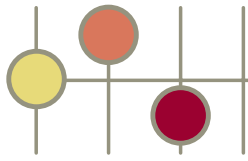

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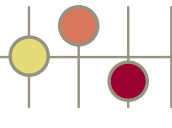

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REPORT 39

Population tobacco control interventions and their effects on social inequalities in smoking

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GLOSSARY AND ABBREVIATIONS

Technical terms and abbreviations are used throughout this report. The meaning is usually clear from the context but a glossary is provided for the non-specialist reader. In some cases usage differs in the literature but the term has a constant meaning throughout the report.

Glossary

Before-and-After study	A study that collects data before and after implementation of an intervention or a policy.
Cigarette demand	Quantity of cigarettes consumed by smokers.
Cross sectional / longitudinal samples	A study using cross-sectional samples, surveys different participants at one time point or over time. A study using longitudinal samples, surveys the same participants at different time points.
Differential effects	Defined as effects which varied between individuals or groups with different socio-demographic or socio-economic characteristics.
Downstream interventions	Interventions to change adverse health behaviours.
Econometric analysis	The application of mathematical and statistical techniques to economic problems.
Grey literature	Literature which is not published in mainstream academic journals.
Narrative synthesis	Findings synthesised using narrative methods as opposed to meta-analysis which uses statistical techniques to produce a summary statistic.
Negative social gradient	Evidence that women/girls, minority/disadvantaged group(s) in terms of race/ethnicity, lower occupational groups, those with a lower level of educational attainment, the less affluent, those living in more deprived areas, or younger “higher” risk populations are more responsive to the intervention.
Population tobacco control intervention	An intervention applied to a population, group, area, jurisdiction or institution with the aim of changing the social, physical, economic or legislative environment to make them less conducive to smoking.
Positive social gradient	Evidence that men/boys, majority/advantaged groups in terms of race/ethnicity, higher occupational groups, those with a higher level of educational attainment, the more affluent, or those who live in more affluent areas are more responsive to the intervention.
Post-intervention study	A study that assesses outcomes after an intervention only.
Price elasticity	A measure of the degree of responsiveness of one variable to changes in another. For example, the price elasticity of demand is the degree of responsiveness of the quantity demanded of a good to changes in its price. Numerically it is given by the proportionate change in the dependent variable (e.g. quantity demanded) divided by the proportionate change in the independent variable (e.g. price). The resulting elasticity is therefore a pure number, independent of units.
Qualitative study	A study using methods such as participant observation or case studies which result in a narrative, descriptive account of a setting or practice.
Socio-demographic factor	Used as an overarching term in this report to encompass both socio-economic characteristics of individuals (such as income, education or occupation) and demographic characteristics (such as age, sex and ethnic origin).
Socio-economic group or status (SES)	Used as a summary term in this report to refer to a person’s position in the social and economic structure of society. For practical purposes, social *status* in a society tends to be measured by one’s place on an occupational, educational or income ladder (relative income). Socio-economic *circumstances,* on the other hand, are indicated by absolute measures such as income or ownership of

	material assets (e.g. cars, houses, computers).[1] The studies in this review use measures of status or circumstances or a mixture of both, in ways that are not always coherent.
Systematic review	A transparent approach to synthesising the literature to address a well-defined question. Detailed inclusion and exclusion criteria are used to select studies for the review, study quality is assessed, and results are synthesised either using meta-analysis or narrative synthesis.
Upstream interventions	Upstream interventions target the circumstances that produce adverse health behaviours

List of abbreviations

CBT	Cognitive Behavioural Therapy
CI	Confidence Interval
CRCT	Cluster randomised controlled trial in which groups of participants are assigned randomly to intervention or control (or no) intervention according to their membership of a cluster e.g. school, workplace, community.
ETS	Environmental Tobacco Smoke
NA	Not Applicable
NR	Not Reported
PCC	Per Capita Consumption
PROGRESS[2] criteria	Place of residence, Religion, Occupation, Gender, Race / ethnicity, Education, Socio-economic status (income or composite measures), Social networks and capital.
OR	Odds Ratio
RR	Relative Risk
RCT	Randomised controlled trial in which participants are assigned randomly to intervention or control (or no) intervention.
SES	Socio-economic status (see glossary entry above).
SHS	Second-hand Smoke

EXECUTIVE SUMMARY

Background

Reducing social inequalities in smoking and its health consequences is a public-health and political priority: the Department of Health has a specific target to reduce the prevalence of smoking in 'manual groups' from 32% to 26% by 2015. Although the extent and causes of health inequalities have been extensively researched, we know remarkably little about the actual effects of measures to reduce such inequalities in general or about the differential impacts of tobacco control measures in particular. It is possible that a strategy which successfully reduces smoking in the population overall might widen inequalities if its benefits are concentrated among the better-off.

Aims

The overall aims of this project were:

- To synthesise the best available evidence about the differential effects of population tobacco control interventions on groups with different socio-demographic characteristics
- To assess which interventions are likely to be effective in reducing smoking-related health inequalities and to identify reasons why other interventions may be ineffective, attempting to answer the questions: What works? What might work? For whom? In what contexts?
- To extend systematic review methods by integrating existing, related systematic reviews and the primary studies included in those reviews into a new systematic review, taking a broad view of the types of evidence which are available in seeking to answer a policy-relevant question, and
- To identify where evidence is lacking and to suggest areas where further primary or secondary research is required.

The project comprised two parts. Part 1 is a review of existing systematic reviews and Part 2 is a new systematic review of primary studies.

Scope

For the purposes of this project, we defined population tobacco control interventions as those applied to populations, groups, areas, jurisdictions or institutions with the aim of changing the social, physical, economic or legislative environment to make them less conducive to smoking. These are approaches that mainly rely on state or institutional control, either of a link in the supply chain or of smokers' behaviour in the presence of others, for example

- Removing subsidies on tobacco production
- Tobacco crop substitution or diversification
- Restricting trade in tobacco products
- Measures to prevent smuggling
- Measures to reduce illicit cross-border shopping
- Restricting advertising of tobacco products
- (Enforcing) restrictions on selling tobacco products to minors
- Mandatory health warning labels on tobacco products
- Increasing the price of tobacco products
- Restricting access to cigarette vending machines
- Restricting smoking in the workplace
- Restricting smoking in public places.

Such approaches could also form part of wider, multifaceted interventions in schools, workplaces or communities. We did not include interventions whose main aim was to strengthen the capacity of individuals to stop smoking or to resist taking up smoking, even if

these interventions were applied to whole groups or populations (e.g. mass media campaigns) as these are approaches that mainly rely on individuals engaging voluntarily with measures intended to help them.

Methods

Part 1 - A review of existing systematic reviews

Electronic databases and library catalogues, bibliographies and reference lists were searched for systematic reviews of the effects of population tobacco control interventions which reported either socio-demographic characteristics (e.g. gender, race, ethnicity, religion, or age in the case of adolescents or young adults) or markers of socio-economic status (e.g. income, occupation, education, area of residence or area-based indices of deprivation) for the participants in any of their included primary studies The quality of reviews meeting the inclusion criteria was assessed and data were synthesised using narrative methods.

Part 2 - A systematic review of primary studies

In addition to the primary studies identified through the review of existing systematic reviews, electronic databases, reference lists, conference abstracts, and electronic tables of contents were searched for evaluations of population tobacco control interventions that reported socio-demographic data for the participants. Studies were grouped by category of intervention and the socio-demographic characteristics by the intervention effects that were stratified. Data were explored and synthesised using narrative and graphical methods. We devised a novel graphical method for this purpose: a matrix whereby the balance of available evidence to support each of three competing hypotheses was compared (null hypothesis of no social gradient in the effectiveness of the intervention, and two alternative hypotheses of a negative or positive social gradient in effectiveness). Study design, methodological quality and outcomes assessed in each study were taken into account.

Results

Part 1 – A review of existing systematic reviews

We identified 19 systematic reviews which met the inclusion criteria. Between them, these reviews included the results of 581 unique primary studies. Some population tobacco control interventions were found to be effective at reducing smoking rates in the population as a whole, but only three systematic reviews had explicitly aimed to examine the differential effects of population tobacco control interventions. We found tentative evidence that the effect of increasing the unit price of tobacco may vary between ethnic and socio-economic groups and between men and women.

Part 2 – A systematic review of primary studies

We identified 84 primary studies, which met the inclusion criteria. These studies evaluated the effects of a variety of different types of intervention:

Restrictions on smoking in workplaces and public places - overall, there is no strong evidence that restrictions in workplaces and public places are more effective in reducing smoking in more advantaged groups, although attitudes may be more favourably affected among better-educated smokers and those in higher occupational grades.

Restrictions on smoking in schools, and restrictions on sales of tobacco to minors - we found evidence from single studies that smoking restrictions in schools are more effective in girls and in younger school children, but no evidence with respect to other social gradients, although this is mainly due to an absence of evidence, as few studies reported effects stratified by socioeconomic status. There is more and better-quality evidence on the differential effects of restrictions on sales to minors: restrictions seem to be more effective in girls and in younger schoolchildren. One study found restrictions on sales to minors to be more effective in white than non-white groups. We found no evidence with respect to other social gradients.

Health warnings on tobacco products, and restrictions on tobacco advertising - the small number of studies (and the lack of methodologically robust studies) evaluating these interventions make firm conclusions difficult to draw. The effects of *health warnings* do not appear to be subject to a social gradient, but their effects have not been examined with respect to income, occupation, or ethnicity, and the evidence with respect to other gradients is not convincing. The effects of *advertising bans* do not show a gradient by gender or age, but the evidence is not strong, and other social gradients have not been examined in primary studies.

The effects of tobacco pricing in adults and adolescents - there is consistent evidence that increasing the price of tobacco is more effective in reducing smoking in lower-income adults. The evidence is also consistent with greater effectiveness among smokers in manual occupations. Higher-educated smokers may also be more responsive to price. The evidence with respect to other variables (gender, ethnicity, age) is less consistent, and can perhaps best be interpreted as "no evidence of differential effects". Although there are fewer studies of the effects of pricing in children, it appears that boys, non-white children, and perhaps also older children may be more price-sensitive. We found no evidence in relation to differential effects on children by income group.

Implications for policy

These findings carry several implications for policy. One is that, the most compelling evidence of a negative (desirable) social gradient in effectiveness is for the price of tobacco products. Increasing the price of tobacco is the population-level intervention for which there is strongest evidence as a measure for reducing smoking-related inequalities in health.

However, effects of increasing tobacco taxation may be undermined by tax evasion or tax avoidance measures such as smuggling and cross-border shopping. The Acheson Inquiry and other commentators have also raised concern about the long-term effect of price rises on disadvantaged households, where smokers are more likely to be nicotine dependent and for whom living in hardship is the primary deterrent to quitting. The policy steer on this point is that extra measures to support cessation among low-income households would be needed, alongside any intensification of pricing policy.

Nonetheless, there is certainly more consistent evidence to support increasing the price of tobacco products as a means of reducing social inequalities in smoking than for other more visible interventions, such as health warnings and advertising restrictions, where differential effects appear under-explored. It should also be noted that although interventions such as health warnings and advertising restrictions may not in themselves impact upon inequalities, they may be important as part of a wider tobacco control strategy if they help to elicit public support for other measures.

In children and young people, restrictions on sales may be effective in deterring younger smokers, though their effectiveness depends on enforcement. Un-enforced voluntary agreements with retailers are less effective in reducing sales. Pricing may be less effective among younger children, perhaps because they obtain cigarettes from non-commercial sources. Among this group, restrictions in schools (which affect consumption) and health warnings (which affect attitudes to smoking) may be more productive. Appropriately-enforced restrictions on sales to minors may offer the greatest promise as part of a strategy for tackling inequalities. While combinations of interventions are also likely to be an important part of the policy armoury, the differential effects of such combinations largely remains an area for further research, though they may hold promise for reducing smoking initiation in young people.

Aside from identifying interventions which are effective in reducing inequalities, it is also important to identify measures which have the potential to increase inequalities. Here the message from our review is encouraging, as there was little evidence that the interventions we examined had adverse effects in this regard. One possible exception was restrictions on smoking in the workplace, which may be more effective among higher occupational grades and among staff with higher levels of educational attainment. This suggests that the

implementation of such policies should be accompanied by measures to mitigate adverse effects on inequalities, such as measures to support adherence across all occupational grades. The potential for workplace restrictions is therefore dependent on their effective implementation in blue-collar settings. This supports the case for legislating for mandatory workplace bans, rather than relying on willing employers to introduce voluntary bans.

Implications for research

We currently know little about the differential effects of the following interventions stratified by income group:

- Health warnings on tobacco products
- Restrictions on tobacco advertising
- Multi-component interventions
- Restrictions on smoking in schools
- Restrictions on sales of tobacco to minors.

With respect to the pricing of tobacco products, a relatively well-researched field, we need to know more about:

- The effects of price increases on adolescents from lower-income households, and on adolescents and young people in general compared to adults; and
- The effects of price increases on lower-income adults, who are more likely to be dependent on nicotine.

Other aspects of the social gradient are under-represented in the evidence-base, in particular;

- The differential effects of most interventions by ethnicity; and
- The differential effects between boys and girls in school restrictions, health warnings, advertising restrictions and pricing.

Further primary research is indicated in each of these areas. Perhaps most important to note is that most of the existing evidence derives from the US. The greatest research priority should therefore be to develop relevant interventions for other country contexts with a focus on behavioural outcomes. The introduction of new population-level tobacco control policies - such as the restrictions on smoking in public places now introduced in all the countries of the UK and elsewhere – provides such an opportunity.

BACKGROUND

1. Introduction

It has been estimated that worldwide in 2000 there were approximately 4.83 million premature deaths (3.84 million in men and 1 million in women) attributable to smoking.[3] These figures represent approximately 1 in 5 premature male deaths and 1 in 20 premature female deaths. The leading causes of death from smoking were cardiovascular disease, chronic obstructive pulmonary disease (COPD) and lung cancer.[3] It is difficult to accurately assess the degree to which these figures underestimate the total mortality burden attributable to tobacco use, as in many countries cigarette smoking is only a small part of tobacco use, and comparable data on chewing tobacco and snuff use are not available.[4] Data from the World Health Organisation (WHO) highlight the global disparity in tobacco use, with the prevalence of adult smoking varying from 69% in Indonesia to 6% in Cambodia for men, and from 44% in Guinea to less than 1% in Oman for women.[5] However, further work indicates the approximate distribution of mortality attributable to smoking was 2.42 million deaths in developing countries and 2.43 million in industrialised countries.[3] Therefore, due to shifting global smoking patterns, with an estimated 930 million of the world's 1.1 billion smokers living in low-income and middle-income countries, the global burden of mortality attributable to tobacco use is set to rise in the next decades.[6]

Within the United Kingdom (UK) the adult smoking prevalence of 26% (27% for men and 25% for women)[7] is just below the average for the European Union (EU) (29%) and for Europe as a whole (30%).[4] The decline in smoking prevalence noted in the UK since the early 1990's has however been considerably less than that achieved in other European countries such as Denmark, Greece, Sweden, France and Iceland.[4] The importance of smoking as a public health priority has been highlighted in a number of key UK policy and strategy documents including the Independent Inquiry into Inequalities in Health Report (Acheson Report),[8] Smoking Kills,[9] Saving Lives: Our Healthier Nation,[10] the NHS Cancer Plan,[11] the National Service Framework for Coronary Heart Disease,[12] and Choosing Health: Making Healthier Choices Easier.[13] On a global scale tobacco control is also a priority public health issue, with Member States of the WHO adhering to the WHO Framework Convention on Tobacco Control,[14] which addresses tobacco taxation, smoking prevention and treatment, illicit trade, advertising, sponsorship and promotion, and product regulation.

In countries in the mature phase of the smoking epidemic,[15] smoking is persistently associated with social disadvantage. The socioeconomic gradient in smoking, namely the increasing prevalence of smoking with decreasing socio-economic status (SES), has been reasonably stable during the last decade of the 20th century in Northern Europe despite overall decreases in smoking prevalence at the population level.[16] A report that examined the distribution of socio-economic inequalities in smoking across the EU highlighted the fact that inequalities in smoking for men were large, in most member states. However, the inequalities were slightly larger in some countries than others, e.g. the UK, whilst smaller inequalities were observed in both Italy and Spain.[16] The patterns of inequalities in smoking among women differed somewhat from that observed for men. Smoking was more common among women of lower SES in the northern part of the EU, but either no gradient or a reverse social gradient in smoking was observed in the southern states, such as southern Italy, Greece and Portugal.[16] However, as southern European countries are presently at an earlier phase of the smoking epidemic trajectory compared to northern European countries, it is likely that smoking will become associated with lower SES among women in southern member states in the next decades.[17] Within the UK the social gradient in smoking was exemplified by the results of the 2002 General Household Survey (GHS). This indicated that overall 19% of managerial and professional workers reported smoking, compared with 26% of semi-skilled manual workers and 32% of unskilled manual workers. In all socio-economic strata smoking prevalence amongst men was approximately 2% higher than among women.[7] However, whilst these figures highlight the social gradient in smoking prevalence, they also disguise the very high prevalence rates amongst the most socio-economically deprived groups, such as lone mothers, among whom prevalence rates can reach over 70%.[18] Reducing health related

inequalities in smoking has therefore become not only a public health priority issue, but also a political one.[11]

The socio-economic patterning of smoking prevalence reflects differences in both the uptake of smoking and cessation rates. It is widely acknowledged that decisions to smoke are made within a broad social context, and there is evidence that poor socio-economic conditions can influence smoking across the individual's lifetime through a wide variety of factors.[19] Not only are adolescents from lower socio-economic groups more likely to initiate smoking, but they are also more likely to become regular smokers and to continue to smoke or relapse than those from higher socio-economic groups.[20] Various different measures of socio-economic status, such as educational level and area-level deprivation indices, have also been found to independently predict smoking status.[21] Specifically within the UK the association between SES and smoking status was highlighted by the findings from recent evaluations of NHS smoking cessation services that indicated that whilst services were generally managing to reach smokers in lower socio-economic groups (as defined by a quit date being set), those categorised as relatively disadvantaged socio-economically had significantly lower cessation rates than those in higher socio-economic strata.[22, 23] These findings were consistent with those of the Acheson Report on Inequalities and Health which also warned that "a well intended policy which improves average health may have no effect on inequalities, and it may even widen them by having a greater impact on the better off".[8] It is therefore essential that interventions to prevent the uptake of smoking, or to promote smoking cessation, are effective in disadvantaged groups and do not contribute to a continuing widening of inequalities in smoking prevalence and tobacco-related ill-health and death.

According to a report for the European Union Network on Interventions to Reduce Social Inequalities in Health, there is "a large body of scientific evidence on the effectiveness of different tobacco control measures. However, the differential impact of these measures among different socio-economic groups has not been assessed systematically".[19] Well conducted systematic reviews are increasingly seen as the most robust source of evidence on the effectiveness of public health interventions.[24] They also have the potential to identify areas where further research is needed, and to inform the most appropriate ways of conducting the research. A report by the Health Development Agency (HDA) assessed the strength of the evidence from systematic reviews on interventions to increase smoking cessation and prevent the further uptake of smoking.[25] Whilst a further explicit aim of the report was to assess the effects of interventions on health inequalities, the authors concluded that "none of the reviews explicitly addressed the issue of inequalities in their analyses, particularly with respect to smoking interventions that have a greater impact on lower rather than higher socio-economic groups. Consequently, there is a need to re-analyse the studies included in present systematic reviews and meta-analyses with the aim of including disadvantaged groups and assessing the differential impacts".[25]

We conducted a pilot study[24] where findings concurred with those of the HDA report.[25] For this pilot study, the Cochrane Library (2002/4) was searched and four completed systematic reviews that had assessed either partly or wholly tobacco control interventions applied to populations or communities were identified.[26-29] In three of the four reviews no evidence was found of any intention to consider the social distribution of effects, and no attempt had been made to stratify summary estimates by any socio-demographic variable.[26, 28, 29] However, when the primary studies included in one of the three reviews[26] were read, it became clear that socio-demographic data about the participants had been collected, but this had not been used within the studies to compare intervention effects between social groups.[26]

The results of the pilot study[24] also identified considerable potential for using primary studies included in existing systematic reviews to address the question of intervention effects on smoking related health inequalities, even though this was not the original focus of the primary studies or the systematic reviews.

There is no established method for using existing systematic reviews, and the primary studies cited in them, as the main source for a new systematic review aiming to answer a different but related question. At the present time, many of the methodological issues in systematic

reviewing are still being explored,[30] including how to use research which has traditionally been excluded from reviews of effectiveness, such as qualitative studies.[31]
This project sought to pilot, develop and demonstrate a method which could synthesise the evidence on effective interventions to reduce smoking-related health inequalities, but would also be applicable to interventions to reduce inequalities in other areas of health.

2. Overall aims

The overall aims of this project were threefold:

- To assess whether there are differential effects of population tobacco control interventions on groups with different socio-demographic characteristics.

- To assess which interventions are likely to be effective in reducing smoking-related health inequalities, and to identify reasons why other interventions may be ineffective, and attempt to answer the questions of: What works? What might work? For whom? In what contexts?"

- To extend systematic review methods by integrating existing, related systematic reviews, and the data from the primary studies included in them into a new review taking a broad view of the types of evidence which are available in seeking to answer a policy relevant question.

The following questions were addressed:

1. What is the evidence that particular tobacco control interventions are, or are not, effective in different social groups?
2. What is the evidence that the effects of different interventions vary according to the context or temporal period?
3. Which social groups are likely to incur relative health advantage or disadvantage from particular tobacco control interventions?
4. Which tobacco control interventions are likely to increase or reduce inequalities in health related to smoking?
5. If evidence is lacking, what further primary or secondary research is required to answer these questions?

3. Overall structure of the project

The project comprised an overview of existing systematic reviews, followed by the conduct of a new systematic review. The aim of both reviews was to address the differential effects of population tobacco control interventions on participants with different socio-demographic characteristics. The project was conducted in phases, with the results from each phase being used to inform and guide the precise methods used in the following phase. The project was also conducted in an iterative way, whereby if the research question(s) had been adequately addressed in a previous phase, further research was not to be conducted unless necessary. Detailed methods for each phase are described in the appropriate sections. The project was separated into three phases (or parts) as follows:

Part 1 - A review of existing systematic reviews

- An overview of systematic reviews that had assessed 'population' level tobacco control interventions, and had reported socio-demographic data for the participants included.

Part 2 - A new systematic review of primary studies

- In light of the findings in Part 1, a new systematic review was conducted with the aim of assessing the differential effects of population tobacco control

interventions. This review used the primary studies identified in Part 1 together with those identified using a new search strategy.

- Any qualitative studies which had a corresponding quantitative evaluation, were integrated into the new systematic review to further expand the evidence base.

- Where socio-demographic information was gathered, and with the author's permission, we hoped to obtain original data and conduct new analyses of the original data-sets. The findings of these new analyses would be added to the review and synthesised.

The following sections of this report provide a comprehensive review of the evidence of the differential effects of population tobacco control interventions on groups with different socio-demographic characteristics.

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POPULATION TOBACCO CONTROL INTERVENTIONS AND THEIR EFFECTS ON SOCIAL INEQUALITIES IN SMOKING: PART 1 - A REVIEW OF SYSTEMATIC REVIEWS

1. Introduction

Reducing social inequalities in smoking and its health consequences is now a public health[1] and political priority:[2] the Department of Health has a specific target to reduce the prevalence of smoking in 'manual groups' from 32% to 26% by 2015.[3] Although the extent and causes of health inequalities have been extensively researched, we know remarkably little about the actual effects of measures to reduce such inequalities.[4, 5] It is possible that a strategy which successfully reduced smoking in the population overall might widen inequalities if its benefits were concentrated among the better-off.

2. Background and aims

In countries with a mature smoking epidemic, smoking is persistently associated with social disadvantage. In 2004, for example, 32% of men and 30% of women in routine and manual occupations in Britain smoked compared with 20% and 17% of their respective professional counterparts.[6]

We now have a wealth of evidence about the effectiveness of measures to reduce smoking. However, many of these involve services targeted on the individual - an approach to promoting health which some sections of the population are more likely to take up or successfully engage with than others.[7] For example, a recent evaluation of NHS smoking cessation services has shown that although services successfully reached smokers in the lowest socio-economic group, the quit rate for these smokers was only half that achieved in the highest socio-economic group.[8, 9] It may therefore be particularly important to address the macro-level or 'upstream' determinants of smoking as well, since intervening at this level may have greater potential to influence larger numbers of people and reduce the 'smoking gap'.

Well-conducted systematic reviews are increasingly seen as the most robust source of evidence about the effects of interventions and should, in principle, be able to inform policy decisions about how best to tackle inequalities related to smoking. However, the lack of evidence from systematic reviews to inform the landmark 1998 Acheson report on health inequalities in general[10] was noted in the BMJ soon after its publication,[11] and our own pilot study[12] and a Health Development Agency report[13] both found little review-level evidence of the effects of interventions on inequalities in smoking in particular. As the first stage of a larger project to address this problem, we systematically reviewed the evidence available from existing systematic reviews about the effects of tobacco control interventions on social inequalities in smoking.

3. Methods

We searched electronic databases and library catalogues, bibliographies and reference lists for systematic and 'borderline systematic' reviews (see box 1) of the effects of any type of intervention to prevent or reduce smoking, access to tobacco products or exposure to environmental tobacco smoke. The search strategy and terms are provided in Appendix 1. From these, we selected reviews of the effects of population tobacco control interventions (see box 2) which had reported characteristics of the participants in at least some of the included primary studies. We were interested in any of the following characteristics: socio-demographic (gender, race or ethnicity, socio-economic status (occupation, educational level or income)), religion, place of residence or area-level index of deprivation. We also included age if the intervention targeted vulnerable age groups such as adolescents or young adults. We searched for, appraised and synthesised evidence from these reviews in accordance with the criteria used for the Database of Abstracts of Reviews of Effects (DARE)[14] and the more general guidelines of the Centre for Reviews and Dissemination.[15]

Box 1
How systematic does a systematic review have to be?

To be included, reviews had to meet the two mandatory criteria for admission to the Database of Abstracts of Reviews of Effects (DARE):[14] they had to address a clearly defined question, and the authors had to have made an effort to identify all relevant literature by searching at least one named database combined with either checking references, hand-searching, citation searching, or contacting authors in the field. We defined reviews as 'systematic' if at least two components (interventions, participants, outcomes, or study designs) of the review question were explicitly defined, and the search criteria were fulfilled. 'Borderline systematic review' was applied if two or more components of the review question could be inferred from the title or text and the search criteria were fulfilled.

Box 2
What is a population tobacco control intervention?

We defined population tobacco control interventions as those applied to populations, groups, areas, jurisdictions or institutions with the aim of changing the social, physical, economic or legislative environment to make them less conducive to smoking. These are approaches that mainly rely on state or institutional control, either of a link in the supply chain or of smokers' behaviour in the presence of others, for example:

- Tobacco crop substitution or diversification
- Removing subsidies on tobacco production
- Restricting trade in tobacco products
- Measures to prevent smuggling
- Measures to reduce illicit cross-border shopping
- Restricting advertising of tobacco products
- (Enforcing) restrictions on selling tobacco products to minors
- Mandatory health warning labels on tobacco products
- Increasing the price of tobacco products
- Restricting access to cigarette vending machines
- Restricting smoking in the workplace
- Restricting smoking in public places

Such approaches could also form part of wider, multifaceted interventions in schools, workplaces or communities.

We did not include interventions whose main aim was to strengthen the capacity of individuals to stop smoking or to resist taking up smoking, even if these interventions were applied to whole groups or populations (e.g. mass media campaigns). These are approaches that mainly rely on individuals engaging voluntarily with measures intended to help them.

4. Results

4.1 Quantity and quality of evidence

We found 176 systematic and 'borderline systematic' reviews of the effects of interventions on smoking, access to tobacco products or exposure to environmental tobacco smoke. Of these, only 25 (14%) addressed the effects of population tobacco control interventions. Nineteen of these reviews, ranging in quality (Figure 1) from four 'borderline' reviews to four high-quality Cochrane reviews, reported socio-demographic data of some kind and were included (Table 1 and Appendix 2).[16-34]

These reviews included the results of 581 unique primary studies of population level, individual level and combined interventions. A map of the primary studies included in the reviews is provided in Appendix 3. Out of these 581 primary studies, 82 had been included in more than one review. No one study was included in more then five reviews, with the majority of the 82 studies included in two reviews. It is important to note that duplicate inclusion of any one study in the evidence base can distort the perceived significance of these individual studies.

Some reviews focused on a specific type of intervention, others had a broader focus on community-based interventions in general, or reducing exposure to environmental tobacco smoke. Only a few reviews (3/19) had explicitly set out to assess how the effects of interventions varied between socio-demographic groups, but most of the others (14/19) were focused on specific at-risk socio-demographic groups or reported that some of their included primary studies had such a focus.

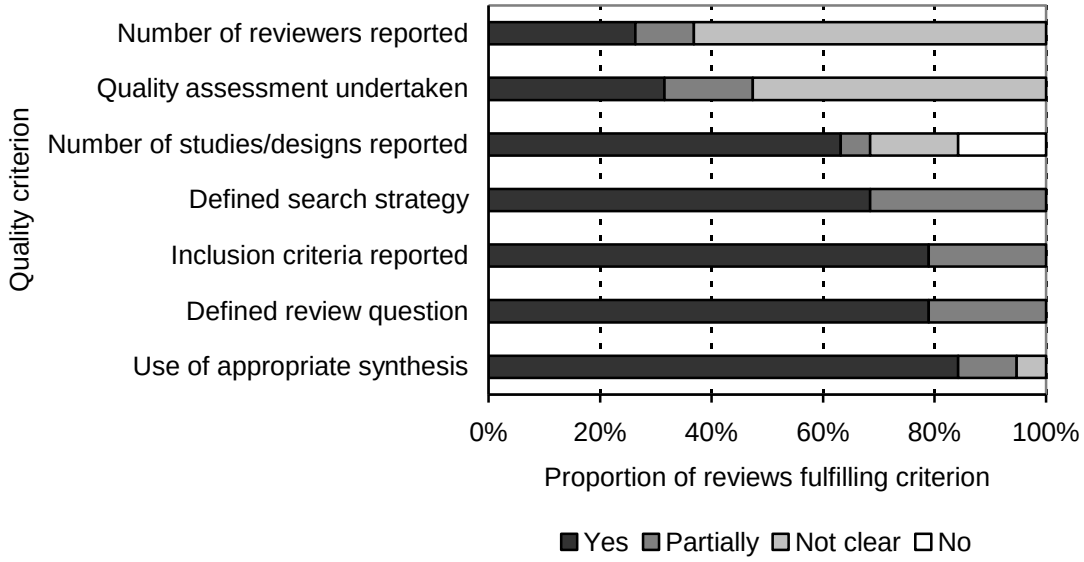

Figure 1 Quality assessment of included reviews

4.2 Findings of reviews

Across the 19 included reviews, we found evidence about the effects of three types of population tobacco control intervention. Full data extraction tables are provided in Appendix 5.

4.2.1 Increasing the price of tobacco products

We found two reviews, both dealing specifically with young people, one based exclusively on US data[20] and from the UK.[28] The US review found evidence that higher prices for tobacco products were associated with lower overall levels of smoking uptake and tobacco consumption by both adolescents and young adults. Four primary studies in this review included stratified analyses showing differential effects by ethnic group or gender. Two of these studies provided tentative evidence that young black Americans were more responsive to price than their white counterparts overall.[35, 36] The review also concluded that males were more responsive to price than females.[35-38] In contrast, the UK data showed that females in all socio-economic groups were more responsive to price than their male counterparts.[39] In the lowest socio-economic group, however, smoking prevalence in both males and females was significantly associated with price.

4.2.2 Restricting young people's access to tobacco products

We found six reviews dealing with education, law enforcement, community mobilisation, or combinations of these approaches to deter retailers from selling tobacco to minors or allowing them access to vending machines.[16-19, 28, 30] These reviews found that enforced controls on retailers could reduce illegal under-age sales, but evidence of any effect on actual smoking behaviour was equivocal both within and between reviews.[16-19, 28, 30] The majority of voluntary agreements with retailers had no effect even on sales. Although five reviews reported differences in the age, gender or ethnicity of participants between studies,[16, 18, 19, 28, 30] none reported whether the effects of interventions varied according to these individual characteristics. Nor could we deduce from these reviews whether the effects of access controls varied according to area-level socio-economic characteristics.

Table 1. Selected characteristics of included reviews

Review	Scope	Age group	Focus	Full systematic review	Explicit consideration of health inequalities	Discussed differential intervention effects
Levy (2002)[16]	Youth access restrictions	Adolescents	Both	—	—	+
Lund (1999)[17]			Smoking cessation	—	—	—
Stead (2002)[18]			Both	+	—	+
Fichtenberg (2002)[19]			Smoking cessation	+	—	+
Hopkins (2001)[20]	Increasing unit price of tobacco		Smoking cessation	+	—	+
Murphy-Hoefer (2005)[21]	Smoking bans or restrictions		Both	+	—	—
El-Guebaly (2002)[22]		Adults	Smoking cessation	+	—	+
Ivers (2003)[23]			Both	+	—	+
Moher (2003)[b 24]			Smoking cessation	+	—	+
Fichtenberg (2002)[25]			Smoking cessation	+	—	+
Eriksen (1998)[b 26]			Smoking cessation	+	—	—
Sowden (2003)[c 27]	Community-based programmes[a]	Adolescents	Smoking prevention	+	—	+
Stead (1995)[28]			Smoking prevention	—	—	+
Blake (2001)[29]			Smoking prevention	—	+	+
Wakefield (2000)[30]			Both	+	—	+
Friend (2002)[c 31]		Adults	Both	+	—	—
Secker-Walker (2002)[c 32]			Smoking cessation	+	+	+
Roseby (2002)[33]	Reductions in ETS		Both	+	+	+
Serra (2002)[34]			Smoking cessation	+	—	—

*Where reviews covered more than one type of intervention the dominant area determined the classifications; ETS: environmental tobacco smoke; Both: focused on smoking cessation and prevention. [a]Thsese reviews included one or more primary studies that assessed the effects of increasing the unit price of tobacco, youth access restrictions, or smoking bans and restrictions. The overall scope of these reviews concerned multi-component community-based programmes and they therefore could include primary studies of interventions not classified as population-level tobacco control interventions. Results from the primary studies are discussed in the text under the relevant type of intervention; [b]Some primary studies included in the review reported outcomes for reductions in ETS; [c]Outcomes not reported separately for population tobacco control interventions.

4.2.3 Restricting or banning smoking

We found 11 reviews examining the effects of smoking bans or restrictions in a variety of population groups including adolescents, students in higher education, employees, Indigenous Australians, and people being treated for mental illness or substance misuse.[21-26, 28-30, 33, 34] Bans or restrictions were associated with reduced cigarette consumption at work or school,[24-26, 28, 29] but evidence of a reduction in overall consumption was less clear. Two studies indicated more comprehensive policies were associated with lower consumption by students both in and outside school and college.[28] Four reviews examined the effects of bans or restrictions on exposure to environmental tobacco smoke[24, 26, 33, 34] and found significant improvements in nicotine vapour levels, smoke exposure and air quality in both workplaces and public places.[24, 26, 34] Two reviews aimed to produce stratified estimates of effects.[29, 33] One included a primary study with results stratified by gender.[29] This provided tentative evidence that girls were more responsive to school-wide smoking policies than boys.[29] The second review failed to find any differential effects for the population tobacco control interventions.[33] Although a further six reported differences in age, gender, ethnicity or occupational status of participants between studies,[22-25, 28, 30] none reported whether the effects of interventions varied according to these individual characteristics.

5. Discussion

Health professionals, researchers and policymakers alike want to know how social inequalities in health can be reduced.[1, 4] It is assumed that systematic reviews of the effects of interventions might be able to help answer this question. In practice however, when we viewed the findings of existing reviews through the prism of a new research question about reducing inequalities (not necessarily in the minds of the original authors), making sense of the available data was challenging. Nonetheless, we considered it important to try to extract whatever evidence we could, rather than despairingly concluding that there is 'no' evidence.

Most systematic reviews in this field have focused on 'downstream' measures aimed at changing individual smoking behaviour - an illustration of an 'inverse evidence' law whereby we know least about the effects of interventions most likely to influence the health of the largest number of people.[40, 41] Of the few reviews that have examined the effects of 'upstream' tobacco control measures, only three have set out to consider how those effects vary between socio-demographic groups;[29, 32, 33] these reviews only partially achieved that aim with respect to gender[29, 32] or gender and age.[33] Ironically, the best available evidence we found about differential effects came from two reviews that had not explicitly set out to identify differential effects.[20, 28] These reviews offered tentative evidence that the effect of increasing the unit price of tobacco may vary between ethnic,[17, 36] and socio-economic groups[39] and between the sexes,[35-38] although differences in both the context (black populations in the US) and findings (on gender effects) of these reviews make it difficult to know what overall conclusions to draw at this stage. We also found preliminary evidence suggesting effects of school-wide smoking policies may vary between the sexes.[29] However, the supporting evidence was limited and it was not possible to assess how these findings might apply to schools where more stringent tobacco control measures have already been implemented.

We chose to focus on what could be gleaned from existing systematic reviews about the effects of population tobacco control interventions on social inequalities in smoking. From our review of reviews, the evidence suggests a variety of interventions may be effective in influencing a range of smoking related outcomes. But these effects are largely presented as averages across entire populations, and there is no indication as to whether effects vary for different sub-groups. In future, systematic reviewers should consider extracting data about differential effects of interventions as well as overall effects. Although our findings almost certainly reflect the fact that many primary studies - the raw material for a systematic review - have not reported, or sought to establish, how the effects of interventions are distributed between groups.[12] More positively, however, most reviews did suggest that the effects of interventions had been studied in populations with different age, gender, ethnic and/or occupational characteristics. This indicates potential to uncover new insights from existing data by re-examining primary studies through the prism of a new research question about reducing inequalities.

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APPENDIX 1. SEARCH STRATEGY AND TERMS

The following medical databases were searched:

Cochrane Database of Systematic Reviews
National Research Register
Database of Abstracts of Reviews of Effects (DARE) - Administrative and Public databases
Health Technology Assessment (HTA) Database

Endnote library - 'smokecess stage1 medical.enl'
Total number of records (after deduplication) - 2,074

STRATEGIES

Cochrane Database of Systematic Reviews - The Cochrane Library 2004 Issue 4
Date searched: 19 November 2004
Records retrieved:
332 complete reviews
117 protocols

#1. SMOKING single term (MeSH)
#2. SMOKING CESSATION single term (MeSH)
#3. TOBACCO single term (MeSH)
#4. TOBACCO USE DISORDER single term (MeSH)
#5. NICOTINE single term (MeSH)
#6. smoking
#7. (smoker or smokers)
#8. tobacco
#9. cigar*
#10. nicotine
#11. sr-tobacco
#12. (#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11)

National Research Register 2004 Issue 3
Date searched: 19 November 2004
Records retrieved:
NRR Records from Regional and National Research Programmes
Ongoing Projects (1)
Completed Projects (25)
NRR Records from Research Centres
Ongoing Projects (24)
Completed Projects (31)
NRR Records from Research Centres: Lead Centres for Multi-Centre Projects
Completed Projects (1)
NRR Records from Research Centres: Participating Centres for Multi-Centre Projects
Ongoing Projects (5)
Completed Projects (4)
MRC Clinical Trials Directory (3)
CRD Register of Reviews
Ongoing Reviews (1)
Completed Reviews (6)

#1. SMOKING single term (MeSH)
#2. SMOKING CESSATION single term (MeSH)
#3. TOBACCO single term (MeSH)
#4. TOBACCO USE DISORDER single term (MeSH)
#5. NICOTINE single term (MeSH)
#6. smoking

#7. (smoker or smokers)
#8. tobacco
#9. cigar*
#10. nicotine
#11. (#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10)
#12. review*
#13. overview*
#14. (meta-analys* or metanalys* or metaanalys*)
#15. (synthes* near literature*)
#16. (synthes* near research*)
#17. (synthes* near studies)
#18. (synthes* near data)
#19. (pooled next analys*)
#20. ((data near pool*) and studies)
#21. (hand near search*)
#22. (manual* near search*)
#23. (database* near search*)
#24. (computer* near search*)
#25. (electronic* near search*)
#26. (electronic* near database*)
#27. (bibliographic* near database*)
#28. (#12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27)
#29. (#11 and #28)

DARE - CRD Internal Administrative Database
Date searched: 19 November 2004
Records retrieved: 1,486

s smoking
s smoker or smokers
s tobacco
s cigar$
s nicotine
s s1 or s2 or s3 or s4 or s5

DARE - CRD Public Database (on internal software)
Date searched: 19 November 2004
Records retrieved: 255

s smoking$/kwo
s smoking cessation$/kwo
s tobacco$/kwo
s tobacco use disorder$/kwo
s nicotine$/kwo
s smoking
s smoker or smokers
s tobacco
s cigar$
s nicotine
s s1 or s2 or s3 or s4 or s5 or s6 or s7 or s8 or s9 or s10

HTA Database - CRD Public Database (on internal software)
Date searched: 19 November 2004
Records retrieved: 43

s smoking$/kwo
s smoking cessation$/kwo
s tobacco$/kwo
s tobacco use disorder$/kwo

s nicotine$/kwo
s smoking
s smoker or smokers
s tobacco
s cigar$
s nicotine
s s1 or s2 or s3 or s4 or s5 or s6 or s7 or s8 or s9 or s10
s (review or overview)/xsd
s s11 and s12

The following non-medical literature specific sources were searched:

Library catalogues:
JB Morrell Library Catalogue
National Library of Medicine Catalogue
British Library Catalogue

Grey literature databases:
SIGLE

Economics databases:
EconLit
NHS EED

General social science databases:
Criminal Justice Abstracts
PAIS International
International Bibliography of the Social Sciences
Social Science Citation Index
ASSIA
Sociological Abstracts
Social Services Abstracts
British Humanities Index

General science databases:
Science Citation Index

Conference Proceedings:
ISI Proceedings - Science & Technology
ISI Proceedings - Social Sciences & Humanities

SEARCH STRATEGIES

JB Morrell Library Catalogue (University of York library)
30 records retrieved - hand sifted for relevance down to 10 records

smoking or smoker or smokers or tobacco or cigarette or cigarettes or nicotine
AND
review or overview

National Library of Medicine Catalogue
49 records retrieved - hand sifted for relevance down to 15 records

smoking smoker tobacco cigarette nicotine {ANY OF THESE} {TITLE}
AND
review reviews overview overviews {ANY OF THESE} {TITLE}

British Library Catalogue
99 records retrieved - hand sifted for relevance down to 25 records

smoking or smoker or smokers or tobacco or cigarette or cigarettes or nicotine
AND
review? or overview?

SIGLE
Ovid Host - 1980-6/2004
36 records retrieved

EconLit
Ovid Host - 1969-10/2004
131 records retrieved

Criminal Justice Abstracts
Ovid Host - 1968-09/2004
74 records retrieved

PAIS International
Ovid Host - 1972-10/2004
64 records retrieved

#1 smoking or smoker or smokers or tobacco or cigar* or nicotine
#2 (review* or overview*) in ti,ab,de
#3 meta-analys* or meta analys* or metanalys* or metaanalys*
#4 synthes* near (literature* or research* or studies or data)
#5 pool* analys*
#6 (data near pool*) and studies
#7 (hand or manual* or database* or computer* or electronic*) near search*
#8 (electronic* or bibliographic*) near database*
#9 systematic*
#10 #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9
#11 #1 and #10
#12 #11 not (book review)

British Education Index
Dialog Host - 1976-09/2004
12 records retrieved

Australian Education Index
Dialog Host - 1976-09/2004
16 records retrieved

s1 smoking or smoker or smokers or tobacco or cigar? or nicotine
s2 review? or overview?
s3 meta-analys? or meta analys? or metanalys? or metaanalys?
s4 synthes? ….. (literature or research? or studies or data)
s5 pool? analys?
s6 (data ….. pool?) and studies
s6 (hand or manual? or database? or computer? or electronic?) ….. search?
s8 (electronic? or bibliographic?) ….. database?
s9 systematic?
s10 s2 or s3 or s4 or s5 or s6 or s7 or s8 or s9
s11 s1 and s10

International Bibliography of the Social Sciences
BIDS Host - 1951-11/2004
47 records retrieved

(smoking or smoker or smokers or tobacco or cigar* or nicotine) and (review* or overview* or meta-analys* or meta analys* or metanalys* or metaanalys* or (synthes* and (literature* or research* or studies or data)) or pool* analys* or (data and pool* and studies) or ((hand or manual* or database* or computer* or electronic*) and search*) or ((electronic* or bibliographic*) and database*) or systematic*)

Science Citation Index
Web of Knowledge Host 1945-2004
1,942 records retrieved

Social Science Citation Index
Web of Knowledge Host 1945-2004
1,146 records retrieved

ISI Proceedings - Science & Technology
Web of Knowledge Host 1990-2004
219 records retrieved

ISI Proceedings - Social Sciences & Humanities
Web of Knowledge Host 1990-2004
64 records retrieved

TS=(((smoking or smoker or smokers or tobacco or cigar* or nicotine) same (prevent* or stop* or quit* or give or giving or reduc* or promot* or encourag* or uptake or cessation or cease or control* or interven* or influenc*)) and (review* or overview* or meta-analys* or meta analys* or metanalys* or metaanalys* or (synthes* same (literature* or research* or studies or data)) or pool* analys* or ((data and pool*) same studies) or ((hand or manual* or database* or computer* or electronic*) same search*) or ((electronic* or bibliographic*) same database*) or systematic*))

ASSIA
CSA Internet Host 1987-2004
212 records retrieved

Sociological Abstracts
CSA Internet Host 1963-2004
91 records retrieved

Social Services Abstracts
CSA Internet Host 1980-2004
75 records retrieved

British Humanities Index
CSA Internet Host 1962-2004
3 records retrieved

((smoking or smoker or smokers or tobacco or cigar* or nicotine) near (prevent* or stop* or quit* or give or giving or reduc* or promot* or encourag* or uptake or cessation or cease or control* or interven* or influenc*)) and (review* or overview* or meta-analys* or meta analys* or metanalys* or metaanalys* or (synthes* same (literature* or research* or studies or data)) or pool* analys* or ((data and pool*) near studies) or ((hand or manual* or database* or computer* or electronic*) near search*) or ((electronic* or bibliographic*) near database*) or systematic*)

NHS Economic Evaluation Database
Public database (internal software). All years
0 records retrieved

s smoking$/kwo
s smoking cessation$/kwo
s tobacco$/kwo
s tobacco use disorder$/kwo

s nicotine$/kwo
s smoking
s smoker or smokers
s tobacco
s cigar$
s nicotine
s s1 or s2 or s3 or s4 or s5 or s6 or s7 or s8 or s9 or s10
s (review or overview)/xsd
s s11 and s12

Business Source Premier
EBSCO Host 1965-2004
169 records found - hand sifted for relevance down to 10 records

(smoking or smoker or smokers or tobacco or cigar* or nicotine) {in title or abstract fields}
and
(prevent* or stop* or quit* or give or giving or reduc* or promot* or encourag* or uptake or cessation or cease or control* or interven* or influenc*) {in title or abstract fields}
and
(review or overview) {in title or abstract fields}

Reuters Business Insights
http://www.reutersbusinessinsight.com/. All years
0 records found

smoking or smoker or smokers or tobacco or cigar* or nicotine

Emerald Fulltext
http://miranda.emeraldinsight.com/. All years
2 records found

(smoking* or smoker* or smokers* or tobacco* or cigar* or nicotine*) and (review* or overview*)

CAB Abstracts
Ovid host 1973-November 2004
223 records retrieved - hand sifted for relevance down to 37 records

#1 smoking or smoker or smokers or tobacco or cigar$ or nicotine
#2 prevent$ or stop$ or quit$ or giv$ or reduc$ or promot$ or encourag$ or uptake or cessation or cease or control$ or interven$ or influenc$
#3 (review$ or overview$).ti,ab.
#4 meta-analys$ or meta analys$ or metanalys$ or metaanalys$
#5 synthes$ adj4 (literature$ or research$ or studies or data)
#6 pool$ analys$
#7 (data near pool$) and studies
#8 (hand or manual$ or database$ or computer$ or electronic$) adj4 search$
#9 (electronic$ or bibliographic$) adj4 database$
#10 systematic$
#11 1 adj4 2
#12 or/3-10
#13 11 and 12

APPENDIX 2. QUALITY ASSESSMENT OF THE NINETEEN REVIEWS INCLUDED IN THE REVIEW OF REVIEWS

Study details	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]
Interventions assessed	Youth access restrictions				Tax increases	Smoking bans / restrictions						Community-based programmes						Reductions in ETS	
Participants	Adolescents						Adults					Adolescents				Adults			
Is there a well defined question?	+	+	++	++	++	++	++	++	++	++	++	++	+	+	++	++	++	++	++
Is there a defined search strategy?	++	++	++	++	++	++	++	++	++	+	+	++	+	+	+	+	++	++	++
Are inclusion / exclusion criteria stated?	+	+	++	++	++	++	++	++	++	++	++	++	+	+	++	++	++	++	++
Are study designs and number of studies clearly stated?	?	?	++	++	++	++	-	++	++	++	++	++	-	+	?	-	++	++	++
Have the primary studies been quality assessed?	-	-	-	-	?	++	-	+	++	-	+	++	-	-	-	-	++	++	+
Have the studies been appropriately synthesised?	++	?	++	++	++	++	++	+	++	++	++	++	+	++	++	++	++	++	++
Has more than one author been involved at each stage of the review process?	?	?	++	?	+	?	?	?	++	?	?	++	?	?	?	?	++	+	++

Key: ++ yes; + partial; - no; ? unclear

APPENDIX 3. PRIMARY STUDIES INCLUDED IN THE NINETEEN SYSTEMATIC REVIEWS

Interventions Assessed	Youth Access Restrictions				Tax increase	Smoking bans / restrictions						Community-based programmes						Reductions in ETS		
Participants	Adolescents					Adolescents	Adults					Adolescents				Adults				
Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Abernathy (1994)[42]			●																	1
Abernathy (1995)[43]		●										●								2
Abt Associates Inc.(1997)[44]															●				`	1
Abt Associates (1998)[44]																●				1
Aguirre-Molina (1995)[45]												●								1
Alciati (1998)[46]		●																		1
Altman (1989)[47]	●		●																	2
Altman (1992)[48]		●																		1
Altman (1991)[49]	●		●																	2
Altman (1999)[50]	●	●	●	●																4
American Non-Smokers' Rights Foundation (1999)[51]		●																		1
Anantha (1995)[52]																	●			1
Andrews (1983)[53]									●		●									2
Apel (1997)[54]						●														1
Arday (1990)[55]														●						1
Arday (1997)[56]		●																		1
Arizona Department of Health Services (1997)[57]															●					1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Arizona Department of Health Services. (1998)[58]															●					1
Arkansas: Little Rock citizens access network (1999)[59]		●																		1
Assaf (1989)[60]																	●			1
Bagott (1997)[61]			●																	1
Bagott (1998)[62]			●	●																2
Baile (1991)[63]										●	●									2
Barr Taylor (1991)[64]																	●			1
Bauer (1999)[65]															●					1
Bauer (2000)[66]																●				1
Bauman (1991)[67]																●				1
Bauman (1999)[68]													●							1
Bauman (1999)[69]																	●			1
Baxter (1997)[70]												●					●			2
Baxter (1997)[71]																	●			1
Becker (1989)[72]									●	●	●								●	4
Beede (1992)[73]													●							1
Begay (1997)[74]															●					1
Bertera (1990)[75]											●									1
Best (1995)[76]														●						1
Bialous (1997)[77]																●				1
Bialous (1999)[78]															●	●				2
Biener (1989)[79]									●											1
Biener (1989)[80]											●									1
Biener (1998)[81]															●					1
Biener (1999)[82]									●											1
Biener (1997)[83]															●					1
Biglan (1996)[84]		●	●																	2
Biglan (2000)[85]												●								1
Biglan (1995)[86]	●		●																	2
Blaine (1997)[87]			●																	1
Boley Cruz (1998)[88]															●					1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Borland (1990)[89]									●	●	●									3
Borland (1991)[90]									●	●										2
Bostick (1991)[91]																	●			1
Botvin (1990)[92]														●						1
Brannstrom (1994)[93]																	●			1
Brannstrom (1998)[94]																	●			1
Brannstrom (1993)[95]																	●			1
Brenner (1994)[96]											●									1
Brenner (1992)[97]										●										1
Brigham (1994)[98]										●	●									2
Briton (1997)[99]															●					1
Broder (1993)[100]										●										1
Bronaugh (1990)[101]							●													1
Brownson (1992)[102]																	●			1
Brownson (1996)[103]																	●			1
Bureau (1999a)[104]																●				1
Burling (2000)[105]									●											1
Burling (1989)[106]									●		●									2
California Department of Health Services (1998)[107]															●					1
Cambien (1981)[108]									●											1
Campbell (1997)[109]			●																	1
Campbell (2002)[110]									●											1
Canada's actions for children (1999)[111]		●																		1
Candian Cancer Society (1998)[112]		●																		1
Carleton (1987)[113]																	●			1
Carleton (1995)[114]																	●			1
Catford (1992)[115]																	●			1
Cella (1992)[116]													●							1
Center for the Study of Population (1988)[117]															●					1
Center for the Study of Population (1988)[118]															●					1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	MJurphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Centers for Disease Control and Prevention (1992)[119]																●				1
Centers for Disease Control and Prevention (1999a)[120]																●				1
Centers for Disease Control and Prevention (1999b)[121]																●				1
Centers for Disease Control and Prevention (1993)[122]													●							1
Centers for Disease Control and Prevention (1988)[35]					●															1
Centers for Disease Control and Prevention (1990)[123]										●										1
Chaloupka (1999)[36]					●															1
Chaloupka (1997)[124]					●	●														2
Chapman (1994)[125]		●	●																	2
Charlton (1994)[126]													●							1
Chilmonczyk (1992)[127]																		●		1
Cismoski (1996)[128]		●																		1
Cohen (1997)[129]						●														1
Collins (1993)[130]																	●			1
COMMIT Research group (1991)[131]																	●			1
COMMIT Research group (1995)[132]																	●			1
COMMIT Research group (1995)[133]																	●			1
Centers for Disease Control and Prevention (1996a)[134]																●				1
Cook (1998)[135]			●																	1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	MJurphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Corbett (1990-91)[136]																	●			1
Cummings (1992)[137]	●												●							2
Cummings (2003)[138]			●																	1
Cummings (1997)[139]	●																			1
Cummings (2002)[140]				●																1
Cummings (1998)[141]		●	●																	2
Curry (1989)[142]									●											1
Darmody (1994)[143]						●														1
Daughton (1992)[144]										●	●									2
Davidson (1992)[145]												●								1
Davis (1991)[146]													●							1
Davis (1995)[147]														●						1
Davis (1992)[148]																		●		1
Dawley (1991)[149]									●		●									2
Dawley (#1984)[150]											●									1
Dawley (1985)[151]																			●	1
Dawley (1981)[152]																			●	1
Dawley (1993)[153]											●									1
De Backer (19980[154]									●											1
De Backer (1997)[155]									●											1
Department of health and human services (1994)[156]		●																		1
DiFranza (1992)[157]			●	●																2
DiFranza (1996)[158]		●																		1
DiFranza (1987)[159]	●																			1
DiFranza (1996)[160]		●																		1
Digrusto (1987)[161]											●									1
Dingman (1988)[162]							●													1
Dishion (1995)[163]														●						1
Division of Adolescent and School Health (1999)[164]															●					1
Domenighetti (1991)[165]																	●			1
Dovell (1996)[166]		●	●																	2

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	MJurphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Downey (1998)[167]							●													1
East Lancashire Health Authority (1994)[168]													●							1
Eckstein (1981)[169]																	●			1
Egger (1983)[170]																	●			1
Eisenberg (1999)[171]															●					1
Eisenberg (1998)[172]															●					1
Eiser (1987)[173]														●						1
Elder (1996)[174]															●					1
Elder (1996)[175]																	●			1
Elder (1987)[176]																	●			1
Elder (1996)[177]																		●		1
Elder (1993)[178]													●							1
Emmons (2001)[179]																		●		1
Emmons (1999)[180]									●											1
Emmons (1994)[181]									●											1
Emmons (2000)[182]									●											1
Emmons (2001)[183]																		●		1
Erfurt (1991)[184]									●											1
Erfurt (1991a)[185]									●											1
Eriksen (1996)[186]																		●		1
Etter (1999)[187]						●														1
Farelly (1999)[188]										●										1
Farquhar (1990)[189]																	●			1
Farquhar (1985)[190]																	●			1
Feighery (1991)[191]	●	●	●										●							4
Finnegan (1989)[192]																	●			1
Fischer (1993)[193]													●							1
Fisher (1995)[194]																	●			1
Fisher (1992)[195]																	●			1
Fisher (1998)[196]																	●			1
Flay (1989)[197]									●											1
Flay (1989)[198]													●							1
Flay (1995)[199]																●				1
Flynn (1995)[200]																	●			1
Elder (1993)[178]													●							1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Flynn (1995)[201]														●		●				2
Flynn (1992)[202]													●							1
Florida Department of Health (1999)[203]															●					1
Forster (1992)[204]	●		●																	2
Forster (1992a)[205]	●																			1
Forster (1998)[206]	●	●	●	●																4
Forster (1998)[207]	●																			1
Forster (1997)[208]		●	●																	2
Fortmann (1995)[209]																	●			1
Fortmann (1985)[210]																	●			1
Fortmann (1993)[211]																	●			1
Fortmann (1990)[212]																	●			1
Foster (1996)[213]		●																		1
Frank (1986)[214]									●		●									2
Gans (1994)[215]																	●			1
Gemson (1998)[216]		●	●																	2
Giampaoli (1997)[217]																	●			1
Giampaoli (1991)[218]																	●			1
Givel (1999)[219]															●					1
Glantz (1993)[220]															●					1
Glasgow (1993)[221]									●		●									2
Glasgow (1991)[222]									●		●									2
Glasgow (1984)[223]									●		●									2
Glasgow (1986)[224]									●											1
Glasgow (1994)[225]									●											1
Glasgow (1995)[226]									●											1
Glasgow (1997)[227]										●										1
Glasgow (1990)[228]									●											1
Glasgow (1996)[229]																	●			1
Goldman (1998)[230]																●				1
Goldman (1991a)[231]															●	●				2
Goldsmith (1991)[232]							●													1
Goldstein (1992)[233]											●									1
Gomel (1997)[234]									●											1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Gomel (1993)[235]									●											1
Goodman (1995)[236]																	●			1
Gordon (1997)[237]												●								1
Gottlieb (1990)[238]									●	●	●								●	4
Gottlieb (199)[239]											●									1
Graham (1990)[240]														●						1
Greenberg (1981)[241]						●														1
Greenberg (1994)[242]																		●		1
Gregg (1990)[243]									●											1
Greiser (1998)[244]																	●			1
Greiser (1994)[245]																	●			1
Greiser (1993)[246]																	●			1
Gritz (1988)[247]											●									1
Groner (2000)[248]																		●		1
Gruber (2000)[37]					●															1
Guallar-Castillon (1993)[249]									●											1
Gutzwiller (1981)[250]																	●			1
Gutzwiller (1985)[251]																	●			1
Hafstad (1997)[252]														●						1
Haller (1996)[253]							●													1
Hallet (1987)[254]									●											1
Hancock (2001)[255]												●					●			2
Hancock (1996)[256]																	●			1
Hancock (1996)[257]																	●			1
Hancock (1997)[258]																	●			1
Hantula (1992)[259]											●									1
Harris (1996)[260]															●					1
Harvey (2002)[261]								●												1
Heath (1995)[262]																	●			1
Heinemann (1986)[263]																	●			1
Heinemann (1970)[264]																	●			1
Hellmann (1988)[265]						●														1
Helmert (1989)[266]																	●			1
Helmert (1993)[267]																	●			1
Hennrikus (1995)[268]									●											1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Hennrikus (2002)[269]									●											1
Hinds (1992)[270]		●	●																	2
Hocking (1991)[271]											●									1
Hodges (1999)[272]						●														1
Hoffmeiste (1996)[273]																	●			1
Hogan (1996)[274]															●					1
Horan (1982)[275]														●						1
Hovell (1994)[276]																		●		1
Hovell (2000)[277]																		●		1
Hovell (2000)[278]																		●		1
Howard-Pitney (1998)[279]															●					1
Hu (1995)[280]															●	●				2
Hu(1995)[281]															●	●				2
Hudzinski (1994)[282]										●										1
Hudzinski (1990)[283]									●	●	●									3
Hughes (1991)[284]																		●		1
Hurt (1995)[285]							●													1
Hymowitz (1991)[286]									●		●									2
Illinois Parent Teachers Association (1999)[287]		●																		1
Independent Evaluation Consortium (1998)[288]															●	●				2
Institute for Social Research.(1999)[289]																●				1
Irvine (1999)[290]																		●		1
Jacobs (1986)[291]																	●			1
Jason (1996)[292]		●	●																	2
Jason(1987)[293]									●											1
Jason (1990)[294]											●									1
Jason (1989)[295]									●		●									2
Jason (1995)[296]									●											1
Jason (1997)[297]									●											1
Jason (1999)[298]			●																	1
Jason (1996)[299]	●		●																	2
Jason (1978)[300]																			●	1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Jason (1979)[301]																			●	1
Jason (1987)[302]									●		●									2
Jason (1991)[303]	●	●	●	●									●							5
Jason (1982)[304]																			●	1
Jason (1978)[305]																			●	1
Jason (2003)[306]			●																	1
Jason (1999)[307]			●																	1
Jeffery (1994)[308]									●		●									2
Jeffery (1988)[309]									●		●									2
Jeffery (1993b)[310]									●											1
Jeffery (1993)[311]									●											1
Jenkins (1997)[312]																	●			1
Johnson (1990)[313]														●						1
Johnston (1997)[314]								●												1
Jonas (1991)[315]							●													1
Jooste (1990)[316]																	●			1
Jooste (1990)[317]																	●			1
Joseph (1990)[318]							●													1
Junck (1997)[319]			●																	1
Kadowaki (1998)[320]									●											1
Kaiserman (1993)[321]													●							1
Kane (1999)[322]						●														1
Kane (1999)[323]						●														1
Kanzler (1976)[324]											●									1
Kaufman (1994)[325]												●								1
Keay (1993)[326]	●	●	●																	3
Kelder (1995)[327]														●						1
Kelder (1993)[328]									●											1
Kempf (1996)[329]							●													1
Kershaw (1999)[330]															●					1
Kinne (1993)[331]										●	●									2
Kinne (1991)[332]											●									1
Klepp (1993)[333]													●							1
Klesges (1987)[334]									●											1
Klesges (1986)[335]											●									1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Klonoff (1997)[336]		●																		1
Korhonen (1999)[337]																	●			1
Kornitzer (1989)[338]									●											1
Kornitzer (1995)[339]									●											1
Kornitzer (1980)[340]									●											1
Kornitzer (1983)[341]									●											1
ornitzer (1978)[342]									●											1
Kornitzer (1980)[343]									●											1
Kornitzer (1987)[344]									●											1
Kornitzer (1985)[345]									●											1
Kronenfeld (1987)[346]																	●			1
Lando (1995)[347]																	●			1
Landrine (2000)[348]			●																	1
Lang (2000)[349]									●											1
Lantz (2000)[350]																●				1
Lasater (1988)[351]																	●			1
Lasater (1988)[352]																	●			1
Leedom (1986)[353]																			●	1
Lefebvre (1988)[354]																	●			1
Lefebvre (1987)[355]																	●			1
Lewis (1996)[356]		●																		1
Lewit (1981)[357]					●															1
Lewit (1997)[38]					●											●				2
Li (1984)[358]									●		●									2
Lichtenstein (1994)[359]																	●			1
Lichtenstein (1996)[360]																	●			1
Lindsay (1994)[361]																	●			1
London Health Education Authority (1992)[362]													●							1
Lowe (1987)[363]											●									1
Luepker (1993)[364]																	●			1
Luepker (1994)[365]																	●			1
Ma (2001)[366]			●																	1
Maccoby (1977)[367]																	●			1
Maheu (1989)[368]											●									1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Maiuro (1989)[369]							●													1
Malott (1984)[370]									●		●									2
Marcus (1992)[371]											●									1
Marlatt (1998)[372]														●						1
Martinson (1999)[373]									●											1
Maschewsky Schneider (1989)[374]																	●			1
Maschewsky Schneider (1993)[375]																	●			1
Massachusetts Department of Education (1998)[376]															●					1
Massachusetts Department of Public Health (1998)[377]															●					1
Mawkes (1997)[378]			●																	1
Mayo (1990)[379]									●		●									2
McAlister (1982)[380]																	●			1
McAlister (1992)[381]																	●			1
McDermott (1998)[382]			●																	1
McGee (1994)[383]													●							1
McIntosh (1994)[384]																		●		1
McMahon (1994)[385]									●											1
McPhee (1997)[386]																	●			1
Merchant (1993)[387]													●							1
Michigan Department of Public Health (1992)[388]																●				1
Millar (1988)[389]									●											
Mittelmark (1988)[390]																	●			1
Mittelmark (1986)[391]																	●			1
Moberg (1990)[392]													●							1
Morgan (1994)[393]													●							1
Mossman (1978)[394]											●									1
Mudde (1995)[395]																	●			1
Mullooly (1990)[396]									●	●	●									3

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg 9[1]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg 5[2]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Munetz (1987)[397]							●													1
Murray (1992)[398]												●	●							2
Murray (1989)[399]													●							1
Murray (1994)[400]												●				●				2
Naidoo (1985)[401]			●																	1
Nater (1985)[402]																	●			1
National Tobacco Campaign (1999)[403]								●												1
Neittaanmaki (1980)[404]																	●			1
Nepps (1984)[405]											●									1
New York: Department of Health (1996)[406]		●																		1
Nilsson (2001)[407]									●											1
Nussel (1985)[408]																	●			1
Nussel (1985)[409]																	●			1
Nutbeam (1987)[410]																	●			1
Nutbeam (1993)[411]													●							1
Nutbeam (1993)[412]																	●			1
Nyhuis (1995)[413]			●																	1
O'Donnell (1995)[414]														●						1
O'Loughlin (1995)[415]																	●			1
O'Loughlin (1997)[416]																	●			1
O'Loughlin (1997)[417]																	●			1
O'Loughlin (1998)[418]																	●			1
O'Loughlin (1999)[419]																	●			1
Ockene (1997)[420]																	●			1
Offord (1992)[421]										●	●									2
O'Hara (1993)[422]											●									1
Ohsfeldt (1997)[423]					●															1
Olive (1996)[424]										●										1
O'Neill (2000)[425]						●														1
Olsen (1991)[426]											●									1
Olsen (1990)[427]											●									1
Omen (1988)[428]											●									1
Omenn (1988)[429]									●											1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Oregon Health Division (1999)[430]															●	●				2
Oregon Health Division (1999)[430]															●					1
Osler (1993)[431]																	●			1
Osler (1992)[432]																	●			1
Palinkas (1996)[433]														●						1
Paradis (1995)[434]																	●			1
Patten (1995)[435]							●													1
Paulozzi (1992)[436]											●									1
Pederson (1993)[437]											●									1
Pentz (1994)[438]													●							1
Pentz (1989)[439]												●								1
Perkins (1986)[440]																			●	1
Perry (1992)[441]													●				●			2
Perry (1994)[442]												●								1
Perry (1990)[443]													●							1
Petersen (1988)[444]											●									1
Phillips (1993)[445]																	●			1
Pierce (1994)[446]											●									1
Pierce (1994)[447]															●					1
Pierce (1998)[448]															●					1
Pierce (1998)[449]															●	●				2
Pilgrim (19980[450]														●						1
Piper (2000)[451]												●								1
Pizacani (1999)[452]															●					1
Pokorny (2002)[453]			●																	1
Polansky (1999)[454]														●						1
Pomrehn (1990-91)[455]																	●			1
Popham (1994)[456]															●					1
Puska (1981)[457]																	●			1
Puska (1981)[458]																	●			1
Puska (1983)[459]																	●			1
Puska (1985)[460]																	●			1
Puska (1983)[461]																	●			1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Puska (1989)[462]																	●			1
Puska (1979)[463]																	●			1
Quinn (2000)[464]							●													1
Ramirez (1988)[465]																	●			1
Rand (1989)[466]									●		●									2
Rauter (19970[467]							●													1
Razavi (1999)[468]									●											1
Renaud (1995)[469]																	●			1
Report from a Working Group of 14 Attorney Generals. (1994)[470]		●																		1
Resnick (1989)[471]							●													1
Rigotti (1997)[472]	●	●	●	●																4
Roberts (1993)[473]																	●			1
Rodriguez-Artalejo (2003)[474]									●											1
Rohrbach (1998)[475]															●					1
Rose (1978)[476]											●									1
Rose (1982)[477]											●									1
Rosen (1977)[478]											●									1
Rosenstock (1986)[479]										●	●									2
Rossouw (1983)[480]																	●			1
Rossouw (1993)[481]																	●			1
Rossouw (1981)[482]																	●			1
Royce (1997)[483]																	●			1
Rustin (1978)[484]									●											1
Rutter (1990)[485]						●														1
Salina (1994)[486]									●											1
Sallis (1985)[487]																	●			1
Salonen (1985)[488]																	●			1
Salonen (1981)[489]																	●			1
Sanson-Fishes (1996)[490]																	●			1
Santi (1994)[491]														●						1
Schensky (1996)[492]			●																	1
Schinke (2000)[493]												●								1
Schoenmakers (1997)[494]			●																	1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Schofield (1997)[495]		●	●																	2
Schorling (1995)[496]																	●			1
Schorling (1997)[497]																	●			1
Scott (1989)[498]											●									1
Scott (1986)[499]											●									1
Secker-Walker (2000)[500]																	●			1
Secker-Walker (2000)[501]																	●			1
Secker-Walker (1996)[502]																	●			1
Secker-Walker (1994)[503]																	●			1
Secker-Walker (1997)[504]																	●			1
Seghers (1998)[505]																●				1
Severson (1991)[506]														●						1
Severson (1997)[507]																		●		1
Shelley (1996)[508]																	●			1
Shelley (1995)[509]																	●			1
Shelley (1991)[510]																	●			1
Shi (1992)[511]									●											1
Shimizu (1999)[512]									●											1
Shiple (1995)[513]																	●			1
Shipley (1988)[514]											●						●			2
Shope (1992)[515]														●						1
Siegal (2000)[516]																●				1
Siegal (1997)[517]															●					1
Sieibold (2000)[518]								●												1
Skretny (1990)[519]	●		●																	2
Skretny (1990)[520]		●																		1
Sloan (1990)[521]											●									1
Sly (1999)[522]															●					1
Smith (1990)[523]							●													1
Smith (1994)[524]																	●			1
Smith (1994)[525]																	●			1
Smith(1996)[526]																	●			1
Smith (1989)[527]							●													1
Snow (1997)[528]														●						1
Solomon (1996)[529]																	●			1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	MJurphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Sorensen (1990-91)[530]																	●			1
Sorensen (1997)[531]																	●			1
Sorensen(1995)[532]									●											1
Sorensen (1993)[533]									●		●									2
Sorensen (1991)[534]											●									1
Sorensen (1996)[535]									●											1
Sorensen (1998)[536]									●											1
Sorensen (1996)[537]									●											1
Sorensen (2002)[538]									●											1
Sorensen (2003)[539]									●											1
Sorensen (1998)[540]									●											1
Sorensen (1996) [541]									●											1
St Pierre (1992)[542]												●								1
Stachnik (1983)[543]											●									1
Staff (1998)[544]			●	●																2
Staff (2003)[545]			●																	1
Stave (1991)[546]									●	●	●									3
Steiner (1991)[547]							●													1
Steyn (1997)[548]																	●			1
Stillman (1990)[549]									●	●	●								●	4
Sussman (1998)[550]												●								1
Sutton (1984)[551]											●									1
Sutton (1987)[552]									●		●									2
Sutton (1988)[553]									●		●									2
Tang (1997)[554]												●								1
Taylor (1993)[555]							●													1
Taylor (1993)[556]																	●			1
Taylor (1998)[557]																	●			1
Terazawa (2001)[558]									●											1
Tessaro (1998)[559]									●											1
Tessaro (2000)[560]									●											1
Thompson (1987)[561]									●											1
Thorward (1989)[562]							●													1
Thrush (1999)[563]														●						1
Tsushima (1991)[564]									●	●										2

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	MJurphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Tudor Smith (1998)[565]																	●			1
Tutt (2004)[566]			●																	1
Tutt (2000)[567]			●																	1
Tutt (2000)[568]			●																	1
Unger (1998)[569]															●					1
van Assema (1994)[570]																	●			1
van Assema (1994)[571]																	●			1
van Teijlingen (1993)[572]													●							1
Vartiainen (1998)[573]												●		●						2
Vartiainen (1990)[574]													●							1
Vartiainen (1986)[575]																	●			1
Vartiainen (1994)[576]																	●			1
Velasco (1996)[577]							●													1
Vineis (1993)[578]																		●		1
Vitaro (1996)[579]														●						1
Vitaro (1994)[580]														●						1
Voorhees (1998)[581]		●																		1
Wahlgren (1997)[582]																		●		1
Wakefield (2002)[583]																		●		1
Wakefield(2000)[584]																●				1
Wakefield (1992)[585]											●									1
Wall (1995)[586]																		●		1
Wallack (1990-91)[587]																	●			1
Walsh (1999)[588]						●														1
Wasserman (1991)[589]					●															1
Watson (1999)[590]			●																	1
Weinbaum (1996)[591]		●																		1
Weinehall (1999)[592]																	●			1
Weisbrod (1992)[593]																	●			1
Weiss (1998)[594]														●						1
Wetter (2002)[595]									●											1
Wewers (1991)[596]																●				1
Wheeler (1991)[597]																	●			1
Whitney (1994)[598]											●									1
Wiist (1991)[599]													●							1

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	MJurphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Wildey (1995)[600]		●	●																	2
Wildey (1995)[601]	●																			1
Willemsen (1998)[602]									●											1
Williams (1995)[603]						●														1
Wilson (2001)[604]																		●		1
Windsor (1989)[605]									●		●									2
Windsor (1988)[606]									●		●									2
Winkleby (1994)[607]																	●			1
Winkleby (1993)[608]												●					●			2
Winkleby (1996)[609]																	●			1
Woodruff (1993)[610]										●	●									2
Woods (1991)[611]													●							1
Woodward (1987)[612]																		●		1
Worden (1983)[613]																●				1
Worden (1996)[614]														●						1
Zhang (1993)[615]																		●		1
Zhang (1993)[616]																		●		1
Zubow (1994)[617]	●																			1
Zucker (2000)[618]																●				1

APPENDIX 4. MAP OF PRIMARY STUDIES INCLUDED IN MORE THAN ONE SYSTEMATIC REVIEW

Interventions Assessed	Youth Access Restrictions				Tax increases	Smoking bans / restrictions						Community-based programmes						Reductions in ETS		
Participants	Adolescents						Adults					Adolescents				Adults				
Included primary studies (first author only)	Lev[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Abernathy (1995)[43]		●										●								2
Altman (1989)[47]	●		●																	2
Altman (1991)[49]	●		●																	2
Altman (1999)[50]	●	●	●	●																4
Andrews (1983)[53]									●		●									2
Bagott (1998)[62]			●	●																2
Baile (1991)[63]										●	●									2
Baxter (1997)[70]												●					●			2
Becker (1989)[72]								●	●	●									●	4
Bialous (1999)[78]														●	●					2
Biglan (1996)[84]		●	●																	2
Biglan (1995)[86]	●		●																	2
Borland (1990)[89]									●	●	●									3
Borland (1991)[90]									●	●										2
Brigham (1994)[98]										●	●									2
Burling (1989)[106]									●		●									2
Chaloupka (1997)[124]					●	●														2
Chapman (1994)[125]		●	●																	2
Cummings (1992)[137]	●												●							2
Cummings (1998)[141]		●	●																	2

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Daughton (1992)[144]										●	●									2
Dawley (1991)[149]									●		●									2
DiFranza (1992)[157]			●	●																2
Dovell (1996)[166]		●	●																	2
Feighery (1991)[191]	●	●	●										●							4
Flynn (1995)[201]														●		●				2
Forster (1992)[204]	●		●																	2
Forster (1998)[206]	●	●	●	●																4
Forster (1997)[208]		●	●																	2
Frank (1986)[214]									●		●									2
Gemson (1998)[216]		●	●																	2
Glasgow (1993)[221]									●		●									2
Glasgow (1991)[222]									●		●									2
Glasgow (1984)[223]									●		●									2
Goldman (1991a)[231]															●	●				2
Gottlieb (1990)[238]									●	●	●								●	4
Hancock (2001)[255]												●					●			2
Hinds (1992)[270]		●	●																	2
Hu (1995)[280]															●	●				2
Hu(1995)[281]															●	●				2
Hudzinski (1990)[283]									●	●	●									3
Hymowitz (1991)[286]									●		●									2
Independent Evaluation Consortium (1998)[288]															●	●				2
Jason (1996)[292]		●	●																	2
Jason (1989)[295]									●		●									2
Jason (1996)[299]	●		●																	2
Jason (1987)[302]									●		●									2
Jason (1991)[303]	●	●	●	●									●							5
Jeffery (1994)[308]									●		●									2
Jeffery (1988)[309]									●		●									2

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Keay (1993)[326]	●	●	●																	3
Kinne (1993)[331]										●	●									2
Lewit (1997)[38]					●											●				2
Li (1984)[358]									●		●									2
Malott (1984)[370]									●		●									2
Mayo (1990)[379]									●		●									2
Mullooly (1990)[396]									●	●	●									3
Murray (1992)[398]												●	●							2
Murray (1994)[400]												●				●				2
Offord (1992)[421]										●	●									2
Oregon Health Division (1999)[430]															●	●				2
Perry (1992)[441]													●				●			2
Pierce (1998)[449]															●	●				2
Rand (1989)[466]									●		●									2
Rigotti (1997)[472]	●	●	●	●																4
Rosenstock (1986)[479]										●	●									2
Schofield (1997)[495]		●	●																	2
Shipley (1988)[514]											●						●			2
Skretny (1990)[519]	●		●																	2

Included primary studies (first author only)	Levy[16]	Lund[17]	Stead[18]	Fichtenberg[19]	Hopkins[20]	Murphy-Hoefer[21]	El-Guebaly[22]	Ivers[23]	Moher[24]	Fichtenberg[25]	Eriksen[26]	Sowden[27]	Stead[28]	Blake[29]	Wakefield[30]	Friend[31]	Secker-Walker[32]	Roseby[33]	Serra[34]	Total
Sorensen (1993)[533]									●		●									2
Staff (1998)[544]			●	●																2
Stave (1991)[546]									●	●	●									3
Stillman (1990)[549]									●	●	●								●	4
Sutton (1987)[552]									●		●									2
Sutton (1988)[553]									●		●									2
Tsushima (1991)[564]									●	●										2
Vartiainen (1998)[573]												●		●						2
Wildey (1995)[600]		●	●																	2
Windsor (1989)[605]									●		●									2
Windsor (1988)[606]									●		●									2
Winkleby (1993)[608]												●					●			2
Woodruff (1993)[610]										●	●									2

APPENDIX 5. DATA EXTRACTION TABLES

Key to abbreviations:
NA = Not Applicable
NR = Not Reported
SES = Socio-economic status

Reviews assessing youth access interventions

Author: Levy (2002)[16] **Country: US**	**Title: Strategies for reducing youth access to tobacco: A framework for understanding empirical findings on youth access policies.** **Objective/review question: To assess the effectiveness of youth access policies and their impact on youth smoking rates.** **SES explicit target? No.** **Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.**
Literature search Summary of searches: Databases searched: Yes Handsearching undertaken: Unclear References checked: Yes Restricted to English language studies only: Unclear Experts contacted: Yes Search terms reported: Yes Search dates reported: No Search sources/dates: MEDLINE and other computerised databases. Internet searches made. Identified references from bibliographies of articles and books. Sought suggestions from tobacco control experts with particular regard to studies not yet entered into computerised databases, manuscripts in review and unpublished studies. Review reported all studies were considered but focuses on studies published since 1990 which included data on retail compliance rates or smoking rates before and after a youth access intervention.	
Inclusion/exclusion criteria Interventions: Studies that assessed US youth access policies were eligible for inclusion. Included studies cover a range of enforcement methods to reduce access to minors at stores and vending machines. Specific interventions included: Stores – community education and mobilisation, direct education of merchants, contact with management franchises, compliance checks, citations, media publicity, licence suspensions, fines, publicity around new laws and penalties; incentives to compliers, publicity for non-compliers; vending machines; community education, direct education to franchises; compliance checks, media publicity; licence suspension; fines; publicity of new state laws increasing penalties; local ordinance requiring locking devices without enforcement. Participants: No inclusion criteria other than 'youths' were stated. Studies that included youths aged 12 to 17 were included. Outcomes: No inclusion criteria were stated for outcomes. Methods section reported a focus on studies that included data on retail compliance rates or smoking rates before and after a youth access intervention. Outcomes reported in tabular format: percentage reduction in access. Limited information on reduction in smoking rates - provided only in text. Study designs: Only information reported was that "all studies" were considered.	
Methods of review Study selection procedure: No information on how studies were selected for the review or on the number of reviewers selecting studies was reported. Validity assessment tool: NR Validity assessment procedure: NR Data extracted from primary studies: Presented in tabular form: Authors, year of publication, location of study, number of stores or attempts, baseline sales rate, follow-up sales rate, percentage reduction in access, time period, enforcement methods and comments. Data extraction procedure: NR Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No How were studies combined in the review? Results were grouped according to whether the study assessed interventions in stores or at vending machines, and synthesised narratively. How were studies weighted in the synthesis? No method of weighting appears to have been used. How was publication bias assessed? The authors did not assess publication bias. How was heterogeneity assessed? Some differences in the interventions were discussed and reported in the tables. However heterogeneity in terms of population, interventions, outcomes, and study quality was not explicitly reported.	
Quality assessment Is there a well defined question? The question is partially defined in terms of interventions and outcome of interest. Is there a defined search strategy? Search dates and terms partially reported. Are the inclusion/exclusion criteria stated? Partially defined in terms of interventions. No explicit criteria specified for study design, participants or outcomes. Are the study designs and number of studies clearly stated? Number of studies reported, but study design is not explicitly reported.	

Have the primary studies been quality assessed? No.
Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? Unclear. No information is reported on study selection, data extraction or synthesis.
Reviewer's comments: The review question was only partially defined in terms of interventions and outcomes. No inclusion/exclusion criteria were explicitly stated. Search sources and dates were only partially reported. Unclear whether hand-searching was undertaken or if language restrictions were applied. The reader is therefore unable to assess publication or retrieval bias. The review methods are unclear so it is difficult to assess what steps (if any) have been taken to reduce bias. The quality of the studies was not assessed. Very little information is provided about the included studies so it is not possible to adequately assess heterogeneity. There was no reporting of differences in the studies apart from brief description of enforcement methods of interventions. Some studies used different stores for pre-test, post-test results. Overall this is a poorly reported review and the reader is unable to adequately assess bias, or reporting of results and therefore unable to assess the validity of the author's conclusions.

Results

Number of studies included in the review: 20
Number of participants: Unclear. Review reported numbers of stores or attempts, and numbers of vending machines or attempts, but may be duplicate recording, and unclear how many stores had multiple attempts.
Results of the validity assessment: Validity was not assessed and therefore is not reported.
Percentage reduction in access by minors calculated from baseline sales rate and follow-up sales rates. Follow-up time period varied from 2 weeks to 3 years for over the counter sales, and 1 month to 12 months for studies including access via vending machines. Review distinguished between policies aimed at over-the-counter sales from those aimed at vending machine purchases.

Over-the-counter sales: Summary of results for over-the-counter sales suggests that enforcement efforts appear to be a critical component of policies to reduce tobacco sales to minors. The extent of the reduction in sales, however, varied considerably between studies even among programmes with similar components.

Access by minors at vending machines: Results varied from 3 studies reporting no significant differences between pre-test and post-test for educational methods and publicity around new laws, to one study reporting 100% reduction for licence suspensions and fines.

Locking devices on vending machines: Vending machine policies involving community and merchant education without locking devices or total vending machine bans, appeared to have limited effects on tobacco vending machine sales to youths. Studies that considered enforcement efforts with merchant education did not find any reduction in purchase rates from machines.

Difference in youth smoking rates: Mixed and inconclusive effects of youth access policies on youth smoking rates. Results were from self-reported questionnaires. (limited results from 3 studies reported in text).
Differential effects: NR
Adverse effects: NR
Publication bias: NR

Conclusions

Authors report that studies of retail compliance found considerable variation in effectiveness but generally reported positive results, while studies of use rates yielded more mixed findings. Results may be due to characteristics of population and intervention that may systematically affect the success of youth access strategies. In particular programme effectiveness may depend upon ability of youth to substitute other sources of tobacco for reduced retail access, as well as combination of policies implemented and scale of efforts.
Smoking rates: Conclusions are limited by small sample size and no control group, so declines in smoking may have reflected general trends in the population.
Implications for practice: Authors present a framework which highlights factors that may influence policy effectiveness and suggest a number of implications to consider in evaluating youth access interventions such as combination of different policies and levels of implementation and the percentage of youth relying on various sources and ability to substitute to other sources.
Implications for research: Further research is needed to confirm whether youth access policies have the intended effect of reducing overall youth smoking. Also research on specific aspects of youth access policies such as limits on self-service, state laws pre-empting local governments from adopting stricter ordinances and widespread consistent tobacco licensing policies. In addition, research on policies that serve to decrease non-retail access is warranted.

Studies included in the review that appear to report data about differential effects: The whole review targets adolescents.

Reference: Lund (1999)[17] Country: Norway	Title: How can illegal sales of tobacco to minors be reduced? Objective/review question: To study the effect of measures applied by Ministries in different countries to enhance the respect for legal age limits for purchase of tobacco to minors. SES explicit target? No. Does the review either present data on or discuss differential effects being present in any of the included studies? No.

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: NR
Restricted to English language studies only: NR Experts contacted: NR Search terms reported: Yes Search dates reported: Partial
Search sources/dates: MEDLINE (in June 1999), Sociological abstracts (in February 1999), Internet searches (Alta Vista, Yahoo, Netscape), GlobaLink (intranet of the American Cancer Society). Search terms used: "licensure-of-tobacco-retailers", "smoking-prevention-and-control", "smoking-legislation-and jurisprudence", "tobacco-sales-to-minors".

Inclusion/exclusion criteria

Interventions: No inclusion criteria were stated a priori for interventions. The included interventions were voluntary agreements (campaigns addressing the public/the minors or purchasers; agreements between health authorities and purchasers/purchaser organisations); sanctions (against minor consumers; against purchasers; boycotts of selected purchasers organised by consumer organisations).
Participants: Purchasers, purchaser organisations, consumers (the public, minors).
Outcomes: No inclusion criteria were specified a priori for outcomes. The outcomes assessed were the ratio of illegal tobacco selling; ratio of purchasers breaking the law; accessibility to tobacco for minors; tobacco use among minors; smoking habits among minors; ratio of smokers among minors.
Study designs: No inclusion criteria were stated and study designs were not reported.

Methods of review

Study selection procedure: NR
Validity assessment tool: NR
Validity assessment procedure: NR
Data extracted from primary studies: NR
Data extraction procedure: NR
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? Studies were grouped according to the interventions and combined narratively.
How were studies weighted in the synthesis? NR
How was publication bias assessed? NR
How was heterogeneity assessed? NR

Quality assessment

Is there a well defined question? No.
Is there a defined search strategy? Partial. Start search date not reported and limited information about search terms.
Are the inclusion/exclusion criteria stated? Inclusion criteria were only stated for the participants. No inclusion criteria were reported for the interventions, outcomes or study designs.
Are the study designs and number of studies clearly stated? The number of studies was reported but didn't tally with the number of references reported. Study design was not reported and was unclear.
Have the primary studies been quality assessed? No.
Have the studies been appropriately synthesised? Unclear.
Has more than one author been involved at each stage of the review process? Unclear.
Reviewer's comments: A borderline SR.

Results

Number of studies included in the review: Unclear, it appears that 65 studies were included; 33 (from electronic databases) plus, 32 (from internet searches). However the references of the included studies do not add up to 65.
Number of participants: NR
Results of the validity assessment: NR

Illegal tobacco sales: Little to no effect by voluntary agreements (point of sales notices, mass media campaigns for the public). Some effect by sanctions and controls (accessed by minors working for the authorities attempting to buy tobacco, and the success rate being recorded).
Smoking habits among minors: Little to no effect by voluntary agreements. Little to no effect by sanctions and controls (as the effects on the number of purchasers selling tobacco to minors are often counteracted by purchasers which do not follow the law and make tobacco accessible for minors; some effect is reported frequent spot tests, for withdrawal of tobacco selling license from purchasers found

to sell tobacco to minors; no effect for legal punishment of minors who had bought tobacco). Differential effects: NR Adverse effects: NR Publication bias: NR
Conclusions Authors conclude that the present Norwegian efforts at increasing compliance are unlikely to lead to fewer smokers among minors. Implications for practice: As about 20% of purchasers will not follow the law, tobacco purchase to minors will be unchanged. Introduction of legal punishment for purchasers not respecting the age limit will be necessary. Implications for research: NR
Studies included in the review that appear to report data about differential effects: None.

Reference: Stead (2004)[18] **Country: UK**	**Title: Interventions for preventing tobacco sales to minors.** **Objective/review question: The objective was to assess the effectiveness of reducing underage access to tobacco products by deterring shopkeepers from illegal sales.** **SES explicit target? No.** **Does the review either present data on or discuss differential effects being present in any of the included studies? Partial.**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: No Restricted to English language studies only: Unclear.
Experts contacted: No Search terms reported: Yes Search dates reported: Partial - search start date not reported.
Search sources/dates: The Cochrane Tobacco Addiction Review group register, MEDLINE and EMBASE were searched to October 2001.

Inclusion/exclusion criteria

Interventions: Studies which assessed education, law enforcement, community mobilisation, or combinations of strategies that aimed to deter retailers from selling tobacco to minors were eligible for inclusion. The main interventions were education about legal requirements, notification of the results of compliance checks, warning of enforcement, and implementation of enforcement. In some of the studies different frequencies of enforcement activity, and different channels of information were used. In some, the intervention included the introduction of new legislation of local ordinances such as a licensing system or a formal requirement for compliance checking. Some for the studies included a community action, awareness or support element. In some studies the intervention had to be modified because of local attitudes. In 1 study researchers were unable to bring about enforcement action because of legal concern about the use of 'sting' operations and an unwillingness to prosecute clerks. Studies were conducted in the US (20), in Australia (5), in the UK (3) and in Canada (2).
Participants: Studies which targeted retailers to reduce tobacco sales to minors were included. Minors were defined by the legal age limit in the communities studied.
Outcomes: Studies which reported illegal tobacco sales (assessed by attempted purchases by young people), perceived ease of access to cigarettes by young people or the prevalence of tobacco use among young people were eligible for inclusion. The majority of the studies assessed 'over the counter' attempted purchases, but some also examined ease of purchase from vending machines. Some studies differentiated between sales in shops with behind the counter or locked displays and self-service. Some studies also assessed the effects on smoking behaviour, and perceived ease of access to cigarettes.
Study designs: Cluster randomised controlled trials (CRCTs), non-randomised cluster trials, time series studies, and uncontrolled before and after studies were included. Uncontrolled studies with post intervention measurements only were excluded.

Methods of review

Study selection procedure: Two reviewers independently assessed studies for inclusion.
Validity assessment tool: NR
Validity assessment procedure: NR
Data extracted from primary studies: Data were extracted on study design, setting, participants, interventions and outcomes.
Data extraction procedure: One reviewer extracted data,which was checked for accuracy by a second reviewer.
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? The studies were grouped by intervention, and by study design and combined in a narrative synthesis.
How were studies weighted in the synthesis? Studies were weighted by study design, with greater weight given to controlled studies that measured the behaviour of retailers and minors in the community.
How was publication bias assessed? Publication bias was not assessed.
How was heterogeneity assessed? Differences between the studies were discussed in relation to intervention programmes, intensities of the intervention, and study design.

Quality assessment

Is there a well defined question? Yes.
Is there a defined search strategy? Partial. Search terms were reported, but the start date for the searches was not.
Are the inclusion/exclusion criteria stated? Yes.
Are the study designs and number of studies clearly stated? Yes.
Have the primary studies been quality assessed? No.
Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? Yes.
Reviewer's comments: The review question was defined in terms of participants, interventions and outcomes. The search was adequate but no handsearching was conducted. Search terms were reported, but search start dates were not reported. Unclear if language restrictions were applied. Publication bias was not assessed by the authors. On the information provided unable to assess publication bias. Inclusion criteria were defined in terms of participants, interventions, outcomes and study designs. No quality assessment was made of the included studies. Studies were grouped by intervention and study design and combined in a narrative synthesis. Studies were weighted by study design, and differences in relation to intervention, intensity of intervention and study design were explored.

Results

Number of studies included in the review: 34 studies; 6 CRCTs, 7 non-randomised controlled trials, 19 pre-post studies, and 2 time series studies.

Number of participants: NR (unclear).

Results of the validity assessment: Validity not assessed.

Number of illegal sales (28 studies; 11 controlled studies and 17 uncontrolled studies). Out of the 11 controlled studies that assessed the effect of an intervention on illegal sales, measured by compliance checks, 6 found the intervention reduced the level of illegal sales compared to the control group. Active enforcement was used in 3 of the successful interventions, with illegal sales falling to 19%, 47% and 18% within the studies. Three interventions without enforcement also produced greater compliance compared to control areas. In the first study multicomponent community and retailer education combined with personal visits reduced sales significantly in 4 out of 6 intervention areas and in no control area. The sales rate was reduced from 70% to 32%, and was sustained at 6-month follow-up. In the second study the intervention of education and community organisation eliminated successful test purchases by the end of 3 years in 2 communities compared to a 39% sales rate in the comparison communities. In the third study, warning letters threatening prosecution to retailers, led to a second offence rate of 31% compared to 60% amongst those not warned. The other five controlled trials that assessed the effectiveness of a comprehensive community approach (n=1), education alone (n=2), enforcement alone (n=1) or education in combination with enforcement (n=1) found no differences between intervention and control communities.

All the uncontrolled studies showed reductions in illegal sales following the intervention, but the size of the pre-post difference was variable. In the study of vending machines, a locking device policy resulted in fewer locations selling cigarettes to minors than a policy of no restriction.

Minors self-reported ease of access (7 studies): The results of studies assessing minor's self-reported ease of access were mixed. In one study recent purchases were less common in 2 out of 3 of the grades assessed (7th and 9th), but baseline differences in the proportion reporting a purchase in the previous three months made longitudinal change difficult to interpret. In 4 out of the 7 studies children either perceived it as more difficult to obtain cigarettes, or reported that more retailers asked for proof of age. In the remaining 2 studies no differences in either perceived ease of access or the number of children being refused sales were shown between either intervention or control communities, or from baseline to follow-up.

Prevalence of tobacco use (8 studies; 5 controlled and 3 uncontrolled): The results of the studies in relation to the prevalance of tobacco use were mixed. 3 out of 5 of the controlled studies showed some effect of the intervention, whilst 2 found no effect. All 3 of the uncontrolled studies reported some effect. In the first controlled study there was a lower rate of increase in all measures of smoking prevalance in seven areas with a comprehensive community-based intervention than in seven control communities. The net difference in prevalence was significant for daily, but not weekly or monthly smoking. The results of the second study, indicated an effect of intervention only in the youngest students, whilst the results of the third study showed a lower smoking prevalence in the 7th grade at baseline, but the effect was not sustained at the end of the 32 month study. The remaining 2 controlled studies found no differences in smoking prevalence between intervention and control communities.

Uncontrolled studies: All 3 studies reported some effect of the intervention. Two reported a decrease in smoking prevalence in students associated with a reduction in illegal sales in single intervention communities, with the first reporting a drop in the number of regular smokers in 7th-8th grade from 16% to 5%. Long term assessments in this community using older youths showed higher rates of sales, but these were still below 20%. The study also reported a lower proportion of smokers amongst students from the target community, compared to communities not conducting regular enforcment. The second study found there was a fall in smoking prevalence in three out of four age groups. The third study reported no signficant change in overall reported tobacco use after introduction of a local ordinance, but there was a signficant decrease amongst girls.

Differential effects: NR

Adverse effects: NR

Publication bias: NR

Conclusions

Interventions with retailers can lead to large decreases in the number of outlets selling tobacco to youths. However, few of the communities achieved sustained level of high compliance. This may explain why there is limited evidence for an effect of intervention on youth perception of ease of access to tobacco, and on smoking behaviour.

Implications for practice: Legislation alone is not sufficient to prevent tobacco sales to minors. Both enforcement and community policies improve compliance by retailers, but the impact on underage smoking prevalence using these approaches alone may be small if the level of compliance attained does not sufficiently restrict access.

Implications for research: Further research needs to link change in retailer behaviour to changes in young people's perceptions of tobacco availability and their smoking behaviour. Studies examining the effects of access restrictions on youth smoking behaviour must first strive to achieve high compliance. There is also a need to develop and test strategies for countries in the developing world.

Studies included in the review that appear to report data about differential effects:

Jason L., Billows W, Schnopp Wyatt D, King C. Reducing the illegal sales of cigarettes to minors: analysis of alternative enforcement schedules. J Appl Behav Anal 1996; 29: 333-44.

Hinds MW. Impact of local ordinance banning tobacco sales to minors. Public Health Rep 1992; 107: 355-8.

Author: Fichtenberg (2002)[19] Country: US	Title: Youth access Interventions do not affect youth smoking. Objective/review question: To determine the effectiveness of laws restricting youth access to cigarettes on the prevalence of smoking among teenagers. SES explicit target? No. Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: Yes Restricted to English language studies only: Unclear
Experts contacted: No Search terms reported: Yes Search dates reported: Yes
Search sources/dates: MEDLINE was searched from 1985 to 2001. Limited search terms were reported. In addition references of retrieved studies were checked.

Inclusion/exclusion criteria

Interventions: Studies examining laws restricting youth access to cigarettes (or youth access programmes) were eligible for inclusion. The included studies reported the following types of interventions: community and retailer education with no enforcement; retailer education with enforcement (e.g. via warnings, fines, or suspensions of tobacco selling licenses); and comprehensive interventions that include community intervention, enactment of laws and a variety of enforcement strategies. The intensity of the interventions varied between the studies. All of the included studies measured compliance with youth access laws using 'sting operations', where teenagers were sent into stores to try and buy cigarettes and record whether the merchants were willing to sell. Details of the youths used in these operations and the number of stores (and number of times) visited by the researcher were not reported. Length of follow-up ranged from 1to 48 months.
Participants: Teenagers less than 18 years of age were eligible for inclusion. The age of the participants was reported in terms of age or school grade. The categories of age (12 to 17 years) varied across the studies.
Outcomes: Studies reporting the prevalence of youth smoking were eligible for inclusion. Studies reporting smoking initiation were excluded, as were those that used process outcomes such as whether youths perceived that they could buy cigarettes. Smoking prevalence in the included studies was measured using school-based surveys. The smoking measures used were smoking at least once during the past 30 days, smoking at least once a week, self-reported 'smokers', daily smoking, frequent smokers (at least 20 cigarettes in the past 30 days) and self-reported 'regular smokers'.
Study designs: No inclusion criteria were stated for study design. A prospective cohort study and cross-sectional studies were included.

Methods of review

Study selection procedure: NR
Validity assessment tool: NR
Validity assessment procedure: NR
Data extracted from primary studies: The different outcome measures used were pooled in 2 groups: 30-day smoking (consisting of the combined outcomes of 30-day smoking, weekly smoking, and self-reported smoking), and regular smoking (consisting of the outcomes of daily smoking, frequent smoking and self-reported 'regular smokers'). For studies that used separate measurements for different age groups, arithmetic averages of the separate effects were used. Teenagers aged 18 years or older were excluded from the analysis.
Data extraction procedure: NR
Summary of how the studies were combined in the review: Meta-analysis: Yes Narrative synthesis: Partial Vote counting methods: No
How were studies combined in the review? The different outcome measures for 30-day smoking (consisting of the combined outcomes of 30-day smoking, weekly smoking and self-reported smoking) were pooled using a random effects meta-analysis. The data for regular smoking (consisting of the outcomes of daily smoking, frequent smoking and self-reported 'regular smokers') was only reported in 2 studies. The data for each study was presented as percentage change, along with either the associated 95% CIs or the p-value. For studies that used separate measurements for different age groups, arithmetic averages of the separate effects were used. Teenagers aged 18 years or older were excluded from the analysis.
How were studies weighted in the synthesis? No method of weighting appears to have been used.
How was publication bias assessed? The authors did not assess publication bias.
How was heterogeneity assessed? Differences between the studies were not assessed.

Quality assessment

Is there a well defined question? The question was partially defined in terms of the interventions and outcomes of interest.
Is there a defined search strategy? Partial. Only one electronic database was searched and references of identified studies scanned. No attempt was made to locate unpublished studies. It is unclear whether any language restrictions were applied.
Are the inclusion/exclusion criteria stated? Partial. The review question was clear in terms of the interventions and outcomes of interest. The authors did not report explicit inclusion criteria in terms of the study design, but they did report some details of the type of data studies had to report. No explicit inclusion criteria were reported for participants, other than 'youths'.
Are the study designs and number of studies clearly stated? Yes.
Have the primary studies been quality assessed? No.
Have the studies been appropriately synthesised? Unclear. The outcomes measured were pooled into 2 measures (30-day and regular smoking). There was insufficient detail of the individual studies to check whether this approach was appropriate. For the correlation analysis, the data from individual communities, as well as baseline and follow-up data, were treated as separate data points. This means that the same participants were included twice for the cohort study. The authors do not report whether appropriate adjustments were undertaken to account for this. The included studies appear

to have varied quite considerably in terms of the interventions and participants, which may limit the meaningfulness of the pooled estimate of the meta-analysis. In addition, the estimated standard error was imputed for all but one study. The authors stated that their estimated standard errors were probably too small, which would mean that the results would be biased in favour of the intervention.
Has more than one author been involved at each stage of the review process? No information on the study selection and data extraction processes was given.
Reviewer's comments: The review question was clear in terms of the interventions and outcomes of interest. The authors did not report explicit inclusion criteria in terms of study design or participants. Only 1 electronic database was searched and no attempt was made to identify unpublished studies. In addition it is not clear whether any language restrictions were applied. This means that studies may have been missed and publication bias cannot be ruled out. No information on the study selection and data extraction process was given, and the authors do not appear to have assessed the quality of the included studies. This means that the reader cannot assess the potential for errors and reviewer bias. The authors did not investigate statistical heterogeneity.

Results

Number of studies included in the review: Eight studies (1 prospective cohort study and 7 cross-sectional studies), including at least 20 communities in total.
Number of participants: Within the intervention communities, 15,446 participants were included at baseline and 16,586 at follow-up. Within the control communities, 9,401 participants were included at baseline and 10,431 at follow-up.
Relationship between merchant compliance and youth smoking: there was no statistically significant relationship (20 communities) between merchant compliance and 30-day (r=0.116; p=0.486) or regular (r=0.017; p=0.926) smoking prevalence. There was no evidence of a threshold effect after compliance reached a certain level. There was no evidence (18 communities) that an increase in merchant compliance was associated with a decrease in 30-day (r=0.294; p=0.237) or regular (r=0.274; p=0.287) smoking prevalence.

Effect of youth access programmes: there was no significant difference in youth 30-day smoking prevalence in communities with youth access interventions, compared with control communities (5 studies; difference –1.5%, 95% CI: -6.0, 2.9). Four of the 5 studies reported the compliance rates; compliance exceeded 82% in the intervention communities. For the outcome of regular smoking, one study reported a 2.9% increase (p=0.08) in prevalence while another reported a –4.9% decrease (95% CI: -.9.0, -0.7).
Differential effects: NR
Adverse effects: NR
Publication bias: NR

Conclusions

Youth access interventions are not associated with a consistent positive effect on youth smoking prevalence. Furthermore, there was no evidence that increased compliance is associated with decreased prevalence.
Implications for practice: The authors state that given the limited resources available for tobacco control, as well as the expense of conducting youth access programmes, tobacco control advocates should start re-directing their energies and funds away from youth access and towards other interventions that have proven effectiveness.
Implications for research: NR

Studies included in the review that appear to report data about differential effects: the whole review targets teenagers:
Ritgotti N, DiFranza JR, Chang Y, Tisdale TT, Kemp B, Singer DE. The effect of enforcing tobacco-sales laws on adolescents' access to tobacco and smoking behaviour. N England J Med. 1997; 337: 1044-1051.
Jason L, Ji P, Anes M, Birkhead S. Active enforcement of cigarette control laws in the prevention of cigarette sales to minors. JAMA. 1991; 266: 3159-3161.
Altman D, Wheelis A, MacFarlane M, Lee H, Fortmann S. The relationship between tobacco access and use among adolescents: a four community study. Soc Sci Med 1999; 48: 759-775.
DiFranza J, Carlson ER, Caisse R. Reducing youth access to tobacco. Tobacco Control. 1991; 1:58.
Forster J, Murray D, Wolfson M, Blaine T, Wagenaar A, Hennrikus D. The effects of community policies to reduce youth access to tobacco. Am J Public Health 1998; 88: 1191-1198.
Bagott M, Jordan C, Wright C, Jarvis S. How easy is it for young people to obtain cigarettes, and do test sales by trading standards have any effect? A survey of two schools in Gateshead. Child Care Health Dev. 1998; 24: 207-216.
Cummings K, Hyland A, Perla J, Giovino G. Does increasing retailer compliance with minor's access laws reduce youth smoking? Nicotine Tobacco Res. 2002 (in press)
Staff M, March L, Barnabic A, et al. Can non-prosecutory enforcement of public health legislation reduce smoking among high school students? Aust NZ J Public Health. 1998; 22: 332-335.

Reviews assessing the effects of increasing the unit price of tobacco

Reference: Hopkins (2001)[20] **Country: US**	**Title: Reviews of evidence regarding interventions to reduce tobacco use and exposure to environmental tobacco smoke. Part II. Strategies to reduce tobacco use initiation - increasing the unit price for tobacco products.** **Objective/review question: To assess the effectiveness of increasing the unit price of tobacco products to reduce tobacco use initiation in children, adolescents and young adults.** **SES explicit target? No.** **Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.** **(The data extraction relating to the methods of this review was taken from: Developing the Guide to Community Preventive Services - Overview and Rationale, Am J Prev Med 2000; 18(IS). The article reports the methodology used to develop all the systematic reviews undertaken by the Task Force on Community Preventive Services. Some of the methodological aspects have therefore been extrapolated).**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: Unclear References checked: Yes Restricted to English language studies only: Yes Experts contacted: Yes
Search terms reported: No Search dates reported: 1980 to 2000.
Search sources/dates: MEDLINE, EconLIT and the database of the Office on Smoking and Health were searched. The references of relevant studies were screened and experts were contacted.

Inclusion/exclusion criteria

Interventions: Studies which assessed the impact of increasing the unit price of tobacco were included.
Participants: It is unclear if any inclusion criteria were specified. Studies of adolescents or young adults were included.
Outcomes: It is unclear if any inclusion criteria were specified. Outcomes assessed were tobacco use prevalence, tobacco product consumption (e.g. number of cigarettes smoked per day), and an overall estimate (participation and consumption).
Study designs: National or regional cross-sectional and before-after studies were eligible for inclusion. Surveys were also included in the review.

Methods of review

Study selection procedure: NR
Validity assessment tool: The validity of the studies was assessed according to characterisation of the study population and intervention, sampling, measurement error, data analysis, and the interpretation of the results.
Validity assessment procedure: Two reviewers independently assessed the quality of the primary studies. Any disagreements were solved through discusssion by the review development team.
Data extracted from primary studies: Data on tobacco use prevalence, tobacco product consumption (e.g. number of cigarettes smoked per day), local tobacco product prices and price changes or differences over the period of study were extracted.
Data extraction procedure: Two reviewers independently abstracted data, with any disagreements being resolved by the review development team.
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? The studies were combined in a narrative synthesis.
How were studies weighted in the synthesis? NR
How was publication bias assessed? NR
How was heterogeneity assessed? Differences between the studies were discussed according to differences in the participants (adolescents versus young adults).

Quality assessment

Is there a well defined question? The question was reasonably well defined.
Is there a defined search strategy? Unclear, as the specific methodology of the review was not reported separately from the methodology used to develop all the preventative guidelines.
Are the inclusion/exclusion criteria stated? Inclusion criteria were only explicitly defined for the interventions. Again, it is unclear whether explicit inclusion criteria were stated for participants, outcomes and study designs, as the review methodology is not reported in any detail or isn't specific to this review.
Are the study designs and number of studies clearly stated? Yes.
Have the primary studies been quality assessed? Unclear, it appears as though the quality of the primary studies has been assessed, but this is not reported specifically for this review.
Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? Yes.
Reviewer's comments: It is difficult to determine the review methods, as only the methodology for developing the guide to the community preventive services is reported. Many of the quality aspects could therefore not be assessed in any detail, and others were extrapolated from the guide methodology.

Results

Number of studies included in the review: Eight surveys using econometric methods.
Number of participants: Unclear.

Results of the validity assessment: All of the studies were of moderate or greatest suitability of design, and fair or good quality of execution.
Five studies evaluated the effect of price on tobacco use for study periods in the 1990s, whilst 3 reporting the effect of price on tobacco use of periods before 1990. A negative price elasticity of demand estimates reflected a decrease in tobacco use in response to an increase in tobacco product price.
Tobacco consumption and prevelance (7 studies): Price elasticity of demand estimates showed that higher tobacco product prices were associated with lower levels of tobacco use by adolescents and young adults. One study did not find a statistically significant effect of price on adolescent tobacco use, after controlling of tobacco use regulations such as smoking restrictions.

Tobacco use prevalence (7 studies): The price elasticity estimates ranged from no statistically signficant effect to -1.19 with a median of -0.37. This suggested that a 10% increase in product price would result in a 3.7% decrease in the prevalence of tobacco use among adolescents.

Tobacco consumption (6 studies): The price elasticity estimates ranged from 0 to -0.68 with a median of -0.23. This suggested that a 10% increase in product price would result in a 2.3% decrease in the quantity of products consumed by adolescent users.

Surveys of adolescents only (13 - 18 years) (5 studies): Price elasticity demand estimates for prevalence ranged from no statistically significant effect to -1.19, with a median of -0.38. Four studies also reported estimates for tobacco consumption ranging from 0 to -0.47, with a median of -0.27.

Surveys of young adults only (18 - 24 years) (3 studies): The price elasticity demands for prevalence ranged from -0.07 to -0.52, with a median of -0.37. Two studies also reported the effect on consumption, with the price elasticity of demand, being -0.21 and -0.68 respectively.
Differential effects: Three studies reported results from stratified analyses and showed evidence of effectiveness of price on tobacco use and consumption among whites, blacks and Hispanic populations. Two studies found that both black adolescents and young adults were more responsive to differences in product price than were white adolescents and young adults respectively. Studies that analysed by gender found that increases in the tobacco product price had a greater effect among males than among females.
Adverse effects: NR
Publication bias: NR

Conclusions

The price elasticity of demand estimates in 7 of 8 studies demonstrate that increases in tobacco product price result in decreases in both the overall prevalence of tobacco product use and the quantity consumed. Increases in product price resulted in reductions in tobacco use in both adolescents and young adults. The authors also stated that as the studies were conducted on nationally representative population samples, the results suggest that the evidence of effectiveness should apply to most adolescents and young adults in the US.
Implications for practice: The authors stated that increases in excise tax require the passage of legislation or state-wide referendum. Political opposition is well organised and funded at both the federal and state levels. Published reports provide information on the components and experiences of both successful and unsuccessful state initiatives that proposed an increase in the excise tax on tobacco products.
Implications for research: NR

Studies included in the review that appear to report data about differential effects: the whole review targets teenagers:
Centers for Disease Control and Prevention. Response to increases in cigarette prices by race/ethnicity, income, and age groups - United States, 1976-1993. MMWR 1998; 47: 605-9.
Chaloupka FJ, Pacula RL. Sex and race differences in young people's responsiveness to price and tobacco control policies. Tob Control 1999; 8: 373-7.
Gruber, J. Youth smoking in the US: prices ande policies. Avaliable at: http://papers.nber.org/papers/W5706. Accessed December 20, 2000.
Lewit EM, Hyland A, Kerrebrock N, Cummings KM. Price, public policy, and smoking in young people. Tob Control 1997; 6(suppl 2): S17-S24.

Reviews assessing smoking bans/restrictions

Adolescents

Reference: Murphy-Hoefer (2005)[21] **Country: US**	**Title: A review of interventions to reduce tobacco use in colleges and universities.** **Objective/review question: To assess the effectiveness of individual and policy interventions that have been implemented, evaluated and peer reviewed, to reduce the prevalence of smoking in college/university students.** **SES explicit target? No.** **Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: Yes Restricted to English language studies only: Yes
Experts contacted: No Search terms reported: Yes Search dates reported: Yes 1980-December 2003
Search sources/dates: The electronic database maintained by the Office on Smoking and Health (1980-December 2003), MEDLINE (1980-December 2003), PsychINFO (1980-December 2003), Current Contents/Social and Behavioral Science (1999-December 2003), Current Contents/Clinical Medicine (1999-December 2003), Current Contents/Life Sciences (1999-December 2003), ERIC (1980-December 2003) and Embase (1980-December 2003) were searched for peer reviewed articles published in English. In addition the references of identified articles were checked.

Inclusion/exclusion criteria

Interventions: No inclusion criteria were stated for the interventions. The specific interventions assessed at the individual level were education, counselling, self-help materials, smoking delay techniques, nicotine gum, a computer administered programme based on the stage of change theory, and an oral examination with feedback, used alone or in combination with each other.
At the institutional level the interventions were smoke free policies, and the displaying of anti-smoking messages in designated smoking areas. One study also assessed local restriction on smoking in conjunction with the effects of the pricing in different states.
Participants: Studies that included college or university students were included. Studies included smokers, non-smokers, and smokeless tobacco users. One study also included university staff. Twelve of the studies were conducted in the US, one in Germany and one in Switzerland.
Outcomes: No inclusion criteria were stated for outcomes. The specific outcomes assessed were self-reported use of cigarettes, knowledge about smoking, motivation level to quit, assessment of cigarette craving and withdrawal, level of exposure to ETS.
Study designs: No inclusion criteria were stated for study design. Randomised controlled trials (RCTs), cluster randomised trials (CRCTs), controlled clinical trials (CCTs), case-control studies, and uncontrolled studies were included.

Methods of review

Study selection procedure: NR
Validity assessment tool: Studies were assessed according to study design, definition and selection of study and comparison groups, definition of the intervention and exposure, assessment of outcomes, follow-up and completion rates, bias, data analysis, and examination of confounders. Studies with 25 or fewer participants, or those without a comparison group were not rated. Studies were then categorised as outstanding (met 7-8 critieria), satisfactory (met 4-6 criteria), or unacceptable (met 3 or fewer criteria).
Validity assessment procedure: Two reviewers independently rated study quality.
Data extracted from primary studies: Data were extracted on the study setting (type of institution, students and location), study design and intervention, study sample demographics, outcome measures and follow-up, and the findings.
Data extraction procedure: NR
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? The studies were grouped according to the type of intervention - individual or institutional and combined in a narrative synthesis.
How were studies weighted in the synthesis? The studies were not weighted.
How was publication bias assessed? Publication bias was not addressed.
How was heterogeneity assessed? Differences between the studies were discussed in relation to the type of tobacco use targeted, interventions, outcome measures, and whether smoking cessation was biochemically confirmed.

Quality assessment

Is there a well defined question? Question was reasonably well defined.
Is there a defined search strategy? Yes.
Are the inclusion/exclusion criteria stated? Inclusion criteria were only stated for participants. No criteria were stated for the interventions, outcomes or study designs.
Are the study designs and number of studies clearly stated? The number of included studies was clearly reported. There were some anomalies between the study designs reported in the tables, and those reported in the text (data abstraction is based upon those reported in the tables).
Have the primary studies been quality assessed? 5 out of 14 studes were quality assessed. The 9 studies with either 25 or less participants, or no control group were not assessed.

Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? Partial, 2 reviewers were involved in validity assessment. Number of reviewers involved in study inclusion and data extraction was not reported.
Reviewers' comments: The review question was well defined. The search was limited to english studies only, no handsearching was undertaken introducing the risk of publication bias. Inclusion criteria are defined for participants only, but not for interventions, outcomes or study designs; Only some of the studies were quality assessed and rated, but the studies were not weighted in the synthesis. Studies were grouped according to intervention and combined in a narrative synthesis, no weighting of studies was undertaken but differences in studies were discussed. Summaries of studies were reported in tables, although there are some anomalies between tables and text.

Results

Number of studies included in the review: 14; 3 RCTs, 1 CRCT, 2 controlled studies, 1 case control study, 7 uncontrolled studies.
Number of participants: Not explicitly reported; more than 18,220.
Results of the validity assessment: None of the studies were rated as outstanding. Out of the 9 individual level studies, 4 were rated as satisfactory and 1 as unacceptable. 4 were not rated due to small sample sizes or a lack of control group. Out of the 4 instituational level studies, 1 was rated as satisfactory and 3 were not rated due to the lack of a control group. The 1 study that assessed both individual and institutional level interventions, was not rated.
Individual level interventions - Tobacco smoking (7 studies): Duration of follow-up ranged from 3 weeks to 6 months in the studies. Clear definitions of abstinence in terms of nonsmoking were not provided in any of the studies. Two studies reported significant reductions in the amount smoked at post intervention compared to pre-intervention. Both studies assessed couselling in combination with advice for scheduled smoking reduction, and self-help materials. However, in both studies the length of follow-up was only 3 weeks, and only 9 and 13 participants were included in the two studies respectively. In the studies that used a comparison group, the abstinence rates tended to be higher in the intervention groups compared to the control groups, but these were not significantly different. One study reported a quit rate of 33% at 1 year, but had included only 24 participants. In another study, students who were counselled by physicians felt that the advice was helpful, but did not believe that it help their quitting. In a further study, a signficantly higher percentage of of students exposed to a computer-assisted intervention advanced through the stages of readiness to quit compared to those exposed to regular health education (48% versus 21% respectively) at 6 week follow-up. The difference did not persist at 3 and 7 months follow-up.
Smokeless tobacco use (3 studies; 1 RCT, 1 case control study & 1 uncontolled study): Three studies targeted athletes specifically. The RCT examined the effectiveness of a self-help manual in combination with education. The results showed there was a 14.5% self-reported quit rate at 3 months, but no differences between those exposed to either 4 or 2 sessions were noted, with quit rates of 14.7% and 10.6% respectively. The case control study assessed the effectiveness of an oral examination in combination with a self-help guide and counselling. The results showed that at 1 year follow-up, the cessation percentages were 34.5% at intervention colleges compared to 15.9% at control colleges (p=0.008). Sustained abstinence was also noted to be higher in the intervention groups, with 13% of those who quit at 3 months remaining abstinent at 1 year compared with 9% in the control group. The final study which was uncontrolled, also assessed the effectivenes of an oral examination in combination with counselling, education and enforcement of a policy against smokeless tobacco use. Quit rates were not reported. However, slight improvements in attitudes towards quitting, and knowledge were reported from baseline.
Institutional level interventions - Tobacco smoking (1 controlled and 3 uncontrolled studies): The institutional level interventions assessed were smoking restrictions, smoke-free policies, anti-tobacco messages, and the impact of state and local-level pricing and restrictions. The main outcome measures assessed were student perception, approval of and compliance with institutional policies, and cigarette consumption. In 2 studies, smoking restrictions were found to be acceptable to both smokers and non-smokers. The first study found that 28% of men and 30% of women surveyed were smoking fewer cigarettes 1 month after policy implementation. The second study showed that quit rates increased significantly from 2% to 3.5% in their intervention group, whilst they remained constant at 3.8% in the control group. A third study examined the effect of anti-smoking messages in designated smoking areas, by assessing the number of whole cigarettes smoked outside the building. The results showed a 35% reduction in whole cigarettes smoked outside the building during the intervention week compared to baseline. The final study examined the impact of 2 tobacco policies - state- and local-level pricing, and restrictions on smoking by college students. The survey found that the price of cigarettes and cigarette excise taxes had a significant negative impact on smoking by college students. A 10% increase in price would reduce smoking participation by over 5% and consumption among smokers by 4.2%, to 7.9% Smoking restrictions in public and private places had less effects than those of pricing.
Differential effects: NR
Adverse effects: NR
Publication bias: NR

Conclusions

While some promising results have been noted, rigorous evaluations of a wider range of programmes are needed, along with studies that address cultural and ethnic diversity on campuses.
Implications for practice: NR
Implications for research: NR

Studies included in the review that appear to report data about differential effects: the whole review targets teenagers:

Chaloupka FJ, Wechsler H. Price, tobacco control policies and smoking among young adults. J Health Econ 1997; 16: 359-73.
Darmody DL, Ehrich B. Snuffing it out: a smokeless tobacco intervention with athletes at a small private college. J Am College Health 1994; 43: 27-30.
Apel M, Klein K, McDermott RJ, Wersthoff WW. Restricting smoking at the University of Koln, Germany: a case study. J Am College Health 1997; 45: 219-23.
Etter JF, Ronchi A, Perneger TV. Short-term impact of a university based smoke free campaign. J Epidemiol Community Health 1999; 53: 710-5.
Hodges J, Srebro K, Kane J, Fruhwirth M, Chambliss C. Use of a visual prompt to reduce public cigarette smoking on a college campus. PA: Clearinghouse Counseling and Personnel Services, 1999.

Adults and the general population

Author: el-Guebaly (2002)[22] **Country: Canada**	**Title: Public health and therapeutic aspects of smoking bans in mental health and addiction settings.** **Objective/review question: To investigate the impact of smoking bans on smokers who are mentally ill or substance dependent.** **SES explicit target? No.** **Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: Yes Restricted to English language studies only: Unclear
Experts contacted: No Search terms reported: Yes Search dates reported: Yes
Search sources/dates: MEDLINE (1997 to 2001), CINAHL (1990 to 2001), PsychINFO (1990 to 2001), Best Evidence/EBM Reviews (1991 to 2002), HealthSTAR (1996 to 2001), The Cochrane Database of Systematic Reviews (2001), EMBASE (1990 to 2002), Legal Trac (1990 to 2002), BIOETHICSLINE (1973 to 2001), Philosopher's Index (1980 to 2002) and Dissertation Abstracts (1990 to 2002) were searched. In addition, the references of the retrieved articles were checked and unpublished studies were identified via searches of the Internet.

Inclusion/exclusion criteria

Interventions: Studies of smoking bans were eligible for inclusion. In studies of in-patients, bans could either be total (no smoking allowed within the facility or on passes) or partial (smoking allowed within restricted areas and on passes). In studies of out-patients the type of bans implemented were unclear, with bans being implemented in out-patient waiting rooms and day hospital programmes.
Participants: Psychiatric patients or patients being treated for addictions, who were either in-patients or attended out-patient departments or day hospitals were included. Involuntary status, where reported, ranged from 55% to near 100%. Seven out of seventeen of the studies, also included members of staff.
Outcomes: The inclusion criteria for the outcomes were not reported. The authors reported behavioural changes. The indicators used included the use of restraints or seclusion, the occurrence of assault or injury, the number of calls to security, discharges against medical advice or elopements, medication changes and records of illicit smoking. The Ward Atmosphere Scale and the Overt Aggression Scale were the most common instruments used. Structured questionnaires were used in some studies to assess the attitudes to, and impact of, smoking bans. The studies in addiction settings focused on the smokers' interest in quitting before and after the smoking ban.
Study designs: No inclusion criteria were stated for study design. Chart reviews, interviews and questionnaires were included. The study design was not reported for 2 studies.

Methods of review

Study selection procedure: No information on how the studies were selected for the review or on the number of reviewers selecting studies was reported.
Validity assessment tool: NR
Validity assessment procedure: NR
Data extracted from primary studies: 17 of the 22 studies were tabulated; details of the study design, behavioural changes, and the results of questionnaires completed by the staff and patients were included.
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? Studies were combined in a narrative synthesis.
How were studies weighted in the synthesis? No method of weighting appears to have been used.
How was publication bias assessed? The authors did not assess publication bias.
How was heterogeneity assessed? Differences between the studies were tabulated to some extent and discussed in the text. Studies reporting the effects of total smoking bans (n=7) and partial smoking bans (n=7) were tabulated separately, as were studies where the bans were implemented in in-patient and out-patient settings (n=3).

Quality assessment

Is there a well defined question? Review question was broad and was only explicitly defined in terms of the interventions.
Is there a defined search strategy? Yes, search dates and terms were reported. However, it is unclear whether any language restrictions were applied.
Are the inclusion/exclusion criteria stated? Explicit inclusion criteria stated for the interventions only. Inclusion criteria for participants could easily be inferred, but no criteria for study designs or outcomes were stated or could be inferred.
Are the study designs and number of studies clearly stated? Study design was not reported for 7 of the studies and no information was tabulated for 5 of these. Total number of included studies was not reported and had to be inferred.
Have the primary studies been quality assessed? No.
Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? Unclear.
Reviewer's comments: The review question was broad and only explicitly defined in terms of the interventions. The search was adequate and efforts were made to minimise publication bias. However, it is not clear whether any language restrictions were applied. No information was provided on how the decisions for inclusion were made, or whether study validity was assessed. Some details of the included studies were reported; however, from the limited information provided it is not possible to judge the validity of the evidence. This, along with the lack of clearly stated inclusion criteria, means that selection bias cannot be ruled out. The decision to combine the studies narratively was appropriate given the varied nature of the included studies and the outcomes assessed. The reader cannot

directly compare the addiction setting with psychiatric in-patient, waiting room and day hospital settings, as any tabulation of studies carried out in addiction settings was lacking. The conclusion that smoking bans have little effect on the behaviour of psychiatric patients seems to be supported by the literature presented, but this may be incomplete.

Results

Number of studies included in the review? 22 were included, but details were only tabulated for 17: 9 chart reviews, 1 chart review in combination with an interview, 4 questionnaires, 1 questionnaire in combination with an interview, and 7 studies in which the study design was not reported (for 5 of these no details were provided in tables).
Number of participants: Total not reported (approximately 2,538 in the 17 studies that were tabulated).
Results of the validity assessment: NR
Only 3 studies, all with total bans, reported behavioural changes; 2 reported a decrease in hostility and aggression, and one reported an increase in aggression and also increased anxiolytic use early in the ban. No changes in the number of patients discharged against medical advice were observed. The questionnaires showed mixed feelings among patients with total bans, with members of staff being more positive than patients. Studies with partials bans reported no behavioural changes. The questionnaires again showed more support among staff than patients for the ban.
Two of the studies in addiction settings found total bans increased interest in quitting smoking (from 24% to 61% after the ban) and was associated with a higher proportion of patients abstaining from smoking (41% after the ban compared with 9% before the ban). The attitudes towards bans were mixed, with partial bans not as unpopular as expected in one study, but in a further study they were not supported by staff, and were unacceptable (along with total bans) to heavy smokers in a third.
Differential effects: NR
Adverse effects: Increase in anxiety among smokers. Overall, no adverse effects on drug or alcohol treatment were observed in the studies.
Publication bias: NR

Conclusions

Policies of total or partial smoking bans had no major long-standing untoward effect in terms of behaviour in psychiatric patients. However, the policies also had little or no effect on smoking cessation. Smoking cessation strategies should be introduced as an inherent component of policies that ban smoking.
Implications for practice: The authors stated that smoking cessation strategies, such as supportive counselling and pharmacotherapy, should be an inherent component of policies that ban smoking. Flexibility is recommended for the protection of non-smokers while promoting a therapeutic agenda for smokers.
Implications for research: The authors stated that more prospective studies are needed.

Studies included in the review that appear to report data about differential effects: the whole review targets patients with mental health or substance abuse disorders:

Smith C, Pristach C, Cartagena M. Obligatory cessation of smoking by psychiatric patients. Psychiatric Services, 50: 91-94, 1999.
Dingman P, Resnick M, Bosworth E, et al. A non-smoking policy on an acute psychiatric unit. Journal of Psychosocial Nursing 26: 11-14, 1988.
Resnick M, Bosworth E. A smoke-free psychiatric unit. Hospital and Community Psychiatry 40: 525-527, 1989.
Jonas J, Eagle J. Smoking patterns among patients discharged from a smoke-free inpatient unit. Hospital and Community Psychiatry 42: 636-637, 1991.
Haller E, McNiel D, Binder R. Impact of a smoking ban on a locked psychiatric unit. Journal of Clinical Psychiatry 57: 329-332, 1996.
Velasco J, Eells T, Anderson R, et al. A two-year follow-up on the effects of a smoking ban in an inpatient psychiatric service. Psychiatric Services 47: 869-871, 1996.
Quinn J, Inman J, Fadow P. Results of the conversion to a tobacco-free environment in a state psychiatric hospital. Administration and Policy in Mental Health 27: 451-453, 2000.
Bronaugh T, Frances R. Establishing a smoke-free inpatient unit: is it feasible? Hospital and Community Psychiatry 41: 1303-1305, 1990.
Smith W, Grant B. Effects of a smoking ban on a general hospital psychiatric service. Hospital and Community Psychiatry 40: 497-450, 1989.
Thorward S, Birnbaum S. Effects of a smoking ban on a general hosptial psychiatric unit. General Hospital Psychiatry 11: 63-67, 1989.
Taylor N, Rosenthal R, Chabus B. The feasibility of smoking bans on psychiatric units. General Hospital Psychiatry 15: 36-40, 1993
Patten C, Bruce B, Hurt R. Effects of a smoke-free policy on an inpatient psychiatric unit. Tobacco Control 4: 372-379, 1995.
Rauter U, deNesnera A, Grandfield S. Up in smoke? Linking patient assults to a psychiatric hospital's smoking ban. Journal of Psychosocial Nursing 35: 35-40, 1997.
Downey L, Pomerleau C, Huth A. The effect of a restricted smoking policy on motivation to quit smoking in psychiatric patients. Journal of Addictive Diseases 17: 1-7, 1998.
Munetz M, Davies M. Smoking by patients. Hospital and Community Psychiatry 38: 413-14, 1987.
Maiuro R, Michael M, Vitaliano P. Patient reactions to a no smoking policy in a community mental health center. Community Mental Health Journal 15: 71-77, 1989.
Steiner J. Becoming a smoke-free day hospital. International Jourall of Partial Hospitalization 7: 155-159, 1991.
Joseph A, Nichol K, Willenbring M, et al. Beneficial effects of treatment of nicotine dependence during an inpatient substance abuse treatment program. JAMA 263: 3043-3046, 1990.
Joseph A. Nicotine treatment at the drug dependence program of the Minneapolis VA Medical Center. Journal of Substance Abuse Treatment 10: 147-152, 1993.
Goldsmith R, Hurt R, Slade J. Development of smoke-free chemical dependency units. Journal of Addictive Diseases 11: 67-77, 1991.
Hurt R, Croghan I, Offord K, et al. Attitudes towards nicotine dependence among chemical dependency staff before and after a smoking cessation trial. Journal of Substance Abuse Treatment 12: 247-252, 1995.
Kempf J, Stanley A. Impact of tobacco-free policy on recruitment and retention of adolescents in residential substance abuse treatment. Journal of Addictive Diseases 15: 1-11, 1996.

Author: Ivers (2003)[23] **Country: Australia**	**Title: A review of tobacco interventions for Indigenous Australians.** **Objective: To summarise findings of interventions to reduce harm resulting from tobacco use among Indigenous Australians.** **SES explicit target? No** **Does the review either present data on or discuss differential effects being present in any of the included studies? Yes**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: Yes References checked: Unclear Restricted to English language studies only: Yes
Experts contacted: Unclear Search terms reported: Yes Search dates reported: Yes
Search sources/dates: MEDLINE, Psychlit, Cinahl, Health Star, APAIS, Aboriginal and Torres Strait Islander Clearinghouse and Cochrane database were searched for articles published in English from 1980 to March 2001. Hand Searches: Aboriginal Health Worker 1979 to 2000, Aboriginal and Islander Health Worker Journal 1991to 1999, Australian Journal of Public Health 1991to 2000, Community Health Studies 1977 to 1990. Information on program delivery was sought from all State & Territory health dept, independent lobby groups, non-government organisations such as National Heart Foundation, Anti Cancer Council, Asthma Foundation and Indigenous health organisations.

Inclusion/exclusion criteria

Interventions: Studies of "tobacco interventions" included.
Participants: Only studies relating to Indigenous Australians were included. Indigenous defined as "all Aboriginal or Torres Strait Islander Australians". No other details provided.
Outcomes: No inclusion criteria were stated in relation to outcomes. No studies evaluated smoking cessation as an outcome. One study reported qualitative analysis of focus group interviews on perceptions of introduction of a smoke-free workplace.
Study Design: No inclusion criteria specified. Included studies described as qualitative analysis of focus group interviews, evaluation report of CD-Rom in traditional language (all classed as low rating on evidence rating scale).

Methods of review

Validity assessment tool: Study quality was assessed according to the National Health and Medical Research Council (NHMRC) evidence rating system.
Validity assessment procedure: NR
Data extracted from primary studies: Intervention, author, date, description of study, quality of evidence.
Data extraction procedure: NR
Summary of how the studies were combined: Meta analysis: No Narrative synthesis: Partial Vote Count: No
How were studies combined in the review? Information from studies was tabulated, and combined narratively.
How were studies weighted in the synthesis? No method of weighting appears to have been used.
How was publication bias assessed? Publication bias was not assessed.
How was heterogeneity assessed? Heterogeneity was not formally assessed.

Quality Assessment:

Is there a well defined question? Partial. Question is partially defined in terms of interventions and outcomes – very broad.
Is there a defined search strategy? Yes.
Are the inclusion/exclusion criteria stated? Inclusion/exclusion were only stated for the participants and interventions. No inclusion criteria reported for the outcomes and study designs.
Are study designs and numbers of studies clearly stated? Yes.
Have the primary studies been quality assessed? Yes.
Have the studies been appropriately synthesised? Due to lack of studies, synthesis was not possible.
Has more than one author been involved in each stage? Unclear.
Reviewers comments:
Review is poorly reported with very little information presented. Review question was broad. Authors did not report explicit inclusion criteria in terms of study design or outcomes. Broadly appears any studies that included Indigenous Australians were included but reporting details are minimal. Only English language studies included. Review also looks at likely effect of tobacco interventions in an indigenous setting considering interventions trialled in other populations but this is not systematically evaluated and is conjecture (authors comment that results from other populations are not generalisable).

Results

Number of studies included in the review: Four studies included in the review.
Number of participants: NR
Results of the validity assessment: One study was “unclassified” in terms of quality assessment by authors.
Three studies related to health promotion programs, but these did not report evaluations of the interventions. One study at ‘population level’ assessed Indigenous peoples’ perceptions about the introduction of smoke-free work places. - policies on banning smoking in mainstream organisations may have some effect on encouraging some Indigenous people to quit.

Differential effects: NA given sparcity of data. Adverse effects: NR Publication bias: NR
Conclusions The review for Indigenous people showed a number of small tobacco programs had been conducted, particularly in the area of health promotion, but few had been evaluated. No programs had been run or evaluated specifically for Torres Strait Islander people. Implications for research: Review showed that there was almost no research into the effectiveness of program deliveries in the area of tobacco control for Indigenous Australians. Implications for practice: NR
Studies included in the review that appear to report data about differential effects: Seibold M. Indigenous Tobacco Control Pilot Project: Process Evaluation, Workplace Policy Development Pilot, Phase One. Brisbane: Queensland Health; 2000.

Reference: Moher (2004[24] **Country: UK**	**Title: Workplace interventions for smoking cessation.** **Objective/review question: The primary objective was to assess the effectiveness of workplace interventions to reduce tobacco consumption and promote smoking cessation. The secondary aim was to compare the effectiveness of different workplace smoking programmes.** **SES explicit target? No.** **Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: Yes Restricted to English language studies only: No.
Experts contacted: No Search terms reported: Yes Search dates reported: Partial
Search sources/dates: The Cochrane Tobacco Addiction Review Group register, EMBASE, MEDLINE and PsycINFO were searched until November 2002. Search terms were reported, but the inception search dates were not. In addition references of the identified studies, and previous reviews and meta-analyses were scanned.

Inclusion/exclusion criteria

Interventions: Studies which evaluated interventions either aimed at individuals in the workforce, or aimed at the workforce as a population were eligible for inclusion. The specific interventions aimed at individuals were individual and group counselling, self-help materials and nicotine replacement therapy. The specific interventions aimed at the workforce as a whole were tobacco smoking bans and restrictions, social support, environmental support, incentives, comprehensive multi-component programmes and competitions and recruitment.
Participants: Adults over 18 years of age who smoked were included. Participants were from a range of worksites including hospitals, public services, private companies, universities and manufacturing. Studies included both blue and white collar workers, males and females.
Outcomes: Studies that assessed smoking cessation rates and smoking prevalence rates with at least 6 months of follow-up were eligible. In addition, outcomes relevant to organisational behaviour (such as rates of absenteeism) were also recorded.
Study designs: Interventions aimed at helping individuals to stop smoking had to be evaluated using RCTs or CRCTs. RCTs, CRCTs, controlled trials with pre and post intervention data reported, and interrupted time series studies were eligible for the evaluation of smoking restrictions and bans.

Methods of review

Study selection procedure: Two reviewers independently assessed studies for inclusion, with any disagreements being resolved by discussion.
Validity assessment tool: Validity was assessed according to the adequacy of randomisation, allocation concealment, follow-up of participants, and whether outcome assessment was verified by biochemical measurement.
Validity assessment procedure: Validity was assessed by one reviewer and checked for accuracy and agreement by a second.
Data extracted from primary studies: Data were extracted on the setting and study design, number of worksites and participants, the interventions, and the outcomes.
Data extraction procedure: Data were extracted by one reviewer and checked for accuracy by a second. Data on quit rates were abstracted using the number randomised as the denominator, with the assumption that those lost to follow-up (or not reported) continued to smoke.
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? The studies were grouped by intervention and combined in a narrative synthesis.
How were studies weighted in the synthesis? Studies were weighted by study design.
How was publication bias assessed? NR
How was heterogeneity assessed? Differences between the studies were discussed in relation to the study setting, the intervention (type of intervention, duration and intensity), and the study design.

Quality assessment

Is there a well defined question? Yes. Questions were defined in terms of the interventions, participants, outcome measures and study designs.
Is there a well defined search strategy? Yes. Search terms reported, inception search dates not reported.
Are the inclusion/exclusion criteria stated? Yes.
Are the study designs and number of studies clearly stated? Yes.
Have the primary studies been quality assessed? Yes.
Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? Yes.
Reviewers' comments: The review question was well defined. The search was adequate, although no handsearching was undertaken. However references were checked. Inception dates of searches were only partially reported. Inclusion criteria were reported in terms of interventions, participants, outcomes and study designs. Studies were quality assessed. Studies were grouped by intervention and weighted by study design and combined into a narrative synthesis. Differences between studies were explored in terms of study setting, intervention and study design.

Results

Number of studies included in the review: Fifty-three; 25 RCTs, 15 CRCTs and 13 pre-post studies.
Number of participants: The number of participants in the included studies was unclear, but was more than 53,708.
Results of the validity assessment: Five of the included studies (9.4%) reported randomization procedures in sufficient detail to be rated A for their attempts to control selection bias. The majority of

included studies (60%) either did not describe how randomization was performed or reported in insufficient detail to determine whether a satisfactory attempt to control selection bias had been made (rated B). Thirteen studies did not use a RCT design at all (rated D, not applicable). In one study blinding was broken at three months and participants were free to choose the level of treatment they preferred; in another two studies a few control group participants were allowed to move into the intervention group; one study modified its randomization procedure partway through the study. One Japanese study was included on the basis of data derived from the abstract alone. Of the 53 studies in which intervention was provided to individuals, 37 (70%) used some form or combination of biochemical verification procedures for at least one follow-up point. These included butt counts, environmental nicotine vapour monitoring, respirable particulate levels, carbon monoxide ((CO) in 50% of the included studies), and urinary and salivary cotinine. The participation rates in the included studies ranged from 11% to 88%.

The studies that assessed workplace tobacco control policies and bans, included two quasi-experimental designs which employed a matched workplace without a policy, and 12 studies with a one or two post-test cross-sectional uncontrolled design. Biochemical validation of quit rates was used in only 2 studies. Two studies reported environmental nicotine vapour levels and one study measured levels of respirable suspended particulates. Four studies reported perceptions of decreased exposure to smoke or improved air quality.

39 studies assessed 'individual' level interventions (group behavioural interventions, individual counselling, computerised interventions, video studies, self-help materials, social support and environmental support).

Smoking bans/policy (14 studies; 1 CRCT and 13 pre-post studies):
Cigarette consumption: In 8 studies smoking policies or bans were associated with a reduction in the number of cigarettes consumed during working hours. One study reported that the percentage of smokers consuming 15 or more cigarettes daily at work declined from 16.9% prior to 7.5% after 1 month and 4.9% after 6 months ($p < 0.001$). However, there was less consistent evidence that the overall daily consumption decreased. Eight studies reported a small decrease in overall consumption while 3 studies confirmed no decrease or a slight increase.
Smoking prevalence: There was inconsistent evidence that smoking prevalence can be reduced with smoking policy or ban interventions, with 5 studies reporting no change, and 4 studies reporting small decreases. One study, however, reported a decrease in prevalence from 22% to 14% at 12 months after the ban ($p < 0.003$), as did a further study, which detected a decrease from 29% to 24% at 12 months ($p < 0.001$).
Quit rates: One study reported that the 3 month carbon monoxide validated quit rates were higher in the workplace with a policy compared to one without (9.2% versus 1.4%; $p<0.02$), as were the 9 month validated quit rates of 10.8% versus 2.9% ($p<0.03$). One study found a net decrease in cessation rates of 4% (7% in the policy hospital versus 11% in the comparison hospital; no p value reported).
Environmental nicotine vapour levels and exposure to ETS: Two studies found there was a decline in observed smoking by both staff and visitors, and in environmental nicotine level by 1 or 2 orders of magnitude. Another study measured respirable suspended particulates in a number of buildings, and detected lower levels throughout (p values ranged from <0.05 to <0.001). A further 3 studies reported perceptions of decreased exposure to smoke, and improved air quality.

Acceptability of restrictions and bans (14 studies): Twelve of the 14 studies on smoking bans/policies addressed this issue directly. Six studies were conducted in a hospital setting. The first study reported that 20 months after the introduction of a restrictive policy, 93% of non-smoker responders (staff and patients) and 83% of smoker responders approved of the policy. Staff compliance in non-smoking areas was variable, with some friction between smokers and non-smokers in some areas. Patient compliance led in some cases to displacement of smoking rather than to reduction. The second study found that smoking bans in a children's hospital was associated with widespread acceptance of the policy, with 93% of non-smokers and 66% of smokers approving. Complete compliance was achieved in public areas, with daily lobby butt counts falling from 940 to 19. Within 6 months of the ban, environmental nicotine vapour had declined from 13 to 0.51 ng per cubic metre ($p = 0.03$). The third study assessed the impact of a restrictive policy in a general hospital. Over 90% of smokers questioned and two-thirds of non-smokers thought that the policy was "a good idea". At 12 months follow-up, 5% of non-smokers at the policy hospital reported being bothered by smoke, compared with 25% at the comparison hospital (95%CI; 8%, 32%). None of the smokers felt that their performance had improved under the policy, compared with 21% of non-smokers who felt that improved air quality helped them to concentrate better. However, none of the non-smokers felt that their performance had deteriorated, compared with 19% of the smokers. The fourth study of a no-smoking policy in a medical institution found that nearly 80% of staff accepted the policy. At baseline a majority of employees (two-thirds of them smokers) said they were bothered by other people's smoke, and 35% were greatly bothered by it. At 12 months follow-up, 74% stated that the policy had improved discomforts such as burning eyes, sinus problems, cough, headaches and the smell of smoke. The fifth study assessing a hospital setting found that 12 months after the ban implementation 80.5% of employees said their workplace was smoke free, compared with 72% three months post-ban, and 41.5% before the ban ($p < 0.01$). Support for the ban increased from 59% pre-policy to 68% at 12 months post-ban. Due to the fact that inpatients were permitted to smoke indoors, 20% of employees continued to report exposure to environmental smoke. The last study, conducted in Canadian health and welfare workplaces evaluated a restrictive policy and reported a decrease in the perception of being bothered by smoke in all tested areas except for the cafeterias. These included some designated smoking areas. Approx. 62% of employees stated that air quality had improved after the policy. Differences between smokers and non-smokers were not assessed. The mean levels of respirable particulates were also found to have decreased significantly in all areas where they were measured, by 27% ($p < 0.001$) to 47% ($p < 0.001$). The restrictive policy had been developed by thorough consultation and consensus between workforce and management.

Two further studies were conducted in a medical centre setting. The first study found a reduction in cigarette butts of 80.7% in the lobbies, lounges and entrances, and 96.8% in the waiting areas at 8 month follow-up. The fire incidents went from an average of 20 per year to nil in the first year of policy implementation. The level of environmental tobacco smoke, measured by passive-diffusion nicotine

monitors, fell significantly in cafeterias (7.06 to 0.22; p = 0.0007), waiting areas (3.88 to 0.28; p = 0.0003), patient areas (0.84 to 0.12; p = 0.04), offices (2.05 to 0.12; p = 0.003), staff lounges (2.43 to 0.12; p = 0.003) and the corridors and elevators (2.28 to 0.20; p = 0.02). The only area not to achieve statistically significant reductions was the restrooms (17.71 to 10.0). Acceptance and compliance were not assessed in the study. The second study found that at baseline acceptance of the policy was 65.3%. At 12 months follow-up, acceptance had risen significantly to 78.5% (p < 0.01). Fewer smokers (25.7% pre-ban versus 16% post-ban) planned to maintain their level of smoking (p < 0.05), and more smokers (7.9% pre-ban versus 24% post-ban) planned to stop smoking in the future (p < 0.01).

One study undertaken in a university setting examined support for the adoption of a smoke-free policy, at baseline and 6 month follow-up, and compared it with a policy-free adjacent campus. Both sites at baseline supported the idea of a ban (intervention site 75.8%, control site 73.2%), although never-smokers were more strongly supportive (89.3% and 85.7% respectively) than were current smokers (37.8% and 31.3% respectively). At follow-up, smoker disapproval was still above 60% on both sites.

One survey conducted in an Australian telecommunications company showed that at 18 months post-ban 81% of respondents approved or strongly approved of the policy, with 53% of smokers approving: 33% of responders reported some tension between smokers and non-smokers, with this perception closely correlated with ban violations (r = 0.71). Perceived work performance was unchanged.

Two studies were conducted in 'general office' setting. The first study reported increased non-smoker satisfaction with the policy, and decreased smoker satisfaction. At 6 month follow-up 61.8% compliance was reported. The average number of days per week that responders reported being bothered by co-workers' smoke declined significantly (p < 0.001) over the 6 months, and the number never bothered by smoke doubled from 41% to 80%. The second study found that the number of people who reported being bothered by other people's smoke declined post-ban from 60% to 29% among non-smokers, and from 14% to 6% among smokers. Approximately 73% of non-smokers and 46% of smokers across all the study sites agreed that the policy was strongly supported. 31% of smokers had anticipated impaired performance after policy implementation, but 83% post-ban reported no difference or improved efficiency, compared with 98% of non-smokers.
Differential effects: NR
Adverse effects: Tension between smokers and non-smokers noted in 1 study. In another study, 19% of smokers felt their performance deteriorated under the restrictive policy.
Publication bias: NR

Conclusions

The authors concluded that there was strong evidence that interventions directed towards individual smokers increase the likelihood of quitting smoking. These include advice from a health professional, individual and group counselling and pharmacological treatment to overcome nicotine addiction. Self-help interventions are less effective. All these interventions are effective whether offered in the workplace or elsewhere. Although people taking up these interventions are more likely to stop, the absolute numbers who quit are low. Limited evidence that participation in programmes can be increased by competitions and incentives organized by the employer. Consistent evidence that workplace tobacco policies and bans can decrease cigarette consumption during the working day by smokers and exposure of non-smoking employees to environmental tobacco smoke at work, but conflicting evidence about whether they decrease prevalence of smoking or overall consumption of tobacco by smokers. A lack of evidence that comprehensive approaches reduce the prevalence of smoking. A lack of evidence about the cost-effectiveness of workplace programmes.
Implications for practice: If properly implemented, workplace tobacco policies and bans reduce exposure of non-smoking employees to environmental tobacco smoke at work. However, there is less consistent evidence that they decrease consumption during the day among employees who smoke. There is conflicting evidence about whether they decrease prevalence of smoking or overall tobacco consumption by smokers.
Implications for research: There is a lack of data on economic aspects of workplace cessation programmes. Future studies should include measurement of direct and indirect costs, and where possible economically relevant outcomes such as absenteeism and productivity should be assessed.

Studies included in the review that appear to report data about differential effects:

Sorensen G, Hammerstein J, Hunt M, Youngstrom R, Hebert J, Hammond S, et al. A model for worksite cancer prevention: integration of health protection and health promotion in the WellWorks Project. American Journal of Health Promotion 1995;10:55-62.
Sorensen G, Stoddard A, Hammond S, Hebert J, Ockene J. Double jeopardy: job and personal risks for craftspersons and labourers. American Journal of Health Promotion 1996;10:355-363.
Sorensen G, Stoddard A, Hunt MK, Herbert JR, Ockene JK, Acronym JS, et al. The effects of a health promotion-health protection intervention on behaviour change: the Well Works study. American Journal of Public Health 1998;88:1685-1690.
Sorensen G, Stoddard A, Ockene JK, Hunt MK, Youngstrom R. Worker participation in an integrated health promotion/health protection program: Results from the WellWorks Project. Health Education Quarterly 1996;23:191-203.
Sorensen G, Stoddard AM, LaMontagne AD, Emmons K, Hunt MK, Youngstrom R, et al. A comprehensive worksite cancer prevention intervention: behavior change results from a randomized controlled trial (US). Cancer Causes and Control 2002;13:493-502.

Reference: Fichtenberg (2002)[25] Country: US	Title: Effect of smoke-free workplaces on smoking behaviour: systematic review. Objective: To assess the effects of smoke-free workplaces on cigarette consumption and to compare these effects with results from raising taxes. SES explicit target? No. Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: Yes Restricted to English language studies only: Unclear
Experts contacted: No Search terms reported: No Search dates reported: No
Search sources/dates: MEDLINE, the Science Citation Index, the Social Sciences Citation Index, Current Contents and PsycINFO were searched. In addition, reviews and reference lists in identified studies were checked.

Inclusion/exclusion criteria

Interventions: Studies of policies of smoke-free workplaces were eligible for inclusion. Studies of policies that were not totally smoke-free were excluded.
Participants: Studies of employees in workplaces with unrestricted and completely smoke-free environments were eligible for inclusion. These included Government offices, hospitals, universities, a telecom company, an ambulance service and a health maintenance organisation. The studies were conducted in various countries including the US, Australia, Canada and Germany.
Outcomes: Studies that assessed cigarette consumption (per day and per employee) and smoking prevalence were eligible for inclusion. The time to follow-up ranged from 1 to 24 months (mean 10; median 9).
Study designs: No inclusion criteria were specified in relation to study designs. The included studies were described as 'worksite studies' (prospective or retrospective cross-sectional studies) and 'population studies' (cross-sectional studies).

Methods of review

Study selection procedure: No information was reported on how the studies were selected or on the number of reviewers involved.
Validity assessment tool: NR
Validity assessment procedure: NR
Data extracted from primary studies: Information on the following were tabulated: year of study, setting, study design, time to follow-up, the number of people used to estimate consumption per continuing smoker, and the number of people used to estimate prevalence of current smokers. For worksite and population studies, the following were estimated for each study: the absolute change and standard error (SE) in consumption per continuing smoker; the absolute percentage change and SE in the prevalence of current smokers; and the absolute and relative percentage change in cigarettes per day, per employee. Details of the methods used to estimate the SE were not reported.
Data extraction procedure: No details about how the reviewers extracted the data were provided.
Summary of how the studies were combined in the review: Meta-analysis: Yes Narrative synthesis: No
Vote counting methods: No
How were studies combined in the review? After ascertaining that there was no difference between the results from worksite and population studies, or between studies according to study design, all the studies were pooled using a random-effects model. The pooled absolute reduction in prevalence of smoking and decreased cigarette consumption per smoker among continuing smokers were estimated, along with the 95% confidence intervals (CIs) and used to calculate the relative reduction (RR) and 95% CI in consumption per employee.
How were studies weighted in the synthesis? NR
How was publication bias assessed? Publication bias was assessed using a funnel plot.
How was heterogeneity assessed? Differences between worksite and population studies were compared using t-tests. The results from different study designs were compared using analysis of variance. The influence of time to follow-up was examined by estimating the correlation between time and prevalence, consumption per smoker and consumption per employee. There were no differences between workplace and population studies, but sequential cross-sectional studies yielded significantly smaller changes in the number of cigarettes per smoker than the other study designs.

Quality assessment

Is there a well defined question? Yes. The question was clear in terms of the interventions, participants and outcome measures. No a priori criteria were defined for study designs.
Is there a defined search strategy? Unclear. No search terms or dates were reported.
Are the inclusion/exclusion criteria stated? Yes. The interventions, participants and outcomes were defined. Study design was not defined a priori.
Are the study designs and number of studies clearly stated? Yes. The type of study designs were reported separately in the tables.
Have the primary studies been quality assessed? No.
Have the studies been appropriately synthesised? The analysis appears to be appropriate. Differences between the studies were assessed prior to pooling, using a random-effects model. However, it does appear that the studies were not weighted.
Has more than one author been involved at each stage of the review process? Unclear.
Reviewer's comments: The review question was clear in terms of the intervention, participants and outcomes. Several relevant sources were searched, but the search terms and dates were not stated and it was not reported whether any language restrictions had been applied. Publication bias was assessed using a funnel plot. The methods used to select the studies, assess validity and extract the

data were not described, hence, efforts made to reduce bias and errors cannot be judged. The quality of the included studies was not assessed. Some relevant information was tabulated, but there was no information on the validity of the methods used to assess smoking behaviour. Statistical heterogeneity was not formally assessed, but differences between workplace and population studies and between cross-sectional studies and other studies were examined before combining the studies in a meta-analysis.

Results

Number of studies included in the review: Twenty-six studies were included: 8 prospective cohort studies, 7 sequential cross-sectional studies, 6 retrospective studies, and 5 population surveys.

Number of participants: Approximately 120, 000.

Results of the validity assessment: NR

Totally smoke-free policies significantly reduced the absolute prevalence of smoking and decreased cigarette consumption per smoker among continuing smokers: the reduction in absolute prevalence was 3.8% (955 CI: 2.8, 4.7) and the decrease in consumption was 3.1% (95% CI: 2.4, 3.8). The reduction in consumption per employee was 29% (95% CI: 11, 53). The effect of smoke-free policies did not change over time for prevalence, (r=0.08; p=0.75), consumption per smoker (r=-.45; p-0.09) or consumption per employee (r=0.28; p=0.43).

Comparison with tax increases: The increase in tax required per cigarette pack to produce a similar reduction (29%) in smoking per capita was estimated to range from $0.76 to $3.05 in the USA, and from £3.44 to £6.59 in the UK. Based on the results of the review, the increase in tax per pack required to produce an effect similar to that of making all workplaces smoke-free would be from $0.76 to $1.11 in the US, and from £3.44 to £4.26 in the UK. If all workplaces became smoke-free, the effect would be a decreased population consumption of 4.5% in the US and 7.6% in the UK. Such decreases were estimated to cost the tobacco industry $1.7 billion in the US and £310 million per year in the UK.

Differential effects: NR

Adverse effects: NR

Publication bias: The funnel plot showed no evidence of publication bias.

Conclusions

Smoke-free workplaces protect non-smokers from the harms of passive smoking and encourage smokers to stop smoking or reduce their consumption of cigarettes.

Implications for practice: The authors stated that smoke-free workplaces protect non-smokers from the harms of passive smoking and encourage smokers to stop smoking or reduce their consumption of cigarettes.

Implications for research: NR

Studies included in the review that appear to report data about differential effects:

Brenner H, Mielck A. Smoking prohibition in the workplace and smoking cessation in the Federal Republic of Germany. Prev Med 1992; 21: 252-261.

Kinne S, Kristal A, White E, Hunt J. Work-site smoking policies: their population impact in Washington State. Am J Public Health 1993; 83: 1031-1033.

Reference: Eriksen (1998)[26] **Country: US**	**Title: A review of the health impact of smoking control at the workplace.** **Objective/review question: To undertake a critical review of worksite health promotion program evaluations published between 1968 and 1994 that assessed the health impact of worksite smoking cessation programs and smoking policies.** **SES explicit target? No.** **Does the review either present data on or discuss differential effects being present in any of the included studies? No.**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: Yes References checked: Yes Restricted to English language studies only: Yes
Experts contacted: No Search terms reported: No Search dates reported: Yes
Search sources/dates: MEDLINE, Aidsline, Psychological Abstracts, Combined Health Information Database, Employee Benefits Info source, National Prevention Evaluation Research Collection, National Resource Centre on Worksite Health Promotion, National Technical Information Service, and the Substance Abuse Information database were searched from 1968 to 1994. The search was very broad and designed to cover 11 topics in total. In addition hand-searching of health promotion journals was undertaken and the references of included studies checked.

Inclusion/exclusion criteria

Interventions: Studies that assessed either smoking cessation programmes or tobacco control policies were eligible for inclusion. The specific interventions assessed in the smoking cessation programmes were multi-faceted interventions (co-worker support, training, lotteries, hypnosis, counselling, CBT (Cognitive Behavioural Therapy), incentives, health screening, self-help bibliography, NRT and information). The interventions assessed for tobacco control policies were smoking bans and restrictions.
Participants: No inclusion criteria were stated in terms of participants. Worksites that introduced smoking cessation programmes and smoking policies were included. The worksites included universities, health organisations, 'blue collar' companies, telephone companies, chemical plants, 'white collar' worksites, oil refinery, engineering companies, financial institutions, offices, factories, hospitals, fire-fighters and paramedics, London Post Office, London Transport, general population (recruited), asbestos-exposed shipyard and construction workers, British civil servants, and Air Force retirees. The studies were mostly conducted in the UK and US. Most of the studies were of worksite programmes (it was implied that these were for all employees) but some were limited to volunteers. Six of the tobacco policy evaluations were not worksite-based, but were based on a general population of employees within a geographical area who responded to a survey.
Outcomes: No inclusion criteria were stated for outcomes. In the smoking cessation review, the outcomes included: self-reported smoking cessation and quit attempts; biochemical measurements; self-reported daily cigarette consumption; weighing of saved cigarette butts; unobtrusive observation; corroboration of self-report status by family and friends; drop-out rate; schedules and kept appointments; participation rates; the number of people sitting in the smoking section of a cafeteria; the number of people smoking; the number of people stopping at an information table; reported nasal obstruction, cough, phlegm, dyspnoea, blood-pressure and weight; ventilatory function; and death.

In the smoking policy review, the outcomes included: self-reported cigarette consumption; cigarette butt length and weight; biochemical measurements; withdrawal symptoms; self-reported smoking status; non-smokers' self-report of being bothered by smoke in workplace; smoking cessation programme participation; self-reported 'quit because of policy' rate; changes in smoking pattern since initiation of smoking ban; nicotine dependency; self-reported effect of air quality; attempts to quit; observations of smoking; environmental nicotine vapour concentrations; self-reported policy type; perception of smokers' behaviour; and stage of change.
Study designs: No inclusion criteria were stated for study designs. RCTs, non-randomised controlled trials and observational studies were included.

Methods of review

Study selection procedure: NR
Validity assessment tool: The authors used a validity rating scale that appears to be based on overall study design alone: RCTs being the highest rating (5) and descriptive, anecdotal or authoritative reports being the lowest (1).
Validity assessment procedure: NR
Data extracted from primary studies: Data were extracted into the following categories: purpose of evaluation; description and rating of research design; comparison group; sample size and description; outcome measures; evaluation period and findings. For the smoking cessation studies, the participation rate and intervention components were also extracted.
Data extraction procedure: NR
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? Details of the smoking cessation programme evaluations and tobacco policy evaluations were tabulated and summarised narratively.
How were studies weighted in the synthesis? The studies were not weighted.
How was publication bias assessed? NR
How was heterogeneity assessed? Differences between the studies in terms of the interventions were discussed in the text. No formal test of heterogeneity was undertaken.

Quality assessment

Is there a well defined question? Partial. Explicit inclusion criteria were only stated for the interventions.
Is there a defined search strategy? Partial. The search terms were not reported.
Are the inclusion/exclusion criteria stated? Explicit inclusion criteria were only stated for the interventions. No criteria were reported for participants, study designs or outcomes.

Are the study designs and number of studies clearly stated? Yes.
Have the primary studies been quality assessed? Partial. Based upon whether studies were randomised or not and the presence/absence of a control group.
Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? Unclear.
Reviewer's comments: The authors' conclusions seem appropriately cautious given the limitations of the included studies.

Results

Number of studies included in the review: Eighty-one (23 RCTs, 13 controlled studies and 45 uncontrolled studies). These included 52 smoking cessation programmes and 29 tobacco policy evaluations.
Number of participants: Unclear.
Results of the validity assessment: Cessation literature: across the 52 studies, there were 14 no-treatment control or comparison groups. The majority of the studies used biochemical confirmation of quitting (65%) and over half (54.9%) followed participants for at least 1 year. Attrition rates were not uniformly reported. Treatment attrition was reported by 17 studies and ranged from 4% to 74%, with a median of 16%. Only five of these studies treated those who did not complete treatment and were not followed up as smokers. Twelve studies reported attrition from follow-up with 17 rates ranging from 3% to 81%, with a median of 12.3%. Three studies with five rates counted these participants as smokers. No attrition rates were reported by the remaining 15 studies for which they were applicable. Several observational studies compared the quit rates of volunteer participants and non-participants.
Smoking policy studies: Eleven studies used a pre-post cross-sectional design, and 8, a one or two post-test cross-sectional design with no baseline. Three quasi-experimental studies used a matched worksite without a policy. One study used the worksite as the unit of analysis. Six studies used population surveys to assess the relationship between worksite policy restrictions and tobacco use. Biochemical validation of quit rates was used in only three studies. An important confounding variable was that policy implementation included optional smoking cessation classes in two-thirds of the worksite studies.
Smoking cessation groups: Smoking cessation group programmes were found to be more effective than minimal treatment programmes, although less intensive treatment when combined with high participation rates can influence the total population.
Smoking policy interventions: A median reduction of 3.4 cigarettes/day was reported in the 9 studies that examined cigarette consumption at work as an outcome. Three other studies reported the % of workers who indicated they had reduced or stopped smoking at work, with a range of 12% to 39%. Two population studies showed that workers at worksites that banned smoking, smoked about 5 cigarettes fewer on workdays compared to non-workdays; for worksites with no policy, the difference was 1 cigarette per day difference.
The findings were less clear as to whether overall cigarette consumption was decreased. Out of the 29 studies, 12 reported some indication of a decrease, and 3 no decrease or a slight increase. In the studies that reported a decrease in consumption the median amount was 2.8 cigarettes/day.
In terms of smoking prevalence, 7 out of 14 studies reported no change, 6 reported decreases in prevalence (ranging from 2.9% to 6% with a median of 5%), and 1 population survey found a 6.8% difference in prevalence between workers employed in worksites with bans versus no restrictions. A net decrease in cessation rates of 4% was found in a comparison of 2 hospitals (one with a policy and one without). A further study found no differences in cessation rates across sites with varying restrictiveness policies in a telecommunications company, and another study found no difference in agreement that " a lot of smokers had quit" between workers covered by a city bylaw on worksite smoking and those outside the city jurisdiction, although 5% more of the city workers agreed that a lot of smokers had tried to quit.
Two studies reported environmental nicotine vapour levels, and one cotinine levels of non-smokers. All of the studies showed lower levels of nicotine and cotinine in worksites with bans than in those with restricted smoking and with no policy. Five studies, also reported on perceptions of decreased exposure to smoke or increased air quality. The results followed a dose-response relationship with the policy restrictiveness.
Differential effects: NR
Adverse effects: NR
Publication bias: NR

Conclusions

The literature was rated suggestive for group and incentive interventions; indicative for minimal interventions, competitions and medical interventions and acceptable for the testing of incremental effects. The smoking policy literature was rated as weak because of the lack of experimental control, although there was strong consistency in the results for reduced cigarette consumption and decreased exposure to ETS at work.
Implications for practice: The authors state that smoking cessation group programmes are more effective than minimal treatment programmes, although less intensive treatment when combined with high participation rates can influence the total worksite population of smokers. Competitions have the potential to increase programme participation. There is consistent evidence that tobacco policies decrease workday cigarette consumption by smokers and exposure to ETS at work. Practitioners should select interventions that have strong empirical evidence of effectiveness, that work to increase participation in cessation programmes, and combine policies with programming for a coherent programme of worksite smoking control. Also, they should consider the pros and cons of conducting cessation programmes as part of a multicomponent health promotion programme within the context of their site, and of targeting all smokers in the workforce with appropriate interventions.
Implications for research: The authors state that researchers should build on the best evidence to date to design innovative theory-based programmes that address the needs of all smokers in the employee population, and evaluate them using rigorous designs and methodology.

Studies included in the review that appear to report data about differential effects: None.

Reviews assessing multi-component community-based programmes

Reference: Sowden (2004)[27] Country: UK	Title: Community interventions for preventing smoking in young people. Objective/review question: To assess the effectiveness of community interventions compared with no intervention or single component interventions, such as school-based programmes,in preventing the uptake of smoking in young people. SES explicit target? No. Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: Yes Restricted to English language studies only: No Experts contacted: No Search terms reported: Yes Search dates reported: Yes Inception -2002.

Search sources/dates: Cochrane Tobacco Addiction Review Group Database, MEDLINE (1976-2002), Sociological Abstracts (1974-2002), Econlit (1969-2002), British Humanities Index (1984-2002), Healthstar (1975-2001), PAIS (1976-2002), EMBASE (1974-2002), ERIC (1966-2002), PsychLIT (1967-2002), CAB Health (1973-2002), ABI/INFORM (1971-2002), ASSIA (1987-2002). Bibliographies of identified studies were checked and personal contact was made with content area specialists. Some databases that had been searched for the original review, were not re-searched and updated in 2002 as no original studies had been located solely from one of the sources.

Inclusion/exclusion criteria

Interventions: Interventions targeted at entire or parts of entire communities or large areas with the intention of influencing the smoking behaviour of young people were included. Specific interventions included cardiovascular disease and cancer risk reduction programmes; smoking prevention and cessation programmes targeted at the entire community, and drug use prevention or smoking prevention programmes targeted at young people.

Community interventions were defined as co-ordinated, widespread programmes in a particular geographical area, or region, or in groupings of people who share common interests or needs, which support non-smoking behaviour.

Participants: Young people aged less than 25 years. The specific ages of participants ranged from 8 to 24 years across studies. No data were available on participant ethnicity in 8 studies, 5 studies included predominantly white populations (>80% of sample size), 1 included only black participants, 1 native Americans, and 2 had balanced participant populations (white, black, hispanic, latino and native American participants). Two studies did not report participant gender, all other studies included both males and females. Three studies targeted participants in deprived areas, and one targeted those attending continuation high-schools.

Outcomes: Primary outcomes included objective measures of smoking and self-reported smoking. Intermediate outcomes were those measured in the included studies (intentions to smoke, attitudes to smoking, knowledge, and decision making and refusal skills). Process outcomes were also those reported in the included studies (cigarette purchases by minors, membership of anti-smoking clubs, media reach and level of implementation, exposure to each component of an intervention). Studies that reported only intermediate or process measures were excluded.

Study designs: Cluster randomised trials (CRTs), or non-randomised cluster trials in which the unit of randomisation was the community, geographical region or school district included. Studies meeting these criteria, in which baseline characteristics were not reported, were excluded.

Study selection procedure: Studies were assessed independently by 2 reviewers.

Methods of review

Validity assessment tool: Studies were assessed according to: methods of identifying intervention and control groups, randomisation procedures, baseline comparability of groups, selecting of participants in whom to measure outcomes, statistical analysis, and attrition rates.

Validity assessment procedure: Studies were assessed independently by 2 reviewers (personal communication).

Data extracted from primary studies: Authors, year of publication, study objectives, study design, methods of analysis; country, site and sample size; age, sex and ethnicity of the participants; the theoretical basis, key components, and duration of the interventions; the outcomes and timings of follow-up.

Data extraction procedure: Data were extracted by one reviewer and checked by a second reviewer for accuracy.

Summary of how the studies were combined in the review: Meta-analysis: No. Narrative synthesis: Yes Vote counting methods: No

How were studies combined in the review? A narrative synthesis.

How were studies weighted in the synthesis? No method of weighting appears to have been used.

How was publication bias assessed? The authors did not assess publication bias.

How was heterogeneity assessed? Differences in the interventions, durations and intensity of intervention, length of follow-up and participant groups were discussed in the text.

Quality assessment

Is there a well defined question? Yes.

Is there a defined search strategy? Yes.

Are the inclusion/exclusion criteria stated? Yes.

Are the study designs and number of studies clearly stated? Yes.

Have the primary studies been quality assessed? Yes.

Have the studies been appropriately synthesised? Yes.

Has more than one author been involved at each stage of the review process? Yes.
Reviewer's comments: The review question was clearly defined in terms of the interventions, participants, outcome measures and study designs. A thorough search was conducted, with efforts being made to locate unpublished studies. No language restrictions were applied (personal communication). The review methodology is clearly reported with efforts being made to reduce reviewer bias and errors. The quality of the included studies was adequately assessed and the results fully reported in tables and text. The use of a narrative synthesis is appropriate given the heterogeneity between the included studies. Differences between studies were also fully explored in the discussion. Overall, this is a thorough review and the authors conclusions should be seen as robust.

Results

Number of studies included in the review: Seventeen studies (with 18 comparisons) (6 CRTs and 11 non-randomised CRTs).
Number of participants: Unclear.
Results of the validity assessment:
1. Methods of identifying control/intervention groups: Varied across studies and was not always reported. Some studies chose specific areas to target particular participants.
2. Allocation to control/intervention: Six studies were randomised, whilst 11 used non-randomised methods of allocation.
3. Selection of participants: Selection of participants depended largely upon the inclusion of a school-based component in the intervention. Pupils in both the control and intervention schools were included in the assessment. Two studies which included school-based components, randomly selected households within the control/intervention communities. In 2 studies without a school-based component, one evaluated pupils at schools with/without smoke free clubs, and the other youth attending clubs with/without intervention programmes.
4. Comparability of intervention and control groups at baseline: Six studies reported differences in smoking prevalence between intervention and control communities. Two took account of baseline differences in follow-up analyses and 6 attempted to match communities before allocation to intervention or control.
5. Statistical analysis: All studies used communities / schools or clubs as the unit of randomisation, however only eight accounted for this in the analysis. Nine studies presented results with the individual as the unit of analysis.
6. Attrition rates: Four studies provided cross-sectional data, and gave response rates from each wave of testing. In these studies the response rates ranged from 61%-94%. Rates of attrition varied between studies with longitudinal data, ranging from 0% (in a study with six month follow-up) to 55% (in a study with six year follow-up).

Smoking behaviour: Two out of 9 evaluations reported reductions in smoking prevalence in the intervention communities compared with a no intervention control (one study included both a school-based control and a no intervention control). One study compared two similar interventions with a standard health education control group and found reductions in smoking prevalence in one and increased smoking prevalence in the other, compared with the control. One out of 3 evaluations reported reductions in the community intervention group compared with a school-based programme only. One study reported reductions in the intervention community versus the control community who received the media component only. Another study reported no differences between a community intervention compared with a community intervention without the school-based component, although smoking prevalence in both groups declined significantly from baseline.

Community interventions versus no interventions or standard care (12 studies): Two studies reported reductions in the prevalence of smoking in the intervention compared with control communities. Both of these programmes were initially designed as large-scale, cardiovascular disease prevention programmes aimed at entire populations, and included a school-based component specifically targeting young people. One further study reported different effects on smoking prevalence between two different versions of an intervention, compared with a control group receiving standard health education.

Community interventions versus other single component interventions (6 studies): Three studies compared the effectiveness of a community wide programme with a school-based component only and one study compared a school plus community to a school only programme and a usual care control. Another study had compared the effectiveness of a community programme including a school component with a community programme without the school component, and a further study compared the effectiveness of a media, school and homework intervention with a media only intervention. Two studies reported statistically significant differences in smoking prevalence between the intervention and control groups, and 3 studies reported no differences between groups. A further study found no differences between groups, but reported that smoking prevalence had decreased from baseline in both groups.

Intermediate outcomes: The intermediate outcomes reported differed between studies, but knowledge was the most frequently measured. In 2 studies there was a significantly greater increase in knowledge in the intervention group than in the control group, whilst in one other study knowledge did not differ significantly between groups. Four studies assessed intentions to smoke. Two studies reported that significantly fewer participants in the intervention group compared with the control group intended to smoke in the future. In one study intentions to smoke were recorded, but not analysed. In the last of the 4 studies, no significant changes in knowledge or attititudes was reported.

Process measures: A variety of different process measures were recorded which included the number of reports of different activities participants engaged in (1 study), the percentage of students who took part in each activity (1 study), or saw media advertisements (1 study) and details about the actual implementation of the programme (2 studies). One study showing no impact on smoking prevalence also reported no significant difference in awareness of antismoking campaigns or association between awareness and smoking status.
Cost effectiveness: Few studies provided any details on cost effectiveness, but the costs of the interventions varied enormously. One study reported the results for the UK Smokebusters programme in Wensleydale in 1992 stated that the project had cost approximately £6,000 to implement and evaluate. This was in comparison to a state wide initiative in the USA (implemented in 1985) which received a total of $2 million per year funded from higher taxes on tobacco products.

Differential effects: NR
Adverse effects: NR
Publication bias: NR

Conclusions

There is some limited support for the effectiveness of community interventions in preventing the up-take of smoking in young people.

Implications for practice: A number of programme characteristics need to be considered when planning future community programmes: including programmes should build upon elements of existing programmes that have been shown to be effective, they need to be flexible to the variability between communities so that different components of a given programme can be modified to achieve acceptability, pilot work with representative samples of individuals to be targeted should be conducted so that appropriate messages and activities can be implemented; programme messages should be guided by theoretical constructs, and community activities must reach the target audience if they are to stand any chance of being successful.

Implications for research: The evaluation of community-wide prevention campaigns is methodologically challenging, but rigorous evaluation is required to demonstrate effectiveness. Careful planning of the evaluation is required, particularly in terms of the unit of analysis and measurement of appropriate outcomes. Different levels of measurement should be planned, including behavioural, intermediate (or mediating) and process outcomes. The adequacy of the implementation of each component of the intervention should also be assessed.

Studies included in the review that appear to report data about differential effects:

Aguirre-Molina M, Gorman DM. The Perth Amboy Community Partnership for Youth: Assessing its effects at the environmental and individual levels of analysis. Int Q Comm Health Educ 1995;15(363):378.
Kaufman JS, Jason LA, Sawlski LM, Halpert JA. A comprehensive multi-media program to prevent smoking among Black students. J Drug Educ 1994;24:95-108.
Sussman S, Dent CW, Stacy AW, Craig S. One-year outcomes of Project Towards No Drug Abuse. Prev Med 1998;27:632-642.
St Pierre TL, Kaltreider DL, Mark MM, Aikin KJ. Drug prevention in a community setting: A longitudinal study of the relative effectiveness of a 3-year primary prevention program in boys and girls clubs across the nation. Am J Community Psychol 1992;20:673-706.
Schinke SP, Tepavac L, Cole KC. Preventing substance use among Native American youth: Three-year results. Addict Behav 2000;25(3):387-397.

Reference: Stead (1995)[28] **Country: UK**	**Title: Developing options for a programme on adolescent smoking in Wales.** **Objective/review question: The review objectives were threefold; firstly, to explore the factors influencing adolescent smoking, secondly, to identify and describe recent intervention strategies, and lastly to examine the effectiveness of these intervention strategies for reducing adolescent smoking. The review included studies form the UK, North America, Australasia and Europe, with a focus on work published between 1989 and 1995 (six years prior to review completion).** **SES explicit target? No.** **Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.**
Literature search Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: No Restricted to English language studies only: Yes Experts contacted: Yes Search terms reported: No Search dates reported: Yes Search sources/dates: MEDLINE, ASSIA, SSCI and Health Promotion Library Scotland Databases were searched between 1989 and 1995. In addition a number of organisations were contacted to identify further relevant studies. Studies were restricted to those published in English.	
Inclusion/exclusion criteria Interventions: No inclusion criteria were reported for interventions. The interventions assessed at the individual level included school-based programmes, media campaigns and SmokeBusters clubs. At the population level, campaigns against under-age sales, active enforcement against under-age sales, school policies, health warnings and generic packaging, and price and taxation increases. Participants: Participants aged between 10-16 years of age were the primary focus. Studies of primary age children and the general population were also eligible for inclusion where the results were pertinent to adolescents. Outcomes: No inclusion criteria were reported for outcomes. Study designs: No inclusion criteria were stated in relation to study designs.	
Methods of review Study selection procedure: NR Validity assessment tool: NR Validity assessment procedure: NR Data extracted from primary studies: A narrative description of each of the included studies was provided along with the results and the primary study authors' conclusions and interpretation of the data. Data extraction procedure: NR Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Partial Vote counting methods: No How were studies combined in the review? The studies were grouped according to the type of intervention, and then a description of the intervention, results and authors conclusions were given for each individual study. How were studies weighted in the synthesis? Weighting was not used. How was publication bias assessed? Publication bias was not assessed. How was heterogeneity assessed? Differences between the studies were not discussed.	
Quality assessment Is there a well defined question? Partial. The participants and type of interventions could be inferred from the title. Is there a defined search strategy? Partial. No search terms were reported. Are the inclusion/exclusion criteria stated? Partial. Inclusion criteria were only stated for the participants. The type of interventions could be inferred from the text. Study design and type of outcomes were not reported. Are the study designs and number of studies clearly stated? No. Have the primary studies been quality assessed? No. Have the studies beeen appropriately synthesised? Partial. Has more than one author been involved at each stage of the review process? Unclear. Reviewers' comments: A 'borderline review'.	
Results Number of studies included in the review: Thirty-two. The studies designs were not reported. Number of participants: Unclear - no description of the participants was given. Results of the validity assessment: NR Individual level interventions: School-based programmes were evaluated in 12 studies (education and resistance training). Media campaigns were assessed in 5 studies. SmokeBuster clubs were evaluated in 3 studies.	

Campaigns against under-age sales (3 studies): Three studies assessed campaigns against under-age sales. The results of the first study conducted in New York, showed that at a second sweep a smaller proportion of retailers were found violating the law than at the first sweep. The results of the second study based in California showed that initially in the absence of active sanctions by police, retailers reported little incentive to change. However, when a more active law enforcement intervention was added (police 'stings' and citations) illegal sales were reduced. The last study conducted in Missouri and Texas, showed that point-of-sale display warnings had no impact on minors' ability to purchase cigarettes illegally.

Active enforcement of under-age sales (2 studies): One study conducted in Illinois, evaluated the effectiveness of introducing a tobacco retailer's license, and fining minors caught in the illegal 'possession' of cigarettes. The results showed that the measures produced a decrease in illegal sales from 70% to under 5% in 18 months. A second study conducted in East Lancashire, showed that a concerted drive by Trading Standards Officers, supported by local magistrates had some success.

School smoking policies (2 studies): One cross-sectional survey conducted in California evaluated the effects of school smoking policy on adolescent consumption and prevalence. The results showed that overall the more comprehensive the policy in school the lower consumption both in and outside of school by pupils; a similar trend was found for prevalence, but was less consistent. A second survey conducted in England and Wales, found lower prevalence and consumption (but not in schools) where policies were in place, and the more comprehensive policies were associated with the lowest rates.

Health warnings and generic packaging (3 studies): One study assessed adolescents recall of current US warnings with newly developed, more prominent warnings. The study found that the newer warnings stimulated higher recall and comprehension. Two further studies conducted in New Zealand, found that adolescents were significantly more likely to recall health warnings when they appeared on plain packages, and that plain packages reduced their interest in and curiosity about smoking.

Price and taxation increases (2 studies): One Spanish survey found that income (pocket money) was the most important socio-demographic variable accounting for differences in experimentation, and that it influenced not only level of experimentation but also prevalence. An econometric analyses of the British Household Survey data evaluated the relative effect of price, income and 'health publicity' (health publicity, policy on smoking in public places and 'social acceptability') in men and women. The results indicated that women of all ages (including 16-25 year olds) were less responsive than men to health publicity and more responsive to price; lower socio-economic groups were similarly less responsive than higher socio-economic groups to health publicity and more responsive to price.

Differential effects: NR

Adverse effects: NR

Publication bias: NR

Conclusions

Community coalitions to lobby for local tobacco control have yet to demonstrate that they can directly reduce adolescent prevalence. They can however, be effective in generating publicity and raising the public debate, both of which are prerequisites for securing the implementation of environmental measures. Legislation banning under age sales, when properly enforced can significantly reduce young people's access to tobacco. No smoking policies in schools can reduce consumption, but it is less conclusive whether they can significantly reduce experimentation or overall prevalence. Price increases may have a greater effect on adolescents than on adults and on females than on males.

Implications for practice: NR

Implications for research: NR

Studies included in the review that appear to report data about differential effects:

Townsend J, Roderick P, Cooper J. (1994) Cigarette smoking by socio-economic group, sex and age: effect of price, income and health publicity. BMJ 309: 923-927.

BASP (European Bureau for Action on Smoking Prevention) (1992). Taxes on tobacco products – a health issue. Brussels: BASP.

Reference: Blake (2001)[29] **Country: US**	**Title: A review of substance abuse prevention interventions for young adolescent girls** **Objective/review question: To assess the effectiveness of traditional alcohol, tobacco, and drug use prevention approaches, as well as gender-specific or gender-informed interventions focussing specifically on girls, and to make recommendations regarding research and prevention strategies that take gender into account.** **SES explicit target? Yes, whole review targets adolescent girls.** **Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.**

Literature search

Summary of searches: Databases searched: Partial Handsearching undertaken: No References checked: No Restricted to English language studies only: Unclear
Experts contacted: No Search terms reported: Yes Search dates reported: Yes.
Search sources/dates: Psychological abstracts were searched from 1980 to 2000. Search terms were very limited but reported.

Inclusion/exclusion criteria

Interventions: No inclusion criteria were reported for type of intervention. At the 'individual level' interventions included multi-component school and media interventions (teacher training, social influences training, education, anti-smoking curriculum and mass media. At the 'population level' one study compared the effectiveness of Theatre in Health Education sessions in one group compared with changes in school-wide smoking policies in a second.
Participants: No inclusion criteria were reported for participants. The participants included in the review were boys and girls aged between 10-19 years.
Outcomes: No inclusion criteria were stated for outcomes. The outcomes assessed were changes in mediating factors and substance use.
Study designs: No inclusion criteria were reported for type of study design. It appeared that all the included studies were uncontrolled. Some used a pre-post design, and some were longitudinal surveys.

Methods of review

Study selection procedure: NR
Validity assessment tool: NR
Validity assessment procedure: NR
Data extracted from primary studies: Data were abstracted on the setting, the focus of prevention (alcohol, smoking, drugs or multi-componenet), intervention, and outcomes.
Data extraction procedure: NR
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? The studies were grouped according to whether differences in effectiveness were reported by gender or differences in effectiveness were assessed as interactions, and combined in a narrative discussion.
How were studies weighted in the synthesis? NR
How was publication bias assessed? NR
How was heterogeneity assessed? Differences between the studies were discussed according to whether the programme reported the outcomes by gender, explored differences as an interaction factor or targeted just female adolescents.

Quality assessment

Is there a well defined question? Partial. No explicit inclusion criteria were stated, but the ‘participants’ and ‘interventions’ could be inferred from the review title.
Is there a defined search strategy? Partial. Only one database was searched. The search terms were very limited.
Are the inclusion/exclusion criteria stated? No.
Are the study designs and number of studies clearly stated? Partial. Number of studies could be calculated from the text and tables. The specific study designs were unclear.
Have the primary studies been quality assessed? No.
Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? No.
Reviewer’s comments: A 'borderline systematic review'; only includes one study with a ‘population’ level intervention. Little data reported on this particular study in the tables.

Results

Number of studies included in the review: 28, pre-post studies or longitudinal surveys.
Number of participants: Not explicitly reported appears to be approximately 60,880.
Results of the validity assessment: NR

Studies presenting gender differences in the effectiveness of substance use prevention interventions separately for boys and girls (n=10): intervention effects were stronger or significant only for girls, particularly in relation to smoking onset or prevalence.
Studies that assessed gender differences in the effectiveness of the intervention by interaction effects (n=18): 12 of the 18 studies failed to demonstrate any differential effects by gender. Four further studies, (including one study that assessed changes in school-wide smoking policies) reported significant treatment by gender interaction effects on substance abuse behaviour. In this study it was found

that both interventions (drama sessions versus changes in school-wide smoking policies versus control) had a weak positive effect on smoking behaviour among girls, but not boys, as compared with control groups across the 2.5 years of follow-up. The remaining studies assessed gender differences (such as attitudes) as potential mediators for differences in outcomes.
Differential effects: as above for boys and girls.
Adverse effects: NR
Publication bias: NR

Conclusions
The authors conclusions appear to be that alcohol, tobacco and drug abuse prevention research should integrate gender as a major defining social factor and give greater consideration to gender in shaping risk behaviours for boys and girls.
Implications for practice: NR
Implications for research: The authors state that well-controlled intervention trials with sufficient sample sizes are needed, so that gender differences in programme effects can be compared and new theoretical models can be tested.

Studies included in the review that appear to report data about differential effects:
Thrush D, Fife-Schaw C and Breakwell G. (1999) Evaluation of interventions to reduce smoking. Swiss Journal of Psychology, 58, 85-100.

Reference: Wakefield (2000)[30] **Country: US**	**Title: Effectiveness of comprehensive tobacco control programmes in reducing teenage smoking in the USA.** **Objective/review question: To assess the extent to which the five comprehensive statewide tobacco control programmes in the USA have reduced teenage smoking.** **SED explicit target? No.** **Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: No Restricted to English language studies only: Unclear
Experts contacted: Partial Search terms reported: No Search dates reported: No
Search sources/dates: MEDLINE was searched for all published studies of aspects of programme implementation and evaluation. In addition, contact was made wih each of the 5 States evaluation co-ordinators and a request made for publicly available evaluation reports and commentaries about the programmes up to October 1999.

Inclusion/exclusion criteria

Interventions: Studies that assessed programme or policy elements of the 5 Statewide tobacco control programmes were eligible for inclusion. The programmes were comprehensive and involved some mix of the following elements: public education through electronic, outdoor, and print media campaigns, development and enforcement of policies to prevent youth access to tobacco, restrictions on tobacco advertising, and/or create smoke-free environments, community initiatives, involving grants to local organisations to facilitate worksite programmes, training and assistance for health professionals to improve cessation services, policy development, school-based programmes focusing on curriculum development, school policy, direct cessation services for smokers, such as telephone helplines and other quit smoking materials.
Participants: Studies of teenagers or adults were included in the review.
Outcomes: Studies that reported measures of programme implementation and strength (overall programme funding and allocation to different strategies, and tobacco industry efforts to counter the aims of the programmes); intermediate markers of progress (awareness of campaign message by youth, beliefs about smoking and passive smoking, support for tobacco control strategies); changes in factors that denormalise smoking (such as decreasing youth access to tobacco, creating more restrictions on smoking, restricting tobacco advertising); consumption; adult smoking; adolescent intentions and uptake continuum measures; or teenage smoking prevalence were included.
Study designs: No inclusion criteria were stated in relation to study designs. The specific designs of the included studies was not reported and was unclear.

Methods of review

Study selection procedure: NR
Validity assessment tool: NR
Validity assessment procedure: NR
Data extracted from primary studies: Selective data were extracted under the following headings: Evaluation elements; mass media campaign recall and recognition; tobacco industry advertising and promotion: awareness and participation; beliefs and attitudes; programme uptake and dissemination; environmental and policy change. Under each heading selected results from studies were used to illustrate examples.
Data extraction procedure: NR
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? The studies were grouped according to the statewide programmes and combined in a narrative summary.
How were studies weighted in the synthesis? The studies do not appear to have been weighted.
How was publication bias assessed? Publication bias was not assessed.
How was heterogeneity assessed? Differences between the studies were not discussed.

Quality assessment

Is there a well defined question? The review question was broad but reasonably well defined.
Is there a defined search strategy? Partial.
Are the inclusion/exclusion criteria stated? Inclusion criteria were only explicit for the interventions and outcome measures. No inclusion criteria were stated for study designs.
Are the study designs and number of studies clearly stated? The number of included studies, and study designs were unclear.
Have the primary studies been quality assessed? NR
Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? Unclear.
Reviewer's comments: The review question was broad, but defined in terms of the interventions and outcome measures. Search was limited to only one database, with no search terms or dates reported. Unpublished data were sought. The methods of conducting the review are not reported, and therefore it is not clear whether any efforts were made to minimise reviewer errors and bias. Likewise, the number of studies included in the review, was not reported. It is therefore not clear whether all the studies identified are discussed and tabulated, or if these were just examples from the literature.

Results
Number of studies included in the review: 49. Study designs were not clearly reported.
Number of participants: Unclear.
Results of the validity assessment: Validity was not assessed.

California (1989 to 1999):
Evaluation elements: Ongoing cross sectional population surveys of adults and teens; cohort study of teens; tracking of per capita consumption; early fragmented documentation of uptake of services; recent more detailed evaluation of programme elements.
Mass media campaign recall and recognition: High levels of campaign awareness among adults and teenagers (3 studies). Tobacco industry advertising and promotions-awareness and participation (2 studies): 90% of teens exposed to pro-smoking messages.
1993-1996: Teen ownership of promotional items increased from 9% to 14%.
1996: 8% of newspaper issues contained pro-tobacco advertising, 13% public events sponsored by tobacco companies.
Beliefs and attitudes (1 study): majority support in 1996 for a range of tougher measures to regulate the industry. Very high levels of agreement by smokers that smoking harms health and that ETS causes disease.
Programme uptake and dissemination (2 studies):
1992-1994: 10, 000 multi-session community programmes provided.
1995-1996: 116 community programmes funded, 40% countering pro-tobacco, 19% reducing exposure to ETS, 19% reducing youth access, 15% on cessation/prevention, 8% 'other'. 52% of 8th grade teachers offered at least one tobacco prevention lesson in 1995-1996.
Environmental and policy change (5 studies): Failed retailer compliance checks fell from 52% in 1994 to 22% in 1997, but no change in perceived access by teens. Increase in percentage of smoke free workplaces and smoke free homes. No change in perceived compliance by teens with school bans.
Per capita consumption (5 studies): significant decline compared with baseline consumption and by comparison with rest of US and greater than expected from price increase alone.
Adult prevalence (1 study): Rate of decline exceeded that of rest of USA from 1989 - 1993, but was less than for rest of US in 1993 - 1996.
Teen smoking (2 studies): Within state surveys showed no change in 12-17 year old prevalence from 1990 -1993 and increase from 1993 - 1996, and increase in non-smoker susceptibility. Among 8th and 10th graders, relative increase in smoking prevalence from 1993 - 1996 was less than other US states.

Massachusetts (1993 - 1999):
Evaluation elements: Ongoing population surveys of adults and teens; cohort studies of teens and adults; tracking of per capita consumption; documentation of uptake of services, programme and policies.
Mass media campaign recall and recognition (1 study): Increasing majority of adolescents have seen and heard campaign advertising and recognise campaign theme.
Tobacco industry advertising and promotion:
1993 - 1996: High but stable levels of exposure to pro-tobacco advertising on billboards (80%), magazines (74%), and on clothing (74%).
1996: 31% of 12-17 year olds owned promotional item. 1998: store advertising highly prevalent.
Beliefs and attitudes (2 studies): Teens who recall campaign advertising express attitudes consistent with campaign intent. Nearly all adults understand smoking is unhealthy, see few benefits to smoking and view industry with scepticism.
Program uptake and dissemination (1 study): Over 3200 local programme staff trained to conduct cessation counselling. In fiscal year 1997, 500,000 education items distributed. Funding provided to 282 boards of health, 66 primary health care cessation programmes, 45 youth leadership programmes, 33 special population programmes, 19 local coalitions.
Environmental and policy change (3 studies): in period 1994 - 1997 failed retailer compliance checks fell from 48% to 8%, but teens more likely to obtain from social sources. 1993 - 1997: smoking bans more common in workplaces, restaurants, homes and other public places, but no change in compliance with school bans.
Per capita consumption (1 study): significant decline during 1993 - 96 compared with baseline period of 1990 - 1992 and for rest of US, greater than expected for price increase alone.
Adult prevalence (1 study): Relative decline of 9% from 3 years before programme to first 3 years of programme, which was greater than 3% decline for rest of US.
Teen smoking (2 studies): relative increase in 30 day prevalence less than for rest of US for 8th and 10th graders from 1993 - 1996. Relative increase for 9th to 12th graders less than for rest of US from 1993 - 1997. Relative decline in lifetime use for 8th graders compared to increase for rest of US.

Arizona (1994 - 1999):
Evaluation elements: surveys of recall and appraisal of campaigns; tracking of per capita consumption; population surveys of teens and adults.
Mass media campaign recall and recognition (1 study):
1998: two-thirds of teens, pregnant women and adults reported seeing advertising in last 30 days.
Tobacco industry advertising and promotions - awareness and participation: Not reported.

Beliefs and attitudes: NR
Program uptake and dissemination (1 study): 27% of teenagers had visited the mobile interactive exhibit called "the Ashkicker" which demonstrates dangers of smoking. Other uptake data not reported.
Environmental and policy change: NR
Per capita consumption (1 study): Decline of 5.4% in 1995 after adjustment for stockpiling of lower priced cigarettes-due to price increase only, since programme did not start until 1996.
Adult prevalence: NR
Teen smoking: NR

Oregon (1996 - 1999):
Evaluation elements: Standardised reports on programme implementation, placement of mass media, quitline calls; surveys of store advertising/promotions, clean indoor air and youth access policies; tracking of per capita consumption; surveys of adult and teen smoking.
Mass media campaign recall and recognition (1 study): 74% of adults and 84% of teens recall at least one campaign advertisement.
Tobacco industry advertising and promotions - awareness and participation: NR
Beliefs and attitudes: NR
Program uptake and dissemination (1 study): By 1998 - 1999, all counties had local coalitions, 24 school prevention projects were being implemented, all 9 Native American tribes and 5 organisations representing ethnic groups received funds for prevention and education, and 5 demonstration projects serving pregnant women and other patient groups were underway.
Environmental and policy change (1 study):
1995 - 1998: failed retailer compliance checks fell from 38% to 28%. No data reported for other policies.
Per capita consumption (1 study): Significant decline compared with baseline consumption and with rest of US.
Adult prevalence (1 study): Relative decline of 6.4% to 21.9% in 1998, but no national comparison available.
Teen smoking (1 study): Among 8th and 11th graders, same as national trends for first two years of campaign.

Florida (1997 - 1999):
Evaluation elements: Information system to track number and type of activities undertaken; teen and adult surveys to assess recall of campaign and beliefs and attitudes; school surveys to assess smoking behaviour; monitoring of smoking in teenage mothers; surveys of law enforcement personnel.
Mass media campaign recall and recognition (2 studies): September 1998: 28% of teens reported seeing one advertisement each day, and 66% at least one each week.
January 1999: 48% of adults aware of Truth campaign.
Tobacco industry advertising and promotions - Awareness and participation (1 study):
March 1999: 56% of stores had tobacco advertising less than 3 feet from the ground.
Beliefs and attitudes (2 studies): Teens more likely to be unfavourably disposed to tobacco industry at follow-up.
Program uptake and dissemination (1 study):
February 1999: 8000 youths had participated in anti-tobacco activities.
January 1999: approved CDC smoking prevention curricula implemented in over 100 schools.
Environmental and policy change (1 study):
March 1999: 12000 citations issued for possession by underage youths.
Per capita consumption: NR
Adult prevalence: NR
Teen smoking (2 studies): From February 1998 - 1999, relative declines in 30 day prevalence for middle and high school students were greater than national trends.
Differential effects: NR
Adverse effects: NR
Publication bias: NR

Conclusions

The authors concluded that despite the different strengths and combinations of programme messages and strategies used in the 5 statewide comprehensive programmes, there was evidence that they lead to change in factors that influence teenage smoking, and to reductions in teenage smoking.
Implications for practice: NR
Implications for research: NR

Studies included in the review that appear to report data about differential effects:
Bauer U, Johnson T, Pallentino J, Hopkins R, et al. Tobacco use among middle and high school students - Florida, 1998 and 1999. Morbidity and Mortality Weekly Reports 1999; 48: 248-53.
Oregon Health Division. Tobacco prevention and education program report 1999. Portland, Oregon: Department of Human Resources, 1999.

Author: Friend (2002)[31] **Country: US**	**Title: Reductions in smoking prevalence and cigarette consumption associated with mass-media campaigns.** **Objective/review question: To assess the differences in smoking rates and behaviour associated with media campaigns, including mass media and community campaigns.** **SES explicit target? No** **Does the review either present data on or discuss differential effects being present in any of the included studies? Some studies report separate data for youths.**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: Unclear References checked: Yes Restricted to English language studies only: Not reported, but limited to studies conducted in the US Experts contacted: Yes Search terms reported: No Search dates reported: No

Search sources/dates: Centers for Disease Control and Prevention's Office of Smoking and Health's Web site, Medline and other computerised databases – unnamed. References identified from bibliographies of relevant articles and books. Experts contacted. Published and unpublished studies were included.

Inclusion/exclusion criteria

Interventions: Studies that assessed mass media campaigns were eligible for inclusion. Review limited to studies that examined reductions in smoking behaviour. State-wide mass media campaigns, competitive grants program, school-based prevention and cessation programs, community programs and coalitions, health care provider education, restrictions on advertising and promotions and clean air laws.

Participants: No inclusion criteria were stated for participants. Studies considered programs aimed at the general population but also reported results for youths. No information provided on numbers, or other participant characteristics.

Outcomes: Studies that reported changes in smoking behaviour, usually measured in terms of change in smoking prevalence and/or cigarette consumption. Smoking prevalence was defined as adults who have smoked >100 cigarettes in their lifetimes and are current smokers, or, for youth, having smoked on 1 day or more in past 30 days. Smoking prevalence measured in terms of number of smokers as a % of population (usually 18+). Cigarette consumption also measured as a % of the population as per capita cigarette consumption (PCC).

Study design: No inclusion criteria were reported for study designs. No information reported about study designs included.

Methods of review

Study selection procedure: NR

Validity assessment tool: NR

Validity assessment procedure: NR

Data extracted from primary studies: Some information was tabulated (study name, date, state, years, per capita cigarette consumption (PCC), % change, Net % change).

Data extraction procedure: Independent extraction was conducted by multiple authors.

Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Partial

Vote counting methods: No

How were the studies combined in the review? Information from studies was discussed in a commentary. Some information on mass media campaigns was tabulated.

How were studies weighted: No method of weighting appears to have been used.

How was publication bias assessed: The authors did not assess publication bias.

How was heterogeneity assessed? Differences between the studies were only discussed according to differences in the interventions.

Quality assessment

Is there a well defined question? Partial. Question defined in terms of intervention and partially in terms of outcomes.

Is there a defined search strategy? Partial. No search terms or search dates were reported. No reporting of language restrictions, but studies were limited to those conducted in US for the sake of comparability.

Are the inclusion/exclusion criteria stated? Inclusion criteria reported for the intervention and partially for the outcomes.

Are the study designs and number of studies clearly stated? No.

Have the primary studies been quality assessed? No.

Have the studies been appropriately synthesised? Yes.

Has more than one author been involved at each stage of the review process? Unclear. Review states multiple authors extracted data, no other information provided.

Reviewer's comments: Review question was broad in terms of definition, participants and outcomes. No search terms or dates reported. No language restrictions reported, but review restricted to studies in the US. No reporting of quality assessment of studies. It is difficult to assess what steps (if any) the authors took to reduce bias. Given the heterogeneity of the interventions, and populations, the narrative synthesis was appropriate, although differences in the studies were not explicitly reported. Results are discussed in the text, with very few figures or tables. It is difficult to assess the quality of the primary studies or the results reported as so little information is provided.

Results

Number of studies included in the review: NR
Number of participants: NR
Results of the validity assessment: NR
Smoking Prevalence
State-level campaigns (California and Massachusetts):
Programs were aimed at the general population, not specifically at minors. But some results were reported for minors. Estimated rates of change in adult smoking prevalence and PCC.
Campaigns yielded mixed results regarding youth effects. Examining patterns across states, 1 study found that tax revenues earmarked for education and mass media campaigns were associated with reduced youth cigarette consumption even after controlling for effects of other tobacco control policies.

Youth oriented campaigns, mass media and community level campaigns:
Florida & Arizona youth oriented programs appeared to be associated with reduced youth smoking rates. Campaigns seemed to be more successful than most of the smaller community-level interventions. One study at community-level reported significant results but was associated with a media campaign of longer duration and greater intensity than other programs. Also media campaigns have been successfully linked with school education and community involvement programs. One study found that those communities with media and school education programs were associated with lower youth smoking rates than communities with a single intervention. Communities with both media and school-based programs experienced 3.8% increase in smoking prevalence between pre- and 1 year post test, and 13% increase between pre and 2-year post test periods. In contrast those with only a school program experienced a 10 and 18% increase respectively over same time period.
Differential effects: NR
Publication bias: NR
Adverse effects: NR

Conclusions

Authors conclude that well-funded and implemented mass-media campaigns targeted at the general population and implemented at the state level, in conjunction with a comprehensive tobacco control program are associated with reduced smoking rates. Youth oriented interventions have shown mixed results, particularly smaller, community level media programs but indicate strong potential. Differences in the campaigns limit the extent to which results are comparable across studies. Other tobacco control policies may be a source of differences in the effect of media campaign. Media campaigns appear to have strong potential in conjunction with other tobacco control interventions, to help reduce the morbidity and mortality associated with cigarette use.
Implications for practice: NR
Implications for research: Randomised experimental designs with appropriate control groups should be conducted to supplement naturalistic investigations to better gauge campaign influence. Further research is needed on the relationship of different types of content to changes in smoking behaviour. In conducting future research, consideration needs to be given to the scale and duration of programs, how the impact of campaigns may change over time, the role of different themes and their influence on specific subgroups and the impact of other policies in effect or being initiated.

Studies included in the review that appear to report data about differential effects:
A number of studies targeted youths:
Bialous SA, Glantz SA. (1997) Tobacco Control in Arizona, 1973-1997. Institute for Health Policy Studies, School of Medicine, University of California, San Francisco, CA.
Bialous SA, Glantz SA. (1999) Arizona's tobacco control initiative illustrates the need for continuing oversight by tobacco control advocates. Tobacco Control, 8, 141-151.
Wakefield M, Chaloupka F. (2000) Effectiveness of comprehensive tobacco control programmes in reducing teenage smoking in the USA. Tobacco Control, 9, 177-186.
Zucker D, Hopkins RS, Sly DF, Urich J, Kershaw J, Inbar TJ, Solari S. (2000) Florida's 'truth' campaign: a counter-marketing, anti-tobacco media campaign. Journal of Public Health Management and Practice, 6(3), 1-6.
Centers for Disease Control and Prevention. (1999b) Tobacco use among middle and high school students – Florida, 1998 and 1999. Morbidity and Mortality Weekly Reports, 48, 248-251.
Institute for Social Research, University of Michigan (1999) Monitoring the Future: 1999 Data From In-School Surveys of 8th, 10th and 12th Grade Students. Available: http://monitoringthefuture.org/data/99data/pr99cig1.pdf (accessed 1 February 2000)
Bauer UE, Johnson TM, Hopkins, Brooks R. (2000) Changes in youth cigarette use and intentions following implementation of a tobacco control program: findings from the Florida Youth Tobacco Survey, 1998-2000. JAMA, 284, 723-728.

Reference: Secker-Walker (2004)[32] Country: UK	Title: Community interventions for reducing smoking among adults. Objective/review question: To assess the effectiveness of community interventions for reducing the prevalance of smoking. SES explicit target? Yes - where possible smoking behavioural outcomes were examined by sex, age, and socio-economic status. Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: Yes Restricted to English language studies only: No
Experts contacted: Yes Search terms reported: Yes Search dates reported: Partial
Search sources/dates: The Cochrane Tobacco Addiction Review Group Register, MEDLINE, the Cochrane Controlled Trials Register and EMBASE (up to August 2001) were searched. In addition the references of relevant papers were checked, and content area specialists were contacted.

Inclusion/exclusion criteria

Interventions: Studies which assessed co-ordinated, multidimensional programmes aimed at changing adult smoking behaviour, involving several segments of the community and conducted in a defined geographical area, such as a town, ciy, country or other administrative district were eligible. Specific programmes or components of programmes were not specified a priori, as these were expected to vary.
Nineteen interventions (59%) aimed at cardiovascular risk factor reduction (usually cholesterol, blood pressure and smoking, and sometimes weight loss/obesity and physical activity). Nine (28%), aimed solely at reducing tobacco use, usually cigarette smoking, 4 (12%) at cancer risk reduction or the promotion of healthy behaviours. Eighteen studies (56%) used educational and informational approaches to influence behaviour, while the other 14 studies (44%) also used policy initiatives.

In 20 studies (63%) there was a description of the process of community involvement: coalitions or planning groups in 20 (63%), employment of local community staff in 14 (44%), and task forces or working groups,(which included community members) in 9 (28%). The channels through which the interventions were delivered included: health professionals in 27 studies (84%), volunteers in 16 (50%), teachers in 13 (41%), community agencies in 18 (56%), schools in 18 (56%), businesses in 16 (50%), local health departments in 15 (47%), local government in 14 (44%), worksites in 15 (47%), restaurants in 14 (44%), churches in 8 (25%), hospitals in 6 (19%), and retailers in 4 (12%). Public events were used in 28 studies (88%). Whilst screening for cardiovascular risk factors was an integral part of 11 studies (34%).
Mass media (including newsprint, news stories, paid advertisements, radio, mailings, or bumper stickers used alone or in combination) was used in 16 studies (81%). Interventions specifically for smoking (quit-lines and contests, self-help materials, support groups, brochures and booklets, individual or group counselling) were used in some studies. Smoking policy: advocacy for smoke-free worksites played a role in 10 studies (31%), for smoke-free public buildings in 7 studies (22%), for smoke-free schools in 3 studies (9%), and for other anti-smoking policies, such as banning cigarette vending machines in 7 studies (22%).
Participants: Adults, 18 years or older were eligible. Fourteen studies took place in Europe, 14 in North America, 2 in Australia, 1 in South Africa, and 1 in India. Twenty-one studies (66%) took place in towns or cities while 11 (34%) were in counties or districts. The intervention communities were characterised as urban (25%), rural (28%), mixed (19%), and unclear (28%). The population size varied from a few thousand to hundreds of thousands of people. All the studies involved adults, and most studies (88%) included both women and men, of varying age ranges. Two studies targeted men and two targeted women. The populations targeted were predominantly white (12 studies), Indian (1 study), not reported (10 studies), mixed (3 studies), predominantly African American (2 studies), Vietnamese (2 studies), Mexican Americans (1 study) and White Afrikaners (1 study).
Outcomes: Studies which reported either self-reported smoking status or self-reported cigarette consumption were eligible. Studies that assessed other types of tobacco use - pipes, cigars, cigarillos, or chewing tobacco were excluded. Mediating variables and intermediate outcomes (knowledge of health risks related to smoking, attitudes such as motivation and intention to quit smoking, confidence in quitting, beliefs related to harmful effects of smoking, number of quit attempts, length of the longest quit attempt, barriers to quitting such as the number of other smokers in the household or among friends, or at work, measures of social influence or pressure to quit smoking, social support for quitting and norms concerning smoking) and process measures (methods of community organisation and involvement of community members during the process of planning and implementing the interventions, and different 'communication channels' used) were also assessed. The extent of intervention exposure, program reach, participation and awareness, dose-response relationship, the maintenance of programmmes after the intervention was complete and programme costs were also examined.

Smoking-related outcomes measured were: 27 studies (84%) reported smoking prevalence, 14 (45%) reported changes in the number of cigarettes (or grams of tobacco) smoked per day. 4 studies (12%) also assessed initiation rates of tobacco use. A few studies included other tobacco use: pipes in 5 (16%), cigars in 5 (16%), cigarillos in 4 (13%), chewing tobacco in 2 (6%), and snuff in 2 (6%).

Only 5 studies reported follow-up beyond the immediate post intervention evaluation, the length of follow-up in these 5 studies ranged from 2 to 25 years. Some of the studies reported measures of social norms regarding smoking, results of on-going evaluations and programme modification through-out the intervention, the level of exposure to the intervention, dose-response relationships, and the interventions reach in terms of the number of participants or awareness of the programmes.
Study designs: Cluster randomised trials (CRCTs) and non-randomised controlled cluster trials were eligible.

Methods of review

Study selection procedure: Studies were assessed independently by two reviewers.

Validity assessment tool: Validity appears to have been assessed according to methods of randomisation, the sampling procedure of participants in whom outcomes were measured, response and retention rates, baseline comparability between the groups, whether the evaluation and analysis was undertaken blinded, and the appropriateness of statistical analyses (correct units of analysis, adjustment for units of analysis, sample size calculations, one or two sided p values reported).

Validity assessment procedure: NR

Data extracted from primary studies: Data were abstracted on the setting and sites, study design, participants, interventions (theoretical basis, components, duration and length of follow-up) and the outcomes.

Data extraction procedure: Data were extracted by one reviewer and checked by a second reviewer for accuracy.

Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No

How were studies combined in the review? The studies were grouped according to outcome measure and combined in a narrative synthesis.

How were studies weighted in the synthesis? Where efforts were made to weight studies, it was by study design.

How was publication bias assessed? NR

How was heterogeneity assessed? Differences were discussed in relation to the project aims, intervention (intensity, duration reach, and programme components), the length of follow-up, and participants.

Quality assessment

Is there a well defined question? Yes.

Is there a defined search strategy? Partial. Search terms and sources were reported. Search dates were only reported for one database.

Are the inclusion/exclusion criteria stated? Yes.

Are the study designs and number of studies clearly stated? Yes.

Have the primary studies been quality assessed? Yes.

Have the studies been appropriately synthesised? Yes.

Has more than one author been involved at each stage of the review process? Two reviewers were involved in the selection of studies for inclusion and data abstraction. It is not clear how many reviewers were involved in the process of validity assessment.

Reviewers' comments: Appears to be a good quality review.

Results

Number of studies included in the review: 32 in total; 4 CRCTs, and 28 controlled studies (4 of which used population based controls, rather than comparison communities).

Number of participants: Unclear.

Results of the validity assessment: Only 4 studies (12%) used random assignment of matched communities to either the intervention or comparison group. Out of these, only 2 had a sufficient number of communities to allow adequately powered comparisons. Most studies made a random selection of individuals from lists such as population registries and city rolls. Several studies used random-digit telephone sampling, or random selection of households, or households within randomly selected blocks. Thirty studies (94%) reported response rates, often combining the rates for intervention and comparison groups. In some studies the overall response rates for baseline and follow-up surveys were also combined. Response rates averaged 76.3%, SE 2.0% (n=30) for initial intervention group surveys, and 74.9%, SE 1.9% (n=29) for comparison group surveys. Among the cohort follow-up studies, most (14/17, 82%) noted their attrition rates at follow-up surveys. Converted to retention rates (100 - attrition rate), these averaged 58.9%, SE 3.8% (n=14) for the intervention groups, and 61.5%, SE 2.9% (n=14) for the comparison groups. The characteristics of those lost to follow-up in the cohort follow-up studies (drop-outs) were described in 8 reports (47%). Information on the demographic characteristics of the participating populations at baseline was reported in 26 studies (81%). In 12 (39%), this included age and sex, in two (6%), age, sex and education, and in 11 (35%), age, sex, education and other characteristics, such as marital status, household income or ethnicity. Six studies (19%) provided no demographic data. In only 5 studies (16%) were intervention and comparison communities shown to be demographically comparable at baseline. In 14 (45%) one or more demographic characteristics were not comparable.

In most studies, the evaluation examinations or surveys were carried out by investigators associated with the research team undertaking the project. In 25 studies (78%) the individual was the unit for analysis, although the community was the unit of assignment. In only 1 of these were appropriate adjustments made. In 6 studies (19%) the unit of analysis matched the design. In 2 there were separate analyses at both the individual and the community level. In 1 study it was not clear which unit of analysis had been used. Sample size and power calculations were explicit described in 13 (41%) studies, The majority of studies used 2 sided p-values. Five studies (16%) hypothesised favourable outcomes, and so used 1-sided p-values, one study used both one-sided and two-sided p-values, and in one study no statistical comparisons were made.

Smoking prevalence (28 studies): The estimated net decline in smoking prevalence for all adults ranged from -1.0% to +3.0% per year (10 studies).

Cigarette consumption (10 studies): Cigarette consumption was reported on a per capita basis in some studies and for smokers in others, and therefore no estimates of the range of changes in tobacco consumption were reported.

Predisposing factors: Knowledge-related outcomes (6 studies): 6 studies assessed knowledge-related outcomes concerning cardiovascular risk factors or the harmful effects of smoking. Three of the 4 studies which assessed gains in knowledge of cardiovascular risk factors showed significant benefits with the intervention. The fourth study showed a non-significant benefit. No net intervention effects

were seen in the 2 studies which assessed knowledge of the harmful effects of smoking.
Attitudinal outcomes (7 studies): Out of 7 studies that assessed attitudes to quiting smoking, one showed a net intervention effect (a significant progression through the stages of change) One other study showed a significant intervention effect for heavy smokers in the independent surveys, and for light-to-moderate smokers in the cohort follow-up, concerning smoking as a public health problem.
Quit attempts: (9 studies): Only 1 out of 9 studies which assessed quit attempts showed a significant effect with intervention.
Smoking environment (2 studies): Neither of the 2 studies with pre- and post-intervention measures on the smoking environment, (household and friends smoking, or passive smoking) showed a significant difference.
Norms concerning smoking (2 studies): One of the studies showed no effect with the intervention, whilst the other showed a significant net intervention effect for women smokers' perceptions of community norms, but not for their perceptions of family or friends' norms.
Social influences or support for quitting (2 studies): Neither of the 2 studies which had pre- and post-intervention assessments of social pressures to quit showed a net intervention effect.
Process evaluations:
Program exposure or awareness was compared between conditions in 11 (34%) studies (4 CV risk reduction and 7 smoking reduction). In 3 CV risk reduction studies (North Karelia, Schleiz and Danish Municipality Project) exposure or program awareness was significantly higher in the intervention communities. In the fourth (the Minnesota Heart Health Program) exposure was significantly higher in the intervention cities in years 1 and 3, but not in years 5 and 6. In 6 smoking reduction studies (COMMIT, Breathe Easy, Neighbors for a Smoke-free Northside, Vietnamese Men 1 and 2, and Alliance for Black Churches) exposure or program awareness was also significantly higher in the intervention communities, but not in the other study (the Dutch Community Study). Four of these projects, had no smoking behavioural effects. Only one study, (COMMIT), compared dose-response between conditions. The receipt index used to measure dose was significantly higher in the intervention communities for the cohort of light-to-moderate smokers followed up, and among smokers and ex-smokers in the cross-sectional follow-up survey.
Economic evalution (6 studies): Cost-effectiveness or cost benefit analyses were reported in 6 studies. All 6 reported favourable cost-effectiveness or cost-benefit ratios. However, only 1 of these focused solely on smoking, while the other 5 were cardiovascular risk reduction projects.
Differential effects: For women, the estimated net decline in smoking prevalence ranged from -0.2% to + 3.5% per year (11 studies), and for men the decline ranged from -0.4% to +1.6% per year (n=12).
Adverse effects: NR
Publication bias: NR

Conclusions

The failure of the largest and best conducted studies to detect an effect on prevalence of smoking is disappointing. A community approach will remain an important part of health promotion studies, but designers of future programmes will need to take account of this limited effect in determining the scale of projects and resources devoted to them.
Implications for practice: Recruitment of community members to staff coalitions and task forces, and to supervise programme implementation, with skills in working with diverse groups and in health education, is strongly recommended. Interventions to reduce smoking among adults need to continue for several years. The use of mass media (print, radio and television) is especially useful for modelling behaviour change, and for changing community norms concerning smoking.
Implications for research: Further community-based studies to reduce adult smoking need to be better designed in terms of sample size and power calculations, and account for the intra-class correlations associated with cluster design. The community must be the unit of analysis. Cross-sectional follow-up surveys are best method of follow-up, whilst cohort follow-up studies indicate intervention effectiveness at the individual level. In addition to assessing changes in smoking prevalence and quit rates during the time the intervention is in progress, smoking initiation rates should also be considered.
Further issues also related to the accounting for secular trends in smoking, and these should be taken into account prior to the interventions, and assessed again after the trial has been completed. Process measures should also be collected and reported.

Studies included in the review that appear to report data about differential effects:

Brownson RC, Smith CA, Jorge NE, Deprima LT, Dean CG, Cates RW. The role of data-driven planning and coalition development in preventing cardiovascular disease. Public Health Reports 1992;107:32-37.
Brownson RC, Smith CA, Pratt M, Mack NE, Jackson Thompson J, Dean CG, Dabney S, Wilkerson JC. Preventing cardiovascular disease through community-based risk reduction: the Bootheel Heart Health Project. Am J Public Health 1996;86(2):206-13.
Fisher EB, Auslander WF, Munro JF, Arfken CL, Brownson RC, Owens NW. Neighbors for a Smoke Free North Side: Evaluation of a community organization approach to promoting smoking cessation among African Americans. Am J Public Health 1998;88:1685-163.
Fisher EB, Jr, Auslander W, Sussman L, Owens N, Jackson Thompson J. Community organization and health promotion in minority neighborhoods. Ethn Dis 1992;2(3):252-72
Goodman RM, Wheeler FC, Lee PR. Evaluation of the Heart to Heart Project: Lessons from a community-based chronic disease prevention project. Am J Health Promotion 1995;9:443-55.
Heath GW, Temple SP, Fuchs R, Wheeler FC, Croft JB. Changes in blood cholesterol awareness: Final results from the South Carolina cardiovascular disease prevention project. Am J Prev Med 1995;11:190-196.
Smith NL, Croft JB, Heath GW, Cokkinides V. Changes in cardiovascular disease knowledge and behavior in a low-education population of African-American and white adults. Ethn Dis 1996;6(3-4):244-54.
Wheeler FC, Lackland DT, Mace ML, Reddick A, Hogelin G, Remington PL. Evaluating South Carolina's community cardiovascular disease prevention project. Public Health Reports 1991;106:536-543.
Jenkins CN, McPhee SJ, Le A, Pham GQ, Ha NT, Stewart S. The effectiveness of a media-led intervention to reduce smoking among Vietnamese-American men. Am J Public Health 1997;87(6):1031-4.
McAlister AL, Ramirez AG, Amezcua C, Pulley LV, Stern MP, Mercado S. Smoking cessation in Texas-Mexico border communities: A quasi- experimental panel study. Am J Health Promot 1992;6:274-9.
Ramirez AG, McAlister AL. Mass media campaign - A Su Salud. Prev Med 1988;17(5):608-21.
McPhee SJ, Jenkins CNH, Wong C, Fordham D, et al. Smoking cessation intervention among Vietnamese Americans: a controlled trial. Tob Control 1995;4(Supp 1):S16-S24.
Schorling JB. The stages of change of rural African-American smokers. Am J Prev Med 1995;11:170-177.
Schorling JB, Roach J, Siegel M, Baturka N, Hunt DE, Guterbock TM, Stewart HL. A trial of church-based smoking cessation interventions for rural African Americans. Prev Med 1997;26:92-101.

Reviews assessing interventions to decrease exposure to environmental tobacco smoke (ETS)

Reference: Roseby (2004)[33] **Country: Australia**	**Title: Family and carer smoking control programmes for reducing children's exposure to environmental tobacco smoke.** **Objective/review question: To assess the effectiveness of interventions aiming to reduce exposure of children to ETS.** **SES explicit target? Yes - the authors stated that where possible the outcomes would be examined by sex, age, and socio-economic status.** **Does the review either present data on or discuss differential effects being present in any of the included studies? Yes.**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: No References checked: Yes Restricted to English language studies only: Unclear
Experts contacted: Yes Search terms reported: Yes Search dates reported: Partial (start date not reported, probably DB inception) until October 2001.
Search sources/dates: Cochrane Tobacco Addiction Review Group Register, Cochrane Central Register of Controlled Trials (CCTR), MEDLINE, CINAHL, PsycINFO, EMBASE, ERIC and HEATLHSTAR were searched up until October 2001. In addition, the references of identified studies were checked, and experts in the field contacted.

Inclusion/exclusion criteria

Interventions: Studies that assessed any intervention for the reduction of children's ETS exposure, and smoking prevention, cessation, and any other tobacco control programmes targeting the participants described in the 'participant inclusion criteria' were eligible. The interventions could be smoke free policies and legislation, health promotion, social-behavioural therapy, technology, and education and clinical interventions. Studies of the uptake of smoking by minors were excluded.
Three studies were targeted within a community setting, 7 were targeted to parents in a well child setting, and 8 studies reported on interventions in the ill child health care setting. There was no restriction on who delivered the programmes. These may have included researchers, GP's, midwives, paediatricians, community and hospital nurses, health promotion agencies, tobacco control and anti-cancer organisations, and health departments.

Only 1 of the 18 included studies assessed a 'population' level intervention (adoption of a formal tobacco free policy for a school), the rest of the studies assessed 'individual' level interventions.
Participants: Persons (parents , family members, child care workers, teachers) involved in the care or education of infants and young children (aged 0-12 years).
Outcomes: Children's exposure to tobacco smoke, child health problems and the changes from baseline in smoking behaviour of those who care for them. Studies were also included where the outcome was parental or carer's smoking status alone.
Study designs: Randomised controlled trials (RCTs) and non-randomised controlled trials were eligible for inclusion.

Methods of review

Study selection procedure: NR
Validity assessment tool: Checklist developed by Jadad (randomisation, blinding, withdrawals and losses to follow-up).
Validity assessment procedure: Two reviewers independently assessed study quality, with any differences being resolved by discussion. Where necessary a third reviewer was consulted.
Data extracted from primary studies: Data were abstracted on study design, setting, participants, interventions, and outcomes.
Data extraction procedure: Two reviewers independently undertook data extraction, with any discrepancies resolved by discussion. Where necessary a third reviewer was consulted.
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? Studies were grouped according to the outcome measure and combined in a narrative synthesis.
How were studies weighted in the synthesis? No explicit weighting was used.
How was publication bias assessed? NR
How was heterogeneity assessed? Differences between the studies were discussed in terms of the interventions, and the different outcome measures assessed.

Quality assessment

Is there a well defined question? Yes.
Is there a defined search strategy? Yes.
Are the inclusion/exclusion criteria stated? Yes.
Are the study designs and number of studies clearly stated? Yes.
Have the primary studies been quality assessed? Yes.
Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? Partial. Number of reviewers involved in applying the inclusion criteria was unclear; two reviewers involved in data extraction and validity assessment.

Results

Number of studies included in the review: Eighteen; 12 RCTs, 2 CRCTs, 4 non-randomised controlled trials.
Number of participants: Unclear.
Results of the validity assessment: Fourteen trials used randomisation to allocate participants to study groups. In 4 of these there was adequate concealment of group allocation. In the remainder

allocation concealment was either unclear or inadequate. Four studies were not randomised. Two of these compared an intervention community with a control community. One study alternated intervention by week of clinic attendance, and another alternated intervention by birth month of the infant. Three of the 15 studies which randomly allocated participants to intervention or control groups achieved an intervention effect. Two of the four studies where there was apparent concealment of group allocation achieved an intervention effect. The other two studies with apparent concealment of group allocation were among the studies which demonstrated no intervention effect.
ETS exposure (18 studies): 4 out of the 18 studies reported success in achieving reduced children's ETS exposure. The interventions were a school-based intervention in which children wrote letters to their fathers urging them to quit (1 study); a 3 month intensive counselling intervention (2 studies) and a half-hour motivational interviewing intervention plus 4 follow-up telephone calls. A further 5 studies demonstrated a trend towards benefit but the differences between intervention and comparison groups were not statistically significant. None of the remaining 9 studies showed any significant differences between the intervention and control groups, including the 1 study that included a 'population' level intervention. The intervention consisted of promoting the adoption of a formal tobacco-free policy for the school, in addition with classroom and home-based programmes for students.
Differential effects: NR
Adverse effects: NR
Publication bias: NR

Conclusions

Brief counselling intereventions are successful in the adult health setting when coming from physicians, cannot be extrapolated to adults in the setting of child health. There is limited support for more intensive counselling interventions. There is no clear evidence for differences between the respiratory, non-respiratory ill child, well child and peripartum settings as contexts for reduction of children's ETS exposure.
Implications for practice: As yet there is insufficient evidence to recommend one strategy over another to reduce ETS prevalence or to reduce the level of exposure ahead of changing background social trends. There is limited support for more intensive counselling interventions. Two intensive counselling interventions were able to demonstrate small benefits in terms of parental smoking location. There is greater support for interventions that concentrate primarily on changing participants' attitude and behaviours, rather than on change in knowledge.
Implications for research: Examining opportunities for and barriers to parental behaviour change (smoking cessation and reducing children's exposure to certain environments), and children's subsequent reduction in ETS exposure would be useful in the development of interventions. Strategies which are effective in the adult healthcare setting may not be generalisable to the paediatric setting.

Studies included in the review that appear to report data about differential effects:
Ronco G, Ciccone G, Verneroa E, Troia B, D'Incalci T, Gogliani F. Prevention of exposure of young children to parental tobacco smoke: effectiveness of an educational program. Tumori 1993; 79 (3): 183-6. ('individual' level intervention).

Reference: Serra (2004)[34] **Country: Spain**	**Title: Interventions for preventing tobacco smoking in public places.** **Objective/review question: To evaluate the effectiveness of interventions to reduce tobacco consumption in public places. The review did not set out to evaluate their effectiveness in encouraging individuals to quit smoking.** **SES explicit target? No.** **Does the review either present data on or discuss differential effects being present in any of the included studies? No.**

Literature search

Summary of searches: Databases searched: Yes Handsearching undertaken: Yes References checked: Yes Restricted to English language studies only: No
Experts contacted: Yes Search terms reported: Yes Search dates reported: Yes 1966-1999.
Search sources/dates: The Cochrane Tobacco Addiction Review Group Register, MEDLINE (1966-1999), HEALTHSTAR (1987-1998), EMBASE (1998-1999), Public Affairs Information Servide database (PAIS), and the CDP File (National Centre for Chronic Disease Prevention and Health Promotion, CDC) "Smoking and Health database" were searched. Search terms were reported and all databases were searched from inception. In addition references of identified studies were checked, and handsearching of references from reviews, relevant articles and abstracts from the 2nd European Conference on Tobacco and Health (Las Palmas de Gran Canaria, Spain, 1999) and the 8th World Conference on Tobacco (Beijing, China), and the journal Tobacco Control (1991-1995, where it is not indexed) were searched. Names of identified authors of more than one paper related to the review subject, authors of included studies, and other professionals involved in tobacco policy research were also contacted.

Inclusion/exclusion criteria

Interventions: Studies that assessed any intervention to reduce smoking in public places, including restrictions and bans, educational materials, signs and strategies that used a combination of different interventions aimed at populations were eligible for inclusion. Interventions aimed at individuals, such as personal messages were also eligible for inclusion. The specific interventions that were aimed at reducing smoking in public places were no-smoking signs, signs about the effects of smoking and non-smoking on health, and comprehensive campaigns that included education about smoking bans, free health advice and smoking cessation support, and written information and signs. The specific interventions that were aimed at reducing smoking in public places and were aimed at individuals were prompts or requests to stop smoking, used either alone or in combination with non-smoking signs. The prompts were either continuous or occasional, and passive or direct (eg. coughing versus direct comment that the smoke was bothering them). All of the studies were conducted in the US.
Participants: Studies that included users of public places where restrictions or bans on smoking were implemented were eligible for inclusion. Participants included in the review were either general public and specific groups to whom no-smoking policies were addressed, or individual smokers in shared or non-smoking close areas. Studies were conducted in hopitals, workplaces, barbershops and supermarkets, elevators and cafeterias.
Outcomes: Studies that assessed either direct observation of people smoking, indirect observation of tobacco consumption (presence of cigarette butts, ashtrays and/or odour or tobacco) or other tests (simulation tests), environmental measures of tobacco smoke concentration or surveys of directors, workers and/or clients were eligible for inclusion.
Study designs: Randomised controlled trials (RCTs), controlled trials, controlled pre-post studies, and interrupted time series studies were eligible for inclusion. The criteria were later widened, to also include uncontrolled pre-post studies. All included studies were uncontrolled pre-post design.

Methods of review

Study selection procedure: Three reviewers independently assessed studies for inclusion, with any disagreements being resolved by discussion. Assessment was undertaken blinded to the source, institution, authors and results of the study.
Validity assessment tool: All the studies were uncontrolled pre-post studies. The assessment of validity was limited to whether the same measurement method was used at baseline and follow-up.
Validity assessment procedure: The authors do not report how this was undertaken.
Data extracted from primary studies: Data were extracted on the country where the study was conducted, population and/or public place studied, study design, inclusion criteria, description of the interventions, outcome measures including validation methods and results.
Data extraction procedure: Data were extracted by one reviewer, and checked for accuracy by two others.
Summary of how the studies were combined in the review: Meta-analysis: No Narrative synthesis: Yes Vote counting methods: No
How were studies combined in the review? The studies were grouped according to their aim, either reducing smoking in public places by strategies aimed at populations or individuals and combined in a narrative synthesis.
How were studies weighted in the synthesis? The studies were not weighted (all pre-post).
How was publication bias assessed? NR
How was heterogeneity assessed? Differences between the studies were discussed in relation to the intervention and partially the setting (recreational versus non-recreational).

Quality assessment

Is there a well defined question? Yes. Question clearly stated in terms of the inclusion/exclusion criteria.
Is there a defined search strategy? Yes. Search dates and terms reported, and a number of sources searched.
Are the inclusion/exclusion criteria stated? Inclusion criteria stated for interventions, participants, outcomes, and study designs. Criteria revised for study designs, as only uncontrolled pre-post studies were identified.

Are the study designs and number of studies clearly stated? Yes.
Have the primary studies been quality assessed? Partially. Due to the type of study design, the primary studies were only assessed on one criteria.
Have the studies been appropriately synthesised? Yes.
Has more than one author been involved at each stage of the review process? Partial. More than one review was involved in the inclusion and extraction of studies. Not reported how many reviewers involved in validity assessment.
Reviewer's comments: It is difficult to determine the extent to which the outcomes were related to the intervention due to the study design. It is also difficult to assess how far the study results can be applied in other settings, as all of the studies were conducted in the US. All of the studies were conducted pre 1990, and careful consideration needs to be given to whether the findings are applicable today, as social and cultural norms regarding smoking in public have changed considerably.

Results

Number of studies included in the review: Eleven uncontrolled pre-post studies.
Number of participants: Not reported and unclear.
Results of the validity assessment: All the studies were uncontrolled pre-post studies. Baseline data were recorded in all of the studies, and measurement methods were the same at baseline and follow-up. Length of follow-up varied across the studies from immediately after the intervention to 1 year. Five of the studies did not conduct any statistical analysis, and presented only a graphical display of data.
Reduction of smoking in public places by strategies aimed at populations (n=6): 2 studies, both conducted in hospitals found significant effects of a comprehensive tobacco ban. The first study found after 6 months a reduction in the number of people seen smoking from 53% to 0%, of the average number of cigarette butts in ashtrays from 940 to 22, and of the concentration of nicotine vapour from 13.01 to 0.48 nannograms per M3 in the elevators (p=.03). No significant differences were found for the environmental measures in restrooms and outpatient clinics. The second study, which assessed a similar intervention found that the percentage of people smoking dropped to zero in all the areas studied, except the cafeteria where the proportion of visitors smoking fell from 13% to 0.3%. Except for the entrances, a signficant reduction in the average number of butts in ashtrays was found from 958 to 184 in the elevators, and from 342 to 11 in the lounges. Significant reductions of the concentration of nicotine vapours were also found in the cafeterias, waiting areas, offices, staff lounges, and corridors/elevators, but again not in the restrooms and inpatient areas. One study evaluated restricted smoking to designated areas and time periods in a workplace setting. The results showed that the proportion of workers reporting being bothered by others' smoke was signficantly reduced 6 months after the policy was implemented. The percentage of workers reporting never being bothered by co-workers smoke increased from 41.3% at baseline to 80.1% at 6 months follow-up, and the percentage reporting being bothered everyday fell from 21.8% to 3.8%. The differences in both of these percentages was statistically significant from baseline. One study conducted in a hospital showed that an information campaign including signs, leaflets and educational displays led to significant reductions in people smoking in the public areas. The percentage of people smoking in the lobby fell from 35.7% to 20.0% and from 26.8% to 23.5% in the canteen. One study which assessed the effects of 2 types of warning signs about the effects of tobacco or quitting on health, in cardiac patients found that the average number of patients smoking decreased from around 5 at baseline to 2 after 4 days of positive signs, and from about 5 to less than 1 after 4 days of negative signs. There was also a reduction in the number of cigarette butts counted. No effects were observed for visitors. A further study assessed the impact of 2 different kinds of worded signs. The results showed a significant decrease in the number of people smoking at baseline (29%) with both interventions measured together (negatively and positively worded signs), but no significant difference between negative signs alone (11%) and positive signs alone (5%).
Reduction in smoking in public places by changing individual behaviour (n=5): a series of 4 studies assessed different methods of requesting individuals not to smoke. The studies were conducted in offices, barbershops, supermarkets and a university cafeteria. In offices continuous consequences or requests not to smoke had a larger effect than occassional ones, on smoking secretaries and employers when measured by the duration of time the office was exposed to cigarette smoke. In a barbershop, when requests were combined with signs, there was a large reduction in smoking among customers (from 74.3% to 41.9%). In supermarkets, requests showed a higher effect than signs alone measured by the amount of time smoke was present (400-600 seconds during the prompts phase, and 800-1,800 seconds when only signs were present). A complete reduction of people smoking was not observed in any of the 3 studies. A study conducted in a university cafeteria suggested a larger effect when signs and verbal prompting were used together, than when several signs on tables and walls were used together. Another study, evaluated the effect of assertive requests to refrain from smoking to individual smokers. Out of 74 people who were smoking in no-smoking designated areas, approx. 57% stopped smoking after the request. The proportion was different if the area where the request was given was recreational (39%) versus non-recreational (75%), or if the smoker was in the company of other people (66%).
Differential effects: NR
Adverse effects: NR
Publication bias: NR

Conclusions

Carefully planned and resourced, multicomponent strategies effectively reduced smoking within public places. Less comprehensive strategies were less effective. All the studies used relatively weak experimental designs and the majority were conducted in the US. There is a need therefore to identify ways in which these strategies can be adopted and used in countries with different attitudes to tobacco use.
Implications for practice: There is some evidence to suggest that institutional bans on smoking that are supported by multicomponent implementation strategies are effective in reducing smoking in workplaces, particularly worksites and healthcare settings. Less intensive strategies have a partial effect, but there is little effect from regulations or signage not supported by other measures. Requests to smoking individuals reduce short-term smoking, but are not an acceptable public health strategy for reducing exposure to smoke.
Implications for research: Further studies with more robust designs are needed to address the applicability of methods of reducing smoking in public places in different societies, and in the context of different cultural and social attitudes to smoking.

POPULATION TOBACCO CONTROL INTERVENTIONS AND THEIR EFFECTS ON SOCIAL INEQUALITIES IN SMOKING: PART 2 - A SYSTEMATIC REVIEW OF PRIMARY STUDIES

1. Introduction

Following on from the review of systematic reviews presented in the earlier part of this report, a new systematic review was conducted. This aimed to assess the evidence from primary studies to determine whether the effects of population tobacco control interventions vary between individuals or groups with different socio-demographic characteristics and to determine if these interventions are likely to either increase or reduce social inequalities in smoking. A further aim was to extend systematic review methods by combining i) existing data from primary studies with ii) relevant qualitative data and where available iii) data from new analyses of original datasets into a new review, to seek answers to address a policy relevant question.

2. Methods

2.1 Search methods

Studies in this review were identified by searching a range of medical, nursing, psychological, social science and grey literature databases. All databases were searched from inception date and searches were not limited by study design or language. The search strategy was designed to identify both quantitative and qualitative studies.

The following databases were searched:

- BIOSIS (1985-2006/01/03) (EDINA)
- Cinahl (1982-2005/12 week 2) (OVID)
- Cochrane Library (Issue 4:2005) (internet)
- Public Affairs Information Service (PAIS) (1972-2005/11) (SilverPlatter) http://www3.interscience.wiley.com
- Embase (1980-2005/week 53) (OVID)
- EconLit (1969-2005/11) (OVID)
- Health Management Information Consortium (up to 2005/11) (OVID)
- Health Technology Assessment database (HTA) (up to 2006/01) (internal CRD interface)
- ISI Technology & Science Proceedings (ISTP) (1990-2006/01/06) (Web of Knowledge)
- Medline (1966-2006/01/01) (OVID)
- Medline In-Process Citations (up to 1.4.06) (OVID)
- NHS Economic Evaluation Database (NHS EED) (up to 2006/01) (internal CRD interface)
- PsycInfo (1806-2005/12 week 4) (OVID)
- Science Citation Index (SCI) (1980-2006/01/07) (Web of Science)
- Social Science Citation Index (SCI) (1980-2006/01/07) (Web of Science)
- System for Information of Grey Literature in Europe (SIGLE) (1980-2005/03) (SilverPlatter)

The strategies are listed in Appendix A. Further studies were identified by examining the reference lists of all included studies, together with conference abstracts. Electronic tables of contents were checked from January 2005 to August 2006. A list is provided in Appendix A. Authors were also contacted for additional information where necessary, e.g. if only an abstract was available through a published source. We also identified primary studies via the systematic reviews included in Part 1.

References were managed using EndNote bibliographic management software.

2.2 Inclusion/exclusion criteria

The titles and abstracts (where available) of articles retrieved by the electronic searches and via the systematic reviews identified earlier in the project were screened for relevance independently by two reviewers. Full paper copies of potentially relevant studies were obtained and assessed for inclusion by one reviewer and independently assessed by a second reviewer using the pre-specified inclusion/exclusion criteria detailed below.

Any disagreements at any stage were resolved through discussion and consensus, and if necessary, the involvement of a third member of the review team. Studies which did not meet the inclusion criteria were excluded. A list of included studies is provided in Appendix B and a list of excluded studies is provided in Appendix C.

2.2.1 Population tobacco control interventions

Studies that assessed population level tobacco control interventions were included. These were defined as interventions applied to populations, groups, areas, jurisdictions or institutions with the aim of changing the social, physical, economic or legislative environment to make them less conducive to smoking and includes interventions assessing the effects of an increase in unit price of tobacco, smoking bans, restrictions on sales of tobacco products to minors, advertising bans, health warnings on tobacco products. Studies that assessed multi-component interventions, of which a population level intervention formed a part, were included provided that the outcomes for smoking and the 'population' level intervention of interest were reported separately.

Studies of interventions applied to populations or groups, aimed at strengthening the capacity of individuals to either stop smoking or resist taking up smoking were excluded. Examples of this type of intervention are health education programmes delivered either via schools or the mass media. It could be argued that pervasive and comprehensive mass media campaigns render exposure to tobacco control messages largely involuntary. However, they remain a form of health education aimed at individuals rather than a mandatory change in the environment relating to tobacco. Likewise, interventions applied directly to individuals with the aim of promoting smoking cessation, such as pharmacological treatment (e.g. nicotine replacement therapy), complementary therapies (e.g. hypnotherapy, acupuncture), psychosocial management (e.g. behavioural counselling, telephone services, interventions by health professionals) and other interventions such as exercise were also excluded.

Since this systematic review was concerned with wider, general population-level interventions, evaluations of interventions conducted within closed settings (e.g. psychiatric/addiction treatment settings, detention centres or prisons) were not included in this review.

2.2.2 Participants

Studies of smokers, people at risk of taking up smoking, people at risk of exposure to environmental tobacco smoke (ETS), or the general population were included. Studies needed to report socio-demographic or socio-economic data about the participants to be eligible. Studies could include one or more socio-economic group. If a study included participants from more than one socio-economic group (e.g. different occupational grades) the outcomes had to be reported separately for each group.

Choosing a measure of socio-economic status is a complex task because the appropriateness of a measure depends on the social context and may differ across countries, cultures and time. The strengths and limitations of the available measures are set out in detail in Galobardes et al (2006a and 2006b) and we have drawn on these texts when interpreting the research results and considering the translation of findings across countries.[1, 2]

The specific variables of interest were based upon the PROGRESS criteria[3] as a means for measuring disadvantage. The acronym PROGRESS[3] represents: Place of residence, Race/ethnicity, Occupation/unemployed, Gender, Religion, Education, Socioeconomic status (such as income or other composite measures) and Social capital. In this review these were categorised as:

Socio-economic status	- occupation; - education; - income;
Socio-demographic	- gender; - race/ethnicity; - religion; - place of residence/area deprivation indicator

Age was also considered as a socio-demographic variable when studies targeted populations who were considered specifically 'at risk' of smoking or taking up smoking due to their age, namely adolescents and young adults.

2.2.3 Outcomes
The outcomes of interest included:

- smoking outcomes (measured by smoking prevalence, consumption)
- intermediate smoking outcomes (measured through change in knowledge about or attitudes to smoking)
- indirect measures of tobacco consumption (such as the number of illegal sales to minors, or the quantity of smuggled cigarettes)
- process measures (such as participation rates)
- programme implementation measures (such as any enforcements of policy change)
- other health outcomes (such as mental health or well being)
- adverse effects.

Studies that reported measures of the concentration of tobacco smoke (such as levels of nicotine in the air or measures of cotinine in urine, blood, saliva or hair) were also included.

Studies that assessed the effectiveness of restrictions on sales to minors/youths via test purchases were excluded. In this review the minors undertaking the test sales at retail outlets were considered to be part of the intervention; their purchase attempts being a device for evaluating the implementation and enforcement of the intervention. Such "test purchases" were not considered to provide sufficient data on the differential effects of an intervention between social groups. Studies that assessed the effectiveness of restrictions on sales to minors/youths by reporting evaluations in a larger population (e.g. surveys of local school children) were included in the review.

Differential effects of an intervention were defined as effects which varied between individuals or groups with different socio-demographic or socio-economic characteristics. **To be included, a study needed to report differential effects (i.e. outcomes for a specific socio-demographic or socio-economic group)**.

2.2.4 Study design
Any study design was eligible for inclusion provided the study was an evaluation of a population tobacco control intervention: randomised controlled trials (RCT), cluster randomised controlled trials (CRCT), before and after studies (with or without a control group), post intervention studies, econometric analyses. We also included qualitative studies (using any method) where these were part of a larger, more comprehensive evaluation. A list of included studies is provided in Appendix B.

2.3 Data extraction and quality assessment

Data were extracted and the quality of the study assessed independently by one reviewer and checked by a second reviewer. The data extracted included: bibliographic details, objectives, study setting (including details of any secular changes during the delivery of the intervention or follow-up periods), description of the intervention (including the process and implementation), details about any co-interventions, details about the participants (including socio-demographic data), length of the intervention and follow-up, and size of the intervention effects. Any effects stratified by socio-economic status and/or by the other socio-demographic variables previously reported were extracted. Data extraction tables are provided in Appendix D.

The quality of the quantitative studies was assessed using a modified version of the Effective Public Health Practice Project Quality Assessment Tool for Quantitative Studies.[4] This was modified by the review authors, to allow methodological quality to be considered in the synthesis. A table of summary validity assessment is provided in Appendix E.

The qualitative data were extracted independently by two reviewers using methods developed by Britten et al as a guide.[5] Data extracted included: bibliographic details, objectives, study setting, intervention, methods used, participant details, methods of analysis, concepts identified, explanations and theories. Final data extraction was agreed by consensus. Quality was also assessed by two reviewers independently using prompts for appraising qualitative research[6] and agreement reached by consensus.

Any disagreements at each stage were resolved by discussion, re-examination of the original papers, and if necessary, the involvement of a third member of the review team.

2.4 Data synthesis

Studies were grouped by intervention and stratified according to the socio-demographic characteristics of the participants included in the studies. Differences between the studies were explored graphically after being plotted onto a matrix of the social gradient of effectiveness, and narratively, by examining differences in the interventions, settings, participants, outcomes and outcome measures and study characteristics, such as design, processes, length of follow-up and any potential biases.

In order to assess the studies for evidence of a social gradient in effectiveness, one of the review authors designed an innovative evidence matrix. This matrix is based upon a hypothesis-testing approach whereby the balance of available evidence to support each of the following hypotheses was compared:

- The *null hypothesis:* that for any given socio-demographic or socio-economic characteristic there is no social gradient in the effectiveness of the intervention.

- H1: that there is a *negative social gradient.* We defined a negative gradient as one where the intervention was more effective in more disadvantaged groups (e.g. in poorer groups, less educated or less skilled occupational groups).

- H2: that there is a *positive social gradient.* We defined a positive gradient as one where the intervention was more effective in more advantaged groups (e.g. in more affluent or more educated groups).

From an equity perspective, we were particularly keen to identify interventions that showed a negative gradient in effect, as the evidence may help inform policies to tackle inequalities in health.

For each dimension of equity we had to define positive and negative anchors. To some extent these choices were arbitrary, but the general principle was that groups with a greater need for effective interventions (to reduce inequalities) were used to define the negative anchor.

A matrix was produced for each intervention category, and was populated with data extracted from each of the included primary studies. Quality scores were assigned to each study according to the strength of the study design, the number of methodological criteria met and the strength of the outcomes assessed, distinguishing between 'hard' outcomes such as smoking behaviour and 'intermediate' outcomes such as attitudes. Each study was then plotted onto the matrix, populating each row with the number of studies supporting each hypothesis for a given PROGRESS[3] criteria. The height of each bar represented the suitability of the study design: high, medium or low as defined in Box 1.

The results were then synthesised to show how the available evidence supports, or does not support, the competing hypotheses. The evidence matrix for social gradient in effectiveness is provided in Appendix F.

2.5 Additional data

One of the aims of the project was to extend systematic review methods by integrating socio-economic status data - where available - from authors of primary studies included in the review. In studies where it was indicated at baseline or elsewhere within the study, that data on occupation, education or social class were gathered, but not presented, the authors were contacted and asked for access to the original data, in order to conduct new analyses. The findings of any new analyses would be added to the review and synthesised alongside data from the other primary studies, with the overall aim of expanding the available evidence base.

2.6 Advisory panel

An advisory panel was established to provide advice to the team on all aspects of the project, including the protocol and drafts of the final report. The panel included leading academics and experts in the field of tobacco control and inequalities in health. A list of members of the advisory panel is provided in Appendix G.

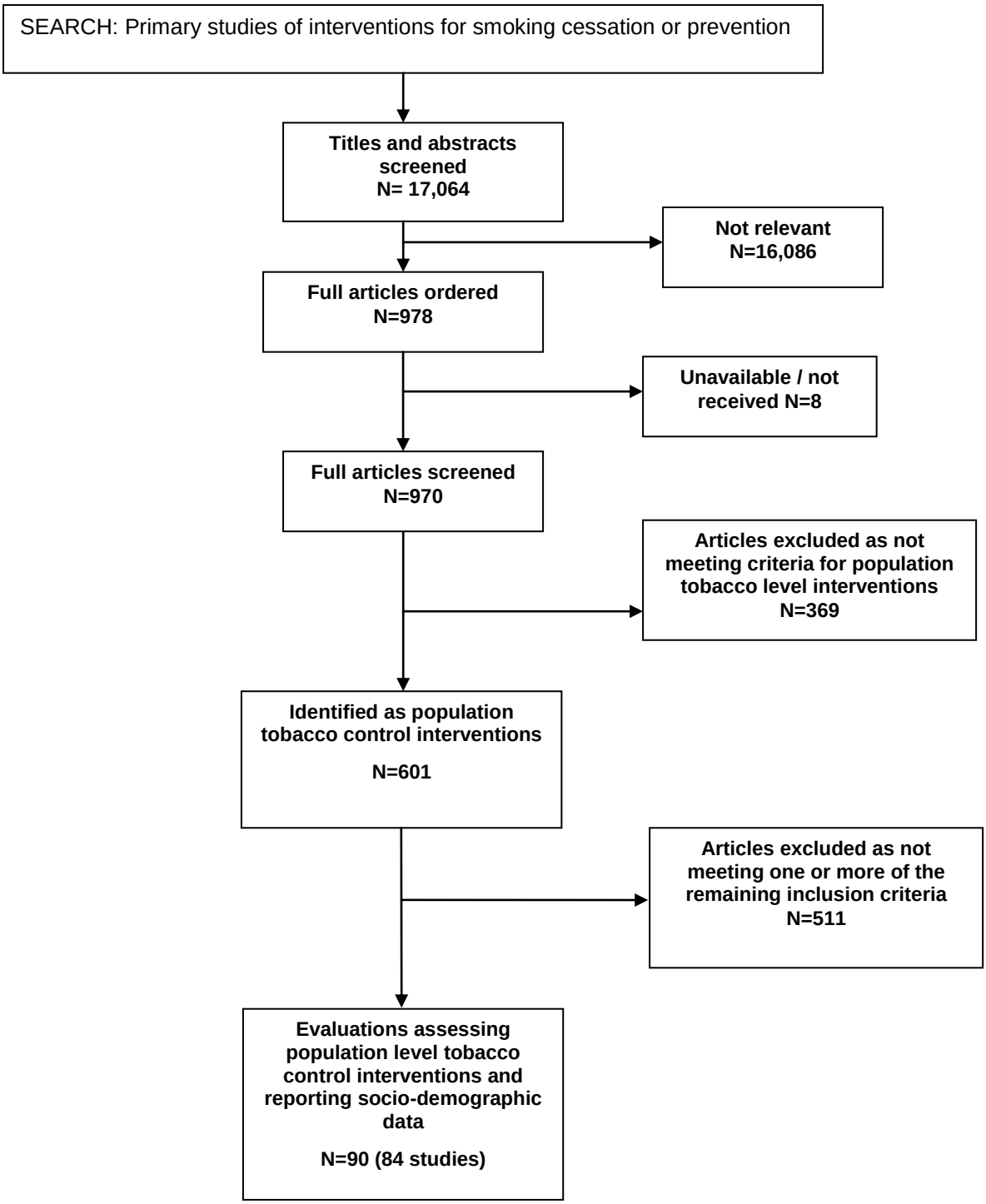

Figure 1. Process of study selection

3. Results

A total of 17,064 references were screened, including 143 references identified by hand searching and 647 articles identified from the systematic reviews included in the review of reviews detailed earlier in this report. A total of 970 potentially eligible papers were obtained. Of these, 84 studies (reported in 91 papers) met the inclusion criteria and are included in the review (Figure 1 and Appendix B). Just 15 (17%) of these studies had been included in one or more of the systematic reviews identified in our review of reviews, thus supporting the decision to conduct a new systematic review of the evidence.

One of the aims of the project was to extend systematic review methods by integrating additional data obtained from authors of primary studies where studies indicated at baseline or elsewhere, that data on occupation, education or social class were gathered, but not used to stratify the results of tobacco control interventions. Six authors were contacted, and access to the original data requested. Two authors responded but no additional data were provided. It was therefore not possible to continue further with this phase of the project.

A crucial part of the synthesis for this review was the use of matrices to graphically display evidence for a social gradient in the effect of an intervention. These matrices are shown at the beginning of each intervention category, followed by a narrative synthesis of the results. A matrix presenting the evidence for all interventions is displayed in section 3.9. The PROGRESS[3] criteria were used to investigate differential effects – defined in this review as Place of residence/area deprivation indicator, Race/ethnicity, Occupation/unemployed, Gender, Religion, Education, Socioeconomic status (such as income or other composite measures).

No studies were found which reported place of residence/area deprivation indicator, religion or social capital and therefore these variables were dropped from our analyses. Studies were identified evaluating the following population interventions: restrictions on smoking in workplaces and public places; restrictions on smoking in schools; restrictions on sales to minors; health warnings on tobacco products; advertising bans; price of tobacco products and multi-faceted interventions.

Box 1 – Key to Matrices of evidence for social gradient in effect of intervention	
No gradient	For any given socio-demographic or socio-economic characteristic there is no evidence for a social gradient in the effectiveness of the intervention.
Negative gradient	Defined as evidence that women/girls, minority/disadvantaged group(s) in terms of race/ethnicity, lower occupational groups, those with a lower level of educational attainment, the less affluent, those living in more deprived areas, or younger "higher" risk populations are more responsive to the intervention.
Positive gradient	Defined as evidence that men/boys, majority/advantaged groups in terms of race/ethnicity, higher occupational groups, those with a higher level of educational attainment, more affluent, and those who live in more affluent areas, or younger "higher" risk populations are more responsive to the intervention.
PROGRESS criteria[3]	Used to investigate differential effects – defined as Place of residence, Race/ethnicity, Occupation/unemployed, Gender, Religion, Education, Socioeconomic status (such as income or other composite measures) and Social capital.
Bars in matrix	In each row, one bar represents one study.
Colour of bars	Black = "hard outcome" directly measuring smoking behaviour such as smoking prevalence or consumption; Grey = intermediate outcome such as beliefs and attitudes.
Height of bars	Low, medium, high based solely on suitability of design, where: Highest is the best category = Suitability category A or B, followed by Medium = Suitability Category C, and Low = Suitability Category D. *Category A*: The study design includes concurrent comparison groups AND prospective measurement of exposure and outcome. *Category B:* The study design includes at least two 'before' measurements and at least two 'after' measurements but no concurrent comparison group. *Category C:* The study design involves single 'before' and 'after' measurements with no concurrent comparison group. *Category D:* The study design involves measurements of exposure and outcome made at a single point in time.
Numbers above each bar	Total number of quality items passed. Maximum 6 (representative of the sample; randomisation of intervention allocation; comparability of groups at baseline (where relevant); credibility of data collection tools; attrition rate (where relevant) or sample size; attributability of observed effects to intervention).

3.1 Effects of restrictions on smoking in workplaces and public places

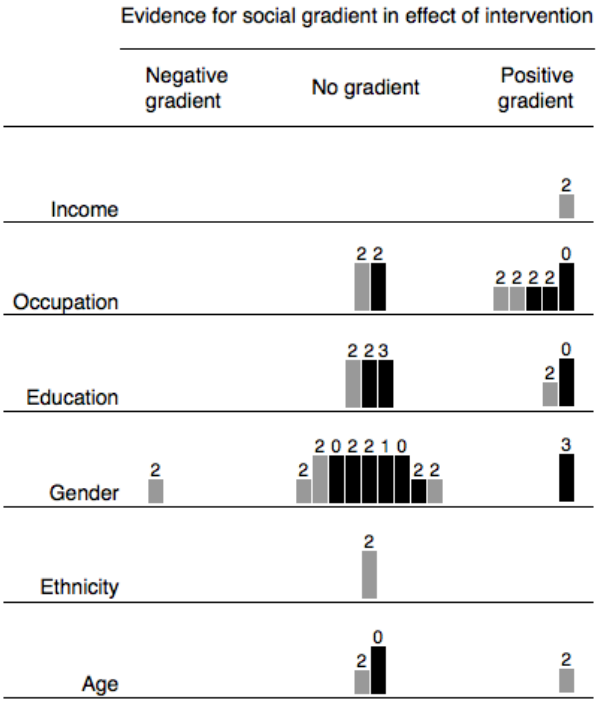

Figure 2 – Effects of restrictions on smoking in workplaces & public places (See Box 1 for key to matrix)

Fourteen studies evaluated smoking restrictions or bans in the workplace or in public places.[7-20] Settings included hospitals and health authorities,[7, 9, 10, 12-14, 18] telecommunications companies,[8, 16, 17] a university,[15] various public and private workplaces,[11] and bars and restaurants[19, 20] in the US,[7, 9, 13, 14, 16-19] Australia,[8] New Zealand,[20] Israel,[10] Finland,[11] Scotland,[15] and Wales.[12] Interventions ranged from a total ban on indoor smoking,[7, 8, 10, 17, 18, 20] through a smoking ban with exceptions,[15] or the restriction of smoking to designated rooms or areas,[11, 12, 14, 16] to display of no-smoking signs in hospital lobby,[9] with the nature of the smoking ban unclear in two studies.[13, 19] Co-interventions included smoking cessation advice or classes,[10, 16] smoking cessation advice together with quit kits[7] or education and support[15] or with quit clinics, individual counselling and self help manuals,[18] media and education,[19] hypnotherapy[17] and removal of ashtrays.[9] Six studies did not report any co-interventions.[8, 11-14, 20] Seven studies reported a pre-implementation strategy including information on the new policy, publicity and education/advice.[7, 10, 13, 15, 17-19] Five studies were published between 2000 and 2005[10, 11, 15, 19, 20] the remainder were published between 1981 and 1999.[7-9, 12-14, 16-18]

Eight studies assessed outcomes before and after the introduction of smoking restrictions.[7-11, 14, 18, 20] All of these used repeated cross-sectional designs (i.e. surveying different participants before and after the intervention) with the exception of one study[18] which included (but was not restricted to) a longitudinal sample of hospital employees. Six studies assessed outcomes post-intervention only[12, 13, 15-17, 19] and one of these[15] had a linked qualitative study (see Appendix D for full details). Studies were generally of limited methodological quality and met between none and three of the six quality criteria, with the majority meeting two. The criteria most often met were that the studies had a representative sample and that the sample comprised at least 200 participants.

3.1.1 Differential effects by PROGRESS[3] criteria for restrictions on smoking in workplaces & public places

Income

As shown in the matrix (Figure 2) only one post-intervention US study, assessed differential effects by income.[19] This study found that respondents with an income of at least $60,000 were more likely to approve of the 1998 law banning smoking in practically all Californian bars than were those with an income of $20,000 or less.

Occupation

Three before-and-after studies examined effects by occupation.[7, 10, 18] One study set in the US[72] and another set in Israel[75] supported the null hypothesis of no difference in effectiveness between occupational groups. However, another[85] in a hospital in the US found that physicians were more likely to quit smoking than nurses, but that all employee groups showed statistically significant reductions in both prevalence and average number of cigarettes smoked per day. Four post-intervention studies examined differential effects by occupation.[12, 15-17] Each demonstrated a positive social gradient, showing the intervention to be more favourable in the higher occupation group. Two studies presented attitudinal outcomes only.[12, 17] One found that a lower percentage of nursing and ancillary staff agreed with a UK health authority's smoking policy than did medical and dental staff and professional and technical staff.[12] The other found that, 12 months after the introduction of a worksite smoking ban in conjunction with hypnotherapy, managers at a large US company were more likely than non-managers to correctly report smoking restrictions and were more satisfied with the policy.[16] In an earlier study at the same US company,[17] it was found that 20 months after the introduction of smoking restrictions managers were more likely than non-managers to be no longer smoking. Additionally, a greater percentage of managers, than non-managers, had reduced the number of cigarettes smoked. Senior managers were more likely than less senior managers and non-managers to be satisfied with the policy. In a study of a UK university smoking ban,[15 21, 22] statistically significant differences in quit rates were found, between academic and related staff and manual staff, with academic and related staff being more likely to quit. Following the ban, significantly fewer academic and related staff had increased their day time smoking in relation to manual staff. This study also noted unintended effects of the policy, in terms of an increase in visible smoking (on university property outside buildings and specifically on entrances and steps) and changes to working patterns. These included time spent in the work area, although information was not broken down by occupational group. Although there was general support for a smoking policy, 55% of respondents felt that designated smoking areas within university buildings should be available.

Qualitative data revealed further unintended consequences of the university smoking ban.[15, 21, 22] The ban was seen as being divisive, as it did not impact equally on all grades of staff. Academic staff who wished to continue smoking could adopt strategies such as leaving the building or working from home. However, not all staff have this flexibility, due to the nature of their work. Disciplinary procedures were not seen as equally applicable to different occupational groups and there was a suspicion that members of staff across the occupational groups were not conforming to the ban to the same extent. There was general recognition that the ban was most likely to adversely affect staff of lower occupational status who were most likely to smoke. Unintended consequences of the ban (not broken down by occupation) also included the creation of divisions between smokers and non-smokers over the impact of the smoking ban.

Education

Four before-and-after studies[7, 10, 11, 18] and one post-intervention study[19] investigated the differential effects of smoking restrictions by educational level. Two studies demonstrated a positive social gradient where the intervention was more favourable in the higher educated group.[18, 19] One before-and-after study, set in the US, found that education was a significant predictor of quitting smoking; those respondents with a doctorate were more likely to quit than those with college/masters education or less.[18] Overall, this study found statistically significant reductions in prevalence of smoking. One post-intervention study found that more highly educated (college graduate or higher) respondents tended to approve of the law banning smoking in practically all bars in California whereas those of a lower education level were less approving.[19] The remaining three before-and-after studies supported the null hypothesis of no difference in effectiveness of smoking restrictions between those of different educational groups.[7, 10, 11] In one US study prevalence of smoking did not decrease significantly following the introduction of restrictions;[7] in a study set in Finland, prevalence was reduced at follow-up[11] and in the third study change in prevalence was not reported.[10]

Gender

As shown in the matrix (Figure 2) eleven studies examined differential effects by gender.[7-14, 17-19] One before-and-after study set in Finland found a positive social gradient.[11] At one year following legislation to restrict smoking in the workplace there was a reduction in prevalence of smoking in both men and women but at four years a further decline in prevalence was only observed in men.[11] One post-intervention study found a negative social gradient.[17] In this study women were more likely than

men to correctly report smoking restrictions at a large US company. They were also more likely to be satisfied with the policy but no differences in job performance were observed by gender.

The remaining nine studies supported the null hypothesis of no difference in effectiveness of smoking restrictions between men and women (based on smoking behaviour and/or attitudes).[7-10, 12-14, 18, 19] In two of these studies, both conducted in the US, overall prevalence of smoking showed a statistically significant decrease following introduction of restrictions[13, 18] whilst in one study overall prevalence did not decrease significantly[7] and in two studies statistical tests were not conducted.[8, 14] Changes in prevalence were not reported in four studies.[9, 10, 12, 19] set in the US, UK and Israel.

Ethnicity

As shown in the matrix (Figure 2) only one before-and-after study, examined differential effects by ethnicity.[20] Respondents' approval of smoking bans in bars and restaurants increased following the extension of smoking ban legislation to include all workplaces in New Zealand. This increase was observed in both Maori and non-Maori populations, supporting the null hypothesis. Reported exposure to second hand smoke in indoor workplaces decreased. The authors stated that Maoris were the group most likely to be exposed to SHS in the workplace but statistical significance tests between groups were not reported.

Age

One before-and-after study[18] and two post-intervention studies[12, 19] examined differential effects by age group with one reporting effects of a smoking ban on smoking behaviour[18] and two focusing on attitudes.[12, 19] One found that support for a UK health authority's no-smoking policy was greater in those over 55 years of age compared with those aged 25 or under. Those over 55 were also more likely to support strengthening the policy than those 25 or under.[12] In contrast, the findings of of two other studies in relation to age were inconsistent and the studies are therefore listed in the matrix as supporting the null hypothesis.[18, 19]

3.1.2 Summary of differential effects by PROGRESS[3] criteria for restrictions on smoking in workplaces & public places

Income	Insufficient evidence of a social gradient on restrictions on smoking in workplaces and public places.
Occupation	Evidence of a possible positive social gradient for restrictions on smoking in workplaces and public places based on five comparatively weak studies. Each found that the higher the occupational group the better the outcome of smoking restrictions.
Education	Insufficient evidence of a social gradient on restrictions on smoking in workplaces and public places
Gender	Evidence suggests no gradient for restrictions on smoking in workplaces and public places.
Ethnicity	Insufficient evidence of a social gradient for restrictions on smoking in workplaces and public places.
Age	Inconsistent evidence of a social gradient for restrictions on smoking in workplaces and public places.

3.2 Effects of restrictions on smoking in schools

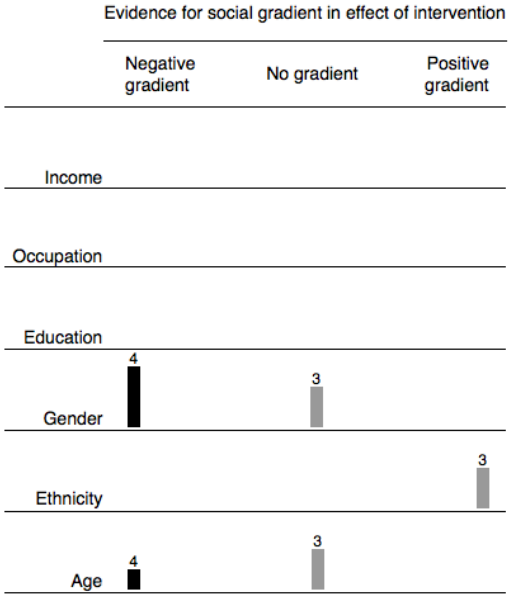

Figure 3 – Effects of restrictions on smoking in schools (See Box 1 for key to matrix)

Three studies assessed the effects of restrictions on smoking in schools.[23-25] Two studies were published in 2005 and conducted in the US[23, 25] and one study was published in 1999 and conducted in the UK.[24]

The UK based study[24] evaluated the impact of two school-based interventions to reduce smoking prevalence in 8 to 13 year olds. One intervention was a population level intervention, introducing a school smoking policy. Each school implementing the policy varied the content of the intervention dependent upon requirements and constraints of the school concerned. This variation related to incorporating decisions on designating and monitoring the smoke-free premises, necessary sanctions and discipline, as well as employment policy and curriculum development together with smoking cessation support. The other intervention was aimed at the individual, and used a specialised theatre performance company to provide a curriculum based programme in schools. This was the most robust study in this category and used a quasi-randomised trial design with two intervention and one control groups. Outcomes were assessed before and after the intervention. The groups were comparable at baseline, and biochemical samples were collected to encourage participants to report behaviour accurately, although these were not used in the analysis. There were a total of 4,970 participants included in the analysis. No concurrent interventions were reported and so it is reasonably likely that any observed effects on smoking behaviour were attributable to the interventions.

The second study[25] examined the extent to which students believed their peers and teachers complied with school smoking bans, and student support for the ban in a population with only 37% white participants in California, US. This study[25] used a repeat cross-sectional design with measurements before and after the intervention but there was no concurrent comparison group. The study assessed student perceptions only and did not measure actual adherence rates or smoking behaviour. There was a response rate of >66% for all surveys. It was also part of a larger national programme which included other smoking cessation/prevention components and so any changes cannot solely be attributed to the intervention.

The final study in this group[23] examined the effect of enforcement action including monitoring student compliance of school tobacco use policies, together with severity of consequences when students were caught violating policies, and school policies regulating tobacco use by staff members, and the association with student smoking behaviour and attitudes in an adolescent population in the US. A national cross-sectional survey of school students and administrators was used. As there was no prior measurement of smoking behaviour it is difficult to assess the direct effect of the intervention.

Studies met three or four, out of the maximum six quality criteria. The methodological criteria most often met were that the study samples were representative, data collection tools were shown to be credible, and results were based on a sample of over 200 participants or with an attrition rate of less than 30%. Only one study also had intervention and control groups which were comparable at baseline.

3.2.1 Differential effects by PROGRESS[3] criteria for restrictions on smoking in schools

Gender

Two studies examined the effect of interventions by gender as shown by the matrix (Figure 3). The UK study[24] supported the hypothesis of a negative social gradient, as it reported a small but statistically significant decrease in current smoking behaviour for girls ($p<0.05$) but not for boys in the intervention group. The intervention had no significant effect on non-smokers' intentions to smoke or to maintain non-smoking status for either boys or girls. There were no significant differences in knowledge relating to health risks between the intervention and the control groups.

The US study[25] was consistent with the null hypothesis of no social gradient by gender. The intervention did not differentially affect girls and boys' beliefs about school smoking bans, either among all students or among current smokers only. However actual smoking behaviour was not measured.

Ethnicity

The same study[25] provided support for a positive social gradient by ethnic group. Hispanic students were significantly less likely to favour smoke-free grounds compared to non-Hispanic white students (Odds Ratio (OR) = 0.68, 95% Confidence Interval (CI) 0.55 to 0.84) when the attitudes of all students were considered. Of those classed as current smokers, participants classified as "Other" in terms of ethnicity were less likely to favour smoke-free school grounds compared to non-Hispanic other participants (OR=0.37, 95% CI 0.14 to 0.94). There was an overall increase in the % of all students who felt that most or all students who smoked obeyed the school no-smoking rule, rising from 34.1% in 1993 to 57.7% in 2002. There was also an increase in current smokers indicating a preference for smoke-free school grounds from approx 55% in 1993 to 69% in 2002, but these results were not stratified by any socio-economic variable.

Age

As shown by the matrix (Figure 3), two studies reported differential effects by age. One[23] supports the negative social gradient as the study found that the level of monitoring in schools was associated with a significant reduction in daily use of cigarettes, and cigarette smoking within the last 30 days in middle school students ($p<0.01$) but not in high school students (with middle school students seen as the more vulnerable group due to their younger age). There was also a significant association between staff being permitted to smoke within schools and a slight increase in daily use of cigarettes by high school students ($p<0.05$). However the severity of consequences for violating school smoking policies showed no statistically significant differences between middle and high school students in daily use of cigarettes or cigarette smoking within the last 30 days. Nor did severity of consequences of violating policies have a significant effect on disapproval of cigarette use by either middle or high school students. The second study[25] did not find any support for a differential effect in student beliefs about school smoking bans according to age (12 to 14 yrs or 15 to 17yrs) in the US.

3.2.2 Summary of differential effects by PROGRESS[3] criteria for restrictions on smoking in schools

Income	**No studies**
Occupation	**No studies**
Education	**No studies**
Gender	**Possible negative social gradient based on one study observing a small but statistically significant decrease in girls' but not boys' current smoking behaviour.**
Ethnicity	**Possible positive social gradient based on one study demonstrating that Hispanic students favoured smoke-free schools less than non-Hispanic students.**
Age	**Possible negative social gradient based on one study demonstrating greater effectiveness for middle school students as opposed to high school students.**

3.3 Effects of restrictions on sales to minors

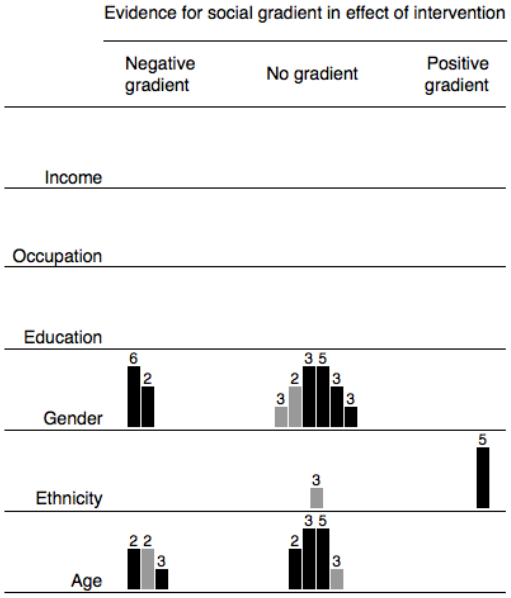

Figure 4 – Effects of restrictions on sales to minors (See Box 1 for key to matrix)

Thirteen studies evaluated restrictions on sales to minors[26-38] in the US,[26-29, 36-38] Sweden,[34] Finland,[31] Australia,[32, 33, 35] and New Zealand.[30] The studies covered the period from 1992 to 2005, but most were conducted between 2000 and 2005.[29, 31, 33-35, 37, 38]

Three studies used a cluster randomised controlled trial design.[26, 27, 29] One study used a before and after design with a control group.[32] Five other studies also assessed outcomes before and after an intervention, but without a control group.[28, 33-36] Four studies assessed outcomes post intervention only,[30, 31, 37, 38] with one study also employing a concurrent intervention group for comparison as well as assessing outcomes post intervention only.[37]

Compared to the other categories this is a methodologically strong set of studies with one study meeting all six quality criteria,[26] and two studies meeting five of the criteria.[27, 29] One study[29] failed to have a representative population, as only 11% of the initial cluster sample were eventually included. The remaining studies met two or three of the methodological quality criteria. The criteria most often met were that studies had a representative sample, that data collection tools were shown to be credible, and that it was reasonably likely that the observed effects were attributable to the intervention under investigation.

3.3.1 Differential effects by PROGRESS[3] criteria for restrictionson sales to minors

Gender

As shown by the matrix (Figure 4) eight studies examined differential effects of restrictions on sales to minors by gender.[26-28, 30-34]

The findings from two studies suggest a negative social gradient.[26, 28] One US study[26] was the most methodologically robust and compared a community and retailer education-only intervention with no intervention in two clusters of communities with a high Latino/Mexican population. This study found girls were less likely to use tobacco than boys at all time periods after the intervention ($p<0.05$). Girls in the intervention communities were also less likely to use tobacco compared to girls in the control communities ($p<0.05$) at the three year follow-up period.

Another US study[28] assessing the impact of a combined retailer education and enforcement intervention aimed at 10th grade (aged 15) students, found evidence that this type of intervention was more effective for girls than boys as there was a significant decrease in smoking among girls ($p=0.004$). 11.5% of girls reported regular tobacco use after the intervention compared with 26.4% before the intervention, whereas boys showed an increase from 23% to 28%. For all students together

there was a slight decrease from 25% before the intervention to 20% after the intervention for regular tobacco use. The results are from a small sample of the population in one US city and may not be representative.

Six studies supported the null hypothesis of no social gradient for gender. Four studies assessed enforcement only[30, 31, 33, 34] and two studies assessed multi-component community driven interventions.[27, 32]

A US study of a multi-component, community-driven intervention combined with community enforcement found it to be equally as effective for boys as for girls in slowing the rate of increase of smoking prevalence.[27] There was a decline for both sexes reporting commercial sources for their most recent cigarette, but this was only statistically significant for boys. Prevalence of smoking increased in control communities for all students over the course of the study.

A study set in Australia found that there was no effect on the prevalence of smoking for either girls or boys, apart from boys in year 8 who showed a significant increase from 12.9% to 20.4% ($p=0.05$) after an enforcement only intervention.[33] The percentage of girls reporting having never smoked showed an increase of 6.7% ($p<0.01$) after the intervention. There were no significant decreases in reported ease of purchase of cigarettes among either boys or girls.

Another study set in Australia assessing the effects of a community education and community enforcement programme reported that the post-intervention smoking prevalence decreased for some age groups, but that overall there was no difference in smoking rates between boy and girl school students.[32] Boys also reported it was more difficult to purchase tobacco products after the introduction of the intervention.

A Finnish study found no differential effect for gender as a ban on sales of tobacco to minors was effective for both girls and boys, with a decrease in daily smoking.[31] However this was a post-intervention only study and the results should be viewed with caution. The study also reported that there was a decrease in adolescents purchasing from commercial sources, although the results were not reported separately for gender.

The New Zealand study found that frequency of cigarette purchasing was greater for boys compared to girls (Relative risk (RR) 1.11; 95% CI 1.03 to 1.19; adjusted for smoking frequency), although there were no gender differences associated with difficulty in buying cigarettes.[30] This study evaluated results after an enforcement-only intervention and did not evaluate smoking prevalence or consumption.

The enforcement-only intervention in Sweden resulted in a significant decrease in self-reported purchase of tobacco for boys and for girls ($p<0.001$).[34] A significantly higher proportion of both boys and girls used snuff and had bought tobacco from friends after the introduction of the intervention ($p<0.001$). In terms of attitudes to the intervention, a higher proportion of boys ($p<0.001$) compared to girls stated that they felt the minimum age should be abolished. No other major attitudinal differences were found relating to gender. Actual smoking behaviour was not measured in this study.

Ethnicity

One study based in the US evaluated the effects of combined enforcement of laws prohibiting tobacco possession for adolescents and laws restricting sales to minors by retailers in one cluster of communities and an intervention which only enforced tobacco sales laws on retailers in another community cluster of different ethnic mixes in the US.[29] This study supported the positive social gradient as, although there was an increase over the duration of the study for occasional and everyday tobacco use of 4.1% for white students, this was less than the approximate 10% increase for non-white students in the combined intervention. Rates of students reporting "never using cigarettes" decreased for 6th to 8th grades (age 11 to 13) for the non-white participants in either intervention. However for white students the decrease was greater in the enforcement of sales only, compared to the combined intervention (decrease of 25.1% vs. 14.3%). Overall a higher proportion of non-white students held more negative views about the policies than white students.

A study[30] set in New Zealand evaluated the effectiveness of enforcement of sales restrictions on under-age tobacco access; however this was a post-implementation only study. This study supported

the null hypothesis as it reported conflicting results. Asian students were less likely to have difficulty in buying cigarettes compared with all other ethnic groups (RR 0.54; 95% CI 0.37 to 0.78). However there were no statistical differences reported for ethnicity in terms of weekly purchasing of cigarettes. The proportion of students reporting someone else bought cigarettes for them rose overall from 14% to 46% but these results were not stratified by ethnicity.

Age

The same six studies which assessed intervention effects by gender of restrictions on sales to minors, also assessed the effects by age.[27, 28, 30-32, 34] An additional study[35] also assessed the effects of retailer compliance on adolescent smoking rates by age group.

As shown by the matrix (Figure 4) three studies found a differential effect in favour of younger participants.[28, 31, 34] One[28] evaluated the impact of a combined education and enforcement intervention on 10th grade (age 15) students in the US and found a decrease in self-reported regular tobacco use (not statistically significant) in students aged 14 to 15 years. There was an increase in approval of legislation across all age groups after the introduction of the intervention. However this study had a small sample for the sub-group analysis. Another found a significant decrease in tobacco purchase for year 7 students after the introduction of an enforcement-only intervention in Sweden.[34] Although figures for older adolescents remained largely unchanged there were some slight increases in some age groups. A significantly higher proportion in all age groups used snuff and bought from friends ($p<0.001$) after the introduction of the intervention. The Finnish study, after the introduction of an enforcement only intervention, found a decrease in tobacco use among 14 and 16 year old boys and 14 year old girls.[31] However, this did not apply to 16 year old girls, and there was no change for either sex at 18 years. This study did not find any difference in daily consumption after the intervention. However a decrease in the proportion of younger participants purchasing from commercial sources was found after the introduction of the legislation.

Four other studies which assessed the effects by gender also supported the null hypothesis of no differential effect, this time on age.[27, 30, 32, 35] One evaluated a non-prosecutory community education and enforcement intervention in Australia and found conflicting results for the different age groups in the follow-up survey.[32] This was one of the more methodologically robust studies in this intervention category. Significantly lower smoking prevalence was reported after the intervention for both year 10 girls and year 7 boys ($p=0.05$), but significantly higher smoking prevalence for year 7 and year 9 girls and year 8 boys ($p=0.05$) in the intervention groups. There were similar conflicting results in the control groups as well.

Another study also used a control group and was methodologically robust.[27] This US based study found that the multi-component intervention was equally effective across all grades for both monthly and weekly smokers in an adolescent population. However it also found an increase in the control communities for daily, weekly and monthly smoking.

The New Zealand study reported that students aged 15 years were more likely to have purchased cigarettes in the last year compared to those aged 14 years (RR 1.14; 95% CI 1.06 to 1.23 when adjusted for smoking frequency).[30] However this study assessing an enforcement-only intervention also found that age was not related to difficulty in buying, although they only assessed student replies after the introduction of the intervention.

A further study evaluated a combined retailer education and enforcement programme in Australia both before and after the introduction of an intervention and found there was a decrease in age specific smoking rates across all age groups.[35]

Three studies in the US evaluated the impact of interventions on an adolescent population but did not assess differential effects by any of the PROGRESS[3] criteria.[36-38]

3.3.2 Summary of differential effects by PROGRESS[3] criteria for restrictions on sales to minors

Income	No studies
Occupation	No studies
Education	No studies
Gender	Two studies evaluating the effects of an education only, and a combined education and enforcement intervention suggest a possible negative social gradient in terms of regular tobacco use. The remaining six studies demonstrated inconsistent evidence for four enforcement-only and two combined education and enforcement interventions.
Ethnicity	One study evaluating a combined education and enforcement intervention suggested a possible positive social gradient with a greater increase in smoking for non-white students compared to white students. A second study suggested no differential effect for an enforcement-only intervention.
Age	A possible negative social gradient was demonstrated with three studies finding stronger effects in younger students, including two studies evaluating an enforcement-only intervention and one a combined education and enforcement intervention. Inconsistent evidence was found in four other studies, with three studies evaluating combined education and enforcement interventions and one an enforcement-only intervention.

3.4 The effects of health warnings on tobacco products

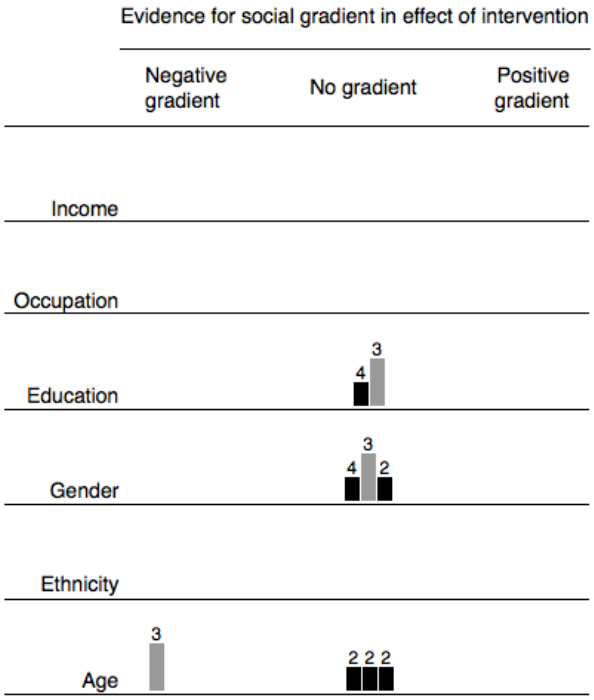

Figure 5 – Effects of health warnings on tobacco products (See Box 1 for key to matrix)

Five studies assessed the effects of health warnings on a variety of groups including the general population,[39-41] young adults[42] and school-children.[43] There was variation in the nature of health warnings assessed, the context and the methods of implementation. These included new health warnings and contents labelling introduced in 1995 in Australia accompanied by a three year pre-publicity campaign,[39] mandatory health warnings using text and graphic images to describe the consequences of tobacco smoking introduced in Canada in 2001,[40, 42] the introduction in 1985 in the US of four rotating warning statements on all cigarette packs[43] and new health warnings introduced in The Netherlands according to a 2002 EU directive.[41]

Only one study assessed outcomes before and after the introduction of health warnings.[39] However, data from cross-sectional surveys were used in addition to data from a small longitudinal sample, meaning that different people were being interviewed before and after the introduction of health

warnings. Attitudes to smoking and health warnings, rather than actual smoking behaviour, were assessed. The remaining four studies assessed the impact of health warnings post-implementation only. Without prior measures of smoking behaviour it is difficult to directly measure the effectiveness of the intervention. The most methodologically robust of the post-intervention studies met four quality criteria (used a random sample, had credible data collection tools, had a sample size of over three thousand and the effects observed were more likely to be due to the intervention).[41] The remaining studies met only two criteria of a possible six quality criteria and are potentially less reliable.

3.4.1 Differential effects by PROGRESS[3] criteria for health warnings on tobacco products

Education

Two studies, as shown on the matrix (Figure 5), examined the effects of health warnings on different educational groups in the general population.[39, 41] One study in the Netherlands found no difference in reported change in smoking behaviour according to education level (low, medium or high) after the introduction of new health warnings.[41] The study overall found that 10% of participants said that they smoked less because of the new warnings and the higher the intention to quit the greater the impact of the warnings. However, changes in attitudes by educational level were noted for selected outcomes in this study (those educated to a higher level preferred to buy packs without the new warnings and those with a medium level of education were more motivated to quit than those of high or low levels). The second study found that better-educated smokers showed a greater knowledge of health warnings.[39] However, no effects of education were noted in relation to awareness of changes to health warnings whilst overall awareness of health warnings showed a statistically significant increase in smokers from 28% to 91%.

Gender

The above two studies also considered the effects of health warnings according to gender, as did a further methodologically weak study[42] that focussed on young adults. One found no difference in smoking behaviour or in motivation to quit by gender after the introduction of new health warnings in the Netherlands.[41] However, more women than men preferred to buy packs without the new wording and women were less inclined to purchase the new packs than men. The second study found that women showed a greater knowledge of health warnings, but no effect was found for gender in relation to awareness of changes to health warnings.[39] In the third (weaker) study no differences were found between men and womens' smoking behaviour following the introduction of mandatory text and graphical health warnings.[42] Differences were observed in attitudes towards, or knowledge of, labels but these were inconsistent in terms of social gradient.

Age

Two studies considered the effects of health warnings on various age groups in the general population. An Australian study found that smokers aged under 50 were more likely to be aware of the new warnings than older smokers.[39] A Canadian study, with some methodological problems, found that new text and graphic warnings did not have a significant effect on smoking prevalence overall, or an effect by age.[40] Quantity smoked was reduced for all groups, except 55-64 year olds but no other differential effects by age group were observed. In the Canadian post-intervention only study of young adults, the prevalence of smoking was 33%.[42] Attitudes towards warning labels varied according to smoking status and overall the authors noted a degree of scepticism among the young people surveyed. In a further study of school age students in the US, 21% increased or continued smoking whilst 79% decreased smoking or remained non-smokers.[43] This study also had some methodological problems. Baseline knowledge of warning labels was not associated with a significant change in smoking behaviour after controlling for other factors in this sample. In this study a high proportion of participants were from Latino or Asian or Pacific Islander ethnic groups but effects on specific groups were not explored.

3.4.2 Summary of differential effects by PROGRESS[3] criteria for health warnings on tobacco products

Income	No studies
Occupation	No studies
Education	Evidence from one study suggests no gradient for smoking behaviour and inconsistent findings in two studies of attitudinal data.
Gender	Evidence from two studies suggests no gradient for smoking behaviour and inconsistent findings in three studies of attitudinal data.
Ethnicity	No studies
Age	Possible negative social gradient based on one study finding that older smokers were less aware of health warnings than younger respondents. In two studies of young people, warning labels did not appear to affect attitudes to smoking or smoking behaviour.

3.5 Effects of restrictions on advertising of tobacco products

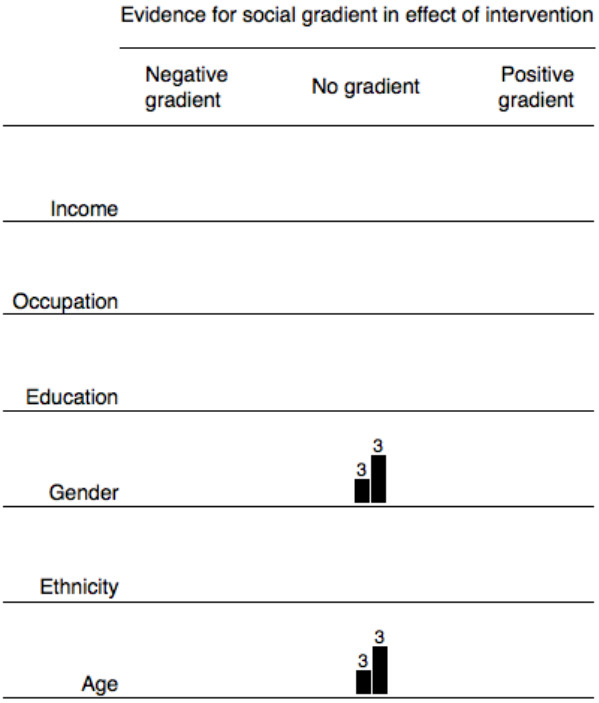

Figure 6 – Effects of advertising bans (See Box 1 for key to matrix)

Two studies described the effects of advertising restrictions on children and young people.[44, 45] One study, published in 2004, investigated smoking prevalence and tobacco name and logo recognition rates in children aged eight to ten in Hong Kong.[44] The other study used national statistics from 1992 to assess smoking prevalence amongst adolescents (ranging from 12-24 years old) in Norway, Finland, New Zealand and France.[45]

The study in Hong Kong assessed outcomes before and after the introduction of advertising restrictions and was of limited methodological quality, meeting three out of a maximum of six quality criteria.[44] Although the study used credible data collection tools and had a sample size of over eight hundred, it had a cross-sectional design meaning that different participants were surveyed before and after the ban. With no control group the effects cannot easily be attributed directly to the advertising ban. In the other study,[42] the effect of the intervention cannot easily be separated from other tobacco control policies ongoing across the four countries.

3.5.1 Differential effects by PROGRESS[3] criteria for restrictions on advertising of tobacco products

Gender

The study in Hong Kong supports the null hypothesis of no social gradient, as a statistically significant decrease in smoking prevalence in both boys and girls was observed.[44] However, the study did demonstrate that although boys consistently identified more tobacco brand names and logos, a

decrease in recognition rates of tobacco names and logos following advertising restrictions was noted in both boys and girls, appearing to support the effects on smoking prevalence.

The second study also supports the null hypothesis, as a decrease in the prevalence of smoking in young males and females was observed, in all countries studied following introduction of advertising bans.

Age

In two studies of young people advertising bans decreased the prevalence of smoking.[44, 45]

3.5.2 Summary of differential effects by PROGRESS[3] criteria for restrictions on advertising of tobacco products

Income	No studies
Occupation	No studies
Education	No studies
Gender	No social gradient based on two studies of young people showing a decrease in smoking prevalence in both boys and girls following advertising bans.
Ethnicity	No studies
Age	In two studies of young people advertising bans decreased the prevalence of smoking.

3.6 Effects of price of tobacco products on adults

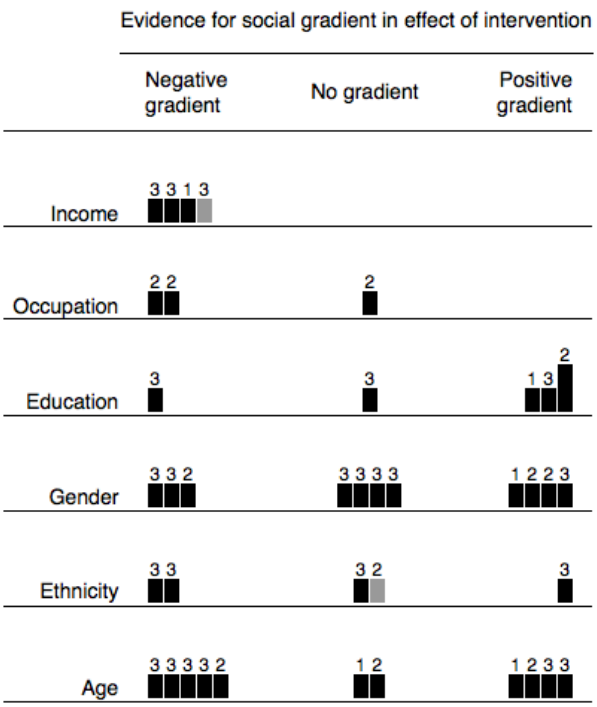

Figure 7 – Effects of price of tobacco products on adults (See Box 1 for key to matrix)

A total of 42 studies provided information about the effects on smoking behaviour of price or tax increases of tobacco products. Most of these studies were econometric analyses, which are statistical regression models applied to cross-sectional or longitudinal survey data to model the relationship between cigarette demand and changes in price or tax. The outcomes modelled were smoking participation (decision to smoke) and demand (the quantity smoked by smokers), either singly or jointly using a two-part modelling approach. These analyses reported price elasticities which give the ratio of the percentage change in the quantity demanded with the percentage change in the price. For example an estimated price elasticity of demand of -0.23 indicates that a 10% increase in price would result in a 2.3% decrease in the quantity of cigarettes smoked.

Most studies were conducted in the US, with 19 studies assessing the effects of price on adolescents only (aged 18 or under), and one assessing college students. The results of these studies are reported separately. A further 13 studies[46-57] conducted in the US provided results for adults only, or young people and adults combined. One of these studies[57] assessed the effects of state excise taxes on the smoking behaviour of pregnant women using Census data collected between 1989 and 1995. Other studies used data collected as part of national surveys, over various periods between 1976 and 2002. One study in New Jersey investigated whether smokers changed to cigars after a cigarette excise tax increase in 2001.[53]

Three studies were conducted in the UK.[58-60] One study reported econometric analyses using data from 1961 to 1977[59] and from 1972 to 1990[58] to investigate whether there was a differential response to cigarette tax increases by social class. The earlier analysis[59] was extended by another group of researchers[60] using data up to 1987 to determine whether differences in smoking by social class were similar for men and women.

Other studies were conducted in France, Spain, Canada, South Africa and Taiwan. The French study[61] used retrospective data from a telephone survey to investigate the relationship between price and smoking cessation between 1965 and 1999. The Spanish study[62] investigated the effect of price and anti-tobacco policies on the time to start and time to quit smoking from 1957 to 1997. The Canadian study[63] used data from national statistics on family expenditure from 1982 to 1998 to model household cigarette expenditure for different income groups. The study from South Africa[64] used cross-sectional survey data from 1997 to assess cigarette demand by race after the implementation of tax increases. Two studies assessed the effects of a new tax scheme introduced in Taiwan in January 2002 which increased excise tax. Both used data from the same face-to-face interviews conducted between 2000 to 2003, with one[65] assessing consumption by smokers after the tax increase and the other[66] reporting any reductions in the amount smoked or whether there were changes in cigarette brands, for men only.

In most of these studies models were constructed from cross-sectional survey data. A few analyses were based on longitudinal data and have been rated more highly in terms of methodological quality.[66-72] Most of the studies used data from published surveys that were representative of the wider population and were based on large samples (usually over 1000 observations). However, descriptive statistics were not always reported and the amount of detail about the modelling methods varied between studies. Not all the studies attempted to adjust their analyses for the effects of other concurrent tobacco control policies; any observed changes in smoking behaviour may not be solely attributable to price or tax increases.

3.6.1 Differential effects by PROGRESS^3 criteria for the effects of price of tobacco products on adults

Income

Four studies found that those on a lower income were more affected by price increases, providing support for a negative social gradient (Figure 7). Two US studies found higher price elasticities for lower income groups: one[52] reported higher elasticities for the decision to smoke for the low income group (mean household income $16,131, elasticity -0.2) compared with middle income (mean $41,449, elasticity -0.127) and high income groups (mean $99,325, elasticity -0.055). Price had little effect on consumption for any of the income groups. A second[55] also found that adults with a lower income were more price-sensitive, with an overall elasticity of
-0.43 for families with an income less than or equal to the median (the actual value was not reported) and -0.11 for families with an income level above the median.

A Canadian study[63] which analysed household cigarette expenditure rather than an individual's smoking behaviour, split households into quartiles by income. It found that demand elasticities were much higher for the lower income quartile, with a decreasing trend ranging from -0.99 for the lowest to -0.36 for the highest income groups. The corresponding proportions of after-tax income spent on cigarettes were highest for the lowest income group, ranging from 4.14% for the low to 1.01% for the highest income groups. A study in Taiwan found that price increases after an excise tax increase had a statistically significant effect on those with no income, or in the lowest income group (those with an income were grouped into four categories). There was also a decreasing trend, with the no income group having an elasticity of -0.84 which decreased to -0.12 for the highest income category. [65]

Occupation

Three studies assessed the effects of price increases on different occupational groups classified using the UK grading of social class (at the time of the later study (1994) this was categorised as: I professionals, II managerial and technical, III non-manual skilled occupations, III manual skilled occupations, IV partly skilled manual, V unskilled manual. One[59] used annual data on cigarette consumption from Tobacco Research Council Surveys (1961 to 77) for men only and found a significant trend ($p<0.01$), with the smallest price elasticity for professionals and the largest for unskilled manual workers. Similar trends by occupational group were seen in a later analysis of general household survey data (1972 to 90) by the same author where a significant trend by occupational group for both men and women ($p=0.02$) was observed.[58] These findings suggest a differential response to price in the UK, with price increases having the most effect on the lower socioeconomic groups, those in which smoking prevalence is highest.

However, these findings were not supported in a later analysis of UK data[60] using the same data, but with additional years up to 1987, and data for women. This study found no evidence of a trend in price elasticities across social class for either men or women. Amongst men, those in middle-income occupations seemed to be the most affected by price increases. For women, those in professional or managerial occupations had the highest elasticities which were greater than those of men in the same occupations, but the trend did not follow a consistent pattern with occupational class.

Education

One study reported results supporting a negative social gradient for the effect of price by level of education. When data from a national US survey of health, diet, alcohol and cigarette consumption (1976 to 80) were analysed, it was found that adults with less than a high school education were responsive to price (elasticities ranged from -0.62 to -0.59) but that those with at least a high school education were not responsive to price changes.[49]

One US study of cigar use before and after a tax increase found no significant changes in cigar smoking prevalence between adults of differing education levels.[53] There was a small increase in prevalence for those with less than a high school education (5.2% to 6.5%) but decreases for those with higher levels of education (the largest decrease was 1.8%). However, it was unclear whether smokers had switched from cigarettes to cigars as a consequence of the higher prices.

As shown in the matrix (Figure 7) three studies provided evidence in support of people with higher levels of education being more responsive to price increases. The two studies from Taiwan[65, 66] both supported a positive social gradient, with one reporting that those with a college or senior school education were most sensitive to price changes. The other study was of men only and found that education level did not have a significant effect on the decision to reduce the amount smoked or on brand switching (both measured as dichotomous outcomes). However, education level did have an impact on the change in the number of packs of cigarettes smoked. On average men with a high school education smoked 5.2 packs less and those with a degree smoked 6.7 packs less (both $p<0.01$) than men with only preliminary school educations. A study of pregnant women conducted in the US which analysed 20 million records from the annual census of births (1989 to 95) found a positive relationship between price elasticity and increasing levels of education. Women with a college education were more affected by tax increases and more likely to quit smoking during pregnancy than those with less than a high school education.[57]

Gender

Three studies found that price increases affected women more than men (Figure 7). The analysis of British Household Survey data[58] found that women were more price-sensitive, with a price elasticity of -0.61 compared to -0.47 for men. Two US studies also found that women were more price-sensitive; one[54] modelled data from national statistics for adults and young people and found that young women (aged 18 to 24) were more affected by price increases than young men. The other[55] also found that women were more affected by prices with an overall price elasticity (comprising the effects on amount smoked and the decision to smoke) of -0.32 compared with -0.21 for men.

Four studies, three from the US and one from Taiwan found that men were more affected by price increases than women. One[48] analysed data from a national survey of adults (1976 to 1980) recording health and dietary information and found that increased prices and the presence of state clean air laws led to a statistically significant reduction in current cigarette consumption for men, but had little

effect on women. A second[46] analysed weekly household interview data from the Health Interview Survey (1976) and found the decision to start smoking for men aged 20 to 25 was the most price-elastic with men generally being more affected by price. A third[56] analysed adults (aged 18 or over) and teenagers (US school grades 9 to 12, age 14 to 18) and found that higher state-level cigarette taxes led to a statistically significant reduction in cigarette smoking prevalence for adult men, but had little effect on teenagers. However, they also found that women were more responsive than men to higher taxes on smokeless tobacco products. A fourth in Taiwan[65] found that men were most sensitive to price increases caused by an excise tax increase.

As shown in the matrix (Figure 7), four studies found no difference between men and women. One[61] found that cigarette price was a statistically significant predictor ($p<0.001$) of the probability of quitting for both men and women aged 21 to 50. However, this relied on peoples' recall of when they started and stopped smoking and the analysis did not account for any other French tobacco control policies, so may not be a true reflection of the effects of price. A second[62] found that Spanish cigarette prices had only a very small impact on the time to start smoking for both men and women; but an increase in the price of black cigarettes (the cheapest Spanish cigarettes) led to significantly shorter times to quit smoking for both men and women. A study of US college students (average age 21) found that the decision to smoke was more price-sensitive for women, but average cigarette consumption was more price-sensitive for men although no significant overall differences between men and women were observed.[51] Another US study assessed whether cigarette smokers changed to cigars after an excise tax increase in 2001. This found that after the tax increase the prevalence of cigar smoking decreased for men (from 13.3% to 10.4%) but increased slightly for women (from 1.2% to 1.7%) although neither change was statistically significant.[53]

Ethnicity

Two US studies found that Hispanic people were more affected by price increases than white people, providing support for a negative social gradient. One[55] reported that Hispanic and African-American adults were more likely to not smoke and to reduce the amount smoked in response to higher prices. A second[54] found that black and Hispanic youths (aged 14 to 24) were more responsive to price changes than white youths, although the analysis did not adjust for any other potential confounding factors and it is likely that these results are overly optimistic as they assume that historic data remains applicable to current consumption.

No evidence for a social gradient could be drawn from two studies. The South African study[64] reported only limited details of its methods, but found that price elasticities of demand for cigarettes were not statistically significantly different from zero for either black or white households who purchased cigarettes. The US study of changes in cigar smoking after an excise tax increase in 2001 found that prevalence reduced for whites (from 8.3% to 6.6%) but increased for black (from 2.9% to 3.1%), Hispanic (from 3.1% to 4.6%) and other races (from 2.6% to 4.3%), but no change was statistically significant.[53]

One US study of the effects of cigarette excise taxes on pregnant women supported a positive social gradient, as it concluded that white women were most responsive to tax changes and were more likely to quit smoking during pregnancy than black or Hispanic women.[57]

Age

As shown in the matrix (Figure 7) five US studies found that young adults were more affected by price than older adults, providing support for a negative social gradient. One[46] found that the price elasticity of the quantity smoked for men aged 20 to 25 was almost twice that of older adults (-0.89 versus -0.47 for those aged over 26) indicating that young men were more likely to reduce the amount smoked as a consequence of higher prices. However, this effect was not observed for women. Another study assessed the effect of taxes on cigarette and snuff use by men only, and also found that young men aged 16 to 24 were more affected by tax increases than those aged 25 to 44.[73]

Three studies which analysed data from the National Health Interview Survey, a nationally representative survey of US adults also found that young adults aged 18 to 24 were more affected by price increases than older adults. One[54] analysed youth smoking prevalence (the percentage of 18 to 24 year olds who smoked), youth smoking history (current, former, never smoked) and adult cigarette consumption between 1974 and 1995 and found that youths were more sensitive to price with an estimated 14% decrease in the prevalence of smoking for a 10% increase in price compared with only

a 2% decrease for older adults. The second[47] assessed whether smokers changed their smoking habits in the face of higher taxes (using data from 1987 only) and found that young adults aged 18 to 24 were more likely to quit as a result of higher taxes but also more likely to switch to high tar cigarettes. The third[55] analysed data from 14 years up to 1993 and found that youths aged 18 to 24 were more sensitive to price than adults aged 40 or over, both in terms of the decision to smoke and the amount smoked, but not compared with the 25 to 39 age group which had a similar response to price (elasticities: -0.55 for ages 18 to 24, -0.53 for ages 25 to 39 and -0.08 for ages 40 or older).

Two studies found no evidence of any difference between younger and older age groups with respect to the effects of price. One[50] also analysed data from the US National Health Interview Survey (1970 to 85) modelling adults and teenagers (aged 12 to 17) separately. This study found that price did not have a statistically significant effect on teenagers and there was no significant difference between the price elasticities for teenagers and adults. The analysis also assessed laws restricting smoking in public places, using an index representing the level of restrictions within each state and found that stricter restrictions (for workplaces and restaurants) led to a significant reduction in the number of packs smoked for both teenagers and adults. The Taiwan study[65] of the effects of a tax increase, found that young people aged 17 to 24 were not affected by price changes and that price did not have a significant effect on the amount smoked for any age group, although this was a predominantly male sample (90%).

Four studies were consistent with the hypothesis of a positive social gradient. An analysis of French retrospective data from a telephone survey concluded that cigarette price had a significant effect on the odds of quitting between the ages of 21 and 30 (odds ratio 1.017, $p<0.001$) and at age 30 or over (odds ratio 1.011, $p<0.001$) but had no effect on quitting before the age of 20 (odds ratio 1.005, $p=0.174$). However, the reporting of this analysis was limited and the analysis relied on people accurately remembering the age when they started and stopped smoking.[61] Two US studies also concluded that young people were less affected by price than older adults. One[48] analysed current cigarette consumption and found that young adults aged 17 to 24 were insensitive to price changes but older adults aged 25 to 64 were sensitive to price changes. The second[56] used a state-level analysis of cigarette and smokeless tobacco prevalence and found that higher cigarette taxes led to a statistically significant reduction in smoking prevalence for adults over 18 but had no effect on teenage smokers in grades 9 to 12 (age 14 to 18). A final US study of smoking in pregnant women also found that older women were most responsive to changes in cigarette taxes with those aged over 30 being more likely to quit during pregnancy due to tax increases.[57]

3.7 Effects of price on young people

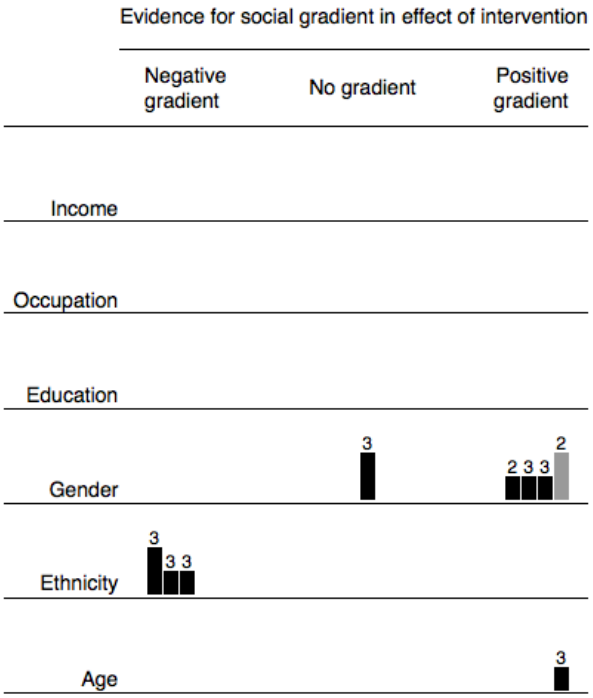

Figure 8 – Effects of price on young people (See Box 1 for key to matrix)

Twenty studies focused on the effects of price on adolescents or college students only.[67-72, 74-87] All used data collected from US surveys of high school or college students and therefore provide results for those at high risk of taking up smoking.

3.7.1 Differential effects by PROGRESS[3] criteria for the effects of price on young people

Gender

One study found no evidence of a difference between adolescent boy and girl smokers (grades 7 to 12; aged 11 to 18) as the effects of state tobacco excise taxes were not significant for either group.[68]

As the matrix shows (Figure 8) four studies found that adolescent boys were more affected by price increases than girls.[67, 74, 76, 87] One[67] analysed longitudinal data from a national survey of youth, but it was not clear if these data were representative as only those with data across a number of years were included. This study assessed the effect of cigarette taxes at age 14 on whether or not someone was a smoker at age 14, 24, 34 and 39. The study found that tax at age 14 had a significant negative effect on current smoking at age 14 for adolescent boys (elasticity -0.88) but not for girls (elasticity -0.46). The effects of tax at age 14 decreased over time for both girls and boys in later adulthood (elasticities decreased over time from ages 14 to 39) indicating that tobacco policies aimed at adolescents may have greater impact in the short-term. The second[76] used cross-sectional survey data and found that adolescent boys aged 13 to 18 were more responsive to price changes than adolescent girls. The third[74] analysed two cross-sectional school-based surveys of 9th grade (aged 14) students conducted as part of a larger tobacco control project (COMMIT) and found that the price elasticity of the decision to smoke was substantially higher for adolescent boys compared to girls, although the effects of price on the intention to smoke (non-smokers at time of survey who thought they would be smoking within a year) were similar for boys and girls. The final study[87] focused on cigar use by 9 to 17 year olds where 13.5% of boys and 5.5% of girls were current cigar smokers (data was taken from the National Youth Tobacco Survey of 6th to 12th grade students; aged 11 to 18). The price of cigars was found to have a significant effect on cigar use overall and for adolescent boys, but not for girls. If cigars were taxed at the same higher rate as cigarettes then the overall elasticity of -0.34 would result in a 5% reduction in cigar smoking prevalence.

Ethnicity

Three studies provided evidence of a negative social gradient with black or Hispanic young people being more sensitive to price increases. One[76] found that overall, black adolescents were more sensitive to price increases than whites (elasticities -1.11 and -0.64 respectively). A second study found that increases in state excise taxes on cigarettes had more effect on the decision to smoke by black adolescents compared with white or Hispanic adolescents.[68] The third[75] analysed data from two surveys of youth behaviour together with national birth statistics, conducting separate analyses of the three data sets. This study found that price elasticities were higher for non-whites or blacks compared to whites, except in the analysis of adolescent mothers where price had more effect on quantity smoked for black mothers but more effect on whites for the decision to smoke.

Age

One study[75] also compared younger (8th to 10th grade; age 13 to 16) and older (12th grade ages 17 to 18) adolescents and found that adolescents aged 17 to 18 were more sensitive to price increases with an elasticity of -0.67 for the decision to smoke compared with those aged 13 to 16. Similar results were seen for adolescent mothers, with price having a significant negative impact on 17 to 18 years olds but having little effect on 13 to 16 year olds.

The remaining studies assessed the effects of price on young people, but did not aim to assess differential effects in relation to older adults, or other socio-economic or socio-demographic subgroups and are therefore not displayed on the matrix.[69-72] One performed a number of analyses on data from the 'Monitoring the Future survey', a nationally representative survey of high school seniors (8th and 10th grades; aged 13 to 15) providing longitudinal data on the smoking habits of teenagers, up to early adulthood. All four studies found that increased cigarette prices, resulting from an increase in excise taxes, would have an impact on youth smoking behaviour. Two studies used survival analysis models: one assessed the effect of price on the time to quit smoking and found an average elasticity of 0.35, indicating that a 10% price increase would increase the probability of quitting by about 3.5%.[70] The other study assessed the probability of starting smoking a given amount at any time and found that price had a statistically significant negative effect on those smoking either 1 to 5 per day (elasticity -0.811) or at least half a pack per day (elasticity -0.955).[71] The other two studies reported an overall

price elasticity of -0.791 (for the total effect on the decision to smoke and amount smoked);[72] and elasticities ranging from -0.646 (for moving from being a non-smoker to smoking one or more per day) to -0.412 (for moving from moderate smoking to heavy smoking of one or more packs per day) indicating that price increases would prevent young people from becoming heavier smokers.[69-72] These analyses were also used to assess the impact of clean air laws on young people's smoking behaviour, however details of the laws were not provided and states were classified as 'yes' or 'no' for the presence of a law, but this did not account for any policies at a more local level. Results varied depending on how the laws were included in the models, but the overall finding was that stronger restrictions in private worksites and public places would reduce the amount smoked by young adults.

A further six studies also found that higher cigarette prices would be effective in reducing smoking amongst teenagers.[78, 79, 81, 84-86] One used data from the 'Monitoring the Future' survey and reported an average overall price elasticity of -1.31.[78] The study also used the same data to analyse smokeless tobacco use amongst adolescent boys (mean age 15.6 years) and found that increases in the price of smokeless tobacco tax would significantly reduce consumption. One study assessed the effects of price on US college students (mean age 21) from a survey of 130 randomly selected colleges or universities assessing tobacco and alcohol use.[80] Higher cigarette prices were found to discourage smoking participation and the amount smoked by students.

Two studies found that adolescent smokers were not affected by price. One[77] used data from a survey of risky behaviours (smoking, drinking, unsafe sex; average age of participants was 16) and found that tobacco taxes had a negative, but not statistically significant effect on the probability of smoking. The second[82] ran separate models on groups categorised by age (survey participants ranged from 10 to 22) and smoking status (current or established) and found that price had a significant negative effect on the amount smoked by current smokers aged 14 or over, but had no effect on smoking experimentation by 10 to 13 year olds, or those aged 14 or over.

3.7.2 Summary of differential effects by PROGRESS[3] criteria for tobacco price increases

Income	Evidence of a negative social gradient. All four studies found that those on lower incomes were more affected by cigarette price increases.
Occupation	Possible negative social gradient by occupational status. Two studies found a trend by occupational class with those in manual occupations being more affected by price increases than those in professional occupations. Although another study found no evidence of a trend by occupation. These studies were conducted in the UK.
Education	Possible positive social gradient by education with three studies (one of pregnant women) finding that those with higher levels of education were more affected by price increases.
Gender	Adults: No evidence of a social gradient; similar numbers of studies supported the hypotheses of a positive, negative, or no social gradient. Young people: Evidence of a positive social gradient. Four studies found that adolescent boys (aged 13-18) were more affected by price increases than girls.
Ethnicity	Adults: No evidence of a social gradient. Young people: Evidence of a negative social gradient. All three studies found that black or Hispanic adolescents were more affected by price increases than white adolescents.
Age	For those studies comparing young (aged 18-24) and older adults there was no overall evidence of a social gradient with five studies finding that younger adults were more affected by price and four studies finding older adults were more affected. The only study comparing younger and older adolescents supported a positive social gradient, finding that older adolescents were more price-sensitive. Twenty studies did not provide results according to age as they analysed data from adolescents or college students only. All found that these groups are price-sensitive and increases in the price of tobacco products would be effective in reducing youth smoking.

3.8 Effects of multi-faceted interventions

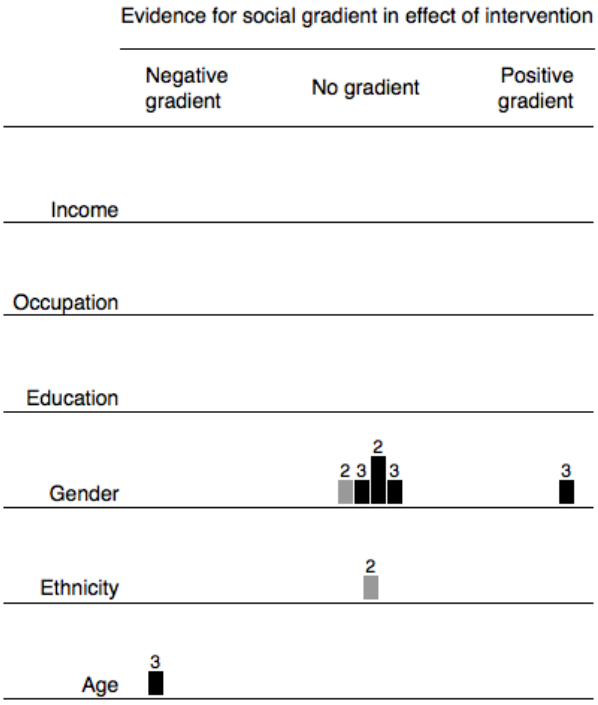

Figure 9 – Effects of multi-faceted interventions (See Box 1 for key to matrix)

Five studies assessed the impact of a number of different interventions;[88-92] most analysed the combined effects of a number of anti-tobacco laws. Two studies were conducted in Finland and both assessed the impact of the 1976 National Tobacco Control Act. One[88] analysed data from annual cross-sectional postal surveys conducted by Finland's National Public Health Institute between 1978 and 2001. The aim was to assess patterns of smoking behaviour amongst adults by gender and year of birth. Survey participants in each year were a random sample of Finnish citizens and response rates were fairly high at 70% for men and 80% for women. The second[89] also analysed data from the National Public Health Institute surveys from 1978 to 2001, as well as data from 1960 to 1977 collected by a different group. The aim was to assess if implementation of the Tobacco Act was associated with changes in the prevalence of smoking and the occurrence of smoking-related lung disease.

The Tobacco Act restricted smoking in public places and on public transport; restricted tobacco advertising; set an age limit of 16 years for sales to minors; put health warnings on cigarette packets and allocated funds representing 0.5% of annual tobacco tax revenue for smoking prevention. It was amended in 1994 to include restrictions in workplaces, and in 2000 to classify tobacco smoke as a carcinogen and restrict smoking in restaurants. In terms of methodological quality both studies were rated poorly in terms of suitability of study design as they were based on cross-sectional survey data. However, the participants were representative of the wider population, data were collected by a national institution and the analyses were conducted on large samples (91,342 participants for Helakorpi; not reported for Heloma but at least 5,000 per year were surveyed).

Another study[92] assessed smoking behaviour and attitudes to smoking before and after the implementation of a French law banning smoking in public places. Surveys designed by the study authors were given to staff working in a Paris hospital in 1985 (before the legislation) and in 1993 (after the legislation). The French law included restrictions on smoking in the workplace; advertising and sports promotion restrictions; health warnings on packets; and signage in shops forbidding sales to minors. Study participants were mostly female (84%) with an average age of 35; most were nurses (approximately 43%) or healthcare assistants (approximately 34%). This study was rated more strongly in terms of design as it collected data before and after the intervention. The participants were representative of the particular hospital although men were under-represented; the response rates were high (83.5% first survey; 79.3% second survey) and data from at least 750 participants were

analysed at each time point. However, the survey questionnaire was designed by the authors and it was unclear how reliable or valid this was.

Another study[90] assessed smoking restrictions in schools in California using data collected in 1996 and 1997 as part of an independent evaluation of the Californian Tobacco Control Prevention and Education Program. This implemented various policies including: minimum purchase age restrictions; bans on vending machines; bans on minors possessing tobacco; signage in shops and requirements of licenses by shopkeepers; and smoking restrictions in worksites, restaurants and other public places. The outcomes assessed were awareness and support of the policies, not actual changes in smoking behaviour. The study was cross-sectional in design and the schools and classes were randomly selected, so the population was judged to be representative. Analyses were based on a sample of 6887 pupils and surveys were conducted in the classrooms with trained data collectors which may explain the high response rate of 96%. Pupils were 15 or 16 years old, 49% were female, 48% were white, 27% Latino and 21% Asian-American.

Another study in Canada[91] assessed the effects of price increases and various tobacco control legislation. This used data from the National Population Health Survey from 1994 to 1995 and the outcomes were smoking status (current or non-smoker) and the amount smoked by smokers. The effects of price; expenditure per province on the delivery of tobacco control programmes; clean air laws; presence of signs at entrances to public buildings; and enforcement of clean air laws were assessed. Municipalities and areas within them were scored for the level of clean air laws, signs and enforcement depending on the level of restriction. Separate analyses were conducted for men and women but the ratio of men to women was not reported. Cross-sectional data from national statistics were used, which were representative of the population and analyses were based on a large sample (14,355 people aged 25 or older). The price of cigarettes in July 1994 was used in analyses although it should be noted that there was a tax cut four months before which effectively reduced prices by up to 50% for two-thirds of the population.

3.8.1 Differential effects by PROGRESS^3 criteria for multi-faceted interventions

Gender

Four studies found no difference between men and women. One of the Finnish studies[88] found that the prevalence of ever smokers declined significantly ($p<0.001$) for both men and women after the introduction of the Tobacco Control Act. The other study[89] found that smoking prevalence for men declined over time, but was declining more steeply before the introduction of the act. For women smoking prevalence increased over time but decreased slightly at the introduction of the 1976 Act although it increased again in the late 1980s, so the effect on women was short term compared to men. The French study[92] reported similar results for men and women before and after the implementation of anti-tobacco legislation. The mean number of cigarettes smoked per day decreased similarly for men (from 17.3 to 14.4) and women (14.6 to 11.7); the proportions of ex-smokers increased for men (from 13% to 16.3%) and for women (9% to 11.8%). The US study of pupils' attitudes to school smoking restrictions found that there was no significant difference between adolescent boys and girls in support for the policies, but girls were less likely to be aware of any anti-tobacco policies.

The study in Canada[91] supported a positive social gradient as it found that men were more affected by some tobacco control policies than women. Separate analyses of the effects of five policies were conducted for both men and women. Men were found to be more affected than women for four of the policies: increased public expenditure on anti-tobacco programs, increased cigarette prices (elasticities of -0.5 and 0.3 respectively for men and women), stricter enforcement of clean air laws and more prominent signage about no-smoking laws. However, stricter restrictions on smoking in public places had more of an impact on women than men with significant reductions in both the odds of being a smoker and the number of cigarettes smoked daily.

Ethnicity

The study of attitudes to school smoking restrictions in the US concluded that African-American and Latino pupils were significantly less likely ($p<0.01$) to be aware of the policies than white pupils although Asian-American pupils were more likely to be aware of them. Latino pupils were significantly more likely to support the policies and African-American pupils were less likely to support (both $p<0.01$) compared to white pupils. No conclusion in respect of any social gradient based on ethnicity can be made from this study.

Age

The study that assessed the Finland Tobacco Control Act also analysed smoking prevalence by birth year.[88] Trends in smoking behaviour by birth year cohort suggested that the introduction of the tobacco act decreased smoking initiation amongst young people with a decline in the prevalence of ever smokers after the act, for both men and women.

3.8.2 Summary of differential effects by PROGRESS[3] criteria for multi-faceted interventions

Income	No studies
Occupation	No studies
Education	No studies
Gender	No evidence of a social gradient based on four studies demonstrating the interventions were effective for both men and women.
Ethnicity	No evidence of a social gradient.
Age	Possible negative social gradient based on one study demonstrating that the introduction of a tobacco control act decreased smoking initiation amongst young people.

3.9 Overall Matrix for all included interventions

The overall matrix displayed in Figure 10 summarises the evidence for a social gradient in each of the intervention categories studied. This shows the distribution of evidence within and between the various intervention categories, as well as highlighting areas where no relevant studies were found.

4. Discussion and conclusions

4.1 Findings and implications

Smoking is the single greatest contributor to preventable illness and premature death in the UK and a major cause of inequalities in health. Jha and colleagues, for example, reported recently that men in lower income groups had twice the risk of premature death compared to men in higher income groups; and that half of this risk was statistically attributable to smoking.[93] Tackling social inequalities in smoking should therefore be considered an important part of a comprehensive strategy to address inequalities in health, with population-level tobacco control interventions of particular potential in this respect.[94]

Our review of reviews highlighted the need for a full systematic review to assess the effects of population tobacco control interventions on social differentials. This new review of 84 studies has applied an “equity lens” to tobacco control policies, re-examining the available evidence about the impact of policy measures and other population-level interventions to assess their role in tackling health inequalities and represents the most comprehensive and up-to-date overview of this evidence base. The literature is international, with over half of the studies being conducted in the US and just six in the UK, and it is dominated by econometric analyses of the effects of the price of tobacco products, which comprised 50% of the included studies. We summarise the findings of each type of intervention briefly below, and identify some of the main implications of this review for policy and research.

Restrictions in workplaces and public places

With respect to restrictions in workplaces and public places, there was some limited evidence that these may be more effective in reducing smoking among those at a higher occupational grade. There was however no evidence of differential effects by education, and an absence of evidence in relation to income, ethnicity and age. In relation to gender, evidence from only one study suggests that restrictions in workplaces and public places may be more effective in men than in women. Overall, there is no strong evidence of these types of intervention being more effective at reducing smoking in more advantaged groups, though attitudes appear to change more among better-educated smokers and those with higher occupational status.

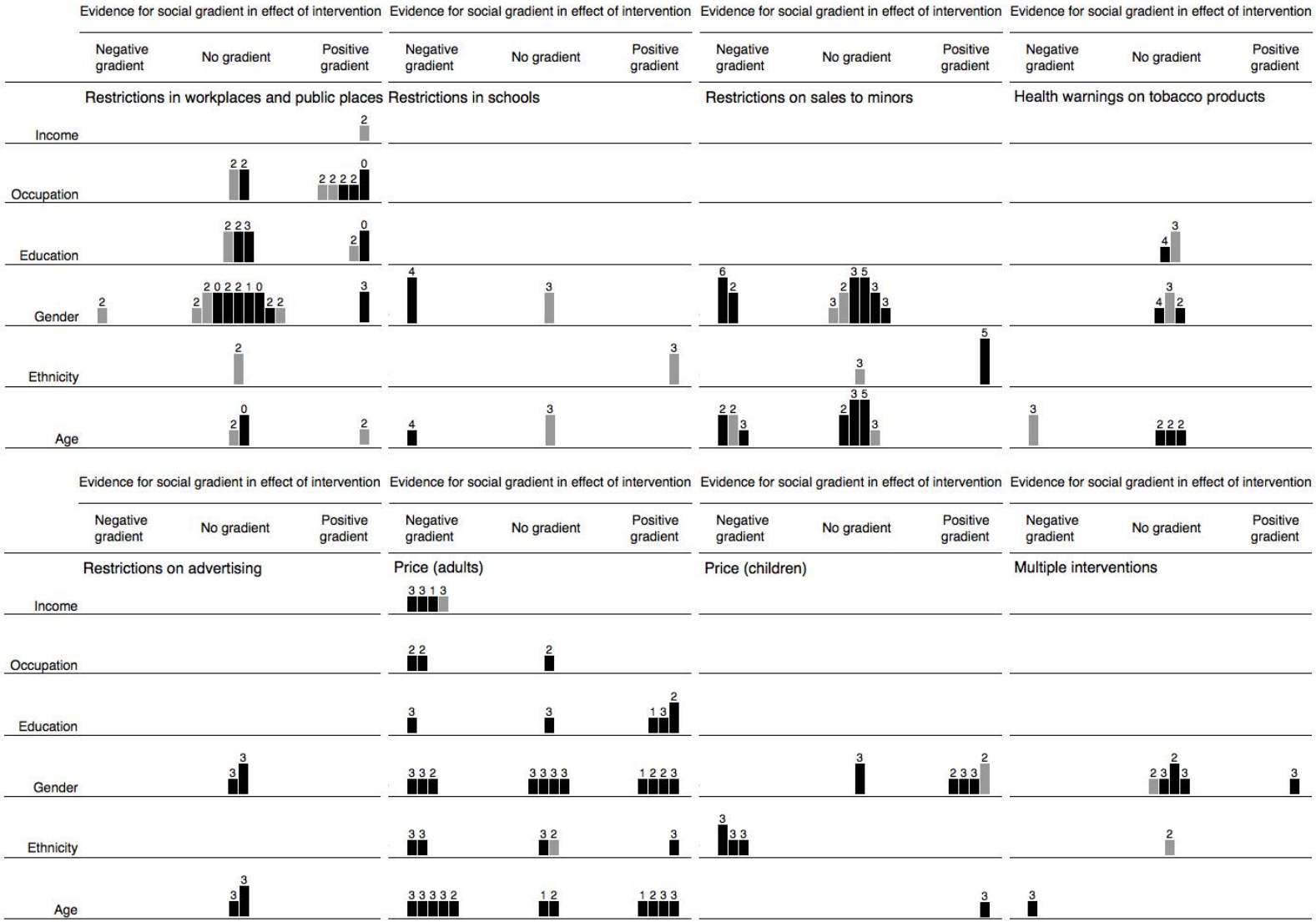

Figure 10 - Overall matrix displaying evidence of effects for social gradient for all included interventions (See Box 1 for key to matrix)

A 'supermatrix' covering all categories of intervention consisting of six rows (one for each dimension of inequality) and three columns (one for each of the three competing hypotheses about the differential effects of each category of intervention). Each study is represented by a mark in each row for which that study had reported relevant results. Studies with "hard" behavioural outcome measures are indicated with full-tone (black) bars, and studies with intermediate outcome measures with half-tone (grey) bars. The suitability of study design is indicated by the height of the bar, where the highest bars represent the most suitable study designs (categories A and B) and the lowest bars represent the least suitable (category D). Each bar is annotated with the number of other methodological criteria (maximum six) met by that study.

Restrictions in schools, and restrictions on sales to minors
It has been suggested that policies for tackling smoking-related inequalities need to take a life course approach, targeting interventions on periods of transition such as childhood and adolescence.[95] We found evidence from one study that smoking restrictions in schools are more effective in girls and in younger schoolchildren, but no evidence with respect to other social gradients, though this is mainly due to an absence of evidence, as few studies reported effectiveness by socioeconomic status. There is more and better quality evidence, on the differential effects of restrictions on sales to minors by gender and age; restrictions seem to be more effective in girls, and in younger schoolchildren. There was also one study - reporting smoking outcomes - that found such interventions to be more effective in white than non-white groups, but no evidence with respect to other socioeconomic indicators.

Health warnings, and restrictions on advertising
Here, the small number of studies (and the lack of methodologically robust studies) makes firm conclusions difficult. The effects of health warnings do not appear to be subject to a social gradient, but their effects have not been examined with respect to income, occupation, or ethnicity, and the evidence with respect to other indicators is not convincing. Advertising bans do not show a gradient by gender or age, but the evidence is not strong, and other social gradients have not yet been evaluated in primary studies.

The effects of pricing in adults and young people
There is consistent evidence that increasing the price of cigarettes is more effective in reducing smoking in lower-income adults and among smokers in manual occupations. There is also some evidence to suggest that smokers with higher levels of education may be more responsive to price, although this evidence was limited to specific study populations (men in Taiwan and pregnant women in the US, whose response to pricing may be confounded by knowledge of the risks of smoking during pregnancy).

The evidence with respect to other variables (gender, ethnicity, age) is less consistent; in each case, some studies favour a positive gradient, some a negative gradient, and some no gradient. This may simply represent the distribution of findings around a true null gradient. Overall, the weight of evidence for this group of variables can perhaps best be interpreted as “no evidence of differential effects”.

Approximately half of the econometric analyses focussed on young people, either adolescents or college students. It appears that boys, non-white and older adolescents may be more price-sensitive. There was no evidence found in relation to adolescents by income group. One hypothesis is that youth of lower socioeconomic status have greater access to cheap tobacco, and so increasing taxation in tobacco would not have as great an effect as predicted. This is one area where new research is clearly needed.[96]

Finally, the differential effects of multi-faceted interventions on smoking behaviour have not often been assessed in primary studies, though the limited evidence available suggests that they may be more effective in younger people.

There are a number of implications for policy arising from these findings. One is that the most compelling evidence of a negative (desirable) gradient in effectiveness is for increasing the price of tobacco. Although we found some evidence to suggest an apparently greater effect of price on those with higher levels of education, the evidence is limited and requires further investigation. Increasing the price of tobacco is therefore the intervention for which there is the strongest evidence as a measure for reducing smoking-related inequalities in health. However, the implementation of such measures may be undermined by tax-evasion or tax-avoidance measures such as smuggling, and cross-border shopping; this also applies to younger smokers who may be able to circumvent such taxes.[97] Nonetheless, there is certainly better evidence than for other more visible interventions, such as health warnings and advertising restrictions, whose differential effects - and effects more generally - appear under-explored. It should also be noted that although interventions such as warnings and advertising restrictions may not in themselves affect inequalities, they may be important as part of a wider tobacco control strategy, as they help to elicit public support for other measures.[98] Evidence from the US suggests that the more elements of a tobacco control strategy that are used the greater the effect.[99-101]

The evidence on restrictions on sales to minors suggests that these may be effective in deterring younger smokers, though their effectiveness depends on enforcement as un-enforced voluntary agreements with retailers are less effective in reducing sales.[97] Pricing may be less effective among younger smokers, perhaps because they do not purchase their cigarettes from retailers but tend to borrow or buy from peers and family. The role of pocket money also needs to be considered, as a recent study found that the level of pocket money was related to smoking prevalence in children.[102] Among this group, restrictions in schools (which affect consumption) and health warnings (which affect attitudes to smoking) may be more productive.

Aside from identifying effective interventions (in terms of reducing inequalities) it is important to identify policies which have the potential to *increase* inequalities. Here the message from our review is encouraging, as there was little evidence that the interventions we examined had adverse effects in this regard. One possible exception was workplace restrictions, which may be more effective among higher occupational grades and among staff with higher levels of educational attainment. This suggests that the implementation of such policies should be accompanied by measures to mitigate adverse effects on inequalities, such as measures to promote adherence across all occupational grades. This is in agreement with the findings of a recent review that smoking bans have tended to be applied more successfully in professional and white-collar settings than in the manufacturing industry or service sectors.[98] The potential for workplace restrictions is therefore dependent on their effective implementation in blue-collar settings. This supports the case for legislating for mandatory workplace bans, rather than relying on willing employers to introduce voluntary bans.

It has also been noted that comprehensive tobacco control policies should give greatest weight to those measures which have the greatest potential to reduce smoking among lower socio-economic groups.[98] From our review, this would mean giving greatest emphasis to pricing policy, though to be fully effective this may need to involve measures to limit the circumvention of tax by smuggling and legitimate cross-border shopping. For example, it has been suggested that cigarette taxes should be raised in those EU states with lower taxes in order to prevent residents of states with relatively high excise duty on cigarettes, such as the UK, from importing large quantities of cheaper cigarettes for personal use from other member states.[98]

Among children, appropriately enforced sales restrictions may offer greatest promise as part of a strategy for tackling inequalities. While combinations of interventions are also likely to be an important part of the policy armoury, the differential effects of such combinations largely remains an area for further research, though they may hold promise for reducing smoking initiation in younger smokers. However studies of such interventions have found it difficult to determine the specific effects of individual tobacco control measures; for example, a reduction attributable to the entire package of measures (e.g., the Finnish Tobacco Control Act) may in reality be attributable to a specific measure (such as increases in sales restrictions).

4.2 Strengths and weaknesses of the review

We used rigorous systematic review methods which included a comprehensive search strategy and extensive attempts to obtain both published and unpublished studies. We were also open to the evidence provided by a wide range of study types, more so than many previous reviews (for example, we included econometric analyses), and so we believe that this is the most inclusive and comprehensive review of this nature conducted to date. Of the 84 studies included, only 15 (17%) were identified from the reviews included in the review of reviews, and the rest were identified from our new searches, which supports our decision to conduct a new systematic review. However, it still remains possible that despite our best efforts we have failed to identify all relevant tobacco control intervention programmes, given that some may not have been formally evaluated and/or reported. Moreover, the evidence base continues to expand and we have not been able to include studies published since we completed the literature searches in August 2006.

Our review aimed to obtain all studies reporting their findings stratified by the PROGRESS criteria.[3] It should be remembered, however, that often it was not the explicit intention of the study author to investigate differential effects. Nevertheless, we had learned from the review of reviews that some such information could still be gleaned. Where appropriate we contacted authors, though this generated no further information. Unfortunately, this meant we were unable to generate the new data we had hoped for and it is acknowledged that obtaining additional data from authors can be very difficult.

A further issue is that evidence supporting the null hypothesis of no social gradient incorporated studies that genuinely demonstrated the absence of a gradient; underpowered or poorly executed studies which were unlikely to detect a gradient even if one were present and studies with internally conflicting results which have been treated as cancelling each other out for the purpose of populating the matrix. However, we attempted to draw out in our narrative the nature and robustness of the evidence supporting the null hypothesis.

One difficulty in dealing with a diverse public health evidence base is that one must incorporate considerable heterogeneity in intervention, study design and appropriateness of that design, study quality, and study outcomes (in this case, "hard" behavioural and "softer" attitudinal outcomes). The stratification of outcomes by social group adds another level of complexity. To manage this, we developed a novel method of presenting findings (the "evidence matrices" which appear in the Results chapter), which allowed us to clearly present the weight of evidence for each gradient, and for each of the various categories of intervention while using a hypothesis-testing approach. We recognise that different ways of measuring smoking (quit rates, prevalence, and reduction in number of cigarettes smoked inter alia) have different implications and may give rise to apparently conflicting gradients within a given study. Where these differences are important (e.g. the distinction between changes in attitudes and in behaviour for workplace bans) they are highlighted in the text. The final disposition of each study to one of three competing hypotheses was based on a balanced consideration of all available outcomes for that study. We feel that this new form of synthesis - using a matrix of evidence - is a considerable strength of the review and a valuable methodological contribution which may be of use to others reviewing the public health literature.

4.3 Limitations of the evidence

There are undoubted limitations in the evidence base which have been well-described elsewhere, notably the lack of prospective evaluations of the outcome of interventions (such as policies). A further challenge in this complex area of research is that it is difficult to attribute outcomes solely to the population-level intervention in question. We found that study authors often did not report the existence of co-interventions or did not describe other contextual factors that might influence the success or otherwise of the intervention. Although we excluded studies examining individual-level interventions, tobacco control policies rarely exist in isolation and several studies included individual-level interventions such as smoking cessation classes running alongside workplace smoking bans. A decision to intervene at one level (policy) could be adversely affected by actions at other levels or, alternatively, there could be a synergistic effect.[103] The completeness and clarity of reporting of primary studies, could therefore be improved. Provision of contextual information relevant to the success or failure of interventions and information on any adverse effects deriving from the intervention would be helpful to future reviewers. Equally, information on the content, duration and intensity of the interventions or policies being evaluated was rarely reported in adequate detail to enable comparisons between studies, or to establish what components of the intervention are actually producing change, where change is reported.

The studies included in this review were conducted between 1970 and 2005. The temporal context is an important consideration, as attitudes to smoking do not remain static. It is likely that older studies are less relevant to current social norms but this issue was not explored in detail in our review. Equally, in interpreting the results of this review the role of context needs to be considered. Most of the studies were from outside the UK and cultural norms and attitudes to smoking differ, such that, much of the evidence may not be directly applicable.

The review findings are based on the best available evidence to date but the evidence has a number of methodological weaknesses. Disentangling genuine intervention effects from background trends in smoking is problematic particularly when using observational studies. Methodological improvements to future studies are, therefore, suggested. In particular, studies should aim to include a random sample of the study population to ensure representativeness, include a sufficiently large sample to allow effects in sub-groups to be detected, use valid and reliable data collection tools and be designed in such a way that the outcome measured can be attributed to the intervention. Future studies should also ensure the reporting of all factors that might impact on the results presented. This includes details of study design, sampling, population characteristics, data collection tools, data analysis, attrition rates and any co-interventions, and contextual and implementation factors.

Such studies also need to present data on behaviour change where possible, rather than attitudinal data alone. Key outcomes in this respect include reductions in prevalence of smoking, cessation rates and reductions in cigarettes consumed across socio-demographic groups. Several studies focussed solely on changes in attitudes either to smoking or to the intervention itself. For example, one study found a negative social gradient in that women were more likely than men to correctly report smoking restrictions in a large US company.[17] However this finding would not necessarily translate into a finding that women were more likely to stop smoking. There is a risk in over-reliance on such measures, as attitudinal change can be a poor proxy for behaviour change. In one study which considered both changes in attitudes and changes in behaviour we noted differences between the two outcomes: no differential effects were reported for changes in smoking behaviour, but for attitudinal data some differential effects were noted for gender and education, although the direction of these results varied for the selected outcomes.[41]

One of the more obvious limitations is the absence of qualitative research on population-level tobacco interventions and their effects on social inequalities. Although we sought such studies, and intended that they would be used to elucidate the acceptability and implementation of tobacco control policies, we found only one with these objectives. However, we are aware of several such studies presently underway or currently being planned (relating to new UK legislation to restrict smoking in public places). There is also of course a body of qualitative research on smoking and its social patterning more generally, though this was not relevant to the questions examined in our review. We were not able to collect primary data on acceptability but it is important that future research should explore this issue. New qualitative research will have an important role to play in assessing the success of policy interventions and any unintended effects, as well as identifying barriers to change before implementation.[103]

4.4 Unanswered questions and future research

Many of the gaps in the evidence base are clearly evident from the matrix (*Figure 10*). This suggests that at present we know little about the differential effects of the following interventions stratified by income group, and new studies are indicated on:

- Health warnings and restrictions on advertising;
- Multi-component interventions, and
- Restrictions in schools, and on sales to minors.

With respect to increases in the price of tobacco products, a relatively well-researched field, we need to know more about:

- The effects of price increases on adolescents from lower-income households, and on adolescents and young people more generally as compared to adults; and
- The effects of price increases on lower-income adults likely to have nicotine dependency.

On this latter point, the Acheson report raised concerns about the long-term effects of price rises on disadvantaged households, where smokers were likely to be nicotine-dependent and for whom living in severe hardship was the primary deterrent to quitting. In such circumstances, the Acheson Inquiry warned that “this makes it unlikely that increasing the price of tobacco, and so decreasing disposable income and increasing hardship, will increase cessation rates in disadvantaged households”.[104] Recent commentators have reiterated this warning.[105] Expert opinion such as this suggests that extra measures to support cessation among low-income households would be needed, alongside any intensification of pricing policy. Effective measures against smuggled and counterfeit tobacco are required if increases in tobacco taxation are to have the desired effect on consumption.

Other specific aspects of the social gradient are under-represented in the evidence base, in particular:

- The differential effects of most interventions by ethnicity (though there are some studies assessing price), and
- Differential effects in girls versus boys for school restrictions, health warnings, advertising restrictions and pricing.

It is noted that people who are unemployed are an under-researched group in terms of the effects of population tobacco control interventions.

More generally, we would advocate that more extensive use of an equity lens in policy analysis should be made; that is, the collection and reporting of data on the effects of policies by social group should be common. Even in such a highly active field of research as tobacco control there are many gaps; the development of evidence-based policies to tackle inequalities is likely to be even more difficult for other health behaviours, and the utility of primary research could be enhanced by ensuring that future evaluations consider the effects of interventions on the health gradient.

Perhaps most important is to note that most of the existing evidence derives from the US. The greatest research priority should therefore be to develop relevant interventions for other country contexts with a focus on behavioural outcomes. The introduction of new population-level tobacco control policies – such as the restrictions on smoking in public places now introduced in all the countries of the UK and elsewhere – provides such an opportunity.

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APPENDIX A – SEARCH STRATEGY

This appendix presents the detailed searches carried out to inform the systematic review.

Medline & In-Process Citations (OVID)

The Medline search covered the date range 1966 to January 2006. The search was carried out on 12 January 2006 and identified 5631 records.

1. SMOKING/
2. Smoking Cessation/
3. TOBACCO/
4. "Tobacco Use Disorder"/
5. NICOTINE/
6. smoking.ti,ab.
7. (smokers or smoker).ti,ab.
8. tobacco.ti,ab.
9. cigar$.ti,ab.
10. nicotine.ti,ab.
11. or/1-10
12. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (ban or bans or prohibit$ or restrict$ or discourage$)).ti,ab.
13. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (workplace or work place or work site or worksite)).ti,ab.
14. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (public place$ or public space$ or public area$ or office$ or school$ or institution$)).ti,ab.
15. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (legislat$ or government$ or authorit$ or law or laws or bylaw$ or byelaw$ or bye-law$ or regulation$)).ti,ab.
16. ((tobacco-free or smoke-free) adj3 (hospital$ or inpatient$ or outpatient$ or institution$)).ti,ab.
17. ((tobacco-free or smoke-free) adj3 (facilit$ or zone$ or area$ or site$ or place$ or environment$ or air)).ti,ab.
18. ((tobacco or smok$ or cigarette$) adj3 (campaign$ or advertis$ or advertiz$)).ti,ab.
19. ((billboard$ or advertis$ or advertiz$ or sale or sales or sponsor$) adj3 (restrict$ or limit$ or ban or bans or prohibit$)).ti,ab.
20. (tobacco control adj3 (program$ or initiative$ or policy or policies or intervention$ or activity or activities or framework)).ti,ab.
21. ((smok$ or tobacco) adj (policy or policies or program$)).ti,ab.
22. ((retailer$ or vendor$) adj3 (educat$ or surveillance or prosecut$ or legislat$)).ti,ab.
23. test purchas$.ti,ab.
24. voluntary agreement$.ti,ab.
25. ((sale or sales or retail$ or purchas$) adj3 (minors or teenage$ or underage$ or under-age$ or child$)).ti,ab.
26. (youth access adj3 restrict$).ti,ab.
27. health warning$.ti,ab.
28. ((tobacco or cigarette$) adj3 (tax or taxes or taxation or excise or duty-free or duty-paid or customs)).ti,ab.
29. ((cigarette$ or tobacco) adj3 (packaging or packet$)).ti,ab.
30. ((cigarette$ or tobacco) adj3 (marketing or marketed)).ti,ab.
31. ((cigarette$ or tobacco) adj3 (price$ or pricing)).ti,ab.
32. point of sale.ti,ab.
33. vending machine$.ti,ab.
34. (tobacco crop adj3 (substitution$ or diversification$)).ti,ab.
35. (tobacco adj3 (subsidy or subsidies)).ti,ab.
36. (trade adj (restrict$ or agreement$)).ti,ab.
37. (contraband$ or smuggl$ or bootleg$ or cross-border shopping).ti,ab.
38. (tobacco control act or clean air or clean indoor air).ti,ab.
39. ((reduce$ or prevent$) adj3 (environmental tobacco smoke or passive smok$ or secondhand smok$ or second hand smok$ or SHS)).ti,ab.
40. ((population level or population based or population orientated or population oriented) adj3 (intervention$ or prevention or policy or policies or program$ or project$)).ti,ab.

41. ((community level or community based or community orientated or community oriented) adj3 (intervention$ or prevention or policy or policies or program$ or project$)).ti,ab.
42. or/12-41
43. 11 and 42

Embase (OVID)

The Embase search covered the date range 1980 to 2005 (week 53). The search was carried out on 3 January 2006 and identified 4727 records.

1. "smoking and smoking related phenomena"/
2. Smoking/
3. Tobacco Smoke/
4. Cigarette Smoke/
5. Cigarette Smoking/
6. smoking cessation/
7. Tobacco/
8. Tobacco Dependence/
9. Nicotine/
10. smoking.ti,ab.
11. (smokers or smoker).ti,ab.
12. tobacco.ti,ab.
13. cigar$.ti,ab.
14. nicotine.ti,ab.
15. or/1-14
16. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (ban or bans or prohibit$ or restrict$ or discourage$)).ti,ab.
17. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (workplace or work place or work site or worksite)).ti,ab.
18. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (public place$ or public space$ or public area$ or office$ or school$ or institution$)).ti,ab.
19. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (legislat$ or government$ or authorit$ or law or laws or bylaw$ or byelaw$ or bye-law$ or regulation$)).ti,ab.
20. ((tobacco-free or smoke-free) adj3 (hospital$ or inpatient$ or outpatient$ or institution$)).ti,ab.
21. ((tobacco-free or smoke-free) adj3 (facilit$ or zone$ or area$ or site$ or place$ or environment$ or air)).ti,ab.
22. ((tobacco or smok$ or cigarette$) adj3 (campaign$ or advertis$ or advertiz$)).ti,ab.
23. ((billboard$ or advertis$ or advertiz$ or sale or sales or sponsor$) adj3 (restrict$ or limit$ or ban or bans or prohibit$)).ti,ab.
24. (tobacco control adj3 (program$ or initiative$ or policy or policies or intervention$ or activity or activities or framework)).ti,ab.
25. ((smok$ or tobacco) adj (policy or policies or program$)).ti,ab.
26. ((retailer$ or vendor$) adj3 (educat$ or surveillance or prosecut$ or legislat$)).ti,ab.
27. test purchas$.ti,ab.
28. voluntary agreement$.ti,ab.
29. ((sale or sales or retail$ or purchas$) adj3 (minors or teenage$ or underage$ or under-age$ or child$)).ti,ab.
30. (youth access adj3 restrict$).ti,ab.
31. health warning$.ti,ab.
32. ((tobacco or cigarette$) adj3 (tax or taxes or taxation or excise or duty-free or duty-paid or customs)).ti,ab.
33. ((cigarette$ or tobacco) adj3 (packaging or packet$)).ti,ab.
34. ((cigarette$ or tobacco) adj3 (marketing or marketed)).ti,ab.
35. ((cigarette$ or tobacco) adj3 (price$ or pricing)).ti,ab.
36. point of sale.ti,ab.
37. vending machine$.ti,ab.
38. (tobacco crop adj3 (substitution$ or diversification$)).ti,ab.
39. (tobacco adj3 (subsidy or subsidies)).ti,ab.
40. (trade adj (restrict$ or agreement$)).ti,ab.
41. (contraband$ or smuggl$ or bootleg$ or cross-border shopping).ti,ab.
42. (tobacco control act or clean air or clean indoor air).ti,ab.

43. ((reduce$ or prevent$) adj3 (environmental tobacco smoke or passive smok$ or secondhand smok$ or second hand smok$ or SHS)).ti,ab.
44. ((population level or population based or population orientated or population oriented) adj3 (intervention$ or prevention or policy or policies or program$ or project$)).ti,ab.
45. ((community level or community based or community orientated or community oriented) adj3 (intervention$ or prevention or policy or policies or program$ or project$)).ti,ab.
46. or/16-45
47. 15 and 46

Cinahl (OVID)

The Cinahl search covered the date range 1982 to December 2005. The search was carried out on 3 January 2006 and identified 1707 records.

1. Smoking/
2. Smoking Cessation/
3. Tobacco/
4. NICOTINE/
5. smoking.ti,ab.
6. (smokers or smoker).ti,ab.
7. tobacco.ti,ab.
8. cigar$.ti,ab.
9. nicotine.ti,ab.
10. or/1-9
11. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (ban or bans or prohibit$ or restrict$ or discourage$)).ti,ab.
12. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (workplace or work place or work site or worksite)).ti,ab.
13. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (public place$ or public space$ or public area$ or office$ or school$ or institution$)).ti,ab.
14. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (legislat$ or government$ or authorit$ or law or laws or bylaw$ or byelaw$ or bye-law$ or regulation$)).ti,ab.
15. ((tobacco-free or smoke-free) adj3 (hospital$ or inpatient$ or outpatient$ or institution$)).ti,ab.
16. ((tobacco-free or smoke-free) adj3 (facilit$ or zone$ or area$ or site$ or place$ or environment$ or air)).ti,ab.
17. ((tobacco or smok$ or cigarette$) adj3 (campaign$ or advertis$ or advertiz$)).ti,ab.
18. ((billboard$ or advertis$ or advertiz$ or sale or sales or sponsor$) adj3 (restrict$ or limit$ or ban or bans or prohibit$)).ti,ab.
19. (tobacco control adj3 (program$ or initiative$ or policy or policies or intervention$ or activity or activities or framework)).ti,ab.
20. ((smok$ or tobacco) adj (policy or policies or program$)).ti,ab.
21. ((retailer$ or vendor$) adj3 (educat$ or surveillance or prosecut$ or legislat$)).ti,ab.
22. test purchas$.ti,ab.
23. voluntary agreement$.ti,ab.
24. ((sale or sales or retail$ or purchas$) adj3 (minors or teenage$ or underage$ or under-age$ or child$)).ti,ab.
25. (youth access adj3 restrict$).ti,ab.
26. health warning$.ti,ab.
27. ((tobacco or cigarette$) adj3 (tax or taxes or taxation or excise or duty-free or duty-paid or customs)).ti,ab.
28. ((cigarette$ or tobacco) adj3 (packaging or packet$)).ti,ab.
29. ((cigarette$ or tobacco) adj3 (marketing or marketed)).ti,ab.
30. ((cigarette$ or tobacco) adj3 (price$ or pricing)).ti,ab.
31. point of sale.ti,ab.
32. vending machine$.ti,ab.
33. (tobacco crop adj3 (substitution$ or diversification$)).ti,ab.
34. (tobacco adj3 (subsidy or subsidies)).ti,ab.
35. (trade adj (restrict$ or agreement$)).ti,ab.
36. (contraband$ or smuggl$ or bootleg$ or cross-border shopping).ti,ab.
37. (tobacco control act or clean air or clean indoor air).ti,ab.

38. ((reduce$ or prevent$) adj3 (environmental tobacco smoke or passive smok$ or secondhand smok$ or second hand smok$ or SHS)).ti,ab.
39. ((population level or population based or population orientated or population oriented) adj3 (intervention$ or prevention or policy or policies or program$ or project$)).ti,ab.
40. ((community level or community based or community orientated or community oriented) adj3 (intervention$ or prevention or policy or policies or program$ or project$)).ti,ab.
41. or/11-40
42. 10 and 41

Health Management Information Consortium (HMIC) (OVID)

The HMIC search covered the date range from inception up to November 2005. The search was carried out on 3 January 2006 and identified 758 records.

1. SMOKING/
2. SMOKING CONTROL/ or SMOKING CESSATION/ or SMOKING POLICY/
3. exp tobacco/
4. smoking/ or anti smoking campaigns/ or tobacco consumption/ or tobacco products/
5. tobacco/ or nicotine/
6. smoking.ti,ab.
7. (smoker or smokers).ti,ab.
8. tobacco.ti,ab.
9. cigar$.ti,ab.
10. nicotine.ti,ab.
11. or/1-10
12. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (ban or bans or prohibit$ or restrict$ or discourage$)).ti,ab.
13. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (workplace or work place or work site or worksite)).ti,ab.
14. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (public place$ or public space$ or public area$ or office$ or school$ or institution$)).ti,ab.
15. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (legislat$ or government$ or authorit$ or law or laws or bylaw$ or byelaw$ or bye-law$ or regulation$)).ti,ab.
16. ((tobacco-free or smoke-free) adj3 (hospital$ or inpatient$ or outpatient$ or institution$)).ti,ab.
17. ((tobacco-free or smoke-free) adj3 (facilit$ or zone$ or area$ or site$ or place$ or environment$ or air)).ti,ab.
18. ((tobacco or smok$ or cigarette$) adj3 (campaign$ or advertis$ or advertiz$)).ti,ab.
19. ((billboard$ or advertis$ or advertiz$ or sale or sales or sponsor$) adj3 (restrict$ or limit$ or ban or bans or prohibit$)).ti,ab.
20. (tobacco control adj3 (program$ or initiative$ or policy or policies or intervention$ or activity or activities or framework)).ti,ab.
21. ((smok$ or tobacco) adj (policy or policies or program$)).ti,ab.
22. ((retailer$ or vendor$) adj3 (educat$ or surveillance or prosecut$ or legislat$)).ti,ab.
23. test purchas$.ti,ab.
24. voluntary agreement$.ti,ab.
25. ((sale or sales or retail$ or purchas$) adj3 (minors or teenage$ or underage$ or under-age$ or child$)).ti,ab.
26. (youth access adj3 restrict$).ti,ab.
27. health warning$.ti,ab.
28. ((tobacco or cigarette$) adj3 (tax or taxes or taxation or excise or duty-free or duty-paid or customs)).ti,ab.
29. ((cigarette$ or tobacco) adj3 (packaging or packet$)).ti,ab.
30. ((cigarette$ or tobacco) adj3 (marketing or marketed)).ti,ab.
31. ((cigarette$ or tobacco) adj3 (price$ or pricing)).ti,ab.
32. point of sale.ti,ab.
33. vending machine$.ti,ab.
34. (tobacco crop adj3 (substitution$ or diversification$)).ti,ab.
35. (tobacco adj3 (subsidy or subsidies)).ti,ab.
36. (trade adj (restrict$ or agreement$)).ti,ab.
37. (contraband$ or smuggl$ or bootleg$ or cross-border shopping).ti,ab.
38. (tobacco control act or clean air or clean indoor air).ti,ab.

39. ((reduce$ or prevent$) adj3 (environmental tobacco smoke or passive smok$ or secondhand smok$ or second hand smok$ or SHS)).ti,ab.
40. ((population level or population based or population orientated or population oriented) adj3 (intervention$ or prevention or policy or policies or program$ or project$)).ti,ab.
41. ((community level or community based or community orientated or community oriented) adj3 (intervention$ or prevention or policy or policies or program$ or project$)).ti,ab.
42. or/12-41
43. 11 and 42

PsycInfo (OVID)

The PscInfo search covered the date range 1806 to December 2005. The search was carried out on 3 January 2006 and identified 2002 records.

1. exp TOBACCO SMOKING/
2. exp SMOKING CESSATION/
3. nicotine/
4. smoking.ti,ab.
5. (smokers or smoker).ti,ab.
6. tobacco.ti,ab.
7. cigar$.ti,ab.
8. nicotine.ti,ab.
9. or/1-8
10. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (ban or bans or prohibit$ or restrict$ or discourage$)).ti,ab.
11. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (workplace or work place or work site or worksite)).ti,ab.
12. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (public place$ or public space$ or public area$ or office$ or school$ or institution$)).ti,ab.
13. ((smok$ or anti-smok$ or tobacco or cigarette$) adj3 (legislat$ or government$ or authorit$ or law or laws or bylaw$ or byelaw$ or bye-law$ or regulation$)).ti,ab.
14. ((tobacco-free or smoke-free) adj3 (hospital$ or inpatient$ or outpatient$ or institution$)).ti,ab.
15. ((tobacco-free or smoke-free) adj3 (facilit$ or zone$ or area$ or site$ or place$ or environment$ or air)).ti,ab.
16. ((tobacco or smok$ or cigarette$) adj3 (campaign$ or advertis$ or advertiz$)).ti,ab.
17. ((billboard$ or advertis$ or advertiz$ or sale or sales or sponsor$) adj3 (restrict$ or limit$ or ban or bans or prohibit$)).ti,ab.
18. (tobacco control adj3 (program$ or initiative$ or policy or policies or intervention$ or activity or activities or framework)).ti,ab.
19. ((smok$ or tobacco) adj (policy or policies or program$)).ti,ab.
20. ((retailer$ or vendor$) adj3 (educat$ or surveillance or prosecut$ or legislat$)).ti,ab.
21. test purchas$.ti,ab.
22. voluntary agreement$.ti,ab.
23. ((sale or sales or retail$ or purchas$) adj3 (minors or teenage$ or underage$ or under-age$ or child$)).ti,ab.
24. (youth access adj3 restrict$).ti,ab.
25. health warning$.ti,ab.
26. ((tobacco or cigarette$) adj3 (tax or taxes or taxation or excise or duty-free or duty-paid or customs)).ti,ab.
27. ((cigarette$ or tobacco) adj3 (packaging or packet$)).ti,ab.
28. ((cigarette$ or tobacco) adj3 (marketing or marketed)).ti,ab.
29. ((cigarette$ or tobacco) adj3 (price$ or pricing)).ti,ab.
30. point of sale.ti,ab.
31. vending machine$.ti,ab.
32. (tobacco crop adj3 (substitution$ or diversification$)).ti,ab.
33. (tobacco adj3 (subsidy or subsidies)).ti,ab.
34. (trade adj (restrict$ or agreement$)).ti,ab.
35. (contraband$ or smuggl$ or bootleg$ or cross-border shopping).ti,ab.
36. (tobacco control act or clean air or clean indoor air).ti,ab.
37. ((reduce$ or prevent$) adj3 (environmental tobacco smoke or passive smok$ or secondhand smok$ or second hand smok$ or SHS)).ti,ab.

38. ((population level or population based or population orientated or population oriented) adj3 (intervention$ or prevention or policy or policies or program$ or project$)).ti,ab.
39. ((community level or community based or community orientated or community oriented) adj3 (intervention$ or prevention or policy or policies or program$ or project$)).ti,ab.
40. or/10-39
41. 9 and 40

BIOSIS (EDINA)

The BIOSIS search covered the date range 1985 to January 2006. The search was carried out on 10 January 2006 and identified 2663 records.

Smoking or smokers or smoker or tobacco or cigar* or nicotine
AND

(smok* w3 ban) or (smok* w3 bans) or (smok* w3 prohibit*) or (smok* w3 restrict*) or (smok* w3 discourage*)
(anti-smok* w3 ban) or (anti-smok* w3 bans) or (anti-smok* w3 prohibit*) or (anti-smok* w3 restrict*) or (anti-smok* w3 discourage*)
(cigarette* w3 ban) or (cigarette* w3 bans) or (cigarette* w3 prohibit*) or (cigarette* w3 restrict*) or (cigarette* w3 discourage*)
OR
(tobacco* w3 ban) or (tobacco* w3 bans) or (tobacco* w3 prohibit*) or (tobacco* w3 restrict*) or (tobacco* w3 discourage*)
(smok* w3 work) or (anti-smok* w3 work) or (tobacco w3 work) or (cigarette* w3 work)
(smok* w3 public) or (smok* w3 office*) or (smok* w3 school*) or (smok* w3 institution*)
OR
(tobacco w3 public) or (tobacco w3 office*) or (tobacco w3 school*) or (tobacco w3 institution*)
(anti-smok* w3 public) or (anti-smok* w3 office*) or (anti-smok* w3 school*) or (anti-smok* w3 institution*)
(cigarette* w3 public) or (cigarette* w3 office*) or (cigarette* w3 school*) or (cigarette* w3 institution*)
OR
(smok* w3 legislat*) or (smok* w3 government*) or (smok* w3 authorit*) or (smok* w3 law) or (smok* w3 laws) or (smok* w3 bylaw*) or (smok* w3 byelaw*) or (smok* w3 bye-law*) or (smok* w3 regulation*)
(anti-smok* w3 legislat*) or (anti-smok* w3 government*) or (anti-smok* w3 authorit*) or (anti-smok* w3 law) or (anti-smok* w3 laws) or (anti-smok* w3 bylaw*) or (anti-smok* w3 byelaw*) or (anti-smok* w3 bye-law*) or (anti-smok* w3 regulation*)
(tobacco w3 legislat*) or (tobacco w3 government*) or (tobacco w3 authorit*) or (tobacco w3 law) or (tobacco w3 laws) or (tobacco w3 bylaw*) or (tobacco w3 byelaw*) or (tobacco w3 bye-law*) or (tobacco w3 regulation*)
OR
(cigarette* w3 legislat*) or (cigarette* w3 government*) or (cigarette* w3 authorit*) or (cigarette* w3 law) or (cigarette* w3 laws) or (cigarette* w3 bylaw*) or (cigarette* w3 byelaw*) or (cigarette* w3 bye-law*) or (cigarette* w3 regulation*)
(tobacco-free w3 hospital*) or (tobacco-free w3 inpatient*) or (tobacco-free w3 outpatient*) or (tobacco-free w3 institution*)
(smoke-free w3 hospital*) or (smoke-free w3 inpatient*) or (smoke-free w3 outpatient*) or (smoke-free w3 institution*)
OR
(tobacco-free w3 facilit*) or (tobacco-free w3 zone*) or (tobacco-free w3 area*) or (tobacco-free w3 site*) or (tobacco-free w3 place*) or (tobacco-free w3 environment*) or (tobacco-free w3 air)
(smoke-free w3 facilit*) or (smoke-free w3 zone*) or (smoke-free w3 area*) or (smoke-free w3 site*) or (smoke-free w3 place*) or (smoke-free w3 environment*) or (smoke-free w3 air)
(tobacco w3 campaign*) or (tobacco w3 advertis*) or (tobacco w3 advertiz*)
OR
(smok* w3 campaign*) or (smok* w3 advertis*) or (smok* w3 advertiz*)
(cigarette* w3 campaign*) or (cigarette* w3 advertis*) or (cigarette* w3 advertiz*)
(billboard* w3 restrict*) or (billboard* w3 limit*) or (billboard* w3 ban*) or (billboard* w3 prohibit*)
OR
(adverti* w3 restrict*) or (adverti* w3 limit*) or (adverti* w3 ban*) or (adverti* w3 prohibit*)

(sale* w3 restrict*) or (sale* w3 limit*) or (sale* w3 ban*) or (sale* w3 prohibit*)
(sponsor* w3 restrict*) or (sponsor* w3 limit*) or (sponsor* w3 ban*) or (sponsor* w3 prohibit*)
OR
(tobacco w3 program*) or (tobacco w3 initiative*) or (tobacco w3 polic*) or (tobacco w3 intervention*) or (tobacco w3 activit*) or (tobacco w3 framework)
(smok* w3 polic*) or (smok* w3 program*) or (tobacco* w3 program*)
(retailer* w3 educat*) or (retailer* w3 surveillance) or (retailer* w3 prosecut*) or (retailer* w3 legislat*)
OR
(vendor* w3 educat*) or (vendor* w3 surveillance) or (vendor* w3 prosecut*) or (vendor* w3 legislat*)
(test w2 purchas*) or (voluntary w2 agreement*)
(sale* w3 minors) or (sale* w3 teenage*) or (sale* w3 underage*) or (sale* w3 under-age*) or (sale* w3 child*)
OR
(retail* w3 minors) or (retail* w3 teenage*) or (retail* w3 underage*) or (retail* w3 under-age*) or (retail* w3 child*)
(purchas* w3 minors) or (purchas* w3 teenage*) or (purchas* w3 underage*) or (purchas* w3 under-age*) or (purchas* w3 child*)
(youth w1 access) or (health w3 warning*) or (point w2 sale) or (vending w3 machine*)
OR
(tobacco w3 tax*) or (tobacco w3 excise) or (tobacco w3 duty-free) or (tobacco w3 duty-paid) or (tobacco w3 customs)
(cigarette w3 tax*) or (cigarette w3 excise) or (cigarette w3 duty-free) or (cigarette w3 duty-paid) or (cigarette w3 customs)
(cigarette* w3 packaging) or (cigarette* w3 packet*)
OR
(tobacco* w3 packaging) or (tobacco* w3 packet*)
(tobacco* w3 market*) or (cigarette* w3 market*)
(tobacco* w3 price*) or (cigarette* w3 pricing) or (tobacco* w3 pricing*) or (cigarette* w3 price*)
OR
(tobacco w1 crop w3 substitution*) or (tobacco w1 crop w3 diversification*)
(tobacco w3 subsidy) or (tobacco w3 subsidies) or (trade w3 restrict*) or (trade w3 agreement*)
contraband* or smuggl* or bootleg* or (cross-border w1 shopping)
OR
(tobacco w1 control w1 act) or (clean w1 air) or (clean w1 indoor w1 air)
(reduce w3 smok*) or (reduc* w3 SHS) or (prevent* w3 smok*) or (prevent* w3 SHS)
(population w2 intervention$) or (population w2 prevention$) or (population w2 polic$) or (population w2 program$) or (population w2 project$)
OR
(community w2 intervention*) or (community w2 prevention)
(community w2 polic*) or (community w2 program*) or (community w2 project*)

EconLit (SilverPlatter)

The EconLit search covered the date range 1969 to November 2005. The search was carried out on 18 January 2006 and identified 491 records.

#37 #3 and #36
#36 #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35
#35 #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 #34 (community level or community based or community orientated or community oriented) near3 (intervention* or prevention or policy or policies or program* or project*)
#33 (population level or population based or population orientated or population oriented) near3 (intervention* or prevention or policy or policies or program* or project*)
#32 (reduce* or prevent*) near3 (environmental tobacco smoke or passive smok* or secondhand smok* or second hand smok* or SHS)
#31 (reduce* or prevent*) near3 (environmental tobacco smoke or passive smok* or secondhand smok* or second hand smok*)
#30 tobacco control act or clean air or clean indoor air
#29 contraband* or smuggl* or bootleg* or cross-border shopping
#28 trade near (restrict* or agreement*)

#27 tobacco near3 (subsidy or subsidies)
#26 (tobacco crop) near3 (substitution* or diversification*)
#25 vending machine*
#24 point of sale
#23 (cigarette* or tobacco) near3 (price* or pricing)
#22 (cigarette* or tobacco) near3 (marketing or marketed)
#21 (cigarette* or tobacco) near3 (packaging or packet*)
#20 (tobacco or cigarette*) near3 (tax or taxes or taxation or excise or duty-free or duty-paid or customs)
#19 health warning*
#18 youth access near3 restrict*
#17 (sale or sales or retail* or purchas*) near3 (minors or teenage* or underage* or under-age* or child*)
#16 voluntary agreement*
#15 test purchas*
#14 (retailer* or vendor*) near3 (educat* or surveillance or prosecut* or legislat*)
#13 (smok* or tobacco) near (policy or policies or program*)
#12 (tobacco control) near3 (program* or initiative* or policy or policies or intervention* or activity or activities or framework)
#11 (billboard* or advertis* or advertiz* or sale or sales or sponsor*) near3 (restrict* or limit* or ban or bans or prohibit*)
#10 (tobacco or smok* or cigarette*) near3 (campaign* or advertis* or advertiz*)
#9 (tobacco-free or smoke-free) near3 (facilit* or zone* or area* or site* or place* or environment* or air)
#8 (tobacco-free or smoke-free) near3 (hospital* or inpatient* or outpatient* or institution*)
#7 (smok* or anti-smok* or tobacco or cigarette*) near3 (legislat* or government* or authorit* or law or laws or bylaw* or byelaw* or bye-law* or regulation*)
#6 (smok* or anti-smok* or tobacco or cigarette*) near3 (public place* or public space* or public area* or office* or school* or institution*)
#5 (smok* or anti-smok* or tobacco or cigarette*) near3 (workplace or work place or work site or worksite)
#4 (smok* or anti-smok* or tobacco or cigarette*) near3 (ban or bans or prohibit* or restrict* or discourage*)
#3 (cigar*) or (smoking or tobacco or nicotine or smoker or smokers)
#2 cigar*
#1 smoking or tobacco or nicotine or smoker or smokers

NHS Economic Evaluation Database (NHS EED) (CRD admin version)

The NHS EED search covered the date range from inception to January 2006. The search was carried out on 12 January 2006 and identified 208 records.

1. S (smoking or smokers or smoker or tobacco or cigar$ or nicotine)
2. S (smok$ or anti(w)smok$ or tobacco or cigarette$)(w3)(ban or bans or prohibit$ or restrict$ or discourage$)
3. S (smok$ or anti(w)smok$ or tobacco or cigarette$) and (workplace or work(w)place or work(w)site or worksite)
4. S (smok$ or anti(w)smok$ or tobacco or cigarette$) and (public(w)space$ or public(w)area$ or office$ or school$ or institution$)
5. S (smok$ or anti(w)smok$ or tobacco or cigarette$) and (legislat$ or government$ or authorit$ or law or laws or bylaw$ or byelaw$ or bye(w)law$ or regulation$)
6. S (tobacco(w)free or smoke(w)free)(w3)(hospital$ or inpatient$ or outpatient$ or institution$)
7. S (tobacco(w)free or smoke(w)free)(w3)(facilit$ or zone$ or area$ or site$ or place$ or environment$ or air)
8. S (tobacco or smok$ or cigarette$)(w3)(campaign$ or advertis$ or advertiz$)
9. S (billboard$ or advertis$ or advertiz$ or sale or sales or sponsor$)(w3)(restrict$ or limit$ or ban or bans or prohibit$)
10. S (tobacco(w)control)(w3)(program$ or initiative$ or policy or policies or intervention$ or activity or activities or framework)
11. S (smok$ or tobacco)(w3)(policy or policies or program$)
12. S (retailer$ or vendor$)(w3)(educat$ or surveillance or prosecut$ or legislat$)

13.S test(w)purchas$
14.S voluntary(w)agreement$
15.S (minors or teenage$ or underage$ or under(w)age$ or child$)(w3)(sale or sales or retail$ or purchas$)
16.S youth(w)access(w)restrict$
17.S health(w)warning$
18.S (tax or taxes or taxation or excise or duty(w)free or duty(w)paid or customs) (w3)(tobacco or cigarette$)
19.S (cigarette$ or tobacco)(w3)(packaging or packet$)
20.S (cigarette$ or tobacco)(w3)(marketing or marketed)
21.S (cigarette$ or tobacco)(w3)(price$ or pricing)
22.S point(w)sale
23.S vending(w)machine$
24.S (tobacco(w)crop)(w3)(substitution$ or diversification$)
25.S tobacco(w)(subsidy or subsidies)
26.S trade(w)(restrict$ or agreement$)
27.S contraband$ or smuggl$ or bootleg$ or (cross(w)border(w)shopping)
28.S (tobacco(w)control(w)act) or (clean(w)air) or (clean(w)indoor(w)air)
29.S reduce$(w)((environmental(w)tobacco(w)smoke) or (passive(w)smok$) or (secondhand(w)smok$) or (second(w)hand(w)smok$) or SHS)
30.S prevent$(w)((environmental(w)tobacco(w)smoke) or (passive(w)smok$) or (secondhand(w)smok$) or (second(w)hand(w)smok$) or SHS)
31.S (population(w)level)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
32.S (population(w)based)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
33.S (population(w)orientated)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
34.S (community(w)level)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
35.S (community(w)based)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
36.S (community(w)orientated)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
37.S (community(w)oriented)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
38.s s2 or s3 or s4 or s5 or s6 or s7 or s8 or s9 or s10 or s11 or s12 or s13 or s14 or s15 or s16 or s17 or s18 or s19 or s20 or s21 or s22 or s23 or s24 or s25 or s26 or s27 or s28 or s29 or s30 or s31 or s32 or s33 or s34 or s35 or s36 or s37
39.s s1 and s38

Health Technology Assessment Database (HTA) (CRD admin version)

The HTA search covered the date range from inception to January 2006. The search was carried out on 12 January 2006 and identified 24 records.

1. S (smoking or smokers or smoker or tobacco or cigar$ or nicotine)
2. S (smok$ or anti(w)smok$ or tobacco or cigarette$)(w3)(ban or bans or prohibit$ or restrict$ or discourage$)
3. S (smok$ or anti(w)smok$ or tobacco or cigarette$)(w3)(workplace or work(w)place or work(w)site or worksite)
4. S (smok$ or anti(w)smok$ or tobacco or cigarette$)(w3)(public(w)space$ or public(w)area$ or office$ or school$ or institution$)
5. S (smok$ or anti(w)smok$ or tobacco or cigarette$)(w3)(legislat$ or government$ or authorit$ or law or laws or bylaw$ or byelaw$ or bye(w)law$ or regulation$)
6. S (tobacco(w)free or smoke(w)free)(w3)(hospital$ or inpatient$ or outpatient$ or institution$)
7. S (tobacco(w)free or smoke(w)free)(w3)(facilit$ or zone$ or area$ or site$ or place$ or environment$ or air)
8. S (tobacco or smok$ or cigarette$)(w3)(campaign$ or advertis$ or advertiz$)
9. S (billboard$ or advertis$ or advertiz$ or sale or sales or sponsor$)(w3)(restrict$ or limit$ or ban or bans or prohibit$)

10.S (tobacco(w)control)(w3)(program$ or initiative$ or policy or policies or intervention$ or activity or activities or framework)
11.S (smok$ or tobacco)(w3)(policy or policies or program$)
12.S (retailer$ or vendor$)(w3)(educat$ or surveillance or prosecut$ or legislat$)
13.S test(w)purchas$
14.S voluntary(w)agreement$
15.S (sale or sales or retail$ or purchas$)(w3)(minors or teenage$ or underage$ or under(w)age$ or child$)
16.S youth(w)access(w)restrict$
17.S health(w)warning$
18.S (tobacco or cigarette$)(w3)(tax or taxes or taxation or excise or duty(w)free or duty(w)paid or customs)
19.S (cigarette$ or tobacco)(w3)(packaging or packet$)
20.S (cigarette$ or tobacco)(w3)(marketing or marketed)
21.S (cigarette$ or tobacco)(w3)(price$ or pricing)
22.S point(w)sale
23.S vending(w)machine$
24.S (tobacco(w)crop)(w3)(substitution$ or diversification$)
25.S tobacco(w)(subsidy or subsidies)
26.S trade(w)(restrict$ or agreement$)
27.S contraband$ or smuggl$ or bootleg$ or (cross(w)border(w)shopping)
28.S (tobacco(w)control)(w)act) or (clean(w)air) or (clean(w)indoor(w)air)
29.S reduce$(w)(environmental(w)tobacco(w)smoke or passive(w)smok$ or secondhand(w)smok$ or second(w)hand(w)smok$ or SHS)
30.S prevent$(w) (environmental(w)tobacco(w)smoke or passive(w)smok$ or secondhand(w)smok$ or second(w)hand(w)smok$ or SHS)
31.S (population(w)level)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
32.S (population(w)based)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
33.S (population(w)orientated)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
34.S (community(w)level)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
35.S (community(w)based)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
36.S (community(w)orientated)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
37.S (community(w)oriented)(w3)(intervention$ or prevention or policy or policies or program$ or project$)
38.s s2 or s3 or s4 or s5 or s6 or s7 or s8 or s9 or s10 or s11 or s12 or s13 or s14 or s15 or s16 or s17 or s18 or s19 or s20 or s21 or s22 or s23 or s24 or s25 or s26 or s27 or s28 or s29 or s30 or s31 or s32 or s33 or s34 or s35 or s36 or s37
39.s s1 and s38

System for Information on Grey Literature in Europe (SIGLE) (SilverPlatter)

The SIGLE search covered the date range 1980 to March 2005. The search was carried out on 3 January 2006 and identified 143 records.

#37 #3 and #36

#36 #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35

#35 #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 #34 (community level or community based or community orientated or community oriented) near3 (intervention* or prevention or policy or policies or program* or project*)

#33 (population level or population based or population orientated or population oriented) near3 (intervention* or prevention or policy or policies or program* or project*)

#32 (reduce* or prevent*) near3 (environmental tobacco smoke or passive smok* or secondhand smok* or second hand smok* or SHS)

#31 (reduce* or prevent*) near3 (environmental tobacco smoke or passive smok* or secondhand smok* or second hand smok*)

#30 tobacco control act or clean air or clean indoor air
#29 contraband* or smuggl* or bootleg* or cross-border shopping
#28 trade near (restrict* or agreement*)
#27 tobacco near3 (subsidy or subsidies)
#26 (tobacco crop) near3 (substitution* or diversification*)
#25 vending machine*
#24 point of sale
#23 (cigarette* or tobacco) near3 (price* or pricing)
#22 (cigarette* or tobacco) near3 (marketing or marketed)
#21 (cigarette* or tobacco) near3 (packaging or packet*)
#20 (tobacco or cigarette*) near3 (tax or taxes or taxation or excise or duty-free or duty-paid or customs)
#19 health warning*
#18 youth access near3 restrict*
#17 (sale or sales or retail* or purchas*) near3 (minors or teenage* or underage* or under-age* or child*)
#16 voluntary agreement*
#15 test purchas*
#14 (retailer* or vendor*) near3 (educat* or surveillance or prosecut* or legislat*)
#13 (smok* or tobacco) near (policy or policies or program*)
#12 (tobacco control) near3 (program* or initiative* or policy or policies or intervention* or activity or activities or framework)
#11 (billboard* or advertis* or advertiz* or sale or sales or sponsor*) near3 (restrict* or limit* or ban or bans or prohibit*)
#10 (tobacco or smok* or cigarette*) near3 (campaign* or advertis* or advertiz*)
#9 (tobacco-free or smoke-free) near3 (facilit* or zone* or area* or site* or place* or environment* or air)
#8 (tobacco-free or smoke-free) near3 (hospital* or inpatient* or outpatient* or institution*)
#7 (smok* or anti-smok* or tobacco or cigarette*) near3 (legislat* or government* or authorit* or law or laws or bylaw* or byelaw* or bye-law* or regulation*)
#6 (smok* or anti-smok* or tobacco or cigarette*) near3 (public place* or public space* or public area* or office* or school* or institution*)
#5 (smok* or anti-smok* or tobacco or cigarette*) near3 (workplace or work place or work site or worksite)
#4 (smok* or anti-smok* or tobacco or cigarette*) near3 (ban or bans or prohibit* or restrict* or discourage*)
#3 (cigar*) or (smoking or tobacco or nicotine or smoker or smokers)
#2 cigar*
#1 smoking or tobacco or nicotine or smoker or smokers

Science Citation Index (Web of Science)

This strategy was also used for Social Science Citation Index (Web of Science)
The SCI and SSCI searches covered the date range 19190 to January 2006.
The SCI search was carried out on 12 January 2006 and identified 3483 records.
The SSCI search was carried out on 11 January 2006 and identified 2852 records.

TI=(Smoking OR smokers OR smoker OR tobacco OR cigar* OR nicotine)
AND

TI=((smok* OR anti-smok* OR tobacco OR cigarette*) SAME (ban OR bans OR prohibit* OR restrict* OR discourage* OR workplace OR work-place OR work-site OR worksite))
TI= ((smok* OR anti-smok* OR tobacco OR cigarette*) SAME ((public SAME place*) OR (public space*) OR (public area*) OR office* OR school* OR institution*))
TI= ((smok* OR anti-smok* OR tobacco OR cigarette*) SAME (legislat* OR government* OR authorit* OR law OR laws OR bylaw* OR byelaw* OR bye-law* OR regulation*))
TI=((tobacco-free OR smoke-free) SAME (hospital* OR inpatient* OR outpatient* OR institution* OR facilit* OR zone* OR area* OR site* OR place* OR environment* OR air))
TI= ((tobacco OR smok* OR cigarette*) SAME (campaign* OR advertis* OR advertiz* or policy OR policies OR program*))

TI= ((billboard* OR advertis* OR advertiz* OR sale OR sales OR sponsor*) SAME (restrict* OR limit* OR ban OR bans OR prohibit*))
TI= ((tobacco control) SAME (program* OR initiative* OR policy OR policies OR intervention* OR activity OR activities OR framework))
TI=(((retailer* OR vendor*) SAME (educat* OR surveillance OR prosecut* OR legislat*)) OR ((tobacco control act) OR (clean air) OR (clean indoor air)))
TI=((test purchas*) OR (Voluntary agreement*) or (youth access restrict*) OR (health warning*) OR (point sale) OR (vending machine*))
TI=((sale OR sales OR retail* OR purchas*) SAME (minors OR teenage* OR underage* OR under-age* OR child*))
TI= ((cigarette* OR tobacco) SAME (packaging OR packet* OR marketing OR marketed OR price* OR pricing OR tax OR taxes OR taxation OR excise OR duty-free OR duty-paid OR customs))
TI=(((tobacco crop) SAME (substitution* OR diversification*)) OR (tobacco SAME (subsidy OR subsidies)))
TI=((trade SAME (restrict* OR agreement*)) OR (contraband* OR smuggl* OR bootleg* OR (cross-border shopping)))
TI=((reduce* OR prevent*) SAME ((environmental tobacco smoke) OR (passive smok*) OR (secondhand smok*) OR (second hand smok*) OR SHS))
TI=(((population level) OR (population based) OR (population orientated) OR (population oriented)) SAME (intervention* OR prevention OR policy OR policies OR program* OR project*))
TI=(((community level) OR (community based) OR (community orientated) OR (community oriented)) SAME (intervention* OR prevention OR policy OR policies OR program* OR project*))

ISI Science & Technology Proceedings (ISTP) (Web of Knowledge)

The ISTP search covered the date range 1990 to January 2006. The search was carried out on 12 January 2006 and identified 628 records.

TS=(Smoking OR smokers OR smoker OR tobacco OR cigar* OR nicotine)
AND
TS=((smok* OR anti-smok* OR tobacco OR cigarette*) SAME (ban OR bans OR prohibit* OR restrict* OR discourage* OR workplace OR work-place OR work-site OR worksite))
TS= ((smok* OR anti-smok* OR tobacco OR cigarette*) SAME ((public SAME place*) OR (public space*) OR (public area*) OR office* OR school* OR institution*))
TS= ((smok* OR anti-smok* OR tobacco OR cigarette*) SAME (legislat* OR government* OR authorit* OR law OR laws OR bylaw* OR byelaw* OR bye-law* OR regulation*))
TS=((tobacco-free OR smoke-free) SAME (hospital* OR inpatient* OR outpatient* OR institution* OR facilit* OR zone* OR area* OR site* OR place* OR environment* OR air))
TS= ((tobacco OR smok* OR cigarette*) SAME (campaign* OR advertis* OR advertiz* or policy OR policies OR program*))
TS= ((billboard* OR advertis* OR advertiz* OR sale OR sales OR sponsor*) SAME (restrict* OR limit* OR ban OR bans OR prohibit*))
TS= ((tobacco control) SAME (program* OR initiative* OR policy OR policies OR intervention* OR activity OR activities OR framework))
TS=(((retailer* OR vendor*) SAME (educat* OR surveillance OR prosecut* OR legislat*)) OR ((tobacco control act) OR (clean air) OR (clean indoor air)))
TS=((test purchas*) OR (Voluntary agreement*) or (youth access restrict*) OR (health warning*) OR (point sale) OR (vending machine*))
TS=((sale OR sales OR retail* OR purchas*) SAME (minors OR teenage* OR underage* OR under-age* OR child*))
TS= ((cigarette* OR tobacco) SAME (packaging OR packet* OR marketing OR marketed OR price* OR pricing OR tax OR taxes OR taxation OR excise OR duty-free OR duty-paid OR customs))
TS=(((tobacco crop) SAME (substitution* OR diversification*)) OR (tobacco SAME (subsidy OR subsidies)))
TS=((trade SAME (restrict* OR agreement*)) OR (contraband* OR smuggl* OR bootleg* OR (cross-border shopping)))
TS=((reduce* OR prevent*) SAME ((environmental tobacco smoke) OR (passive smok*) OR (secondhand smok*) OR (second hand smok*) OR SHS))
TS=(((population level) OR (population based) OR (population orientated) OR (population oriented)) SAME (intervention* OR prevention OR policy OR policies OR program* OR project*))

TS=(((community level) OR (community based) OR (community orientated) OR (community oriented)) SAME (intervention* OR prevention OR policy OR policies OR program* OR project*))

Cochrane Library Issue 4:2005 (internet)

The CENTRAL search covered Issue 4:2005. The search was carried out on 4 January 2006 and identified 1097 records.

#1 MeSH descriptor Smoking, this term only in MeSH
#2 MeSH descriptor Smoking Cessation, this term only in MeSH
#3 MeSH descriptor Tobacco, this term only in MeSH
#4 MeSH descriptor Tobacco Use Disorder, this term only in MeSH
#5 MeSH descriptor Nicotine, this term only in MeSH
#6 smoking or smokers or smoker or tobacco or cigar* or nicotine in All Fields
#7 (#1 OR #2 OR #3 OR # OR #5 OR #6)
#8 (smok* or anti-smok* or tobacco or cigarette*) near (ban or bans or prohibit* or restrict* or discourage*) in All Fields
#9 (smok* or anti-smok* or tobacco or cigarette*) near (workplace or work place or worksite) in All Fields or (smok* or anti-smok* or tobacco or cigarette*) near (public near place*) in All Fields
#10 (smok* or anti-smok* or tobacco or cigarette*) near (public near space) in All Fields or (smok* or anti-smok* or tobacco or cigarette*) near (public near area*) in All Fields or (smok* or anti-smok* or tobacco or cigarette*) near (office* or school* or institution*) in All Fields or (smok* or anti-smok* or tobacco or cigarette*) near (legislat* or government* or authorit* or law or laws or bylaw* or byelaw* or bye-law* or regulation*) in All Fields or (tobacco-free or smoke-free) near3 (hospital* or inpatient* or outpatient* or institution*) in All Fields in all products 350 edit delete
#11 (tobacco-free or smoke-free) near (hospital* or inpatient* or outpatient* or institution*) in All Fields or (tobacco or smok* or cigarette*) near (campaign* or advertis* or advertiz*) in All Fields or (billboard* or advertis* or advertiz* or sale or sales or sponsor*) near (restrict* or limit* or ban or bans or prohibit*) in All Fields or (tobacco near control) near (program* or initiative* or policy or policies or intervention* or activity or activities or framework) in All Fields or (smok* or tobacco) near (policy or policies or program*) in All Fields
#12 (retailer* or vendor*) near (educat* or surveillance or prosecut* or legslat*) in All Fields or test near purchas* in All Fields or (voluntary near agreement*) in All Fields or (sale or sales or retail* or purchas*) near (minors or teenage* or underage* or under-age* or child*) in All Fields or (youth near access) near restrict* in All Fields
#13 health near warning* in All Fields or (tobacco or cigarette*) near (tax or taxes or taxation or excise or duty-free or duty-paid or customs) in All Fields or (cigarette* or tobacco) near (packaging or packet*) in All Fields or (cigarette* or tobacco) near (marketing or marketed) in All Fields or (cigarette* or tobacco) near (price* or pricing) in All Fields
#14 "point of sale" in All Fields or vending machine* in All Fields or (tobacco near crop) near (substitution* or diversification*) in All Fields or tobacco near (subsidy or subsidies) in All Fields or trade near (restrict* or agreement*) in All Fields
#15 contraband* or smuggl* or bootleg* or (cross-border near shopping) in All Fields or (tobacco near control near act) or (clean near air) or (clean near indoor near air) in All Fields or reduce* near ((environmental near tobacco near smoke) or (passive near smok*) or (secondhand near smok*) or (second near hand near smok*) or SHS) in All Fields or prevent* near ((environmental near tobacco near smoke) or (passive near smok*) or (secondhand near smok*) or (second near hand near smok*) or SHS) in All Fields or (population near level) near (intervention* or prevention or policy or policies or program* or project*) in All Fields
#16 (population near based) near (intervention* or prevention or policy or policies or program* or project*) in All Fields or (population near orientated) near (intervention* or prevention or policy or policies or program* or project*) in All Fields or (community near level) near (intervention* or prevention or policy or policies or program* or project*) in All Fields or (community near based) near (intervention* or prevention or policy or policies or program* or project*) in All Fields or (community near orientated) near (intervention* or prevention or policy or policies or program* or project*) in All Fields
#17 (community near oriented) near (intervention* or prevention or policy or policies or program* or project*) in All Fields
#18 (#8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17)
#19 (#7 AND #18)

Public Affairs Information Service (PAIS) (SilverPlatter)

The PAIS search covered the date range 1972 to November 2005. The search was carried out on 12 January 2006 and identified 626 records.

#37 #3 and #36
#36 #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35
#35 #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 #34 (community level or community based or community orientated or community oriented) near3 (intervention* or prevention or policy or policies or program* or project*)
#33 (population level or population based or population orientated or population oriented) near3 (intervention* or prevention or policy or policies or program* or project*)
#32 (reduce* or prevent*) near3 (environmental tobacco smoke or passive smok* or secondhand smok* or second hand smok* or SHS)
#31 (reduce* or prevent*) near3 (environmental tobacco smoke or passive smok* or secondhand smok* or second hand smok*)
#30 tobacco control act or clean air or clean indoor air
#29 contraband* or smuggl* or bootleg* or cross-border shopping
#28 trade near (restrict* or agreement*)
#27 tobacco near3 (subsidy or subsidies)
#26 (tobacco crop) near3 (substitution* or diversification*)
#25 vending machine*
#24 point of sale
#23 (cigarette* or tobacco) near3 (price* or pricing)
#22 (cigarette* or tobacco) near3 (marketing or marketed)
#21 (cigarette* or tobacco) near3 (packaging or packet*)
#20 (tobacco or cigarette*) near3 (tax or taxes or taxation or excise or duty-free or duty-paid or customs)
#19 health warning*
#18 youth access near3 restrict*
#17 (sale or sales or retail* or purchas*) near3 (minors or teenage* or underage* or under-age* or child*)
#16 voluntary agreement*
#15 test purchas*
#14 (retailer* or vendor*) near3 (educat* or surveillance or prosecut* or legislat*)
#13 (smok* or tobacco) near (policy or policies or program*)
#12 (tobacco control) near3 (program* or initiative* or policy or policies or intervention* or activity or activities or framework)
#11 (billboard* or advertis* or advertiz* or sale or sales or sponsor*) near3 (restrict* or limit* or ban or bans or prohibit*)
#10 (tobacco or smok* or cigarette*) near3 (campaign* or advertis* or advertiz*)
#9 (tobacco-free or smoke-free) near3 (facilit* or zone* or area* or site* or place* or environment* or air)
#8 (tobacco-free or smoke-free) near3 (hospital* or inpatient* or outpatient* or institution*)
#7 (smok* or anti-smok* or tobacco or cigarette*) near3 (legislat* or government* or authorit* or law or laws or bylaw* or byelaw* or bye-law* or regulation*)
#6 (smok* or anti-smok* or tobacco or cigarette*) near3 (public place* or public space* or public area* or office* or school* or institution*)
#5 (smok* or anti-smok* or tobacco or cigarette*) near3 (workplace or work place or work site or worksite)
#4 (smok* or anti-smok* or tobacco or cigarette*) near3 (ban or bans or prohibit* or restrict* or discourage*)
#3 (cigar*) or (smoking or tobacco or nicotine or smoker or smokers)
#2 cigar*
#1 smoking or tobacco or nicotine or smoker or smokers

Hand searching of online journals

Searched articles in press, current content, past issues from January 2005 to August 2006, including supplements.

Name of journal	
Addiction	http://www.blackwell-synergy.com/loi/ADD
Addictive Behaviours	http://www.sciencedirect.com/science?_ob=JournalURL&_cdi=5949&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=76a2e0d2ccf745831bdf91b260668f4d
Am J Health Behaviours	http://www.ajhb.org/2005/29-1.htm
American Journal of Addiction	http://taylorandfrancis.metapress.com/(f5xej2bmapv02km2umohbp45)/app/home/journal.asp?referrer=parent&backto=linkingpublicationresults,1:102425,1
American Journal of Community Psychology	http://www.springerlink.com/(j4nvqz552lkszy55ohkdz53c)/app/home/journal.asp?referrer=parent&backto=linkingpublicationresults,1:104830,1
American Journal of Epidemiology	http://aje.oxfordjournals.org/archive/
American Journal of Preventive Medicine	http://www.sciencedirect.com/science?_ob=JournalURL&_cdi=6075&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=050282157d905d3c8c18634fdeead3f5
American Journal of Public Health	http://www.ajph.org/contents-by-date.0.shtml
Annals of Oncology	http://annonc.oxfordjournals.org/
Aust New Zealand Journal of Public Health	http://www.phaa.net.au/anzjph/anzjph.htm
BMJ	http://bmj.bmjjournals.com/contents-by-date.2005.shtml
Canadian Journal of Public Health	http://www.cpha.ca/shared/cjph/archives/index05.htm#96_1
Cancer Causes & Control	http://www.springerlink.com/(dyd3e4455gusjw3efgdlshyl)/app/home/journal.asp?referrer=parent&backto=browsepublicationsresults,351,2577;
Chest	http://www.chestjournal.org/contents-by-date.0.shtml
European Journal of Cancer	http://www.sciencedirect.com/science?_ob=JournalURL&_cdi=5024&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=2cb604b6025a90ac83353205f264f90b
European Journal of Epidemiology	http://www.springerlink.com/(y1oy0v451xmrbzup3lyoy0je)/app/home/journal.asp?referrer=parent&backto=browsepublicationsresults,702,2576;
European Journal Public Health	http://eurpub.oxfordjournals.org/archive/
Int Journal Epidemiology	http://ije.oxfordjournals.org/archive/
Irish Medical Journal	http://imj.ie/DTIndex.aspx?tabindex=0&tabid=1
JAMA	http://jama.ama-assn.org/contents-by-date.2005.dtl
Journal Epidemiology & Community Health	http://jech.bmjjournals.com/current.shtml
	http://www.sciencedirect.com/science?_ob=JournalURL&_cdi=5873&_

Name of journal	
Journal of Health Economics	auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=4709f34d8f24f0763cbdf8e92ad9e6dd
Journal of Occupational Medicine	http://occmed.oxfordjournals.org/archive/
Journal of Public Health	http://jpubhealth.oxfordjournals.org/
Journal of Public Health Policy	http://www.jphp.umb.edu/current.htm
Lung Cancer	http://www.sciencedirect.com/science?_ob=JournalURL&_cdi=5111&_auth=y&_acct=C000055026&_version=1&_urlVersion=0&_userid=4005836&md5=0daadbb6ad6549dde0b196cc6e2e781c
Medical Journal of Australia	http://www.mja.com.au/public/issues/contents.html
New England Journal of Medicine	http://content.nejm.org/
Pediatrics	http://pediatrics.aappublications.org/
Preventive Medicine	http://www.sciencedirect.com/science?_ob=JournalURL&_cdi=6990&_auth=y&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=28b08f3d295238384145fcf4fc73aec4
Substance Use & Misuse	http://journalsonline.tandf.co.uk/(bvphfci13l0nbuaezdnskf55)/app/home/journal.asp?referrer=parent&backto=linkingpublicationresults,1:107866,1
The Lancet	http://www.thelancet.com/journals/lancet/section?issue=9501&section=Articles&volume=366
Tobacco Control	http://tc.bmjjournals.com/contents-by-date.2005.shtml

APPENDIX B – LIST OF INCLUDED STUDIES BY INTERVENTION CATEGORY

Below is a list of all the intervention categories and primary studies included in the systematic review. All the studies included had to meet the inclusion criteria (detailed in section 2.2) of a population level tobacco control intervention, reporting relevant outcomes and socio-demographic and socio-economic variables.

Effects of smoking restrictions – workplaces and other public places

Study	Country	Participants
Becker (1989)[7]	US	Employees at a hospital
Borland (1991)[8]	Canada	Employees of a telecommunication company
Dawley (1981)[9]	US	Employees and visitors to a hospital
Donchin (2004)[10]	Israel	Employees at a hospital
Heloma (2003)[11] Heloma (2001)[106]	Finland	Employees in multiple workplaces
Kassab (1992)[12]	UK	Employees in one health authority
Offord (1992)[13]	US	Employees in a medical centre
Olive (1996)[14]	US	Employees in a hospital
Parry (2000)[15]	UK	Employees at a university
Sorensen (1991)[16] Sorensen (1991)[107]	US	Employees in a telecommunications company
Sorensen (1995)[17]	US	Employees in a telecommunications company
Stillman (1990)[18] Stillman (1994)[108]	US	Employees in a hospital
Tang (2003)[19]	US	Customers and employees of bars and restaurants
Waa (2005)[20]	New Zealand	General New Zealand population and Maori population sample

Effects of smoking restrictions – workplaces and other public places: Qualitative Studies

Parry (2000)[15] also [21, 22]	UK	Employees at a university

Effects of smoking restrictions - schools

Study	Country	Participants
Kumar (2005)[23]	US	Middle school students
Thrush (1999)[24]	UK	School students aged 8 to 13 yrs
Trinidad (2005)[25]	US	School students aged 12 to 17yrs (only 37.2% white)

Effects of restrictions on sales to minors

Study	Country	Participants
Altman (1999)[26] Blaine (1997)[109]	US	School students, majority Hispanic
Forster (1998)[27]	US	School students 8th to 10th grade (age 13 to 15)
Hinds (1992)[28]	Australia	School students aged 14 to 17 years
Jason (2003)[29]	US	School students 6th to 8th grade (age 11 to 13 years)
Laugesen (1999)[30]	New Zealand	School students aged 14 to 15 years
Livingood (2001)[37]	US	School students aged under 18 years
Rimpela (2004)[31]	Finland	School students aged 12 to 18 years
Siegel (1999)[36]	US	School students aged 12 to 15 years
Staff (1998)[32]	Australia	School students aged 12 to 17years
Staff (2003)[33]	Australia	School students aged 12 to 17 years
Sundh (2005)[34]	Sweden	School students aged 13 to 17 years
Thomson (2004)[38]	US	School students aged 12 to 17 years
Tutt (2000)[35]	Australia	School students under 18 years

Note on ages and grades of students : this is approximately how ages map onto grades.

Effects of health warnings on tobacco products

Study	Country	Participants
Borland (1997)[39]	Australia	General population
Gospodinov (2004)[40]	Canada	General population
Koval (2005)[42]	Canada	Adolescents
Robinson (1997)[43]	US	Adolescents, mean age 15 years
Willemsen (2005)[41]	Netherlands	General population

Effects of restrictions on advertising of tobacco products

Study	Country	Participants
Fielding (2004)[44]	Hong Kong	Young children aged 8-10 years
Joossens (1997)[45]		General population

Effects of an increase in unit price of tobacco

Study	Country	Participants
Berg (2001)[64]	South Africa	Households (adults and children)
Bishai (2004)[77]	US	Adolescents, mean age 16 years
Borren (1992)[60]	UK	Adults
Chaloupka (1991)[49]	US	Adults aged 18 or over
Chaloupka (1992)[48]	US	Adults aged 17 or over
Chaloupka (1995)[51]	US	University and college students
Chaloupka (1996)[78]	US	School students, 8th, 10th, 12th grade (aged 13 to 18)
Chaloupka (1997)[79]	US	School students, 8th, 10th, 12th grade (age 13 to 18)
Chaloupka (1999)[76]	US	School students, 8th, 10th, 12th grade (age 13 to 18)
Colman (2004)[52]	US	General population
Czart (2001)[80]	US	University and college students
DeCicca (2002)[81]	US	School students, 8th, 10th, 12th grade (age 13 to 18)
Delnevo (2004)[53]	US	General population

Study	Country	Participants
Ding (2003)[54]	US	School students, 8th, 10th, 12th grade (aged 13 to 18) and young adults aged 18-24
Emery (2001)[82]	US	Adolescents and young adults, aged 10-22
Evans (1998)[47]	US	Adults aged 18 or over
Farrelly (2001)[55]	US	Adults
Glied (2002)[67]	US	Young adults, mean age 17.5 but using longitudinal data to age 39
Goel (2005)[56]	US	School students (9th-12th grades; aged 14 to 18) and adults aged 18 or over
Gruber (2000)[75]	US	School students 8th, 10th, 12th grades (aged 13 to 18); pregnant women
Gruber (2002)[63]	US	Households (adults and children)
Katzman (2002)[83]	US	School students, 9th-12th grades (aged 14 to 18)
Lee (2004)[65]	Taiwan	Adults aged 17 or over (90% men)
Lewit (1982)[46]	US	Adults aged 20-74
Lewit (1997)[74]	US	School students, 9th grade (age 14)
Liang (2002)[84]	US	School students, 8th, 10th, 12th grades (aged 13 to 18)
Lopez Nicolas (2002)[62]	Spain	General population
Nonnemaker (2002)[68]	US	School students, 7th-12th grades (aged 12 to 18)
Ohsfeldt (1998)[73]	US	Men aged 16 or over
Peretti-Watel (2005)[61]	France	General population aged 12-75
Ringel (2001)[57]	US	Pregnant women
Ringel (2005)[87]	US	School students, 6th-12th grades (aged 11 to 18)
Ross (2004)[86]	US	School students, mean age 15.7
Tauras (1999)[72]	US	School students, 8th, 10th grades (aged 13 and 15)
Tauras (2001)[71]	US	School students, 8th, 10th grades (aged 13 and 15)
Tauras (2003)[70]	US	School students, 8th, 10th grades (aged 13 and 15)
Tauras (2005)[69]	US	School students, 8th, 10th grades (aged 13 and 15)
Thomson (2004)[85]	US	Adolescents aged 12-18
Townsend (1987)[59]	UK	Adult men
Townsend (1994)[58]	UK	General population aged 16 or over
Tsai (2005)[66]	Taiwan	Men who smoked
Wasserman (1991)[50]	US	Adolescents aged 12-17 and adults

Effects of multi-faceted interventions

Study	Country	Participants
Cooreman (1997)[92]	France	Hospital staff
Helakorpi (2004)[88]	Finland	General population aged 15-64
Heloma (2004)[89]	Finland	General population
Stephens (2001)[91]	Canada	Adults aged 25 or over
Unger (1999)[90]	US	School students, 10th grade (age 15)

APPENDIX C - LIST OF STUDIES EXCLUDED FROM THE SYSTEMATIC REVIEW

1. Anonymous. A tale of two companies. no smoking in the workplace. *American Lung Association Bulletin* 1983;69:7-11.
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INTERVENTION: Smoking restrictions (workplace)

Study details	Methods	Stratified results	Global results
Becker (1989)[7] **Study design** Before-and-After Study (cross-sectional samples) **Objectives** Evaluation of the first phase of a total ban on smoking in the Johns Hopkins Children's Center (before and after implementation of total smoke-free policy) **Setting** Johns Hopkins Children's Medical and Surgical Center, Baltimore, US **Intervention** Total smoking ban **SES outcomes reported** Gender, education and occupation **Authors' conclusions** Although smoking prevalence did not decrease significantly, employees were generally compliant with the ban.	**Data sources** Two surveys. Pre-ban survey - Jan 1987 - distributed to hospital units. Non-responders given second survey one month after first one. Post-ban survey – one year after first survey (6 months after implementation of the ban) distributed again using same approach. Surveys elicited attitudes towards smoking and the ban as well as self-reported smoking behaviour. **How were the participants selected?** Personnel payroll roster used to identify employees of all functional units of the centre and clinics. **Population characteristics** Number: Pre 762 Post 704 Age: Pre & Post Mean 34yrs Gender: Pre: F=83%; Post F=75% Occupation: Pre: Physician 20%; Nurse 38%; Other: 43% Post: Physician 23%; Nurse 34%; Other 32% Education: High school education or less: Pre ban 16%; Post Ban 19% No other demographic data were recorded. **Intervention details** Policy at the time of the intervention limited smoking to designated lounges on two of eight inpatient units. But marked non-compliance among both visitors and staff with highly visible smoking was occurring throughout the centre. A decision was made by chief of paediatrics and admin committee to ban smoking in all areas of 200-bed acute care hospital and clinics. Employee policy advisory committee assisted in implementation. Media campaign in both Centre and local press; produced newsletters that defined policy and provided information on smoking cessation alternatives. “Health Awareness Days” included various health promotional tests such as cholesterol, pulmonary function screening, counselling, etc. Six month programme instituted 1 Jan 87 to prepare employees and environment for total ban. In June 1987 policy card summarising no smoking policy given to all parents in admitting office. In June and July 1987 a lunchtime booth offered smoking cessation advice, T-shirts and buttons and self-help quit smoking materials. 1 July 1987 – first day of ban marked by press conference, placement of highly visible no smoking signs and dissemination of “quit kits” for parents of children in centre. Public awareness activities remained in place for 3 more months. **Outcomes measured** Smoking prevalence Number of cigarettes smoked per day: Percentage smoking at work	**Smoking prevalence** *OCCUPATION* Prevalence of current smoking was highest in both baseline and follow-up surveys before and after ban among housekeeping/kitchen employees. Clerical employees also retained a high smoking prevalence in both pre- and post-surveys. Changes in smoking status by occupation were not significant for any group. *EDUCATION* Smoking prevalence at follow-up was 31% among high school graduates; 12% among college graduates; 6% among master-educated employees and 4% among employees with doctorates. This did not differ significantly from baseline survey. *GENDER* There were no gender differences in current smoking; 16% of men and 15% of women smoked 6 months pre ban; 12% of men and 14% of women smoked at follow-up.	**Smoking prevalence** Six months pre ban 115 (15%) of 762 respondents reported being current smokers; 481 (63.5%) never smokers; 8 people did not indicate smoking status. Six months after ban 95 (13.8%) of 704 respondents reported being current smokers; 189 (58.6%) never smokers; 18 people did not indicate smoking status. Among the 189 former smokers, 13% indicated they had quit in past year since baseline survey. Overall self-reported changes in current smoking prevalence were small. **Percentage smoking at work** Average number of cigarettes smoked per day was 15+/-11 prior to ban and 15+/-9 post ban; Pre ban 82% smokers reported smoking during work shift with 16% smoking 10 cigarettes or more during shift. Average number of cigarettes smoked at work was 5.8+/-5.6. Six months after ban 43% of smokers reported smoking at work with 45% smoking 10 cigarettes or more during shift. The average number of cigarettes smoked at work after the ban was 5.1+/-4.8. Most employees rotated shifts so not possible to differentiate smoking frequency by time of day. Majority of work-site smoking (90%) occurred on or adjacent to patient units and in adjacent offices before the ban; after ban 88% indicated that they smoked away from patient areas. Remaining 12% of employees did not indicate where they smoked at work after the ban.

INTERVENTION: Smoking restrictions (workplace)

Study details	Methods	Stratified results	Global results
Borland (1991)[8] **Study design** Before-and-After Study (cross-sectional samples) **Objectives** To examine the effects of a total workplace smoking ban on cigarette consumption at work, on workdays and non-workdays, on smoking cessation and on attempts at cessation **Setting** Telecom Australia, Victoria and South Australia **Intervention** Workplace smoking ban **SES outcomes reported** Gender **Authors' conclusions** The introduction of the workplace smoking ban led to an overall reduction in workday cigarette consumption and probably to a reduction in smoking prevalence.	**Data sources** Cross-sectional survey and longitudinal survey. As the longitudinal survey has no SES data only the cross-sectional (18 month follow-up) data have been extracted. **How were the participants selected?** All staff at work on the day of the survey or due back to work that week and who spent a considerable portion of their workday (unspecified) inside on the premises were given a survey. **Population characteristics** Number: 1424 Age: Mean 34.5 Gender: 72%M, 28%F No other demographic data were recorded. **Intervention details** Smoking ban in the workplace **Outcomes measured** Smoking prevalence (Self report) Cigarette workday consumption (Self report) Nonwork day consumption (Self report) Cigarette weekday consumption (Self report)	**Smoking prevalence (18 months)** *GENDER* Baseline prevalence: Overall: 29.6% (24.6%, 34.6%); Male: 27.4% (21.6%, 33.2%); Female: 38.1% (27.8%, 48.4%) 18 month prevalence: Overall: 26.5% (22.1%, 30.9%); Male: 22.8% (17.1%, 28.5%); Female: 33.4% (25.0%, 41.8%); Change in prevalence: Overall: -3.1% (-9.8%, 3.6%); Male: -4.6% (-12.7%, 3.5%); Female: -4.7% (-18.0%, 3.6%) **Cigarette workday consumption** *GENDER* Baseline Men - mean of 20.1 cigarettes per day(SD 10.4) Women - mean of 17.3 cigarettes per day (SD 11.7) 18 months Men - mean of 16.3 cigarettes per day(SD 9.2), mean difference -3.8; women mean of 14 cigarettes per day (SD 7.9), mean difference -3.3.	**Nonwork day consumption** At 18 months 20% of smokers reported changes (increases or decreases), overall estimates indicated 5.9 fewer cigarettes per day but 13.2% actually increased nonworkday consumption. **Cigarette weekday consumption** At 18 months 32.3% reported changed weekday consumption and estimated they were smoking, on average 9 fewer cigarettes a day. Averaging across all smokers this represents a mean reduction of about 3 cigarettes a day.

INTERVENTION: Smoking restrictions (warning signs)

Study details	Methods	Stratified results	Global results
Dawley (1981)[9] **Study design** Before-and-After Study (cross-sectional samples) **Objectives** To assess the effect of differently worded no-smoking signs on smoking behaviour **Setting** Perdido Street Lobby of New Orleans Veterans Administration Medical Centre, US **Intervention** Differently worded No Smoking signs **SES outcomes reported** Gender **Authors' conclusions** The potential for environmental control of smoking showed promising results.	**Data sources** Data gatherer made tallies unobtrusively while sitting in centrally located position in lobby. Samples separated by several hours to ensure complete turnover of subjects in areas. **How were the participants selected?** Veterans (patients) and families/visitors using hospital. **Population characteristics** Veterans being admitted for treatment and family members Number: 537 (but some may be multiple observations); Gender: Greater proportion of men than women, but numbers not reported No other demographic data were recorded **Intervention details** Year study commenced: 1978 Normally no prohibitions against smoking anywhere in lobby area. In fact nine large ashtrays usually distributed throughout area by housekeeping staff. First phase assessed baseline smoking rate. Following this ashtrays were removed from lobby for the two experimental conditions. Negative signs installed and smoking rate again assessed. Following that assessment, positive signs were put up and proportion of smokers noted. Apart from the installation of signs and removal of ashtrays, there were no attempts to enforce a no-smoking policy during the two experimental conditions. One group of signs worded to threaten punitive action against violators of hospital smoking policy (negative signs): Two were worded: "Hospital Smoking Policy Strictly Enforced"; two were worded "No Smoking – Offenders will be subject to Fine"; The other group were worded in a nonthreatening and courteous manner (positive signs) "Consider Others' Health, Do Not Smoke"; Two "Please do not smoke". All signs plastic laminated construction with black lettering 1 ¼ in high on yellow background. During experimental phases of study signs were attached to walls and posts in lobby so that at least one of four signs could be seen by every person seated there. Underlying Theory: rationale behind intervention was that the negative threatening signs might not be appropriate as a) the threats might not be backed up and people would ignore them, b) veterans were very concerned about personal freedom and signs might provoke a reaction against them; **Outcomes measured** Proportion of smokers (Non-random time samples)	**Proportion of smokers** *GENDER* Prior to both conditions: Data based on six observations each: Proportion of smokers in each condition: Baseline: n=192; Males : .37; Females: .08; Total: .29 Data based on six observations each: Proportion of smokers in each condition: Negative signs (n=219); Males: .15; Females .03; Total .11 Positive signs (n=126); Males .07; Females .00; Total .05 Although a greater proportion of men than women smoked over all three conditions $p<0.01$, separate analysis of males and females showed same relationships between the conditions e.g. significantly lower incidence of smoking in sign conditions $p<0.01$ for men and $p<0.05$ for women but no difference between the two sign conditions for men and women. (Note sign conditions confounded by removal of ashtrays).	**Proportion of smokers** Chi square analyses of total incidence of smoking revealed a significant difference in proportions among the three conditions $p<0.01$. Sub analyses showed that while the difference between the two experimental conditions combined and the baseline was significant $p<0.01$, the difference between the two experimental conditions was not statistically significant.

INTERVENTION: Smoking restrictions (hospital)

Study details	Methods	Stratified results	Global results
Donchin, (2004)[10] **Study design** Before-and-After Study (cross-sectional samples) **Objectives** An evaluation of a hospital process and short-term outcomes of implementing a smoke-free policy in a hospital setting **Setting** Hadassah Ein Kerem Hospital, Jerusalem, Israel **Intervention** Smoking ban **SES outcomes reported** Occupation, education and gender **Authors' conclusions** The authors concluded that implementation of a "smoke-free" policy was an effective way to reduce smoking within the hospital environment. However more effort is needed to enable staff to quit smoking altogether.	**Data sources** Two successive surveys of hospital employees (different participants in each wave). Baseline 3 months prior to policy implementation; Follow-up survey 6-9 months after policy launched. Demographic and occupational characteristics obtained from computerised personnel records. Self-administered questionnaire used for data collection. Questionnaires not anonymous. Surveys conducted by hospital's occupational health unit and school of public health, respondents promised confidentiality. **How were the participants selected?** Random-sample surveys of hospital employees before and after introduction of smoking ban. All salaried employees on payroll in July 2000 (1st survey) and April 2001 (2nd survey) were eligible. **Population characteristics** 1st Survey –407 (22%) of 3,670 hospital workers, response rate : 368 (90.4%). 2nd survey: 431 (12%) of 3,705 workers, Response rate: 400 (92.8%)All those included in first survey (36 people) excluded from second survey. N=364 analyses. Pre Policy Survey (Survey 1) (n=368) Gender: M 36.1%; F 63.9% Age: <35 23.1% 35-44 26.9% 45-54 29.3% 55+ 20.7% Education: 0-12 yrs 23.2%; 13-15 yrs: 23.5%; 16+ yrs: 53.3% Occupation: Doctors & Dentists 17.1%; Nurses 27.4%; Administrators & Clerks 14.9%; Technicians 28%; Unskilled Workers 12.5% Years of employment: 0-5 27.7%; 6-10 26.1%; 11-20 22.3% >20 23.9%; Post Policy Survey (Survey 2) (n=364) Gender: M 30.2%; F 69.8%	**Smoking behaviour** *OCCUPATION* Doctors least likely to be smokers (12.7% pre vs. 6.1% post implementation survey). Unskilled workers were most likely to be smokers (30.4% pre and 45% post). The distribution of stages of change was not associated with age, gender, education, occupation, marital status, degree of compliance to new policy. **Compliance with "smoke-free" policy** *OCCUPATION* In the post-policy survey compliance was associated with occupation (difference between job categories: p=0.04) with clerical staff being most likely to comply while technicians and unskilled workers (e.g. cleaners) were least likely to do so. But occupation did not remain a significant predictor for smoking policy compliance when entered into logistic regression model with marital status. *EDUCATION*: There were no significant differences based on years of education. *GENDER* There were no significant differences based on gender. *MARITAL STATUS* In the post-policy survey, there were significant differences in compliance with married respondents being more likely to comply than unmarried (p=0.03). **Attitudes to policy:** *OCCUPATION* *"Smokers Have A right to smoke at Work"* In the post-policy survey, among smokers, clerks were most likely to agree with this statement, while among non-smokers, nurses and unskilled workers	**Smoking behaviour** No great change in number of cigarettes smoked (total or in work hours only) observed 6 months after the policy was implemented (12.9 SD=10.4, and 4.9, SD=4.7 respectively). The majority of smokers in both surveys were classified in pre-contemplation stage, which meant they had no intention to change their smoking behaviour in the foreseeable future (49.2% and 57.4% respectively). Only a small percentage were in the preparatory stage (intending to take action soon and may have taken some inconsistent action in recent past) (12.7% pre and 8.2% post). **Compliance with "smoke-free" policy** 16.9% of all respondents reported leaving their workplace to smoke pre-policy compared with 62.1% post policy (p<0.0001). Significant reduction in reported smoking in unauthorised areas (by employees, patients or visitors) observed in hospital building. 14.2% of respondents in pre-policy survey reported that they never observe smokers in unauthorised places compared to 42.3% in post-policy survey (p<0.001).

	Age: <35 22.5%; 35-44 28.3%; 45-54 27.7%; 55+ 20 21.4% Education: 0-12 yrs 25.4%; 13-15 yrs 18.5%; 16+ yrs 56.1% Occupation: Doctors & Dentists 13.5%; Nurses 31.9%; Administrators & Clerks 17.0%; Technicians 26.6%; Unskilled workers 11% Years of employment: 0-5 30.5%; 6-10 17.9%; 11-20 26.6%; >20 25% **Intervention details** Israeli laws have restricted smoking in public sites since 1983 and in the workplace since 1996. Laws vary but generally forbid smoking in such buildings and permit but do not require the establishment of designated areas for smokers. Hospital had been active in its attempts to reduce smoking in the hospital in line with previous legislation. Smoke Free policy launched 1 November 2000. Promotional and campaign activities to facilitate introduction carried out during 6 months prior to announcement by a multisector steering committee headed by chief administrator. Smoking booths erected outside hospital buildings, sale of tobacco products banned in the hospital, information campaign about new policy run 2 months prior to implementation. Enforcement of new policy assigned to municipal superintendents of city of Jerusalem authorised to fine violators. Smoking cessation programs offered to employees. August 2001 antismoking law was revised in Israel which called for a complete ban of smoking in all hospitals. **Outcomes measured** Smoking behaviour (Questionnaire) Compliance with “smoke free policy (Questionnaire) Attitude to policy (Questionnaire)	most likely to express solidarity with smokers (no data provided). In the post-policy survey doctors were least likely to feel that the smoking policy was unfair (while controlling for smoking status)(no data provided). *EDUCATION* *Smokers should only smoke in designated areas:* In the post-policy survey smokers were significantly less likely to agree with smoking restrictions than in the pre-survey (76% vs. 93%, $p<0.01$) but there was no effect for education. *GENDER* Male non smokers were more likely to support stricter regulations than female non-smokers: 41.2% vs. 22.7% respectively ($p<0.005$). Male smokers were eight times more likely to support smoking rights at work than female smokers, controlling for occupation and length of employment (no data provided).	

INTERVENTION: Smoking restrictions (workplace)

Study details	Methods	Stratified results	Global results
Heloma (2003)[11] **Study design** Before-and-After Study (cross-sectional samples) **Objectives** To evaluate the impact of national smoke-free workplace legislation on employee exposure to environmental tobacco smoke (ETS), employee smoking habits and attitudes to workplace smoking regulations **Setting** Eight industrial, service sector and office workplaces (medium and large) from the public and private sector, Helsinki metropolitan area, Finland **Intervention** National smoke-free workplace law **SES outcomes reported** Gender, education **Authors' conclusions** The study found that a smoke-free workplace law was associated with reducing ETS exposure at work particularly where the voluntary smoking regulations have failed to reduce exposure. The implementation of the law also seemed to encourage smokers to accept a non-smoking workplace as the norm. There was a	**Data sources** Surveys. Time 1(T1) 1994-95 (before Act), Time 2(T2) Winter 1995-96 (almost 1 year after Act) and Time 3(T3) March 1998 (3 years after implementation of Act). Questionnaires were distributed to all employees during workplace visits at the same time as the indoor air nicotine measurements were performed. Anonymous questionnaires were returned to researchers during the workplace visits. Absentees provided with a prepaid return envelope. Indoor air nicotine measurements took place in 41 sites in 1994-95, 40 sites in 1995-96 and 18 sites in 1998. Measurements performed in corridors or workrooms near a designated smoking area to assess the potential spreading of tobacco smoke. **How were the participants selected?** Medium and large workplaces from the Helsinki metropolitan area were selected from a registry kept by the Finnish Institute of Occupational Health. The public and private sector was represented in three categories: industry, service and offices. The workplaces were allowed to have smoking restrictions of various degrees but workplaces with a total ban on smoking before the enforcement of the revised act were not eligible for the study. All eight workplaces selected participated in the three cross-sectional surveys (1994-5, 1995-96 and 1998). **Population characteristics** Age: 15->55 **Time 1 (T1) 1994-95** Number: 880 Gender: 70.5%M, 29.5%F Occupation: Leading position 3.3%, Senior salaried staff 11.1%, Salaried staff 27.5%, Worker 58.0% Other: Workplace category: Industry 37.5%, Services 45.1%, Office 17.4% **Time 2 (T2) 1995-96** Number: 1251 Gender: 72.9%M, 27.1%F Occupation: Leading position 3.7%, Senior salaried staff 13.7%, Salaried staff 26.5%, Worker 56.2% Other: Workplace category: Industry 35.1%, Services 43.9%, Office 21.0%	**Prevalence of smoking** *GENDER AND EDUCATION* T1: Total 29.6% Elementary or Comprehensive School 37.2% (M 39.7%, F 32.0%), Senior High or Vocational School 32.9% (M 33.9%, F 26.4%), College or University 16.8% (M 19.8%, F 11.8%) Percentage prevalence with p values for change from T1. T2: Total 25.0% (p=0.021) Elementary or Comprehensive School 33.4% (p=0.307) (M 34.3% (p=0.228), F 29.5%(p=0.723)), Senior High or Vocational School 25.3%(p=0.034) (M 26.9%(p=0.068), F 19.2%(p=0.295)), College or University 16% (p=0.790) (M 19.6 (p=0.967), F 9.7% (p=0.631)) T3: not recorded. *GENDER* T1: Total 262 (29.8%), M 205 (33.1%), F 57 (22.0%) T2:Total 225 (24.6%), M 179 (26.9%), F 46 (18.4%) T3 Total 162 (25.2%), M 102 (24.8%), F 60 (26.1%) Trend over time Total (p= 0.026), M (p=0.006), F (p=0.128) **Average number of cigarettes** *GENDER* T1: 19 per day T2: 16 per day The trend was similar for men and women (no data provided)	

reduction in smoking prevalence and tobacco consumption among employees at 1 year and smoking declined further in men at 4 year follow-up but not women where there was an increase.	**Time 3 (T3) 1998** Number: 878 Gender: 64%M, 36%F Occupation: Leading position 4.3%, Senior salaried staff 15.6%, Salaried staff 27.3%, Worker 52.9% Other: Workplace category: Industry 37.8%, Services 38.2%, Office 24.0% No other demographic data were recorded. **Intervention** National smoke-free workplace law. The revised Tobacco Act (Act Amending the Act on Measures to Reduce Tobacco Smoking 1994) came into effect on 1 March 1995. The amended law extended smoking restrictions to all premises that were shared by employees as well as to the public premises of workplaces, including areas for customers. Employers had two options: either impose a total ban on smoking or provide designated smoking rooms with separate ventilation systems and a lower air pressure to prevent any escape of smoke to the non-smoking spaces. Two participating workplaces had imposed a total ban on smoking before this third survey. No nicotine measurements were performed in those workplaces in the last survey but they participated in the questionnaire study. **Outcomes measured** Prevalence of smoking (Survey) Average number of cigarettes (Survey)		

INTERVENTION: Smoking restrictions (health authority)

Study details	Methods	Stratified results	Global results
Kassab (1992)[12] **Study design** Post-intervention Study (cross-sectional sample) **Objectives** To investigate smoking prevalence and attitudes of Health Authority employees to non-smoking policy, passive smoking and other related issues **Setting** Gwynedd Health Authority, Wales, UK **Intervention** Non-smoking policy within Health Authority premises **SES outcomes reported** Gender, occupation, age **Authors' conclusions** Study demonstrates that, by supporting the non-smoking behaviour of the majority, there is justification for promoting non-smoking on NHS premises. The finding that the attitudes of ex-smokers support those of non-smokers suggest that giving up smoking leads to changes in attitudes towards issues such as non-smoking policy and passive smoking. Smokers appear to reject that passive smoking is harmful to health and anti-social.	**Data sources** Pilot questionnaire 1988 (English and Welsh language); After modification final version was bilingual, included 13 questions, 7 of which were attitudinal. **How were the participants selected?** Survey included all Health Authority employees including hospitals and other centres and was sent with January 1989 payslip 3 years after implementation of smoking restrictions. **Population characteristics** Number: 2,620/5,118 respondents (51%); Note: Figures of participants in analysis vary in tables Age: </=25yrs n=432; 26-35 yrs n=670; 36-45yrs n=636; 46-55yrs n=569; >55yrs n=218; Gender: Males n=705 (26%); Females n=1902 (74%); Occupation : Area of employment: Ancillary n=335; Nursing n=1229; Ambulance n=111; Works & engineering n=84; Admin & clerical n=373; Professional & technical n=248; Medical and dental n=180 **Intervention details** In 1986 following 3 month period of staff consultation, Gwynedd Health Authority adopted and published its no-smoking policy. Health service managers and employees contributed to implementation of policy over several years. No smoking policy which aims to provide smoke free environment for patients, staff and visitors, with a few designated rooms available for employees to smoke. No smoking permitted in clinical areas, wards, outpatient depts, waiting areas or theatres. Health centres and clinics also designated no smoking areas. **Outcome measured** Agreement with Authority's non-smoking policy (Questionnaire) Views on strengthening or relaxing the policy (Questionnaire) Support for a smoking ban (Questionnaire) Implementation of policy at place of work (Questionnaire) Smoking Prevalence (does not report change from before the survey) (Questionnaire)	**Agreement with authority's non-smoking policy** *OCCUPATION* Professional and technical 86% Medical and dental staff 83% Nursing staff 70% Ancillary employees 54% *GENDER* Men 73%; Women 71% *AGE* >55yrs 81% compared with 63% </=25 yrs Higher proportion of younger age group uncertain about their views or not aware of policy (figures not reported). **Views on strengthening or relaxing the policy** *OCCUPATION* Fewer ancillary and nursing staff felt the policy needed strengthening (40% and 44% respectively); 28% of ancillary staff and 15% of nurses felt the policy needed to be relaxed, compared with only 3% of Medical and Dental staff. *GENDER* More males (57%) compared with females (45%) thought the policy needed to be strengthened. Similar proportion of males (13%) and females (14%) thought the policy needed relaxing; More females (35%) than males (24%) felt the policy was about right.. *AGE* Support for strengthening the policy increased with employees age : </=25yrs 42% compared with >55 yrs 57%. Numbers who did not want to modify the policy decreased slightly with age: </=25 yrs 34% compared with >55 27%; Similar proportions in all age groups supported a relaxation of the policy. **Support for smoking ban** *OCCUPATION*	**Agreement with authority's non-smoking policy** Agreed : 72%; Disagreed 12%; Uncertain 10%; Unaware of policy 6%. 22% of smokers who did not want to stop smoking agreed with policy compared with 84% of non-smokers and 80% of ex-smokers; 47% of smokers who wanted to give up supported the policy. **Views on strengthening or relaxing the policy** 58% overall supported strengthening the policy. 53% of ex-smokers and 61% of non-smokers felt the policy needed strengthening; 43% of smokers wanting to give up felt the policy was acceptable, while % for other 3 groups indicated lower levels of satisfaction. **Support for smoking ban** Only 7% of smokers who did not want to stop supported a ban, compared with 60% of ex-smokers and 71% of non-smokers. **Smoking prevalence** The majority of employees (78%) were non-smokers or ex-smokers.

Authors recommend that the Health Authority design a comprehensive range of information and services on how to stop smoking, to be available to meet the needs of individual staff groups.		Professional and technical (78%) and medical and dental staff (78%) supported a smoking ban, compared with 50% of nurses and 42% of ancillary staff. *GENDER* 67% of men supported the smoking ban in all areas compared to 52% of women. *AGE* Positive answers in support of a ban increased with age (47% for the </= 25 yrs compared to 65% >55 yrs). **Implementation of policy at place of work** 53% of all employees thought that the Authority's non-smoking policy was only partially implemented, 28% considered it fully implemented and 19% believed the policy had not been implemented. These proportions were independent of sex, age-group, area of employment and smoking status. **Smoking prevalence** *GENDER* More males (31%) compared to females (20%) were ex-smokers; More females (58%) compared to males (47%) were non-smokers. The rates of smokers who do not wish to stop smoking and those who do were the same for both sexes. *AGE* Small differences in smoking prevalence between age groups for respondents. But percentage of non-smokers decreased with age while that of ex-smokers increased. *OCCUPATION* Ancillary workers had highest proportion of smokers (38%) followed by nursing staff (24%), with medical and dental staff the lowest proportion at 8%. Ambulance crews and ancillary workers had the highest % of smokers who wanted to give up (17% and 15% respectively); Medical and dental staff had the lowest percentage who wished to give up smoking with 5%.	

INTERVENTION: Smoking restrictions (workplace)

Study details	Methods	Stratified results	Global results
Offord (1992)[13] **Study design** Post-intervention Study (cross-sectional sample) **Objectives** Effects of the implementation of a smoke-free policy in a medical centre **Setting** Mayo Medical Centre, Rochester, Minnesota **Intervention** Smoking restrictions (workplace) **SES outcomes reported** Gender and age **Authors' conclusions** Authors conclude the implementation of a smoke-free policy has made a significant contribution toward providing a healthful work environment and toward encouraging non-smoking behaviour in staff and patients.	**Data sources** Self completed anonymous questionnaires which were distributed to all employees both before and after the ban. Pre implementation survey (November 1986) to assess policy announcement and other implementation issues. One follow-up 2 yr post ban (June 1989) Study reporting unclear as it appears some results may be from pre ban survey and some are from post ban survey asking questions about pre-ban smoking. **How were the participants selected?** All employees at medical centre sent a questionnaire in a single mailing. **Population characteristics** Number: 10579 (post ban) Gender: Follow-up Survey Male = 29% Female = 70.5%; Staff Groups: consultant staff consisting of physicians, PhD. Medical scientists and senior administrators, the majority were physicians; n=990; Paramedical staff including desk attendants, secretaries, students, laboratory technicians based in outpatient and research settings other than in hospital n-8,693; No other demographic data were recorded. **Intervention details** Introduction of a smoke-free policy (Implemented on 29 June 1987). Implementation of policy was preceded by extensive preparation and dissemination of information about the institutional importance of the policy itself, smoking and smoking cessation. Aim to provide a smoke free-environment in medical centre (study states that smoking cessation itself was not a primary aim, although the issue is addressed). No other details reported. **Outcomes measured** Smoking prevalence (Survey) Smoking cessation rates (Survey) Smoking behaviour (Survey)	**Smoking prevalence** *GENDER AND AGE* Women 14.6%; Men 11.5% Recency of employment, gender and age all were significantly associated either alone or in combination with prevalence of current smoking. Trend was for lower rates in men, declining with age and lower in more recent employees. **Smoking cessation rates** *GENDER AND AGE* Of N=1,562 employed and regular smokers prior to implementation 22.5% (95% CI: 20.4 to 24.6%) reported not smoking at time of follow-up. When analysed by logistic regression found no associations between cessation and age or gender.	**Smoking prevalence** Overall prevalence of regular smoking at follow-up was 13.8% (95% CI: 13.1 to 14.5%) which is significantly lower ($p<0.001$) than 16.7% of pre implementation survey. **Smoking cessation rates** Of 352 not currently smoking 119 (33.8%) reported stopped smoking as a result of smoke-free policy. 12.8% (of 1,562) reported using smoking cessation self-help material that was made available to staff after the announcement of the policy; 13.4% attended formal smoking cessation program. Use of nicotine polacrilex as part of smoking cessation was reported by 21.3%. **Smoking behaviour among 1,210 who were smokers at policy announcement and currently still regularly smoking cigarettes** When asked about categoric change to overall level of cigarette smoking 30.2% reported it decreased; 7.4% that it had increased; 62.4% said no change.

INTERVENTION: Smoking restrictions (workplace)

Study details	Methods	Stratified results	Global results
Olive (1996)[14] **Study design** Before-and-After Study (VA) and Post-intervention Study (USAF) (cross-sectional samples) **Objectives** To assess the effect of restrictive smoking policies on smoking behaviour **Setting** USAF federal hospital, Dayton, Ohio, and Veterans Affairs Medical Centre, Tennessee, US **Intervention** Restrictive smoking policy (workplace) **SES outcomes reported** Gender **Authors' conclusions** Research suggests that restrictive smoking policies may have impact beyond the workplace and are conducive to a healthy workforce. Authors believe such policies are important in hospitals to convey to patients the negative health consequences of smoking. Patients expect health care professionals to model healthy behaviour. Patients are mostly supportive of hospital restrictive smoking policies, and the majority of smoking patients are willing to comply with such policies. Authors believe current US	**Data sources** Anonymous self-reported questionnaires designed by authors. Year study commenced: 1988 - USAF 6 & 12 months post implementation; VA administered 1 month pre and 6 months post implementation. **How were the participants selected?** At each hospital, full-time and part-time employees identified from administrative records. **Population characteristics** USAF: A 325 bed military hospital in Dayton Ohio, providing both active duty and retired military members and their dependents with health care; Its 1,600 employees include both military members and civilians. Number: USAF 934 at 6 months; 742 at 12 months. Gender: USAF 6 month: Female 45.2%; Male 54.8%; 12 month Female 48.1%; Male 51.9%. Ethnicity: USAF: Black %: 6 month 10.5; 12 month 9.5; White %: 6 month 82.7; 12 month 85; Other %: 6 month 6.8; 12 month 5.5 Occupation: USAF Administration %: 6 month 8.2; 12 month 10.0; Clerical %: 6 month 10.4; 12 month 9.1; Nurse %: 6 month 16; 12 month 22.4; Physician %: 6 month 12.4; 12 month 14.1; Other %: 6 month 53; 12 month 44.4 No other demographic data were recorded. VA: A 450 bed hospital. Its 1,500 employees all civilians, although may have previously served in military. Served 185,000 veterans. Number: VA Hospital: 708 at baseline; 625 at 6 months Gender: VA Baseline Female 46.1%; Male 53.9%; 6 month Female 51.5%; Male 48.5% Ethnicity: Black %: baseline 2.1; 6 month 1.7; White %: baseline 92; 6 month 91.9; Other %: baseline 5.9; 6 month 6.4 Occupation: Clerical %: baseline 16; 6 month 17.1; Nurse %: baseline 14.3; 6 month 17.4; Physician %: baseline 9.3; 6 month 8.8; Other %: baseline 54.6; 6 month 50.5; No other demographic data were recorded.	**Cigarette consumption before and after policy** *GENDER* USAF No baseline survey 6 month (n=870) Female : Never smoked 52.7%; Smokers 22.4%; Ex-smokers 24.9% Male : Never smoked 50.9%; Smokers 23.5%; Ex-smokers 25.6% Combined : Never smoked 51.7%; Smokers 23%; Ex-smokers 25.3% 12 month (n=663) Female : Never smoked 59.6%; Smokers 15%; Ex-smokers 25.4%; Difference between 6 month & 12 month: p=0.039 Male : Never smoked 47.1%; Smokers 21.2%; Ex-smokers 31.7%; Difference between 6month & 12month: p=0.16 Combined : Never smoked 53%; Smokers 18.3%; Ex-smokers 28.7%; Difference between 6month & 12month p=0.056 VA *Smoking Status by Sex (%)* Baseline (n=653) Female: Never smoked 58.2%; Smokers 21.9%; Ex-smokers 19.9%; Male: Never smoked 34.1%; Smokers 27.6%; Ex-smokers 38.3%; Combined: Never smoked 45.2%; Smokers 24.9%; Ex-smokers 29.9%; 6month (n=542) Female: Never smoked 65.1%; Smokers 16.2%; Ex-smokers 18.7%; Difference between baseline & 6months:p=0.15 Male: Never smoked 38.3%; Smokers 24.6%; Ex-smokers 37.1%; Difference between baseline & 6months:p=0.53	**Cigarette consumption before and after policy** Data indicate cigarette consumption at work decreased at USAF hospital (p=0.002) but not at the VA hospital. Analysis conducted to investigate if USAF difference was due to lower response rate of women smokers at 12 month follow-up. Contingency table analysis from male respondents was independently significant (p=0.0014) suggesting that cigarette consumption at work was reduced by policy implementation. Daily consumption declined in both hospital settings but the differences were not statistically significant. Response to question "What effect has the hospital's smoking policy had on number of cigarettes you smoke at work?" USAF 54% answered "smoke less" at 6 months & 12 months; VA 37% answered "smoke less" at 6months though this was not supported by the self-reported cigarette consumption.

standards requiring such policies are appropriate, make an important statement and contribute to a healthier society.	Across all surveys in both hospitals nurses had higher response rates on follow-up surveys. **Intervention details** USAF (Dayton) did not have a smoking policy in mid-1980s. In 1986 each dept established a smoking area and each ward established separate employee and patient smoking areas. Hospital permitted smoking only in designated smoking areas. VA: No restrictive smoking policy in mid-1980s. Initial policy restricted smoking to one area on each level of each building with no significant efforts towards policy enforcement. USAF Dayton (Restrictive Smoking Policy): In July 1988 hospital administration completely eliminated smoking in the hospital. The new policy allowed smoking only outdoors and indoors in one room in a separately constructed facility attached to the main hospital building. VA: In November 1989 all but one indoor smoking area was eliminated. This change left most buildings with no indoor smoking area. USAF: The policy developed on initiative of hospital commander by a committee comprised of administrators, union reps and a lawyer. Enforcement ultimately responsibility of commander who was strong proponent of the policy. VA: Policy was developed by a committee of administrations and union representatives. Smoking cessation programmes were offered at the two institutions. **Outcomes measured** Cigarette consumption before and after policy implementation (Questionnaire)	Combined: Never smoked 52.0%: Smokers 20.3%: Ex-smokers 27.7%; Difference between baseline & 6months:p=0.045	

INTERVENTION: Smoking restrictions (workplace)

Study details	Methods	Stratified results	Global results
Parry (2000)[15] **Study design** Post-intervention Study (cross-sectional sample) **Objectives** To ascertain the effectiveness of the smoking ban policy at the University of Edinburgh **Setting** University of Edinburgh, Scotland **Intervention** Smoking ban **SES outcomes reported** Occupation **Authors' conclusions** Based on the survey, University smoking policy did not impact equally upon all members of the organisation.	**Data sources** Postal survey as part of an evaluation of the smoking ban commissioned by the University conducted approx six months following the ban (March / April 1998). **How were the participants selected?** Questionnaire respondents were identified from the January 1998 salary register. Questionnaires were personally addressed to respondents and sent through the University internal mail system. Each respondent received a pre-addressed envelope and instructions to return completed questionnaires via the University internal mail service. **Population characteristics** Number: 3531 Gender: 1675M (46.6%), 1898F(52.8%), 19 Unknown (<1%) Occupation: Academic (1355), Academic related (419), Clerical / secretarial (825), Technical(469), Manual (524) Significant differences in reported smoking between the different occupational groups within the University: Academic 188 of 1765(10.7%), Clerical / secretarial 134 of 802 (16.7%), Technical 67 of 457 (14.7%), Manual 223 of 507 (44%), Missing data 61. There was a significant variation in smoking prevalence by gender (Males 225 of 1653 (15.4%) vs. Females 354 of 1862 (19.0%), p= 0.005). Smoking rates did not differ by age. No other demographic data were recorded. **Intervention details** Prior to the intervention smoking at the University was guided by a voluntary code discouraging smoking in communal areas. Those with their own offices were allowed to smoke provided they kept their doors shut and those sharing offices were expected to respect the wishes of their colleagues. Reserved smoking areas were provided in some restaurant facilities and designated smoking rooms were provided at the discretion of heads of department. The smoking policy, banning smoking in University buildings and University vehicles was introduced on 1 October 1997. The smoking policy applies to all staff, students, outside contractors and visitors to the University of Edinburgh. The policy is supported by University disciplinary procedures for staff and through faculty representation for students. Three	**Day time smoking** *OCCUPATION* 426 of 612 (69.6%) respondents who smoked did so during the day before the ban. At six months 170 smoked less, 21 smoked more, 36 had quit and for 167 there had been no change, 32 had missing data. Across the staff groups (smoke less, smoke more, quit, no change) the proportions were as follows: Academic and related 39 (36.8%), 3 (2.8%), 17 (16.0%), 47 (44.3%); Clerical / secretarial 30(42.2%), 1 (1.4%), 6 (8.4%), 34 (47.9%); Technical 25 (51.0%), 2 (4.1%), 6 (12.2%), 16 (32.7%); Manual 76 (45.2%), 15 (8.9%), 7 (4.2%), 70 (41.7%). Significant differences were found in quit rates between academic and related staff and manual staff (16.0% vs. 4.2%) and in increase in smoking between academic and related and manual staff (2.8% vs. 8.9%). The largest response categories for academic and related and clerical / secretarial staff was 'no change' and for technical and manual staff was 'smoke less' (p values not reported).	**Day time smoking** Do not smoke now 36 (9.1%), Smoke less 170 (43.1%), Smoke more 21 (5.3%), No change 167(42.4%) **Overall pattern of smoking** Do not smoke now 21 (6.5%), Smoke less 77 (23.8%), Smoke more 45 (13.9%), No change 180 (55.7%) **Smoking outside work** Do not smoke now 19 (5.9%), Smoke less 35 (10.9%), Smoke more 70 (21.7%), No change 198 (61.5%) Of those still smoking during the working day 35(8.2%) had reduced smoking outside work since the ban. 70(16.4%) smoked more and 198(46.5%) had not changed. **Relocation of smoking** 2648 of 3448 (76.8%) of respondents reported an increase of smoking on University property outside buildings. 2756 of 3435 (80.29%) noted an increase in smoking specifically on entrances and steps to University buildings. **Quality of air** No change, 2419 of 3529 (68.5%), Improvement 1069 of 3529(30.3%), Deterioration 41 of 3529 (1.2%). Data on quality of air by smoking status not extracted. **Change in working patterns** 3278 (91.3%) reported no change in the amount of time spent in the main work area before the 'official' beginning of the work day, 3226(89.8%) reported no change in working late, 3124(87.5%) no change at lunch times and 3254 (90.6%) no change during actual working hours. 76 (17.8%) of smokers stated that they spent less time in their work area during working hours since the ban was introduced compared to 6 (0.2%) of non-smokers. 122 (32.2%) of smokers and 14 (0.5%) of non-smokers indicated they spent less

	exceptions to the ban are licensed premises, some selected residential accommodation for students and University grounds (provided entrances to buildings are not obstructed). The decision to move from a voluntary code to a smoking ban was taken by the University Court without prior consultation with staff or students. Two years' warning was given during which time the University devised a programme of publicity, education and the provision of support for smokers. No-smoking classes were held during work hours and run by a smoking consultant commissioned by the University. **Outcomes measured** Relocation of smoking (Survey) Quality of air (Survey) Change in working patterns (Survey) Desire to quit (Survey) Perception of rule breaking (Survey) Attitudes to smoking (Survey)		time in their main work area at lunch time since the ban. 84 (19.7%) smokers and 4(0.1%) non-smokers claimed to spend less time at work before the official start to the day and 70 (16.7%) smokers and 8 (0.3%) non-smokers stayed late less often than before the ban. When data on respondents who used to smoke during the day but subsequent to the ban claimed to be non-smokers were excluded the level of reported change in the amount of time spent in the main work area rose further (data not extracted). **Desire to quit** Of the 358 respondents (84.0%) who still smoked during the day 43 (12.0%) expressed an interest in changing smoking behaviour through the uptake of support from the University or elsewhere. **Perception of rule breaking** 445 (15.2%) of non-smokers felt that the ban was only partially working or not working at all in personal offices. Of the non-smokers 724 (24.8%) claimed the ban was not wholly effective in corridors and foyers. **Attitudes to smoking** 3125/3947 (89.4%) agreed it was important for the University to have a policy on smoking. 223/405 (55.1%) of those who had smoked during the day prior to the ban, 135/178 (75.8%) of those smoking outside the working day prior to the ban and 2720/2862 (95.0%) of non-smokers were in favour of a policy(chi-squared = 664.4, df=4, p<0.001). 1919/3516 (54.6%) felt that a University smoking policy should allow for designated smoking areas within University buildings. There were significant differences in opinion according to smoking status (data not extracted)

Qualitative Data Extraction – Smoking restrictions

Study details	Methods	Critical appraisal
Parry 2000, UK [15, 21, 22] **Study design** Qualitative **Objectives** To examine the implications of an institutionally defined risk-reduced environment for smokers and non-smokers at work **Setting** Edinburgh University, Scotland **Intervention** Workplace smoking ban **SES data** Occupation	**Qualitative methods used** Qualitative work was undertaken as part of an evaluation of the smoking ban commissioned by the University. It included analysis of policy documentation, a questionnaire, qualitative interviews and participant observation. **How were data collected?** Questionnaire with A4-size space for free text comments, preceded by an open-ended invitation 'If you would like to say more about the smoking ban and how it's been working, please write your comments here. We are very interested in anything you have to say.' Staff were also able to explore issues raised in the questionnaires by contacting members of the research team. Qualitative interviews – no further details. Participant observation – Members of the evaluation team observed the content and conduct of implementation and support classes (no further detail provided). Analysis of policy documentation – no further details. **How were participants selected?** Questionnaire – Respondents were identified from the January 1998 salary register. Questionnaires were personally addressed to respondents and sent through the University internal mail system together with a pre-addressed envelope and instructions to return the questionnaire via the University internal mail service. Qualitative interviews – a purposive sample of 30 staff members pre- and post-implementation of the policy. Interviewees included members of the University court, those involved in the process of implementation, union officials, student representatives and attendees at support and implementation classes. **Population characteristics** 997 people (27.8% of achieved sample) wrote comments on the blank page of the questionnaires. Of these 151 (15.5%) indicated that they smoked during the working day prior to the ban, 51 (5.2%) smoked but not during the day and 775 (79.3%) were non-smokers. No information on smoking was available for 20 respondents.	**Are the research questions clear?** Yes, the objective was to evaluate the implications of the university smoking ban and the three papers in this study consider a different aspect of this enquiry. **Are the research questions suited to qualitative inquiry?** Yes as the subjective views and experiences of both smokers and non-smokers are sought. **Are the following clearly described?** **- sampling :** Yes for the questionnaire and briefly for the interviews. **- data collection:** Yes for the questionnaires but only briefly for the interviews. **- analysis:** Most of the data appear to be derived from the questionnaire free text comments. It is unclear what contribution to the data the interviews made. **Are the following appropriate to the research question?** **- sampling:** Yes, the entire staff for the questionnaire and a purposive sample for the interviews. Differences between the University sample and national samples are discussed. **- data collection:** Yes for the questionnaire but unclear for the interviews - **analysis:** Details of analysis are only provided briefly so it is not possible to assess their suitability. It is not clear how themes were derived and what were the relative contributions of interview and questionnaire data. **Are the claims made supported by sufficient evidence?** Yes, but more information on any contradictory data and how themes were generated would have been helpful. **Are the data, interpretations and conclusions clearly integrated?** Yes **Does the paper make a useful contribution?** Yes, as it examines the unintended consequences of a population level intervention. It considers the views of non-smokers and smokers

	Which groups' views were represented? Smokers and non-smokers All staff and by occupation group **How were data analysed?** Qualitative data – from questionnaires and interviews - were transcribed, then thematically explored and analysed.	in addition to examining changes to smokers' behaviour following a smoking ban.
Concepts identified across the three papers describing this study		
Study: [15] (from questionnaire and with reference to interviews)	**[21]**	**[22] (from questionnaires and with reference to interviews)**
Smokers at risk: implications of an institutionally bordered risk-reduced environment	*Out of sight, out of mind: workplace smoking bans and the relocation of smoking at work*	*The perceived impact of a workplace smoking ban on the work routines of smokers*
Stratified results: **Occupational Groups - Smokers' Views**	**Stratified results:**	**Stratified results:**
Smoking is seen as an important part of people's lives and is associated with accomplishment of routine work tasks	None	None
Smoking is seen as an integral part of the work especially for academic staff		
Academic staff who wish to continue smoking adopt strategies such as leaving the building at regular intervals or working from home.		
Not all staff have the freedom to come and go due to the nature of their work therefore the ban is experienced as divisive		
Disciplinary procedures are not seen as equally applicable to different staff groups		
Staff members appear not to conform to the ban to the same extent		
Occupational Groups - Smokers and Non-smokers Views		
The ban is most likely to affect lower status staff who have the highest proportion of smokers		
Global - Smokers' Views	**Global - Smokers' Views**	**Global - Smokers' Views**
The smoker is a 'leper' experiencing discrimination and persecution	None	None
Smoking outside or in other locations means no chance to chat with other members of staff.		
It is humiliating standing outside smoking		
Even if smoking is now seen as socially unacceptable some smokers are dependent on cigarettes.		
The new arrangements for smoking lead to the development of strategies to continue smoking at work and associated stress.		
Global - Non-smokers' Views	**Global - Non-smokers' Views**	**Global - Non-smokers' Views**
None	Smokers have moved to smoking at entrances and exits of the University so those leaving and entering experience smoke pollution.	Smoking has simply 'gone underground' with illicit smoking in areas such as corridors and toilets with a diminishing effect on air quality after the 'culprits' have gone.
	The ban has resulted in an increase in the level of passive smoking as a result of smokers using entrances to buildings.	Potential increase in risk of fire through secret smoking and associated irritation caused by cigarette smoke setting off alarms and detectors.

	Doorway smoking presents a poor impression to outsiders.	Smokers spend less time in their workplace and perform less efficiently.
	Despite provision of ashtrays and installation of bins, some smokers continue to throw cigarette ends down.	There is a need for clarity on 'cigarette breaks'.
	There is concern about the fire risk associated with relocated smoking.	Smokers are spending less time doing their work and this causes resentment.
	The smoking ban might just shift smoking to other public places outside working hours.	There is a loss to the university in terms of time and cost from smokers taking cigarette breaks.
	Global - Non-smokers' Views (punitive minority)	Smokers should be penalised for taking cigarette breaks or non-smokers should be compensated.
	The comfort and health of non-smokers is more important than a smoker's need/ choice to smoke.	Senior academic staff who smoke continue to do so in their own offices.
	Those who seek active help to cut down or quit are deserving of sympathy and help whilst those who have no intention of stopping are undeserving.	
	Classes for smokers are a waste of time and resources.	
	Global - Non-smokers' Views (supportive majority)	
	Dependent individuals should be encouraged to stop and assisted to do so. Glad to see the university is supporting smokers who wish to quit.	
	Designated areas should be provided (some respondents).	
	Health education and other forms of intervention should be provided (some respondents).	
	Reinstatement of smoking areas might appear to condone smoking and might also ghettoize it.	
Explanations / theories		
The University smoking policy did not impact equally upon all members of the organisation and was experienced as divisive contributing towards and sustaining social inequalities among staff.	The high visibility of smokers following the ban raised awareness about the problems faced by smokers among non-smoking staff members.	'Smoking bans can be divisive in pitching non-smoker against smoker at work.'

INTERVENTION: Smoking restrictions (workplace)

Study details	Methods	Stratified results	Global results
Sorensen (1991)[16, 107] **Study design** Post-intervention Study (cross-sectional sample) **Objectives** Examines the effects of a worksite smoking policy on employee smoking behaviour and perceived air quality **Setting** New England Telephone Company, US **Intervention** Smoking restrictions (workplace) **SES outcomes reported** Occupation **Authors' conclusions** [16]This study suggests that a well implemented worksite smoking policy, which is fully supported by management and accompanied by cessation class, may be followed by apparent increases in smoking cessation by employees. [107]This study suggests that a highly restrictive non-smoking policy - including a total ban on smoking - may be more easily and successfully implemented than are less restrictive policies.	**Data sources** One survey 20 months post intervention in Nov 1987. Survey self administered, anonymous, designed by authors (no further details) and distributed through company mail. **How were the participants selected?** Stratified random sample (method not reported) of 1,599/27,374 employees **Population characteristics** Approx 600 work sites All employees of the company (total approx 1,120) Upper Level Managers: Number: 177 Gender: F=16.9%; M=83.1% Lower Level Managers: Number: 407 Gender: F=41.5%; M=58.5% Non-Managers Number: 524 Gender: F=52.5%; m=47.5% No other demographic data were recorded. **Intervention details** A company-wide smoking restriction policy. From March 1 1986 smoking was prohibited in all work areas, including individual offices. Smoking areas designated in cafeterias, lounges, hallways and restrooms. A full time field manager appointed for 18 months to facilitate implementation and enforcement of policy. Free onsite smoking cessation classes offered. **Outcomes measured** Smoking status (Survey) Air quality (Survey) Satisfaction with policy (Survey)	**Smoking status** *OCCUPATION* N=79 (21%) of 375 respondents who were smokers when first became aware of policy said they were not smoking by time of survey, including 15% of nonmanagers; 25% of lower level managers; and 32% of upper level managers (p<0.01); Logistic regression: Non-managers OR 1.34 (95% CI 0.40 to 3.54); Managers OR 0.83 (95% CI 0.32 to 2.11). Upper level managers served as reference category. Omitting short term quitters (n=13) 18% had quit for at least 3 months. Of 375 classified as smokers, 32 (9%) reported quitting smoking due to policy, including 20% upper level managers; 9% lower level managers; 6% nonmanagers; representing 42% of those who quit. In addition 113 of 375 (32%) said reduced number of cigarettes smoked as a result of policy, including 36% upper level managers; 34% lower level managers; 29% nonmanagers. Differences in smoking category not explained by age or sex based on logistic regression analyses. **Air quality** Policy effective in reducing reported exposure to smoke in work areas but not in nonwork areas; Results varied significantly by smoking status but not by job category. (Data not reported) **Satisfaction with policy [107]** *OCCUPATION* Satisfaction with policy was higher among Upper level managers compared with non-managers OR=0.15 (95% CI: 0.04 to 0.55) and among smokers compared to with smokers. Satisfaction higher for upper level managers compared with lower level managers OR=0.24 (95% CI 0.97 to 0.92). A significant interaction was found between job status and frequency with which smoky air was noticed in nonwork areas, such as restrooms; satisfaction among nonmanagers lower among those frequently noticing smoky air in nonwork areas. Age and sex not significantly related to satisfaction of policy.	Awareness of the rules about smoking in most areas was high, especially where smoking was totally banned. (data not extracted). Respondents were highly satisfied with policy, but half preferred additional restrictions on smoking. Policy was effective in reducing perceived environmental tobacco smoke exposure in work areas where smoking was banned but not in nonwork areas where smoking was allowed in designated areas (data not extracted).

INTERVENTION: Smoking restrictions (workplace)

Study details	Methods	Stratified results	Global results
Sorensen (1995)[17] **Study design** Post-intervention Study (cross-sectional sample) **Objectives** To investigate a worksite smoking ban implemented with the support of a company-sponsored smoking cessation programme based on hypnotherapy. Data extracted relates only to the policy survey not to the smoking cessation programme survey **Setting** New England Telephone Company, US **Intervention** Workplace smoking ban **SES outcomes reported** Gender, occupation **Authors' conclusions** Results suggest that a smoking ban may provide substantial motivation for smokers to participate in smoking cessation programmes and to quit.	**Data sources** Self-administered survey June 1991 (12 months after ban). **How were the participants selected?** Stratified random sample of 1949 employees sent a survey through company mail. **Population characteristics** Number: 1256 No demographic data were recorded **Intervention details** Worksite smoking ban with hypnotherapy offered to encourage quitting. In March 1990 the telephone company completely banned smoking in any company-owned or company-leased facility taking effect in July 1990. The policy was implemented through its buildings operation department to ensure distribution of information and uniform enforcement. To support smokers company offered smoking cessation programmes through Beder Health associates, a privately operated hypnotherapy group located in Boston. The hypnotherapy was offered in several formats but the evaluation focused on the single session 90 minute group seminar as the most commonly attended format. The seminar used hypnotic exercises, behavioural strategies and an audio cassette for home use. Programmes were promoted throughout the company and offered to all employees and spouses at no charge on company time before and during implementation of the worksite smoking ban. Employees could work through the programme again and a booster session was also made available. **Outcomes measured** Knowledge of the smoking ban (Survey) Compliance with the policy (Survey) Satisfaction with the policy (Survey) Job performance (Survey)	**Knowledge of the smoking ban** *OCCUPATION* At 12 month follow-up managers were more likely than nonmanagers (95.6% vs. 92.7%, p <0.05) to correctly report smoking restrictions. *GENDER* Women were more likely than men (96.4% vs. 91.3%, p<0.001) to be correct. **Compliance with the policy** *GENDER:* Females were more likely than males to report that believed people always followed the policy (49.5% vs. 26.2%, p <0.001). **Satisfaction with the policy** *GENDER & OCCUPATION* Managers were more satisfied with the policy than were nonmanagers (70.1% vs. 64.1%, p <0.01) and women than men (but data given in the table is 69.3% for men and 64.2% for women, p<0.05). **Job performance** *OCCUPATION & GENDER* Managers were more likely than nonmanagers to report that the policy made their jobs easier to do (32.8% vs. 27.3%, NS). No differences in the effect of the policy on job performance were observed by gender or age.	**Compliance with the policy** 89.3% of respondents said that people always or almost always followed the smoking policy. **Satisfaction with the policy** 66.5% of all respondents were satisfied or very satisfied with the policy. Satisfaction was highest among those who reported that the policy was always or almost always followed (69.4% vs. 43.5%, p<0.01). **Job performance** 10.7% of all respondents said that the smoking policy made it harder for them to do their job, 29.8% said it made it easier and 59.6% said it did not change their ability to do their job.

INTERVENTION: Smoking restrictions (public areas - hospital)

Study details	Methods	Stratified results	Global results
Stillman (1990)[18, 108] **Study design** Before-and-After Study (cross-sectional sample and longitudinal sample) **Objectives** To assess the effects of a policy to eliminate smoking at the Johns Hopkins Hospital **Setting** Johns Hopkins Hospital, Baltimore, US **Intervention** Total smoking ban in workplace and public areas **SES outcomes reported** Age, gender, education and occupation **Authors' conclusions** [18] The findings suggest that visible smoking and environmental tobacco smoke exposure can be markedly decreased by instituting a policy eliminating smoking in a large medical centre. [108] Physicians and nurses agreed with establishing a smoke-free environment but disagreed over the efforts needed to maintain the smoke free environment. Quitting behaviour was not influenced by pre-ban attitudes.	**Data sources** Surveys. Initial survey: Nov - Dec 1987 (2 months pre-ban). Post-ban survey: Jan 1989, approx 6 months after policy implementation. Self administered questionnaires (taking approx 15mins to complete). Observations of employee and visitor smoking activity. Cigarette remnant counts and hospital fires monitors. Atmospheric Nicotine Vapour: Nicotine monitors used to document changes in environmental tobacco smoke (ETS). **How were the participants selected?** All employees within institution were sent surveys at baseline; Only those who had completed first survey and still on payroll included in second survey (n=8742). **Population characteristics** [18] Included Employees, patients and visitors. N= 8742 (surveyed), 5190 (with baseline data), 2877 (with baseline and follow-up data); approximately 73% female; greater than high-school education 68.9% (baseline) and 72.7% (follow-up). [108] Nurses & Physicians only. N=1,008 (nurses), 688 (physicians); Nurses Female 96.1%; Male 3.9%; Physicians Female 22.6%; Male 77.4%;: 81% had Bachelors degree or higher (all had professional qualifications). Mean (SD) age 31.9 (8.4) Nurses, 36.4 (8.8) Physicians. Smoking prevalence pre-ban: 16.4% (Nurses), 4.6% (Physicians). **Intervention details** Total smoking ban to eliminate smoking in all areas of hospital. Previous policy (described in [7] allowed smoking in all designated areas of all cafeterias, waiting areas, lounges, most patient areas, work areas and offices, except the Children's Centre. Smoking also persisted among visitors, patients and staff in nondesignated areas throughout institution. In 1987 Board of Trustees of Hospital voted to eliminate smoking as of 1 July 1988 in all areas of hospital complex involving 24 buildings. A steering committee composed of representatives from all major depts formed to implement smoke-free environment. Policy officially announced in January 1, 1988 and followed by	**Smoking prevalence** *OCCUPATION* Job Category: Statistically significant reductions in both prevalence and average number of cigarettes smoked per day (at work and at home) were observed in all employee groups (physicians, nurses, clerical, service, supervisory and other health related occupations, e.g. dieticians). Service workers had the highest self-reported smoking prevalence (34.6% at baseline, 27.3% at follow-up), whereas physicians had lowest self-reported smoking prevalence (5.5% at baseline, 2.7% at follow-up). Supervisors reported smoking the most cigarettes per day and nurses the least, both before and after the policy. [108] A reported decrease in prevalence was found at follow-up, with a decrease from 4.6% to 2.1% of physicians ($p<0.03$) and a decrease from 16.4% to 11.7% ($p<0.001$) of nurses classifying themselves as smokers. **Smoking cohort quit rates** *EDUCATION* [18] Educational level was a significant predictor of quitting ($p=0.02$ univariate analysis, $p=0.006$ multiple regression). Those with a doctorate were more likely to quit smoking (50%) compared with those with a college/masters (22%) or less than high school education (16%). [108] Educational level was not found to predict quitting behaviour (although this study was of physicians and nurses only, who all had relevant health care qualifications). *OCCUPATION* [18] Occupation was not assessed in relation to quitting. There was no difference between those who worked full-time or part-time in the numbers who quit (23% vs. 20%). [108] Occupation was a significant predictor of both overall and long-term quitting with physicians being more likely to quit than nurses (OR 3.9, $p<0.03$ for overall; OR 7.3, $p<0.009$ for long-term quitting). *GENDER* [18] Gender was not associated with quitting, 20% of men and	**Smoking prevalence** During the year between surveys, the reported cross sectional smoking prevalence declined by 25%, from 21.7% to 16.2% ($p=0.0001$). Of those who continued to smoke the average no. of cigarettes reported smoked per day declined by 20%, from 16.4% to 13.1 ($p=0.001$). The number smoked during working hours declined from 7.8 to 3.8 ($p=0001$). **Smoking cohort quit rates** [18] Self-reported sustained quitting rate in respondents in year between surveys was 20.4% (91/446). In the worst-case scenario assuming all of remaining nonrespondents to the original survey continued smoking the quitting rate would be 10.1% (91/990). Exclusion of pre-policy smokers with self-reported non-smoking status of <3month altered quit rates to 81/446,(18.2%); 81/899 (9.0%). **Smoking attitudes** [108] Smoking Status (Never, Current & Former smokers): Pre-ban smoking related attitudes among current, never and former smokers were significantly different on all but one of the attitude statements ("Smokers are not able to control their smoking at work". Current smokers disagree more strongly with implementation of a smoking policy in general and specifically toward a policy at the hospital (both $p<0.001$). Current smokers were also more negative about enforcement of the smoking ban; No difference in attitudes among the groups regarding ability to control smoking at work with the majority of respondents feeling that smokers could control their behaviour.

	extensive internal media and educational campaign. To prepare for policy change, large scale and comprehensive health oriented campaign emphasised effects of passive smoking, included free health checks beginning 6 months prior to implementation. Multicomponent 8-week smoking cessation groups, quit clinics and individual counselling, self help manuals provided free to all employees. **Outcomes measured** Smoking prevalence (Survey) Smoking cohort quit rates (Survey) Smoking attitudes (Survey)	16% of women reported quitting. [108] Gender was also not a predictor of quitting. *AGE* [18] Age was associated with quitting in the univariate analysis (p=0.03) with smokers aged 20 to 29 (32% quit) and aged 50 or over (27% quit) being most likely to quit, compared with those aged 30 to 39 (16% quit) and 40 to 49 (17% quit). However this result was not seen in the multiple regression model where age was no longer a significant predictor. [108] Age was a significant predictor of both overall (p<0.01) and long-term quitting (p<0.01), indicating a higher probability of quitting with increasing age. (Mean age of sample was approximately 32, quitting results were not reported separately for younger and older participants) **Smoking attitudes [108]** *OCCUPATION* Smoking attitudes by occupation: Significant differences between physicians and nurses on all but one of the attitudinal statements ("Smoke from someone else's cigarette is unhealthy for non-smokers"). Physicians had higher agreement rates than nurses for the following statements: "a hospital should be smoke-free", "I would like this hospital to become smoke-free", "cigarette smokers are addicted to cigarettes", "with a smoking ban in place employees should encourage visitors to put out cigarettes (same comment also for other employees)". Nurses had higher agreement rates than physicians for the following statements: "a ban on smoking would be unfair to smokers", "smokers are not able to control their smoking at work", "employees working in areas away from patient care should be able to smoke". In multiple regression analysis occupation (nurse or physician) was a predictor of the differences on 4 of the 9 attitude statements. *AGE* Age was also a predictor of attitudes with those aged 34 or younger being more likely to agree that passive smoking was a health risk, and those over 34 being more likely to agree that smokers were unable to control their smoking at work.	

INTERVENTION: Smoking restrictions (bars, restaurants)

Study details	Methods	Stratified results	Global results
Tang (2003)[19] **Study design** Post-intervention Study (cross-sectional samples) **Objectives** To examine patron responses to a California smoke-free bar law **Setting** California, US **Intervention** Smoking Free Bar law (restrictions in Bars and Restaurants) **SES outcomes reported** Gender, age, education and income **Authors' conclusions** "California bar patrons increasingly support and comply with the smoke-free bar law".	**Data sources** 3 cross-sectional telephone surveys. Survey 1: March 1998, 3 months post implementation of law; Survey 2: August 1998, 8 months post intervention; Survey 3: June 2000 2.5yrs post intervention. Conducted in English & Spanish. Same survey instrument for each survey except the two questions regarding alcohol use during bar visit excluded in 3rd survey. **How were the participants selected?** Computer-assisted telephone surveys on behalf of California Department of Health using random-digit dialling to create new samples of both listed and unlisted California residential telephone households for each survey. Each household identified a respondent aged 21 or older. The first eligible respondent who had visited a bar at least once in the past year was asked for an interview. Sample size: Survey 1 – 1001; 2: 1020; 3: 1000 **Population characteristics** *Age* Age 21-29 (Survey 1) 27.4%; (Survey 2) 28.2%; (Survey 3) 26.1%; Age 30-39 (1) 25.5%; (2) 28.7%; (3) 22.4% Age 40-49 (1) 20.3%; (2) 19.3%; (3) 22.9% Age 50-59 (1) 15.1%; (2) 12.2%; (3) 16% Age 60+ (1) 11.7%; (2) 11.6%; (3) 11.6% *Gender:* Male (1) 52.2%; (2) 54%; (3) 51.1% Female (1) 47.8%; (2) 45.9%; (3) 48.9% *Ethnicity* Hispanic (1) 18.1%; (2) 17%; (3) 21.2% Non-Hispanic-White (1) 67.4%; (2) 67.3%; (3) 62.9% Non-Hispanic Black (1) 5.3%; (2) 5.2%; (3) 6.2% Asian/Other (1) 9.2%; (2) 10.6%; (3) 9.7% *Educational level:* =/<High School Graduate (1) 22.5%; (2) 22.4%; (3) 25.7% Some college (1) 38.4%; (2) 38.1%; (3) 32.4% =/> College students (1) 39.2%; (2) 39.5%; (3) 41.9% *Household income* =/<20,000 (1) 13.2%; (2) 11.2%; (3) 13.2% 20,001 to 40,000 (1) 25.3%; (2) 27.3%; (3) 24.3% 40,001 to 60,000 (1) 25.6%; (2) 24.6%; (3) 21.2% 60,001 to 80,000 (1) 15%; (2) 16.3%; (3) 15.9% =/>80,001 (1) 21%; (2) 20.7%; (3) 25.4%	**Approval of the law** All results are reported as OR (95% CI); *p<0.05; **p<0.01; ***p<0.001 *EDUCATION, INCOME, GENDER, AGE, OTHER* Respondents who approved of the law were more likely to be female, younger, more highly educated. Educational level: ≥ college graduate 1.34 (1.11 to 1.62)** compared to ≤High school Household income $: ≥60,001 1.22 (1.00 to 1.47)* compared to ≤20,000 Gender: Male 0.98 (0.82 to 1.61) compared to female (not significant) Age: 21-29 yrs 1.82(1.42 to 2.34)***; 30-39 yrs 1.52 (1.20 to 1.92)***; 40-49 yrs 1.36 (1.06 to 1.74)**; compared to ≥60 yrs **More likely or no difference of bar visiting** *EDUCATION AND INCOME* Patrons with higher income, educational attainment (data not reported) tended to report they were "more likely" to visit bars or to report "no change" in their patronage. Education – OR not reported Income: ≥$60,001 1.37 (1.04 to 1.81)* compared to ≤20,000 **Personal non-compliance with the law** *AGE* Smokers in 21-29 yrs" and 50-59 yrs age groups more likely to violate the law by smoking inside. Age: 21-29 yrs 2.46 (1.55 to 3.90)**; 50-59 yrs 2.42 (1.32 to 4.45)** compared to >/=60 yrs **Perceived non-compliance with the law** *INCOME, GENDER, AGE*	**Approval of the law** All results are reported as OR (95% CI); *p<0.05; **p<0.01; ***p<0.001 Respondents who approved of the law were more likely to be non-smokers, patronise restaurants or hotel-connected bars or to be less frequent bar patrons. Smoking status: Current smoker 0.17 (0.14 to 0.21) *** compared to non-smoker. Type of bar: Stand alone bar 0.71 (0.55 to 0.91)** less likely to approve; Restaurant/Hotel bar 1.26 (1.03 to 1.53)** More likely to approve. Frequency of bar visiting: =/<once a month 1.27 (1.03 to 1.59)*; compared to >/= once a week; Compared with respondents to 1st survey, a higher % of respondents to the 3rd survey reported that they were "more likely" to visit bars or that there would be "no change" in their visiting intentions now that smoking was banned in bars 1.76 (95% CI 1.29 to 2.4)**. However there was no significant difference on this variable between the 1st and 2nd surveys. After controlling for other factors, respondents to the 2nd & 3rd surveys were more likely to approve of the smoke-free bar law compared to respondents to the first survey. 3rd survey 1.95 (95% CI 1.58 to 2.40)*** was larger than for the 2nd survey 1.45; (95% CI 1.18 to 1.78)*** suggesting bar patrons were more likely to approve of the smoke-free bar law in the 3rd survey than in the 2nd. Compared with respondents to 1st survey, respondents in 3rd survey more likely to agree that it is important to have a smoke-free environment inside bars 1.58 (95%CI 1.27 to 1.97) ***. There was no significant difference on this variable between the second and first surveys. **More likely or no difference of bar Visiting**

	Health conditions affected by smoking: Yes: (1) 24.5%; (2) 23.9%; (3) 29.3% No: (1) 75.5%; (2) 76.1%; (3) 70.7% Frequency of bar visiting, type of bars, and staying time per visit not extracted. **Intervention details** In 1994 California legislature passed a Bill banning smoking in "virtually" all indoor workplaces. On 1 January 1998 – law came into effect banning smoking in "practically all bars". In 1998 California Tobacco Control program launched campaign to introduce new law, focused on changing social norms regarding tobacco use through media and other educational efforts (No other details provided). **Outcomes measured** Approval of the law (Survey) Likelihood of visiting a bar (Survey) Personal and perceived compliance with the law (Survey)	Patrons who perceived non-compliance with the law were more likely to be aged between 21 and 29yrs, be male. Patrons with an income =/>60,000, or visiting restaurant/hotel bar were less likely to perceive non-compliance. Age: 21-29yrs 1.38 (1.13 to 1.70)** compared to ≥60 yrs Gender: Male 1.23 (1.02 to 1.47)*; Income: ≥$60,001 0.77 (0.63 to 0.95)* compared to ≤20,000	Patrons with health problems affected by smoking tended to report they were "more likely" to visit bars or to report "no change" in their patronage. Health Condition: Yes 1.64 (1.16 to 2.32)** compared to no health condition. **Personal non-compliance with the law** Stand alone bar patrons were also more likely to smoke in bars. Smokers who stayed in bars >2hrs were less likely to smoke inside. Type of Bar: Stand-alone bar 1.84 (1.16 to 2.92)** Length of stay: <30 minutes 1.27 (1.02 to 1.59)* compared to >/=2 hours. Of the 3 surveys 21.2% reported smoking inside the bar during their last visit. In both 2nd and 3rd surveys about 25% of smokers reported smoking inside but this % decreased in 3rd survey to 14%. The change persisted after controlling for other factors. (0.50; 95% CI 0.30 to 0.85)** **Perceived non-compliance with the law** Perceived non-compliance rate (patron observed smoking inside bar during his or her last visit) was about 30% in first 2 surveys but only about 20% in 3rd survey. After differences among types of bars controlled for this difference was still significant. (0.63; 95% CI 0.50 to 0.80)**

INTERVENTION: Smoking Restrictions: Legislation implementing smoking ban

Study details	Methods	Stratified results	Global results
Waa (2005)[20] **Study design** Before-and-After Study (cross-sectional samples) **Objectives** To assess direct or indirect impacts of the amended Smoke-free Environments (SFE) Act 1990 which extended smoking bans to all indoor workplaces with effect from December 2004 **Setting** Workplaces, New Zealand **Intervention** Indoor smoking ban **SES outcomes reported** Ethnicity **Authors' conclusions** The authors concluded that the study supported the effectiveness of workplace smoking bans in reducing second hand smoke exposure. However Maori were the most likely group to be exposed to SHS in the workplace, suggesting that the impact of smoking bans may not have been equitable for Maori. Patronage of hospitality venues did not appear to decrease with non-smoker patronage increasing. Levels of support for smoking bans in bars and restaurants increased following the bans with smokers being less	**Data sources** Cross-sectional surveys. Surveys carried out in early 2003, 2004 and 2005. For each survey, data from the Maori and General Population samples were combined to create a single data set. Data relating to the general population was weighted by age, ethnicity and smoking status according to frequencies for the 2001 census and Tobacco Facts 2002 (Ministry of Health 2002). Data relating to the Maori sample was weighted by smoking status and age only. **How were the participants selected?** For the 2003 and 2004 surveys the general population samples were obtained using a random digit dialling process using the Computer Assisted Telephone Interviewing (CATI) system. The 2005 general population sample was obtained using a predetermined list of private household numbers provided by Telecom New Zealand. The Maori samples were derived from electoral roll data, randomly selected and their names and addresses telematched to all landline numbers where there was a higher than average probability of contacting a Maori person. Numbers were then randomly selected from the list and contacted by interviewers. For the 2003 and 2004 surveys interviewers asked to speak to the person who was present in the household at the time of the call with the next birthday. In 2005 interviewers asked to speak to the person in the household with the next birthday. If this person was not present at the time of the call the interviewer arranged a call back time. To be eligible for the surveys participants had to be at least 15 years of age, have sufficient comprehension of the English language, meet quota requirements (gender to reflect male / female distributions in populations of interest), age (to reflect age distributions of 2001 census) and self-identify as Maori for the Maori sample **Population characteristics** General population and Maori population Smokers were defined as people who reported smoking at least once a month. Non-smokers were defined as people who reported smoking less often than monthly and included those participants who had quit smoking or who had never smoked.	**Level of approval for smoking bans in bars** *ETHNICITY* 2004: All respondents Approve 61.7% (59.8-63.6), Neither 6.6%(5.6-7.6), Disapprove 30.0% (28.3-31.8); Maori Approve 62.7% (59.7-65.7), Neither 7.5%(5.8-9.2), Disapprove 28.5% (25.7-31.3) 2005: All respondents Approve 75.2% (73.5-76.9), Neither 2.1%(1.5-2.7), Disapprove 21.9% (20.3-23.6); Maori Approve 75.2% (72.6-77.9), Neither 2.0%(1.1-2.9), Disapprove 22.1% (19.6-24.6) The only group who increased in disapproval in 2005 was smokers (data not extracted). **Exposure to SHS in indoor workplaces** *ETHNICITY* 2003: All working respondents 20.2% (18.8-22.4); Non-smokers 16.7% (14.4-19.1); Current smokers 35.4% (29.5-41.3); Maori 26.6% (23.7-29.5); Non-Maori 19.4% (15.4-23.4). 2004: All working respondents 21.0% (19.1-22.9); Non-smokers 20.2% (18.0-22.4); Current smokers 23.4% (19.9-27.1); Maori 18.5% (15.6-21.4); Non-Maori 21.4% (18.9-23.9). 2005: All working respondents 8.9% (7.6-10.2); Non-smokers 7.5% (6.0-9.0); Current smokers 13.2% (10.1-16.3); Maori 11.2% (9.0-13.4); Non-Maori 7.2% (5.5-8.9). **Level of approval for smoking bans in restaurants** *ETHNICITY* 2004: All respondents Approve 71.7% (69.9-73.5), Neither 5.8% (4.9-6.7), Disapprove 21.6% (20.0-23.2); Maori Approve 71.3% (68.5-74.1), Neither 6.9% (5.3-8.5), Disapprove 21.0% (18.4-23.6); 2005: All respondents Approve 81.2% (79.6-82.8), Neither 2.0%(1.4-2.6), Disapprove 16.3% (14.8-17.8); Maori Approve 80.1% (77.7-82.6), Neither	

supportive than other groups. A number of positive direct and indirect impacts associated with the amended SFE Act were identified, for example belief in information regarding risks of SHS exposure increased following the ban, social cued smoking decreased and exposure to SHS in homes was observed to decrease. Negative impacts were largely absent.	**Year 2003 - Maori** Number: 500 Gender: NR Ethnicity: 100% Maori Occupation: In paid employment 63% Income: <$10,000 4.7%, $10,000-$20,000 6.3%, $20,001-$30,000 16.3%, 30,001-$50,000 29.5%, $50,001-$70,000 8.8%, $70,000-$100,000 3.8%, $100,000 plus 4.4%, Refused 26.2% Other: Current smokers All 25.3%, M NR, F NR **Year 2003 – General population** Number: 1502 Gender: 50%M, 50%F Ethnicity: Maori 6.4%, NZ European 81.6%, Pacific peoples 3.2%, Asian / Indian 6.7%, Other 2.1% Occupation: In paid employment 62.6% Income: <$10,000 5%, $10,000-$20,000 10.3%, $20,001-$30,000 16.2%, 30,001-$50,000 29.5%, $50,001-$70,000 13.6%, $70,000-$100,000 6.4%, $100,000 plus 5.2%, Refused 13.8% Other: Current smokers All 21.2%, M 19.6%, F 16.2% **Year 2004 - Maori** Number: 931 Age: 15-66+ Gender: 49%M, 51%F Ethnicity: 100% Maori Occupation: In paid employment 67.9% Income: <$10,000 11.5%, $10,000-$20,000 13.0%, $20,001-$30,000 14.2%, 30,001-$50,000 24.7%, $50,001-$70,000 15%, $70,000-$100,000 4.5%, $100,000 plus 2.6%, Refused 14.5% Other: Current smokers All NR, M 22.7%, F 31.6% **Year 2004 – General population** Number: 1500 Gender: 50%M, 50%F Ethnicity: Maori 7.5%, NZ European 76.8%, Pacific peoples 3.7%, Asian / Indian 6.1%, Other 5.9% Occupation: In paid employment 62.2% Income: <$10,000 10.4%, $10,000-$20,000 14.3%, $20,001-$30,000 14.0%, 30,001-$50,000 22.9%, $50,001-$70,000 11.5%, $70,000-$100,000 6.5%, $100,000 plus 4.4%, Refused 16% Other: Current smokers All 21.7%, M 20.4%, F 16.4%	2.9% (1.9-3.9), Disapprove 16.7% (14.4-19.0); The only group who increased in disapproval in 2005 was smokers (data not extracted).	

	Year 2005 - Maori Number: 1024 Gender: 50.6%M, 49.4%F Ethnicity : 100% Maori Occupation: In paid employment 74.7% Income: <$10,000 13.1%, $10,000-$20,000 13.9%, $20,001-$30,000 19.4%, 30,001-$50,000 27.6%, $50,001-$70,000 11.1%, $70,000-$100,000 4.7%, $100,000 plus 2.2%, Refused 8% Other: Current smokers All NR, M 33.6%, F 29.1% **Year 2005 – General population** Number: 1503 Gender: 49.9%M, 50.1%F Ethnicity: Maori 8.2%, NZ European 84.0%, Pacific peoples 2.1%, Asian / Indian 4.2%, Other 1.5% Occupation: In paid employment 67.5% Income: <$10,000 12.4%, $10,000-$20,000 14.2%, $20,001-$30,000 14.7%, 30,001-$50,000 24.1%, $50,001-$70,000 14.9%, $70,000-$100,000 5.1%, $100,000 plus 4.4%, Refused 10.2% Other: Current smokers All 25.1%, M 22.8%, F 18.5% No other demographic data were recorded **Intervention details** To extend indoor smoking bans to include all workplaces. Legislation for smoking bans in New Zealand workplaces has existed since 1990 with the passing of the Smoke-free environments (SFE) Act 1990. The Act banned tobacco advertising, sales to minors and smoking in a number of indoor work settings. Minor amendments were made to the Act in 1993 and 1997. Smoking bans specified within the original Act mainly covered office work places and settings such as industrial sites and hospitality venues were not included. Following a Private Members Bill, a report from the Health select Committee (2003) and debate in parliament the SFE Act was amended in December 2003 and included an extension on indoor smoking bans to include all workplaces. The amendment came into force in December 2004. **Outcomes measured** Level of approval for smoking bans in bars (Survey) Exposure to SHS in indoor workplaces (Survey) Level of approval for smoking bans in restaurants (Survey)		

INTERVENTION: Smoking restrictions (schools)

Study details	Methods	Stratified results	Global results
Kumar (2005)[23] **Study design** Post-intervention Study (cross-sectional sample) **Objectives** Examines the association between school policies regarding monitoring student behaviour, severity of action taken for infraction of policies, and tobacco use by staff, and student smoking behaviour and attitudes **Setting** National Survey (from Monitoring the Future Project), US **Intervention** School smoking policies **SES outcomes reported** Outcomes stratified by school grade **Authors' conclusions** Study suggests that schools cannot successfully prevent cigarette use by punitive measures alone; instead they need to take a more proactive role in promoting healthy behaviours.	**Data sources** Monitoring the Future (MTF) project conducted by Institute for Social Research at University of Michigan. Self completed questionnaires. Administrators of schools contributed data on school policy, programmes and practices. Uses survey data from 1975 onwards. **How were the participants selected?** National sample: 3 stage – geographic, school and students within school (class). No other details presented. **Population characteristics** Number: Middle Schools =126, 14,125 students; high schools; =216, 21,621 students) No other demographic data were recorded. **Intervention details** Policies varied between schools. Elements included monitoring of cigarette use in school and punitive measures for violation of cigarette use policies. School policy regulating tobacco use by staff also varied. **Outcomes measured** Smoking prevalence (Survey) Daily cigarette use in past 30 days (Survey) Disapproval of cigarette use (Survey)	**Smoking prevalence** *AGE (in terms of school)* A significantly higher % of high school students (17%) than middle school students (7%) reported that they smoke one or more cigarettes per day in past 30 days ($p<0.001$). An additional 8% of middle school students and 11% of high school students smoked in past 30 days but <1 cigarette per day. **Effect of school policies on students' daily use of cigarettes** *AGE (in terms of school)* The level of monitoring in the school was negatively significantly related to cigarette use among middle school students ($p<0.001$) but not among high school students (ns). **Cigarette smoking in past 30 days** Monitoring student behaviour was a negative predictor of any cigarette use in past 30 days (-0.14, $p<0.058$) among middle school students. When school and student demographic characteristics included in the model severity of consequences for infraction of school policies was not a significant predictor of any cigarette use in the past 30 days. **Disapproval of cigarette use** *AGE (in terms of school)* Neither monitoring of students' behaviour or severity of consequences for violating school tobacco policy had a significant effect on middle school or high school students' attitudes towards cigarette use. In middle schools where staff were permitted to smoke, student disapproval of cigarette use was significantly lower ($p<0.05$). This relationship became insignificant when other student and school demographic characteristics were included in the analysis. In high schools where staff were permitted to smoke, student disapproval of smoking was significantly lower, even after controlling for student and school demographic characteristics ($p=0.05$).	

INTERVENTION: Smoking restrictions (school)

Study details	Methods	Stratified results	Global results
Thrush (1999)[24] **Study design** Controlled Before-and-After Study (longitudinal sample with some new participants at each wave) **Objectives** To evaluate the impact of two school-based interventions to reduce smoking prevalence among 8-13 year olds **Setting** Schools within Surrey, UK **Intervention** Smoking policy in school **SES outcomes reported** Outcomes reported by gender **Authors' conclusions** Authors conclude that the effects of both interventions on sample were small and had only limited impact over the period of the study. Neither intervention was successful in changing boys smoking behaviour and one only slightly so in altering their stated intentions about future smoking (theatre); for girls, the effects were reversed, with both having a weak effect on behaviour and none on intention.	**Data sources** Self completed questionnaire included demographic, intra individual and social influence factors. Biochemical sample: saliva. Collected in order to encourage children to report their behaviour accurately. But it was not measured or assessed. Wave 1 = June 1994 Wave 2 = Sept 1994 Theatre intervention & introduction of policy Wave 3 = Jan 1995 (post intervention) Wave 4 = Sept 1995 Second Theatre intervention (continuation of policy) Wave 5 = Jan 1996 Waves 1 and 2 combined to form pre-intervention data. **How were the participants selected?** All schools sampled within Education area; and allocated by researchers to one of three groups: Control Group: State schools in one district (2 secondary, 10 primary); Two districts randomly assigned schools to either Smoking Policy or Theatre in Health Education. **Population characteristics** **Smoking Policy** Number: (All) n=4,970 Gender: male = 2,550; Female n=2,420 Ethnicity: Predominantly white Three cohorts aged between 8 and 13; Pre-intervention sample: Year 4 (8-9yrs); Year 5 (9-10 yrs); Year 6 (10-11yrs); Post intervention sample: School years 6,7 and 8 No other demographic data were recorded. **Intervention details** *Intervention 1:* School Smoking Policy: Each policy was unique, varying in content and implementation dependent upon requirements and constraints of the school concerned, each would incorporate decisions about designating and monitoring smoke-free premises, sanctions and discipline, employment policy and curriculum development and smoking cessation support. Policies for each school in relevant condition to be agreed by a working party comprising school personnel and HPU officer.	**Smoking behaviour** *GENDER* For males the addition of intervention group did not improve the logistic regression model significantly suggesting negligible impact of the interventions on smoking behaviour. For females the interventions appeared to have a weak effect ($p<0.05$). **Psychological variables** Girls' knowledge about health risks from smoking were 88.7% of School Policy group maintaining or gaining high levels of knowledge with the equivalent figures for Theatre and the Control group being 84.2% and 82.6% respectively. **Non-smokers' intentions to smoke or to maintain non-smoking status** *GENDER* Sequential logistic regression models fitted to assess impact of interventions on non-smokers' intentions at Wave 5. For males the addition of intervention group yielded a significant improvement in model fit ($p<0.05$). This improvement attributable to exposure to Theatre intervention only ($p<0.05$, partial $r=-0.09$) though this effect must be regarded as weak as proportion of correctly classified individuals remains effectively unchanged. For females there is no effect for either intervention (change in log likelihood ns though the model as a whole fits well ns). This suggests that intentions are largely unchanged by exposure to the interventions. With regard to the intentions of smokers, the figures were too small to permit sensible inferential analysis (ns=26 and 15 for males and females in the three groups combined). **Prior experience of smoking** *GENDER* After excluding those who have already tried a cigarette prior to interventions, a contingency table of prior experience at Wave 5 against intervention condition yielded a significant effect of the interventions for females ($p<0.05$). For males, the equivalent analyses were non significant.	**Smoking behaviour** No strong impact for either intervention was detected on reported behaviour. **Prior experience of smoking** For the Theatre group, 14.2%(39/274) had tried a cigarette since the intervention started with equivalent figures for the School Policy group being 16.1% (50/310) and for the main control group, 26.3% (35/133). The figures suggest an improvement attributable to both interventions.

	Intervention 2: Theatre in Education/Theatre in Health Education - Theatre company specialising in devising and performance was commissioned by Health Promotion Unit (HPU) to provide a programme to be delivered to schools in the treatment group. Staff from the HPU work with theatre group. Primary aim to use theatre and drama to create a wide range of learning opportunities across whole curriculum. Programme entitled "What a Drag!" with resource packs. *Control:* No details. Study implies no intervention. **Outcomes measured** Smoking behaviour (Questionnaire): Psychological variables (Questionnaire) Non-smokers' intentions to smoke or to maintain non-smoking status (Questionnaire) Prior experience of smoking (Questionnaire)		

INTERVENTION: Smoking restrictions (schools)

Study details	Methods	Stratified results	Global results
Trinidad (2005)[25] **Study design** Before-and-After Study (cross sectional samples) **Objectives** To examine trends to the extent to which students believed their peers and teachers complied with the school-smoking ban and support for the ban **Setting** California, US. **Intervention** Smoke-free campuses in schools **SES outcomes reported** Age for smoking prevalence and attitudes **Authors' conclusions** Authors conclude that this study contributes to tobacco control objectives by identifying the some factors associated with student support of smoke-free school grounds and also highlights how smoking behaviours of teachers convey a strong message to students who smoke, which affects their support for smoke-free school policies. Increased efforts may be necessary to communicate to teachers the importance of their modelling of appropriate behaviour.	**Data sources** Population based random digit dialled surveys conducted every 3 years as part of the California Tobacco Control Program. Years from 1993 to 2002. **How were the participants selected?** Random-digit dialled household surveys **Population characteristics** Completion response rate: 1993, 1996, 1999 from 71.2% to 80.3% (no numbers reported); 2002 analysed 5,857 adolescents. Age between 12 and 17 yrs. Mean age 14.4 yrs old (12-14 yrs 52.1%; 15-17yrs 47.9%). Gender: 51.6% males (approx); Ethnicity: 7.5% African American; 13.7% Asian/Pacific Islander; 36.4% Hispanic/Latino; 37.2% White; 5.2% other. Private schools: 11.6%; No other demographic data were recorded. **Intervention details** Part of TUPE (Tobacco Use Prevention Education program) – to apply for funding schools had to implement a policy completely banning smoking on campus for everyone (pupils and teachers). *Definitions of "smoker"* Questions: "Have you ever smoked a cigarette?", "No" = non-smokers; "yes" asked following question "Think about the last 30 days. On how many of these days did you smoke?". Answer "yes" to ever smoking question but did not smoke in last 30 days were also considered non-smokers. Those who answered "yes" to ever smoking question and smoked in last 30 days considered current smokers. Current smokers asked: "Have you smoked at least 100 cigarettes in your life?". If "yes" were considered established smokers, "no" were considered experimenters. **Outcomes measured** Obeying the rule not to smoke (Survey) Students preferences for smoke-free school grounds (Survey) Factors associated with student preference for a smoke-free school environment (Multivariate analysis).	**Trends in students obeying the rule not to smoke, 1993 to 2002**: *AGE (all adolescents)* A decline from 43.7 +/- 1.6% in 1993 to 40.7% +/- 1.4 in 1996 for the percentage of adolescents who perceived that most or all students obey the rule not to smoke on school property. This figure increased significantly to 66.7% +/- 1.5% by 1999 and to 71.5 +/- 1.4% by 2002. When broken down by smoking status: Non-smokers: A slight decline from 45 +/- 1.8% in 1993, to 41 +/- 1.6% in 1996; increasing significantly to 67.5 +/- 1.5% by 1999 and to 72.2 +/- 1.3% by 2002. Adolescent current smokers: 34.1 +/- 5.1% in 1993 perceived that most or all students obeyed the rule not to smoke on school property. After a non-significant increase to 37.4 +/- 4.5% in 1996, the percentage increased to 56.9 +/- 5.8% by 1999 and remained relatively level at 57.7 +/- 6.6% in 2002. **Trends in student preferences for smoke-free school grounds, 1993 to 2002.** *AGE (all adolescents)* Supported imposition of a policy prohibiting smoking at any time on school grounds, 1993 & 1996 approx 84% 1999: 89.2 +/- 0.8% 2002: 90.5 +/- 0.9% Current smokers (any smoking in past 30 days): 1993: Approx 55 (read from graph). 1996 : 55.8% +/- 4.7%; 1999: Approx 65% (read from graph) 2001: 69.1 +/- 6.8%; Non-smokers (Figures read from graph) 1993 & 1996: Approx 85% 1999 & 2000: Approx 90%	

		Factors associated with student preference for a smoke-free school environment: *AGE (all adolescents)* Current smokers 0.30 times as likely to favour smoke-free school grounds (OR=0.30, 95% CI 0.20 to 0.46) compared to non smokers. Those who perceived that most or all students who smoked obeyed the school no-smoking rule were 1.53 times more likely to favour a school smoking ban than those who did not (OR=1.53, 95% CI 1.21 to 1.93). Those who believed their best friends would disapprove if they smoked daily were 2.63 times more likely to favour a school smoking ban, compared to those who did not hold this belief (OR=2.63, 95% CI 2.14 to 3.23). *AGE AND GENDER* Age group 12 to 14 and 15-17, or gender did not predict support for the ban.OR (95% CI) Age 15 to 17 when compared to 12-14 yrs: All Students 1.05 (0.84 to 1.32). Boys (compared to girls) All students 0.97 (0.77 to 1.22). Those who answered "yes" to the question of whether they had or would use a cigarette promotional item were less likely to support the ban (OR=0.65, 95% CI 0.50 to 0.84) than those who answered "no". ETHNICITY **All students (n=5767)** Hispanic participants less likely to favour school-free school grounds compared to non-Hispanic white: (OR=0.68, 95% CI 0.55 to 0.84). **Current smokers (n=296)** Participants who were classified as "Other" in terms of ethnicity were 0.37 times less likely to favour smoke-free school grounds compared to non-Hispanic other (OR 0.37, 95% CI 0.14 to 0.94).	

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Altman (1999)[26] **Study design** CRCT **Objectives** To assess effectiveness of a longitudinal community intervention on reduction of tobacco sales to minors and subsequent effects on tobacco consumption to youths **Setting** Moneterey County, California, US **Intervention** Restrictions on sales to minors – education, no enforcement **SES outcomes reported** Self-reported consumption of tobacco - stratified by school grade and gender **Authors' conclusions** Tobacco sales to minors can be reduced through a broad-based intervention. To prevent or reduce tobacco use by youths, however, multiple supply and demand focused strategies are needed.	**Data sources** Control & intervention students completed Stanford Tobacco Survey, a tobacco use prevalence and attitudinal survey (Spanish and English), pilot assessed for readability (SMOG). Time 1 to 3 saliva samples for cotinine analysis, and a random sample were analysed. Time 1: July-Dec 1991; Time 2: October-November 1992 ; Time 3: May-June 1993 (Both time 2 & 3 All 8th, 10th and 12th grade students); Time 4: May-June 1994 (All 7th, 9th and 11th grade students), these 7th graders comprised new cross sectional sample that was compared to baseline 7th graders). **How were the participants selected?** Middle schools were located in each of four communities. No other details reported. Response rate: Time 1,2, 3 :87%; Time 4 89%; (Control group had lower baseline response). **Population characteristics** Number: 2 clusters (Number of participants not reported) Gender: Intervention: Between 50 and 56% Male; 44 to 50% Female; Control: Between 50 & 53% Male; 46 to 50% female Ethnicity: Intervention: Between 88 and 91% Mexicano/Latino for each survey; Control : Between 68-72% Mexicano/Latino Education: Parental education was lower for intervention group than comparison group. No other demographic data were recorded. **Intervention details** Merchants sent letters signed by police chief. Multi-component including Community Education (press releases, newspaper articles, community forums, messages at point of purchase and involvement of community groups); Merchant education including personal visits and mailings; resolutions of support sought by political bodies. Delivered by county health department staff. Involvement of community. But could not engage Police Dept or County District Attorney in enforcement procedures so this part of intervention did not take place. Control: No intervention, just test purchases. **Duration:** Ongoing between July 91 to June 94	**Self-reported consumption of tobacco** *AGE* Significant differences in cross-sectional analyses within intervention group at each time point for each grade. Intervention effects evident among youngest students (7th graders at baseline) at times 2 and 3 but the effects were not sustained at time 4 (p values not reported). Cross sectional analysis comparing 7th graders at time 1 with 7th graders at time 4 (post-test only) showed that 7th graders in intervention communities significantly less likely to use tobacco over course of study (13.1% and 12.6%); while 7th graders in control communities significantly more likely to use tobacco (15.6% and 18.6%). No significant effects were found for 9th graders and 11th graders, except 11th grade students in control condition significantly less likely than intervention students to use tobacco at time 1 (p values not reported). According to authors although data on 9th grade students do not show statistically significant differences, trend lines are in predicted direction. *AGE, GENDER, PARENTAL EDUCATION* A repeated measures analysis using generalised estimating equations with treatment condition, time, sex, parent education and acculturation showed: 7th grade revealed significant effects for treatment condition (favouring intervention communities), time (increase in tobacco use over time) and gender (males more likely than females to use tobacco); 9th grade analysis revealed significant effects for gender; 11th grade analysis revealed significant effects for time and gender. Acculturation and parental education not significantly associated with tobacco use (p values not reported). Significant differences in cross sectional analysis of self-reported tobacco use within treatment group at each time point for each grade. Girls used tobacco less than boys at all time periods ($p<0.05$); intervention effect was evident at time 4 (girls in intervention communities used tobacco less than	

	Outcomes measured Consumption of Tobacco (Survey and and checks of cotinine level) Sources of tobacco (Survey)	girls in comparison groups p<0.05). **Sources of tobacco** *AGE* Cross sectional data on commercial sources of tobacco 3mths prior to data collection: Significant treatment effects evident among 7th graders at times 2 (p<0.001) and 3 (p<0.05) but not sustained at time 4. Significant effects for 9th graders (fewer purchases in treatment communities) were evident at time 4 (p<0.05). 7th graders in intervention communities more likely than 7th graders in control communities to report the perception that youths in their community asked other people to buy tobacco for them (significant at times 3 and 4 p<0.05 for both). At time 3 9th grade students in control community more likely than students in intervention groups to report students employed this method (p<0.05). Use of Fake IDs or stealing to obtain tobacco – data showed these practices perceived to be widespread across grade levels, communities and time (70-90%). Students in intervention communities more likely than control communities to report using these methods (p<0.05).	

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Forster (1998)[27] Blaine (1997)[109] **Study design** CRCT **Objectives** To test hypothesis that adoption and implementation of local policies regarding youth access to tobacco can affect adolescent smoking **Setting** Minnesota-St Paul metropolitan areas US **Intervention** Restrictions on sales to minors – education and enforcement **SES outcomes reported** Smoking prevalence by age and gender; Ease of obtaining cigarettes stratified by gender **Authors' conclusions** Authors conclude that the results provide encouraging evidence that efforts to limit commercial access to tobacco by youth represent an effective component of a multidimensional approach to reducing tobacco use.	**Data sources** Student survey Spring 1993 and Spring 1994 with regard to adolescent tobacco use; tobacco acquisition behaviours; perceptions about tobacco availability. University staff administered survey during school time to students grades 8 through 10. One follow-up June 1996, three years after baseline. Study reports data collected immediately following intervention. **How were the participants selected?** Inclusion criteria for communities: 90 or more students in each grades of 8,9 & 10; location outside primary Minnesota American Stop Smoking Intervention Study (ASSIST) geographic area; no recent ordinance changes regarding tobacco. **Population characteristics** Retailers; Adolescents Number: 14 clusters; Students: 1993: 6014; 1996 6269 Age: Grade 8 to 10 Gender: Baseline (ALL): Grade 8: F50.2%; Grade 9 F48.5%; Grade 10 F49% Ethnicity: Students in 1993 & 1996 survey 94% white Residence: Rural communities; approx 70% resided in town where school located No other demographic data were recorded. **Intervention details** In 1996 US Dept of Health & Human Services issued rules to implement Synar amendment requiring each state receiving federal substance abuse prevention and treatment block, grant, adopt and enforce a tobacco age-of-sale law and show progressive reductions in tobacco sales to minors. Food & Drug Administration in 1996 issued regulation designed to restrict youth access to tobacco, including requirement that retailers request id of purchasers; ban on tobacco vending machines and self-service displays in most locations; prohibition against free tobacco supplies. Various legislative moves, draft bills etc had been going through development during intervention period. Community teams planned and executed activities to raise awareness about youth tobacco access and use and to develop and demonstrate broad support for policy change.	**Prevalence of smoking among students** *AGE & GENDER* In addition to main effects models, stratified models were examined to determine whether the effects were homogenous across gender and grade. The intervention was equally effective in slowing the rate of increase in male and female students. For monthly and weekly smokers, the intervention was also equally effective across grades 8 through 10. For daily smokers there was a non-significant trend towards greater effectiveness among students. **Ease of obtaining cigarettes from a variety of sources** *GENDER:* Commercial sources: showed net decrease among students in intervention condition. There was a net decline among boys in reporting a commercial source for their most recent cigarette (net difference -12.2% (95% CI: -21.4 to -3). The trend among girls was also favourable (net difference -5% (95% CI: -14.8 to 3.9) but not statistically significant.	**Smoking prevalence** Lower net prevalence of smoking in intervention communities compared to control communities. Prevalence of daily, weekly and monthly smoking climbed sharply in control communities over course of study. Increase in intervention communities less pronounced, with net differences between intervention and control communities for: Daily smoking (net difference): -4.9% (95% CI = -9.0 to -0.7) Weekly smoking (net difference): -5.6% (95% CI = -11.7 to 0.5) Monthly smoking (net difference) : -6.7% (95% CI: -14.9 to 1.5) **Ease of obtaining cigarettes from a variety of sources** Social sources: Intervention had no effect with most students in both conditions reporting that it was easy to obtain cigarettes from family members, friends or acquaintances. The proportion of adolescents who reported at least one purchase attempt in the previous month declined in intervention communities, while it increased in control communities. This was true among students who had smoked at least once in previous month as well as among all students. All students : Intervention: 9% at baseline to 6.5% post intervention; Control: 8% at baseline to 9.9% post intervention. Smokers: Intervention: 34.9% at baseline to 23.8% post intervention); Control: 31.8% at baseline to 33.3% post intervention.

	Various methods employed including tobacco purchase attempts by underaged youth, media campaigns and letters/presentations etc. Some resources provided by research team, but local teams chose how to use these. With exception of school officials (for permission to survey adolescents) no one contacted in potential communities prior to intervention. All communities in "Tobacco Policy Options for Prevention (TPOP) study required that tobacco retailers be licensed at beginning of study. Fuller details of implementation described in Blaine 1997; The process in each community was the same but implementation varied across communities as they developed “ownership” of project. **Control** : No intervention activities. **Outcomes measured** Prevalence of smoking among students (Survey) Ease of obtaining cigarettes from a variety of sources (Survey)		

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Hinds (1992)[28] **Study design** Uncontrolled pre-post (likely 2 separate cross sectional studies) **Objectives** To assess the impact of a local ordinance designed to prevent tobacco sales to minors **Setting** Everett, Washington, US **Intervention** Restrictions on sales to minors – education and enforcement **SES outcomes reported** Regular tobacco use stratified by age and gender; Proof of age stratified by age **Authors' conclusions** Authors state this study suggests that younger students in particular and all girls in general may be affected more strongly by knowledge that sale of tobacco to minors is illegal and that enforcement of the law is likely.	**Data sources** Oct 1989 and Oct 1990 (10 months post-intervention) a one page questionnaire distributed to 10th grade students at high school. Questionnaire completed voluntarily by all students present on day of distribution. Response to questionnaire was anonymous and no individual's answers could be identified. **How were the participants selected?** 10th grade students selected due to anecdotal information suggesting substantial proportion of students used tobacco, most <18rs and most not dropped out of school. Response rate 1989 70.6%; 1990: 82.3%. **Population characteristics** Adolescents Number: 1989: 221; 1990: 279 Age: Range: 14 to 17 yrs No other demographic data were recorded. **Intervention details** Ordinance adopted in Spring 1989, implemented Jan 1990. During Spring of 1990 all retail sales sites in city were identified and notified of ordinance. Active enforcement began in July 1990 by Everett Dept of Licensing. Everett Ordinance contains several provisions: Requirement that a sign indicating that sale of tobacco to persons younger than age 18 is illegal be posted at all points of retail sales. Tobacco vending machines can be located only in areas where they are not accessible to minors. Proof of age is required of any person attempting to purchase tobacco if he or she is not clearly older than age 18. A local license is required for all vending machines as well as any over the counter sales of tobacco products and violations will result in suspending and revocation of the license, civil penalties, or both. **Outcomes measured** 10th grade students reporting regular tobacco use (Questionnaire) Type of tobacco used (Questionnaire) Attitudes (Questionnaire) Asked for proof of age when attempted to buy tobacco products at stores (Questionnaire)	**10th grade students reporting regular tobacco use** *AGE AND GENDER* Pre-Intervention :1989 Users: Ages 14-15: 31 (22%) Ages 16-17: 25 (31.3%) Boys: 25 (22.9%) Girls: 29 (26.4%) All: 56 (25.3%) (2 users did not report gender in pre survey) Post-Intervention: 1990 Users Ages 14-15: 29 (14.2%) Ages 16-17: 26 (34.7%) Boys: 39 (27.9%) Girls: 16 (11.5%) All: 55 (19.7%) Significant difference between girls pre and post (p=0.004) Borderline significance among students ages 14 to 15 (p=0.08). **Type of tobacco used** *GENDER* Only one female respondent reported using a tobacco product other than cigarettes (no details of whether this is pre or post or what product). No significant changes were reported. **Attitudes** *AGE* Pre Intervention : 60.3% of 14 to 15 yr olds and 41.3% of 16-17 yr olds agreed that it should be illegal to sell tobacco to persons <18 yrs. Post Intervention: 66.5% of 14 to 15 yr olds and 52.8% of 16-17 yr olds agreed that it should be illegal to sell tobacco to persons <18 yrs (increase on pre survey).	**10th grade students reporting regular tobacco use** Cigarettes used by 77.8% of smokers; Chewing tobacco 14.8%; Snuff 7.4% Cigarettes 75.9%; Chewing tobacco 18.5%; Snuff 5.6% **Attitudes** Pre intervention 93% indicated they believed a person can become addicted to tobacco. Post intervention 96% indicated they believed a person can become addicted to tobacco. For all ages, agreement that sales of tobacco to minors should be illegal increased between pre and post test from 53.6% to 62.8% (p=0.05). **Asked for proof of age when attempted to buy tobacco products at stores** Of attempted purchases: All: an increase from 29.3% to 61.5% asked for proof of age. Note: numbers were small of those reporting being asked for proof of age (ranging from 20 to 40 students). Also some missing responses.

		Asked for proof of age when attempted to buy tobacco products at stores Analysis restricted to users who indicated they purchased tobacco from a store. *AGE* Age 14 to 15 yrs: an increase from 35% to 65% asked for proof of age. Age 16-17 yrs: an increase from 23.8% to 57.9% asked for proof of age. (Difference between pre and post for overall figures was significant p=0.008) with younger students being asked for their age more often than older students.	

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Jason (2003)[29] **Study design** CRCT **Objectives** To test the hypothesis that the combination of tobacco sales law enforcement plus tobacco possession law enforcement would be more effective in reducing youths smoking than tobacco sales law enforcements alone **Setting** Northern and central Illinois, US **Intervention** Enforcement of tobacco possession and sales laws **SES outcomes reported** Prevalence and attitudes to policies, age and ethnicity **Authors' conclusions** The effects of the combined intervention reduced smoking rates only for white students. Attitudes among the overall non-white samples were generally more negative toward these policies.	**Data sources** Questions related to tobacco use and attitudes toward tobacco control laws; Modified from Youth Risk Behaviour Survey (Centres for Disease Control 1999); surveys developed by Jason et al (1999); surveys developed by Rigotti et al 1997; Altman et al 1999; and The Teenage Attitudes and Practices Survey (Allen 1993). Student Surveys: 1999; 2000; 2001. **How were the participants selected?** Initial random sample of 68 towns; after inclusion criteria applied, and consent refused reduced to 8 towns included in the study. **Population characteristics** Number: Schools n=15; Students: 1999: 975; 2000: 1046; 2001: 1004 Age: 6th to 8th graders Ethnicity: "Possession" towns 76% White and 24% Non-white; "Non Possession" towns 55% White and 45% non-white Residence: "Possession" and "Non-Possession" groups were separated geographically (no other details reported) Income: Mean family incomes "Possession" group mean=$37,185; Non-possession group NP group mean=$32,220 Other: Total n=8 towns; Mean population size ("Possession" group Mean=32,424; "Non possession" group mean =34,839. No other demographic data were recorded. **Intervention details** **"Possession" community (P)**: Enforcement of both tobacco possession and sales laws; In all towns smoking not allowed on school property; Possession Law Enforcement (P group): minors issued citations for possession or use of tobacco products. Police officers issued citations to fine minors caught possessing tobacco in public locations. During first year of intervention investigators worked with communities to develop or strengthen existing ordinance **"Non-Possession" Community (NP):** Enforcement of only the tobacco sales law. In all towns smoking not allowed on school property. Sales Law enforcement: both conditions enforced tobacco sales laws; Police Depts checked retailer compliance with local laws 2-3 times per year.	**Smoking prevalence** *AGE AND ETHNICITY* Student Survey: (responses: smoked cigarettes; quit, smoked occasionally, or smoked every day); Best proportional odds regression model had significant effects for grade ($p<0.01$), treatment ($p<0.01$), age ($p<0.01$), population size ($p<0.01$), treatment by ethnicity interaction ($p<0.01$) and treatment by grade interaction approached significance ($p<0.09$). When examined two treatments by grade parameters, one parameter not significant and other significant at $p<0.05$ level; parameter of significance indicated there was significant grade by treatment interaction at 7th & 8th grade levels. Overall treatment had effects on white students but not on non-white students. No P vs NP significant differences at 6th grade for either white or non-white students, was significant P vs NP differences at 7th and 8th grade levels for only white participants. Rates of "never use" of cigarettes deceased similarly from 6th to 8th grades for non-white participants; For white NP participants rates decreased 25.1% points but only 14.3% for white P participants. Occasional and everyday tobacco use increased similarly for non-whites but for white NP youth rates increased 15.6%; for white P youth, rates only increased 4.1%. For everyday use a similar pattern occurred with rates for white NPs increasing 6.8% and rates for white Ps increasing only 2%. Number of days smoked over past 30 days: (evaluated with non-parametric tests); 4 groups (P Whites, NP Whites, P non-whites, NP non-whites) at 6th grade level; then same 4 groups at 7th & 8th grade levels; only significant effects were found at 7th & 8th grade levels. Next examined P whites vs NP whites and P non-whites vs NP non-whites at 7th & 8th grade levels – only P whites vs NP whites were significantly different at 7th & 8th grade levels.	**Attitudes towards policies** With regard to whether youth in towns that have fines for possession of tobacco have negative attitudes towards the policies, significant findings were not noted. However directional findings indicated that youth in P condition compared to NP condition had generally fewer negative attitudes over time towards the policies. Significant effects did not occur among current smokers but directional findings indicated that about 2/3 of youth who were current smokers in P and NP towns generally had negative attitudes towards fines but, over time, these attitudes stayed about the same and the slight changes that occurred did indicate that P white youth decreased their negative attitudes (66.7% to 60.7%) whereas NP white youth increased their negative attitudes over time (55.5% to 65.7%).

	Outcomes measured Smoking prevalence (Survey) Attitudes towards Policies (Survey)	P intervention appears to have decreased the trajectory of cigarette use for white youth but no effects for non-white youth. When examined total number of cigarettes smoked over past month (no. days smoked x av no. cigarettes smoked per day), using non-parametric tests found similar results (whites in P condition total cigarettes over past month increased from 1.1. to 6.3 from 6th to 8th grade, whereas for whites in NP condition, total cigarettes increased from 0.4 to 27.4). **Attitudes towards policies** *AGE AND ETHNICITY* Those who disagreed or strongly disagreed with the policies increased from 6th grade to 8th grade: for white P youth from 12.1% to 16.2% and for white NP youths from 15.7% to 31.3%; for non-white P youth from 143.5% to 22.8% and for non-white NP youth from 20.6 to 35.8%.	

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Laugesen (1999)[30] **Study design** Post intervention Study **Objectives** To evaluate the effectiveness of law on under-age tobacco sales **Setting** New Zealand **Intervention** Restrictions on sales to minors – enforcement **SES outcomes reported** Access to cigarettes stratified by age and gender **Authors' conclusions** Authors conclude the results indicate major changes in cigarette purchasing behaviour between 1992 and 1997 where there was increased enforcement against underage sales of tobacco.	**Data sources** First survey 2 years after intervention (1992); Second Survey 7 yrs after intervention(1997) and shortly after amendment to law raising min age to 18yrs. Self administered questionnaires which were similar for both surveys. No details of survey instrument reported. **How were the participants selected?** Not reported. Study states schools participating made up 25% of secondary school population but no other details given. **Population characteristics** Number: 85 schools; Number of participants: 4526 (1997); 4198 (1992); Age: 14 to 15yrs. Analysis only included students who were smokers Gender: 1992:Female: 2,462; Male, 1736; 1997: Females: 2746; Males: 1780 Ethnicity: 1992:European 3,298; Maori 659; Pacific Islands 188; Asian 53; 1997: Europ 3264; Maori 800; Pacific 292; Asian 170 No other demographic data were recorded. **Intervention details** Smoke-free Environment Act 1990 included a ban on sales of tobacco products to under 16yr olds. In late 1995 the government announced increased allocation to enforce law. Amendment to Act July 1997 to raise minimum age of sales from 16 to 18yrs. Prosecution of shopkeepers occurring from 1992 onwards (not clearly stated in text). **Outcomes measured** Access to cigarettes (Questionnaire)	**Access to cigarettes** *AGE AND GENDER* Frequency of cigarette purchasing increased in males (RR 1.11 95% CI 1.03 to 1.19 adjusted for smoking frequency), in older students, in students who purchased 25 cigarette packs and those who always smoked same brand. *ETHNICITY, AGE AND GENDER* Asian students less likely to have difficulty in buying compared with all other ethnic groups (RR 0.54; 95% CI 0.37 to 0.78). Sex and age were not related to difficulty in buying.	Proportion of students who had ever had anyone refuse to sell them cigarettes due to age increased from 24.9% in 1992 to 62.3% in 1997. Proportion who had difficulty in buying cigarettes increased from 6.6% in 1992 to 27.9% in 1997. Study reports similar increases in all Health funding authority divisions with some regional differences in 1997 survey. Students who smoked up to 5 cigarettes per week were more likely to have difficulty in purchasing (RR 1.32; 95% CI 1.13 to 1.53) than students who smoked more. Students who bought cigarettes themselves had less difficulty purchasing (RR 0.41 95% CI: 0.36 to 0.46) while those who had someone else buy perceived greater difficulty in purchasing (RR 1.47 95% CI 1.31 to 1.64). Refusal of sale was also associated with greater difficulty in purchasing (RR 2.11 95% CI 1.85 to 2.40). Frequency of weekly purchasing increased between surveys. Analysis adjusted for difference between students who smoked daily and those who smoked monthly. Weekly purchasing was less frequent in students who had difficulty in purchasing compared to those who did not (31.1% vs 41.4%).

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Livingood (2001)[37] **Study design** Allocated by investigators to intervention group, data collected post intervention via questionnaire **Objectives** To assess the impact of possession enforcement on youth attitudes, perceptions and behaviours **Setting** Polk & Volusia and Citrus & Marion, Florida, US **Intervention** Restrictions on sales to minors - enforcement **SES outcomes reported** Use of cigarettes has some data on gender and ethnicity; attitudes has some data on age **Authors' conclusions** Authors report the higher enforcement counties had lower tobacco use than the lower enforcement counties. Data indicate that probable confounding variables were unlikely to have caused the differences in tobacco use that were observed between the high-enforcement counties (intervention) and the low enforcement counties (control). Other studies with heavy emphasis on the context of enforcement are required for conclusive findings. Results should not be generalised beyond this particular type of enforcement within the context of a similar comprehensive tobacco control programme.	**Data sources** Modified version of Florida Youth Tobacco Survey (FYTS). Year study commenced: 1999. Unclear how long after implementation of law survey was undertaken. **How were the participants selected?** Four counties selected based on law enforcement activity; two with highest enforcement (intervention) and two counties with lowest levels of enforcement selected as controls. The two groups were selected by the investigators, therefore, the results are likely to be biased. **Population characteristics** Intervention: Volusia and Polk, - high enforcement. Controls: Marion and Citrus Counties - lower enforcement. Number in analysis: 4163 students Gender: Whole sample: male 49.8%; Female 50.2%; Ethnicity: Whole sample: predominantly white but also 20.8% Black/African Am; 13.9% Hispanic/Latino, also other ethnic categories represented. No other demographic details were recorded. **Intervention details** Laws prohibiting possession of tobacco products. Non-criminal penalties (progressive from fine to loss of driver's licence) for purchase, possession or use of tobacco by underage youth. Enforcement activities: indication that all counties supported enforcement of law restricting sales to youth. Intervention part of larger state multi component comprehensive tobacco control intervention study. (Larger study evaluated Florida Youth Tobacco Survey (Bauer, 2000) accessed for inclusion but both population and individual level interventions assessed and outcomes not reported separately, therefore excluded). Counties: **Outcomes measured** Use of cigarettes (Survey) Attitudes to smoking and tobacco control (Survey)	**Use of cigarettes** *ETHNICITY* Main effect (differences in youth cigarette use) was clearly observed between the high enforcement (intervention) and low enforcement (control) counties within both the white and black populations. The effect (reduced cigarette use by youth) due to law enforcement most pronounced with those identifying themselves as black or African American. Blacks in high enforcement counties (Intervention, 16% black) were much less likely (7.6%) to use cigarettes in comparison to low enforcement (Control 11% black) counties where 19% reported cigarette use in past 30 days. Pattern of use (27.9%) in intervention cohort (72% white) was also lower than use (30.6%) within those identifying themselves as white in control counties (80% white). (Results not used in matrix as unable to assess whether due to intervention or not). Both ethnicity ($p>0.0001$) and grade level ($p>0.0001$) shown to be more predictive of tobacco use than possession enforcement through logistic regression analysis. **Attitudes** *AGE* Impact on younger students: law governing possession of tobacco by youth appears to affect younger students more than older students. Law and enforcement activity: In general students relatively unaware of potential penalties. Students in counties with Control groups less aware than students in Intervention counties. Perceived impact: Students in intervention counties indicated that others would definitely or probably be less likely to use tobacco because of penalties at a higher rate (39%) than students in low enforcement counties (31.5%, $p<0.001$). Similar responses to attitude questions from intervention and control communities, with 69% “definitely” agreeing that people who smoke have more friends.	Use of cigarettes highest in two control (lower enforcement) counties. Cigarette use rate in past 30 days in Marion was 29.2% and Citrus of 28.1%. (Volusia 21%, Polk 26.5%). Aggregated difference in cigarette use was statistically significant (Intervention 23.4% 95% CI 22.1 to 24.7; Control 28.5 95% CI 27.1 to 29.9). Additional analysis confirmed that cigarette use rates at both high school and middle school followed similar patterns.

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Rimpela (2004)[31] **Study design** Cross-sectional survey **Objectives** To evaluate the effects of the 1977 and 1995 tobacco sales bans on tobacco acquisition of minors **Setting** Finland **Intervention** Restrictions on sales to minors **SES outcomes reported** Purchase from commercial sources, social sources and ease of buying tobacco, stratified by age. Tobacco use, stratified by age and sex **Authors' conclusions** Sales ban appears to have permanently changed tobacco sales practices in some types of commercial outlets, decreased tobacco purchase and may have contributed to a recent decrease in smoking. The unforeseen consequence was a shift from commercial to social sources. Authors say that decrease in smoking cannot be attributed to sales ban alone as other restrictions were in place in the media etc. Recommendations for combining other health promotion activities and	**Data sources** Adolescent Health & Lifestyle Survey (AHLS) Self administered 12 page questionnaire (Postal). And SHPS – classroom survey of secondary schools at municipality level; AHLS surveyed every two years from 1977 to 2003; SHPS annually from 1996 to 2003 **How were the participants selected?** Questionnaire mailed to nationally representative sample of adolescents. Samples from Population Register Centre - All Finns born on sample days of dates included. **Population characteristics** Entire Finland population 12, 14, 16 and 18 yr olds (1977 to 2003); 8th & 9th graders (14 to 16 yr olds) 1996 to 2003. Number: AHLS 80,282; SHPS 226,681 (Note response rates vary depending on survey year) Age: 12 to 18 yrs No other demographic details were recorded. **Intervention details** Tobacco sales ban to children “apparently under age 16” introduced 1 March 1977. 1 March 1995 – amendment made change to exact age limit of 18 yrs for sales ban. In March 2000 further revision of Act required business to draw up and implement a “Plan for own control” to prevent sales to underage children. Also other control measures on advertising, prohibition of smoking in public places. Campaign for public accompanied by negotiations with retailers associations and representatives of major store chains in 1995. Finland is situated next to Estonia and Russia where tobacco sales are almost unrestricted to adolescents. Also compliance mechanisms of punishment in tobacco sales violations are limited. Retailers violating laws can only be reported to public prosecutor by local authority, which limits lay action (eg parents). **Outcomes measured** Tobacco use (Survey) Acquisition of tobacco from Social Sources (Survey) Purchase from commercial sources (Survey) Ease of buying tobacco (Survey)	**Tobacco use** *AGE and GENDER* After 1977 Tobacco Act daily smoking decreased in all age groups but the effect was short term. Daily Smokers (%) Boys Age 14yrs 1977 11%; 1979 9%; 1981 15%; 2001 13%; 2003 7% Age 16 yrs 1977 30%; 1979 25%; 1981 30%; 2001 29%; 2003 24% Age 18 yrs 1977 41%; 1979 33%; 1981 36%; 2001 33%; 2003 35% Girls: Age 14yrs 1977 15%; 1979 9%; 1981 12%; 2001 15%; 2003 11% Age 16 yrs 1977 27%; 1979 25%; 1981 25%; 2001 31%; 2003 30% Age 18 yrs 1977 32%; 1979 26%; 1981 26%; 2001 31%; 2003 36% No immediate decrease in daily smoking after 1995 ban, but between 2001 and 2003 there was a decrease among 14yr old boys (from 13% to 7%; p=0.000) and 16 yr old boys (from 29% to 24%; p=0.004) and 14 year old girls (from 15% to 11%; p=0.000) but not 16 year old girls. Daily smoking among 18 yr olds remained stable during entire period. Tobacco experimenting did not diminish after 1977 ban, but downward trend started before 1995 ban and between 2001 and 2003 decrease was significant among 14 yr old boys (56% to 47%; p=0.000) and girls (59% to 50%; p=0.000), 16 yr old boys (73% to 67%; p=0.004) and 12 yr olds (girls 23% to 12%; boys 30% to 17%; p=0.000). Among 12 yr old boys experimenting dropped from 50% (1977) to 17% (2003), while no change observed among 18 yr olds. 12 yr old girls experimenting dropped from 32% in 1977 to 12% in 2003. Other age groups for girls showed smaller difference, an 18 yr olds showed a slight increase from 79% in 1977 to 82% in 2003. Daily consumption of cigarettes did not diminish after sales bans. **Acquisition of tobacco from social sources**	

wide enough discussion on smoking and health together with tobacco sales bans.		*AGE* Purchase of tobacco from friends increased among 14 yr olds (p=0.08) between 1977 and 1979 although the change was not significant. No change observed in older age groups. Between 1995 and 1997 a significant increase in purchase of tobacco from friends among 14 and 16 yr olds (p=0.005). In 2003 48% of 14 and 32% of 16 yr old daily smokers had bought tobacco from friends. No changes observed for 18 yr olds. Purchase of tobacco for friends was measured only in 1977-79 and 1997-99. This was not common among 14 yr olds and remained unchanged during study period. Among 16 yr olds purchase for friends was more common but no change seen here for same period either. 18 yr olds reported purchasing tobacco for friends more often in 1999 than 20 yrs earlier. Proportion of 14-18 yrs olds who purchased tobacco for friends during past month with money friends gave them, by age and study year: 14 yr olds: 1977 9%; 1979 8%; 1997 10%; 1999 8% 16 yr olds: 1977 14%; 1979 17%; 1997 18%; 1999 19% 18yr olds: 1977 15%; 1979 14%; 1997 23%; 1999 26% Proportion of 14 yr olds for whom somebody else purchased tobacco increased in 1977-81. Question not included in 1985-95 survey but notable increase between 1983 and 1997 among both 14 (from 41% to 61%) and 16 yr olds (from 27% to 59%) (p=0.000) continuing after 1999. No change among 18 yr olds observed. Between 2001 and 2003 figures remained nearly unchanged in all age groups. Ways in which underage daily smokers obtained tobacco was diverse based on sample of 1,802 AHLS 1999. 2% of 14 yr olds and 3 to 5% of 16 yr olds purchased all their tobacco from commercial sources. Most used social sources (data not extracted as does not directly relate to intervention). **Purchase from commercial sources** *AGE* 1977 Sales Ban: proportion of 14 yr old daily smokers who had bought tobacco for themselves during past month decreased slightly from 87% in 1977 to 83% in 1981 (p=0.033) and no statistically significant changes in 16 and 18 yr olds not targeted by law.	

		1995 Sales Ban: downward turn in proportion of tobacco purchases among 14 (from 90% to 78%, p=0.005) and 16 yr olds (from 94% to 78%, p=0.000) observed between 1995 to 2001. Downturn continued between 2001 and 2003 among 14 (from 78% to 67%, p=0.003) and 16 yr olds (from 78% to 62%, p=0.000). No change among 18 yr olds not targeted by law. **Ease of buying tobacco** *AGE (all children)* In 2002-2003 72% of children reported that it was very or fairly easy to buy tobacco from commercial sources near their homes. Proportion of those reporting that it was rather or very difficult to buy tobacco was larger than in earlier years: 1996/1997 : Very easy 19% Fairly easy 60% Rather difficult: 18% Very difficult 3% 1998/1999 Very easy 26% Fairly Easy 53% Rather difficult: 17% Very difficult 3% 2000/2001: Very easy 23% Fairly easy 52% Rather difficult: 21% Very difficult 4% 2002/2003: Very easy 22% Fairly easy 50% Rather difficult: 23% Very difficult 5% (All figures are post introduction of Act Amendment. No details of change from before).	

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Siegel (1999)[36] **Study design** Before-and-After Study (cohort) **Objectives** To determine whether local tobacco sales laws decrease the rate of progression to established smoking among adolescents **Setting** Massachusetts, US **Intervention** Restrictions on sales to minors **SES outcomes reported** Age 12-15yrs **Authors' conclusions** Local tobacco sales laws are associated with reduced rates of adolescent smoking initiation, but in this setting this effect did not appear to be mediated through reduced access to cigarettes. Authors suggest that effect may be result of baseline differences in social norms regarding communities, adoption etc. Although interventions may not work in ways they were intended may provide a mechanism for community mobilisation around issues of smoking.	**Data sources** 1993 Massachusetts Tobacco Survey conducted by Centre for Survey Research, University of Mass. (Telephone survey) One follow-up survey, 4 yrs after initial survey. **How were the participants selected?** Probability sample of Massachusetts housing units with telephone numbers drawn using random digit dial techniques. **Population characteristics** Number: 592 (38%) (not established smokers) Overall number of participants 1,069 aged between 12 & 15. Age:12-15yrs Gender: Male 49.5%; Female 50.5% Ethnicity: White (Non Hispanic) 67.6%; Black (Non Hispanic) 5.2%; Hispanic 5.4%; Other 21.8% No other demographic data were recorded. **Intervention details** Local tobacco sales legislation. Potential of 8 components from licensing of retailers, fines, complete ban or restrictions on location of vending machines, ban on free samples, ban on sale of individual cigarettes and on free standing cigarette displays in shops. **Outcomes measured** Predictors of Progression to Established Smoking (Survey).	**Predictors of progression to established smoking** *AGE* Youths living in a town with tobacco sales ordinance in place in 1993 were significantly less likely to progress to established smoking (18.3%) than those living in a town without an ordinance in place (27.3%) ($p<0.05$) (OR=0.60; 95% CI=0.37 to 0.97). In logistic regression analyses the effect of living in a town with a tobacco sales ordinance on smoking initiation appeared to be strongest among youths at earliest stages of smoking initiation. Analysis examined effect of year of adoption of local ordinances – no statistically significant effect, but magnitude of OR suggests a dose response relationship between how early a tobacco sales ordinance was adopted and subsequent smoking initiation rates.	

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Staff (1998)[32] **Study design** Controlled pre-post Study **Objectives** To assess the impact of non-prosecutory enforcement of legislation **Setting** Northern Sydney, Australia **Intervention** Restrictions on sales to minors - enforcement **SES outcomes reported** Outcomes reported by gender and age **Authors' conclusions** The study demonstrates the difficulties in restricting high school students' access to cigarettes. Isolated non-prosecutory strategies are likely to only have a limited impact on reducing smoking prevalence among high school students.	**Data sources** One page anonymous questionnaires distributed by students' normal teachers in roll call classes. Baseline: October/November 1995; June/July 1996, 8 months after baseline survey. Not reported how long after implementation of intervention. **How were the participants selected?** Control and intervention regions were defined geographically. Students - convenience sample of all students at 13 public secondary schools within local health area. **Population characteristics** Number in analysis: Baseline: 6,156 in analysis; Follow-up : 6,098 Age: 12 to 17 yrs Gender: Baseline: Intervention Baseline: Females n=1,803; Males n=2,015 Intervention Follow-up: Females n=1,720; Males n=1,718 Control Baseline: Females 979; Males 1359; Follow-up Females 1090; Males 1570 Other: Number of clusters: 13 schools No other demographic data were recorded. Smoking prevalence at baseline: Smoking prevalence increased significantly with school year (8.6% yr 7 students compared to 27.4% of yr 11 students claiming to be smokers p<0.001). Non-parametric analysis revealed that smokers significantly older than non-smokers (p<0.001). No significant difference in smoking prevalence between sexes (p=0.064). Baseline survey Initial univariate analysis demonstrated smoking prevalence was significantly greater among students attending co-educational schools (22.5% students of coed schools being smokers compared to 13.8% attending single sex schools p<0.001). **Intervention details** Intervention targeted tobacco retailers and consisted of "beat police" delivering 357 education kits addressing tobacco retailers' obligations under Section 59 of the NSW Public Health Act 1991; local media articles addressing issue of minors' smoking; information about project in school newsletters; establishment of a telephone line (dob-in line) for students and members of public to identify retailers not complying with Act. **Outcomes measured** Smoking prevalence (Questionnaire) Ease of puchase (Questionnaire) Students' knowledge of legal age (Questionnaire)	**Smoking prevalence** *AGE and GENDER* Follow-up survey **Intervention** Among students attending school in the intervention region, significantly lower post intervention smoking prevalence was reported for yr 10 girls (decline from 29.8% to 23.7%, p=0.05) and yr 7 boys (decline from 13.4% to 7.8%, p=0.05). Significantly higher post intervention smoking prevalence was reported for Year 7 girls (from 4.1% to 7%; p=0.05); Year 9 girls (from 19.1% to 27.4%; p=0.05) and Year 8 boys (from 10.8% to 18.1%, p=0.05). Logistic regression model predicts that a yr 7 student from intervention region post-intervention is 0.54 times less likely to be a smoker when compared to a student of same age and sex from intervention region prior to intervention. Only statistically significant for year 7. **Control**: Among students who attended school in control region reporting significantly higher smoking prevalence at follow-up were yr 10 boys (from 19.7 to 27.2%; p=0.05) and yr 11 girls (from 30.2 to 40.8%; p=0.05). **Ease of purchase** *GENDER:* The proportion of male students from intervention region who rated purchasing cigarettes from petrol stations as "easy" or "very easy" was significantly lower post-intervention (no figures reported in study). No other significant changes in either the control or intervention regions were noted. **Students' knowledge of legal age** *GENDER* Significantly lower proportion of correct post-intervention responses from males in intervention region (84.2% vs 79.5%) Post-intervention female student responses from control region demonstrated a significantly higher proportion of corrected responses compared to baseline (88.3% vs 84.4%) which was not paralleled in the intervention group.	**Students knowledge of legal age** Overall (intervention and control) 83.4% of students who gave plausible responses to the question correctly nominated 18 yrs as the legal age for tobacco.

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Staff (2003)[33] **Study design** Repeat cross-sectional surveys (Before- and- After intervention) **Objectives** To assess the impact of actively enforced public health legislation on adolescent smoking behaviour **Setting** Northern Sydney, Australia **Intervention** Restrictions on sales to minors – enforcement **SES outcomes reported** SES outcomes are by age and gender **Authors' conclusions** No reduction in adolescent smoking with active enforcement of tobacco access laws despite an apparent increase in students who reported never to have smoked. The interaction between gender and attendance at coeducational school in influencing smoking behaviour points to the importance of social factors in determining behaviour and reinforces the need to deglamourise tobacco use. A combination of approaches is needed rather than focussing on "youth access" laws in isolation.	**Data sources** Baseline data from original 1995 survey (see study [32 Staff]) and follow-up data from 2000 survey. Survey was one page anonymous questionnaire. **How were the participants selected?** From 13 schools in previous survey.[32] All secondary schools from within 2 geographical areas defined by transport routes and local newspaper distribution areas within the Northern Sydney Health region (total population approx 800,000 people). 11/13 schools agreed to participate in 2000 survey. Only data from schools participating in both 1995 & 2000 surveys analysed. In some schools "whole school years" were absent at time of 2000 survey and so the paired year group data from 1995 survey was also excluded. 3/11 schools were single sex (2 female, one male) providing 2728 (29%) of total response. Lower proportion of students were smokers (occasional plus daily) in single-sex schools compared with coed schools (13.3% compared with 22.3%). This was more evident among female students: 11.5% and 23.8% respectively. **Population characteristics** Numbers: 1995: 5,172; 2000: 4,007; Total both surveys 9,179 Age: 12 to 17 yrs; Gender: 1995 Females 2,349; Males 2,823; 2000 Females 1,822; Males 2,185 Students who never smoked: 71.8% of single sex school students reporting never having smoked compared with 55.8% of co-ed school students. Disparity slightly greater for girls with proportions of 74.5% and 54.4%. No other demographic data were recorded. **Intervention details** Between 1995 and 2000, Northern Sydney Health conducted the PROOF project with objective of improving retailer compliance with sales to minors legislation. The project utilised "staged sales to minors" with first-time offenders receiving warnings and repeat offenders being considered for prosecution under the relevant public health legislation. Legislation: 1991 NSW Public Health act – actively restricts	**Smoking prevalence** *GENDER and AGE* Current smokers not significantly different between surveys except for Year 8 boys with significant increase from 12.9 to 20.4% (p=0.05); Proportion of students reporting having never smoked increased by 6.7% in females to 65.7% (p<0.01) and by 2.1% in males to 60.7% (NS). Logistic regression model: Model 1: Current smoker status: showed no significant association between year of survey and current smoking status. Model 2: never smoked status: shows significant association between never having smoked and year of survey and adjusted odds of never having smoked is 16% greater post intervention (Year 2000) OR=1.16 (1.01 to 1.33). **Ease of purchase** *GENDER* There were significant decreases in reported ease of cigarette purchase among both males and females for petrol stations, vending machines, bottle shops and clubs. Ease of purchasing tobacco from small general stores remained high, with >80% of males and females rating it as "easy" or "very easy". % students rating purchase of cigarettes from particular sources as "easy" or "very easy" from 1995 and 2000 surveys. Females: Petrol stations NS Small general store NS Supermarket NS Vending machine decrease from 83.7% (254/271) to 83.5% (122/146) p=0.05; Bottle shop from 63.4% (118/186) to 43.1% (66/153) p=0.05; Club decrease from 59% (79/134) to 45.9% (56/122) p=0.05 Males: Petrol stations decrease from 73.8% (340/461) to	**Smoking prevalence** Students reported: Smoking daily: 1995 9%; 2000 9.2% Smoking occasionally but not daily: 1995 10.5%; 2000 10.9% Past smokers but not having smoked in last month: 1995: 21.8%; 2000 17.3% Never having smoked: 1995 58.7%; 2000 62.7% **Ease of purchase** Purchased cigarettes: 1995: 27.2% students indicated bought cigarettes at least once 2000: 23.3% indicated bought cigarettes at least once Purchased from : Small general stores: 1995 19.2%; 2000 16.8% Petrol stations 1995 12.8%; 2000 9.6% From friends: 1995 11.7%; 2000 10.5% From vending machines 1995 10.6%; 2000 7.3% From supermarkets: 1995 10.2%; 2000 8.2% The decrease was greatest in occasional smokers with a fall from 75.6% to 65.8% who bought cigarettes compared with a fall from 95.5% to 93.9% in daily smokers.

	sale of tobacco to minors. Legislation explicitly states "a person who sells a tobacco product to a person who is under the age of 18yrs is guilty of an offence". Compliance Enforcement Activities: Estimated there are approx 1000 tobacco retailers in Northern Sydney Health region. From 1995 to 2000 the PROOF project conducted 545 first-time compliance checks of tobacco retailers and 93 follow-up checks on those who sold to minors below legal age. Retailers identified through random cluster sampling based on postcode with 63% comprising small businesses, 19% petrol stations, 18% supermarkets. 34% of retailers illegally sold cigarettes to a minor at initial compliance check, and 28% of these sold to a minor on 2nd approach. During this period, 9 retailers were prosecuted under Public Health Act, resulting in 8 fines. **Outcomes measured** Smoking prevalence (Questionnaire) Ease of purchase (Questionnaire)	60.1% (251/418) p=0.05 Small general store NS Supermarket NS Vending machine NS Bottle shop from decrease from 62.3% (177/284) to 48.1% (155/322) p=0.05 Club decrease from 63.5% (146/230) to 49.5% (137/277) p=0.05	

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Sundh (2005)[34] **Study design** Before- and- After Study using cross-sectional surveys **Objectives** To increase understanding of the prerequisites for tobacco prevention by analysing youth access opportunities and how they view effect of law and their attitudes towards the law **Setting** Malmo, Varmland & Vasternorrland, Sweden **Intervention** Restrictions on sales to minors – no enforcement **SES outcomes reported** Outcomes were stratified by age and gender in terms of purchasing tobacco and stratified by gender for attitudes **Authors' conclusions** Results show that the proportion of adolescents who reported that it was easy for young people to buy tobacco in shops near their homes had decreased across age groups and gender since the introduction of the law. However there was an increase in obtaining tobacco from other sources. Authors suggest that in the long term, an effective	**Data sources** Questionnaire designed by authors. Year study commenced: 1996 One follow-up approx 3 yrs post intervention. **How were the participants selected?** All students at participating schools on day of survey. Not reported how schools selected. Sub-sample for attitudes selected by randomly choosing individual classes for these questions. **Population characteristics** All pupils in 1996 and 2000 in year 7 (aged approx 13 yrs) and year 9 (aged about 15 yrs) in 9-yr compulsory school, and those in year 2 (age approx 17yrs) in three-yr upper-secondary school in 3 different regions of Sweden Number: Survey 1: 20,130; Survey 2: 21,492 Age: 13 to 17yrs Gender: Survey 1: Boys 9,815; Girls 9,212; Survey 2: Boys 10,093; Girls 9,732 Selected sub-sample used for "attitudes": n=897 (1996); n=820 (2000). Drop out 18.5% and 19.3% respectively. No other demographic data were recorded. **Intervention details** Law on minimum age of 18yrs for purchase of tobacco (introduced 1 January 1997). **Outcomes measured** Purchase and perceived availability of tobacco (Survey) Perceived effects of, and attitudes towards, the minimum age law (Survey) Ease of purchase (Survey)	**Purchase and perceived availability of tobacco (including snuff)** *AGE AND GENDER* Proportion of boys and girls in yr 7 who said they had bought tobacco during previous month had decreased significantly by 2000 (p=<0.001), while corresponding figures for older adolescents remained more or less unchanged, although some showed a slight increase in 2000. When analysis restricted to smokers the proportion of girls who had bought tobacco in shops had decreased (p=<0.001) in all age groups. Corresponding figures for boys show a statistically significant decrease only among yr 9 boys from 92.8% to 87.6% (p=<0.05) but this group had an increase in boys who bought tobacco from friends from 28.2% to 40.7%; All age groups of boys and girls showed an increase in obtaining tobacco from friends (p=<0.001). Restricting analysis to those who used snuff and bought tobacco from shops – reduction from 1996 to 2000 among yr 9 boys (from 94% to 83.9%) and girls (from 96.4% to 80%) (p=<0.01) and among boys in year 2 of upper-secondary school (from 96.3% to 91.7%) (p=<0.001). (Girls in yr 2 also declined from 96.9% to 89%). Much smaller numbers of girls in each year used snuff. A significantly higher proportion of both genders in 2000 than in 1996, in all three age groups, used snuff and had bought tobacco from friends (p=<0.001). Boys in yr 7 (2000) of compulsory school who took snuff, compared to those in yr 9 and yr 2 had, to a greater extent, bought tobacco from friends (p=<0.001). This was also true for girls in Yr 9 who took snuff compared to those in yr 2 (p=<0.001). **Perceived effects of, and attitudes towards, the minimum age law (subsample only)**: *AGE AND GENDER* Among smokers and non-smokers, the proportion of	

minimum age law may change parents and older friends attitudes making them unwilling to buy tobacco for adolescents. Also supervision of the law should be improved and greater attention paid to opportunities to obtain tobacco by non-commercial sources.		adolescents in all three age-groups who thought that boys and girls smoked less due to minimum age law had decreased between 1996 and 2000 (p=<0.001). In addition, the proportion of adolescent smokers in all three age-groups who thought that the minimum-age law for purchase of tobacco was unacceptable or should be abolished had decreased by 2000 (p=<0.005). Among non-smokers, different patterns occurred in the different age-groups. In yr 7, a considerably larger proportion in 2000 (p=<0.001) than in 1996 felt that the law was unacceptable or should be abolished. The proportion of girls in yr 9 and of both genders in yr 2 who had negative attitudes toward the minimum-age law had decreased by 2000, compared to 1996 (p=<0.005). In 2000, regardless of age group, a higher proportion of boys (p=<0.001) than girls stated that the minimum age law should be abolished. **Ease of purchase** *AGE AND GENDER* Proportion of both genders of smokers and snuff users in all three age groups who had bought tobacco over previous month and who reported that it was easy for people of their age to buy tobacco in shops decreased significantly (p=<0.05) between 1996 and 2000. Also the proportion of girl and boy smokers who had bought tobacco and who stated it was easy for people of their age to obtain tobacco from shops near their homes was significantly higher (p=<0.001) for those in upper secondary yr 2 than in compulsory school year 7.	

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Thomson (2004)[38] **Study design** Post-test only **Objectives** To test whether community-level youth access ordinances reduce adolescents' perceived access to tobacco **Setting** Massachusetts, US **Intervention** Restrictions on sales to minors – including enforcement **SES outcomes reported** Youths' perceived access to tobacco products; attempts to purchase tobacco products; tobacco use; some stratification by ethnicity and gender **Authors' conclusions** The presence of the youth access ordinances was not consistently associated with a reduction in perceived ease of access to tobacco products, purchase attempts or use of tobacco products.	**Data sources** Data from larger longitudinal study in Massachusetts - interviews of respondents of random sample. Ordinance data from State Tobacco Control Program. (Data derived from telephone survey linked to town level database of ordinances). Data were collected during 2001 and 2002. **How were the participants selected?** Telephone random digit sampling of state-wide households **Population characteristics** Number: 3,831 across 314 communities Age: 12 to 17yrs Gender: Male 52%; Female 48% Ethnicity: White 78%; Hispanic 9%; Other 13% Income: Household income $50,000 or less: 34%; $50,001 or more 66%; Other: Lived in town that passed 1992 Tobacco Excise tax increase: 42% No other demographic data were recorded. **Intervention details** Ordinances included 6 provisions of youth access ordinances including: 1) licensing, requiring retailers to have a license to sell tobacco products; 2) fines for merchants who sell tobacco products to minors; 3) vending machine restrictions (complete ban or restriction); 4) ban on free standing displays of tobacco products; 5) ban on sales of single cigarettes; 6) ban on distribution of free samples. Information on local tobacco control ordinances and regulations obtained from bi-annual reports submitted to the Massachusetts Tobacco Control Program. **Outcomes measured** Tobacco use (Survey)	**Tobacco use** *AGE – All adolescents* The actual presence of a fine for selling tobacco to minors was not found to be significantly associated with smoking OR= -0.9 (95% CI 0.7 to 1.1), nor were youth access ordinances. Although presence of a fine for selling tobacco to minors was associated with ever smoking in initial models (p=0.05), this was no longer significant in fully adjusted models (p=0.02). No associations were found between youth access ordinances and either current smoking or established smoking.	

INTERVENTION: Restrictions on sales to minors

Study details	Methods	Stratified results	Global results
Tutt (2000)[35] **Study design** Before-and-After Study **Objectives** To assess effectiveness of a retailer compliance programme on adolescent smoking rates **Setting** Central Coast of New South Wales, Australia **Intervention** Restrictions on sales to minors - enforcement **SES Outcomes reported** Age of participants - range from 12 to 17, stratified by year **Authors' conclusions** Study suggests that initial high retail compliance will affect 12 and 13 yr old smoking rates, but will only produce substantial effects up to the 17 yr age group if the compliance rate is maintained for a number of years. This strategy and further policy to support it, such as tobacco retailer licensing, should be undertaken in all areas.	**Data sources** Survey of students timed to coincide with other student alcohol and drug surveys. No other details reported. Year study commenced: 1993. Student surveys 1993, 1996 (one yr after enforcement) and 1999 (during random compliance testing period). **How were the participants selected?** Retailers: Authors physically located retailers - no other accurate listing available. Retailers located near high schools in study. Students: All students present on day questionnaire administered. No details of how schools selected apart from being in geographic region. **Population characteristics** Adolescents under 18 yrs Number: 1993: 2,827; 1996 3,144; 1999 2,238 Age: 12 to 17 yrs No other demographic data were recorded. **Intervention details** Section 59 of NSW Public Health Act 1991 prohibits sale of tobacco to persons under 18yrs. Penalties exist for person selling and their employer. Initial publicity and education phase conducted in 1993 and 1994. Active enforcement in 1995; Education and publicity phase: Community mobilisation with seminars, high school initiatives, reporting of retailers not complying, media publicity about legislation. Active enforcement in cooperation with police and publicity about results. **Outcomes measured** Age specific smoking rates (Survey)	**Age specific smoking rates** *AGE* No numbers of students in each age group presented in study. Sample sizes of individual age groups too small to produce significant results between 1993 and 1996 but greatest changes reported in 12 and 13 yr students. Age 12 yrs dropped from 13.1% in 1993 to 9% in 1996. Age 13 yrs dropped from 19.7% to 13.3% over same period. Age 14 yrs dropped from 29% in 1993 to 15% in 1999; Age 15 yrs dropped from 29% to 18%; 16 yrs from 30% to 18% and 17 yrs from 40% to 20% over same period.	

INTERVENTION: Health warning labels on tobacco products

Study details	Methods	Stratified results	Global results
Borland (1997)[39] **Study design** Before-and-After Study (cross-sectional and longitudinal samples) **Objectives** To assess impact of new Australian tobacco health warnings on knowledge and beliefs **Setting** Various states in Australia **Intervention** Health warnings on tobacco products **SES outcomes reported** Gender, education, ethnicity, employment status **Authors' conclusions** "These results suggest the new health warnings are resulting in better informed smokers and thus suggest that informative health warnings can play an important role in better informing consumers."	**Data sources** Data collection by a large market research company via survey. One survey December 1994 (2 weeks pre implementation). 2nd survey May 1995 during phase-in period for new warnings. Questions in both surveys largely identical with some extra questions at follow-up. **How were the participants selected?** Random digit dialling of telephone numbers in Australia with quotas set for each state. Cross-sectional response rate across both surveys 66% **Population characteristics** Number: 1035 Pre-intervention(Baseline): 510 smokers; 525 non-smoker (183 ex-smokers and 342 never-smokers) Post- implementation 512 smokers; 521 non-smokers (176 ex-smokers, 345 never smokers). Longitudinal sample: May 95 attempted to reinterview 510 smokers in baseline survey;interviewed 243 (48%); those recontacted more likely to be women (57%); also older than those not re-contacted; no other significant differences reported. Age: Baseline Smokers 16-29 years 30; 30-49 years 48; =/>50 years 22; Non Smokers 16-29 years 25; 30-49 years 34; =/>50 years 42 Post Implementation Smokers 16-29 years 30; 30-49 years 49; =/>50 years 21; Non Smokers 16-29 years 22; 30-49 years 41*; =/>50 years 37 Significant differences in distribution between surveys. Smokers more likely to be younger than non-smokers across both cross-sectional surveys. Gender: Baseline n=1,035 Non-smokers M=40%; Smokers M=51% Post-implementation survey n=1033 Non-smokers M=39%; Smokers M=47% Education: Baseline	**Smoking behaviour** *GENDER* Across both surveys men smoked more cigarettes per day (23) than women (18.7) p<0.001 **Perceived impact of the warnings** *AGE* 6% of smokers (mainly younger smokers, age unstated) had avoided buying packs with any of the health warnings on them. **Knowledge of health warnings** *EDUCATION, GENDER, AGE* Among smokers at follow-up, recall was inversely related to age (p<0.0001). Controlling for age, there was a small effect for education with the better educated recalling slightly more (p<0.05) and for sex (p<0.05) with women recalling slightly more than men, but no effect for country of birth or workforce participation. **Awareness of changes to health warnings** *EDUCATION, ETHNICITY, EMPLOYMENT, GENDER, AGE* *Cross sectional data:* At follow-up smokers aged under 50 were more likely to be aware of new warnings than older smokers (p<0.0001). There were no effects for sex or education. Those born in non-English speaking countries (79%) were less aware than those from Australia (93%) or other English speaking countries (95%) (p<0.001). When age was controlled for there was no effect for employment status. .	**Smoking behaviour** Of the longitudinal sample, 11% had quit at follow-up and 38% reported an unsuccessful quit attempt since baseline interview. **Perceived impact of the warnings** Cross-sectional survey: 2/8 recent ex-smokers from non-smoker subsample and 18% of smokers who had tried to quit recently and were aware of the new warnings said warnings contributed to decision to quit. Effect on number of cigarettes smoked per day: 0.8% said they smoked more; 1.4% said had temporary effect in reducing consumption; 13.5% now smoked less due to warnings. When asked earlier in survey about reported consumption change in last two months, 19% claimed to have reduced consumption. Results suggest that much of any consumption reduction may have happened anyway. No significant change in cross-sectional sample, but longitudinal group drop from 22 to 20.5 cigarettes per day (p<0.05). **Knowledge of health warnings** 94% of smokers could mention at least one warning at follow-up compared with 87% at baseline. For non-smokers the figures were 56% at follow-up, 43 at baseline. (Detail of recall of health warnings not extracted). In the longitudinal sample of smokers warnings recalled increased from 1.9 at baseline to 2.8 at follow-up (p<0.0001). There was a significant interaction with the number recalled increasing more in the continuing smokers (p<0.01). **Awareness of changes to health warnings** Cross sectional samples: smokers' awareness increased from 28% at baseline to 91% at follow-up (p<0.0001). Non smokers' awareness increased from 24% to 51% (p<0.0001). In the longitudinal subsample, 90% reported awareness of new warnings at follow-up.

	Smokers: </-year 10 36; Year 11-12 41; Higher 23; Non-smokers: </+ year 10 37; Year 11-12 33; Higher 30 Post Implementation Smokers </= Year 10 39; Year 11-12 41; Higher 20; Non-smokers </= year 10 32; Year 11-12 31; Higher 37 No other demographic data were recorded. **Intervention details** New health warnings and contents labelling on tobacco products introduced in Australia in 1995. Included rotating of 6 warnings covering >25% of front of pack, back of pack warning elaborating on front of pack warning, info line; plus contents labelling. Over 3 years from announcement of new warnings to date of implementation considerable amount of publicity. At the time of the baseline survey there was a campaign promoting the new warnings; Surveys in state capitals suggested that phase-in of new warnings took longer than anticipated. At the time of the follow-up packs with new warnings were common on most popular brands but there was variability between retail outlets. **Outcomes measured** Smoking prevalence (Survey) Perceived impact of the warnings (Survey) Knowledge of Health Warnings (Survey) Awareness of changes to Health Warnings (Survey)		

INTERVENTION: Health warning labels on tobacco products

Study details	Methods	Stratified results	Global results
Gospodinov (2004)[40] **Study design** Econometric study **Objectives** To investigate if the introduction of the warnings had any significant impacts on smokers **Setting** National population survey, Canada **Intervention** Health warnings on tobacco products **SES outcomes reported** Age **Authors' conclusions** The study findings indicate that the "heavy duty" warnings have not had a discernible impact on smoking prevalence. There is some evidence of an influential effect on amount smoked though at a low level of statistical significance ($p<0.01$). Models were estimated to allow the impact of the warnings to vary by age group, but no difference in their impact was detected on the young (age 15-19), the old (age>64) and the others (age 20-64).	**Data sources** Two waves of Health Canada's Canadian Tobacco Use Monitoring Surveys for data on smoking residence, economic and demographic data. Price of cigarettes for Nov 2001 from Dept of Finance. Data from immediately preceding intervention, (July-Dec 2000) one immediately following (February-June 2001). **How were the participants selected?** Data from Statistics Canada/Health Canada publicly available surveys – participants with missing data were excluded (2.5%). **Population characteristics** General population (n=20,176 with 5,114 smokers) No other demographic details were reported. **Intervention details** Health warnings on tobacco packaging in Canada became mandatory in Jan 2001. Producers required to print large-font warning text and graphic images describing health consequences of using tobacco. **Outcomes measured** Smoking prevalence (Survey) Quantity smoked (Survey) Youth and non-youth estimates	**Smoking prevalence** *AGE* The warnings did not have a significant effect on different age groups. Interaction terms between warning and age (for categories 15-19, and 65+ compared with 20-64) were not statistically significant. **Quantity smoked** *AGE* For quantity smoked the unconditional analyses showed a reduction in all groups with the exception of the 55 to 64 age group (20.2% (SE 3.9) to 22.4% (SE 4.0). **Youth and non-youth estimates** *AGE* The regression models which collapse data into age groups 15-19; 20 to 64 and >65. Results do not reveal any identifiable age effect of the warnings. In both prevalence and quantity smoked equations the coefficients on interaction of age and warnings failed to reach a statistical level of significance for any group.	**Smoking prevalence** The warnings did not have a significant effect on smoking prevalence overall, although prevalence reduced. Policy measures – price coefficient is significant and implies that the participation (prevalence) price elasticity is about -0.57. One policy measure that appears to be insignificant is the year/warnings dummy – while it is negative, it is not significant and therefore the hypothesis that smoking rates remained the same over the period cannot be rejected on the basis of this specification and set of results. **Quantity smoked** A reduction in the amount smoked of approx 9% (2 cigarettes per week) but this was not statistically significant.

INTERVENTION: Health warning labels on tobacco products

Study details	Methods	Stratified results	Global results
Koval (2005)[42] **Study design** Post-intervention Study (cross-sectional sample) **Objectives** Assess the potential effectiveness of warning labels on cigarette packages **Setting** Greater Toronto area of Canada **Intervention** Warning labels on cigarette packets **SES outcomes reported** Gender **Authors' conclusions** "Despite efforts taken in developing labels, some young adults are sceptical about their effects. Warning labels may have to be modified to target issues that are relevant to young adults; gender differences are important in this modification. Warning labels can offer an additional component to a comprehensive tobacco control programme, in that they provide health information."	**Data sources** 88 item self completed questionnaire covering a range of issues including smoking behaviour. Six items on health warnings (two years after introduction of new labels). **How were the participants selected?** 1614 young adults who had participated in a 10 year longitudinal study (original purpose of study to examine influence of specific psycho-social factors on smoking behaviour). Response rate 90.1% **Population characteristics** Number: 1,267 Age NR Gender: 592 (46.7% Males); 675 (53.3%) females No other demographic data were recorded. **Intervention details** Voluntary labelling of cigarette packages with health warnings and tar concentrations prior to 1989. 1989 Tobacco Product Control Act allowed Canadian government to regulate health information on tobacco products. New warnings introduced in June 2000. Canadian warning labels have evolved from text-only labels covering 20% of the pack in 1989 to graphics and text covering over 50% of the pack in 2000. **Outcomes measured** Smoking Prevalence (Questionnaire) Attitude toward or knowledge of cigarette package warning labels (Questionnaire)	**Smoking prevalence** *GENDER* Prevalence of current smoking was 32.8%, and was higher for males (35.6%) than females (30.4%). Males 172 (29.1%) were classified as never-smokers; 209 (35.1%) experimental/ex smokers and 211 (35.6%) current smokers; Females 226 (33.4%) never smokers; 244 (36.2%) experimental/ex smokers and 205 (30.4%) current smokers. **Attitude toward or knowledge of cigarette package warning labels** *GENDER* Females significantly less likely to have seen the labels than males (n=558, 82.79% vs. n= 519, 88.27%; p=0.0061). Males were significantly more likely to feel that the warnings carried a stronger message than females (n=370, 63%, vs. n=382 57.1%, p=0.03). N=39, 6.67% of males were more likely to respond that the new warnings might make some people more likely to start smoking than females (n=26, 3.86% p=0.0251). No significant difference noted between males and females when asked if they were less likely to start smoking (males 214, 36.69%; females 226, 33.53, NS) Female current smokers (n=93, 48.44%) were significantly more likely to think about trying to quit after viewing the labels than male current smokers (n=70, 37.04%, p=0245). No significant difference noted among current smokers when asked about whether they decided not to have a cigarette after noticing the warning label.	

INTERVENTION: Health warning labels on tobacco products

Study details	Methods	Stratified results	Global results
Robinson (1997)[43] **Study design** Post-intervention Study (longitudinal sample) **Objectives** To examine the association between adolescents' knowledge of cigarette warning labels and actual smoking behaviour **Setting** Four public high schools in San Jose, Northern California, US **Intervention** Health warnings on tobacco products **SES outcomes reported** Age **Authors' conclusions** "Sizeable proportions of adolescent smokers are not seeing, reading or remembering cigarette warnings labels. In addition, knowledge of warning labels on cigarette packages and advertisements is not associated with reduced smoking. Current warning labels are ineffective among adolescents."	**Data sources** Data sources modified from aided recall methods of Fischer et al. Anonymous questionnaires (self completed). Baseline Jan 1994, Follow-up May 1994. **How were the participants selected?** Participants were part of a wider controlled study of a school based intervention to reduce smoking and other disease related behaviours. Only "Control" subjects used in longitudinal sample. NR how schools selected Response Rate: analysable 88.2% **Population characteristics** Number: 803 Age: Mean 14.95 +/- 0.5 Gender: 49.2% Female Ethnicity: Latino 31.1%; Asian or Pacific Islander 27.9%; White 27.9%; African American 6.2%; Other 6.9% No other demographic data were recorded. **Intervention details** Warning labels have been required on cigarette packages since 1966 and on all cigarette advertisements since 1972. Starting in 1985, 4 rotating warning statements were required on all cigarette packages and advertisements (Public Law 98-474). **Outcomes measured** Warning label knowledge and change in smoking behaviour (Survey and 'bogus' collection of saliva samples)	**Warning label knowledge and change in smoking behaviour** *AGE (mean 14.9years)* 170 (21.2%) increased or continued smoking and 633 (78.8%) decreased smoking or remained non-smokers. Greater knowledge of cigarette package warning labels associated with statistically significant higher risk of increasing or continuing smoking (OR 1.22; 95% CI 1.02 to 1.46; p<0.05). Subgroup analysis showed that elevated risk was mostly limited to those students who were already experimental, monthly or regular smokers at baseline (OR 1.43; 95% CI 1.09 to 1.87; p<0.01). Among never smokers, knowledge of package warning labels was associated with neither a significantly increased nor decreased risk of subsequently becoming a smoker (OR 1.10; 95% CI 0.84 to 1.45). Baseline advertisement warning label knowledge not associated with a significant change in smoking behaviour, after controlling for other factors, in the full longitudinal sample (OR 1.06; 95% CI 0.82 to 1.35) and among subgroups of smokers (OR 0.95; 95% CI 0.67 to 1.34) and never smokers (OR 1.14; 95% CI 0.78 to 1.68).	

INTERVENTION: Health warning labels on tobacco products

Study details	Methods	Stratified results	Global results
Willemsen (2005)[41] **Study design** Post-intervention Study (cross-sectional samples) **Objectives** To examine the self-reported effect of the health warnings on cigarette packets on the attractiveness of cigarettes, on smokers' motivation to quit and on smoking behaviour, and to determine whether these effects differed for subgroups of smokers **Setting** The Netherlands **Intervention** Health warnings on cigarette products **SES outcomes reported** Gender, education **Authors' conclusions** The new warnings made cigarette packs less attractive, especially to smokers who already intended to stop smoking.	**Data sources** Continuous Survey of Smoking Habits (CSSH) carried out by TNS NIPO. Questions about the new health messages included in CSSH April-Dec 2002 (1month post intervention) and Apr, May, June 2003(13 months post intervention) April & May 2003 questions not used as smokers unable to purchase new packets. **How were the participants selected?** From an omnibus Internet survey in which each week approximately 800 households are randomly selected from a database of >50,000 households. **Population characteristics** General population in the Netherlands Number: 12,654 in original sample Paper reports on results of 3,318 smokers who had noticed the health warnings 3,937 of original sample were smokers (31%), 3318 (84.3%) had noticed change to health warnings and were asked further questions. No other demographic data were recorded. **Intervention details** According to an EU Directive as of 30 Sept 2002, the front of cigarette packets in EU countries were required to have one of two health warnings, covering 30% of surface. The back of the packet must contain one of 14 different health warnings, covering 40% of the surface. On 1 May 2002 the new health warning labels came into effect in The Netherlands. **Outcomes measured** Respondents noticing changes to warnings (Survey) Self-reported change in smoking behaviour (Survey) Self-reported change in motivation to quit	**Self-reported change in smoking behaviour** *GENDER* There were no significant gender differences in self-reported change in smoking behaviour. *EDUCATION:* There were no significant differences in level of education for respondents in reported change in smoking behaviour. **Self-reported change in motivation to quit** *GENDER* Women were not more motivated to quit than men (18.9% vs 16.9%; NS) *EDUCATION* More respondents with medium level of education (19.4%) reported being more motivated to quit than those of high (18.3%) or low levels (15.8%) (p<0.001) Higher motivation: Low education 15.8% Medium education 19.4% High education 18.3% Neutral Low Education 75.7% Medium education 75.7% High education 72.9% Lower motivation: Low education 8.5% Medium education 4.9% High education 4.3% $X^2(4)=22.9$; p<0.001 **Preference for buying pack with/without new warning** *GENDER* More women than men preferred to buy packs without new wording (37.1 vs 26.8%). Without Male 26.8% Female 37.1% Neutral Male 70.7% Female 60.% With Male 2.5%	**Respondents noticing changes to warnings** After the survey period 3318 (84.3%) said they had noticed changes to the health warnings. This % was higher in the 3 months directly after introduction (90%) compared with one year later (81%) p<0.001. **Self-reported change in smoking behaviour** Of all smokers 10.3% said they smoked less because of new warnings. **Self-reported change in motivation to quit** A strong dose-response relationship was observed, e.g. the higher the intention the greater the impact of the warnings. Of all smokers 17.9% reported that warnings made them more motivated to quit. Multivariate analysis showed that those intending to quit smoking within 1 month had higher change of reporting that they smoke less because of new warnings (OR 7.89) independent of other variables. **Preference for buying pack with/without new warning** Of all smokers, 31.8% said would prefer to buy packs without new warnings. **Change in inclination to buy cigarette pack with new warning** Of all smokers, 14% indicated they were less inclined to

	(Survey) Preference for buying pack with / without new warning (Survey) Change in inclination to buy cigarette pack with new warning (Survey)	Female 2.0% $X^2(2)=40.5;p<0.001$ *EDUCATION* More respondents with a higher level of education (35.5%) reported a preference for buying packs without the new warning compared to those of low (28%%) or medium levels 31%. Without labels Low education 28.5% Medium education 31.0% High education 35.5% Neutral Low education 68.8% Medium 66.1% High 62.3% With Low education 2.7% Medium 2.0% High 2.1% $X^2(4)=12.6;p<0.05$ **Change in inclination to buy cigarette pack with new warning** *GENDER* Women were less inclined to purchase the new pack than men (10.6% vs 17.7%) Less Male 10.6% Female 17.7% Neutral Male 87.8% Female 81.6% More Male 1.6% Female 0.7% $X^2(2)=39.3;p<0.001$ *EDUCATION* There was no significant difference between education levels in inclination to buy the new packs.	purchase cigarettes as a result of the new warnings.

INTERVENTION: Advertisement restrictions

Study details	Methods	Stratified results	Global results
Fielding (2004)[44] **Study design** Before-and-After Study (cross-sectional samples) **Objectives** To compare the recognition of tobacco brands and ever-smoking rates in young children before and after the implementation of cigarette advertising restrictions and to identify continuing sources of tobacco promotion exposure **Setting** Primary schools from Kwai Tsing and Southern districts Hong Kong **Intervention** Advertising restrictions **SES outcomes reported** Brand recognition by children, brand recognition by gender of child, smoking prevalence of children **Authors' conclusions** Advertising restrictions in Hong Kong have effectively decreased primary school aged children's recognition of tobacco branding. Children, however, remain vulnerable to branding mostly through exposure to family members, point of sale tobacco advertisement and occasional promotions. Measures to control these are required.	**Data sources** Replicated a previous study (Peters et al, Tobacco Control 1995:4; 150-155) using the same districts and sampling procedures. 1991 comparative data were taken from this study. 2001 survey (11 years after initial advertising restrictions) was presented in a classroom setting with guidance from a team member. Each question was presented on an overhead transparency and explanations were given for each questionnaire section. Questionnaires were distributed to whole classes at a time at different times of day for different classes. Children were told of the confidentiality and anonymity of the questionnaires. **How were the participants selected?** Invitation letters were sent to the head teachers of six schools. Four agreed to participate. Within each school whole classes were enrolled following consent from the school head. **Population characteristics** Primary school aged children. Number: 824 Age: 8-10 (inc) Mean NR Gender: 304M, 520F Other: 51% non-smoking families, 34% one smoking family member, 8% two smoking family members, 2% three smoking family members, 4% >3 smoking family members. No other demographic data were recorded. **Intervention details** In 1990 tobacco advertising on broadcast media was prohibited and later billboard bans were instituted. The Smoking (Public Health) Ordinance (Cap 371) regulations included bans of print media advertisements in 1997, effective from December 1999. Current restrictions exempt point of sale advertising and tobacco companies can also promote brand awareness principally through sports sponsorship and branded clothing and music. **Outcomes measured** Smoking prevalence (Survey) Brand recognition (Survey)	**Smoking prevalence** *GENDER* 1991 survey - 15% for boys, 7% for girls 2001 survey - 8% for boys, 2.5% for girls Significant decrease between 1991 and 2001 in both genders after adjustment for age differences (p <0.00001). **Brand recognition** *GENDER* Recognition of tobacco brand names was more strongly predicted by age and gender than by smoking status (data not extracted as do not relate directly to advertising ban). Cigarette brand and logo recognition rates were lower in both genders in the 2001 sample than in the 1991 sample. Boys - Marlboro name 96% vs. 53% (-43, p <0.001), Marlboro logo 82% vs. 24% (-58, p<0.001), Salem name: 61% vs. 40% (-21, p<0.001), Salem logo: 95% vs. 55% (-40, p<0.001). Girls - Marlboro name 94% vs. 40% (-54, p <0.001), Marlboro logo 69% vs. 18% (-51, p<0.001), Salem name: 45% vs. 29% (-16, p<0.001), Salem logo: 95% vs. 52% (-43, p<0.001). Children reporting prior exposure to tobacco advertising were more likely to obtain correct scores on tobacco names (p=0.12) and logos (p=0.007).	**Brand recognition** 2001 survey - recognition rates of the Marlboro name were 45% (41-48%), the Marlboro logo 20% (18-23%), the Salem name 33% (30-36%), the Salem logo 53% (50-57%), the Viceroy name 5%(4-7%) and the Viceroy logo 73%(70-76%). Tobacco brand logos were significantly more likely to be correctly identified than their names (p<0.001). After adjustment for age and gender, ever-smoking status was of marginal significance in predicting tobacco logo recognition (p=0.054). Never smokers' recognition rates for all tobacco names and logos were significantly lower than those reported in 1991. Marlboro name 95% vs. 44% (-51, p <0.001), Marlboro logo 75% vs. 20% (-55, p<0.001), Salem name: 50% vs. 32% (-18, p<0.001), Salem logo: 95% vs. 53% (-42, p<0.001). Ever-smokers in 2001 showed significantly lower recognition rates for all tobacco brand names and logos than in the 1991 sample. Marlboro name 97% vs. 68% (-29, p <0.001), Marlboro logo 84% vs. 35% (-49, p<0.001), Salem name: 73% vs. 52% (-21, p<0.001), Salem logo: 96% vs. 61% (-35, p<0.001). Declines in tobacco brand name and logo recognition rates were less among ever-smokers than among never-smokers whereas this trend was reversed for non-tobacco brands (data not extracted). Among the 12 sources of exposure to tobacco advertising were (percentage exposed in brackets) point of sale ads at street stalls (75% (72-78%)), indirect advertising (71% (68-75%)), Magazines (65% (62-68%)), movies (38%), outdoor buildings (31%), the Internet (25%), Soccer games (20%), tennis competitions (18%), Motor racing (15%), Boutiques (13%), Cartoons (11%) and swimming competitions (9%).

INTERVENTION: Advertisement restrictions

Study details	Methods	Stratified results	Global results
Joossens (1997)[45] **Study design** National Statistics (cross-sectional samples) **Objectives** Assesses the effectiveness of banning advertising on tobacco consumption in four countries where a ban was introduced as part of a comprehensive policy **Setting** Norway, Finland, New Zealand, France **Intervention** Advertising ban **SES outcomes reported** Per capita consumption and smoking prevalence by age for adolescents and by gender **Authors' conclusions** Advertising bans do work if they are properly implemented as part of a comprehensive tobacco control policy.	**Data sources** Data obtained from UK Dept of Health Report 1992 and international sources as follows. Norway: Directorate for Customs & Excise/National Council on Tobacco Health; Finland: Statistics Finland, Tobacco Statistics 1996; New Zealand: National Public Health Institute, Statistics New Zealand, Health New Zealand; France: Centre de Documentation et d'Information sur le Tabac, Eurostat, Comite Francais pour l'education a la Sante. **How were the participants selected?** NA **Population characteristics** General population of adolescents Number: NR No demographic data were recorded. **Intervention details** Advertising bans came into force: France - 1 Jan 1993; Norway - 1 May 1975; Finland - 1 March 1978; New Zealand - 17 December 1990. **Outcomes measured** Smoking prevalence (National statistics)	**Smoking prevalence** *AGE AND GENDER* NORWAY Daily Smoking prevalence among 16-19yr olds *1997 study:* Boys: 1975 38%; 1996: 22.2% Girls: 1975 37.3%; 1996 22.3% *2000 study:* Boys: 1975 38%; 1996 23.1%; 1999 23.6%; Girls: 1975 37.3%; 1996 23.9%; 1999 27.4% *(Note figures differ between studies)* FINLAND - Smoking prevalence among 15 to 24 yr olds (daily smokers): *1997 study:* Males: 1978/9 35%; 1997 23% Females: 1978/9 25%; 1997 21% *2000 study:* Males 1978/9 35%; 1997 21%; 1999 20% Females: 1978/9 25%; 1997 21%; 1999 21% *(Note figures differ between studies)* *AGE* NEW ZEALAND - Prevalence of smoking by 15 to 19 y olds 1997 study: 1990 26.8%; 1995 24.7% 2000 study: 1990: 27%; 1995 24%; 1999 25% FRANCE - Prevalence of smoking by 12 to 18 yr olds 1997 study: 1992 34%; 1996 34% 2000 study: 1992 34%; 1996 34%; 1999 27%	

INTERVENTION: Price or tax increase studies (the data extraction format differs for the price/taxation studies due to the nature of the studies and the methods used)

Study details	Methods	Results	Conclusions
Berg (2001)[64] **Study design** Econometric analysis **Objectives** To calculate cigarette demand for race groups in South Africa **Setting** South Africa **Intervention** Implementation of a tax policy **SES outcomes reported** Race	**Data sources** All data appears to be cross-sectional data taken from Deaton A (1997). *The analysis of Household Surveys: Microeconometric Analysis for Development Policy*, Johns Hopkins University Press. **Data description** 1131 households with mean 2.92 (SD 1.82) adults and 1.46 (1.71) children (black group), 998 households with mean 2.33 (SD 1.02) adults and 0.78 (1.06) children (white group). **Analysis methods** ***Model*** Regression models using censored least absolute deviation (LAD) estimation and also censored maximum likelihood (ML) estimation. ***Outcome variables*** Quantity demand (cigarettes). ***Explanatory variables*** Price of each of the following: cigarettes, eggs. mutton/beef/pork, bread, fresh/sour milk or yogurt, mealie meal/maize flour, chicken; number of adults, number of children (per household); income.	**Stratified results** ***Black*** Price elasticity (* statistically significant) -0.80 (all data) 0.34 (only households who purchased cigarettes) ***White*** Price elasticity (* statistically significant) -1.79*(all data) 0.09 (only households who purchased cigarettes) **Global results** Not applicable	**Authors' conclusions** The authors' concluded that this South African data did not support the theory that an increase in the tax on cigarettes causes a decrease in the consumption by smokers. Price responsiveness was positive from smokers but elasticities were not statistically significantly different from zero, so no definite conclusions can be made. **Reviewers' comments** The sources of data, especially regarding prices, were not provided. It is difficult to judge the methods and the appropriateness of the modelling from the details reported.

Study details	Methods	Results	Conclusions
Bishai (2004)[77] **Study design** Econometric analysis **Objectives** To examine the extent to which policies influence participation of adolescents in alcohol and tobacco consumption and unsafe sex (Only results for tobacco consumption are presented here) **Setting** US **Intervention** Tobacco taxes, vending machine restrictions **SES outcomes reported** Age	**Data sources** Risk behaviour from Youth Risk Behavioral Survey (CDC, 1995) which provided data for 20 states. State and year-specific cigarette prices from the Tobacco Tax Council. State excise tax and laws on youth access to tobacco vending machines data from National Cancer Institute State Cancer Legislative Database. **Data description** Number=29,693 (overall); 29,454 (tobacco analysis); mean age 16; 48% male; 63.4% white; 18.5% African-American; 8.7% Hispanic; 2.9% Asian; 2.4% Native American. **Analysis methods** ***Model****:* structural equation modelling (SEM) with a separate model for each risk behaviour (smoking, drinking, unsafe sex). Probit regression models where participation elasticities were calculated from probit estimates. As a comparison ordinary least squares regression models were also used. ***Outcome variables***: probability of ever tried smoking (modelled by probit model); % of previous 30 days when smoked (modelled by SEM). ***Explanatory variables****:* tobacco tax; state laws limiting vending machines; age; gender; race.	**Stratified results** **Tobacco tax** Participation elasticity 0.19 Taxes had a negative but not statistically significant effect on the probability of smoking, and the amount smoked. The results were similar across all models. ***Laws limiting vending machine access*** Participation elasticity 0.00 Vending machine restrictions did not have a statistically significant effect on the probability of smoking. However the SEM analysis found that vending machine restrictions had a statistically significant deterrent effect on the amount smoked. **Global results** Not applicable	**Authors' conclusions** Using the structural analysis approach, this found evidence that government policies can have a substantial impact on adolescent risk behaviour. The effects of state policies on smoking participation are similar to those published in previous studies. **Reviewers' comments** The data sample was not nationally representative of US teenagers. The results of the SEM analysis appear to have been confirmed by further modelling. The models did not account for many confounding factors and could have missed important factors that may influence teenage behaviour.

Study details	Methods	Results	Conclusions
Borren (1992)[60] **Study design** Econometric analysis **Objectives** To re-evaluate the question of whether increases in cigarette taxation are regressive by extending the study by Townsend [59] using additional data. In addition, to analyse female smoking behaviour to determine if social class smoking behaviour is similar between the sexes **Setting** UK **Intervention** Price, health publicity **SES outcomes reported:** Gender, social class (UK gradings)	**Data sources** Average weekly cigarette consumption from Tobacco Advisory Council surveys (1961-87). Consumption by social class for men was estimated from published data and results from Townsend as survey data was not available for all years. Only years with available consumption by social class for women were used and estimated as if it were cross-sectional data. Cigarette price data obtained by dividing expenditure at current prices by that at 1980 prices, then deflating by an all items price index. Personal disposable income data from the Monthly Digest of Statistics. **Data description** Number= approximately 10,000. **Analysis methods** ***Model****:* single equation time-series model assuming demand is log linear. Separate equations by socioeconomic group and gender. Wald tests were used to compare price elasticities between social classes. ***Outcome variables***: average cigarette consumption per week per adult. ***Explanatory variables****:* annual disposable income; price index for cigarettes; price index for consumer expenditure; health education events (publication of reports by the Royal College of Physicians in 1962, 71, 77 and 83; television advertising ban in 1965); time (for changes in taste over time).	**Stratified results** ***Men by socioeconomic class*** Price elasticity [** p<0.01, *p<0.05] 1: -0.69* 2: -0.48* 3: -0.84** 4: -0.89** 5: -0.31 There was no obvious pattern of increasing price elasticity across social class. The middle income classes (3 and 4) seemed to be most affected by price. Health publicity had little effect and only appeared to have a statistically significant impact on social class 3. Differences between elasticities were only significant at the 10% level for social class 2 compared with 4; and 3 and 4 compared with 5. ***Women by socioeconomic class*** Price elasticity [** p<0.01, *p<0.05] 1: -1.04** 2: -0.93** 3: -0.65** 4: -0.85** 5: -0.45* There were no obvious patterns between social classes although elasticities were higher for social classes 1 and 2. As the analysis for women was cross-sectional, time represents the effect of the sample being interviewed in different years. Time was negative and statistically significant for social classes 1, 2 and 3, suggesting health awareness may have been most effective in higher social classes. Differences between elasticities were only significant at the 10% level for social class 2 compared with 5. **Global results** Not applicable.	**Authors' conclusions** Price and time appear to have the most influence on smoking across all social classes. Income and health publicity 'shocks' did not have a significant effect on consumption. The results of this analysis provide no evidence of a gradient in price responsiveness across social classes and contradict earlier findings.[59] **Reviewers' comments** The data was nationally representative of the UK adult population. Sample sizes for each model, or baseline summary statistics were not provided. Most of the models appeared to be a good fit to the data (more so for men than for women). The results of significance testing to compare elasticities between social classes may be unreliable because of multiple significance testing.

Study details	Methods	Results	Conclusions
Chaloupka (1992)[48] **Study design** Econometric analysis **Objectives** To assess the impact of clean indoor air laws on cigarette demand **Setting** US **Intervention** Legislation (clean air), price increases **SES outcomes reported** Gender	**Data sources** Second National Health and Nutrition Examination Survey (1976-80) a national survey of people aged 6 mths to 74 yrs. Those aged 18 and above provided data on health, diet, alcohol, and cigarette consumption. Indicator variables for laws based on Surgeon General reports (1986, 1989). Cigarette price was a weighted average of the 'border' price (to account for border crossing) and the local state price for a pack of 20 (inclusive of state sales and local excise taxes). Prices and taxes were deflated by the monthly Consumer Price Index and a local price index. **Data description** Number=14,305 (full sample); 7,946 (ever smokers, i.e. current and former); 6,569 (men); 7736 (women) **Analysis methods** ***Model****:* Becker-Murphy model of rational additive behaviour was used to model demand. Four models were developed for different addictive stock depreciation rates. ***Outcome variables***: current cigarette consumption. ***Explanatory variables****:* current, past (one year lag) and future (one year lead) prices; past and future consumption; indicator variables for each type of law: nominal (restrictions in 1 to 3 public places excluding restaurants and private worksites), basic (as for nominal but applying to 4 or more places), moderate (restrictions at restaurants but not worksites), extensive (restrictions at worksites); age, race, family income, educational attainment, marital and labour force status.	**Global results** ***Clean air laws*** Only the basic and moderate clean air laws were found to have a statistically significant negative effect on cigarette consumption in most of the models for the full sample, and ever smokers. ***Price*** Long-run price elasticities of demand were in the range -0.36 to -0.27 for the full sample and -0.44 to -0.33 for ever smokers. Current cigarette price was found to have a negative and statistically significant (in most models) impact on average cigarette consumption. **SES results** ***Men*** Increased cigarette prices led to a statistically significant reduction in consumption with a long-run price elasticity of -0.49 Men in states with clean air laws were found to smoke significantly less than their counterparts in states with no restrictions. Basic and moderate laws appeared to have the most effect with increased restrictiveness leading to less smoking. ***Women*** Cigarette prices were also found to have no impact on consumption for women (elasticity not significantly different from zero). Neither the presence of a law, or any single law had any statistically significant effect on consumption for women.	**Authors' conclusions** The passage of a clean air indoor law has a negative effect on average cigarette consumption. However these results suggest that increasing the restrictiveness beyond a basic level does not appear to have a greater impact on consumption. Increased cigarette prices resulting from increased excise taxes on cigarettes were found to have a significant negative impact on average consumption, affecting the behaviour of men but having no impact on the smoking behaviour of women. **Reviewers' comments** Descriptive statistics (means, SDs) were provided for the main variables (laws, consumption, price). The authors attempted to adjust for other possible confounding factors.

Study details	Methods	Results	Conclusions
Chaloupka (1991)[49] (analysis of same data as Chaloupka (1992)[48] **Study design** Econometric analysis **Objectives** To test the predictions of the Becker-Murphy model using micro data and to estimate the price elasticity of demand for cigarettes based on individual data **Setting** US **Intervention** Price increases **SES outcomes reported** Education, age	**Data sources** Second National Health and Nutrition Examination Survey (1976-80) a national survey of people aged 6 mths to 74 yrs. Those aged 18 and above provided data on health, diet, alcohol, and cigarette consumption. Indicator variables for laws based on Surgeon General reports (1986, 1989). Cigarette price was a weighted average of the 'border' price (to account for border crossing) and the local state price for a pack of 20 (inclusive of state sales and local excise taxes). Prices and taxes were deflated by the monthly Consumer Price Index and a local price index. **Data description** Number=14,305 (full sample); 7,946 (ever smokers, i.e. current and former); 6,569 (men); 7736 (women) 5,111 (current smokers) 5,665 (less than a high school education) 8,640 (at least a high school education) 2,575 (young adult 17-24) **Analysis methods** ***Model****:* Becker-Murphy model of rational additive behaviour was used to model demand. Four models were developed for different addictive stock depreciation rates. ***Outcome variables***: current cigarette consumption. ***Explanatory variables****:* current, past (one year lag) and future (one year lead) prices; past and future consumption, age, race, family income, educational attainment, marital and labour force status.	**Stratified results** ***Less than a high school education*** Long-run price elasticities ranged from -0.62 to -0.59 ***At least a high school education*** Long-run price elasticities ranged from 0.14 to 0.27 Individuals with fewer years of formal education were relatively responsive to price, and more educated individuals were unresponsive to price changes. ***Age*** Young adults (aged 17-24) were insensitive to price changes with long-run price elasticities ranging from -0.10 to 0.05. Older adults (25-64) were found to be sensitive to price changes which contradicts the findings of Lewit et al. **Global results** Long-run price elasticities of demand ranged from -0.36 to -0.27 for the full sample; -0.48 to -0.35 for ever smokers; and -0.89 to -0.30 for current smokers.	**Authors' conclusions** The estimates from these models support the hypotheses that cigarette smoking is an addictive behaviour; that individuals do not behave myopically; and that increasing the price of cigarettes by increasing taxes would effectively reduce smoking. The strong effects of past consumption and weak effects of future consumption amongst younger or less educated individuals support the view that these groups behave myopically (addictively). People with less education will be more responsive in the long run to changes in price. **Reviewers' comments** The authors attempted to adjust for other possible confounding factors.

Study details	Methods	Results	Conclusions
Chaloupka (1995)[51] **Study design** Econometric analysis **Objectives** To examine the effectiveness of several tobacco control policies in discouraging cigarette smoking in young adults **Setting** US **Intervention** Price, restrictions in public places and work sites, limits on availability of tobacco **SES outcomes reported** Age (college students), gender	**Data sources** Demographic, cigarette smoking and binge drinking data from the Harvard College Alcohol Study (1993). Price data (including taxes) for each city from American Chamber of Commerce Researchers' Association quarterly report and deflated by the local cost-of-living index. State and local tobacco control policy data from NCI monograph of all known ordinances at mid-1992. **Data description** Number= 16,277 (full sample); 13,611 (restricted sample accounting for cross-border shopping); 6,972 (male); 9,305 (female); mean age 21. **Analysis methods** ***Model****:* ordered probit models (categorical consumption); two-part model of demand (probit methods to estimate smoking participation followed by ordinary least squares modelling of average daily consumption by smokers). ***Outcome variables***: smoking participation (whether or not smoked in past 30 days); frequency of consumption; average daily consumption (categorical: none, light (< 9 cigarettes/day), moderate (10-19), heavy (>1 pack); and as a continuous measure). ***Explanatory variables****:* price; smoking restrictions (workplace, smoking, retail, school, other public place); minimum purchase age; vending machine restrictions; free sample restrictions; tobacco licensing ordinances; age; gender; race; marital status; religious activity; parental education; characteristics of the college/university.	**Stratified results** ***Price-all*** Full sample -0.62 (participation) -0.85 (quantity smoked by smokers) -1.46 (overall demand) Restricted sample -0.71 (participation) -0.69 (quantity smoked by smokers) -1.40 (overall demand) Cigarette price had a statistically significant negative effect, reducing both smoking participation rates and the numbers of cigarettes smoked in all models. ***Men*** -0.45 (participation) -1.19 (quantity smoked by smokers) ***Women*** -0.68 (participation) -0.57 (quantity smoked by smokers) No significant gender related differences were observed. Smoking participation decisions were more price sensitive for women, whereas average consumption was more price sensitive for men. ***Smoking restrictions*** ***All*** Restrictions in restaurants had a statistically significant negative effect (at the 10% significance level) on participation and level of smoking, but not on quantity smoked by smokers. Restrictions in other public places had a statistically significant negative effect on the quantity smoked by smokers. ***Gender*** School based restrictions and restrictions in other public places both had a statistically significant negative effect on smoking participation of young men, but not young women. ***Youth access restrictions*** ***All*** None of the variables representing limitations for youth access had a statistically significant impact on cigarette demand. ***Gender*** Restrictions on youth availability did not have a statistically significant impact on smoking behaviour of young men or young women. **Global results** Not applicable.	**Authors' conclusions** Higher cigarette excise taxes would lead to substantial reductions in smoking participation and cigarette consumption amongst US college students. Cigarette smoking amongst youths is more responsive to price than for adults. **Reviewers' comments** The data was from a nationally representative survey of US students at colleges and universities. The variables used in the analysis were well described and appropriate summary statistics provided.

Study details	Methods	Results	Conclusions
Chaloupka (1996)[78] **Study design** Econometric analysis **Objectives** To assess the effectiveness of several tobacco control policies in discouraging cigarette smoking amongst young people **Setting** US **Intervention** Tax, smoking restrictions in public places; restrictions on availability to youth **SES outcomes reported** Young people	**Data sources** Cigarette smoking and demographic data from the Monitoring the Future surveys of 8th, 10th and 12th.grade students (1992-4). State cigarette prices from 'The Tax Burden on Tobacco' (Tobacco Institute) and deflated by National Consumer Price Index. State level tobacco control policy data from 'State Legislated Actions on Tobacco Issues' (CSH annual publication). County and city level restrictions from National Cancer Institute monograph (1993b). **Data description** Number=110,717; restricted sample (to account for boot-legging 75,090); mean (SD) age 16.1 (1.82); 48% men; 12% black; 27% live in rural area. **Analysis methods** ***Model****:* two-part model of demand with probit methods used to estimate participation followed by ordinary least squares regression of average daily consumption by smokers. Modelled all data and a restricted sample to account for bootlegging which dropped all those living within 25 miles of a state with lower prices. ***Outcome variables***: participation (whether or not smoked in last 30 days); average daily cigarette consumption. ***Explanatory variables****:* price; state/county/city level restrictions on smoking in public places/work sites (five variables for fraction of population subject to restrictions in private workplaces, restaurants, retail stores, schools, or any other place); restrictions on availability to youths (state minimum purchase age, signs displaying minimum purchase age, fraction of population subject to restrictions on vending machine sales, limits on free sample distribution, licensing for tobacco vendors); age; average weekly income; year of survey; school grade; race (black, other); parental education; family structure; mother's work status; siblings; average number of hours worked weekly; living in rural area; participation in religious services.	**Stratified results (young people only)** ***Price elasticity*** Full sample (price only model) -0.799 (participation) -0.651 (quantity smoked by smokers) -1.450 (overall demand) Full sample (full model including restrictions) -0.376 (participation) -0.470 (quantity smoked by smokers) -0.846 (overall demand) Restricted sample (price only model) -0.923 (participation) -0.779 (quantity smoked by smokers) -1.702 (overall demand) Restricted sample (full model) -0.602 (participation) -0.652 (quantity smoked by smokers) -1.254 (overall demand) The overall estimate of elasticity was -1.313 which is about 3 times other published estimates for adults ***Tobacco restrictions*** Strong restrictions on smoking in private workplaces, restaurants or retails stores had a negative and statistically significant impact on the probability of youth smoking when assessed individually. When they were all included in the model, only smoking restrictions in workplaces remained statistically significant although these restrictions did not affect daily consumption. Restrictions on the availability to youths had little impact on youth smoking. **Global results** Not applicable.	**Authors' conclusions** Tobacco control policies, including higher excise taxes, can be effect in reducing cigarette smoking amongst youths. The average price elasticity of demand of -1.313 indicates than large increases in taxes, through price rises would lead to sharp reductions in youth smoking. **Reviewers' comments** Data were taken from a nationally representative survey of high-school seniors. Summary statistics (mean, SD) of all the variables were provided. The authors adjusted for a large number of other factors affecting smokeless tobacco demand. The results of various models were presented and their shortcomings discussed, the final estimate was an average of the total elasticity across four different models.

Study details	Methods	Results	Conclusions
Chaloupka (1997)[79] **Study design** Econometric analysis **Objectives** To assess the effectiveness of tobacco control policies in discouraging smokeless tobacco use among male adolescents **Setting** US **Intervention** Smokeless tobacco tax, various tobacco restrictions **SES outcomes reported** Adolescent men.	**Data sources** Current and past smokeless tobacco use and demographic data from the Monitoring the Future surveys of 8th, 10th and 12th.grade students (1992-4). State level taxes from 'The Tax Burden on Tobacco' (Tobacco Institute 1995) and expressed as % of wholesale price. Two variables to account for cross-border shopping were used for living within 25 miles of either a state with lower taxes; or Alabama. **Data description** Number=19,581; mean (SD) age 15.61 (1.59); 10% black; 24% live in rural area; 100% men. **Analysis methods** ***Model****:* ordered probit models of frequency of consumption. Two-part model of demand with probit methods used to estimate participation followed by ordinary least squares regression of average monthly consumption. ***Outcome variables***: frequency of smokeless tobacco consumption (number of times consumed in last 30 days); participation (whether or not consumed in last 30 days); average monthly consumption. ***Explanatory variables****:* tax; tobacco control policies (state legal minimum purchase age; restrictions on free samples; vendor penalties for supplying to minors; signs in stores displaying minimum purchase age for tobacco); age; average weekly income; year of survey; race (white, black, other); parental education; familty structure; mother's work status; siblings; average number of hours worked weekly; living in rural area; participation in religious services.	**Stratified results (young men only)** **Tax** Smokeless tobacco tax had a statistically significant negative effect on frequency of consumption and participation, but not on smokeless tobacco use by users. Estimates of overall tax elasticity ranged from -0.057 to -0.097. **Price** The overall price elasticity was -0.592., suggesting that increases in the price of smokeless tobacco would significantly reduce consumption by young men. (NB: price elasticities were calculated from tax elasticities by assuming a one cent increase in tax results in a one cent increase in price, and that taxes are 13% of the retail price). ***Tobacco restrictions*** Minimum legal purchase age and the presence of strong tobacco licensing provisions had a statistically significant negative effect on all measures of smokeless tobacco consumption. Free sample restrictions and signs displaying minimum purchase age had a statistically significant negative effect on participation, and frequency of use but not use by users. **Global results** Not applicable.	**Authors' conclusions** Tobacco control policies such as higher smokeless tobacco taxes; higher minimum legal purchase ages; strong licensing provisions; restrictions on free sample distribution; and display of minimum purchase age signs are effective in reducing adolescent male smokeless tobacco use. **Reviewers' comments** Data were taken from a nationally representative survey of high-school seniors. Summary statistics (mean, SD) of all the variables were provided. The authors adjusted for a large number of other factors affecting smokeless tobacco demand.

Study details	Methods	Results	Conclusions
Chaloupka (1999)[76] **Study design** Econometric analysis **Objectives** To determine if there are differences in young peoples responsiveness to price and tobacco control policies and if these differences can explain sex and racial differences in smoking prevalence trends **Setting** US **Intervention** Price, tobacco control policies (various) **SES outcomes reported** Age (13-18), gender, race	**Data sources** Smoking prevalence and other demographic data for young people aged 13-18 from Monitoring the Future surveys (1992-4). Cigarette price per pack of 20 and tobacco control policies per state from 'The Tax Burden on Tobacco' (Tobacco Institute annual publication). State-level policies data from 'State legislated actions on tobacco issues' (Coalition on Smoking or Health). County and city-level policies from National Cancer Institute's Monograph. A variable to account for cross-border shopping was created representing the largest price difference between a person's state of residence and states within 25 miles. **Data description** Number=53,209 (male); 57,508 (female); 74,745 (white); 12,897 (black) **Analysis methods** ***Model****:* probit regression models (maximum likelihood). As tobacco policies were highly correlated each model was estimated five times, once with price only and four with price and each of the tobacco control variables. Standard errors were corrected for clustering within a state. ***Outcome variables***: smoking prevalance (whether or not smoked in previous 30 days). ***Explanatory variables****:* price; state tobacco control policies (setting aside tax revenues for anti-tobacco activities, having smoker protection legislation); clean indoor air restrictions (sum of five factors representing restrictions in work sites, restaurants, shops, schools, other public places); youth access restrictions (sum of five factors representing minimum purchase age of 18, point-of-sale signage, vending machine and free sample restrictions, vendors need a license to sell tobacco); gender; race (white, black, other); age; average weekly income; grade (8^{th}, 10^{th}, 12^{th}); marital status; parental education; family structure; siblings; hours worked per week; place of residence (rural, urban); participation in religious services; year (to account for differences in smoking rates across time).	**Stratified results (by gender and race)** **Price** Price elasticity (average of all models) [*** p<0.01, **p<0.05, *p<0.10]] ***Men*** -0.93*** (all) -0.86*** (white) -1.65*** (black) ***Women*** -0.60** (all) -0.45** (white) -0.45 (black) ***White*** -0.64***(all) ***Black*** -1.11* (all) ***Tobacco control policies*** ***Earmarking of tax revenue*** Using tax revenue to promote anti-tobacco activities had a statistically significant negative effect (decreased smoking prevalence) on young men and young women but only for young white people. **Smoker protection laws** These had a statistically significant positive effect for young black men only, and a positive (although not significant) effect on black women. **Clean indoor air laws** These had a statistically significant negative effect on young white men only. **Youth access laws** Stricter youth access laws significantly decreased (at the 10% significance level) smoking prevalence amongst young black people. **Global results** Not applicable.	**Authors' conclusions** Different youths respond differently to changes in price and public policies. Significant differences exist by sex and race. Young men are more responsive to price changes than young women. Smoking rates amongst young black men are more responsive to price changes than young white men. Smoking rates among young whites are more responsive than amongst young blacks to anti-tobacco activities and clean indoor air restrictions. However, smoker protection laws and youth access restrictions influence young blacks but not whites. **Reviewers' comments** Data were taken from a nationally representative survey of high-school seniors. Summary statistics (mean, sd) of the main variables were provided for each socioeconomic subgroup. The authors provided a good description of the variables and analysis methods used, and also ran separate models to account for correlation between policies. This analysis only measures the existence of anti-smoking policies and not their enforcement.

Study details	Methods	Results	Conclusions
Colman (2005)[52] **Study design** Econometric analysis **Objectives** To perform vertical equity calculations that incorporate differential price sensitivity by income, into traditional cigarette tax progressivity calculations **Setting** US **Intervention** Price **SES outcomes reported** Income	**Data sources** Tobacco use data from Current Population Survey (CPS) Tobacco Use Supplements was merged with income data from CPS March Income Supplements, using household identifiers. Final dataset contained 5 pooled cross-sections for 1993, 96, 99, 2001 and 2002. Cigarette prices (dollars per cigarette) and taxes from The Tax Burden on Tobacco and converted to real 1997 prices using Consumer Price Index. **Data description** Number=approximately 460,000; mean age 45 years; mean household income $16,131 (low), $41,449 (middle), $99,325 (high); 53% female; 33% high school education; 27% some college; 11%(non-Hispanic black; 4% non-Hispanic other; 9.5% Hispanic. **Analysis methods** ***Model****:* Two-part model of demand with an initial linear probability model (ordinary least square (OLS)) followed by OLS regression model of consumption amongst smokers. Interactions between price and income were included to look at the effects of price on different income levels. A linear time trend was included to control for national trends in smoking behaviour. Robust standard errors were used to account for clustering at the state-level. Models were also estimated using probit methods; using tax rather than price; and stratified by income groups. ***Outcome variables***: smoking participation (whether or not smoke); consumption amongst smokers (number smoked per day); consumption amongst sporadic smokers (on how many of previous 30 days did they smoke). ***Explanatory variables****:* cigarette price; household income (as a continuous variable and split into terciles); education (high school, some college, college graduate, more than college); age; race (Hispanic, non-Hispanic black; non-Hispanic other); index for state restrictions on indoor smoking.	**Stratified results** **Price** ***Low income group*** Median of individual price elasticities -0.200 (participation) -0.055 (consumption) -0.262 (total elasticity) ***Middle income group*** Median of individual price elasticities -0.127 (participation) -0.046 (consumption) -0.176 (total elasticity) ***High income group*** Median of individual price elasticities -0.024 (participation) -0.031 (consumption) -0.055 (total elasticity) Price had a negative and statistically significant effect on the decision to smoke and the price-income interaction was positive and significant suggesting that those with a higher income are less price-sensitive. For consumption by smokers price did not have a significant effect, and consumption did not vary significantly with income. **Tax** Simulations showed that a $1 per pack tax increase would cause declines in smoking participation of 2% amongst the low income group, 1.3% for the middle income, and approximately zero amongst the high income group. **Global results** Not applicable.	**Authors' conclusions** This analysis found that although participation elasticity does fall with income, the differences between the income groups were modest and the price sensitivity of consumption amongst smokers was essentially flat (didn't alter with income). Elasticities in this study were smaller than those previously reported, with the low income group being not particularly price-sensitive with a total elasticity of only -0.26. **Reviewers' comments** Data were taken from surveys conducted by the US Census Bureau. Summary statistics (mean, sd) of all the variables were provided. The authors provided a thorough description of their modelling methods, accounted for clustering, and discussed differences to the results caused by modifications to the analysis.

Study details	Methods	Results	Conclusions
Czart (2001)[80] **Study design** **Objectives** To estimate the demand for cigarettes as a function of price, smoking regulation policies, and an array of sociodemographic variables **Setting** US **Intervention** Price, college-level and state/city-level smoking restrictions **SES outcomes reported** Young people (college students)	**Data sources** Smoking behaviour and socioeconomic/demographic data from the 1997 Harvard School of Public Health College Alcohol Survey, a nationally representative sample of 130 randomly selected 4-year colleges or universities. State average price for pack of 20 cigarettes from 'The Tax Burden on Tobacco' (Tobacco Institute). Campus tobacco policies from the school administrator component of the same survey. **Data description** Number=15,148; mean (SD) age 21 (2.2); 60% female; 6% black; 7.5% Asian; 8% Hispanic; 24% current smokers. **Analysis methods** ***Model****:* ordered probit regression models to estimate frequency of consumption. Two-part models of demand (quantity smoked) with logistic regression to model the probability of smoking (participation), followed by OLS regression of the average daily consumption of smokers. Standard errors were adjusted for clustering within school. ***Outcome variables***: smoking participation (whether or not has smoked in past 30 days); frequency of consumption (ordered categorical: 0 (non-smokers); 1 (<1 cigarette/day); 2 (up to half a pack/day); 3 (more than half a pack/day); actual consumption (semi-continuous measure). ***Explanatory variables****:* cigarette price; age; gender; race (white, black, Asian, Native American); ethnicity (Hispanic or not); marital status; religious status; parental education; sorority membership; on-campus living; student employment and income; type and region of college; campus tobacco policy (prohibited areas, campus cigarette availability on campus, campus advertising); state-level restrictions (workplaces; restaurants, retail, other public places); presence of a clean-indoor air law.	**Stratified results** **Price** [* p<0.1, ** p<0.05, *** p<0.001] Coefficient for model containing price only -0.0013** (frequency of consumption) 0.9983* (participation) -0.0032** (amount smoked by smokers) These results remained similar for models containing socioeconomic variables and the various levels of smoking restrictions. The effects of price became larger and more statistically significant when campus-level restrictions were added to the model. ***State-level smoking restrictions***. Restrictions on smoking in workplaces, restaurants, retails stores or other public places did not have any effect on student smoking behaviour. When all measures were collapsed into a single index for the number of restrictions present, the amount and frequency of cigarettes smoked were both statistically significantly negatively affected by the strength of the restrictions. ***College-level restrictions*** It was not possible to draw strong conclusions as the effects of college-level smoking restrictions were mixed. **Global results** Not applicable.	**Authors' conclusions** These results provide evidence to support the argument that higher cigarette prices discourage smoking participation and the level of smoking amongst young adults. **Reviewers' comments** Data were taken from a nationally representative survey of college students. Summary statistics (mean, sd) of all the variables were provided. Price elasticities were not reported.

Study details	Methods	Results	Conclusions
DeCicca (2002)[81] **Study design** Econometric analysis **Objectives** To examine the impact of taxes on the onset of youth smoking, and to explore the relationship between schooling and smoking **Setting** US **Intervention** Tax **SES outcomes reported** Young people (American 8th to 12th grade)	**Data sources** Cross-sectional and panel data on smoking and socioeconomic data from the National Education Longitudinal Study (1988, 90, 92), provided smoking data for American 8th grade students. Only students with data from 8th, 10th and 12th grade (all 3 surveys) were included. State excise tax data from 'The Tax Burden on Tobacco' (1999). State legislation data from 'Tobacco Control Laws: Implementation and Enforcement' (Jacobson and Wasserman 1997). **Data description** Number=13,316 (8th grade); 13,132 (10th grade); 12,889 (12th grade). **Analysis methods** ***Model****:* ordered probit regression model of amount smoked, accounting for clustering within a state. Separate models for each grade. ***Outcome variables***: amount smoked (ordered categorical: 0; 1-5; 6-10; 11-40; 40+) (<1 cigarette/day); 2 (up to half a pack/day); 3 (more than half a pack/day); actual consumption (semi-continuous measure). Smoking onset between grades 8 and 10, and grades 8 and 12. ***Explanatory variables****:* state cigarette tax (cents); change in tax from 1988 to 92 (for analysis of smoking onset); youth smoking restrictions; restrictions in public places; legislation banning discrimination amongst smokers; race; gender; rural residence; region; family size; religion; academic achievement; parental education and occupation; family income; parental marital status.	**Stratified results** **Tax** Cigarette taxes had a statistically significant negative effect on consumption for 8th, 10th and 12th grade students. The estimated reductions in smoking participation for a \$0.20 tax increase per pack was 1.6% for 8th grade, 2.8% for 10th grade and 1.7% for 12th grade. Price elasticities (for \$0.20 tax increase) -2.03 (8th grade) -1.31 (10th grade) -0.72 (12th grade) ***Smoking onset*** From models of 10th and 12th grade students which excluded 8th grade smokers, the price elasticity assuming a \$0.20 increase in tax was -0.9 (for smoking onset between 8th and 10th grades) and -0.46 (for onset between 8th and 12th grades, although not significant). Alternative models all found a statistically insignificant effect of taxes on the onset of youth smoking. **Global results** Not applicable.	**Authors' conclusions** Treating the data as three separate cross-sections produced results for the effect of cigarette tax increases on youth smoking that are comparable to previous studies. Modelling smoking onset between 8th and 12th grades suggested that cigarette taxes and smoking onset were not strongly related. **Reviewers' comments** The analysis was restricted to students with data in all three cross-sectional surveys therefore allowing more direct comparisons. No summary statistics of demographic data were provided, other than the amount smoked.

Study details	Methods	Results	Conclusions
Delnevo (2004)[53] **Study design** Cross-sectional survey **Objectives** To determine if cigarette smokers in New Jersey substituted cigars following a cigarette excise tax increase **Setting** US **Intervention** Tax **SES outcomes reported** Gender, race, education level.	**Data sources** Smoking data from New Jersey's Adult Tobacco Survey (2001 and 2002), a random sample with telephone surveys and extended interviews (co-operation rates of 79.4% (2001) and 50.4% (2002)). The 2002 survey was conducted after a large cigarette excise tax increase in 2001 ($0.80 to $1.50 per pack) **Data description** Number=3,930 (2001); 4,004 (2002). **Analysis methods** ***Model****:* multivariate logistic regression to assess factors predictive of ever and current cigar use. Odds ratios (OR) and 95% confidence intervals (95% CI) and the prevalence of cigar smoking were reported. ***Outcome variables***: cigar use: ever, current (now smoking cigar every day or some days). ***Explanatory variables****:* current cigarette smoking status (never, former, recent quitter, current); age, race (white, black, Hispanic, other), gender, level of education (less than high school, high school, some college, college graduate, some graduate school or degree).	**Stratified results** **Gender** In 2002 (after the tax increase) men had statistically significantly increased odds of being a current cigar smoker (OR 6.19, 95% CI: 3.73, 10.29) compared with women, although this was lower than the result for 2001 (OR 13.67, 95% CI: 8.1, 23.07). The prevalence of current cigar smoking for men reduced from 13.3% to 10.4% (2001 to 2002) but increased from 1.2% to 1.7% for women although both non-significant. ***Race*** After the tax increase, black (OR 0.36, 95% CI: 0.17, 0.80) and Hispanic (OR 0.45, 95% CI: 0.22, 0.92) adults were significantly less likely to be current cigar smokers than white adults. The actual change in prevalence of current cigar use reduced slightly for whites (8.3% to 6.6%) but increased slightly for black (2.9% to 3.1%), Hispanic (3.1% to 4.6%) and other races (2.6% to 4.3%), all non-significant changes. **Education** No statistically significant results for education level were observed. **Global results** Following the tax increase prevalence of cigarette smoking fell from 22.1% to 18% in New Jersey with 1.6% of the adult population reporting that they quit since the increase. Recent quitters of cigarettes had the greatest increase in current cigar use (2.6% to 11.1%), all other categories of cigarette use saw a reduction in current cigar smoking.	**Authors' conclusions**. Patterns of cigar use were consistent with those of previous studies with men, whites and those with greater education with higher rates of ever and current use. The results from New Jersey suggested that after a cigarette excise tax increase, a small but notable proportion of recent cigarette quitters tried cigars, changed to cigars, or remained tobacco users but in the form of cigars. **Reviewers' comments** The data was from two cross-sectional surveys conducted before and after the tax increase. Results for the change from cigarettes to cigars were not reported by socio-economic groups. Limitations were that the data was based on self-report, the tobacco products may have only been used temporarily, it was not possible to determine if recent quitters started cigars after quitting cigarettes or had remained cigar users.

Study details	Methods	Results	Conclusions
Ding (2004)[54] **Study design** Econometric analysis **Objectives** To examine the success that taxation and price increases could have on limiting cigarette consumption **Setting** US **Intervention** Price **SES outcomes reported** Young people (8th to 12th grade; and aged 18-24), gender, race.	**Data sources** Smoking data for adults and young people (18-24) from the National Health Interview Survey (CDC) which provided data on number of cigarettes smoked per day for 1974, 1978-80, 1983, 1985, 1987-88, 1990-95. Youth prevalence for cigarette use from CDC whose source was the Monitoring the Future Project (1976-1998). Time-series data for adult consumption from 1970-2000 from 'The Tax Burden on Tobacco' (Tobacco Institute, 2001) and the US Dept. Agriculture from 1970 to 1995 and 1996 to 2001. Average retail price per pack from 'The Tax Burden on Tobacco' (2000) and adjusted using the consumer price index to account for the effects of inflation. **Data description** Number=NR; data from Monitoring the Future was young people 8th to 12th grade, CDC data ages 18-24. **Analysis methods** ***Model****:* Log-log regression model (using ordinary least squares). ***Outcome variables***: Four separate outcomes were modelled: adult cigarette consumption; youth smoking prevalence (% of youths who had smoked in past 30 days); adult level of smoking (<15 cigarettes per day, 15-24, 25 or more); and youth history of smoking (current, former, never). ***Explanatory variables****:* price.	**Stratified results** Price elasticity (*p<0.05) for % of youths that smoke **Overall** -1.41 ***Men*** 0.29 ***Women*** -2.98* ***White*** 0.89 ***Black*** -9.11* ***Hispanic*** -2.01* Young women were more responsive to price changes than young men. Black and Hispanic youths were more responsive to price changes than white youths. **Youth smoking history** Price increases can lead to the deterrence of smoking, by reducing the number of current smokers (elasticity -4.74, p<0.05), former smokers (elasticity -0.80, p<0.05) and increasing the number who had never smoked (elasticity 5.53, p<0.05). **Global results** For adult consumption the price elasticities were -0.15 and -0.19 (depending on the data source, both p<0.05).	**Authors' conclusions**. Youths are quite responsive to price increases with an estimated 14% decrease in the prevalence of smoking for a 10% increase in price. However the adult population was less responsive to price, with a 2% decrease in prevalence for a 10% increase in price. Taxation is an effective means of socially-enacted preventive medicine in deterring youth smoking. **Reviewers' comments** Data for smoking have been taken from a number of sources, and the youth data appear to have come from nationally representative sources. However, details of the sample sizes and summary statistics were not provided. The authors' point out that their results present 'an optimistic picture for the effectiveness of taxation on the youth population of smokers', as they are assuming that the historic time-series data used in their analyses remains reflective of current youth cigarette consumption.

Study details	Methods	Results	Conclusions
Emery (2001)[82] **Study design** Econometric analysis **Objectives** To use data from a 1993 national survey on youth smoking to explore if adolescents' price responsiveness varies by smoking experience **Setting** US **Intervention** Price **SES outcomes reported** Adolescents (aged 10-22)	**Data sources** Smoking data from the follow-up phase of the longitudinal teenage attitudes and practices survey (1993). This interviewed adolescents (aged 10-22) by telephone or at home, from the 1988 National Health Interview Survey from 48 States plus Columbia. Average price per pack per state from the Tobacco Institute and adjusted by the consumer price index. The price for November 1992 was used in analysis as this was before a cigarette price decrease which occurred in April 1993. **Data description** Number=9,166 (all subjects over 14); 526 (experimenters aged 10-13); 5,368 (experimenters over 14); 2,073 (current smokers over 14); 1,630 (established smokers over 14). **Analysis methods** ***Model****:* two-part model of demand, modelling smoking participation, followed by the amount smoked by smokers. ***Outcome variables***: Participation (whether or not smoked); amount smoked by smokers (current or established using the average of the number smoked per day for each of the 7days before the survey). Separate models for experimenters (had tried smoking but smoked <100 cigarettes in total); current (smoked in last 30 days); and established smokers (smoked in last 30 days and smoked >100 cigarettes in lifetime). ***Explanatory variables****:* price; state-level tobacco control activities; gender; race; rural residence; lives with single parent; not living with parents; religiousness; employment; weekly income; parental education; household income; set of psycho-social variables including family smoking and belief that it is easy to get cigarettes.	**Stratified results** Price elasticity ***Current smokers aged 14+*** -0.83 (participation) -0.87 (amount smoked) -1.70 (total) ***Established smokers aged 14+*** -1.56(participation) -0.68 (amount smoked) -2.24 (total) Price had a statistically significant negative effect ($p<0.05$) on both participation and amount smoked for current and established smokers aged 14 or over. Price did not have a significant effect on smoking experimentation by 10-13 year olds or those aged 14 or over. **Global results** Not applicable.	**Authors' conclusions** Adolescent experimenters seem unaffected by cigarette prices, which suggest that different public policy approaches are needed that specifically address smoking experimentation. Results for current and established smokers suggest that higher cigarette prices may slow down progression from higher levels of experimentation to established smoking. **Reviewers' comments** Data were a national cross-section of adolescents. Summary statistics were provided although little detail of the modelling was reported other than it was a two-part model. Included other tobacco control policies (full results not provided) but no single tobacco control policy was associated with adolescent smoking.

Study details	Methods	Results	Conclusions
Evans (1998)[47] **Study design:** Econometric analysis **Objectives** To test whether smokers alter their smoking habits in the face of higher taxes **Setting** US **Intervention** Tax increases **SES outcomes reported** Age	**Data sources** Smoking supplement (1979) and Cancer Control supplement (1987) from National Health Interview Survey, a nationally representative sample of adult civilian, non-institutionalised population. These contained data on state of residence, number of cigarettes smoked, plus brand, tar and nicotine content, length of cigarette and type of filter. Data on state excise tax rates and average cigarette prices from 'The Tax Burden on Tobacco' (Tobacco Institute annual publication). **Data description** Number=24,092 (1979); 22,043 (1987) SES results for young adults based on 1987 data only (n=2,806). **Analysis methods** ***Model****:* "two-part" model: a probit model of the decision to smoke followed by a simple linear regression (OLS) of cigarette demand amongst smokers. ***Outcome variables***: binary variable for if a person is a smoker or not; average number of cigarettes smoked per day; plus six other measures including cigarette length, mm smoked; total and average tar and nicotine content. ***Explanatory variables****:* excise tax per pack (state and federal) and price per pack (in constant 1982-4 cents); age; income (value or missing); family size, region; city size; race; marital status and gender.	**Stratified results (from 1987 data)** ***Age 18-24 (young adults):*** Price elasticity for tax Decision to smoke: -0.58 Amount smoked: -0.22 Length: -0.02 MM smoked: -0.11 Ave. nicotine per cigarette: 0.42 Ave. tar per cigarette: 0.46 Total daily nicotine: 0.70 Total daily tar: 0.79 The results for young adults show that most of the overall response observed is generated by the behaviour of young adults. The level of tar and nicotine in the brand most often smoked by young adults is very sensitive to tax changes. Daily tar and nicotine consumption increases for these smokers as taxes increase. These effects were not seen for older smokers (tar and nicotine elasticities were lower). Decision to smoke elasticities were lower for older adults, but taxes had more effect on the amount smoked by older adults (elasticities of -0.33 for ages 25-39, and -0.50 for ages 40+). **Global results (from 1987 data)** Price elasticity for tax Decision to smoke: -0.20 Amount smoked: -0.35 Length: -0.03 MM smoked: -0.25 Ave. nicotine per cigarette: 0.21 Ave. tar per cigarette: 0.20 Total daily nicotine: 0.01 Total daily tar: 0.01	**Authors' conclusions** Smokers in high-tax states purchase longer cigarettes and those with higher levels of tar and nicotine. The tax-induced shift to higher-yield cigarettes reduces many of the health benefits of tax-induced smoking cessation. Younger smokers are most likely to quit as a result of higher taxes but are also the group most likely to switch to higher-yield cigarettes. **Reviewers' comments** Descriptive statistics (means and SDs) were provided for all the outcome variables. The authors attempted to adjust for other possible confounding factors. As cigarette consumption is self-reported this may be an under-estimate of the true consumption. Using a two-part model may lead to bias as the authors report that the sample of remaining smokers may not be random.

Study details	Methods	Results	Conclusions
Farrelly (2001)[55] **Objectives** To evaluate the effect of cigarette price increases by gender, income, age and race or ethnicity with a nationally representative sample of more than 350,000 adults **Setting** US **Intervention** Price **SES outcomes reported** Gender, family income; age; race/ethnicity	**Data sources** Smoking data from 14 years of the National Health Interview Survey (covering 1976-1993). Average price per state from the 'The Tax Burden on Tobacco' (Tobacco Institute 1998) and adjusted for inflation. **Data description** Number=367,106 (all respondents); 354,228 (those with complete sociodemographic and price data); 53% female; mean (SD) age 44 (17.7); 10% African-American/non-Hispanic; 6% Hispanic; 26% high school dropout; 38% high school graduate; 18% some college; 10% college graduate; 7% postgraduate; mean (SD) family income $25,784 ($18,670). **Analysis methods** ***Model****:* two-part model of demand: firstly a probit model of the decision to smoke (participation); followed by linear regression (ordinary least squares) of the amount smoked by smokers. ***Outcome variables***: current smoker or not (participation); number of cigarettes smoked per day for a current smoker. ***Explanatory variables****:* price; age; family income; family size; state; year; city size; race/ethnicity; education level; marital status; gender; state-specific fixed effect to account for unobserved within-state variation.	**Stratified results** Elasticity [* p<0.10] ***Family income less or equal to median (median value was not reported)*** -0.21* (participation) -0.22* (amount smoked) -0.43 (total) ***Family income above median*** -0.01 (participation) -0.11 (amount smoked) -0.11 (total) ***African-American*** -0.20* (participation) -0.15* (amount smoked) -0.35 (total) ***Hispanic*** -0.62* (participation) -0.31* (amount smoked) -0.93 (total) ***White*** -0.08 (participation) -0.15* (amount smoked) -0.23 (total) ***Men*** -0.03 (participation) -0.18* (amount smoked) -0.21 (total) ***Women*** -0.19* (participation) -0.13* (amount smoked) -0.32 (total) ***Age*** ***18-24*** -0.30* (participation) -0.25* (amount smoked) -0.55 (total)	**Authors' conclusions** Any increase in cigarette price will have differential effects on smokers of different gender, income, age and race or ethnicity. Women are more price-responsive than men and more likely to quit in response to a price increase, whereas men are more likely to reduce the amount smoked. Adults with a lower income are more price-responsive than those with a high income. Young adults (aged 18-24) are more responsive to price than those aged 40 or more, but had similar price-responsiveness to the 25-39 age group. African-Americans and Hispanics are more likely than whites to decrease smoking in response to higher cigarette prices, with Hispanics being the most price-responsive. **Reviewers' comments** Data were from a nationally representative sample. Details of the models and summary statistics of the data were reported and the authors attempted to control for within-state variation in the models. Modelling methods were well-reported.

		25-39 -0.25* (participation) -0.28* (amount smoked) -0.53 (total) ***40 and older*** -0.02 (participation) -0.06 (amount smoked) -0.08 (total) **Global results** Elasticity [* p<0.10] -0.13 (participation) -0.15 (amount smoked) -0.28 (total).	

Study details	Methods	Results	Conclusions
Glied (2002)[67] **Objectives** To test the assumption that policies targeting youth to reduce smoking initiation will reduce lifetime smoking propensities **Setting** US **Intervention** Effect of cigarette taxes at age 14 on future smoking status **SES outcomes reported** Gender, income	**Data sources** Smoking data from the National Longitudinal Survey of Youth (only data for those surveyed in 1979, 84, 92 and 94). Cigarette tax rates and tax policies from the 'The Tax Burden on Tobacco' (Tobacco Institute 1996). **Data description** Number=7,605; mean (SD): age 17.5 (2.2), age began smoking 13.6 (3.4); 53% female; 30% black; 18% Hispanic; mean (SD) family income in 1979 $18,270 ($11,747). **Analysis methods** ***Model****:* using longitudinal data: (1) probit model including the effects of time and how taxes change over time, with adjustment for clustering within an individual; (2) ordinary least squares regression using individual fixed effects with an interaction term between tax at and time since age 14. Using cross-sectional data (analysing 1984, 92 and 94 separately) to estimate the effect of taxes at age 14 on overall smoking behaviour, quitting and initiation. ***Outcome variables***: current smoker or not (smoking participation); quitting; initiation. ***Explanatory variables****:* tax at age 14; current tax at year of interview (in some models, results presented here are from analyses that include current tax); age; gender; race; grade level at most recent interview; IQ; marital status; if lived in a metropolitan statistical area (measure of high population density). Cross-sectional analyses also adjusted for if a person smoked at age 16.	**Stratified results** **Longitudinal data** Elasticity [*p<0.10, **p<0.05, ***p<0.01] ***Men*** -0.88** (at age 14) -0.66 (at age 24) -0.43 (at age 34) -0.32 (at age 39) ***Women*** -0.46 (at age 14) -0.18 (at age 24) 0.05 (at age 34) 0.23 (at age 39) ***Low income (< $12,000 median in 1979)*** -0.65* (at age 14) -0.33 (at age 24) -0.01 (at age 34) 0.15 (at age 39) Tax at age 14 had a statistically significant negative effect on current smoking overall, for men, and low income people, but not women. Elasticities declined over time for all groups except men, indicating that by age 39 the effect of taxes at age 14 has largely disappeared. **Cross-sectional data** Elasticity [*p<0.10, **p<0.05, ***p<0.01] ***Current smoking at age 19 to 28*** -1.44*** (men) -0.58 (women) -1.00** (low income) Taxes at age 14 had most effect on low income people at ages 19-28 although this reduced and was no longer significant in later years. Taxes had no effect on women, but remained a significant predictor for men 25 years later (elasticity of -0.55*). ***Quitting*** Taxes at age 14 had a positive but not significant effect on quitting by the age of 27 to 37 for men, woman and low income people.	**Authors' conclusions** Focussing on the effects of taxes and other policies on youth smoking is likely to overstate the potential public health effects of these policies. These results show that policies affecting teens have larger short-term than long-term impact and further research into the long-term effects of such policies is needed. **Reviewers' comments** Data were from a longitudinal survey of American youth but it is not clear if this was representative as minorities were oversampled, and the analysis was restricted to only those surveyed across a number of years. The authors say results are based on a relatively small sample and sample sizes for some subgroups (although not reported) were small, so results should be viewed as suggestive. Summary statistics and model details were provided.

		Late initiation (starting after age 16) Taxes at age 14 did not have a significant effect on late initiation for men, woman and low income people **Global results** **Longitudinal data** Taxes at age 14 had a significant negative impact on later smoking behaviour (elasticity -0.66**) although this effect reduced over time. This result was confirmed by the fixed effect analysis. **Cross-sectional data** Taxes at age 14 had a significant negative impact on current smoking at ages 19-28 (elasticity -0.96***) and late initiation ($p<0.10$), but no effect on quitting.	

Study details	Methods	Results	Conclusions
Goel (2005)[56] **Objectives** To study the effectiveness of tobacco policies in reducing tobacco use amongst different population groups in the US **Setting** US **Intervention** Cigarette and smokeless tobacco taxes; advertising, workplace and youth access restrictions **SES outcomes reported** Age (young people grades 9-12), gender	**Data sources** State-level cross-sectional data for 1997 for adult and youth smoking prevalence; taxes; advertising restrictions; indoor restrictions; minor access; and minimum purchase age from the Centers for Disease Control and Prevention (CDC 1999). Per-capita state income from the Bureau of Economic Analysis (1999). **Data description** Number=not reported but analysis was of state-level rather than per-person outcomes, number of states included ranged from 32 to 51. **Analysis methods** ***Model****:* ordinary least squares regression. Separate models for young people and adults, men and women. ***Outcome variables***: percentage of population consuming cigarettes (or smokeless tobacco). ***Explanatory variables****:* per-capita income at state level; federal and state excise tax as a % of retail price; state tax on smokeless tobacco as a % of retail price, wholesale price or production cost; dichotomous variable for presence of advertising restrictions (on school buses, billboards, pack warning labels); index for restrictions in government worksites, private worksites, restaurants, day care centres and home day care. Analyses of youth also included minimum age for sales to minors; and an index for restrictions on youth purchasing, tobacco possession, using tobacco, vending machines, signs warning about sales to minors, and licensure.	**Stratified results** **Young people (grades 9-12)** Cigarette taxes did not have a significant effect on smoking prevalence overall, or for young men or women. Cigarette taxes had no effect on smokeless tobacco prevalence. Smokeless tobacco taxes led to a statistically significant reduction in smokeless tobacco prevalence overall ($p<0.10$) and for young men ($p<0.05$). Indoor smoking restrictions had a statistically significant negative effect on smoking by young men ($p<0.05$ or $p<0.10$ depending on the model). Minimum age restrictions had a statistically significant negative effect on smoking prevalence overall and for young men and women ($p<0.05$). **Adults (aged 18 and over)** Cigarette taxes led to a statistically significant reduction in smoking prevalence ($p<0.05$) for all adults and adult men (from models that adjusted for tax only and not other smoking restrictions). Cigarette taxes also led to a reduction in smoking prevalence for women ($p<0.10$) Cigarette taxes had no effect on smokeless tobacco prevalence. Smokeless tobacco taxes led to a statistically significant reduction in smokeless tobacco prevalence overall ($p<0.10$) and for women ($p<0.05$).	**Authors' conclusions** Adult smokers appear more responsive to higher taxes than young people. Men smokers appeared more responsive to higher cigarette taxes whereas women were more responsive to higher smokeless tobacco taxes. **Reviewers' comments** Little detail of data sources was provided. Analysis was by state, rather than by person, and summary statistics of the data were not provided making it difficult to assess the appropriateness of the modelling methods. In particular the outcome modelled was % of smokers per state and no details of this were reported. The authors claimed that the overall fit of the models was reasonable although the numerical results do not support this.

Study details	Methods	Results	Conclusions
Gruber (2000)[75] **Study design** Econometric analysis **Objectives** To provide a comprehensive analysis of the impact of prices and other public policies on youth smoking in the 1990s **Setting** US **Intervention** State-level measures of prices, clean air regulations and youth access restrictions **SES outcomes reported** Age, teenage women during pregnancy, race, parental education	**Data sources** Only sources providing repeated cross-sectional data over the 1990s were used. These were: Monitoring the Future (MTF:University of Michigan) providing smoking behaviour, race, age, sex and state data for 8th, 10th, 12th graders (1991-97); Youth Behaviour Risk Survey (YBRS) data (CDC) for 1991, 3, 5, and 7 for 9th-12th graders; Vital Statistics Natality Detail Files from 1989 onwards providing smoking behaviour of women during pregnancy. Yearly state price and tax data from the Tobacco Institute (1998). Law data from state legislative records, Coalition on Smoking; and CDC. Youth access restriction data using data from an expert panel of the National Cancer Institute. **Data description** Number=641,759 (MTF); 106,556 (YBRS); 3,970 (Natality, aged 13-18) **Analysis methods** ***Model****:* linear regression models with standard errors corrected for within state-year correlation (to account for variation across states and years). Separate models built for each dataset. (MTF, YBRS, Natality) ***Outcome variables***: smoking participation (any smoking over past months); conditional intensity (quantity smoked) ***Explanatory variables****:* price per pack (including taxes); clean air regulations (private workplace, public workplace, restaurants, schools, other e.g. public transport); youth access index (score across 9 categories including minimum purchase age, vending machine availability, which is added to create a total index with high scores indicating more restrictions); state and year (as fixed effects to account for between state and between year price differences).	**Stratified results** ***MTF data*** ***Price*** For seniors (12th grade), price had a statistically significant negative impact on smoking participation (elasticity -0.67) but little effect on conditional intensity (-0.06). For younger teenagers (8th - 10th grade), price had little impact on smoking outcomes (elasticities were not statistically significant) ***Restrictions*** For seniors, access restrictions had little effect on smoking outcomes. The only clean air restrictions with statistically significant negative effects were for government workplaces (for conditional intensity) and other sites (both smoking outcomes). For younger teenagers, youth access restrictions had a highly statistically significant impact on the conditional quantity smoked. Government worksite and other site restrictions also had statistically significant negative effects. ***YRBS data*** ***Price*** For seniors (12th grade), price had a statistically significant negative impact on smoking participation and conditional intensity (elasticities of -1.53 and -1.58 respectively). For younger teenagers (9th - 11th grade), price had little impact on either smoking outcomes (elasticities were not statistically significant) ***Restrictions*** Clean air restrictions in restaurants had a statistically significant negative impact on participation by seniors but no effect on younger teenagers. ***Natality data (teenage mothers)*** ***Price*** For 17-18 year olds, price had a statistically significant negative impact on smoking participation and conditional intensity (elasticities of -0.38 and -0.15 respectively). For 13-16 year olds, price had little impact on either smoking outcome (elasticities were not statistically significant)	**Authors' conclusions** These results suggest that the single greatest policy determinant of youth smoking is the price of cigarettes. Older teenagers are more sensitive to prices with a central elasticity estimate of -0.67. This price sensitivity rises for more socioeconomically disadvantaged groups such as blacks or those with less educated parents. There is some evidence that youth access restriction policies reduce the quantity smoked but this finding is not as robust as the price relationship. There is no consistent evidence that smoking restrictions in public places lowers smoking. **Reviewers' comments** The main sources of smoking data were nationally representative surveys. The author provided a good description of all data used in the analyses and used multiple datasets to answer the question.

		Restrictions For 17-18 years olds, access restrictions had a statistically significant negative impact on the quantity smoked and clean air restrictions in restaurants had a statistically significant negative impact on both smoking outcomes. Only clean air restrictions for other sites had a statistically significant impact on younger teenagers. ***Race*** For older teens there was higher price responsiveness amongst blacks than whites. For MTF data price elasticities for participation and intensity respectively were -2.32* and -2.03* (non-whites), and -0.35* and 0.13 (whites). For YRBS data participation elasticities were -9.26* (blacks) and -0.63 (whites). For Natality data price had a higher impact on participation for whites (-0.41*) than blacks (0.53) although this was reversed for quantity smoked (-0.11 for whites, -0.54* for blacks). The Natality results were similar for younger teens but for the other datasets there was no racial pattern in the effects of price for younger teenagers (none of the elasticities were statistically significant). ***Parental education (YRBS data only)*** For seniors the elasticity of participation was -4.39* for those whose parents were high school dropouts or graduates and -0.24 for parents with some college education. For smoking intensity this trend was reversed with elasticities of -0.40 for high school and -2.39* for college education. There was no pattern for younger teenagers, although participation elasticity was positive and statistically significant for high school educated parents (2.72*). [* p<0.05] **Global results** Not applicable.	

Study details	Methods	Results	Conclusions
Gruber (2002)[63] **Objectives** To estimate cigarette demand models for Canada that account for the problem of smuggling, and to assess demand by different income groups **Setting** Canada **Intervention** Price **SES outcomes reported** Income (split into quartiles).	**Data sources** Household cigarette expenditure and demographic data from the Canadian Survey of Family Expenditure (FAMEX, 1982-98). Average prices for each province per 200 cigarettes from Statistics Canada. All expenditure and income data were transformed in 1992 Canadian dollars. **Data description** Number=not reported; 44% of households with cigarette expenditure with mean (SD) spend $553 ($934); mean (SD) family size 2.7 (1.4); mean (SD) after-tax household income $35,714 (22,468). **Analysis methods** ***Model****:* linear regression models. ***Outcome variables***: household cigarette expenditure in dollars (zero if no expenditure). ***Explanatory variables****:* price; region fixed effects; year fixed effects; gender of head of household; income; family size and regional time trends.	**Stratified results** **Price elasticities by income quartile (1 is lowest income group, 4 is highest)** Quartile 1: -0.99 Quartile 2: -0.45 Quartile 3: -0.31 Quartile 4: -0.36 **Amount of after-tax income spent on cigarettes in 1998 by income group** Quartile 1: 4.14% Quartile 2: 2.16% Quartile 3: 1.72% Quartile 4: 1.01% The price elasticity of demand is larger amongst lower income smokers. **Global results** Overall elasticity = -0.45	**Authors' conclusions** Demand elasticities are much higher for lower income or consumption quartiles, ranging from -1 to -0.3 for the lowest to highest quartiles. These estimates are consistent with the US literature. [Only results and conclusions in relation to income, not smuggling, have been extracted] **Reviewers' comments** Data was from a national Canadian survey. Analysis was by household rather than by person, although the sample size was not reported. Summary statistics of the data were presented although details of the average income for each quartile group were not provided.

Study details	Methods	Results	Conclusions
Katzman (2002)[83] **Objectives** To develop a theoretical model to allow for better understanding of the determinants of teenage smoking by looking at the effects of price and restrictions on the decision to buy or bum cigarettes **Setting** US **Intervention** Price and various smoking restrictions **SES outcomes reported** Young people (grades 9-12)	**Data sources** Cigarette consumption, socio-economic characteristics, buying and lending behaviour from the Youth Behaviour Risk Survey (1995, 7 and 9). Cigarette prices (inclusive of taxes) and state-level excise tax from 'The Tax Burden on Tobacco' (Tobacco Institute). Smoking restriction data from the ImpacTeen project. Per capita income and unemployment rates form the Bureau of Economic Analysis and Bureau of Labor Statistics. **Data description** Number=37,513 (full sample); 10,644 (current smokers); 6,853 (buyers); 3,791 (bummers). **Analysis methods** ***Model****:* the authors developed a theoretical model to assess the impact of a lending/borrowing market on the expected utility maximization problem of a potential teenage smoker. Empirical models to test these predictions used multinomial logits to estimate the probability of being a non-smoker, buyer or bummer. Consumption was modelled using ordinary least squares regression. ***Outcome variables***: smoking status (non-smoker, buyer or bummer); cigarette consumption measured in two ways: number of days on which smoked in past 30 days; number of cigarettes smoked per day. ***Explanatory variables****:* price; tax; school smoking bans (4 categories ranging from none to a total ban); age; gender; race; real per capita income; state unemployment rate; region; how often they wear a seatbelt in a car (risk propensity); number of sports teams belonged to; and religion.	**Stratified results** **Smoking status** Bummers tended to smoke less than buyers, smoking on 5.8 days compared to 19.9 days per month and smoking an average of 1.8 cigarettes a day compared to 6 for buyers. Changes in price did not have statistically significant effect on whether someone was a bummer or a buyer. Price did have a statistically significant negative effect on the probability of a current smoker being a buyer. As prices increase the probability of buying decreases and the probability of bumming increases. **Consumption** **Number of days smoked** Price had a statistically significant negative effect on current smokers (elasticity –0.28) and buyers (elasticity –0.28), but not on those who bummed cigarettes (elasticity –0.001). **Amount smoked on smoking days** Price had a statistically significant negative effect on current smokers (elasticity –0.37), buyers (elasticity –0.28) and bummers (elasticity –0.48). **Global results** Not applicable.	**Authors' conclusions** Higher cigarette prices may affect a teenager's decision to smoke, the amount they smoke and the manner in which they acquire cigarettes. **Reviewers' comments** Data was from a nationally representative sample of American high school students. No summary statistics were presented. The paper was mostly about the development of the theoretical model.

Study details	Methods	Results	Conclusions
Lee (2004)[65] **Objectives** To assess the effect of a new excise tax increase on cigarette consumption in Taiwan, and to assess the response from various types of smokers **Setting** Taiwan **Intervention** Price (looking at the effects of a new tax scheme introduced Jan 2002 of a NT $5 tax excise increase. This increased the price from NT $35.2 to NT $42.2) **SES outcomes reported** Age, gender, education, income.	**Data sources** Annual face-to-face survey on cigarette consumption by Taiwan National Health Research Institutes (2000-2003) provided data on consumption; price paid per pack; personal monthly income; spending per month on cigarettes. Price based on average retail price of top 3 most consumed cigarettes. Number of packs per months calculated as monthly consumption divided by price. **Data description** Number=856 (2000); 632 (2001); 521 (2002); 493 (2003); approximately 90% male; aged 17-24 ranged from 5.4% (2000) to 12.8%(2003); 20-27% with college education; 35-40% earned between NT $20,000 and NT $30,000 per month. **Analysis methods** ***Model****:* ordinary least squares regression using a double log function (modelling the log of the outcome and using logs of the explanatory variables). Elasticities were calculated for different groups by gender, age, education, income and amount smoked. ***Outcome variables***: amount smoked per month by current smokers. ***Explanatory variables****:* price per pack; per capita income.	**Stratified results** Price elasticities for 2002-3 after the tax increase [* p<0.05] **Gender** Men: -0.393* Women: -0.141 **Age** 17-24: -0.106 25-34: 0.230 35-44: -0.215 **Education** College: -0.701* Senior high school: -0.537* Junior high school: -0.179 Preliminary or lower: -0.039 **Income** None: -0.836* <NT $20,000: -0.748* NT $20,000-39,999: -0.286 NT $40,000-59,999: -0.262 >NT $60,000: -0.115 **Global results** -0.406*	**Authors' conclusions** An additional tax added to the cost of cigarettes would reduce consumption and increase tax revenues. Male smokers, those without income and light smokers were most sensitive to changes in cigarette prices. Young people aged 17-24 were not found to be affected by price changes. Future research should assess other factors such as advertising. **Reviewers' comments** It was not clear how representative the sample was or whether this was a published national survey. The sample sizes seemed small. Some summary statistics were provided but not for cigarette consumption.

Study details	Methods	Results	Conclusions
Lewit (1982)[46] **Study design** Econometric analysis **Objectives** To use information on individual smoking behaviour to estimate the price elasticity of demand for cigarettes **Setting** US **Intervention** Price (tax) increases **SES outcomes reported** Age, gender.	**Data sources** Health Interview Survey (1976) weekly interviews of households of US civilian, non-institutionalised population, is representative of the wider population. Average cigarette prices for each survey site from Tobacco Tax Council (1980). Other data from public use data tapes from National Centre for Health Statistics. **Data description** Number=19,268 (aged 20-74) SES results based on restricted sample (n=11,052) of individuals facing prices equal to those of their own state to reduce bias caused by 'bootlegging'. **Analysis methods** ***Model****:* linear regression model (OLS). Models for all (smokers and non-smokers) and smokers only. ***Outcome variables***: quantity smoked by an individual in a locality (demand); binary outcome indicating if a smoker or not (decision to smoke). ***Explanatory variables****:* average price of cigarettes in the locality; family income; family size; education; age; sex; marital status; health status; race; also region and city size characteristics (to control for cross-sectional differences in the cost of living).	**Stratified results** ***Age 20-25:*** Quantity smoked All: -0.89 (0.40) Smokers: -0.20 (0.25) Decision to smoke All: -0.74 (0.35) The price elasticity of demand for the 20-25 age group was almost twice as high as for older adults (-0.47 for 26-35 years, -0.45 for over 35 years), with similar results for the decision to smoke. ***Age and gender*** Men age 20-25: quantity smoked All: -1.40 (0.56) Smokers: -0.17 (0.31) Decision to smoke All: -1.28 (0.48) Women age 20-25: quantity smoked All: -0.30 (0.60) Smokers: -0.03 (0.40) Decision to smoke All: -0.14 (0.50) Overall demand by females appears not sensitive to price, men are more sensitive to price. For men demand and decision to smoke elasticities were higher for age 20-25 than for 26+. This trend was not seen for women where younger women had lower elasticities than aged 26+. **Global results** Quantity smoked All: -0.42 (0.16) Smokers: -0.10 (0.09) Decision to smoke All: -0.26 (0.12)	**Authors' conclusions** These results indicate that the price elasticity of demand for cigarettes is -0.42; that the decision to begin smoking by men under the age of 25 is price elastic; and that price effects appear to be larger for men than for women. In addition, that price has its greatest effect on the smoking behaviour of younger people and that it operates via the decision to begin smoking rather than on the quantity smoked. **Reviewers' comments** Descriptive statistics (means and SDs) were provided for all outcome and explanatory variables by analysis sample. Most of the models appeared to fit the data well. The authors attempted to adjust for other possible confounding factors.

Study details	Methods	Results	Conclusions
Lewit (1997)[74] **Study design** Econometric analysis **Objectives** To examine the effect of cigarette taxes, limits on public smoking, laws regulating access to tobacco by young people, and exposure to pro- and anti-tobacco messages, on smoking participation and intention to smoke amongst ninth-grade students **Setting** US and Canada **Intervention** Taxes, legislation (various) **SES outcomes reported** Gender	**Data sources** Two cross-sectional school-based surveys of ninth-grade students in 21 communities (2 Ontario, 19 American cities) conducted in conjunction with the COMMIT project (autumn 1990 and 1992) provided data on smoking behaviour, exposure to tobacco advertising and school policies. Random sampling was used to obtain 400 students per community (public and private schools). Cigarette prices for the average price of a pack of 20 inclusive of taxes for 1990 and 1992 were taken from Tobacco Institute reports (America) and Non-Smokers' Rights Association (Canada) and deflated to 1990 US dollars using consumer price indices. Prices were also adjusted by an index to reflect cross-sectional variation in the cost of goods and services that teenagers might buy (e.g. price of pizza). Ease of access to cigarettes and restrictions to under 18s data was obtained from COMMIT's legislative tracking database of tobacco control policies. **Data description** Number=15,432 (overall); 7,833 (male); 7,599 (female) **Analysis methods** ***Model****:* multivariate logistic regression models which accounted for the clustering of the data. ***Outcome variables***: smoking participation (whether or not a student has smoked in the 30 days preceding the survey); intention to smoke (amongst non-smokers, if a person who has not smoked in the last 30 days thinks they will be smoking with one year). ***Explanatory variables****:* price; clean indoor air restriction index for work sites and public places ranging from none to 100% ban; school smoking policy ranging from can smoke outside building to banned on school property; number of school classes warning about tobacco use; presence of minimum age purchase restrictions, vending machine restrictions; limits on free sample distribution; anti-tobacco and pro-tobacco media exposure ranging from never to very often); gender; age; race (white, black, Hispanic, Canadian, other); intervention site; year.	**Stratified results** ***All ninth-grade students*** ***Smoking restrictions*** Policies restricting smoking in public places or schools, or bans on vending machines had little effect on smoking behaviour (none of the results were statistically significant). Laws restricting purchase to those aged 18 or over did have a statistically significant negative effect on smoking participation but not the intention to smoke. Anti-tobacco and pro-tobacco media exposure were both associated with a statistically significant increase in intention to smoke, but only anti-tobacco exposure had any effect on smoking participation again leading to an increase. ***Price*** Price elasticity [* p<0.05] Smoking participation -0.87* (price only model) -0.49 (full model) Intention to smoke -0.95* (price only model) -1.07* (full model) ***Boys*** ***Smoking restrictions*** Laws restricting purchase to those aged 18 or over had a statistically significant negative effect on smoking participation but not the intention to smoke. Anti-tobacco media exposure had little effect on boys, but pro-tobacco exposure led to a statistically significant increase in smoking participation. ***Price*** Price elasticity [* p<0.05] Smoking participation -1.51* (price only model) -1.02* (full model) Intention to smoke -0.92* (price only model) -0.84 (full model) ***Girls*** ***Smoking restrictions*** Laws restricting purchase to those aged 18 or over had a statistically significant negative effect on smoking participation but not the intention to smoke. Anti-tobacco media exposure led to a statistically significant increase in both smoking	**Authors' conclusions** A variety of tobacco control policies, including higher excise taxes, can be effective in reducing smoking participation among ninth-graders and probably amongst a wider age spectrum of young people. The price elasticity of participation is substantially higher for males than females and high prices are associated with large reductions in the intent to smoke amongst young non-smokers. This study did not find any evidence that stronger restrictions on smoking in public places or schools were associated with reductions in smoking prevalence, but restricting sales to those aged 18 or over correlates to reduced smoking participation. **Reviewers' comments** It is not clear how representative these students were of the wider community. Summary statistics (mean, SD) of the data were provided. Possible multi-collinearity between the set of policy-related variables in the full model means that it is difficult to estimate the true effect of the various smoking restrictions on young people.

		participation and intention to smoke, but pro-tobacco exposure had little effect on girls. ***Price*** Price elasticity [* p<0.05] Smoking participation -0.32 (price only model) -0.06 (full model) Intention to smoke -0.99* (price only model) -1.26* (full model) **Global results** Not applicable.	

Study details	Methods	Results	Conclusions
Liang (2002)[84] **Objectives** To investigate the differential effects of cigarette price on the intensity of youth smoking **Setting** US. **Intervention** Price **SES outcomes reported** Young people	**Data sources** Cigarette smoking data from the Monitoring the Future Surveys of 8th, 10th and 12th grade students (University of Michigan 1992, 3 and 4). State-level price and tobacco control policy data from the 'Tax Burden on Tobacco' (Tobacco Institute 1995). Price was average price per pack of 20 and was deflated by the Consumer Price Index. A variable for cross-border shopping to represent largest price difference between states within 25 miles was created. **Data description** Number=110,717. **Analysis methods** ***Model****:* the Threshold of Change model (generalised ordered logit model). Likelihood ratio tests were used to compare effects between different price categories. ***Outcome variables***: 5 categories for amount smoked per day: non-smokers; <1 cigarette; 1-5; ½ pack; 1 or more packs. ***Explanatory variables****:* price (low <$1.175, medium $1.175 to $1.315 , high >$1.315); four variables for state and local policies (tax revenues earmarked for anti-tobacco activities, smoker protection legislation, clean indoor air laws, limits on youth access); gender; race; age; frequency of participation in religious services; living in rural area; living with parents; siblings; parental education; mothers working status during childhood; number of hours worked per week; weekly income; grade; year.	**Stratified results** Odds ratios of crossing to the next threshold for an increase in amount smoked. Odds ratios >1 mean less likely to cross threshold. [*p<0.05, **p<0.01, ***p<0.001] **Living in medium price area (relative to low)** Baseline = non-smoker <1 cigarette: 1.057*** 1-5: 1.051* ½ pack: 1.094** 1+ packs: 1.128** Overall equal effect: 1.060** **Living in high price area (relative to low)** Baseline = non-smoker <1 cigarette: 1.132*** 1-5: 1.190*** ½ pack: 1.255*** 1+ packs: 1.307*** Overall equal effect: 1.146*** Students who lived in a medium-price area were less likely to remain in the non-smoking stage than those living in a high-price stage (odds ratio of 1.057 compared with 1.132). The effects of higher prices were generally more pronounced at higher levels of smoking intensity. Those in a high-price area were 30% less likely to smoke one or more packs per day compared to those in a low-price area. Higher prices had more impact on smoking intensity than medium prices. **Global results** Not applicable.	**Authors' conclusions** These results show the effectiveness of higher cigarette prices in controlling youth smoking. The negative effect of price was robust when allowing for different levels of smoking intensity. These results are consistent with other research that shows that higher prices have the most effect on initiation of regular smoking. **Reviewers' comments** Data was from a nationally representative survey of American High School students. No summary statistics were presented.

Study details	Methods	Results	Conclusions
Lopez Nicolas (2002)[62] **Objectives** To investigate the effect of policies such as prices, restrictions to use, and health warnings on the decisions to start and quit smoking **Setting** Spain **Intervention** Price **SES outcomes reported** Gender	**Data sources** Smoking and socioeconomic data from the National Health Survey (Ministerio de Sanidad y Consumo, 1993, 95 and 97). Price data of black and blond cigarettes from 1957 to 1997 from the annual reports of Tabacalera (company with monopoly on tobacco distribution in Spanish market). **Data description** Number=starting analysis: 7092 (men), 6913 (women); Quitting analysis: 2305 (men); 1817 (women). 13% men and 14-17% women with university degree; starting age 17 (men), 17.4-18 (women). **Analysis methods** ***Model****:* starting analysis: time to start smoking was modelled using a split population duration model, and a log-logistic model, only those born after 1956 were analysed. Time to quitting analysis used a Cox proportional hazards model, Weibull and Gamma models and only those born after 1947 were included. Men and women were modelled separately. ***Outcome variables***: duration (time) to start smoking, duration to quitting (if ever started smoking). ***Explanatory variables****:* real price of a 20 pack of cigarettes (log); education (university degree or not); has completed secondary education; cohort effects (born 1967-76, or after 1976); variables for 1984 and 1992 to represent media advertising ban (1984) and bans on bus/plane and intensification of health warnings (1992).	**Stratified results** **Starting smoking (log-logistic model)** The effect of price overall (average price of blond and black cigarettes) was statistically significant for men and women, although the price effect was small. Duration elasticities were 0.069 for men and 0.076 for women. At the average starting age of 17, this means that a 10% increase in price would delay smoking by approximately 1.5 months. **Quitting smoking (Weibull model)** Price overall did not have a significant effect on the time to quitting for men or for women. However the price of black cigarettes had a statistically significant effect on time to quit for men (duration elasticity -1.32) and for women (duration elasticity -1.5). **Other tobacco policies** Stronger anti-tobacco policies introduced in 1992 (health warning intensification and ban on flights/public transport) had a statistically significant effect on time to start smoking and time to quitting for both men and women. **Global results** Not applicable.	**Authors' conclusions** Prices have a very small effect on the duration to starting smoking. The price of black cigarettes was significant for quitting and so quitting duration is shortened by increases in the prices of the cheapest Spanish cigarettes. **Reviewers' comments** Data was from a nationally representative survey but not all participants were included in the analyses. Some summary statistics were presented, but no data for the outcomes were presented. A number of different models were used. The results for the different types of cigarettes may not be reliable as the survey did not contain data on the type of cigarettes (blond or black) consumed by individuals.

Study details	Methods	Results	Conclusions
Nonnemaker (2002)[68] **Study design** Econometric analysis (thesis) [Only the results for tax have been extracted] **Objectives** To examine the effects of tobacco control policies on adolescent smoking specifically: the effects of excise taxes and state-level tobacco control policies **Setting** US **Intervention** Excise tax, marketing restrictions, vending machine restrictions, enforcement programs, school smoking policies **SES outcomes reported** Young people (grades 7 to 12); race; gender	**Data sources** Smoking, demographic and other risky behaviours data from the National Longitudinal Study of Adolescent Health (Add Health, 1994-6) a nationally representative sample of adolescents in grades 7 to 12. Data comprised questionnaires completed at home and in school (smoking questions were different for these surveys). State excise tax and state-level tobacco control policy data also came from the Add Health data. Smoking smoking policy variables came from a school administrator survey (also part of Add Health). **Data description** School sample: number=66539 (full sample), 19% black; 16% Hispanic; 64% white; 50% female; 36% any smokers; 26% experimental smokers; 13% regular smokers. Home sample: number=17226 (full sample), 17% black; 13% Hispanic; 70% white; 49% female; 28% any smokers; 16% experimental smokers; 14% regular smokers. **Analysis methods** ***Model****:* school sample: logistic regression of smoking participation, and a two-step probit model to investigate the impact of selection/endogeneity on the peer smoking estimate. Home sample: logistic regression of smoking participation; logistic regression of the probability of smoking cessation; multinomial logistic regression of the probability of transition between smoking states. Different models were presented adjusting for different combinations of tobacco control policies. Model fit was tested using the Hosmer-Lemeshow method. No formal tests of subgroups differences were performed so results are only suggestive of possible subgroup differences. ***Outcome variables***: for school sample: smoking participation in past 12 months (any, experimental, regular). For home sample: smoking participation in past 30 days (any, experimental, regular, light regular (1-10/day), heavy regular (>10/day)). The transition outcome (change in smoking status between waves 1 and 2 of data) is based on the home responses and has 3 categories (non-current smoker, experimental, regular). ***Explanatory variables****:* state excise tax (cents per pack of 20); school policies (binary variables for if school bans staff from smoking on school premises, if there are penalties for students caught smoking); indicators for presence/absence of : vending machine restrictions, marketing restrictions, enforcement program (also included as index for number of policies); state tobacco resources (FTE staff and total funds for tobacco control per 100,000	**Stratified results (adolescents only)** **Tax** ***School sample-smoking participation*** Excise tax had no significant effect on experimental or regular smoking in the full sample. Blacks were more sensitive to tax than whites and Hispanics with an average tax elasticity of -0.33 ($p<0.01$) for experimental smoking. There was no difference between men and women, the effects of tax were not significant for either outcome apart from a marginally significant (elasticity -0.12, $p<0.1$) result for men for regular smoking in the model that excluded other tobacco control policies. ***Home sample-smoking participation*** Excise tax had no significant effect on experimental or regular smoking in the full sample. Black smokers appeared to be the most tax responsive group but the elasticity was only significant (-0.27, $p<0.1$) in one model when experimental smoking was classed as smoking 1-29 days out of past 30. Tax had a significant positive effect on women for regular smoking indicating increased smoking (regular smoking elasticity 0.22, light smoking 0.031, both $p<0.05$). For heavy regular smoking, taxes had a significant effect ($p<0.05$) for the full sample (elasticity -0.16), whites (-0.18) and men (-0.22). ***Home sample-quantity smoked*** Tax had a significant negative effect (elasticity -0.15, $p<0.05$) on cigarettes per day for men, but little effect on women. The amount smoked by white adolescents was also more affected by taxes than for blacks or Hispanics (elasticities of -0.09 and -0.11, $p<0.05$ depending on the model; elasticities for other races were positive). **Global results** Not applicable.	**Authors' conclusions** These results suggest that state excise taxes, vending machine restrictions, tobacco marketing restrictions, state programs for enforcement of tobacco control policies, and school policies are not broadly effective strategies for reducing adolescent smoking. The effectiveness of policies, vary by race and gender, with African-American experimental smokers having the largest negative tax elasticity. **Reviewers' comments** The dataset was nationally representative of school pupils. Baseline summary statistics were presented. As this was a thesis there were a number of datasets and modelling strategies used, making it difficult to assess which results are relevant. The author states that most of the results are null, i.e. no meaningful effects of any policies were found.

	population); index of 3 items for school smoking policies (state recommendations for: schools ruling against student tobacco use, against staff tobacco use, and communications of policies to parents , students and staff); variable to capture peer smoking influence; parental smoking (home survey only); proportion of pupils over 14 years in a school; gender; race (black, white, Hispanic); age; school grade; parental education; family structure; family and adolescent income (home survey models only); region of country; % of adult population that smoke in a state; duration of experimental smoking and duration of regular smoking (for the transition models only).		

Study details	Methods	Results	Conclusions
Ohsfeldt (1998)[73] **Objectives** To investigate the effect of tobacco excise taxes and laws restricting public smoking on the current use of moist snuff and cigarettes **Setting** US **Intervention** Tax, tobacco legislation **SES outcomes reported** Age (men only).	**Data sources** Cigarette, snuff and smokeless tobacco use and demographic data from the Current Population Surveys (Sept. 1992, Jan. and May 2003). Tobacco tax data from the Tobacco Institute (1992-3) for the average excise rate tax (of state and local excise taxes). Smokeless tobacco prices by state were not available and represented in models by the state snuff tax rate. Data on laws restricting smoking in public places from US Dept. Health and Human Services (1993), no data on local laws restricting smokeless tobacco use were available. **Data description** Number=165,653 white or black males aged 16 or over. 18% current cigarette users; 1.2% current snuff users. **Analysis methods** ***Model****:* logistic regression model of the probability of use of the tobacco product. The Hausman test was used to test if tax was related to the level of tobacco use (endogenous). Cigarettes and snuff were modelled separately, and tax and restrictions were treated as both endogenous and exogenous variables. ***Outcome variables***: whether or not used snuff, and whether or not used cigarettes. ***Explanatory variables****:* tax of cigarettes (or snuff); personal income (adjusted for differences across states); education (high school or college, less than high school); race (black, white); marital status; if a fundamentalist Protestant; tobacco restrictions index (4 categories covering private worksites, restaurants, 4 other areas, 1-3 other areas). .	**Stratified results (men only)** All results are treating tax as an endogenous variable. **Cigarette use [tax elasticity, *p<0.01]** ***Cigarette tax*** All men: -0.15* 16-24: -0.22* 25-44: -0.11* >44: -0.07 ***Snuff tax*** All men: 0.001 16-24: 0.002 25-44: 0.001 >44: -0.002 Tobacco regulations had a statistically significant negative impact on cigarette use across all ages, but the elasticity was largest (-0.19) for men aged 25-44. **Snuff use** ***Cigarette tax*** All men: -0.98* 16-24: -1.15* 25-44: 0.04 >44: 0.54* ***Snuff tax*** All men: -0.10* 16-24: -0.24* 25-44: -0.05* >44: 0.003 Tobacco regulations had a statistically significant negative impact on snuff use for men aged 25-44 (-0.03). **Global results** Not applicable.	**Authors' conclusions** Young men are more responsive to tax increases than those over 24, for both cigarette and snuff taxes. Men over 24 appear to be more responsive to smoking regulations than young men. **Reviewers' comments** Data was from a nationally representative survey but only included white or black males and excluded "other" races. No summary statistics were presented. As data from the amount smoked/consumed was not available, only part of the potential response to tax changes could be analysed.

Study details	Methods	Results	Conclusions
Peretti-Watel (2004)[61] **Study design** Cross-sectional survey **Objectives** To assess, using a life-course perspective with retrospective data, the impact of pricing policy and other predictors on smoking behaviour in France during 1965 to 1999 **Setting** France **Intervention** Price **SES outcomes reported** Gender, age at quitting	**Data sources** Retrospective smoking data from a national random telephone survey of people aged 12 to 75, the French Health Barometer, conducted in December 1999 by the French Board for Health Education. **Data description** Number=13,685 (survey response rate of 70.1%). 47.8% non-smokers; 19.2% former smokers; 33% current smokers. **Analysis methods** ***Model****:* the discrete time hazard model of smoking cessation by Kenkel (2002). The unit of analysis is the smoker-year. Analysis of quitting was conducted using a logistic regression model. ***Outcome variables***: whether or not a person quit smoking in a given year. ***Explanatory variables****:* price at a given year (using 1980 as the base price), age and parenthood (all time-varying variables); gender, academic achievement (high school graduate or not).	**Stratified results** **Men aged 21-50** Price was significantly associated with the probability of quitting (odds ratio 1.007, p<0.001). **Women aged 21-50** Price was significantly associated with the probability of quitting (odds ratio 1.009, p<0.001). The results of the models for men and women were very similar. Parenthood was a significant predictor of quitting and high school graduates were also more likely to quit. For age, the risk to quit increased up to the age of 35 and then decreased thereafter. **Age** Price had a significant effect on the probability of quitting between ages 21 and 30 (odds ratio 1.017, p<0.001) and after age 30 (odds ratio 1.011, p<0.001) but not at age 20 or before (odds ratio 1.005, p=0.174). **Global results** Not applicable.	**Authors' conclusions** The findings highlight the need to implement other preventive strategies, such as smoking restrictions, youth access and tobacco advertising restrictions as well as mass media and school-based campaigns. Increasing the cigarette price could be more effective if co-ordinated with other interventions. **Reviewers' comments** This was a representative sample although it was relying on peoples' recall of when they started and stopped smoking. No baseline summary statistics were presented and it was not clear of the source of the price data. The effects of other French tobacco control policies were not accounted for in the modelling.

Study details	Methods	Results	Conclusions
Ringel (2005)[87] **Study design** Econometric analysis **Objectives** To estimate the effect of prices and regulations on youth cigar demand **Setting** US **Intervention** Price, state-level tobacco control policies **SES outcomes reported** Young people (aged 9 to 17), gender.	**Data sources** The National Youth Tobacco Survey, a nationally representative survey of tobacco-related issues in students from grades 6 to 12 (1999 and 2000 waves) Cigar and smokeless tobacco prices from grocery store price information from a marketing firm. Cigarette price data from the "Tax Burden on Tobacco" (the Tobacco Institute 2000). State-level tobacco control policies from the Centers for Disease Control and Prevention STATE system. **Data description** Number=33,632 (full sample); 16,801 (men); 16,831 (women); 9.5% current cigar users (13.5% of men, 5.5% of women); 8.2% aged 9 to 11; 48.6% aged 12 to 14; 43.2% aged 15 to 17. **Analysis methods** ***Model****:* logistic regression models. Standard errors were adjusted to account for the complex survey design. Models estimated for the full sample and by gender. ***Outcome variables***: current cigar use (having smoked a cigar in past 30 days). ***Explanatory variables****:* price of cigars, cigarettes and smokeless tobacco; age; race (white, African American, Hispanic, other); gender (for overall model only); survey period; tobacco policies: purchase law, possession or use law, clean indoor air law, state-sponsored media campaign.	**Stratified results (adolescents only)** **Price** The price of cigars had a statistically significant (*p<0.05) effect on cigar use overall and for men, but not for women. Cigarette and smokeless tobacco prices did not have a significant effect on cigar use. The price elasticities were: -0.336 (full sample)* -0.349 (men)* -0.240 (women). **Tobacco-control policies** Purchase laws had a statistically significant (p<0.05) positive effect on cigar use for the full sample and women, indicating that youths living in states with these laws were more likely to smoke cigars . No other policies were found to have an effect on cigar use. **Global results** Not applicable.	**Authors' conclusions** Policymakers can reduce the prevalence of youth cigar smoking by raising federal and state excise taxes. Cigars are currently taxed at a lower rate than cigarettes. If cigars were taxed at the same rate as cigarettes then assuming an elasticity of –0.34 this would result in a 5% reduction in cigar smoking prevalence. **Reviewers' comments** Data was taken from a nationally representative survey. Baseline summary statistics were presented but little details were given of the tobacco-control policies. Prices of other tobacco products were included in the models but no attempt was made to account for other smoking behaviours, as those who smoke cigars may also be more likely to be cigarette smokers.

Study details	Methods	Results	Conclusions
Ringel (2001)[57] **Study design** Econometric analysis **Objectives** To estimate how changes in state cigarette taxes affect the smoking behaviour of pregnant women **Setting** US **Intervention** Tax **SES outcomes reported** Race, age, education (for pregnant women only)	**Data sources** Cigarette smoking, demographic and birth outcome data from the Natality Detail File, an annual census of births on the US (1989 to 1995), this was self-reported data for if mothers smoked during pregnancy and the amount smoked. Monthly state excise tax data from "The Tax Burden on Tobacco" adjusted to real 1997 values by the Consumer Price Index. **Data description** Number= 20,025,000. 16.5% of mothers reported smoking in pregnancy. 17.5% black, 67.1% white, 11% Hispanic; 39.7% aged 24 or less; 21.1% less than high school education, 36.6% high school, 40.2% college. **Analysis methods** ***Model****:* probit model, using a within-group estimator to account for state-specific effects and factors that vary over time. To explore heterogeneity in the effect of taxes, separate models were constructed by race, age, education, marital status and 4 subgroups with particularly high smoking status (young unmarried women, unmarried women with low education, white unmarried women, and white women with low education). ***Outcome variables***: whether or not smoked during pregnancy (participation). ***Explanatory variables****:* tax; education (none, less than high school, high school, some college, college); age; race (white, black, Hispanic, other); parity; plurality (single birth, twin, triplet); Kessner index (4 levels for prenatal care); sex of child; marital status; month of conception; state.	**Stratified results (pregnant women only)** Price elasticity **Race** Black non-Hispanic: -0.55 White non-Hispanic: -0.79 Hispanic: -0.64 Other: -0.54 **Age** ≤19: -0.50 20-24: -0.55 25-29: -0.58 30-34: -1.18 35-39: -1.13 40 or more: -1.02 **Education** Less than high school:: -0.30 High school: -0.49 Some college: -0.86 College: -3.39 **Subgroups with high smoking rate** Unmarried ≤24: -0.46 Unmarried less than high school: -0.32 White less than high school: -0.37 White unmarried: -0.22 **Global results (pregnant women only)** Price elasticity Full sample: -0.70	**Authors' conclusions** Smoking participation rates vary widely across demographic and socioeconomic groups implying that responsiveness to price changes would vary in a similar way. The results indicate that white women, older women and highly educated women are most responsive to changes in cigarette taxes. All subgroups of pregnant women had higher price elasticities than the general population. This is not surprising because as many pregnant women try to quit smoking interventions such as tax increases may be more effective during pregnancy. **Reviewers' comments** This was an extremely large dataset taken from an annual census of all births. Data on other important factors such as income and maternal smoking were not available in the dataset. It was not possible to assess if a mother quit smoking upon becoming pregnant or started again after giving birth. Under-reporting of smoking status may be more of a problem for data from pregnant women compared with the general population.

Study details	Methods	Results	Conclusions
Ross (2004)[86] **Study design** Econometric analysis **Objectives** To test the effect of various tobacco control measures on youth cigarette demand using a 1996 nationally representative survey of US high school students **Setting** US **Intervention** Price, youth access laws, clean indoor air laws **SES outcomes reported** Young people	**Data sources** Cigarette smoking data from "The Study of Smoking and Tobacco Use among Young People" a survey of high school students from 202 schools conducted between March and June 1996. African American, Hispanic and high poverty communities were oversampled but weights were used to account for this. State average cigarette (inclusive of state but not local excise taxes) price from the Tobacco Institute. Two variables were created to account for cross-border smuggling. State-level tobacco control policy data from the Centers for Disease Control and Prevention. City/town level restriction data from the Americans for Nonsmokers Rights Organization. Tobacco policy enforcement data from the FFY97 summary, a yearly report provided by each state to the federal government. **Data description** Number=16,514; mean (SD) age 15.7 (0.03); 49.6% men; 14.7% black; 10.4% Hispanic; 3% Asian; 31.4% smoked in past 30 days; mean (SD) number cigarettes smoked per month 163.3 (4.5). **Analysis methods** ***Model****:* the two-part demand model of Cragg: firstly modelling smoking participation using a probit model; then a generalised linear model of consumption. Standard errors were adjusted for clustering within states. ***Outcome variables***: smoking participation (whether or not smoked a in previous 30 days); average number of cigarettes consumed in previous 30 days. ***Explanatory variables****:* actual price; perceived price; age; gender; race (black, white, Asian, Hispanic, other); frequency of participation in religious services; living status (alone, with others, in city, in suburb); parental marital status; fathers educational status; mothers educational status; parental employment; average hours worked per week; pocket money; clean air laws: private workplace, restaurants, stores, other places; index of clean air laws (one from 0-4 for amount of laws present, another for the amount of complete 100% restrictions); youth access laws: vending machine restrictions, youth access restrictions, bans on free samples; level of law enforcement: civil penalty, criminal penalty, fines (for minor or graduated).	**Stratified results (adolescents only)** **Price** Elasticity [* p<0.1, ** p<0.05] **State average price** -0.393* (smoking participation) -0.052 (amount smoked) **Average perceived price** -0.414** (smoking participation) -0.543* (amount smoked) Results for average perceived price reflect local taxes and price promotions that are not captured by state-level prices and may provide more accurate estimates of youth responses to prices. When the models included indices for clean air laws and compliance with youth access laws (to reduce multicollinearity caused by having multiple policies in the same model: model 1 includes the clean air index and model 2 includes the 100% restriction index) the elasticities were: **State average price** -0.351* (smoking participation, model 1) -0.347* (smoking participation, model 2) -0.199 (amount smoked, model 1) -0.241 (amount smoked, model 2) **Average perceived price** -0.492** (smoking participation, model 1) -0.474** (smoking participation, model 2) -0.562* (amount smoked, model 1) -0.592*(amount smoked, model 2) **Tobacco-control policies** Restrictions on smoking in restaurants had a significant negative effect (p<0.1) on participation and amount smoked on two out of four models. The clean air index did not have a significant effect on either smoking measure. The 100% clean air restrictions index had a significant (p<0.1) effect on smoking participation but not on the amount smoked by smokers. **Global results** Not applicable.	**Authors' conclusions** Youth access laws have a negative effect on smoking probability and relatively strong clean indoor laws may also reduce the probability of youth smoking. The presence of all tobacco policies combined and higher prices lowers both smoking participation and intensity. The teen-specific price has a larger impact on cigarette demand than the more commonly tested state average price. **Reviewers' comments** The dataset was nationally representative of high school seniors. Baseline summary statistics were presented and various models were used to account for relationships between different tobacco control policies. The survey data was unique in that it contained perceived price data as well as actual state cigarette prices. The results for the effect of tobacco restrictions varied depending on the models used and it is difficult to draw clear conclusions about them.

Study details	Methods	Results	Conclusions
Tauras (1999)[72] **Study design** Econometric analysis **Objectives** To examine the impact cigarette prices and restrictions on smoking in public places and private worksites have on the use of cigarettes by young adults **Setting** US **Intervention** Price, various smoking restrictions in worksites, restaurants and other public places **SES outcomes reported** Young people (longitudinal survey of high school seniors)	**Data sources** Longitudinal smoking data from the Monitoring the Future project (35 panels from high school senior surveys from 1976-93 followed-up every 2 years. Between 2 and 8 observations per person up to an average maximum age of 32). Average price for a pack of 20 cigarettes from the "Tax burden on Tobacco" (the Tobacco Institute 1997) deflated by Consumer Price Index. Data on the presence and magnitude of state clean indoor air laws from an unpublished database from the Centers for Disease Control and Prevention. **Data description** Number=NR (but approximately 2,400 from each senior class); 35.3% smoked in past month; mean (SD) age 22.8 (4.4); 14.2% live in rural community; 17.4% live in urban community; gender NR; mean (SD) clean air index score 1.6 (1.7). **Analysis methods** ***Model****:* the two-part demand model of Cragg: firstly modelling smoking participation using a linear probability model; then ordinary least squares regression of consumption. A two-part fixed effect model was also used to control for unobserved differences within individuals. Various models were presented accounting for collinearity between smoking restrictions. ***Outcome variables***: smoking participation (whether or not has smoked in previous 30 days); categorically "continuous" variable of average monthly consumption (taking values 0, 15, 90, 300, 600, 900, 1200 (which corresponds to 2 packs/day)). ***Explanatory variables****:* Price; age; average yearly income; number of years of formal schooling; weekly hours worked; college status; participation in religious services; marital status; family structure; type of city/town (urban, suburban, rural); location of residence at time of survey administration; year of survey; region (Bureau of Labour statistics groupings); state of residence when survey was conducted; six dichotomous variables for state restrictions on smoking in: private worksites, restaurants, health care facilities, government worksites, grocery stores, other public places; clean air index (0 to 4 depending on the amount of laws per state with 4 being extensive, i.e. private worksite restrictions, 1 is other public places and 0 is no restrictions).	**Stratified results (young adults only)** **Price** Cigarette price had a statistically significant negative effect on both smoking participation and amount smoked in all models. The average price elasticities (over 3 models with fixed effects for year, year and region, and year and state) were: -0.104 (smoking participation) -0.607 (quantity smoked) -0.711 (total elasticity) When the clean air index was included in the model, cigarette price still had a statistically significant negative effect on both participation and amount smoked. The average price elasticities were: -0.121 (smoking participation) -0.67 (quantity smoked) -0.791 (total elasticity) **Clean indoor air laws** The clean air index had a statistically significant negative impact on smoking participation and the amount smoked in all models. This indicates that strong limits on smoking in public places and private worksites may be an effective way of reducing cigarette consumption amongst young adults. **Global results** Not applicable.	**Authors' conclusions** This research suggests that higher cigarette prices, which could be achieved through increases in excise taxes would result in substantial reductions in both smoking participation and average consumption among young adults. The estimated price elasticity of demand ranged from –0.614 to –0.86 with a best estimate of –0.791. **Reviewers' comments** Data was taken from a nationally representative survey which is the only dataset tracking individual's smoking habits from teenagers to early adulthood. Some baseline summary statistics were presented but the size of the dataset was not reported. The modelling approach was thorough with various models constructed to account for state differences, and correlation between smoking restrictions.

Study details	Methods	Results	Conclusions
Tauras (2001)[71] **Study design** Econometric analysis **Objectives** To examine the impact cigarette prices and youth access restrictions have on adolescents' decisions to initiate smoking using longitudinal data from large national samples **Setting** US **Intervention** Price, various youth access restrictions **SES outcomes reported** Young people (longitudinal survey of high school seniors)	**Data sources** Longitudinal smoking data from the Monitoring the Future project (8th and 10th grade students, 3 cohorts from 1991, 92, and 93 followed-up every 2 years). Average price for a pack of 20 cigarettes from the "Tax burden on Tobacco" (the Tobacco Institute 1997) deflated by Consumer Price Index. Youth access law data from the American Lung Association. **Data description** Number=8,447 (35.2% started smoking any cigarettes, 18.7% smoked at least 1-5/day, 9.5% smoked at least ½ pack/day); 51% male; mean (SD) age 15.3 (1.7); mean (SD) no. youth restrictions per state 3.9 (1.3); years of formal schooling 8 (1). **Analysis methods** ***Model****:* discrete-time hazard model (using a weighted probit equation) of the probability of starting smoking in any given time period for each of the amounts smoked. A Huber/White robust method was used to account for correlation within an individual. Ten separate models adjusting for different combinations of confounders with some only including one access restriction policy to minimise collinearity from correlated state-level variables. ***Outcome variables***: 3 dichotomous variables for smoking in previous 30 days: if any cigarettes; if 1-5 cigarettes per day; if at least ½ pack per day. ***Explanatory variables****:* Price; age; gender; average yearly income; number of years of formal schooling; weekly hours worked; number of children; race (African American, Mexican, Cuban, Puerto Rican, Asian American, other, white); family structure; parental education; mother's work status; participation in religious services; marital status; region; year; dichotomous variables for if a state has: minimum purchase age, restrictions on free tobacco samples, minimum age assigns on vending machines, vendor punishments, law restricting smoking in schools; index variable taking values from 0 to 7 for the amount of youth restrictions per state.	**Stratified results (adolescents only)** **Price** Cigarette price had a statistically significant negative effect ($p<0.01$) on smoking initiation for those smoking 1-5/day, and at least ½ pack/day (in all models). There was little effect of price on smoking any cigarettes, it was only significant ($p<0.1$) in two of the 10 models. The average price elasticities were: -0.271 (any smoking) -0.811 (1-5 cigarettes/day) -0.955 (1/2 pack/day) All models were repeated replacing regional effects with state fixed effects (to account for unobserved state attitudes towards smoking). Price had a statistically significant negative effect on all 3 measures of smoking initiation which implies price increases have a larger deterrent effect when controlling for state-level sentiment. The average price elasticities were: -0.111 (any smoking) -1.23 (1-5 cigarettes/day) -1.43 (1/2 pack/day) **Youth access restrictions** Mixed results were found for youth access restrictions. The index variable was not significant. Minimum age purchase laws had a significant ($p<0.1$) effect in most models. School restriction had a significant ($p<0.1$) effect on smoking any cigarettes but not on the other outcomes. Restricting free samples had a significant ($p<0.1$) effect on smoking 1-5 cigarettes/day. Minimum purchase age signs and vendor penalties had no effect on smoking initiation. **Global results** Not applicable.	**Authors' conclusions** This research contradicts previous findings suggesting that price and tax increases would have little effect on youth smoking initiation. The average estimates suggest that if a 10% increase in federal excise had been enacted during this study and been fully passed on to consumers, the probability of daily smoking initiation amongst would have decreased by around 10%. Minimum purchase age laws, restrictions in schools and on free samples could possibly be effective tools in decreasing smoking initiation. **Reviewers' comments** Data was taken from a nationally representative survey which is the only dataset tracking individual's smoking habits from teenagers to early adulthood. Baseline summary statistics were presented. The state-level policies may underestimate the true effect of youth smoking restrictions as they do not account for local level policies, or the level of enforcement.

Study details	Methods	Results	Conclusions
Tauras (2003)[70] **Study design** Econometric analysis **Objectives** To examine if increasing the price of cigarettes and implementing stronger restrictions on smoking in private worksites and other public places have an impact on smoking cessation decisions of young adults **Setting** US **Intervention** Price, smoking restrictions in private worksites, restaurants, and other public places **SES outcomes reported** Young people (longitudinal survey of high school seniors)	**Data sources** Same data sources as Tauras (2005) [69]. **Data description** Number=approximately 2,400 (2 groups of 1,200 followed-up by surveys on odd and even-numbered years respectively). 44% male; 86% white; 66% live in suburban and 15% in rural communities; mean (SD) years of schooling 12.5 (1.8); age=NR **Analysis methods** ***Model****:* Cox regression model. Robust methods were used to account for correlation within an individual. Eight separate models were estimated, adjusting for different factors. ***Outcome variables***: time to quit smoking (smokers were defined as those who had smoked cigarettes in the 30 days prior to the survey). The data provided individual smoking trajectories for up to 14 years. ***Explanatory variables****:* Price; age; average yearly income; number of years of formal schooling; race (white/black); gender; college status (attending full-time, less than half-time, half-time or not at all); participation in religious services; marital status; family structure; type of city/town (suburban, rural, urban); year of survey (to control for time trends); US Census Bureau divisions (to control for regional trends); 3 dichotomous variables for the presence of a state clean air laws restricting smoking in each of private worksites, restaurants and other public places.	**Stratified results (young adults only)** **Price** The real price of cigarettes had a statistically significant negative effect on the quitting hazard in all models. The average elasticity was 0.350 (range 0.269 to 0.466) indicating that a 10% increase in price would increase the probability of quitting among young adults by about 3.5%. **Smoke-free air laws** Mixed results were found for the impact of smoking restrictions. Policies restricting smoking in private worksites were found to have a positive impact on quitting but this was only statistically significant in some of the models. The average hazard ratio indicates that those residing in states with private worksite restrictions have a 4.55% greater probability of quitting smoking than those who reside in states with no worksite restrictions. Restrictions in other public places only had a significant positive effect in models not adjusting for regional effects. Restaurant restrictions had little effect except in one model where they had a significant negative effect (implying an increase in time to quitting) **Global results** Not applicable.	**Authors' conclusions** The findings from this study support the hypothesis that increasing cigarette prices (resulting from increases in cigarette excise taxes) would increase the number of young adults who quit smoking. Stronger restrictions on smoking in private worksites and public places other than restaurants are likely to have a positive impact on young adults smoking cessation. **Reviewers' comments** Data was taken from a nationally representative survey which is the only dataset tracking individual's smoking habits from teenagers to early adulthood. Baseline summary statistics were presented but the sample size and participant ages were not reported. Laws used in this analysis probably underestimate the true effect of smoking restrictions as they don't account for local-level policies or the level of enforcement.

Study details	Methods	Results	Conclusions
Tauras (2005)[69] **Study design** Econometric analysis **Objectives** To examine the impact of increasing the price of cigarettes, and implementing smoking restrictions on young adults smoking progression **Setting** US **Intervention** Price, smoking restrictions in private and public worksites, restaurants, healthcare facilities and other public places **SES outcomes reported** Young people (longitudinal survey of high school seniors)	**Data sources** Smoking data from the Monitoring the Future survey, a nationally representative cross-sectional sample of high school seniors (8th and 10th grades, from 1976-1995 with data collection every 2 years). Cigarette prices from the "Tax Burden on Tobacco" (Tobacco Institute 1999) and deflated by the Consumer Price Index. State-level smoke-free air laws data from an unpublished database from the Centers for Disease Control and Prevention. **Data description** Number=44,985, after excluding missing data there were 5,383; 4,259; and 4,639 people included in the daily, moderate, and heavy uptake analyses respectively. Approximately 92% white, mean (SD) age over all survey waves 24 (3.4); years of schooling 14 (1.6). **Analysis methods** ***Model****:* discrete time duration model of the decision to move from one smoking state to another. Standard errors were adjusted to account for the clustering of data within individuals. Year fixed-effects were included to account for unmeasured factors (e.g. changes in attitudes to smoking) over time. ***Outcome variables***: daily uptake (transition from non-daily to one or more cigarettes/day); moderate uptake (transition from 1-5 to 10 or more/day); heavy uptake (transition from 10 or more to 1 or more packs/day). ***Explanatory variables****:* Price; age; average yearly income; number of years of formal schooling; race (white/non-white); gender; college status (attending full-time, less than half-time, half-time or not at all); participation in religious services; marital status; dichotomous variables for the presence of a state law restricting smoking in each of private worksites, restaurants, government worksites, healthcare facilities, and other public places; US. Census Bureau divisions (to control for regional attitudes to smoking).	**Stratified results (young adults only)** **Price** Price had a statistically significant negative effect on smoking uptake across all three categories. Price elasticities were: -0.646 (daily uptake) -0.576 (moderate uptake) -0.412 (heavy uptake) These results show that price increases will prevent many young adults from progressing into higher intensities of smoking. **Smoke-free air laws** Private worksite laws and restrictions in other places both had a statistically significant negative effect on moderate uptake. Government worksite, healthcare and restaurant smoking restrictions did not have any significant effect on daily, moderate or heavy smoking uptake. These results should be treated with caution as they are state-level and do not account for local-level laws which may be more stringent. **Global results** Not applicable.	**Authors' conclusions** The findings from this study support the hypothesis that increasing cigarette prices (resulting from increases in cigarette excise taxes) would substantially decrease the number of young adults who progress to higher smoking intensities. A significant increase in excise taxes and greater enactment of private worksite and other public place smoking restrictions will yield large reductions in future disease and death caused by tobacco use in the United States. **Reviewers' comments** Data were taken from a nationally representative survey which is the only dataset tracking individual's smoking habits from teenagers to early adulthood. Baseline summary statistics were presented. As longitudinal data were used, the drop-out rates increased over time (retention rate at 7th follow-up 55-62%) but analyses assessing the effects of drop-out indicated no difference in the effects of price and policies on those who dropped out early. Analyses adjusted for clean air laws and possible confounders but there may have been other local restrictions affecting smoking decisions.

Study details	Methods	Results	Conclusions
Thomson (2004)[85] **Study design** Cross-sectional survey **Objectives** To examine the association between state cigarette excise taxes and smoking behaviour amongst young people in the United States **Setting** US **Intervention** Tax (state excise tax at 1st January 1999) **SES outcomes reported** Young people (aged 12 to 18)	**Data sources** Smoking data from the Growing Up Today (GUTS) longitudinal cohort study started in 1996 with data taken from the 1999 questionnaire. State excise tax at 1st Jan 1999 from "The Tax Burden on Tobacco" (Tobacco Institute). **Data description** Number=10,981; 41% male; 93% white; 1% African-American; 1% Latino/Hispanic; 2% Asian; 3% other race; 21% ever smoked; 9% established smokers. **Analysis methods** ***Model****:* logistic regression models using general estimating equations to account for clustering within a state. 3 models adjusting for: age and gender only; plus known predictors of peer and parental smoking and tobacco promotional item possession; plus % of state living below poverty level. ***Outcome variables***: experimental smoking (if ever tried cigarette smoking); established smokers (if had tried smoking and smoked at least 100 cigarettes). ***Explanatory variables****:* state excise tax in 1999 split into quartiles (2.5-24, 25-39, 40-59, 60-100 cents); age; gender; peer smoking, parental smoking (at least one parent smoked vs. neither), possession of a tobacco promotional item such as hat or t-shirt with cigarette logo; % of state living at or below the poverty level based on 1999 Census data. Data on tobacco control programs were not included as the measurements were too imprecise.	**Stratified results** **Experimental smokers** In the baseline model (adjusting for state-clustering, age and gender) the highest tax quartile was associated with a significant reduction in the odds of experimentation (OR 0.72, 95% CI: 0.63, 0.84). This result remained significant in the other models. The test for trend across increased levels of tax was also significant ($p<0.0001$). **Established smokers** In the baseline model (adjusting for state-clustering, age and gender) the highest tax quartile was associated with a significant reduction in the odds of being an established smoker (OR 0.61, 95% CI: 0.43, 0.85). The test for trend across increased levels of tax was also significant ($p=0.009$). However the results for the 2 models adjusting for additional factors were no longer significant. **Global results** Not applicable.	**Authors' conclusions** Higher state cigarette taxes are associated with a 20% reduction in the likelihood of adolescent smoking experimentation. Higher taxes are possibly associated with established smoking although this association may attenuated by other factors such as peer smoking. **Reviewers' comments** The sample was not random or representative and the participants were children of nurses. There may have been other confounding factors such as school and state tobacco control programs, which were not accounted for in the analysis. Analyses were repeated using retail pack price which produced no difference in the results (not presented in the paper).

Study details	Methods	Results	Conclusions
Townsend (1987)[59] **Study design** Econometric analysis **Objectives** To investigate whether the response of smokers of different social class or income groups to tax changes is homogenous; and to consider a methodology for measuring the effect of a cigarette tax increase in the consumption, tax burden and economic welfare of the average member of different socioeconomic groups **Setting** UK **Intervention** Price changes, income and the effects of health publicity **SES outcomes reported** Social class (UK categories 1 to 5) for men only	**Data sources** The Tobacco Research Council (1961-77) provided annual data on cigarette consumption by social class (data inflated to agree with sales data and eradicate bias). Average incomes of professional, management, clerical and manual workers from Family Expenditure Survey (1960-77). Economic data from UK National Income and Expenditure Yearbook (1982) **Data description** Number=10,000 **Analysis methods** ***Model****:* single equation time-series model assuming demand is log linear. Separate equations for each socioeconomic group. ***Outcome variables***: average cigarette consumption per week per adult. ***Explanatory variables****:* price indices for cigarettes and for consumer expenditure; annual disposable income per head; health publicity effect (representing the effect of health publicity in 1962, 65, 71), a time trend to detect underlying changes in taste.	**Stratified results** ***Socioeconomic group (men only)*** Price elasticity 1: 0.15 2: -0.34 3: -0.54 4: -0.87 5: -1.26 [none were significant at the 5% level] Price response was low for social classes 1 and 2 but there was a highly significant trend ($p<0.01$) in social class elasticities with the highest elasticity observed for class 5. Anti-smoking publicity had most effect on the higher social classes with a fall in male smoking from 1962 of approximately 17%($p<0.05$) for class 1 and 16% for class 2 and a possible further reduction of 17% for class 1 and 5% for class 2 from 1965. Publicity in 1971 relates to a reduction of 15% ($p<0.05$) in smoking in class 4 (semi-skilled) male workers and around 8% in class 5 (unskilled) workers. **Global results** NR	**Authors' conclusions** The study suggested a method for measuring price response of different social classes and the effect of tax changes on tax paid and economic welfare. It suggests that price response may be greater in lower social class groups. It also suggests that the downward drift in prices may have effectively increased the smoking levels of men from social classes 3, 4 and 5 relative to 1 and 2 but levels for classes 1 and 2 may have fallen due to the effects of anti-smoking education. It is suggested that increases in cigarette tax may fall less heavily on lower social groups despite their higher consumption because they respond more by reducing consumption. **Reviewers' comments** No descriptive statistics of data were provided. The models used fitted the data reasonably well (R-squared 50-71%). No other confounding factors were accounted for and it is not clear why this analysis was only applied to men.

Study details	Methods	Results	Conclusions
Townsend (1994)[58] **Study design** Econometric analysis **Objectives** To assess effects of price, income and health publicity on cigarette smoking by age, gender and socioeconomic group **Setting** UK **Intervention** Price changes, income and the effects of health publicity **SES outcomes reported** Socioeconomic group (UK categories I to V), age (starting with 16-19 age group), gender	**Data sources** British general household survey (1972-90) provided biennial data on the proportion of adults smoking >1 cigarette per day and the numbers smoked per smoker. Annual national disposable income and cigarette prices were from the national income and expenditure accounts. National income was divided by the population and deflated by the RPI to give real per capita income. **Data description** Number=NR **Analysis methods** ***Model****:* multiple regression model assuming demand is log linear. Separate equations fitted by sex for each socioeconomic and age group. Non-significant terms (p<0.05) were excluded from the models, and tests for trend in elasticities over socioeconomic and age groups were tested by ANOVA. ***Outcome variables***: average cigarette consumption per week per adult, smoking prevalence. ***Explanatory variables****:* real price of cigarettes; annual real disposable income per head; health publicity effect (representing the net effect of health publicity, social acceptability and smoking restrictions).	**Stratified results** [* p<0.05, ** p<0.01] ***Consumption*** ***Socioeconomic group and gender:*** Men - price elasticity (SE) All: -0.47 (0.19)* I: 0.03 (0.42) II: -0.12 (0.32) III non-manual: -0.67 (0.24)* III manual: -0.49 (0.19)* IV: -0.47 (0.17)* V: -1.02 (0.31)* Men – health publicity (SE) All: -0.05 (0.01)** I: -0.09 (0.01)** II: -0.07 (0.01)** III non-manual: -0.06 (0.01)* III manual: -0.04 (0.01)** IV: -0.03 (0.01)** V: -0.007 (0.01) Significant linear trends by socioeconomic group for men for price elasticities (p=0.02, elasticity was higher for group V) and health publicity (p=0.01, most effect on group I). Women - price elasticity (SE) All: -0.61 (0.14)** I: 0.50 (0.59) II: -0.29 (0.34) III non-manual: -0.75 (0.21)* III manual: -0.71 (0.22)* IV: -0.64 (0.26)* V: -0.88 (0.41)* Women – health publicity (SE) All: -0.014 (0.006)* I: -0.06 (0.02)** II: -0.05 (0.01)** III non-manual: -0.02 (0.01) III manual: -0.01 (0.01) IV: 0.01 (0.01) V: 0.02 (0.02)	**Authors' conclusions** These results suggest a differential response to real cigarette prices by socioeconomic group, and some evidence of a difference by gender and age. Health publicity had a significant effect on men across all groups, but only for women in groups I and II. The effects of advertising were not assessed. For young men (16-19) income was more influential than price but teenage women may be more affected by price rises. Price elasticity estimates were generally higher for lower socioeconomic groups, which confirms previous findings for men and provides new results for women. Price has the most effect on smoking prevalence in group V and these are the groups for whom smoking prevalence is highest. **Reviewers' comments** The size of the dataset was not reported, although the authors say it was relatively small. No descriptive statistics of data were provided. All models appeared to fit the data well apart from those for older women and women in group V. Models did not adjust for any other confounding factors and the analysis of age in particular presented problems as there are cohort effects, which can't be separated from the main analysis.

		Significant linear trends by socioeconomic group for women for price elasticities (p=0.02, elasticity was higher for group V) and health publicity (p=0.003, but effects only significant for groups I and II). ***Socioeconomic group and age*** The effects of price were not significant for men aged 16-19 or 20-24 (elasticities of 0.06 and 0.16). Price had most effect on men aged 25-34 with a statistically significant elasticity of -0.73**. Price had more of an effect of women of all ages, elasticities were high and significant for all ages (-0.86** for ages 16-19; -0.96** for ages 20-24; -0.85** for ages 25-34). There was no evidence of any trend with age. ***Smoking prevalence*** Price was a statistically significant factor in smoking prevalence only for men and women in group V (elasticities of -0.61* and -0.51** respectively). The overall elasticities were -0.08 (men) and -0.23* (women). [* p<0.05, ** p<0.01] **Global results** NR	

Study details	Methods	Results	Conclusions
Tsai (2005)[66] **Study design** Econometric analysis **Objectives** To assess the effect of a new cigarette tax scheme implemented in Taiwan in 2002 on brand switching, amount consumed and amount spent on smoking **Setting** Taiwan **Intervention** Tax increase (the new tax scheme implemented January 2002 increased the price of a pack of cigarettes by on average NT $10) **SES outcomes reported** Gender (men only); education; income	**Data sources** Cigarette consumption data from face-to-face interview longitudinal surveys conducted by the National Health Research Institutes (2000, 2001 and 2002). Cigarette price was the retail price reported by 7-11 retail stores in 2001 to capture the price before the tax changes. **Data description** Number=501 (male smokers with data for 2001 and 2002), women and teenagers excluded from analysis due to small sample sizes. 31% aged 18-35; 73% employed; 35% high school education and 22% undergraduate; mean monthly income (SD) NT $40,700 ($47,200). **Analysis methods** ***Model****:* logistic regression (binary outcomes); ordinary least squares regression (continuous outcomes). Zellner's seemingly unrelated regression (SUR) was used to assess possible correlations between changes in price, the amount smoked and the amount spent. ***Outcome variables***: binary outcomes: whether or not reduced amount smoked, and if switched brands after 2002 tax changes. Continuous outcomes were the differences in: the numbers of packs smoked per month from 2001 to 02; self-reported pack prices of brand smoked most often; and monthly expenditure on smoking. ***Explanatory variables****:* advertising (3 categories for the amount of cigarette advertising seen in 2001); loyalty (3 categories for the brand most often smoked); addiction (how soon after waking was the first cigarette smoked); amount smoked per month in 2001; age; education; employment status; marital status; personal income; living area.	**Stratified results (men only)** After the 2002 tax changes 54.3% did not change their smoking behaviour, 17.4% switched brands, 18.8% reduced the amount smoked, and 8.4% switched brands and reduced the amount smoked. **Smoking reduction/brand switching** The amount smoked before the tax changes was significantly associated with the decision to reduce smoking in 2002 (odds ratio 1.03, p<0.01). Personal income or education level did not have a significant effect (p>0.05) the decision to reduce smoking. Brand switching was significantly affected by advertising exposure (odds ratio 0.30, p<0.05) with those exposed to advertising for the brand they smoked in 2001, being less likely to change in 2002. Monthly income or education did not affect switching (p>0.05). **Increase in number of packs smoked** The increase in amount smoked was negatively associated with education level. Those with higher educational levels smoked less: high school educated people smoked 5.18 packs (p<0.01) and those with undergraduate or graduate degrees smoked 6.71 packs (p<0.01) less than those with preliminary school educations. **Global results** Not applicable.	**Authors' conclusions** Increase in prices following the 2002 taxation influenced brand-switching rather than reducing the amount smoked. Smokers respond to increased prices by switching to lower-priced brands as an alternative to quitting or reducing the amount smoked. Education level is related to smoking behaviour, the higher the education level the greater the reduction in the amount smoked and the less increase in price paid after the 2002 tax. **Reviewers' comments** It was not clear if the data was representative of the Taiwanese population. Only men were included and there was considerable loss to follow-up with more smokers dropping out. Baseline summary statistics were presented.

Study details	Methods	Results	Conclusions
Wasserman (1991)[50] **Study design** Econometric analysis **Objectives** To estimate a generalized linear model to examine adult and teenage cigarette demand **Setting** US **Intervention** Legislation restricting smoking in public places, prices **SES outcomes reported** Age (teenage smoking)	**Data sources** Seven smoking supplements from the National Health Interview Survey (1970-85) provided data on adult smoking habits. Teenage smoking data from National Health and Nutrition Examination Survey II (1976-80). Family income data from the Current Population Survey. Weighted average cigarette prices by state using data from the Tobacco Institute's Report (1986).Price and income data were deflated to constant dollars (1967) using the Consumer Price Index. A border variable was used to identify if an area bordered any area with lower-priced cigarettes (to account for bootlegging). Data on regulations restricting smoking, and laws restricting sales to minors, from US Dept. Health and Human Services reports (1986). **Data description** Number=84,301 (adults); 1,891 (teenagers aged 12-17) **Analysis methods** ***Model****:* generalized linear model (GLM) using a pseudo-Poisson distribution and estimated using a split sample approach (to prevent over-fitting). Separate models were developed for adult and teenage smokers. Additional two-part models modelling the decision to smoke, followed by the level of smoking by current smokers, were used to confirm the GLM results. ***Outcome variables***: cigarette consumption (packs per day), this was taken as zero for non-smokers. ***Explanatory variables****:* both sets of models included price, age, gender, race, education, family income and size, year and an index representing the level of state smoking restriction (1 for private worksites, 0.75 for restaurants but not worksites scored 0.75, 0.5 for no restaurant or worksite but with restrictions in at least 4 public places, 0.25 for between 1 and 3 minor restrictions, and 0 for no regulations). Adult model also included birth cohorts to control for an individuals exposure to different cultural aspects of smoking across different time periods. Teenage model did not include level of education of the individual, but that attained by the head of the household (as a proxy for parental smoking habits). An additional variable was included for the presence of a law in that state restricting sales to minors.	**Stratified results** ***Teenagers*** ***Smoking restrictions*** Anti-smoking regulations had a statistically significant negative effect on the number of packs smoked, with stricter restrictions reducing cigarette consumption. The estimated percentage decrease in overall per capita smoking for an increase in the regulation index from 0.25 to 1 was calculated to be 41%. However, the presence of a law restricting sales to minors was not statistically significant. In the additional two-part model, regulations had a statistically significant effect on the probability of being a smoker but not on the amount smoked by current smokers. ***Price*** The effect of price on consumption was not statistically significant and the elasticity of demand for teenagers was not significantly different to adults (teenage price elasticity not reported). These results were confirmed by the two-part model. **Global results** ***Adults*** ***Smoking restrictions*** Anti-smoking regulations had a statistically significant negative effect on the number of packs smoked, with stricter restrictions reducing cigarette consumption. The estimated percentage decrease in overall per capita smoking for an increase in the regulation index from 0.25 to 1 was calculated to be 5.9% (to achieve this same reduction through a price increase would require an increase of 31%). In the additional two-part model, regulations had a statistically significant effect on the amount smoked by current smokers but not the probability of being a smoker ***Price*** There were statistically significant interactions between price and year so price elasticities were calculated on a year-by-year basis. Elasticities ranged from 0.06 (SE 0.08) to -0.23 (SE 0.12) from 1970 to 1985 becoming increasingly negative over time. These results were confirmed by the two-part model.	**Authors' conclusions** The price elasticity of demand for adults is low and the structure of the demand for cigarettes is changing over time. The elasticities reported in this paper are low compared to earlier studies. Regulations restricting smoking in public places have a significant negative effect on cigarette demand. The teenage smoking results suggest that teenagers may not be as responsive to price changes as previously thought. Regulations restricting smoking in public places have a considerable impact on teenage smoking behaviour, affecting the decision to become a smoker rather than the amount smoked. **Reviewers' comments** The NHIS may underreport cigarette consumption and the authors assumed that this was by approximately a third. However, as the models were multiplicative no adjustments were made. No summary statistics of the data were provided. The modelling methods were described well, developed using a split sample technique and confirmed using an additional model. All models adjusted for other confounding factors.

INTERVENTION: Multi-faceted interventions

Study details	Methods	Stratified results	Global results
Cooreman (1996)[92] **Study design** Before-and-After Study (cross-sectional samples) **Objectives** To study the effect of the French anti-tobacco legislation on staff in a hospital in Paris **Setting** Cochin Hospital, Paris, France **Intervention** Tobacco control legislation **SES outcomes reported** Gender **Authors' conclusions** The authors concluded that the law appeared to have been accepted without too much opposition.	**Data sources** Surveys designed by study authors. Questions related to demographics, knowledge of the dangers of tobacco in relation to increasing risks of other diseases, smoking ban at the hospital, smoking habits, impact of the law on attitudes to smoking and perceived educational role in dissuading others from smoking. 1985 survey (pre-legislation) 1993 survey (post-legislation) – also included extra questions on the tobacco law **How were the participants selected?** In 1993 all medical ancillary staff present at the hospital on the day of the survey were invited to participate (n=1026). 814 sent back usable questionnaires (response rate 79.3%). The 1985 response rate was 83.8% of 895 invited participants (differences in response rates were not significant). **Population characteristics** Men: 1985 (15.8%) 1993 (16.3%) NS Women 1985 (84.2%) 1993 (83.7%) NS Mean age 1985 (34.9 (9.7) years) 1993 (35.3 (9.6) years) NS Group 1 (wards for patients with tobacco-related diseases) 1985 (21.3%) 1993 (16.6%) Group 2 (wards for patients with diseases unrelated to tobacco) 1985 (40.4%) 1993 (45.7%) Group 3 (Surgery, Intensive Care) 1985 (38.3%) 1993 (37.7%) Significant differences between wards (p=0.03) Supervisors: 1985 (9.5%) 1993 (7.8%) Nurses: 1985 (45.6%) 1993 (41.4%) Healthcare assistants: 1985 (31.5%) 1993 (34.6%) Employees with no direct patient contact 1985 (3.8%) 1993 (6.3%) Various 1985 (8.6%) 1993 (9.9%) **Intervention details** Legislation (La Loi Evin) covers smoking restrictions in the workplace, restrictions on advertising and sports promotion of	**Prevalence of smoking** GENDER Men: 1985 54.7% 1993 43.4% NS Women: 1985 31% 1993 31% NS (data on smoking prevalence by age <30, 30-44 years and >45 years not extracted) (data on smoking by hospital ward not extracted) **Age at which started smoking** GENDER Men: 1985 17.9(5.2) yrs 1993 18.0 (3.2) yrs NS Women 1985 20.2 (5.6) yrs 1993 19.2 (4.9) yrs (p= 0.04) **Number of cigarettes per day** GENDER Men: 1985 17.3 (9.6) 1993 14.4 (8.8) NS Women: 1985 14.6 (10.1) 1993 11.7 (7.0) p=0.001 **Number of quit attempts** Differences in quit attempts not broken down by gender so not extracted in full. More men than women tried to quit (data not provided) but there were no statistically significant differences between 1985 and 1993. **Proportion of ex-smokers** GENDER Men: 1985 13% 1993 16.3% NS Women: 1985 9% 1993 11.8% NS (reasons for quitting not broken down by gender and not extracted) (knowledge of diseases linked to tobacco not broken down by gender and not extracted)	**Prevalence of smoking** 1993: 32.3% (comparable to 1985 survey but data not provided) Of these 80.7% did not find it difficult to stop smoking in smoke-free areas. 22.5% said they had decreased their overall consumption. None had stopped smoking altogether. **Number of cigarettes per day** 1985: 15 1993: 12.1 **Consumption of lower-tar cigarettes** Lower tar cigarettes 1985: 11% 1993: 50.8% (p=0.001) Higher tar cigarettes 1985: 16.6% 1993: 6.2% **Attitudes to smoking** Non-smokers and ex-smokers were less tolerant of smoking since the new law in relation to colleagues, patients and visiting families (p=0.001). (Further data on attitudes not extracted as no gender data.)

	cigarettes, amount of tar permissible in cigarettes, provision of cigarette composition information and health warning information on cigarette packs and signage forbidding sales of cigarettes to minors to be displayed where cigarettes are sold. **Outcomes measured** Prevalence of smoking (Survey) Age at which started smoking (Survey) Number of cigarettes per day (Survey) Number of quit attempts (Survey) Proportion of ex-smokers (Survey) Reasons for quitting (Survey) Knowledge of diseases linked to tobacco (Survey) Consumption of lower-tar cigarettes (Survey) Attitudes to smoking (Survey)		

Study details	Methods	Stratified results	Global results
Helakorpi (2004)[88] **Study design** Post-intervention Study (cross sectional and some longitudinal samples) **Objectives** To examine patterns of ever smoking among Finnish adults by gender and birth cohort from 1978 to 2001, with special emphasis on possible effects of 1976 Tobacco Control Act (TCA) **Setting** Finland **Intervention** Tobacco control legislation **SES outcomes reported** Gender and birth cohort **Authors' conclusions** "The smoking behaviour trends across successive birth cohorts suggest the impact of tobacco policy in decreasing smoking initiation in youth. These findings thus support the acceptability and effectiveness of antismoking and smoke free policy measures in society." Note: Hypothesis of study: baseline hypothesis was that any impact of TCA would manifest as a lower initiation rate than could otherwise be expected among birth cohorts that entered critical range after TCA became effective. Authors expected no effects on prevalence of ever regular smoking among cohorts that had already passed 21st birthday in 1976 (born 155 or earlier), a gradually increasing effect among those born in 1956 to 1960, and a full effect among those born in 1961 or later.	**Data sources** Data from Finland's National Public Health Institute (KTL) independent, annual cross sectional postal surveys. Survey covering period 1978 to 2001. 13 5-year birth cohorts constructed. 7 of the birth cohorts were followed up through the entire 24 years period. **How were the participants selected?** Each year random sample (n=5000) of Finnish citizens drawn from population register. **Population characteristics** Number: 91,342 Age 15 to 64yrs Gender: Males n=43,809; Females n=47,533 No other demographic details reported. **Intervention details** 1976 Tobacco Control Act in Finland prohibited smoking in most public areas and on public transport, restricted tobacco advertising and set 16 year age limit for tobacco purchases. Manufacturers obliged to include health warnings on tobacco packaging, and about 0.5% of tobacco revenue allocated to tobacco control programmes and other health promotion initiatives. Total advertising ban enforced in 1978. **Outcomes measured** Smoking prevalence (Questionnaire)	**Smoking prevalence** GENDER & AGE (Birth Cohort) Males: A decrease in smoking from older male cohorts to younger ones was suggested by graphic analysis. Among men the proportion of ever regular smokers was as high as 70-80% in the cohort born in 1916-30, compared with no more than 65% born in 1951 to 1960 or later. After controlling for cohort and age profile, a clear decline in prevalence of male ever smokers concurrent with the TCA was found (OR=0.74, 95% CI=0.68 to 0.81, p<0.001). Prevalence of ever regular smoking was exceptionally high among men born in 1916-25 and in 1946 to 50 while it was low among men born in 1931-35. Females: Among women a continuous increase in smoking prevalence was observed in successive cohorts. The proportion of ever regular smokers was 15-25% among women born in 1916-40 but reached 48% among the 1951-60 cohort. Among women the interaction term between the TCA and cohort trend (p<.001)was included in the model and showed a decline in the prevalence of ever smokers concurrent with the TCA. Study also reports extrapolation of the prevalence expected in birth cohorts assuming that the smoking trends observed before the effect of the TCA had continued. The difference between the observed prevalence of ever regular smoking and that expected on the basis of the extrapolation, which authors say may be taken to estimate impact of TCA, was 7.4% (p<0.001) for men and 19.7% (p<0.001) for women born in 1961-65. This increased among younger cohorts: Men: 1966-70: -8% 1971-75: -8.3% 1976-80: -8.5% Females: 1966-70: -26.0% 1971-75: -31.7% 1976-80: -36.9%	

Study details	Methods	Stratified results	Global results
Heloma (2004)[89] **Study design** Before-and-After Study (cross sectional samples) **Objectives** To analyse whether the implementation of national tobacco control legislation had an association with the prevalence of smoking, and the occurrence of smoking-related lung disease **Setting** Finland **Intervention** National Tobacco Control Act of 1976 **SES outcomes reported** Gender **Authors' conclusions** Analysis indicated a change in smoking prevalence among men and women in the period from 1976 to 1985. National legislation was found to be associated with a change in smoking prevalence for women, from a linear rise to a plateau. After the Act smoking prevalence among men continued to decline without change.	**Data sources** Smoking prevalence for 1960 to 1977 from surveys by Suomen Gallup plc, for period 1978 to 2000 from annual surveys conducted by National Public Health Institute. Surveys for 1978 to 2000 had more demographic information than earlier survey which only had gender. Lung cancer incidence rates (from 1980 to 2000) from Finnish Cancer Registry; Mortality data (1970 to 2000) on respiratory diseases published by Statistics Finland. **How were the participants selected?** Part of a national survey **Population characteristics** Sample: from 1960 to 1977 – no details available on sample size or number of surveys From 1978 sample size approx 5,000 per year No other demographic data were recorded. **Intervention details** Tobacco Act 1976 (came into force in 1977) comprised: imposing a ban on tobacco advertising; restricting smoking in public premises; prohibited selling tobacco products to minors; required health warnings in packages; allocated funds representing 0.5% of annual tobacco tax revenue for smoking prevention. Also amendment to include workplaces in 1994. Revised in 2000, classifying environmental tobacco smoke as a carcinogen and restricted smoking in restaurants. **Outcomes measured** Smoking prevalence (Survey)	**Smoking prevalence** *GENDER* Men: Proportion of daily smokers among Finnish men declined from 58 to 32% between 1960 to 1983, after which the decline slowed. The test of the main hypothesis, that smoking prevalence was not different before and after tobacco control legislation was enacted was statistically significant (regression coefficient 14.37 SE 4.99, p=0.006). The shape of the smoking prevalence curve before 1976 (Tobacco Act) was steeper than after the year of enactment. Women: From 1960 to 1973, the prevalence of smoking for women increased from approx 12 to 20%. After introduction of the Act in 1976 the increase stopped and prevalence decreased slightly. In the late 1980s female smoking prevalence increased again to remain at a plateau of 20% from 1997 to 2000. For women the effect of the Tobacco Act reached statistical significance (Regression coefficient -2.53 SE 0.97, p=0.012) and the effect was to lower smoking prevalence temporarily.	None.

Study details	Methods	Stratified results	Global results
Unger (1999)[90] **Study design** Post-intervention Study (cross sectional samples) **Objectives** To examine the awareness of and support for anti-tobacco policies among 10th grade youth **Setting** Schools within California counties, US **Intervention** Smoking restrictions within schools **SES outcomes reported** Ethnicity and gender, all adolescents **Authors' conclusions** "Although the results cannot prove a causal association, they suggest that adolescents' attitudes towards anti-tobacco policies may play a role in their decisions about smoking. Tobacco control and education programs should include information about existing anti-tobacco policies, and should educate youth about the importance and benefits of anti-tobacco policies".	**Data sources** Data part of independent evaluation of the California Tobacco Control Prevention & Education Program. Collected during 1996 to 1997 school year. Anonymous self-completed questionnaire, survey conducted in classroom with trained data collectors. **How were the participants selected?** Sample from 65 schools in 18 California counties. Sample weighted to represent population of California youth enrolled in public schools. Schools districts randomly selected with each county, schools randomly selected within districts and classrooms of students randomly selected within schools. **Population characteristics** Sample: 6887 (96% response rate). All 10th grade students; Age: 15yrs (70%) 16 yrs (25%); Gender: Female approx 49%; Ethnicity: White 48%; Latino 27%; Asian-American 21%; African-American 7%; Native-American 5%; Other 5% (Some respondents identified with more than one ethnic group). **Intervention details** Various policies implemented within states and cities including: minimum ages for tobacco purchase, laws banning minors for possessing or using tobacco products, restrictions or bans on cigarette vending machines, laws requiring merchants to post signs about sale of cigarettes to minors, laws requiring merchants to be licensed to sell tobacco, and restrictions on smoking in worksites, public buildings and restaurants. **Outcomes measured** Awareness of tobacco policies (Questionnaire) Support for anti-tobacco policy (Questionnaire) Psychosocial smoking-related variables (Questionnaire0 Advocacy actions (Questionnaire)	**Awareness of policies** *GENDER & ETHNICITY* Females (p=0.0001), African-Americans (p=0.001) and Latinos (p=0.0101) were less likely to be aware of policies, while Asian-American were more likely to be aware of policies (p=0.0022). **Support for policies** *ETHNICITY* Latino respondents were more likely to support policies (p=0.0001) compared to White respondents. African-Americans were less likely to support policies (p=0.0039) compared to White respondents. **Advocacy action:** *ETHNICITY* The respondents who performed any of the advocacy actions (other than asking someone else not to smoke) were older (p<0.001), more likely to be male (p<0.001), and more likely to be African-American (p<0.001) or Latino (p<0.05).	**Awareness of policies** Smokers showed highest levels of awareness of anti-tobacco policies (0.22) and susceptible students showed the lowest levels of awareness (0.2). Smokers were more likely to be aware of policies (p=0.0001), while quitters were less likely to be aware (p=0.0371). Psychosocial variables positively associated with policy awareness were perceived negative consequences of smoking, prevalence estimate of smoking among peers, cigarette offers, cigarette refusal self-efficacy, (p=0.0001). Perceived access to cigarettes (p=0.0009) and perceived positive consequences of smoking (p=0.0001) were negatively associated with policy awareness. **Support for policies** Never smokers showed the highest levels of support of anti-tobacco policies (0.2) and smokers showed the lowest levels of support (-0.5) Those susceptible to smoking (p=0.0001), experimenters (p=0.0001) and smokers (p=0.0001) were less likely to support policies. (Figures read from graphs – scale is policy support score). Perceived negative consequences of smoking (p=0.0001) and cigarette refusal self-efficacy (p=0.0001) were positively associated with support for policies. Perceived access to cigarettes (p=0.0001), prevalence estimate of smoking among peers (p=0.0044), friends' smoking (p=0001), cigarette offers (p=0.0001) were negatively associated with support for policies. **Advocacy action:** 48.3% of respondents reported performing at

			least one advocacy action. Of those who reported performing one or more advocacy actions, 72.9% reported their only action had been asking someone else not to smoke. 27.1% who had performed advocacy actions. (13.1% of entire sample) had performed one or more of the other six advocacy actions. Rates of advocacy actions did not differ by smoking status. Policy awareness was associated with a higher probability of asking someone not to smoke, signing a petition about reducing tobacco use, attending a press conference about reducing tobacco use, talking to store employees about not advertising cigarettes or selling tobacco to minors, contacting government officials or news reporters about reducing tobacco use, attending youth summits or conferences about reducing tobacco use and helping police to see if stores were selling cigarettes to youth. Policy support was associated with a higher probability of performing all these actions except for attending a press conference which had a lower probability of attending press conferences about reducing tobacco use.

APPENDIX E – TABLE OF STUDY SUITABILITY AND QUALITY

Study	Suitability of study design				Methodological quality criterion					
	A[a]	B[b]	C[c]	D[d]	Representative*	Randomisation**	Comparability***	Credibility of data collection instruments†	Attrition rate††	Attributable to intervention†††
Effects of smoking restrictions – workplaces and other public places										
Becker[7]			✓		✓				✓	
Borland[8]			✓		✓				✓	
Dawley[9]			✓							
Donchin[10]			✓		✓				✓	
Heloma[11]			✓		✓				✓	✓
Kassab[12]				✓	✓				✓	
Offord[13]				✓	✓				✓	
Olive[14]			✓						✓	
Parry[15]				✓	✓				✓	
Sorensen[16]				✓	✓				✓	
Sorensen[17]				✓	✓				✓	
Stillman[18]			✓							
Tang[19]				✓					✓	✓
Waa[20]			✓		✓				✓	
Effects of smoking restrictions in schools										
Kumar[23]				✓	✓			✓	✓	
Thrush[24]	✓						✓	✓	✓	✓
Trinidad[25]			✓		✓			✓	✓	
Effects of restrictions on sales to minors										
Altman[26]	✓				✓	✓	✓	✓	✓	✓
Forster[27]	✓				✓	✓	✓		✓	✓
Hinds[28]			✓						✓	✓
Jason[29]	✓					✓	✓	✓	✓	✓
Laugesen[30]				✓				✓	✓	✓
Livingood[37]				✓				✓		
Rimpela[31]				✓	✓			✓	✓	

Study	Suitability of study design				Methodological quality criterion					
	A[a]	B[b]	C[c]	D[d]	Representative*	Randomisation**	Comparability***	Credibility of data collection instruments†	Attrition rate††	Attributable to intervention†††
Siegel[36]			✓		✓			✓	✓	✓
Staff[32]	✓				✓				✓	✓
Staff[33]			✓		✓				✓	✓
Sundh[34]			✓						✓	✓
Thomson[38]				✓					✓	
Tutt[35]			✓		✓				✓	
Effects of restrictions on advertising of tobacco products										
Fielding[44]			✓					✓	✓	✓
Joosens[45]				✓	✓			✓	✓	
Effects of health warnings on tobacco products										
Borland[39]			✓		✓				✓	✓
Gospodinov[40]				✓				✓	✓	
Koval[42]				✓					✓	✓
Robinson[43]				✓					✓	✓
Willemsen[41]				✓	✓			✓	✓	✓
Effects of an increase in the price of tobacco products										
Berg[64]				✓				✓	✓	
Bishai[77]				✓				✓	✓	
Borren[60]				✓	✓				✓	
Chaloupka[48]				✓				✓	✓	
Chaloupka[49]				✓				✓	✓	
Chaloupka[79]				✓	✓			✓	✓	
Chaloupka[78]				✓	✓			✓	✓	
Chaloupka[51]				✓	✓			✓	✓	
Colman[52]				✓	✓			✓	✓	
Czart[80]				✓	✓			✓	✓	
DeCicca[81]				✓				✓	✓	
Delnevo[53]				✓	✓			✓	✓	
Ding[54]				✓	✓			✓	✓	

Study	Suitability of study design				Methodological quality criterion					
	A[a]	B[b]	C[c]	D[d]	Representative*	Randomisation**	Comparability***	Credibility of data collection instruments†	Attrition rate††	Attributable to intervention†††
Emery[82]				✓	✓			✓	✓	
Evans[47]				✓	✓			✓	✓	
Farrelly[55]				✓	✓			✓	✓	
Goel[56]				✓				✓	✓	
Gruber[75]				✓	✓			✓	✓	
Katzman[83]				✓	✓			✓	✓	
Lee[65]				✓					✓	
Lewit[46]				✓	✓			✓	✓	
Liang[84]				✓	✓			✓	✓	
Lopez Nicolas[62]				✓	✓			✓	✓	
Ohsfeldt[73]				✓				✓	✓	
Peretti-Watel[61]				✓	✓			✓	✓	
Ringel[87]				✓	✓			✓	✓	
Ringel[57]				✓	✓			✓	✓	
Ross[86]				✓	✓			✓	✓	
Tauras[70]			✓		✓			✓	✓	
Tauras[69]			✓		✓			✓	✓	
Tauras[72]			✓		✓			✓	✓	
Tauras[71]			✓		✓			✓	✓	
Thomson[85]				✓				✓	✓	
Townsend[58]				✓	✓			✓		
Townsend[59]				✓				✓	✓	
Tsai[66]			✓					✓	✓	
Wasserman[50]				✓				✓	✓	
Effects of increase in price of tobacco products on people under the age of 18										
Chaloupka[76]				✓	✓			✓	✓	
Glied[67]			✓					✓	✓	
Gruber[63]				✓	✓			✓	✓	
Lewit[74]				✓				✓	✓	

Study	Suitability of study design				Methodological quality criterion					
	A[a]	B[b]	C[c]	D[d]	Representative*	Randomisation**	Comparability***	Credibility of data collection instruments†	Attrition rate††	Attributable to intervention†††
Nonnemaker[68]			✓		✓			✓	✓	
Effects of multi-faceted interventions										
Cooreman[92]			✓		✓				✓	
Helakorpi[88]				✓	✓			✓	✓	
Heloma[89]				✓	✓			✓	✓	
Stephens[91]				✓	✓			✓	✓	
Unger[90]				✓	✓				✓	

Note: Only the primary reference for each study is referenced.

Suitability of study design was summarised using a four point scale from A (most suitable) to D (least suitable). Each study was also assessed on a scale of quality of execution with a maximum possible score of 6.

Suitability of Study Design

[a.] Category A: The study design includes concurrent comparison groups AND prospective measurement of exposure and outcome

[b.] Category B: The study design includes at least two 'before' measurements and at least two 'after' measurements but no concurrent comparision group

[c.] Category C: The study design involves single 'before' and 'after' measurements with no concurrent comparison group

[d.] Category D: The study design involves measurements of exposure and outcome made at a single point in time

Methodological Quality Criterion

***Representative** Were the study samples randomly recruited from the study population with a response rate of at least 60% OR were they otherwise shown to be representative of the study population?
****Randomisation** Were participants, groups or areas randomly allocated to receive the intervention or control condition?

*****Comparability** Were the baseline characteristics of the comparison groups comparable OR if there were important differences in potential confounders were these appropriately adjusted for in analysis? If there is no comparison group this criterion cannot be met
†Credibility of data collection instruments Were data collection tools shown to be credible, e.g. shown to be valid and reliable in published research, OR in a pilot study, OR taken from a published national survey, OR recognized as an acceptable measure (such as biochemical measures of smoking).
††Attrition Rate Were outcomes studied in a panel of respondents with an attrition rate of less than 30% OR were results based on a cross-sectional design with at least 200 participants included in analysis in each wave?
†††Attributable to intervention Is it reasonably likely that the observed effects were attributable to the intervention under investigation? This criterion cannot be met if there is evidence of contamination of a control group in a controlled study. Equally, in all types of study, if there is evidence of a concurrent intervention that could also have explained the observed effects and was not adjusted for in analysis, the criterion cannot be met.

APPENDIX F – TABLE INDICATING EVIDENCE FOR SOCIAL GRADIENT IN EFFECTIVENESS

This matrix is based upon a hypothesis-testing model:

- The *null hypothesis* that for any given socio-demographic or socio-economic characteristic there is no social gradient in the effectiveness of the intervention.

- The hypothesis of a *negative social gradient* defined as evidence that groups such as women, minority/disadvantaged group(s) in terms of race/ethnicity, lower occupational groups, those with a lower level of educational attainment, the less affluent, those living in more deprived areas, or younger "higher" risk populations are more responsive to the intervention.

- The hypothesis of a *positive social gradient* defined as evidence that groups such as men, majority/advantaged groups in terms of race/ethnicity, higher occupational groups, those with a higher level of educational attainment, the more affluent, or those who live in more affluent areas are more responsive to the intervention.

Key to symbol colour
■ = "hard outcome" such as smoking prevalence or consumption;
□ = "intermediate outcome" such as beliefs and attitudes

Neg = evidence supports hypothesis of negative social gradient
Null = evidence supports null hypothesis
Pos = evidence supports hypothesis of positive social gradient

First author	Income			Occupation			Education			Gender			Ethnicity			Age		
	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos
Effects of restrictions on smoking – workplaces and other public places																		
Becker[7]											□				□		□	
Borland[8]					□			□			□							
Dawley[9]					■			■			■							
Donchin[10]						■			■		■						■	
Heloma[11]											■							
Kassab[12]											■							
Offord[13]																■		
Olive[14]										■								

First author	Income			Occupation			Education			Gender			Ethnicity			Age		
	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos
Parry[15]											■							
Sorensen[16]						□				□								
Sorensen[17]								■				■						
Stillman[18]														□				
Tang[19]						■												
Waa[20]			□						□		□						□	
Effects of smoking restrictions in schools																		
Kumar[23]						■												
Thrush[24]											■							
Trinidad[25]						□					□							□
Effects of restrictions on sales to minors																		
Altman[26]											□			□			o	
Forster[27]										■						■		
Hinds[28]																	■	
Jason[29]											■					■		
Laugesen[30]											■						■	
Livingood[37]											■							
Rimpela[31]											■						■	
Siegel[36]											□					□		
Staff[32]																		
Staff[33]															■			
Sundh[34]																		
Thomson[38]																		
Tutt[35]										■								
Effects of restrictions on advertising of tobacco products																		
Fielding[44]											■							
Joosens[45]											■							
Effects of health warnings on tobacco products																		
Borland[39]																		
Gospodinov[40]											□					□		

First author	Income			Occupation			Education			Gender			Ethnicity			Age		
	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos
Koval[42]								■			■							
Robinson[43]											■							
Willemsen[41]																	■	
Effects of an increase in price of tobacco																		
Berg[64]																■		
Bishai[77]														■				
Borren[60]																		
Chaloupka[48]											■		■					
Chaloupka[49]	□																	
Chaloupka[79]												■						■
Chaloupka[78]																■		
Chaloupka[51]											■							
Colman[52]	■								■			■					■	
Czart[80]																		
DeCicca[81]				■						■								
Delnevo[53]				■														
Ding[54]												■				■		
Emery[82]												■						
Evans[47]							■											■
Farrelly[55]																	■	
Goel[56]												■	■					
Gruber[75]																		
Katzman[83]																		
Lee[65]												■						
Lewit[46]											■							■
Liang[84]								■			■			■				
Lopez Nicolas[62]									■									
Ohsfeldt[73]																		
Peretti-Watel[61]										■			■			■		
Ringel[87]																		
Ringel[57]																		

First author	Income			Occupation			Education			Gender			Ethnicity			Age		
	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos	Neg	Null	Pos
Ross[86]	■																	
Tauras[70]																		
Tauras[69]																		
Tauras[72]					■													
Tauras[71]											■							
Thomson[85]																		
Townsend[58]									■						■			■
Townsend[59]																		
Tsai[66]																		
Wasserman[50]												■						
Effects of price of tobacco products on people under the age of 18																		
Chaloupka[76]												□						
Glied[67]													■					■
Gruber[63]																		
Lewit[74]																		
Nonnemaker[68]	■									■			■			■		
Effects of multifaceted interventions																		
Cooreman[92]											■							
Helakorpi[88]											■					■		
Heloma[89]											□			□				
Stephens[91]												■						
Unger[90]											■							

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