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[Intervention Review]

Mass media interventions for smoking cessation in adults

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ABSTRACT

Background

Mass media tobacco control campaigns can reach large numbers of people. Much of the literature is focused on the effects of tobacco control advertising on young people, but there are also a number of evaluations of campaigns targeting adult smokers, which show mixed results. Campaigns may be local, regional or national, and may be combined with other components of a comprehensive tobacco control policy.

Objectives

To assess the effectiveness of mass media interventions in reducing smoking among adults.

Search methods

The Cochrane Tobacco Addiction Group search strategy was combined with additional searches for any studies that referred to tobacco/smoking cessation, mass media and adults. We also searched the Cochrane Central Register of Controlled Trials (CENTRAL) and a number of electronic databases. The last search was carried out in November 2016.

Selection criteria

Controlled trials allocating communities, regions or states to intervention or control conditions; interrupted time series.

Adults, 25 years or older, who regularly smoke cigarettes. Studies which cover all adults as defined in studies were included.

Mass media are defined here as channels of communication such as television, radio, newspapers, billboards, posters, leaflets or booklets intended to reach large numbers of people, and which are not dependent on person-to-person contact. The purpose of the mass media campaign must be primarily to encourage smokers to quit. They could be carried out alone or in conjunction with tobacco control programmes.

The primary outcome was change in smoking behaviour. This could be reported as changes in prevalence, changes in cigarette consumption, quit rates, or odds of being a smoker.

Data collection and analysis

Two authors independently assessed all studies for inclusion criteria and for study quality (MB, LS, RTM). One author (MB) extracted data, and a second author (LS) checked them.

Results were not pooled due to heterogeneity of the included studies and are presented narratively and in table form.

Main results

Eleven campaigns met the inclusion criteria for this review. Studies differed in design, settings, duration, content and intensity of intervention, length of follow-up, methods of evaluation and also in definitions and measures of smoking behaviour used. Among seven campaigns reporting smoking prevalence, significant decreases were observed in the California and Massachusetts statewide tobacco control campaigns compared with the rest of the USA. Some positive effects on prevalence in the whole population or in the subgroups were observed in three of the remaining seven studies. Three large-scale campaigns of the seven presenting results for tobacco consumption found statistically significant decreases. Among the eight studies presenting abstinence or quit rates, four showed some positive effect, although in one of them the effect was measured for quitting and cutting down combined. Among the three that did not show significant decreases, one demonstrated a significant intervention effect on smokers and ex-smokers combined.

Authors' conclusions

There is evidence that comprehensive tobacco control programmes which include mass media campaigns can be effective in changing smoking behaviour in adults, but the evidence comes from a heterogeneous group of studies of variable methodological quality. One state-wide tobacco control programme (Massachusetts) showed positive results up to eight years after the campaign. Another (California) showed positive results during the period of adequate funding and implementation and in final evaluation since the beginning of the programme. Six of nine studies carried out in communities or regions showed some positive effects on smoking behaviour and at least one significant change in smoking prevalence (Sydney). The intensity and duration of mass media campaigns may influence effectiveness, but length of follow-up and concurrent secular trends and events can make this difficult to quantify. No consistent relationship was observed between campaign effectiveness and age, education, ethnicity or gender.

PLAIN LANGUAGE SUMMARY

Can tobacco control programmes that include a mass media campaign help to reduce levels of smoking among adults?

Background

Mass media programmes involve communication through television, radio, newspapers, billboards, posters, leaflets or booklets, with the aims of encouraging smokers to quit, and maintaining abstinence in non-smokers. It is difficult to establish their role in this process and they require strict methodological design.

Review question

To assess the effectiveness of mass media interventions in reducing smoking among adults.

Study characteristics

We searched up until 30th November 2016, and found 11 relevant studies for this review. The numbers of participants varied between the included studies. All of the studies involved adults, although some studies also included younger people (14+ or 15+). Campaigns involved TV, radio, print media and billboard advertising. Studies differed in setting, duration, content of the intervention, length of observation, measures of smoking behaviour and the way of showing results. Two campaigns reported definite decreases in smoking prevalence, and some positive effects were observed in another three. Three large-scale campaigns reported lower tobacco consumption. Three studies showed some positive effect in abstinence or quit rates. One study did not show significant decreases but did demonstrate an effect of the intervention on smokers and ex-smokers combined.

Key results

Tobacco control programmes that include mass media campaigns may change smoking behaviour in adults, but the evidence comes from studies of variable quality and scale and often occur in an environment where there are other influences on smoking, making it hard to isolate the effects of the media campaign itself. No consistent patterns by age, education, ethnicity or gender were found.

Quality of the evidence

There were problems with the design and conduct of all of the studies, which clouded the evidence. It would help if future studies could include comparator communities where there are no mass media interventions taking place to get a better estimate of the effect of the mass media campaign.

SUMMARY OF FINDINGS

Summary of findings for the main comparison.

Mass media smoking cessation intervention compared with no intervention for smoking cessation

Patient or population: Adults who smoke

Settings: Community

Intervention: Mass media

Comparison: No mass media

Outcomes	Impact	No of Studies	Quality of the evidence (GRADE)	Comments
Smoking prevalence (follow up from 6 months to 18 years)	The 2 state-wide programmes, in which mass media campaigns were part of comprehensive tobacco control programmes, observed greater declines in smoking prevalence than in the rest of the USA. Of the 5 community-based studies, 2 found significant decreases in smoking prevalence, 1 did not detect a significant effect, and of 2 studies conducted among Vietnamese-American men, one detected a statistically significant decrease in smoking prevalence at 2 years, while the other did not.	7 (n = 1,965,478) ¹	⊕⊕⊕⊕ very low 2,3	2 studies were interrupted time series; and 5 were quasi experimental
Tobacco consumption (follow up from 2 to 18 years)	In the 2 state-wide campaigns cigarette consumption was measured on the basis of aggregated sales data. In 1, a statistically significant decline was observed compared with the rest of the USA. In the other, declines in consumption were reported, but without statistical comparisons. Of the five community-based studies, 1 study detected a significant reduction in cigarette or tobacco consumption for a high-risk group, who also received counselling, but not in the media-only intervention community compared with controls. The remaining 4 studies did not detect significant differences.	7 (n = 1,964,292) ¹	⊕⊕⊕⊕ very low 2,3	2 studies were interrupted time series and 5 were quasi experimental
Abstinence or quit rates (follow up from 6 months to 18 years)	Among the 8 studies presenting abstinence or quit rates, 4 showed some positive effect. 1 state-wide campaign presented the quit ratio (i.e. the percentage of ever-smokers (current and former) who were ex-smokers in a given year), finding a statistically significant difference in favour of the intervention. The other 7 studies were community based; of these, 4 detected a statistically significant effect in favour of the intervention across the study population, 1 found statistically significant differences only in women, 1 study reported a non-statistically significant difference in point prevalence of daily smoking, and 1 detected no significant differences.	8 (n = 987,800) ¹	⊕⊕⊕⊕ very low 2,3	1 study was quasi RCT and 7 were quasi experimental
Quit attempts (follow-up from 7 months to 18 years)	Of the 5 studies that assessed quit attempts, 3 were community-based studies, and 2 were state-wide campaigns. 2 community-based studies among Vietnamese-American men found no significant	5 (n=1,947,674) ¹	⊕⊕⊕⊕ very low 2,3	2 studies were interrupted time series and 3 studies were

Mass media interventions for smoking cessation in adults (Review)

differences between the intervention and control communities. A third study only assessed quit attempts among participants still smoking at follow-up, of whom 27.3% had made quit attempt. 2 state-wide campaigns assessed quit attempts only in the intervention community. In 1 they increased in line with campaign duration but not to a statistically significant extent, in the other the percentage of smokers with a quit attempt in the last year increased over the duration of the study, but without statistical comparisons.

quasi experimental

GRADE Working Group grades of evidence

High quality: Further research is very unlikely to change our confidence in the estimate of effect.

Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

Very low quality: We are very uncertain about the estimate.

¹ Estimated participant numbers based on the number of respondents to surveys and the number of participants at follow up in the quasi-experimental studies.

² GRADE rating started at 'low': none of the studies were RCTs. One was a quasi-RCT, two were interrupted time series and eight were quasi-experimental.

³ Downgraded one level for inconsistency: included studies varied in design, intervention, comparator and population, and results were not homogenous.

BACKGROUND

It is estimated that about 820 million men over the age of 15 and about 176 million women are daily smokers (Eriksen 2015). World wide, tobacco is the leading cause of preventable death, killing nearly 6 million people each year, with 80% of deaths occurring in low- and middle-income countries (WHO 2015). It is estimated that if no additional measures are introduced the smoking prevalence in 191 countries included in the Global InfoBase Database of the World Health Organization (WHO) will be 22.7% in 2020 and 22% in 2030, accounting for 872 million smokers (Mendez 2012). In 2003 the World Health Assembly adopted the Framework Convention on Tobacco Control (FCTC), which was ratified by 180 parties, covering about 90% of the world's population (WHO FCTC 2003; WHO 2015). To assist those countries in implementation of effective interventions to reduce the demand for tobacco in 2008, the WHO disseminated recommendations called MPOWER, which included the following strategies: monitor tobacco use, protect people from tobacco smoke, offer help to quit tobacco use, warn about the dangers of tobacco, enforce bans on tobacco advertising promotion and sponsorship, and raise taxes on tobacco (WHO 2008). Article 12 of the FCTC requires signatories to promote and strengthen public awareness of tobacco control issues using available communication tools, including mass media campaigns (WHO 2015).

Mass media interventions consist of the dissemination through television, radio, print media and billboards, of cessation-related messages, informing smokers and motivating them to quit. Mass media campaigns can be effective in keeping tobacco control on the social and political agenda, in legitimising community action and in triggering other interventions. Campaigns are designed either directly to change individuals' smoking behaviour (the risk factor model), or to catalyse other forces of social change (the social diffusion model), which may then lead to a change in social norms about smoking (Wellings 2000). Social diffusion campaigns, such as those run in Australia, Canada, Thailand, the United Kingdom and some US states, are designed to de-normalise smoking, so counteracting the tobacco industry's message that smoking is desirable and harmless (WHO 2001).

Research into the effectiveness of mass media campaigns is generally conducted through community trials. This term includes both randomised and non-randomised studies which involve whole communities as the unit of assignment, with data collection from individuals within the communities. Murray 1998 has identified four main features which differentiate the designs of such studies, and which are generally determined by the nature of the research question.

- (i) Main effects (to assess the impact of a single intervention) versus factorial (to assess the impact and sometimes the interaction of two or more variables).
- (ii) Data collection schedules: these can range from a single post-intervention measurement of the groups, through two or more series of assessments (including pre-intervention baseline measures), to continuous surveillance.
- (iii) Cross-sectional versus cohort: cross-sectional designs are appropriate when the investigators are concerned with the impact of the intervention on the population as a whole, while cohort designs are more suited to measuring behaviour change in individuals over time.

- (iv) A priori matching and stratification may help to limit bias and improve precision.

Analysis 1.1, 'Response and Retention Rates', summarises the design characteristics of the studies included in this review.

Mass media tobacco control campaigns in the USA began in 1967, following the publication of the 1964 Surgeon General's report on smoking and health (Surgeon General 1964). The Federal Communications Commission enforced the Fairness Doctrine, obliging radio and television stations to broadcast one tobacco control message for every three cigarette commercials (equivalent to a media value today of USD 300 million (WHO 2001)). This policy lasted until 1970, when a ban on broadcast cigarette advertising came into effect. Cigarette consumption had declined by 37% during the campaign, but began to rise again after the advertising ban ended free access to broadcast time for tobacco control messages (Warner 1977; USDHHS 1991).

Mass media campaigns in the 1970s tended to be based on the premise that information and heightened public awareness would of themselves effect changes in cultural norms and smoking behaviour. This assumption was challenged by the social learning theory approach, which held that public attitudes to smoking were more successfully translated into behaviour change if the mass media campaign was combined with well-targeted interpersonal interventions conducted by healthcare workers or other credible agencies. This approach also acknowledged the importance of role models and peer-group pressure and support in changing behaviour (Bandura 1977; Flay 1987b; NCI 1991). Later campaigns, the 'second generation' model, concentrated more on developing personal skills to cope with social and media pressure, and to recognise and resist tobacco industry advertising; they were also more likely to help smokers and non-smokers to improve their decision-making and problem-solving abilities (Logan 1999). Such an approach, however, did not address the continuing dissonance between 'expert' opinion (scientists, healthcare providers, policy-makers, many non-smokers) and those smokers who resented the paternalism of campaigners, and who may have had complicated cultural and emotional attachments to their smoking, independently of their physical addiction (Yankelovich 1991; Logan 1999; Hastings 2002).

A number of studies suggest that media-supported cessation campaigns can be an effective part of comprehensive and synergistic tobacco control programmes, reaching individuals directly with cessation messages and influencing their knowledge, attitudes and behaviour. Campaigns have been run and evaluated in a number of countries, including Australia, Canada, France, Iceland, New Zealand, the Philippines, Poland, Singapore and the UK, and in Arizona, California, Kansas, Massachusetts, Florida, Minnesota and Oregon within the USA (Flay 1987a; USDHHS 1991; WHO 2001). According to a 2015 WHO report, more than half of the countries in the world, covering 40% of the population implemented at least one MPOWER measure (without mass media), 39 countries ran national anti-tobacco media campaigns fulfilling all the WHO requirements (WHO 2015), while a further 30 countries conducted campaigns fulfilling most but not all of those requirements. In total 55% of the world's population received in the previous two years at least one anti-tobacco mass-media campaign lasting at least three weeks (WHO 2015).

Previous reviews of the literature lend some support to tobacco control media campaigns as a component of comprehensive

tobacco control programmes (World Bank 1999; Fiore 2000). Much of the literature is focused on the effects of tobacco control advertising on young people (Reid 1995; Tyas 1997; Pechmann 2000; Wakefield 2000; Wakefield 2003), but there are also a number of evaluations of campaigns targeting adult smokers, which show mixed results. Some national and state-wide interventions have been shown to be effective in reducing smoking rates, while the outcomes are less consistent for community and local campaigns (Flay 1987a; Flay 1987b; Levy 2000; NCI 2000; Hopkins 2001; WHO 2001; Friend 2002; Siegel 2002a; Siegel 2002b).

OBJECTIVES

To assess the effectiveness of mass media interventions in reducing smoking among adults.

We addressed the following questions.

1. Do mass media campaigns reduce smoking (measured by prevalence, cigarette consumption, quit attempts and quit rates) compared with no intervention in comparison communities?
2. Do mass media campaigns, run in conjunction with tobacco control programmes, reduce smoking, compared with no intervention or with tobacco control programmes alone?
3. Which characteristics of these studies are related to their efficacy?
4. Do mass media tobacco control campaigns cause any adverse effects?

METHODS

Criteria for considering studies for this review

Types of studies

- Randomised or quasi-randomised controlled trials allocating communities, regions or states to intervention or control conditions.
- Controlled trials without randomisation, allocating communities, regions or states to intervention or control conditions.
- Interrupted time series.

Uncontrolled before-and-after studies, and uncontrolled studies with post-intervention measurements but no baseline measurement were excluded.

Types of participants

Adults, 25 years or older, who regularly smoke cigarettes. Studies which cover all adults as defined in studies were included. Studies addressing only adolescents and 18- to 25-year-olds are covered in a separate Cochrane Review (Brinn 2010).

Interventions for pregnant women were excluded, since this topic is covered by a separate Cochrane Review (Lumley 2009).

Types of interventions

Mass media are defined here as channels of communication such as television, radio, newspapers, billboards, posters, leaflets or booklets intended to reach large numbers of people, and which are not dependent on person-to-person contact. The purpose of the

mass media campaign must be primarily to encourage smokers to quit. They could be carried out alone or in conjunction with tobacco control programmes. Studies of comprehensive programmes were included, provided that the comparison was structured in such a way that the contribution and efficacy of the mass media component could be assessed.

Interventions comprising competitions and incentives or 'quit and win' contests are covered by other Cochrane Reviews (Cahill 2008; Cahill 2011). Internet-based interventions and mobile-phone interventions are covered by other Cochrane Reviews (Civljak 2010; Whittaker 2012).

Types of outcome measures

Measures of smoking behaviour

- Primary: tobacco cessation, covered by prevalence rates, quit rates.
- Secondary: tobacco reduction, covered by changes in the number of cigarettes purchased or smoked, prevalence of daily smoking, quit attempts.

We prefer outcomes measured at the longest follow-up, and at least six months from the beginning of the intervention. It is generally not feasible for community trials to conduct biochemical validation of their smoking cessation results, and we do not require this of the included studies in this review.

Intermediate measures

- Attitudes to smoking.
- Knowledge about smoking, including smoking norms, and effects of tobacco on health.
- Adverse side effects.

Process measures

- Descriptions of formative research, pilot studies and ongoing evaluation and modification of the intervention.
- Media weight (reach, frequency and duration), campaign awareness/exposure.
- Dose-response relationships (e.g. volume of calls to telephone helplines).
- Maintenance of programmes after the interventions were completed.
- Intervention costs.

Mass media campaigns that have only been reported in terms of intermediate outcomes or process measures were excluded.

Search methods for identification of studies

The Cochrane Tobacco Addiction Group Specialised Register was searched for reports of evaluations of mass media campaigns. See Appendix 1 for strategy. The register is derived from sensitive searches for trials and other evaluations of tobacco control and smoking cessation interventions; see the Tobacco Addiction Group Module in the Cochrane Library for full search strategies. At the time of the search in November 2016 the Register included the results of searches of the Cochrane Central Register of Controlled trials (CENTRAL), issue 9, 2016, in the Cochrane Library; MEDLINE (via OVID) to update 20160923; Embase (via OVID) to week 201639;

and PsycINFO (via OVID) to update 20160926. Additional databases searched for early versions of this review are no longer checked.

Data collection and analysis

One reviewer prescreened all search results (abstracts), for possible inclusion or as useful background. Three reviewers (MB, LS and RTM) independently assessed relevant studies for inclusion and resolved discrepancies by consensus. The editorial base would have resolved any persistent disagreements. The reviewers noted reasons for the non-inclusion of studies.

One reviewer (MB) extracted data, and a second reviewer (LS) checked them. This stage included an evaluation of quality. Two reviewers independently assessed each study according to the presence and quality of the randomisation process, whether the analysis was appropriate to the study design, and the description of withdrawals and drop-outs. They assessed interrupted time series studies according to criteria defined by the Cochrane Effective Practice and Organisation of Care Group (EPOC 2006). These require a minimum of three assessments before the intervention and three afterwards for the study to be included in the review.

We extracted data on:

- country and community status (e.g. state, city);
- participants (baseline demographic, clinical and smoking characteristics);
- intervention (duration, intensity, message development);
- outcomes, and how they were measured;
- length of follow-up;
- completeness of follow-up;
- definition of smoking cessation;
- biochemical confirmation of abstinence, if present.

In cases of missing data, we contacted the authors of the study where possible.

Due to the expected heterogeneity of included studies we did not pool results but present them narratively and in the Results Tables. Eligible studies differed significantly in design, setting, duration, content and intensity of intervention, length of follow-up, methods of evaluation and also in definitions and measures of smoking behaviour used.

'Summary of findings' table

Following standard Cochrane methodology, we created a 'Summary of findings' table for our primary outcomes. We used the five GRADE considerations (study limitations, consistency of effect, imprecision, indirectness and publication bias) to assess the quality of the body of evidence for that outcome.

RESULTS

Description of studies

Results of the search

From our update searches, the latest of which was performed in November 2016, we identified 1507 studies. Based on titles and abstracts we excluded 1337 references, resulting in 170 full papers to be retrieved. In addition, we found 17 references through handsearching and from the websites of included mass media campaigns. We therefore retrieved 187 full-text papers. Based on these, we excluded 1762 papers.

For this update we identified three reports updating the California TCP campaign (California TCP 2003), four reports from the Massachusetts TCP campaign (Massachusetts 2003), and one new excluded study (Figure 1).

Figure 1. Prisma flow diagram of search results

Included studies

We identified 11 campaigns meeting our inclusion criteria. Detailed information about each is shown in the table [Characteristics of included studies](#). Sixty-five excluded studies and reasons for exclusion are described in the [Characteristics of excluded studies](#) table.

Eight studies had strong designs comparing the effect of mass media campaigns in exposed areas to control areas, using indices of smoking behaviour (mainly prevalence) in the whole population ([Stanford 3 City 1977](#); [North Coast QFL 1983](#); [Sydney QFL 1986](#); [McPhee 1995](#); [CORIS 1997](#); [Jenkins 1997](#); [McVey 2000](#); [McAlister 2004](#)). One study had a similar design, but assessed the effect of the intervention by examining the abstinence rates achieved in one clinic each in the intervention and control areas ([Mogielnicki 1986](#)). Two studies had strong controlled designs ([California TCP 2003](#); [Massachusetts 2003](#)), but the intervention areas were exposed to mass media campaigns plus a range of other tobacco control interventions as compared to no special interventions in control areas. Study sites ranged from the USA ([Stanford 3 City 1977](#); [Mogielnicki 1986](#); [McPhee 1995](#); [Jenkins 1997](#); [California TCP 2003](#); [Massachusetts 2003](#); [McAlister 2004](#)); to the UK ([McVey 2000](#)); South Africa ([CORIS 1997](#)); and Australia ([North Coast QFL 1983](#); [Sydney QFL 1986](#)).

Characteristics of study populations

Study populations were diverse. All studies involved adults, although the age of adulthood varied between studies. Eight studies targeted both men and women, and three targeted

men only ([Mogielnicki 1986](#); [McPhee 1995](#); [Jenkins 1997](#)). Two studies targeted male Vietnamese immigrants in the USA ([McPhee 1995](#); [Jenkins 1997](#)). Two state-wide campaigns targeted adults, adolescents and the general population ([California TCP 2003](#); [Massachusetts 2003](#)).

Characteristics of interventions

In six studies the theoretical basis for the development of the intervention was described. In [Stanford 3 City 1977](#) social marketing theory, social learning theory and communication theory underpinned the intervention, while [McAlister 2004](#) specified social learning theory, the transtheoretical model and elements of modelling, social reinforcement for behaviour change and emotional arousal. [California TCP 2003](#) and [Massachusetts 2003](#) both used social diffusion theory with social marketing and social policy change. [North Coast QFL 1983](#) cited social marketing and communication theory, and [Mogielnicki 1986](#) specified current marketing methodology in developing its mass media campaign. In the remaining five studies no theoretical basis was specified.

Two campaigns conducted as part of tobacco control programmes involved TV, radio, print media and billboard advertising ([California TCP 2003](#); [Massachusetts 2003](#)). One study used only TV advertising ([McVey 2000](#)); one used TV and radio advertising ([Mogielnicki 1986](#)); one study used only billboards, posters, mailings and local newspapers ([CORIS 1997](#)). The remaining studies used TV, radio and print media, and billboards or posters or both ([Stanford 3 City 1977](#); [North Coast QFL 1983](#); [Sydney QFL 1986](#); [McPhee 1995](#); [Jenkins 1997](#); [McAlister 2004](#)). Two studies aimed at the reduction of

cardiovascular risk factors, such as smoking, diet, blood pressure, cholesterol, sedentary lifestyle, and stress (Stanford 3 City 1977; CORIS 1997), while the remaining nine studies aimed specifically at changing smoking behaviour (reducing smoking prevalence, reducing the number of cigarettes smoked or increasing quit rates).

The two state-wide campaigns, California TCP 2003 and Massachusetts 2003, were each part of a wider tobacco control programme which implemented a number of public policy measures to reduce smoking, but we have not included those outcomes in our review.

Assessments

Cross-sectional independent surveys were used in five studies (North Coast QFL 1983; McPhee 1995; Jenkins 1997; California TCP 2003; Massachusetts 2003); cohort follow-up in two studies (Mogielnicki 1986; McVey 2000); and both methods in four studies (Stanford 3 City 1977; Sydney QFL 1986; CORIS 1997; McAlister 2004).

Three studies reported follow-up beyond the duration of the intervention and the immediate post-intervention assessment, at 12 years for CORIS 1997, at 18 months for McVey 2000, and at one year for Sydney QFL 1986. Stanford 3 City 1977 reported one additional year of follow-up for the high-risk group only.

Interviews were conducted in person in six studies (Stanford 3 City 1977; North Coast QFL 1983; Mogielnicki 1986; Sydney QFL 1986; CORIS 1997; McVey 2000), by telephone in four studies (McPhee 1995; Jenkins 1997; Massachusetts 2003; McAlister 2004), and by both methods in California TCP 2003. In addition to the interviews, physical examination and blood tests were carried out in three studies (Stanford 3 City 1977; North Coast QFL 1983; CORIS 1997).

In most studies smoking abstinence was self-reported, and was biochemically confirmed in all participants in only two studies: Stanford 3 City 1977 checked plasma thiocyanate, and Mogielnicki 1986 checked plasma thiocyanate and exhaled carbon monoxide. Subsamples of participants were tested for salivary cotinine in Sydney QFL 1986, and for plasma thiocyanate in North Coast QFL 1983.

Outcome measures

Difference in smoking prevalence was the main outcome measure in seven campaigns (North Coast QFL 1983; Sydney QFL 1986; McPhee 1995; CORIS 1997; Jenkins 1997; California TCP 2003; Massachusetts 2003). One study reported it for the high risk group only (Stanford 3 City 1977).

Changes in the number of cigarettes (or grams of tobacco) smoked were reported in five studies (Stanford 3 City 1977; Sydney QFL 1986; McPhee 1995; CORIS 1997; Jenkins 1997), and was the main outcome for Stanford 3 City 1977.

In seven studies quit rates or abstinence rates were reported (Mogielnicki 1986; Sydney QFL 1986; McPhee 1995; CORIS 1997; Jenkins 1997; McVey 2000; California TCP 2003), and were the main outcome in two studies (Mogielnicki 1986; McVey 2000).

In McAlister 2004, point prevalence of daily smoking (ceasing to smoke at all or every day) was reported as the main outcome. In the two state campaigns per capita cigarette consumption based

on aggregate sales data was also presented (California TCP 2003; Massachusetts 2003).

The number of quit attempts was reported in six studies (Sydney QFL 1986; McPhee 1995; Jenkins 1997; California TCP 2003; Massachusetts 2003; McAlister 2004).

Intermediate measures

Attitudes to smoking were assessed at baseline in nine studies (North Coast QFL 1983; Mogielnicki 1986; McPhee 1995; CORIS 1997; Jenkins 1997; McVey 2000; California TCP 2003; Massachusetts 2003; McAlister 2004), with follow-up data provided in five of them (North Coast QFL 1983; McPhee 1995; Jenkins 1997; California TCP 2003; Massachusetts 2003), but in one study only in graphical form (North Coast QFL 1983).

Social pressure/influences in the decision to quit were assessed in four studies at baseline and at follow-up (North Coast QFL 1983; Sydney QFL 1986; McPhee 1995; Massachusetts 2003).

Norms concerning smoking behaviour were assessed in three studies at baseline and at follow-up (McPhee 1995; California TCP 2003; Massachusetts 2003): in McPhee 1995 this was assessed by the number of friends or household members smoking and giving advice or being advised to stop smoking. In the two state-wide campaigns norms were assessed by measuring support for tobacco control legislative measures and exposure to environmental tobacco smoke at work and at home, but only within the intervention communities and not for the controls.

Information-seeking behaviour in the population was assessed at baseline and at follow-up in one study (Sydney QFL 1986).

Knowledge and/or beliefs about cardiovascular risk factors or the effects of smoking were assessed at baseline in eight studies (Stanford 3 City 1977; North Coast QFL 1983; Mogielnicki 1986; Sydney QFL 1986; CORIS 1997; California TCP 2003; Massachusetts 2003; McAlister 2004).

Follow-up data were provided in six studies (Stanford 3 City 1977; North Coast QFL 1983; Sydney QFL 1986; CORIS 1997; California TCP 2003; Massachusetts 2003), but in one study only in graphical form without elucidation in the text (North Coast QFL 1983).

No study reported adverse effects of the campaigns.

Process measures

Formative research or pilot studies were used in nine campaigns (Stanford 3 City 1977; North Coast QFL 1983; Mogielnicki 1986; Sydney QFL 1986; Jenkins 1997; McVey 2000; California TCP 2003; Massachusetts 2003; McAlister 2004). No information was provided for two campaigns (McPhee 1995; CORIS 1997). Ongoing evaluation and modification of the intervention was reported in five studies (Stanford 3 City 1977; North Coast QFL 1983; McVey 2000; California TCP 2003; Massachusetts 2003).

Detailed information regarding media weight (numbers of TV and radio spots, newspaper articles etc.) was provided in five studies (Mogielnicki 1986; Sydney QFL 1986; McPhee 1995; Jenkins 1997; California TCP 2003), and summary information was given in four studies (Stanford 3 City 1977; CORIS 1997; McVey 2000; Massachusetts 2003). Little or no information was given in McAlister 2004 or North Coast QFL 1983.

Awareness and reach of the intervention was measured in seven studies (Mogielnicki 1986; Sydney QFL 1986; McPhee 1995; Jenkins 1997; California TCP 2003; Massachusetts 2003; McAlister 2004) with only McAlister 2004 not reporting numerical data for this outcome.

Dose response: some evidence on possible dose-response relationships was mentioned, either as numbers of calls to quitlines (Sydney QFL 1986; McVey 2000), as increasing knowledge with increasing intensity of the intervention (Stanford 3 City 1977), or as increasing cessation rates, number of quit attempts, or changes in social norms with increasing numbers of channels or intensity of intervention (California TCP 2003; McAlister 2004). In McVey 2000 abstinence rates were compared in two study areas which received single- or double-weight interventions. No study presented a formal dose-response analysis.

Maintenance: the campaigns were maintained beyond the intervention period in six studies (Stanford 3 City 1977; Sydney QFL 1986; CORIS 1997; McVey 2000; California TCP 2003; Massachusetts 2003). In one study the campaign was continued beyond the final assessment point for one year, but with reduced intensity and no additional evaluation (Stanford 3 City 1977). The CORIS 1997

campaign was subsequently maintained by the community, but no details are given. The McVey 2000 campaign was continued nationally after a controlled evaluation. In Sydney QFL 1986 the mass media campaign was run in later years for a few weeks, with assessment of long-term success. The two state-wide campaigns were established as constitutional amendments, so they remained in place (California TCP 2003; Massachusetts 2003).

Intervention costs: costs per capita were reported in four studies (CORIS 1997; California TCP 2003; Massachusetts 2003; McAlister 2004), and total campaign costs in four studies (Sydney QFL 1986; Mogielnicki 1986; California TCP 2003; Massachusetts 2003). Some cost-effectiveness analysis was performed for the two state-wide campaigns (California TCP 2003; Massachusetts 2003). No economic evaluation was reported for five campaigns (Stanford 3 City 1977; North Coast QFL 1983; McPhee 1995; Jenkins 1997; McVey 2000).

Risk of bias in included studies

Overall, we assessed the risk of bias of the included studies as high. For an overview of the methodological quality of the included trials see Figure 2.

Figure 2. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

Allocation

Mogielnicki 1986 randomised clinic attenders to different interventions within each clinic assigned to intervention or control conditions. It is normally not feasible or affordable to use true randomisation in community studies of this kind. Nine were of quasi-experimental design, with intervention and control status non-randomly allocated (Stanford 3 City 1977; North Coast QFL 1983; Mogielnicki 1986; Sydney QFL 1986; McPhee 1995; CORIS 1997; Jenkins 1997; McVey 2000; McAlister 2004). The two state-wide campaigns were assessed through an interrupted time series design comparing the effects of the campaigns as part of tobacco control programmes with other US states where there were no campaigns.

Selection of participants for outcome measures

Samples of participants were selected in most studies through random digit dialling, or through selecting from enumeration lists or telephone books. In one study the total population was surveyed (CORIS 1997).

Response rates and retention rates

Response rates (applicable to nested cross-sectional analyses) were reported in nine campaigns. Three of them reported the combined rates for the intervention and control communities (Sydney QFL 1986; California TCP 2003; McAlister 2004); and five reported them separately (Stanford 3 City 1977; North Coast QFL 1983; McPhee 1995; CORIS 1997; Jenkins 1997). Massachusetts 2003 reported combined and separate response rates. In those studies reporting separately for intervention and control communities,

the response rates at baseline ranged from 70% to 84% in the intervention communities, and from 64% to 82% among the controls. The follow-up response rates for those studies ranged from 68% to 94% for intervention communities, and from 62% to 88% for the controls. The response rates combined for intervention and control community varied between 42.7% and 99.4%.

Retention rates (applicable to cohort analyses) were reported in six studies ([Stanford 3 City 1977](#); [Mogielnicki 1986](#); [Sydney QFL 1986](#); [CORIS 1997](#); [McVey 2000](#); [McAlister 2004](#)), and ranged from 53.5% to 76% in the intervention communities and from 52% to 73% in the controls. Two studies provided some information on participants lost to follow-up ([McVey 2000](#); [McAlister 2004](#)); and [Sydney QFL 1986](#) surveyed non-responders in Sydney and Melbourne at baseline, for evidence of selection bias. Among the cohort studies, [CORIS 1997](#) reported on demographic differences between cohort and non-cohort participants (i.e. those who had only responded to one of the surveys); and [Stanford 3 City 1977](#) identified higher smoking prevalence and heavier daily smoking among non-cohort participants than in the cohorts. Study design, with detailed response and retention rates, are shown in [Analysis 1.1](#).

Comparability of intervention and control community at baseline

Nine studies described the demographic characteristics of participants at baseline ([Stanford 3 City 1977](#); [Mogielnicki 1986](#); [Sydney QFL 1986](#); [McPhee 1995](#); [CORIS 1997](#); [Jenkins 1997](#); [McVey 2000](#); [Massachusetts 2003](#); [McAlister 2004](#)), with six of them conducting statistical tests for comparability ([Mogielnicki 1986](#); [Sydney QFL 1986](#); [McPhee 1995](#); [Jenkins 1997](#); [Massachusetts 2003](#); [McAlister 2004](#)). In [North Coast QFL 1983](#) the statistical comparisons are reported without numerical detail. [California TCP 2003](#) did not provide any information on comparability of the population. The intervention and control communities were shown to be demographically disparate in three studies, with analyses controlling for those differences ([McPhee 1995](#); [Jenkins 1997](#); [Massachusetts 2003](#)). [Sydney QFL 1986](#) tested for possible confounding by sex, age, education, marital status, and socio-economic status, but found none of them to be predictive of quitting.

Blinding

Only one study reported blinding participants and personnel ([McVey 2000](#)); in other studies it was unclear if they were blinded. Three studies reported on blinding outcome assessors ([McAlister 2004](#); [McVey 2000](#); [Mogielnicki 1986](#)); in other studies it was unclear if they were blinded.

Incomplete outcome data

None of the included studies reported attrition rates or losses to follow-up.

Selective reporting

Only one trial did not report the outcomes as prespecified in the Methods section ([McAlister 2004](#)), with all the other studies reporting outcomes as prespecified.

Other potential sources of bias

Other sources of bias were not identified in most studies. The [California TCP 2003](#) and the [Massachusetts 2003](#) campaigns were interrupted time series studies. Both had clearly defined time points when the intervention was conducted, with at least three data points before and three after the intervention. It was unclear whether other quality assessment criteria for interrupted time series had been fulfilled.

Evaluation process

In six campaigns the evaluation was done by study investigators ([Stanford 3 City 1977](#); [North Coast QFL 1983](#); [Mogielnicki 1986](#); [McPhee 1995](#); [CORIS 1997](#); [Jenkins 1997](#)). In the remaining five included studies independent organisations conducted the evaluation or surveys or some parts of the work ([Sydney QFL 1986](#); [McVey 2000](#); [California TCP 2003](#); [Massachusetts 2003](#); [McAlister 2004](#)). National surveys were conducted for the Californian and Massachusetts state-wide campaigns.

Statistical analysis

Two of the 11 included studies reported sample size calculations ([McPhee 1995](#); [McVey 2000](#)). However, because of the variability of the effect sizes we do not consider that the absence of a power calculation should be interpreted as a marker of lower quality. All the studies except [CORIS 1997](#), which reported use of t-tests with and without covariance adjustments, used regression analyses to produce their results. Two studies reported one-sided P value tests ([Stanford 3 City 1977](#); [McAlister 2004](#)); and [CORIS 1997](#) used two-sided P value tests.

The Californian and Massachusetts campaigns were described using an interrupted time series design. We assessed the reports according to the Cochrane Effective Practice and Organisation of Care Group criteria ([EPOC 2006](#)). All the studies identified a clearly defined point in time when the intervention occurred, and at least three assessment points before and three after the intervention. However, the impact of the intervention independent of other changes was not clearly established. The TCP studies used regression models for data analysis. The intervention was deemed unlikely to affect data collection, and sources and methods of data collection were consistent before and after the intervention. Smoking prevalence was self-reported and unvalidated. In two of the studies (one for each campaign) aggregated cigarette sales data were used as an objective measure. None of the studies reported on completeness of data sets, but did report response rates for outcome surveys.

Effects of interventions

See: [Summary of findings for the main comparison](#)

Detailed results are presented in 'Intermediate measures' ([Analysis 1.2](#)) and 'Primary measures of smoking behaviour' ([Analysis 1.3](#)). Summary findings on theoretical orientation, costs and outcomes are reported in 'Study summary by type of outcome' ([Analysis 1.4](#)). Baseline differences and possible confounders are reported in [Analysis 1.5](#).

Smoking prevalence

Among the seven campaigns reporting smoking prevalence, two studies reported smoking prevalence separately for men and

women ([North Coast QFL 1983](#); [CORIS 1997](#)), and also by age group in [North Coast QFL 1983](#). Three studies reported prevalence for the whole population ([California TCP 2003](#)), and for men and women separately ([Sydney QFL 1986](#); [Massachusetts 2003](#)). Two studies targeted and reported on men only ([McPhee 1995](#); [Jenkins 1997](#)), and the [Stanford 3 City 1977](#) study reported in detail only on the high risk cohort. In three studies smoking prevalence was not reported ([Mogielnicki 1986](#); [McVey 2000](#); [McAlister 2004](#)).

Decreases in smoking prevalence were observed in both of the state-wide programmes compared with the rest of the USA ([California TCP 2003](#); [Massachusetts 2003](#)), but in California the decrease was statistically significant only during the early period of the campaign, before cuts in funding. The final assessments of the California TCP showed greater decline of smoking prevalence since the beginning of the programme compared with the rest of the USA and lower smoking prevalence, but the statistical significance of the differences was not reported. In the Massachusetts campaign the decrease was statistically significant for the population as a whole and for men, but not for women. It should be noted that the mass media campaigns in both states were part of a comprehensive programme of tobacco control measures.

Among those studies which analysed men and women separately, both the Australian studies detected significantly decreased prevalence among men and women ([North Coast QFL 1983](#); [Sydney QFL 1986](#)), while two studies found significant reductions in men's but not women's smoking at long-term follow-up ([Sydney QFL 1986](#); [CORIS 1997](#) at 12 years). For the two studies that examined Vietnamese men's smoking, [Jenkins 1997](#) detected a significant decrease in prevalence at two-year follow-up, while [McPhee 1995](#) failed to detect a significant reduction. [Stanford 3 City 1977](#) failed to detect a significant effect of the media-only intervention on prevalence compared with controls at three years, although the declining trend favoured the control community.

Cigarette consumption

Among the seven campaigns reporting cigarette consumption, one study presented cigarette consumption separately for men and women ([CORIS 1997](#)); two studies for men only ([McPhee 1995](#); [Jenkins 1997](#)); and two studies for the population as a whole ([Stanford 3 City 1977](#); [Sydney QFL 1986](#)). [Stanford 3 City 1977](#) detected a significant reduction in cigarette or tobacco consumption for the high-risk group, but not in the media-only intervention community compared with controls. The remaining studies failed to detect significant differences.

In the two state-wide campaigns cigarette consumption was measured on the basis of aggregated sales data ([California TCP 2003](#); [Massachusetts 2003](#)). In California a significant decline was observed compared with the rest of the USA. In Massachusetts, declines in consumption were reported, but without statistical comparisons.

Quit attempts

Of the five studies that assessed quit attempts, two found no significant differences between the intervention and control communities ([McPhee 1995](#); [Jenkins 1997](#)); and [McAlister 2004](#) only assessed quit attempts among continuing smokers. The two state-wide campaigns assessed quit attempts only in the intervention community ([California TCP 2003](#); [Massachusetts 2003](#)). In Massachusetts they increased in line with campaign

duration but not to a statistically significant extent, while in California rate changes were reported, but without statistical comparisons.

Quit rates

Eight studies reported quit rates or abstinence rates, with only one study reporting separately for men and women ([CORIS 1997](#)). Three of the studies included men only ([Mogielnicki 1986](#); [McPhee 1995](#); [Jenkins 1997](#)). The [California TCP 2003](#) presented the quit ratio, i.e. the percentage of ever-smokers (current and former) who were ex-smokers in a given year, and [McVey 2000](#) gave quit rates for smokers and abstinence rates for ex-smokers. [McAlister 2004](#) reported point prevalence of daily smoking (ceasing to smoke at all or every day). This study also detected a benefit of 3% in quit rates (8% versus 5%) between study areas that received a media campaign and no cessation services, compared with areas without either intervention. This difference, however, was not statistically significant.

[CORIS 1997](#) found significant differences in intervention quit rates for women but not for men, compared to controls. Two studies found significant intervention effects ([Mogielnicki 1986](#); [Jenkins 1997](#)), while in [Sydney QFL 1986](#) the quit rate was not reported separately from the smoking reduction rate. Significant differences were not detected in [California TCP 2003](#) or [McPhee 1995](#). [McAlister 2004](#) reported no significant change in the point prevalence of daily smoking. [McVey 2000](#) detected a significant intervention effect of the media campaign on abstinence rates for smokers and ex-smokers combined at 18 months.

Intermediate measures

Five of six studies presenting follow-up results for knowledge or beliefs data found some increases in knowledge about smoking or cardiovascular risk factors ([Stanford 3 City 1977](#); [Sydney QFL 1986](#); [CORIS 1997](#) (women only); [California TCP 2003](#); [Massachusetts 2003](#)), with only [North Coast QFL 1983](#) failing to detect a significant change.

Among five studies presenting follow-up data on attitudes to smoking or cardiovascular risk factors, three found no significant differences between the intervention and control communities ([North Coast QFL 1983](#); [McPhee 1995](#); [Jenkins 1997](#)). The Californian and Massachusetts TCP campaigns found significant change compared with the period before the campaign, but there were no comparisons with other states ([California TCP 2003](#); [Massachusetts 2003](#)).

Information-seeking behaviour, measured as the number of calls to quitlines, enrolments in 'quit centres' and the number of 'quit kits' sold, was reported as increased in [Sydney QFL 1986](#).

Social influences or pressure to quit compared with baseline rates did not change in one study ([North Coast QFL 1983](#)), and increased in three studies ([Sydney QFL 1986](#); [McPhee 1995](#); [Massachusetts 2003](#)) — in [McPhee 1995](#) there was no difference between the intervention and control communities at the follow-up, while in the Massachusetts and Sydney studies no comparison with the control community was reported. Norms concerning smoking changed compared to baseline in all three studies which measured them ([McPhee 1995](#); [California TCP 2003](#); [Massachusetts 2003](#)), but [McPhee 1995](#) found no difference between the intervention

and control communities, and in the state-wide campaigns no comparison was made with non-intervention states.

Process measures

Details of mass media campaign awareness in the intervention community comparison with the control community was presented in two studies and in both was significantly higher in the intervention community (McPhee 1995; Jenkins 1997). None of the studies presented formal dose-response analysis of intervention effects.

Intervention costs

Cost-effectiveness data were presented for two state-wide campaigns (California TCP 2003; Massachusetts 2003). They indicated that both campaigns brought benefit in terms of decreases in the number of cigarette packs sold per capita per year for each per capita dollar spent on the media campaign. The effect was more pronounced in California than in Massachusetts. Per capita media expenditure was reported in four studies (CORIS 1997; California TCP 2003; Massachusetts 2003; McAlister 2004), and ranged from USD 0.25 and USD 3.35 per person per year. Two studies reported raw campaign costs (Mogielnicki 1986: copy development and production USD 7480, broadcast time USD 15,150; Sydney QFL 1986: AUD 620,000 for media and a 'Quit Centre'), but without attempting any cost benefit analysis.

DISCUSSION

Summary of main results

Eleven mass media campaigns met our inclusion criteria for this review. Two state-wide tobacco control programmes with mass media campaigns (California TCP 2003; Massachusetts 2003) and six out of nine community studies (Stanford 3 City 1977; North Coast QFL 1983; Mogielnicki 1986; Sydney QFL 1986; CORIS 1997; Jenkins 1997) showed some positive effects on smoking behaviour, and at least one significant change in smoking behaviour (McVey 2000), although the increase in abstinence was for smokers and ex-smokers combined.

Overall completeness and applicability of evidence

The inclusion criteria for this review (requiring a comparison community) were designed to help us to identify and assess the specific contribution of the mass media to changing smoking behaviour. However, mass media campaigns are rarely the only component of a community-based smoking cessation intervention, and it is often difficult or impossible to disentangle the contribution that the separate elements make to the overall impact of a comprehensive tobacco control programme.

The advantage of assigning a community to control 'no campaign' status should be that broad secular trends in smoking behaviour may more easily be distinguished from the specific effect of the intervention being tested. Despite this methodological strength, several of the studies in our review reported confounding of their findings by extraneous or concurrent events. For example: the findings of the baseline survey for the CORIS 1997 study directly contributed to the establishment of the Heart Foundation of Southern Africa, which then set up a number of tobacco control initiatives that may have contaminated CORIS's subsequent findings; the North Coast QFL 1983 campaign came under attack from the tobacco industry and was briefly suspended, with the

resulting national publicity assumed to have influenced smoking behaviour in the control community; and during the Sydney QFL 1986 programme, which led to a 2.8% decrease in local prevalence, cigarette prices in Sydney rose less than in the rest of Australia, which may have masked some of the positive effects of the campaign. While such interactions may demonstrate the synergy between campaigns and societal changes, they compromise our ability to measure the impact of such research.

Mass media campaigns are inherently difficult to evaluate, since large samples are required to detect relatively small effects on individual members of the target community. However, even small changes may deliver significant benefits at the population level. McVey 2000 extrapolated that the odds ratio (1.53) for being a non-smoker following the HEA tobacco control TV campaign would yield a decline in prevalence of 1.2% in a stable population with a smoking rate of 28% (the approximate prevalence rate in the UK at that time (ASH 2007)). There is also evidence that a memorable media campaign, particularly a TV-based one, may increase calls to quitlines, the distribution of 'quit kits' and enrolment in treatment programmes, but that these may be transient responses, and do not necessarily translate to an increase in successful quit attempts. Low success rates and high drop-out rates may be a consequence of unrealistically high expectations raised by a successful campaign (Sydney QFL 1986).

None of our included studies tested simply a mass media intervention. Some compared groups receiving a mass media intervention alone with groups receiving mass media and community interventions. In these cases only the mass media groups were included in our review (Stanford 3 City 1977; North Coast QFL 1983; CORIS 1997; McVey 2000; McAlister 2004). In some studies the intervention was led by a mass media programme but also included components such as quitlines, physician involvement and clinics (Mogielnicki 1986; Sydney QFL 1986; MCPhee 1995; Jenkins 1997). We decided to include all studies in which a mass media programme led the intervention, but this has involved complex processes of evaluation and comparison.

The definitions of smoker, ex-smoker and quitter varied from study to study, making between-study comparisons problematic. In addition, the surveys used in both the state-wide tobacco control programme (TCP) campaigns modified their definition of a smoker during the course of the campaigns. Because of those differences, people who were defined as smokers, ex-smokers or quitters might not have fallen into those categories in another study. Some studies included both smoking cessation and smoking reduction as primary objectives; and in one study the criterion for success changed retrospectively from complete cessation to no longer smoking every day (McAlister 2004).

The state TCP campaigns were both introduced as constitutional amendments, and are funded from tobacco excise tax increases. They are to be continued, but with reduced funding and less aggressive advertising. Compared with smoking prevalence before the programme and in other states before and after the programme, the early campaign in California was associated with significant decreases in smoking prevalence. However, the early success was not sustained through the later stages of the campaign. The final evaluation up to 2008 showed a faster decline in smoking prevalence compared with the rest of the USA population. In addition smoking-attributable cancer mortality rates declined

more in California than in the rest of the USA (18.8% vs 2.4%) during 1979 to 2002 ([California TCP 2003](#))

[Fichtenberg 2000](#) reported a correlation between changes in funding, per capita cigarette consumption and mortality from heart disease in California during the 1990s, and estimated that over the first eight years of the campaign 33,000 deaths from heart disease were avoided. Goldman and colleagues calculated that a decline of 12.2% following the second wave of media activity could be directly attributed to the campaign rather than to fiscal pressures ([California TCP 2003](#)). In Massachusetts the programme budget was also cut. [Friend 2002](#) notes that the gradual tapering off of the effectiveness of the California and Massachusetts campaigns may be an inevitable reduction in impact over time, irrespective of fluctuating trends in funding.

The impact of campaign duration and intensity is difficult to ascertain. The [Flay 1987b](#) and [Friend 2002](#) reviews both detected an effect of longer duration and higher intensity campaigns, but our own assessment has less clearcut findings. [McVey 2000](#), comparing the impact of single- and double-weight TV campaigns on quit rates, found no significant differences at six months, with the single-weight region (Granada) at 6.3% and double-weight (Tyne Tees, Yorkshire) at 6.6%, yielding an adjusted OR of 1.02 ($P = 0.94$). The Vietnamese-American men studies I ([McPhee 1995](#)) and II ([Jenkins 1997](#)) ran for a total of 24 and 39 months respectively, with the latter producing positive effects, but other factors in the study design (a 15-month pilot phase, physician input, Saturday schools, student and family involvement) may have confounded the mass media effect. [North Coast QFL 1983](#) lasted for three years, but after early success the campaign was scaled down and prevalence rose again during the second year; the intervention effects may have been masked by a concurrent substantial decline in smoking in the control community. In the [Stanford 3 City 1977](#) study, it is difficult to disentangle the effects of the mass media campaign from face-to-face counselling in the intervention communities. However, significant declines in cigarette consumption were observed only within the community in which the whole population was exposed to a mass media campaign with high-risk smokers receiving intensive counselling, and not in the community that received the media campaign alone. In the [Sydney QFL 1986](#) study, a significant decline in smoking prevalence was observed in the intervention city at the end of the first year, but from that point on both cities (Sydney and Melbourne) over four years received complex interventions which included mass media campaigns. It was not possible to separate out the independent effect of the mass media from co-interventions such as physician input, smoking clinics, school programmes and shopping mall displays. From the studies in our review, there was no consistent relationship discernible between campaign duration and effectiveness.

Differences by age, gender, ethnicity and education presented similar problems. During the assessment period (1989 to 2000) for the [California TCP 2003](#), the decline was significant for women but not for men during the last phase only. The trend was significant for older smokers (45+) throughout the campaign. Changes in male smoking prevalence were similar between ethnic groups, with the highest smoking prevalence reported in African Americans. In women, significant declines in prevalence were observed for Hispanic and non-Hispanic white women. The greatest decline in male smoking prevalence was observed for college graduates, while in women the largest declines were noted in those who did

not graduate from high school. In the Massachusetts campaign, the decline in smoking prevalence between 1990 and 2000 was significantly different from the rest of the USA for men but not for women. The effect was also more pronounced for people aged between 18 and 34, for those who graduated from high school but not college, and for white non-Hispanics.

After four years' follow-up [CORIS 1997](#) detected significantly higher quit rates for women than for men, but after 12 years this difference was no longer apparent, with prevalence for men significantly lower in the intervention than in the control community, but not for women. The [North Coast QFL 1983](#) study found no difference between men and women, but a significant trend by age, with greater declines in prevalence among younger smokers. The [Sydney QFL 1986](#) study detected no significant associations between changes in prevalence and demographic characteristics, other than a long-term decline in prevalence for men but not for women. The impact of age was contradictory, with three campaigns detecting positive effects among older smokers, and three among younger smokers (up to 34 years).

Gender indications were also inconclusive, with three studies showing positive long-term effects for men, and one for women. This mixed picture casts doubt upon the widely-held assumption that targeted campaigns are likely to be the most effective. [Chapman 2007](#) points out that the tobacco industry, although nuancing much of its promotion to appeal to different subgroups within a population, does not tailor its packaging or advertising of the major brands (e.g. Camel, Marlboro) to different cultural groups or countries.

Quality of the evidence

Overall the included studies were assessed as being at high risk of bias. All the included studies used some kind of control group, but did not randomise communities to intervention and control conditions. Baseline demographic characteristics were statistically compared in five studies (three with positive outcomes and two with a negative outcome). Studies with declared baseline differences between compared groups controlled for those differences in the analyses. Six studies did not conduct statistical tests for comparability between groups or did not describe details of demographic characteristics of the population. Since comparison groups were not randomised, there could be baseline differences between them which could have confounded the results.

Most of the studies with positive findings had problems with drop-outs and missing data. Response rates ranged from 42.7% to 99.4%, with retention rates between 52% and 76%. Most studies with positive findings did not provide information on participants lost to follow-up. Any of these limitations could have confounded the results of the studies.

[Analysis 1.5](#) gives information on those studies which identified possible confounders, the analytical measures taken to control for these, and the changes in effect where reported.

Agreements and disagreements with other studies or reviews

There is a broad consensus that comprehensive tobacco control interventions which include mass media campaigns can be effective in reducing smoking consumption and prevalence ([Flay](#)

1987a; Flay 1987b; COMMIT 1995; Levy 2000; Friend 2002; Biener 2006; NICE 2007; NCI 2008; Niederdeppe 2008; Ontario 2009; Durkin 2012; Wilson 2012).

The NICE 2007 review found little high-quality evidence for the effectiveness of targeting mass media interventions at high-risk groups such as pregnant women, men only or young smokers.

Durkin 2012 assessed mass media interventions in adults on the basis of 26 population-based studies (cohort, cross-sectional and time series, with no control group). They concluded that the evidence supports the use of mass media campaigns as a part of comprehensive tobacco control programmes. In addition the authors evaluated different message types and different media channels using subgroup analysis.

NCI 2008 reported on the role of the media in promoting and reducing tobacco use. They included studies of various designs, and concluded that mass media campaigns may encourage adult smoking cessation and lead to decreases in smoking prevalence.

Niederdeppe 2008 conducted a systematic review of the effectiveness of media campaigns in smoking cessation in socio-economically disadvantaged populations. They included 50 studies, and concluded that media campaigns are less or equally effective in populations with low socio-economic status compared with populations with higher socio-economic status. In addition they observed that media campaigns in disadvantaged populations are most effective when combined with tobacco control programmes.

The Ontario 2009 Health Technology Assessment report examined the efficacy and cost effectiveness of selected population-based interventions for smoking cessation, including mass media interventions; they agreed with the conclusions of our review.

Wilson 2012 evaluated several tobacco control interventions outlined in the WHO MPOWER Package, including mass media interventions in adults and youth. They included 19 studies with and without control groups, some of which were also included in our review, but excluded studies assessing multi-component interventions. They concluded that there is moderate evidence that mass media can be effective in reducing smoking prevalence in adults.

Atusingwize 2015 conducted a review of economic evaluations of tobacco control mass media interventions. They noted methodological and content heterogeneity and limitations, but despite this, found consistent evidence that these campaigns were cost-effective.

As a part of Community Preventive Services Task Force, Robinson 2014, reviewed the effectiveness of mass media health communication campaigns. Some of these were campaigns on smoking but that also included distributing smoking cessation materials and aids. Twenty two studies were included and from these they concluded that mass media-supported distribution of cessation aids improves smoking cessation.

AUTHORS' CONCLUSIONS

Implications for practice

- Tobacco control programmes that include mass media campaigns may change smoking behaviour in adults, but the evidence comes from studies of variable quality and scale. The specific contribution of the mass media component is unclear.
- The duration and intensity of an intervention may affect its impact on smoking behaviour, but evaluations need to last long enough to detect lasting changes, and to allow for confounders and for secular trends.
- No consistent relationship was observed between campaign effectiveness and age, education, ethnicity or gender.

Implications for research

- Evaluations should include control groups matched to intervention groups, or at least with between-group baseline differences noted and adjusted for in the analysis.
- Formative research is also essential to test the value of refining media campaigns to target specific populations.

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Yankelovich D. Coming to public judgement: making democracy work in a complex world. Syracuse, N.Y.: Syracuse University Press, 1991.

* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

California TCP 2003

Methods	<p>Country: USA.</p> <p>Objective: to reduce tobacco use in California – reduce exposure to ETS, counter pro-tobacco influences, promote tobacco use cessation, reduce youth access to tobacco products and to promote social norm of not accepting tobacco.</p> <p>Study sites: state of California (intervention group), rest of USA (control group).</p> <p>Programme name: California Tobacco Control Program (CTCP).</p> <p>Design: interrupted time series study design using data from national and California population surveys.</p> <p>Analysis: regression models, 2-tailed statistical tests; smoking behaviour was measured in several population-based cross-sectional surveys conducted nationally and in California for several years before the start of the programme, and during and after the programme.</p> <p>No power estimates.</p>
Participants	<p>Population of study sites: CA 1999 – 23,788,205; rest of US – not provided.</p> <p>Target population: adult smokers, adolescents, general audience, minority populations (Hispanic, Asian, African Americans).</p> <p>Age: 18+ and 15+ (depending on survey).</p> <p>Ethnicity: White, Hispanic, Asian, African Americans, Chinese, Vietnamese, Korean.</p>
Interventions	<p>Theoretical basis: social diffusion model. Yr started: 1989.</p> <p>Duration of media campaign: April 1990 to June 1991; then funding reduced, campaign restarted October 1992 to May 1993; funding decreased till mid-1996; campaign restored January 1997 to June 1998, then funding reduced again.</p> <p>Focus groups were used in development of messages. Ongoing independent evaluation.</p> <p>Components:</p> <ul style="list-style-type: none"> (i) statewide media campaign disseminating anti-tobacco messages; (ii) local tobacco control initiatives, policy development and public education programmes; (iii) school-based tobacco prevention programmes, activities and policies. <p>Media campaign includes paid commercials and PSAs for TV, radio, outdoor advertisements, newspaper ads and public relations activities, in English, Spanish, Cantonese, Mandarin, Vietnamese, Korean, Laotian, Cambodian, Japanese, Hmong. Messages were designed to de-glamorise smoking for young people, show the dishonesty of the tobacco industry, encourage smokers to quit, publicize the health risks of exposure to environmental tobacco smoke.</p> <p>Community programme includes a variety of activities implemented by county health departments and community-based organization, focused on changing community norms regarding tobacco use, getting support for decreasing tobacco advertising and sponsorship, reducing environmental tobacco smoke (in the workplaces, vehicles and at home), announce the statewide telephone quitline.</p> <p>Year started: 1990.</p> <p>Duration: ongoing</p>
Outcomes	<p>Smoking prevalence, quit ratio (% of ever-smokers now ex-smokers), per capita cigarette consumption (based on aggregated sales data).</p> <p>Definitions: smoker – currently smoking and 100+ lifetime cigs; in more recent surveys (NHIS since 1993, CPS since 1992, BRFS/CATS since 1994) respondents were asked if they currently smoked 'every day', 'some days' or 'not at all'; in CTS, prevalence was based on 'smoke now' question, while in the other surveys smokers must have reported smoking at least 100 cigs in their lifetime; former smoker – smoked at least 1+ cigs in the past 30 days and does not currently smoke; quit ratio – for a given year % of ever-smokers (current smokers + former smokers) who were now former smokers.</p> <p>Questionnaire: by telephone and in person.</p> <p>Biochemical confirmation of abstinence: none reported.</p> <p>Measured at baseline (1978), then yearly to 2002; campaign ongoing.</p>

California TCP 2003 (Continued)

Notes

Intermediate measures:

health beliefs, health-enhancing attitude score, percentage of smokers thinking about quitting, attempts to quit, support for further increase in tax on tobacco with funds devoted to tobacco control, support for ban on tobacco advertising and tobacco company sponsorship, support for smoking restrictions in public place, smokefree worksites, home smoking bans, nonsmokers exposed to ETS at work.

Process measures:

media weight, campaign awareness/reach, expenditures and cost effectiveness.

Intermediate measures and process measures were assessed in California only, without other state comparisons.

The evaluation of the campaign continues with California Smokers' Cohort (CSC), but without comparison to control group.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Not RCT: the results of the programme were compared with the smoking prevalence of the rest of the USA in interrupted time series study design using data from national and California population survey.
Allocation concealment (selection bias)	High risk	Not RCT: the results of the programme were compared with the smoking prevalence of the rest of the USA in interrupted time series study design using data from national and California population survey.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not done due to the nature of the intervention, making people aware of the programme.
Blinding of outcome assessment (detection bias) All outcomes	High risk	Self-reported cigarette consumption from population-based surveys.
Incomplete outcome data (attrition bias) All outcomes	High risk	Cross-sectional surveys, no cohort follow-up; response rates 71% to 99%.
Selective reporting (reporting bias)	Low risk	Outcomes presented as prespecified in Methods section.
Other bias	Unclear risk	<p>Insufficient information:</p> <p>ITS assessment (Pierce 1998) —</p> <p>clearly defined point in time when the intervention occurred DONE</p> <p>At least three data points before and three after the intervention DONE</p> <p>The intervention is independent of other changes NOT CLEAR</p> <p>There are sufficient data points to enable reliable statistical inference NOT CLEAR</p> <p>Formal test for trend NOT CLEAR</p> <p>Intervention unlikely to affect data collection DONE</p>

California TCP 2003 (Continued)

Blinded assessment of primary outcome NOT DONE

Completeness of data set NOT CLEAR

Reliable primary outcome NOT CLEAR

ITS assessment (Siegel 2000) —

Clearly defined point in time when the intervention occurred DONE

At least three data points before and three after the intervention DONE

The intervention is independent of other changes NOT CLEAR

There are sufficient data points to enable reliable statistical inference NOT CLEAR

Formal test for trend NOT CLEAR

Intervention unlikely to affect data collection DONE

Blinded assessment of primary outcome NOT DONE

Completeness of data set NOT CLEAR

Reliable primary outcome NOT CLEAR

CORIS 1997

Methods	<p>Country: South Africa.</p> <p>Objective: to reduce levels of coronary heart disease factors (e.g. high blood pressure, high blood cholesterol, stress, sedentary life style and smoking).</p> <p>Study sites: Robertson, Swellenden and Riversdale in South-Western Cape Province.</p> <p>Programme name: The Coronary Risk Factor Study (CORIS).</p> <p>Design: quasi-experimental study (i) Robertson (mass media intervention + community-based intervention) (ii) Swellenden (similar mass media intervention alone), (iii) Riversdale (control). Only Swellenden and Riversdale comparison included in our review.</p> <p>Analysis: t-tests paired and unpaired with and without covariance adjustment, two-tailed P values < 0.01, Chi², with individual as the unit of analysis.</p> <p>No power estimates.</p>
Participants	<p>Population of study sites: 1980 census estimate Swellenden 6176 (low-intensity mass media intervention), Riversdale 6049 (control).</p> <p>Target population: all Afrikaner adult inhabitants.</p> <p>Age: 15 to 64 at baseline and at 12 yr follow-up, 15 to 68 at 4 yr follow up.</p> <p>Sex: M & F.</p> <p>Ethnicity: > 95% White (Afrikaner).</p>
Interventions	<p>Theoretical basis: not specified. Year started: baseline survey 1979, mass media intervention 1980.</p> <p>Duration: 4 yrs.</p> <p>Components: structured mass media health education intervention addressing each of the risk factors. Baseline survey 1 yr before the campaign and results reported to the participants as the first intervention. Interviewers and observers centrally trained, standardized instruments.</p> <p>Initial 4 m general awareness campaign followed by risk factor programmes, repeated during subsequent 2 yrs, singly and in combinations, with new materials and varied intensity and duration. The intervention included: blood pressure screening stations + educational materials, billboards, posters, mailings, frequent news items, health messages on electricity accounts and special supplement in the local newspaper. During 2nd and 3rd yrs frequency of the billboards, posters and mailings was halved, but news items and supplement remained the same.</p>

CORIS 1997 (Continued)

Robertson (High-intensity arm) received 5-day smoking cessation seminars not offered to the low-intensity or control communities.

Outcomes	Smoking prevalence, cigarette consumption, quit rate; smoking behaviour was measured in cross-sectional surveys at baseline and at 4 yrs, in cohort identified at baseline. Additional follow-up survey at 12 yrs from baseline. Definitions: Smoker – smoking on average at least 1 cig (= 1 g tobacco) daily. Ex-smoker – abstinent for at least 3 m before study start. Questionnaire: in-person interview. Participation rates: 60% to 74% at baseline, 56% to 70% at 4 yr survey. Biochemical confirmation of abstinence: none reported. Measured at baseline, 4 yrs, 12 yrs.
Notes	Intermediate measures: 43-item questionnaire on knowledge of risk factors, diet and attitudes at baseline, but only knowledge score was reported. Process measures: media weight, intervention costs. We have not included the Robertson community intervention (high intensity) in this review, but it is covered fully in Secker-Walker 2002 .

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quasi-experimental with two intervention towns, Robertson receiving a mass media intervention and a community-based intervention, Swellenden receiving a similar mass media intervention alone, and Riversdale acting as the comparison town. ONLY COMPARISON SWELLENDEN AND RIVERSDALE INCLUDED IN THE ANALYSIS
Allocation concealment (selection bias)	High risk	Quasi-experimental, no randomisation attempt
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not done due to the nature of the intervention.
Blinding of outcome assessment (detection bias) All outcomes	High risk	Self-reported cigarette consumption.
Incomplete outcome data (attrition bias) All outcomes	High risk	Cross-sectional surveys in the whole population, 56% of participants re-surveyed after 4 yrs (cohort follow-up); response rates for cross-sectional surveys 62% to 74%.
Selective reporting (reporting bias)	Low risk	Outcomes presented as prespecified in methods section.
Other bias	Low risk	No other bias identified.

Jenkins 1997

Methods	Country: USA. Objective: to lower smoking prevalence among Vietnamese-American men. Study sites: San Francisco and Alameda counties, California (intervention), and Houston, Texas (control). Programme name: Smoking Cessation among Vietnamese-American Men – II.
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Mass media interventions for smoking cessation in adults (Review)

Jenkins 1997 (Continued)

Design: quasi-experimental.
Analysis: χ^2 , t-tests, multiple logistic regression, with individual as the unit of analysis. Smoking behaviour assessed in cross-sectional surveys at baseline and 2 yrs.
No power estimates.

Participants	Age: 18+, Vietnamese–American male current smokers (smoked a cigarette during prior week).
Interventions	Theoretical basis: not specified. Yr started: 1990; Duration: 2yrs. Components: 15 m uncontrolled pilot campaign. Then (i) Newspaper and magazine articles in Vietnamese language, a videotape broadcast ×2 on Vietnamese-language TV, calendar, bumper stickers, lapel buttons, 3 posters, 2 brochures and self-help 'quit kit'. (ii) Anti-tobacco counter-advertising campaign included billboards (3 different types), newspaper ads and paid TV ads. (iii) Short anti-tobacco presentations at community events, 'Saturday' schools in Vietnamese language for students, courses of smoking cessation counselling for Vietnamese physicians, Vietnamese 'no smoking' signs and smoking control ordinances to local businesses and restaurants.
Outcomes	Smoking prevalence, cigarette consumption, quit rates. Definitions: current smoker – answered yes to 2 questions: (a) ever smoked a cig (b) smoked a cig during the previous week; former smoker – answered yes to the 1st question and no to 2nd; never-smoker – answered no to both questions; recent quitter – quit smoking during 2 yrs before either pretest or post-test interview. Questionnaire: by telephone. Biochemical confirmation of abstinence: none. Measured at baseline and 2 yrs.
Notes	Intermediate measures: motivation to quit, self-efficacy, quit attempts assessed at baseline and follow-up. Process measures: media weight, awareness/reach.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quasi-experimental, with SF and Alameda County chosen as the intervention area and Houston, Texas as the comparison area.
Allocation concealment (selection bias)	High risk	Quasi-experimental, with SF and Alameda County chosen as the intervention area and Houston, Texas as the comparison area.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not done due to the nature of the intervention.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Self-reported smoking – telephone interview, not clear if interviewers were aware of the intervention received.
Incomplete outcome data (attrition bias) All outcomes	High risk	cross-sectional surveys, no cohort follow up, response rates 82% to 94%.
Selective reporting (reporting bias)	Low risk	Outcomes presented as prespecified in Methods section.

Jenkins 1997 (Continued)

Other bias	Low risk	No other bias identified.
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Massachusetts 2003

Methods	<p>Country: USA.</p> <p>Objectives: to reduce tobacco use in Massachusetts residents.</p> <p>Study sites: state of Massachusetts (intervention) and the rest of the USA (all states except Alaska, Arkansas, California, Kansas, Nevada, New Jersey, Rhode Island, Wyoming).</p> <p>Programme name: Massachusetts Tobacco Control Program (MTCP).</p> <p>Design: interrupted time series study design using data from national and Massachusetts population surveys.</p> <p>Analysis: regression models, test of model coefficients, test for trends, Chi². Smoking behaviour was measured in several population-based cross-sectional surveys conducted nationally and in Massachusetts for several years before the start of the programme, and during and after the programme.</p> <p>No power estimates.</p>
Participants	<p>Population of study sites: not given.</p> <p>Target population: adult smokers, adolescent, general audience.</p> <p>Age: 18+</p> <p>Sex: M & F.</p>
Interventions	<p>Theoretical basis: social diffusion theory.</p> <p>Year started: baseline measures 1989, intervention 1993;</p> <p>Duration: still ongoing but with very low funding.</p> <p>Formative research in the message development. Systematic monitoring of the campaign and independent evaluations of the programme.</p> <p>Components:</p> <ul style="list-style-type: none"> (i) high-profile statewide media campaign, targeting adult smokers, youth and general audience; (ii) programme to establish community-based tobacco control efforts; (iii) statewide initiatives. <p>Mass media campaign started in October 1993, still ongoing, with 100+ ads for TV, radio, billboards, newspapers and public relations events. Two aims: Public Education Media Campaign, focused on general population, raising awareness and explaining tobacco control issues; and Strategic and Targeted Marketing (tailored messages for selected populations). The intention of messages was to de-glamorise smoking among young people, show the dishonesty of the tobacco industry, encourage smokers to quit, inform about the health risks of exposure to ETS. Media ads were translated into Spanish, Portuguese, Chinese and Vietnamese.</p> <p>Community-based tobacco control run from existing institutions, e.g. local health departments, plus new initiatives such as cessation counselling and/or public information and education services, promoting local policies, regulations, and ordinances limiting smoking in public places or restricting youth access to tobacco. Statewide initiatives included telephone hotline, technical assistance in establishing worksite smoking policies, efforts to build tobacco control infrastructure.</p>
Outcomes	<p>Smoking prevalence, per capita cigarette consumption (based on aggregated sales data).</p> <p>Definitions: current smoker – (BRFSS surveys): answered 'yes' to the questions 'Have you ever smoked at least 100 cigs in your entire life?' and 'Do you smoke cigs now?'; after 1996 the latter question was changed to 'Do you now smoke cigs everyday, some days or not at all?' and current smokers post-1996 answered 'every day' or 'some days'; in MTS – adult who reported to have smoked 100 cigs in their life-time and currently smoked 'every day or some days'; quit success – smoking at baseline and reporting smoking 'not at all' at the time of the interview.</p> <p>Questionnaire: by telephone.</p> <p>Biochemical confirmation of abstinence: none reported.</p>

Massachusetts 2003 (Continued)

Measured at baseline, then yearly from 1993 to 2000; campaign ongoing.

Notes

Intermediate measures: attitudes and health beliefs about smoking, support for further increase in tax on tobacco with funds devoted to tobacco control, support for ban on vending machines, support for ban on sponsorship of sports and cultural events by tobacco companies, smokefree worksites, homes with smoking ban, ETS at work, support for restricting smoking in public buildings, and for some form of restriction on smoking in restaurants, social pressure to quit.

Process measures: media weight, campaign awareness/reach, expenditures and cost-effectiveness. Intermediate and process measures were assessed in survey carried out in Massachusetts, without other state comparisons

Tobacco control efforts ongoing, information about smoking and quitting in Massachusetts is available from BRFSS surveys, no control group, no evaluation.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Not RCT: the results of the programme were compared with the smoking prevalence of the rest of the USA in interrupted time series study design using data from national and California population survey.
Allocation concealment (selection bias)	High risk	Not RCT: the results of the programme were compared with the smoking prevalence of the rest of the USA in interrupted time series study design using data from national and California population survey
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not done due to the nature of the intervention, making people aware of the programme.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Self-reported cigarette consumption from population based surveys.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Cross-sectional surveys, no cohort follow up; response rates 43% to 84%.
Selective reporting (reporting bias)	Low risk	Outcomes presented as prespecified in Methods section.
Other bias	Unclear risk	<p>Insufficient information:</p> <p>ITS assessment:</p> <p>Clearly defined point in time when the intervention occurred DONE</p> <p>At least three data points before and three after the intervention DONE</p> <p>The intervention is independent of other changes NOT CLEAR</p> <p>There are sufficient data points to enable reliable statistical inference NOT CLEAR</p> <p>Formal test for trend NOT CLEAR</p> <p>Intervention unlikely to affect data collection DONE</p> <p>Blinded assessment of primary outcome NOT DONE</p> <p>Completeness of data set NOT CLEAR</p>

Massachusetts 2003 (Continued)

Reliable primary outcome NOT CLEAR

ITS assessment:

Clearly defined point in time when the intervention occurred DONE

At least three data points before and three after the intervention DONE

The intervention is independent of other changes NOT CLEAR

There are sufficient data points to enable reliable statistical inference NOT CLEAR

Formal test for trend NOT CLEAR

Intervention unlikely to affect data collection DONE

Blinded assessment of primary outcome NOT DONE

Completeness of data set NOT CLEAR

Reliable primary outcome NOT CLEAR

McAlister 2004

Methods	<p>Country: USA.</p> <p>Objective: to promote smoking cessation among adults.</p> <p>Study site: eastern Texas.</p> <p>Programme name: Texas Tobacco Prevention Pilot Initiative.</p> <p>Design: quasi-experimental study, 13 intervention regions and 1 control region; 3 levels of media exposure (none, low-level, high-level) and 5 community programme options (no programme, law enforcement programmes only, cessation programmes only, school-community prevention programmes only, or all programmes combined); for this review only areas with media programmes and without community programmes were included – 4 areas: 2 low-level media (Liberty-Chambers, Northeast Harris County), one intensive media (Tyler County) and one control (Bell County).</p> <p>Analysis: logistic regression, Chi², Pearson's Correlation, one-way ANOVA, with individual as unit of analysis; smoking behaviour was assessed in a cohort of smokers identified at baseline and at follow-up 7 m later; smoking prevalence was assessed in 2 independent cross-sectional samples at same time points (no results presented).</p> <p>No power estimates.</p>
Participants	<p>Population of study sites: exact number not given, all treatment areas had populations of over 100,000. Target population: residents of Texas, primary target audience - smokers aged 25 to 49. Prevalence samples were 9407 at baseline and 8974 at follow-up. Cessation cohort of 622 daily smokers, 62.9% F.</p> <p>Age: 18+.</p> <p>Sex: M & F.</p> <p>Ethnicity: White 82.9%, Black 8.3%, Hispanic 6.0%, Asian 0.2%, other 2.6%. High-level media/cessation areas had disproportionately more African-Americans (20.6%) than the other four conditions (4.4% to 6.9%)</p>
Interventions	<p>Theoretical basis: social learning theory, the transtheoretical model, modelling, social reinforcement for behaviour change, emotional arousal.</p> <p>Year conducted: 2000.</p> <p>Duration: 7 m.</p> <p>Community forums, focus groups and pre-testing were used to develop messages.</p> <p>Components and content:</p> <p>TV, radio, newspapers, billboards, posters.</p>

McAlister 2004 (Continued)

Ads were created in English, Spanish and Vietnamese. TV ads and radio spots included 2 developed by the CDC, one of which was also printed in local newspapers. All ads promoted the American Cancer Society Smokers' Quitline; radio and print ads encouraged smokers to seek doctor's or pharmacist's help in quitting. 10-second PSAs promoting the Quitline were broadcast during morning drive times.

Outcomes	Point prevalence of daily smoking. Definition: smoker - answered 'yes' to the question 'Do you now smoke cigs everyday?' Questionnaire: by random digit dialled telephone. Biochemical confirmation of abstinence: none reported.
Notes	Process measures: awareness/reach was measured by 3 questions about frequency of being exposed to media messages through TV, radio and newspaper ads over past 30 days. Answer choices were never, 1 to 3 times, 1 to 3 times per week, daily or almost daily, more than once a day. Processes of change variables adapted from TTM.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	A quasi-experimental cross-sectional study.
Allocation concealment (selection bias)	High risk	A quasi-experimental cross-sectional study.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not done due to the nature of the intervention.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Data collection was done by independent contractors, the interviewers were blinded to the intervention received by the respondent.
Incomplete outcome data (attrition bias) All outcomes	High risk	Cross-sectional surveys, no cohort follow-up, a panel of smokers followed (58% to 65% followed up), reasons for attrition described.
Selective reporting (reporting bias)	High risk	Outcomes presented combined, not as specified in Methods section.
Other bias	Low risk	No other bias identified.

McPhee 1995

Methods	Country: USA. Objective: to reduce smoking prevalence among Vietnamese-American men. Study sites: Santa Clara County, California (intervention), and Houston Texas (control). Programme name: Smoking Cessation among Vietnamese-American Men - I. Design: quasi-experimental. Analysis: Chi ² tests, t-tests, multiple logistic regression, with individual as the unit of analysis. Smoking behaviour was assessed in cross-sectional surveys at baseline and 2 yr follow-up. Power estimate of 0.8 power to detect a 5%+ reduction in prevalence. Required a sample of at least 1200 in each community (achieved).
Participants	Population of study sites: Santa Clara County – 54,212 Vietnamese (18,770 men 18+); Houston – 33035 Vietnamese (11878 men 18+).

Mass media interventions for smoking cessation in adults (Review)

McPhee 1995 (Continued)

Age: 18+ Vietnamese–American men.

Interventions	<p>Theoretical basis: not specified. In 1989 ran a 15 m pilot media programme in San Francisco.</p> <p>This trial started: Nov 1990.</p> <p>Duration: 2 yrs.</p> <p>Components:</p> <p>(i) 35 print articles in Vietnamese-language newspapers and magazines; videotape broadcast ×2 on Vietnamese-language TV, interviews with smokers, physicians and quitters, health education materials, e.g. calendar, bumper stickers, lapel buttons, 3 posters, 2 brochures (one for male smokers – effects of smoking and quitting; 1 for female smokers – effects of ETS) and self-help 'quit kit'.</p> <p>(ii) An anti-tobacco counter-advertising campaign included billboards (3 different types), newspaper and magazine ads and paid TV ads.</p> <p>(iii) Short anti-tobacco presentations at community events (adaptation of American Cancer Society Great Smokeout Programme for Vietnamese population) and a CME course on smoking cessation counselling methods for Vietnamese physicians, Vietnamese 'no smoking' signs and smoking control ordinances to local businesses and restaurants.</p>	
Outcomes	<p>Smoking prevalence, cigarette consumption, quit rates.</p> <p>Definitions: current smoker – answered yes to 2 questions: (a) ever smoked a cig (b) smoked a cig during the previous week; former smoker – answered yes to 1st and no to 2nd question; never smoker – answered no to both questions; recent quitter – quit smoking during 2 yrs before either pretest or post-test interview.</p> <p>Questionnaire: by telephone.</p> <p>Biochemical confirmation of abstinence: none.</p>	
Notes	<p>Intermediate measures: motivation to quit, self-efficacy, quit attempts assessed at baseline and follow up.</p> <p>Process measures: media weight, awareness/reach.</p>	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quasi-experimental, with Santa Clara County chosen as the intervention area and Houston, Texas as the comparison area.
Allocation concealment (selection bias)	High risk	Quasi-experimental, with Santa Clara County chosen as the intervention area and Houston, Texas as the comparison area.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not done due to the nature of the intervention.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Self-reported smoking – telephone interview, not clear if interviewers were aware of the intervention received.
Incomplete outcome data (attrition bias) All outcomes	High risk	Cross-sectional surveys, no cohort follow up, response rates 81% to 88%
Selective reporting (reporting bias)	Low risk	Outcomes presented as prespecified in Methods section.
Other bias	Low risk	No other bias identified.

McVey 2000

Methods	<p>Country: England.</p> <p>Objective: to motivate smokers to give up and ex-smokers to stay stopped.</p> <p>Study site: 4 central and northern English independent TV regions (Central, Granada, Tyne Tees, and Yorkshire).</p> <p>Programme name: Health Education Authority for England's anti-smoking TV campaign.</p> <p>Power calculation: assuming a control quit rate of 7%, looking for a 50% increase by TV campaign alone, and 100% increase in TV + LTCN, and alpha set to 0.05, 4000 smokers required to detect at 0.9 power (TV alone) and 0.8 power (TV + LTCN). Assuming a 30% drop-out rate, 5800 needed at baseline</p> <p>Design: quasi-experimental, 3 intervention regions: Granada, Tyne Tees and a region of Yorkshire (TV advertising), West Yorkshire (TV campaign and a local tobacco control network); 1 control region: Central TV. Only TV media and control regions analysed in this review.</p> <p>Analysis: multiple logistic regression, χ^2, ORs of smoking/not smoking with 95% CIs, calculated for smokers and ex-smokers. The ORs adjusted for all pre-intervention predictors of change in smoking status for smokers and ex-smokers were pooled to estimate a common intervention effect using fixed-effect meta-analysis method, with individual as unit of analysis; smoking behaviour assessed in a cohort of smokers and ex-smokers at baseline, 6 m and 18 m.</p> <p>Power estimate 0.9 (TV alone) to detect a 3.5% increase in cessation, and 0.8 (TV + LTCN) to detect a 7% increase in cessation.</p>
Participants	<p>Population of study sites: inhabitants of Central, Granada, Tyne Tees and Yorkshire TV regions, overall numbers not given; chosen for higher prevalence of smoking.</p> <p>Age: adults, aged 16+, 5468 at baseline, 3610 at 6 m and 2381 smokers or ex-smokers at 18 m; interviews conducted in a 2-stage cluster sampling design, including pseudo-random Kish-grid method. Interviewers and participants at baseline were not informed about forthcoming TV campaign, or that they were part of a trial; follow-up interviews conducted by different team, blinded to intervention or pre-campaign status.</p> <p>Sex: M & F.</p> <p>Ethnicity: not recorded.</p>
Interventions	<p>Theoretical basis: not specified.</p> <p>Year started: 1992.</p> <p>Duration: 18 m.</p> <p>Formative process: a series of qualitative pilot studies using focus groups and in-depth interviews with smokers and ex-smokers.</p> <p>Components:</p> <p>(i) paid TV anti-smoking ads aimed at current smokers and those who had already given up. In the ads morbid or 'black' humour, macabre or bizarre scenarios were used, featuring John Cleese (well-known English comic actor). Each ad ended with a 'Quitline' number for further information and advice. Ads were screened in 2 phases over 18 m, at varying intensity during 1st phase (10 ads, each 30 to 40 secs, Dec 1992 to March 1993). Granada received single weight advertising, and Tyne Tees and Yorkshire double weight. In 2nd phase (9 ads (4 new) December 1993 to March 1994) all 3 regions received double weight advertising.</p> <p>LTCN intervention (not considered in this review) in West Yorkshire only: organised network 'West Yorkshire Smoking and Health' (WYSH) to fund and co-ordinate multiple anti-smoking activities, e.g. clean air awards, health promotion, Guide to Smoke-Free Eating and Drinking, cessation support. Media and skills training for local health professionals, political lobbying, media publicity.</p>
Outcomes	<p>Quit rate, relapse rate, abstinence rate; smoking/not smoking at 18 m.</p> <p>Definitions: current smoker – answered yes to question 'Do you smoke cigs at all nowadays?' and reported number of cpd; ex-smoker – did not report current smoking, but answered yes to question: 'Have you ever smoked a cigarette, pipe or cigar?' and reported the number of cpd previously smoked; quitter – baseline smokers reporting no current smoking at follow up; relapser – ex-smokers reporting current smoking at follow-up.</p> <p>Questionnaire: in person at home.</p> <p>Biochemical confirmation of abstinence: none.</p>

McVey 2000 (Continued)

Analysis not ITT, since participants unaware of objectives and interventions.

Notes Intermediate measures: attitudes at baseline, no follow-up results.
Process measures: media weight.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quasi-experimental, 3 intervention regions: Granada, Tyne Tees and a region of Yorkshire (TV advertising), 1 control region: Central TV, not random by practical and ethical considerations.
Allocation concealment (selection bias)	High risk	Quasi-experimental, 3 intervention regions: Granada, Tyne Tees and a region of Yorkshire (TV advertising), 1 control region: Central TV.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Interviewers and respondents were unaware of the forthcoming TV campaign or of the intention to conduct follow-up interviews; the follow-up interviews were conducted by a different group of field workers who were unaware of the pre-campaign responses or the relationship between the interviews and the interventions.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Interviewers and respondents were unaware of the forthcoming TV campaign or of the intention to conduct follow-up interviews; the follow-up interviews were conducted by a different group of field workers who were unaware of the pre-campaign responses or the relationship between the interviews and the interventions.
Incomplete outcome data (attrition bias) All outcomes	High risk	Response rate not reported, cohort follow-up – just number of sampled at baseline and followed at 6 and 18 months provided; 39% to 52% of those sampled at baseline followed, lost to follow-up not counted as eligible at follow-up, reasons provided
Selective reporting (reporting bias)	Low risk	Outcomes presented as prespecified in methods section.
Other bias	Low risk	No other bias identified.

Mogielnicki 1986

Methods	Country: USA. Objective: to improve smoking cessation achieved in clinic programme by mass-media anti-smoking campaign. Study site: 2 outpatient clinics at Veterans Administration Hospitals – Manchester (M) NH, and White River Junction (WRJ) Vt. Design: quasi-randomised study (sequential allocation 1 to 1) in 1st yr; subjects allocated to behaviour-modification programme or mailed cessation materials. In 2nd yr patients were assigned on a 2:1 ratio to clinic and mailing group respectively. After 2nd yr clinics a mass media intervention was delivered to one of the hospital regions (WRJ) in quasi-experimental design, but not to the control region (M). Only 2nd yr of study analysed here. Analysis: Chi ² , F test, logistic regression analysis, with individual as unit of analysis. Smoking behaviour was assessed in a cohort of smokers at baseline and 6 m follow-up. No power estimates.
Participants	Total participants: 311 clinic enrolments, 66 mailed quit kit recipients. Participants of interest: WRJ (clinic + media after 2nd yr) 71 veterans, M (clinic, no media after 2nd year) 33 veterans.

Mogielnicki 1986 (Continued)

Target population: male veterans 18 to 65 yrs with self-reported cigarette consumption of at least 10 a day.
Ethnicity: not reported.

Interventions	<p>Theoretical basis: for clinic treatment, behavioural model of Best (Best 1978a; Best 1978b).</p> <p>Study period: Nov 1980 to May 1981; 2nd phase July 1981 to December 1981. Media campaign ran in WRJ region as a series of 3-week 'flights' Nov 1981 to March 1982 (2 to 6 m after 2nd yr of clinics). Duration: 5 m. Media campaign – current marketing methodology used to develop a media campaign targeting cessation clinic participants. Components and content:</p> <p>TV and radio spots – testimonial vignettes selected from interviews with quitters about benefits of quitting.</p> <p>1 × 60 sec main ad (aired 60 times) and 2 × 30 sec variations (aired 106 times) made for TV and modified audio version for radio, all ending with the sentence 'Life is better without a cigarette; if you are smoke-free, stay free'. Campaign aired on 2 most popular TV stations and 2 most popular radio stations in the WRJ region.</p>
Outcomes	<p>Abstinence rate. No definitions given. Questionnaire: in person at the clinic. Biochemical confirmation of abstinence: exhaled CO; venous blood specimen for thiocyanate level.</p>
Notes	<p>Intermediate measures: at baseline: attitudes and beliefs on smoking, TV viewing habits. Process measures: media weight, awareness/reach, intervention costs.</p>

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quasi-experimental: in one of the hospitals mass media intervention, no mass media in another hospital.
Allocation concealment (selection bias)	High risk	Quasi-experimental: in one of the hospitals mass media intervention, no mass media in another hospital.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not done due to the nature of the intervention.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	No blinding; biochemical validation of smoking cessation, lack of blinding has no influence.
Incomplete outcome data (attrition bias) All outcomes	High risk	Cohort follow-up, 52% to 54% follow-up, loss to follow-up not reported for mailed control group.
Selective reporting (reporting bias)	Low risk	Outcomes presented as prespecified in Methods section.
Other bias	Low risk	No other bias identified.

North Coast QFL 1983

Methods	<p>Country: Australia.</p> <p>Objective: to lower prevalence of smoking.</p> <p>Study sites: Lismore, Coffs Harbour and Tamworth, New South Wales.</p> <p>Programme name: North Coast Quit for Life Programme as a part of North Coast Healthy Lifestyle Programme.</p> <p>Design: quasi-experimental, 2 intervention towns: Lismore (mass media and community programmes); Coffs Harbour (mass media programme alone); Tamworth (control town). Only Coffs Harbour and Tamworth included in our analysis.</p> <p>Analysis: multiple logistic regression, χ^2, with individual as the unit of analysis. Smoking behaviour was assessed in cross-sectional surveys of random samples at baseline 3 yrs.</p> <p>No power estimates.</p>
Participants	<p>Population of study sites: Lismore 22,083, Coffs Harbour 12,197, Tamworth 27,280.</p> <p>Age: 18+</p> <p>Sex: M & F.</p> <p>Ethnicity: White.</p>
Interventions	<p>Theoretical basis: communication theory and social marketing.</p> <p>Year started: 1978.</p> <p>Duration: 2 yrs.</p> <p>Formative research: focus groups, spot surveys.</p> <p>Components:</p> <p>(i) newspaper (Lismore: 1 paid local daily; Coffs Harbour: 1 paid local tri-weekly newspaper and weekly free paper);</p> <p>(ii) radio (Lismore: a local station; Coffs Harbour: a relay station)</p> <p>(iii) TV (Lismore and Coffs Harbour a shared station)</p> <p>(iv) stickers, posters, T-shirts, balloons, and self-help quit kits. First part of mass media intervention was part of 9-week healthy lifestyle campaign and focused on general awareness. Second part was providing information, 3rd part was aimed to create 'a positive effect'. Parts 2 and 3 lasted 31 weeks. Ads in media were paid, with equal time also donated free by stations. Other media included editorial space, features, radio interviews, TV appearances, weekly programmes, retail ads and pictorial spreads. All ads were professionally created, entertaining and controversial; (see Notes).</p> <p>The community intervention (in Lismore, not included in this analysis) included quit kits handed out by doctors, quit fact sheets, quitter tips packs, a quitline telephone message, a variety of smoking cessation groups, and public events such as fun runs.</p> <p>We have not included the Lismore community intervention in this review, but it is covered fully in review by Secker-Walker 2002</p>
Outcomes	<p>Smoking prevalence.</p> <p>Definition: smoker - no definition given.</p> <p>Questionnaire: in-person interview at a central screening centre or at home.</p> <p>Biochemical confirmation of abstinence: plasma thiocyanate in 2nd and 3rd yr on a randomly selected 5% sub-sample.</p>
Notes	<p>All printed ads were withdrawn 4 m after the start of campaign (Oct 1979) for 15 weeks because of complaints to the Media Council of Australia by 3 major tobacco companies. National publicity about the suspended ads reached the control town, and may have contaminated the comparison.</p> <p>Intermediate measures: attitudes to smoking (6 questions), knowledge of the effects of smoking (6 questions), smoking behaviour (4 questions), influence in decision to quit and techniques of quitting by those quitting smoking were assessed. Knowledge and attitudes follow-up data provided only in the graphical form without description and numbers.</p>

Risk of bias

North Coast QFL 1983 (Continued)

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quasi-experimental, no randomisation attempted, intervention and control sites chosen due to practical reasons.
Allocation concealment (selection bias)	High risk	Quasi-experimental, no randomisation attempted.
Blinding of participants and personnel (performance bias) All outcomes	High risk	No blinding due to the nature of the intervention.
Blinding of outcome assessment (detection bias) All outcomes	High risk	Self-reported smoking behaviour, interview carried out by trained interviewer at a central screening centre; only 5% subsample biochemical validation.
Incomplete outcome data (attrition bias) All outcomes	High risk	Cross-sectional surveys, no cohort follow-up, response rates 71% to 74%.
Selective reporting (reporting bias)	Low risk	Outcomes presented as prespecified in Methods section.
Other bias	Low risk	No other bias identified.

Stanford 3 City 1977

Methods	<p>Country: USA.</p> <p>Objective: to increase knowledge of the risk factors for cardiovascular disease and change behaviour by decreasing smoking, improving diet, weight, physical activity and blood pressure.</p> <p>Study sites: Watsonville, Gilroy and Tracy, California.</p> <p>Programme name: Stanford 3-City Project.</p> <p>Design: quasi-experimental. 2 intervention towns: Watsonville (mass media for the whole population + counselling for high-risk individuals); Gilroy (mass media programme alone); Tracy as comparison town. High-risk subjects were identified in each town and in Watsonville were randomly assigned to face-to-face counselling or no counselling. In Watsonville another sample of community members excluding the group receiving face-to-face counselling was created (= Watsonville-reconstituted). Gilroy, Watsonville-reconstituted and Tracy were included in the analysis. Within the high-risk subjects analysis included Watsonville randomised control group, Gilroy and Tracy high-risk participants.</p> <p>Analysis: multiple logistic function of risk factors for 12-yr event probability, cohort analyses, t-tests, one-sided P values, with individual as the unit of analysis. Smoking behaviour was assessed in cohort surveys at baseline and at yrs 1 and 2. In high-risk group additional survey at yr 3.</p> <p>No power estimates.</p>
Participants	<p>Population of study sites: Watsonville 14,569, Gilroy 12,665, Tracy 14,724.</p> <p>Age: 35 to 59; target population sizes Watsonville 4115, Gilroy 3224, Tracy 4283.</p> <p>High-risk group defined as those in top quartile of risk at baseline.</p> <p>Sex: M & F.</p> <p>Ethnicity: White.</p>
Interventions	<p>Theoretical basis: social marketing, social learning theory and communication theory.</p> <p>Year started: 1972.</p> <p>Duration 3 yrs (3rd yr results for high-risk group only).</p> <p>Components:</p>

Mass media interventions for smoking cessation in adults (Review)

Stanford 3 City 1977 (Continued)

(i) mass media campaigns in English and Spanish, with 3 hrs of TV programmes and 50 TV spots, several hrs of radio programmes and about 100 radio spots, weekly newspaper columns, newspaper and advertisement stories, billboards, printed materials sent via direct mail to participants, posters in buses, stores and worksites. Campaigns were conducted in both intervention towns for 9 m in 1973 and 9 m in 1974.

(ii) community intervention: high risk subjects identified in each city, with face-to-face counselling for a random subset in Watsonville.

We have not included the high-risk subjects group from Watsonville community in this review, but it is covered fully in 'Community interventions for reducing smoking in adults' by [Secker-Walker 2002](#)

Outcomes	Cigarette consumption, smoking prevalence within high-risk group. Both reduction and cessation were study outcomes. No definitions given, but daily consumption of cigarettes, pipe and cigar smoking recorded. Questionnaire: in-person interview at survey centres in each community. Biochemical confirmation of abstinence: plasma thiocyanate.
Notes	Intermediate measures: 25-item behavioural interview concerning participants' knowledge about risk factors (3 questions on smoking). Process measures: media weight.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quasi-experimental, no randomisation, study sites chosen due to practical reasons.
Allocation concealment (selection bias)	High risk	Quasi-experimental, no randomisation.
Blinding of participants and personnel (performance bias) All outcomes	High risk	No blinding due to the nature of the intervention.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	In-person interview at survey centres in each community – surveys of behavioural knowledge and medical examination, not clear if interviewers aware of the intervention in the group; thiocyanate measurement mentioned, but not clear in how many people measured.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	cross-sectional surveys with response rate of 60% (Australia -wide) and cohort follow up with response rate of 73% to 76% at baseline and 63% of original sample at follow up
Selective reporting (reporting bias)	Low risk	Outcomes presented as prespecified in Methods section.
Other bias	Low risk	No other bias identified.

Sydney QFL 1986

Methods	Country: Australia. Objective: To reduce the prevalence of smoking. Study sites: Sydney, Melbourne, rest of Australia. Programme name: Sydney 'Quit. For Life'.
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Sydney QFL 1986 (Continued)

Design: quasi-experimental study, Year 1: Sydney intervention city, Melbourne control city, with rest of Australia as 2nd comparator; additional long-term effectiveness assessed on ITS data 1981 to 1987 for Sydney and Melbourne. Melbourne received intervention from 2nd yr onwards to 1986.
Analysis: normal approximation; P values reported; test of difference in proportions; simplified form of linear regression model, full and parsimonious statistical models fitted to the age-standardized data; individual as the unit of analysis; smoking behaviour assessed in cross-sectional surveys in Sydney, Melbourne and the rest of Australia, and in Sydney and Melbourne in longitudinal cohort surveys.
No power estimates.

Participants	Population of study sites: Sydney 3.25 million; Melbourne, rest of Australia, not stated. Target population: adult inhabitants of Sydney and Melbourne. Age: 14+ (16+ in long-term follow-up). Sex: M & F. Ethnicity: not given.
Interventions	Theoretical basis: none reported. Year started: 1983 (Sydney), 1984 (Melbourne). Duration: 4 yrs. Formative research on message effectiveness among target audience. Components: (i) media-based campaign, with prime-time ads on TV and radio, ads in newspapers and posters in public places. All ads ended with a 'Quitline' 24-hr phone number (message encouraging to quit, information about 'Quit centre in Sydney Hospital' (choice of 6 standard anti-smoking treatments for AUD 5) and a 'Quit Kit' self-help booklet and audiocassette tape); billboards with simple message from TV spots, ads in newspapers included normal large ads and in Sydney a section covering smoking-related events and issues; radio ads with anti-smoking skits by major personalities. The campaign generated substantial news coverage in all mass media, and used strong visual images of the health consequences of smoking. Coverage alternated in 2-week phases between heavy and nothing for 1st 3 m, + follow-up ad campaign of half the intensity after 5 m. (ii) After first year, community components added, e.g. physicians' offices and schools. TV spots during prime or fringe time for approx 4 weeks at the start of each campaign year. Year started: Jun to Nov 1983 (Sydney) - first assessment. According to long-term follow-up study since 1984 the campaigns continued in both Sydney and Melbourne till 1986 with commercials shown each year on prime time TV for 6 to 8 weeks during winter months. Duration: 6 months – first evaluation; 6 to 8 weeks a year for 4 yrs – long-term evaluation.
Outcomes	Smoking prevalence, tobacco consumption. Definitions: smoker – anyone who responded positively to the question 'do you smoke factory-made cigarettes, roll-your-own cigarettes, cigars or a pipe'; quitter – a person smoking at baseline but not smoking at the time of 2nd (1984) survey; reducer – a smoker who at 2nd survey smoked at least 5 cpd fewer than at baseline survey. Questionnaire: in person, at home. Biochemical confirmation of abstinence: saliva cotinine in 2 subsamples. Measured at 1 yr (Sydney vs Melbourne), 2 years (Sydney vs rest of Australia). Further follow-up: every 6 m for 7 yrs (Sydney and Melbourne trends).
Notes	Intermediate measures: health beliefs and social influences assessed at baseline and at long-term follow-up; failed quit attempts assessed in a cohort of smokers in Sydney and Melbourne; information-seeking behaviour of the population; number of calls to quitline, enrolments in 'Quit centre' stop-smoking programmes, number of quit kits sold. Process measures: media weight, awareness/reach, intervention costs.
Risk of bias	
Bias	Authors' judgement Support for judgement

Sydney QFL 1986 *(Continued)*

Random sequence generation (selection bias)	High risk	Quasi-experimental, study sites chosen due to the practical reasons.
Allocation concealment (selection bias)	High risk	Quasi-experimental design did not allow for allocation concealment.
Blinding of participants and personnel (performance bias) All outcomes	High risk	No blinding.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Saliva cotinine in subsamples, self-reported smoking behaviour, in-person interview, not clear if interviewers were aware of the intervention.
Incomplete outcome data (attrition bias) All outcomes	High risk	cohort study - 61% to 63% followed up, cross-sectional surveys response rates 60%.
Selective reporting (reporting bias)	Low risk	Outcomes presented as prespecified in Methods section.
Other bias	Low risk	no other bias identified

ad: advertisement

BRFSS: Behavior Risk Factor Surveillance System

CDC: Centers for Disease Control

CI: confidence interval

CME: continuous medical education

CO: carbon monoxide

cpd: cigarettes per day

CPS: Current Population Surveys

ETS: environmental tobacco smoke

F: female

ITS: interrupted time series

LTCN: local tobacco control network

m: month(s)

M: male

MTS: Massachusetts Tobacco Surveys

NHIS: National Health Interview Survey

OR: odds ratio

PSA: public service announcement

TTM: Trans-Theoretical Model (stages of change)

TV: television

yr: year

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
A Su Salud 1990	Community intervention, multicomponent, smoking and other risk factors; health education, mass media and an intensive programme of individual face-to-face and telephone counselling. Each mass media group received face-to-face contact.
Arizona 1998	Arizona statewide tobacco control program; description of the programme design; no baseline measurement, no control, no smoking-related outcomes.

Study	Reason for exclusion
ASSIST 2003	Demonstration project in 17 states of policy interventions, media interventions and smoking cessation activities. No description of mass media component, effectiveness measured in print coverage, not possible to separate out the effects of the mass media component.
Barber 1990	Australia's media campaign against drug abuse; no non-exposed control group, 1 measurement before and 1 immediately after the campaign.
Boyd 1998	RCT, randomising 14 media markets; targeting African Americans communication campaign utilizing radio and TV advertisements in combination with community outreach encouraging to call Cancer Information Service for smoking cessation information and materials; Outcome was volume of calls rather than changes to smoking behaviour.
Brownson 1996	The Bootheel Heart Health Project; quasi-experimental; smoking as a part of the community programmes and coalition development; mass media (newspaper column) within community programmes, no separate results for mass media component alone.
Chicago I 1989	Mass media cessation series accompanying self-help smoking manual and in some counselling for supported groups of adults at health maintenance organisations or worksites. Surveys immediately after the campaign, 3 months, 1 year, no concurrent nonexposed control group.
Chicago II 1992	Mass media cessation series accompanying self-help smoking manual and group counselling in some participants; no control group without mass media exposure.
Chow 2009	Multicomponent health promotion campaign including posters, street theatre, mimicry, rally and community presentation; not possible to assess mass media (posters) component alone.
Coeur en santé 1999	Coeur en sante St-Henri, Montreal, Canada, mass media component was included in a multicomponent communitywide intervention targeting women. No results for mass media component alone.
COMMIT 1995	Multicomponent community intervention, involved face-to face contact, mass media included news and stories in newspapers, on radio and television, posters and billboards, mailings; not possible to assess effects of mass media separately. Includes a cohort follow-up (Hyland 2006) reporting association between level of exposure to campaign and RR of quitting.
Cummings 1987	Newspaper series and 1 survey after, no control group.
Cummings 1993	Media markets randomised; mass media used to encourage women with young children to call for information on quitting; mass media as a recruiting tool; the smoking intervention was the counselling they received when they called the NCI phone line.
Danaher 1984	Televised smoking cessation programme shown as a part of local news in Los Angeles area, no baseline measurement, registrants to the programme compared with cross-sectional sample, all exposed to the programme
Davidson 1990	Unable to assess as reprint unobtainable.
Donovan 1984	'Give it away for a day' - Australia smoke-free day; mass media, events, competitions and community interventions used for awareness, call to action, encouraging commitment to quit, no control group.
Doxiadis 1985	Nationwide anti-smoking campaign in Greece, mostly TV and radio, tobacco advertising ban; no control group; outcomes measured - aggregated data on tobacco consumption, annual increase.
Dubren 1977	Televised stop smoking clinic; no control group, no baseline measurement.

Study	Reason for exclusion
Dyer 1983	Survey on impact of 'Smokers' Luck' TV programme on smokers' attitudes and behaviour, no control group.
Eiser 1978	National survey on impact of TV programmes 'Dying for a Fag' and 'Licence to Kill' on cigarette smokers' attitudes and behaviour - one before and 2 after the programme, no control group.
Etter 2005	Poster campaign; controlled before-after study, follow-up too short
Etter 2007	Booklet sent; RCT, follow-up too short
EX campaign 2010	Mass media campaign; no non-exposed control group
Frith 1997	Nationwide No Smoking Day - panel survey, no control group, 1 before and 2 after measurements.
GASO 2002	Great American Smokeout; mass media for recruitment; before and after surveys, 2 months follow up only, no control group.
Gredler 1981	National information campaign on smoking in Austria with 'stop now' programme, no control group, 1 survey after the campaign.
Heartbeat Wales 1998	Multicomponent intervention including mass media, self-help materials, stop smoking groups and smoking cessation counselling. Smoking cessation not a reported outcome, only daily smoking and cigarettes per day.
HEBS 1997	Health Education Board for Scotland's anti-smoking campaign involving mass media, phone line and booklet. No control group, 1 measurement of callers to quit line before and 3 after.
Hill 2003	National tobacco campaign, no control group, one baseline measurement.
Hunkeler 1990	Multicomponent community-wide intervention targeted at minorities, including use of the mass media; description of the design of campaign and implementation, no smoking-related results given.
IHHP 2003	Multicomponent community intervention, mass media public education (TV, newspapers, radio) supported several community programmes; not possible to assess effects of mass media separately.
Jason 1988	Televised smoking cessation programme combined with self-help manual, supportive phone calls and group meetings led by community member and psychology graduate student; control group potentially exposed to TV programme.
Laugesen 2000	New Zealand's tobacco control programme involving mass media use, census data 1 before the programme and 2 after the beginning, no control group, country case study.
Le Net 1977	National against tobacco campaign involving mass media, no control group, 1 survey before and 1 after the campaign.
Ledwith 1984	RCT, mass media used as recruitment tool, the intervention was posted leaflet targeted at those recruited.
Leroux 1983	Quit line, smoking kit - a letter explaining the programme, booklet, media clinic broadcast as a part of TV show and radio programme - the format of talk show; comparison group exposed to the media programmes; follow up 3 months.
Lichtenstein 2008	RCT cross-over trial of 1346 households, randomised to self-help video information/no video and telephone counselling/no counselling. Interventions not counted as mass media, since only par-

Study	Reason for exclusion
	icipating homes received videos, and outcomes were cessation rates and imposition of domestic smoking bans.
McAlister 2006	Comprehensive community and media programme in Beaumont/Port Arthur, measuring prevalence compared with other parts of Texas. Cannot separate effects of media from co-interventions.
MHHP 1995	Minnesota Heart Health Programme - comprehensive community intervention to reduce smoking, high cholesterol, high blood pressure and sedentary lifestyles; health education, policy intervention and mass media use. No separate results for the mass media component alone.
Millar 1987	Community-based smoking cessation programme led by self-help booklet as primary quitting aid and complemented by 3-part TV series. Major design problems and confounders - cigarette prices rose sharply in the control city in the 6 months post-intervention, and thus confounded or nullified the effect of the comparison - the quit rates were higher in control city than in experimental city.
Minnesota 2011	Statewide mass media campaign; only 1 measurement point before campaign
Mudde 1995	Multi-component community-wide smoking cessation intervention involving local mass media (newspaper, radio and TV), posters and leaflets, a local quit line, and self-help materials, smoking cessation groups, and individual telephone counselling. Mass media primarily used to recruit to self-help or group support rather than to disseminate tobacco control messages. Control community may have been 'contaminated' by national campaigns and national smoking ban.
Mudde 1999	Mass media-led smoking cessation campaign, no control group, 1 measurement before and 2 after the campaign.
Multicity 1997	Both groups exposed to mass media campaign, designed to promote readiness to quit smoking; active vs passive intervention - community+mass media vs mass media alone (to raise awareness).
New York	Statewide mass media campaign; only 1 measurement point pre-campaign
North Karelia 1998	Comprehensive community-based programme to reduce major cardiovascular risk factors; education and health services, community involvement, mass media, screening, appropriate practical skills training, social support for behaviour change and environmental modification. No separate results for the mass media component alone.
Oregon 1999	Oregon's Tobacco Prevention and Education Program, description of programme design, development and implementation; result concerning aggregate data on tobacco sales in Oregon compared to other states (tobacco boxes taxed before and after tax increase).
Osler 1993	Mix of community and mass media interventions (including smoking cessation programmes). Planned as community-based cardiovascular disease prevention project, but the authors state that 'it almost ended up being pure mass media awareness'. Doubtful design and quality, under-resourced and poorly executed.
Pallonen 1994	RCT, 6 months follow up, not smoking cessation mass media intervention; mass media used for recruitment and identification.
Perkins 1986	Intervention - posters-public places intervention (another review); study does not provide information about cessation or smoking or the change in smoking due to intervention; not possible to assess the effects of the intervention, as counting of butts and visible smokers may be a subjective and naive assessment of efficacy; although the study lasted for 26 weeks, smoking status of the patients was not recorded up to week 12 of the study.
Programa Latino 1994	Programa Latino para Dejar de Fumar; multi-component, including mass media, community-wide smoking cessation intervention for Spanish-speaking Hispanics; 2 pre and 2 post intervention measurements, no control group.

Study	Reason for exclusion
Sansores 2002	No control group, monthly sales of all smoking cessation products before and after marketing a new nicotine patch.
Secker-Walker 2000	Multicomponent community campaign involving mass media use. No separate results for mass media component alone.
Sogaard 1992	Mass media-based health education campaign 'Heart for Life', no control group, post-campaign survey only.
Stanford 5 City 2000	Multicomponent community-wide cardiovascular disease risk factor reduction programme, including smoking prevention and cessation campaign. The intervention was implemented through the use of the media - TV, radio, newspapers and direct face-to-face education in classes, contests and correspondence courses and school based programmes. Not possible to separate effect of mass media.
Stevens 2002	Economic evaluation of mass media-based community smoking cessation intervention aimed at the Turkish community; no control group, before-and-after panel survey in Turkish population.
Sussman 1994	Self-help media-enhanced smoking cessation programme which had been aired in 7 cities in California. Subjects had been randomly assigned to be prompted or not prompted to view the mass media smoking cessation broadcast. 3 months follow up; control group potentially exposed to the programme, no smoking related outcomes.
Sutton 1987	Mass media smoking cessation intervention, the evaluation carried out in the workplace during BBC broadcasting of 'So You Want to Stop Smoking' programme; smokers at the workplaces were shown the 2 series of the programme and encouraged to watch the remaining four parts on TV. Control groups were shown film about political and economic aspects of smoking; no non-exposed control group.
Terry-McElrath 2013	Not specific campaign; no non-exposed control group
TIPS	Randomised field trial comparing standard dose of mass media campaign (national campaign TIPS) and higher dose mass media campaign (additional). Follow up was too short - tobacco related outcomes were assessed on average 55 days after the end of campaign.
TV Finland 1992	National TV smoking programmes in Finland based on North Karelia experience; National TV smoking cessation campaign in 1978, 'Keys to Health' in 1980,82, 84-85, 'Quit Smoking 86'; North Karelia (community interventions) vs the rest of Finland or one city/county of Finland with no community activities; no non-exposed control group.
Valois 1996	Community cable TV smoking cessation programme; time series design to assess effectiveness, 1 measurement before and 3 after, no control group.
Van Assema 1994	Multicomponent community project; community agencies and associations, local government, public events, newsprint, posters, pamphlets, mailings, stop smoking self-help manuals and smoking cessation groups. No separate results for mass media component alone.
Webb 2009	Booklet vs booklet RCT; no non-exposed control group
Wewers 1991	Mass media smoking cessation campaign; no control group, first survey after the campaign.
Wheeler 1988	Community-wide smoking cessation campaign using self-help manual and TV coverage. No control group, first survey after campaign.

DATA AND ANALYSES

Comparison 1. Mass media versus no mass media

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Response and retention rates			Other data	No numeric data
2 Intermediate measures			Other data	No numeric data
3 Primary measures of smoking behaviour			Other data	No numeric data
4 Study summary by type of outcome			Other data	No numeric data
5 Baseline differences and possible confounding			Other data	No numeric data

Analysis 1.1. Comparison 1 Mass media versus no mass media, Outcome 1 Response and retention rates.

Response and retention rates			
Study	Design	Intervention	Control
California TCP 2003	Nested cross-sectional	1990-1 75.1% ¹ (CA only) CTS: 71.3 - 99.4% (CA only) NHIS 79.5 - 87.8% across all USA BRFSS: 77% - 84% CPS: 87.9%	NHIS, BRFSS and CPS rates apply.
CORIS 1997	Nested cross-sectional	69.5% at baseline, 67.5% at resurvey Cohort identified retrospectively at 2nd survey, i.e. 4087 (56.3%) of those originally surveyed. In men 46.4% of cohort smoked vs 50% of drop-outs; in women 15.4% of cohort smoked vs 21.4% of drop-outs. Non-cohort (i.e 1 survey only) were younger, less educated and higher smoking, but differences applied equally across all groups.	64% at baseline, 63% at resurvey
	Nested cohort		Cohort control not reported separately
Jenkins 1997	Nested cross-sectional	Pretest: 84%, post-test: 94%	Pretest: 82%, post-test: 88%
Massachusetts 2003	Nested cross-sectional	Median (1995): 60.4%, median (1999): 42.7% ⁶	Median (1995): 68.4%, median (1999): 55.2%
McAlister 2004	Nested cross-sectional	Baseline survey 9407, 7m follow-up 8974; response rate approximately 60%.	Not reported separately
	Nested cohort	Cohort identified retrospectively at 2nd survey, i.e. 622 (58%) of the 1069 baseline daily smokers. Conditions not reported separately. 835 valid phone numbers at follow-up, giving retention rate of 74.5%.	Not reported separately
McPhee 1995	Nested cross-sectional	Pretest: 81%, post-test: 82%	Pretest: 85%, post-test: 88%
McVey 2000	Nested cohort	Smokers: 6m: 73%, 18m: 70% Ex-smokers: 6m: 76%, 18m: 75%	Smokers: 6m: 74%, 18m: 66% Ex-smokers: 6m: 80%, 18m: 76%
Mogielnicki 1986	Randomized cohort	Mail: Yr2 follow-up: 17% Clinic: Yr2 follow-up: 54%	Mail: Yr2 follow-up: 15% Clinic: Yr2 follow-up: 52%
North Coast QFL 1983	Nested cross-sectional	Baseline: 71% Yr 2: 73% Yr 3: 73%	Baseline: 72% Yr 2: 74% Yr 3: 74%
	Nested cohort	Not reported here	Not reported here
Stanford 3 City 1977	Nested cross-sectional (cohort + non-cohort)	Gilroy 116 at baseline.	Tracy 115 at baseline.

Study	Design	Response and retention rates	
		Intervention	Control
	Nested cohort	Non-cohort had higher baseline % rates of smoking (74.2/62.4) and more cpd (20/13.8) than cohort.	Non-cohort had higher baseline % rates of smoking (78/52.8) and more cpd (17.4/14) than cohort.
		73.2% at 2yr follow-up	72.2% at 2yr follow up
Sydney QFL 1986	Nested cross-sectional	Sydney: 66% Melbourne: 67.9%	Australia-wide: 60%
	Nested cohort	Sydney: 76% Melbourne: 73%	

Analysis 1.2. Comparison 1 Mass media versus no mass media, Outcome 2 Intermediate measures.

Study	Intermediate measures	
	Intermediate measure	Process measures
California TCP 2003	<p>Between 1996 and 1999 slight increases in agreements that smoking causes cancer (82.2% and 83.3%) and that passive smoking harms children's health (93.2% and 94%).</p> <p>Between 1992 and 2002 increases in agreement that passive smoking causes cancer in nonsmokers (1992: 62.4%, 1996: 66.8%, 1999: 68.9%, 2002: 72.1%) and that smoking harms children's health (1992: 85.5%, 1996: 87.7%, 1999: 90.1%, 2002: 90.9%).</p> <p>In 2008, 67.2% of daily smokers, 80.2% of non-daily smokers, and 85.8% of nonsmokers perceived secondhand smoke (SHS) as a cause of cancer and 88.6% of daily smokers, 94.1% of non-daily smokers and 94.7% of non-smokers believed that SHS can harm the health of children and babies.</p> <p>Between 1990 and 1991 increase in % of smokers thinking about quitting (from 38.6 to 42%; NS); health-enhancing attitude score decreased (from 68.4% to 66.3%; SS).</p> <p>Further increase in % of smokers thinking about quitting between 1994 and 2005, in the next 30 days (1994: 30.9, 2000:37.8%, 2005: 43.9%) and in the next 6 months (1994: 65.6%, 2000: 74%, 2005: 75%).</p> <p>Between 1992 and 2002 increases in: % of indoor workers reporting a smokefree work site (1990: 35%, 1992: 46.3%, 1993: 65%, 1996: 90.5%, 1999: 93.4%, 2002: 95.4%, 2005: 94.5%, 2008: 96.4%).</p> <p>In 2008, 95.2% of smokers and 96.6% of nonsmokers report having a completely smoke-free workplace.</p> <p>Between 1992 and 2008 increase in % of homes with smoking ban (1992: 48.1, 1993: 50.9%, 1996: 64.5%, 1999: 72.8%, 2002: 76.9%, 2005: 78.4%, 2008: 80.8%).</p> <p>Between 1992 and 2008 increase in % of smokers with a total home ban on smoking (1992: 19.4 ± 1.6%, 2008: 59.3 ± 2.6%; increase of 204.9%).</p> <p>Between 1990 and 2008 decrease in % of nonsmokers exposed to ETS at work (1990: 29%, 1993: 22.4%, 1996: 11.8%, 1999: 15.6%, 2002: 12.0%, 2005: 13.9%, 2008: 13.5%).</p> <p>Increases in: support for further increase in tax on tobacco (1992: 74%, 1993: 78%; 2008: 78%), support for ban on tobacco advertising (1990: 52%, 1996: 65% [read from the graph]), support for ban on tobacco sponsorships (1998: 56%, 2000: 60%), % of adults preferring non-smoking bars (1996: 75%, 2000: 81%), support for banning smoking outside the entrance of buildings (2002: 62.8%, 2008: 72.1%) and in restaurant outdoor patios (2002: 62.4%, 2008: 75%), outdoor public places (2002: 52.3%, 2008: 60.4%), Indian casinos (2002: 59.9%, 2008: 66.5%), inside cars when children are in them (2005: 92.3%, 2008: 95.2%).</p> <p>Support for smoking restrictions in public places in at least 4 out of 6 venues significantly higher in CA than the rest of USA (1992/3: 58.5% vs 46.5%; 1995/6: 70.2% vs 51.5%; 1998/9: 75.8% vs 57.3%).</p>	<p>Systematic monitoring of the campaign and independent evaluations of the programme.</p> <p>Media weight: 1990/1: 50+ TV spots, 50 radio spots (69 radio stations), 20 outdoor ads (775 outdoor venues), 40 newspaper ads (130 newspapers); 1992/3: 40 spots (20 TV, 12 radio, 8 in outdoor locations), 44% focused on reducing ETS, 34% on countering pro-tobacco influences, 20% smoking cessation and 2% on reducing youth access. 1990/4: local health departments conducted 10,000+ multi-session programmes focusing on prevention (61%), cessation (37%) and ETS (2%).</p> <p>July 1995 - Dec 1996: 19 ads (11 TV, 4 radio, 4 outdoor); 1997 - 1998: 40 general audience ads for distribution (20 TV, 12 radio, 8 outdoor); July 1998 - Aug 1999: 50 general audience anti-tobacco ads (22 TV, 13 radio, 15 print - mostly billboards).</p> <p>Awareness/reach: 1990/1: unaided awareness in adult smokers 38.4% (similar for most ethnic groups), unaided and aided awareness almost 78.7%. In 1992 > 50% of the adult respondents and > 80% of the adolescent respondents recalled having seen or heard anti-tobacco messages. In 1992 recall of anti-tobacco campaign highest among the youngest age group (18 - 24: M 75%, W 70%, 25 - 44: M 65%, W 60%, 45+: M 58%, W 50% [read from the graph]).</p> <p>In 1996, 67% of adults reported seeing antismoking message on TV, 44% hearing on radio, 41% seeing antismoking billboard. In 1998 80% of adults were exposed to tobacco control programme through two or more components.</p> <p>In 1999 vs 1996 more respondents reported being exposed to lots of tobacco messages on TV, radio, billboards. 91% of adults reported seeing at least one anti-tobacco ad in 1996, 1998 and 2000. Between 1996 and 2002 the % of smokers reporting seeing a lot of anti-smoking ads on TV in last month increased, but then decreased between 2002 and 2008 (18 - 24 yrs: 1996: 16.1%, 1999: 29.9%, 2002: 37.9%, 2005: 21.2%, 2008: 20.8%; 25 - 40 yrs: 1996: 13%, 1999: 20.1%, 2002: 23.2%, 2005: 15.7%, 2008: 10.8%; 41+ yrs: 1996: 10.3%, 1999: 14.9%, 2002: 13.6%, 2005: 8.9%, 2008: 5.6%).</p> <p>In 2011 in CSC 28% to 61% recalled anti-tobacco commercials.</p> <p>Dose-response: 1990 - 1996 smokers reporting recall of media spots more likely to make a quit attempt in the last year than those who did not. The more channels recalled between 1990 and 1996 the higher increase in cessation was observed. 1996 - 2000 in counties with the highest multicomponent exposure rates, there were greatest reductions in adult smoking prevalence, workplace no-smoking policy violations and the largest increases in home smoking bans.</p> <p>2011 recall of any of anti-tobacco spots was not related to quitting 1 yr later, recall of one specific spot ("Stages") was associated with higher quit attempts rate and quitting for more than 1 month, after 1 yr.</p>

Study	Intermediate measures	
	Intermediate measure	Process measures
	1998 survey showed that multicomponent exposure was significantly associated with reductions in smoking prevalence, increases in home smoking bans and reductions in perceived violations of workplace no-smoking rules ($P < 0.05$).	<p>Maintenance: The campaign was established as Proposition 99, as a constitutional amendment and mandated the conduct of a mass media campaign. The campaign has been running since 1990.</p> <p>Intervention costs: CA TCP mass media campaign funding/ total expenditures targeted at tobacco use in millions of US dollars: 1989/90: 14.3/85.8; 1990/1: 14.3/132.0; 1991/2: 16.0/55.9; 1992/3: 15.4/84.0; 1993/4: 12.9/61.1; 1994/5: 12.2/56.3; 1995/6: 6.6/41.8; 1999-2000: 19.6/60.8; 2000/1: 45.3/88.2; 2001/2: 45.3/108.1; 2002/3 21.1/61.7; 2003/4: 16.8/61.8; 2004/5: 15.7/56.8; 2005/6: 15.7/58.5; 2006/7: 20/65; 2007/8: 15.7/56.6; 2008/9: 15.7/56.5. Total expenditures for mass media campaign and for the programme between 1989 and 1996 were in millions of US dollars: 91.7 and 516.9. Average annual expenditure was USD 3.35 per capita per year, but from mid-1993 to mid-1996 when funding was decreased annual expenditure was USD 2.08 per capita per year. The CTCP media funding was USD 1.33 per capita in 2001/2 and it decreased from 2002/3 (USD 0.6 per capita) to 2007/8 and 2008/9 (USD 0.43 per capita). The analysis on the basis of per capita consumption of cigarettes and average per capita media expenditures gave estimates of a fall of 3.9 packs per capita per year for each per capita USD spent on the media campaign.</p>
CORIS 1997	At baseline, knowledge scores higher in Swellenden than in Riversdale (both cross-sectional and cohort surveys; no statistical comparisons given); at 4 yrs more increase in women in Swellenden (both cross-sectional and cohort surveys; in cohort survey net change statistically significant); at 12 yrs increase in both communities and no difference. Attitudes were assessed at baseline, but the results were not reported.	<p>Participation and reach of activities recorded in mass media and community intervention town (not included in this analysis).</p> <p>Media weight: Limited data. 1st yr: 6 different billboards, 6 posters, 8 mailings, frequent news items, health messages on electricity accounts, 1 special supplement in local newspaper. 2nd and 3rd yr frequency of billboards, posters and mailings about half of the initial rate, but news items frequent and annual special supplement in a local newspaper was added.</p> <p>Awareness/reach: no evidence found.</p> <p>Dose-response: no evidence found.</p> <p>Maintenance: after 4 yrs of active intervention a maintenance programme was run by community. Intervention costs: per capita costs given (USD 5 over 4 yrs in intervention community).</p>
Jenkins 1997	At baseline no differences in motivation to quit and self efficacy (SF/Houston: 29%/23%; 29%/25%). At follow-up significant increase in motivation in both communities, but no difference (SF/Houston: 45%/44%), no significant change in self efficacy (SF/Houston: 33%/26%).	<p>A 15-month uncontrolled pilot anti-tobacco campaign.</p> <p>Media weight: newspaper articles - 465,000 print media exposures; 15,000+ copies of brochure, 4600 copies of self-help quit kit distributed; billboard and newspaper ads - 2.8 million exposures, paid TV ads - 100 mins of air time. Short anti-tobacco presentations at 25 community events, 68 Vietnamese physicians took part in smoking cessation course and 400 Vietnamese students participated in anti-tobacco activities.</p> <p>Awareness/reach: Participants were asked if they had ever read, seen or attended any of five elements of media intervention. Recall of each was significantly greater in intervention than in control community ($P < 0.05$), except for newspaper articles. In both communities smokers were more likely than non-smokers to recall the elements of the campaign.</p> <p>Dose-response: no evidence found.</p> <p>Maintenance: no evidence found.</p> <p>Intervention costs: no evidence found.</p>
Massachusetts 2003	1993 - 2000: the majority of non-smokers believed that second-hand smoke (SHS) can harm children (96%) and can cause lung cancer (89%); increase in % of smokers believing that environmental tobacco smoke (ETS) can harm their children (1993: 78%, 1999: 91%,	<p>Messages were developed through formative research including focus groups. Systematic evaluation of the programme.</p> <p>Media weight: Oct 1993 - Dec 1996: 66 spots aired; 35 TV ads (14,901 total gross rating points [GRP]), 27 ra-</p>

Study	Intermediate measures	Process measures
	Intermediate measure	
	<p>2000: 93%) and can cause cancer (1993: 58%, 1999: 72%, 2000: 74%);</p> <p>1993 - 1995: decrease in: % believing that ETS is harmful (1993: 90%, 1995: 84%), support for ban on support of sports and cultural events by tobacco companies (1993: 59%, 1995: 53%, $P < 0.05$); increase in: support for further tobacco tax increase with funds devoted to tobacco control (1993: 78%, 1995: 81%), support for ban on vending machines (1993: 54%, 1995: 64%, $P < 0.05$).</p> <p>1993 - 2000: Increase of % of workers reporting a smokefree work site (1993: 53%, 1995: 65%, $P < 0.05$; 2000: 75%, 2001: 82.2%), % of homes with smoking ban (1993: 41%, 1995: 51%, $P < 0.05$; 2001: 71.2%).</p> <p>2007 - 94.5% believe ETS is harmful.</p> <p>Decrease in: ETS exposure at work (1993: 44%, 2000: 29%), at home (1993: 28%, 2000: 18%) and in restaurants (1995: 64%, 2000: 39%, 2002: 37%), mean hours of ETS exposure during prior week at work (1993: 4.2, 1995: 2.3, $P < 0.05$, 1997: 2.2, 2001: 1.4), and at home (1993: 4.7, 2000: 3.3). Increase in: % of population covered by smoking restrictions in restaurants (1995: 26%, 2000: 69%, 2001: 78%); % of population living in a town with some form of smoking restrictions in public places (1993: 22%, 2000: 78%, 2001: 85%); % of smokers reporting that fewer than half their friends and relatives smoke (1993: 40.8%, 2000: 46.9%; P for trend = 0.03); most non-smokers reported so both in 1993 and 2000 (1993: 90.1, 2000: 89.9).</p> <p>1995-2000 significant increase in: support for complete ban on smoking in restaurants (1995: 42%, 2000: 51%), public buildings (1995: 46%, 2000: 58%), at indoor sporting events (1995: 52%, 2000: 67%), in shopping malls (1995: 53%, 2000: 67%), but not at outdoor sporting event (1995: 15%, 2000: 19%).</p> <p>1993 - 1999: decline in the proportion of people who allow visitors to smoke in their homes (1993: 57%, 1999: 37%, $P < 0.01$), increase in the proportion of people who asked a colleague not to smoke increased (1993: 29%, 1999: 36%).</p> <p>2008 - 80.7% voluntary tobacco-free homes (vs 81.5% in 2007).</p> <p>2009- 57% of schools with comprehensive smoking policies</p> <p>2014 - based BRFSS exposure for ETS decreased to 10% (vs 32% in 2002); only 16.4% of houses allow smoking. and exposure to ETS >1 hr/last wk decreased to 11% (vs 32% in 2002; 14.5% in 2008).</p> <p>Increase in support smoking ban in all personal spaces - of people living in smoke-free houses 87% and of those living in non smoke-free houses 52%.</p>	<p>dio spots (13,644 total GRP) on smoking cessation in adults; 38 TV (17,800 total GRP) and 22 radio (13,950 total GRP) ads targeted youth; 6 TV (17,727 total GRP) and 2 radio spots (6,308 total GRP) on ETS.</p> <p>Awareness/reach: 88% respondents saw any TV ads, among quitters - 97%. On average 4.48 ads recognised. In 1995, 65% of the adult population were aware of the statewide anti-tobacco campaign, and 76% recognised the tag line of the media campaign "It's time we made smoking history". Around 89% of adult smokers reported having heard, read or seen information about quitting smoking within the past year.</p> <p>Dose-response: no evidence found.</p> <p>Maintenance: The campaign is ongoing.</p> <p>Intervention costs: On average USD13 million per year spent on anti-tobacco advertising. About 48% expenditure (up to Dec 1996) spent on TV time (much prime time viewing hours). MTCP activities expenditures: 1st yr - USD 43 million, 3rd yr - USD 35 million. Mean per capita cost for media campaign was USD 2.42.</p> <p>The analysis on the basis of per capita consumption of cigarettes and average per capita media expenditures gave estimates of a fall of 0.5 packs per capita per yr for each per capita dollar spent on the media campaign.</p>
McAlister 2004	<p>Knowledge, attitudes, beliefs, intentions, brand preferences were assessed at baseline. Process of change variables were measured by rating by responders how much they agree or disagree (1 = strongly disagree, 5 = strongly agree) with the statements regarding attitudes to smoking and occurrence of behaviours associated with smoking cessation. At follow-up, mean level of agreement was significantly higher among those who reported daily smoking cessation compared to those who maintained daily smoking with regard to having support for quitting and behaviours associated with smoking cessation and dealing with tension. Participants still smoking at follow-up were significantly more likely to agree with the statements about attitudes and ability to quit. There are no follow-up results in comparison with control group.</p>	<p>In message development community forums, focus groups and pre-testing were used. No information regarding ongoing monitoring of media campaign was provided.</p> <p>Media weight: no evidence found.</p> <p>Awareness/reach: At follow-up correlations between media exposures and process variables were calculated for all groups. No separate result for mass media were given.</p> <p>Dose-response: Not given for mass media campaigns without community programmes separately.</p> <p>Maintenance: no evidence found.</p> <p>Intervention costs: per capita media spending reported, high level and low level media represented about USD 0.25 versus USD 1.00 per capita for media spending during the year of the campaign.</p>
McPhee 1995	<p>Motivation to quit and self efficacy significantly more common in Santa Clara (SC) at baseline (SC/Houston: 36%/23%; 34%/ 25%). At follow-up motivation to quit increased significantly in both communities, but did not differ (SC/Houston: 44%/ 44%), self efficacy did not change significantly and did not differ at follow-up (SC/Houston: 32%/ 26%). 'Any household member smokes' responses similar at baseline (SC/Houston: 31%/29%) fell significantly in both communities (SC/</p>	<p>Media weight: newspaper articles - 562,000 print media exposures, videotape copies distributed to 60+ Vietnamese doctors' offices and 20 community agencies in SC; nearly 42,000 brochures at 500+ location in SC, nearly 6000 self-help quit kit copies at 250+ locations; 1140 signs with adhesive backings saying "Please do not smoke" in Vietnamese distributed; 50 copies of 3 billboards posted each month and printed in newspapers and magazines (8,000,000 print media</p>

Study	Intermediate measures	
	Intermediate measure	Process measures
	<p>Houston: 26%/24%). 'No friend smokes' responses not different at baseline (SC/Houston: 4%/3%) increased significantly in both communities (SC/Houston: 15%/13%). 'All or most friends smoke' responses similar at baseline (SC/Houston: 43%/46%) increased in Houston (SC/H: 44%/51%). Never-smokers or former smokers advising family or friends to quit smoking increased from baseline in both communities (SC vs Houston: from 51% to 62% ($P < 0.05$) vs from 34% to 66% ($P < 0.05$)). Current or former smokers being advised to quit by family or friends increased from baseline in both communities (SC vs Houston: from 53% to 63% ($P < 0.05$) vs from 51% to 62% ($P < 0.05$)).</p>	<p>exposures). Paid TV ads -13,000 secs of air time; short anti-tobacco presentations at 30 community events. CME courses on smoking cessation - 68 Vietnamese physicians.</p> <p>Awareness/reach: Participants were asked if they had ever read article or seen advertisement in Vietnamese language newspaper or seen television programme or billboard in Vietnamese or heard a speech at a Vietnamese community meeting. Significantly more respondents from SC reported exposure to anti-smoking activities in Vietnamese language (except for newspaper articles and public speaking). Smokers and non-smokers in SC recalled significantly more intervention elements (SC vs Houston: out of a possible 5: 3.0 vs 1.6, $P < 0.01$ and 2.8 vs 1.4, $P < 0.01$). In SC significantly more physicians reported using antismoking brochures in Vietnamese, providing self-help quit kits and referring patients to smoking cessation programmes (SC vs Houston: 86.4% vs 32.5%, $P = 0.001$; 66.7% vs 43.2%, $P = 0.03$; 35.9% vs 13.5%, $P = 0.02$). Quality of health education materials assessed: at follow-up 96.4% of physicians reported they were helpful.</p> <p>Dose-response: no evidence found.</p> <p>Maintenance: no evidence found.</p> <p>Intervention costs: no evidence found.</p>
McVey 2000	Smoking and health-related attitudes assessed at baseline, no follow-up data given.	<p>Qualitative pilot research studies using focus groups and in-depth interviews with smokers and ex-smokers were conducted before and during the campaign.</p> <p>Media weight: It was estimated that over the course of the campaign in the double-weight regions each viewer could see at least 20 screenings, and in single-weight regions about 15.</p> <p>Awareness/reach: no evidence found.</p> <p>Dose-response: nearly 20,000 calls to the quit line during the campaign. No evidence of an effect of intensity of ads measured at 6 month follow-up found.</p> <p>Maintenance: After study completion the TV advertisements were shown nationally in all TV regions in England.</p> <p>Intervention costs: evidence not found.</p>
Mogielnicki 1986	Attitudes and beliefs regarding cigarette smoking were assessed on enrolment on a 5-point rating scale (1 = disagree strongly, 5 = agree strongly). No separate results for 2nd yr follow-up (mass media) given.	<p>Surveys, interviews, copy tests among patients fulfilling study inclusion criteria but not included in the final study group.</p> <p>Media weight: One 60-sec main commercial and 2 x 30-sec variants used. A series of 3-week 'flights'; main spot on TV was broadcast 40 times, and variants 106 times, radio spot - 90 times. Each flight lasted 2 - 3 weeks.</p> <p>Awareness/reach: Participants were asked about the recall of advertising campaign, clinic participants in media group (White River Jct): 61% did and 39% did not recall the advertising campaign at 6 month follow-up.</p> <p>Dose-response: Among those who recalled, 43.5% were abstinent at 6 months, while among those who did not 26.7% abstinent.</p> <p>Maintenance: no evidence found.</p> <p>Intervention costs: total costs of commercials development and production: USD 7480, broadcast time cost: USD15,150.</p>
North Coast QFL 1983	Attitudes to smoking and knowledge of the effects of smoking assessed in a questionnaire (6 questions each). No significant differences were found. Influences in decision to quit smoking reported - the most common: health concerns (Coffs Harbour/Tamworth: 53%/ 59%), the least common: social pressure and media advertisement (Coffs Harbour/Tamworth: 1%/1%, 2%/1%), other were friends/family (Coffs Harbour/Tamworth: 15%/ 13%) and doctor's advice (Coffs Harbour/Tamworth: 7%/5%). Technique of quitting: most common - 'cold turkey' (87% in both towns), quitting with help was rare (Coffs Harbour: self-help kits 2%, group programme 1%, hypnosis 2%).	<p>Focus groups and spot surveys were used to assess the effectiveness of the intervention techniques used.</p> <p>Media weight: Information collected only on community programme exposure.</p> <p>Awareness/reach: no evidence found.</p> <p>Dose-response: no evidence found.</p> <p>Maintenance: no evidence found.</p> <p>Intervention costs: no evidence found.</p>

Study	Intermediate measures	
	Intermediate measure	Process measures
Stanford 3 City 1977	25-item behavioural interview on participants' knowledge about risk factors (diet, weight, exercise and smoking - 3 items). Significant increases in knowledge scores in intervention cities compared to control city after 2 yrs.	Mass media campaign was monitored and revised; instructional content, development, pretesting, application and reformulation co-ordinated by study staff. Media weight: limited data; TV programming - 3 hours, 50 TV spots, 100 radio spots, several hours of radio programming, weekly newspaper columns, no details about newspaper and ads stories, billboards, printed materials sent via direct mail to participants, posters in buses, stores and work sites. Awareness/reach: no evidence found. Dose-response: increases in risk factor knowledge related to increases in intervention intensity, even in Watsonville-reconstituted group (mass media only, but a group in community received intensive face-to-face counselling) the gains were bigger than in Gilroy (mass media only group) and in both intervention communities the gains were bigger than in Tracy. Maintenance: After intensive 2 yrs, 1 yr reduced level campaign. Intervention costs: no evidence found.
Sydney QFL 1986	Additional random samples of Sydney and Melbourne smoker populations surveyed in 1983 and 1986 (Sydney/Melbourne: 1983: 271/217; 1986: 557/ 550). Health beliefs and social influences increased between 1983 and 1986 (Sydney/Melbourne: 40+ years old: males 10% to 29%/21% to 29%; females 12% to 27%/22% to 32%; < 40: males 34% to 53%/30% to 43%, females 30% to 44%/31% to 41%). Information-seeking behaviour was measured as the number of calls to quitline and the number of enrolments to quit centre - see dose-response.	Formative research on messages' effectiveness among target audience. Media weight: 1983: 389 primetime ads spots (3 commercials used) - the intensity alternated in 2-wk phases: between heavy and nothing for 1st 3 months, follow-up ad campaign of half the intensity after 5 months. After 1st year spots during prime or fringe time for approx 4 wks at the start of the campaign yr - each yr nearly 40 spots/wk. Awareness/reach: During 1st yr each month 750 people in Sydney and 200 in Melbourne interviewed on recall of campaign messages and response to the question on likelihood of giving up smoking in the next 12 months. The recall rates for the commercial most frequently shown were 87% in smokers, 82% in non-smokers and 85% in ex-smokers, the second in the frequency: 73%, 69% and 67% respectively. The third commercial recall rates were: smokers: 39%, non-smokers: 31%, ex-smokers: 33%. During campaign more smokers in Sydney indicated they were likely to quit smoking, especially after 4 months (difference: 18.6%); the difference disappeared by the end of the campaign. Long-term assessment: TV ads recall measured each yr in separate random samples of the population of at least 1000 persons higher in Sydney (Sydney/Melbourne: 1984: males: 72%/70%, females: 80%/67%; 1986: males: 92%/68, females: 94%/67%). Dose-response: number of calls to quitline was measured as a direct relationship to the number of TV spots aired (presented on the graph); peak response - 11,000 calls in wk 8; 50,000+ calls to the quitline in the 1st 3 months. 'Quit centre' stop smoking programmes enrolments: almost 3000 in 1983 (previous yr 500); in wk 8 with peak quitline calls number - 352. 19,196 quit kits sold. Maintenance: Since 1984 the campaigns continued in both Sydney and Melbourne till 1986, ads shown on primetime TV for 6 - 8 weeks during winter months. Intervention costs: The budget for the campaign given (AUD 620,000), most of which was used for purchase of newspaper space and radio and TV time (AUD 500,000).

Analysis 1.3. Comparison 1 Mass media versus no mass media, Outcome 3 Primary measures of smoking behaviour.

Study	Study population	Primary measures of smoking behaviour		
		Smoking prevalence	Tobacco consumption	Other outcomes
California TCP 2003	Selection: population-based surveys conducted nationally and in California (CA):	Final data (From 1990 programme start to 2008): All surveys (CTS, CPS and BR-FSS pooled analysis years 1990	Final data (1970 - 2008), per capita taxable sales: 1970 per capita sales similar in CA and rest of US.	Quit ratio, defined as % of ever-smokers (current and former) who were former smokers in a given year, accelerat-

Primary measures of smoking behaviour

Study	Study population	Smoking prevalence	Tobacco consumption	Other outcomes
	<p>National Health Interview Surveys (NHIS) 1978 - 1994: household survey of a stratified, multistage, probability sample of the US population administered to all adults 18+ yrs; Behavioral Risk Factor Surveillance System (BRFSS) 1984 - 1994: state surveillance of behavioural risk factors among adults, data collected through random digit dial telephone interviews (with multistage cluster sampling method); with California Adult Tobacco Survey from 1994, data up to 2008.</p> <p>Current Population Surveys (CPS) 1985, 1989, 1992/3 - 1996: national survey of the US household population 15+ yrs, interviews in person; data up to 2008</p> <p>California Tobacco Survey 1990-2008</p> <p>N of participants: NHIS 1978 - 1994, response rate 79.5% to 87.8%; CA, rest of US: from 1112 to 5747, from 9205 to 39,203; BRFSS 1984 - 1994, response rate from 77% to 84%; from 1081 to 3959; with CATS from 1994 over 10,000 in CA and 80,000 to 400,000 in the rest of US.</p> <p>CPS 1985 - 1996: response rate from 86% to 89%; CA, rest of US: from 4076 to 8272, from 70,164 to 97,856; CPS 1992/3 to 2006/7, CA, rest of US: from 16,000 to 24,000, from 210,000 to 290,000; CTS, CA only between 44,000 and 93,000 respondents per survey.</p> <p>Comparability of demographic data at baseline: not analysed.</p>	<p>- 2008, decline of smoking prevalence: CA 0.32% points per year, rest of US 0.24% points per year.</p> <p>2008 smoking prevalence: CA 13.1%, rest of US: 19%</p> <p>Interim reported data: According to the analysis of the results of NHIS, adult smoking prevalence decreased more rapidly from 1985 to 1990 than from 1978 to 1985 in CA and in the rest of USA. Increase in rate of decline between 2 periods in CA was 0.62% points per year (95% CI -1.27 to -0.03), and in rest of USA 0.43 (-0.70 to -0.16).</p> <p>Adult smoking prevalence decreased less rapidly from 1990 to 1994 than from 1985 to 1990 in CA (0.39% points per year) and in the rest of USA (0.05%, non-sig different from zero).</p> <p>Between 1978 and 1994 adult smoking prevalence was 2 - 5 percentage points lower in CA than in the rest of USA, but the estimated rate of decline in smoking prevalence was non-sig different from that of the rest of USA during any of the 3 time periods.</p> <p>Combined estimated rate of decline before CA TCP began was similar in CA to the rest of USA. Rates of decline were not statistically different but estimated prevalence in CA was lower than in the rest of USA.</p> <p>The rate of decline increased significantly in CA at the early period of the programme but not in the rest of USA. In the late phase of the programme the rate of decline in CA and in the rest of USA was non-sig different from zero and in both cases it was less than in the previous period.</p> <p>BRFSS trends similar, but consistently around 2% lower.</p> <p>CPS, CTS and CATS trends similar to BRFSS (all telephone surveys, while NHIS is face-to-face).</p> <p>NHIS only: rate of change in smoking prevalence 1978 - 1985, CA vs rest of US: Adults aged 18+ yrs: -0.6 (95% CI -0.79 to -0.40) vs -0.5 (-0.67 to -0.33); 1985 - 1990: -1.22* (-1.51 to -0.93) vs -0.93* (-1.13 to -0.73); 1990 - 1994: -0.39* (-0.76 to -0.03) vs -0.05* (-0.34 to +0.24); Adults aged 25+ yrs: 1978 - 1985: -0.61(-0.83 to -0.39) vs -0.43 (-0.63 to -0.24); 1985 - 1990: -1.11* (-1.37 to -0.84) vs -0.88* (-1.10 to -0.66); 1990 - 94: -0.61 (-0.99 to -0.23) vs -0.20* (-0.52 to +0.12); *significant difference (P < 0.05) between the estimated rate</p>	<p>In 1989, CA sales 26.1% lower than sales for the rest of the US (108.8 versus 147.2 packs per year).</p> <p>Faster rate of decline in CA vs rest of the US.</p> <p>2002 CA vs rest of the US lower sales (48 versus 101 packs per capita per year).</p> <p>From 2002 slower rate of decline in CA vs rest of the US (from 44.6 to 40.4 packs per year, a decline of 9.4%), but still lower sales than in the rest of the US. 2008: 40 versus 77 packs per capita per year, or 3.37 versus 6.42 packs per capita per month).</p> <p>1989/90 to 2006/7, per capita consumption greater decline in CA vs rest of the US: 60.8% vs 41.0% (40 vs 92 packs per person per year).</p> <p>Per capita consumption based on aggregated sales data declined faster in CA in the early period of the campaign than before it started, and the decline was significantly greater than in the rest of USA.</p> <p>During late programme the decline slowed but remained greater than in the rest of USA.</p> <p>Rate of decline in per capita consumption based on aggregated sales data CA/rest of US pack (SE), packs/month: Baseline 1989: -0.42* (0.03), 9.7/ -0.36 (0.02), 12.5; Early programme 1989 - 1993: -0.64#* (0.03), 6.5/ -0.42 (0.03), 10.4; Late programme 1994 - 1996: -0.17 *# (0.07), 6.0/ 0.04 # (0.06), 10.5.</p> <p>In another analysis presenting the results up to 1999 the rate of decline of tobacco consumption (tobacco consumption pack/month), CA/rest of US: Baseline 1/1983 - 12/1988: -0.46 (9.5)/ -0.35 (12.4); Early programme 1/1989 - 12/1993: -0.58 (6.6)/ -0.4 (10.3); Mid-programme 1/1994-10/1998: -0.16 (5.8)/ -0.07 (10); Recent programme 10/1998-12/1999: -1.56 (4.1)/ -0.78 (9.1).</p> <p>In analysis presenting the results for tobacco consumption up to 2002, CA, rest of US packs/month 1988: 9.8/12.5; 2002: 3.9/7.5.</p> <p>* CA vs rest of US P < 0.01. ^CA vs rest of US P < 0.001. #change from previous period P < 0.001.</p>	<p>ed non-sig in CA and in the rest of US between 1985 and 1990. 1990 to 1994, rate of increase in quit ratio decreased, with no significant changes in CA and in the rest of US compared to the period of 1985 to 1990.</p> <p>Quit ratio: NHIS only, 1978 - 1994, CA, rest of US, adults 18+years: 1978 - 1985: 0.73 (0.22 to 1.24), 0.73 (0.40 to 1.05); 1985 - 1990: 1.36 (0.74 to 1.97), 1.04 (0.62 to 1.46); 1990 - 94: 0.18 (-0.8 to 1.15), 0.15 (-0.47 to 0.77);</p> <p>Quit attempts: mean number of quit attempts in last yr decreased between 1990 and 1992 from 48.9% to 38.1%, then increased in 1996 and 1999 to 56.0% and 61.5%.</p> <p>% of smokers attempting quitting and abstinent for 3m at time of survey increased (1990:15.3%, 1992:18.6%, 1993: 20.2%).</p> <p>% of smokers with quit attempt in last yr lasting 7 days + increased between 1990 and 2002 (1990: 29.2%, 1992: 25.1%, 1996: 36.1, 1999: 41.4%, 2002: 40.5%).</p> <p>% of smokers who are currently quit for 3+ months did not change significantly (1990: 8.5 ± 1.0%, 1999: 5.4 ± 0.5%, 2008: 8.0 ± 2.5%)</p> <p>% of recent smokers currently in a quit attempt of 6+ months did not change significantly (1990: 5.6 ± 0.7%, 1999: 4.2 ± 0.5%, 2008: 6.4 ± 2.5%)</p>

Study	Study population	Primary measures of smoking behaviour		
		Smoking prevalence	Tobacco consumption	Other outcomes
		of change for that period and that for the previous period. All surveys combined analysis: CA, rest of US rate of decline % (SE) - smoking prevalence %: pre-1989 (preprogramme): -0.74 (0.12) - 23.3, -0.77 (0.09) - 26.2; 1989 - 1993 (early programme): -1.06 (0.17) - 18.0, -0.57 (0.14) - 23.3; 1994 - 1996 (late programme): 0.01 (0.21) - 18.0, -0.28 (0.26) - 22.4; P < 0.05 CA vs rest of US, P < 0.001, change from previous period.		
CORIS 1997	<p>Selection: Total population included in baseline and 4-yr follow-up surveys (15 - 64 yrs at baseline and 15 - 68 at 4-yr follow-up).</p> <p>At 12-yr follow-up a random sample of white participants aged 15 - 64 was selected - about 50 people per sex- and age-specific decile were selected, excluding people living < 2 yrs in the community.</p> <p>High-risk cohort was identified within cohort sample - people who had at least 1 of: high cholesterol (> 20th percentile for age), high blood pressure (systolic > 160 or diastolic > 95 mm Hg or antihypertensive drug use), regular smokers.</p> <p>N of participants: Total population Swellendam [Intervention]/Riversdale [Control] [M: men; F: women]. Baseline 1979 (% 1980 census): M: 1224 (65)/ 1082 (60); F: 1396 (74)/ 1208 (68); Follow-up: 1983 (% of 1980 census): M: 1171 (65)/ 1109 (62); F: 1323 (70)/ 1150 (64); 12-yr follow-up 1991: random sample Swellendam/Riversdale: M: 273/269; F: 267/274; response rate not reported. Cohort Swellendam/Riversdale (% of total population): M: 710 (58)/595 (55); F: 821 (59)/710 (59); High-risk cohort, Swellendam/ Riversdale (% of cohort): M: 388 (55)/320 (53); F: 234 (29)/224 (32). Comparability of demographic data at baseline: Authors state that age and sex distributions were very similar.</p>	<p>In total population % of smokers was lower in men and women in intervention compared to control city (non-sig difference).</p> <p>Baseline prevalence (1979) and (% change) at 4 yrs (1983): Swellendam/ Riversdale: M: 49.5 (-9.1)/45.7 (-7.6); F: 17.6 (-3.6)/16.1 (-0.5).</p> <p>At 4 yr follow-up in the intervention cohort compared to control cohort the % of smokers decreased (non-sig) in women but not in men.</p> <p>Cohort: baseline Swellendam/ Riversdale, and (net change): M: 46.5/44.4 (+0.9); F: 14.5 /14.4 (-3.0);</p> <p>At 4 yr follow-up in the high-risk cohort in the intervention group compared to control group the % of smokers decreased (non-sig) in women but not in men.</p> <p>High-risk cohort baseline Swellendam/ Riversdale (net change): M: 85.3/82.5 (+1.3); F: 50.9/45.5 (-7.4);</p> <p>At 12 yr (1991) follow-up smoking prevalence was lower in intervention compared to control city.</p> <p>1991 random sample smoking prevalence Swellendam/ Riversdale: M: 25.3*/34.2; F: 12.4/12.8; *significantly lower than Riversdale.</p>	<p>In total population tobacco consumption was lower in men and women in intervention compared to control city (non-sig difference).</p> <p>Baseline per capita consumption of tobacco grams/day (1979) and % change at 4 years (1983): Swellendam/Riversdale: M: 11.2/-2.6, 8.8/-1.8; F: 2.6/-0.4, 2.3/0.1;</p> <p>At 4 yr follow-up in the intervention cohort compared to control cohort tobacco consumption decreased in men and women (non-sig difference).</p> <p>Cohort baseline Swellendam/ Riversdale and (net change): M: 11.3/9.2 (-0.4); F: 2.1/2.3 (-0.2).</p> <p>At 4 yr follow-up in the high-risk cohort in the intervention group compared to control group tobacco consumption decreased in men and women (non-sig difference). High-risk cohort baseline Swellendam/Riversdale (net change): M: 20.5/17.3 (-0.8), F: 7.5/7.3 (-0.4).</p> <p>At 12 yr (1991) follow-up tobacco consumption was lower in intervention compared to control city. 1991 random sample per capita consumption Swellendam/Riversdale: M: 4.8/5.8, W: 1.9/1.8.</p>	<p>In women quit rates were significantly lower in intervention compared to control city.</p> <p>Quit rates: Swellendam/Riversdale: after 4 yrs: % of all smokers: M: 16.9/20.1; F: 28.3*/15.5; Light smokers: M: 26.5/32.6**; F: 44.4**/28.6**;</p> <p>Heavy smokers: M: 15.8/17.7; F: 23.7/10.7.</p> <p>*significant difference compared to control; **significant compared with heavy smokers.</p>
Jenkins 1997	<p>Selection: Phone surveys of randomly selected Vietnamese men, with numbers chosen randomly from 23 most common Vietnamese surnames listed in area phone books. After enumerating all men aged 18+ living in the household and speaking Vietnamese, subjects for interview were selected according to random age rankings in the household.</p>	<p>Smoking prevalence did not differ significantly at baseline. Post-intervention, smoking prevalence fell significantly (P = 0.004) in SF and increased in Houston. Current smokers % among Vietnamese men: SF/ Houston: Baseline (1990): 36.1/39.6; Follow-up (1992): 33.9/40.9. Significant intervention effect (P > 0.01). The odds of being a smoker at follow-up were sig-</p>	<p>Significant difference in cpd at baseline (Houston higher), significant decrease in Houston, but not in SF. At follow-up mean cpd was significantly higher in Houston.</p> <p>Mean cpd among smokers: SF/Houston, Baseline 1990: 11.1/13.2; Follow-up 1992: 10.3/11.9.</p>	<p>Significant increase in quit rate in SF compared to Houston (P = 0.017).</p> <p>% Quit rates in past 2 yrs: SF/ Houston: Baseline 1990: 7.2/5.8; Follow-up 1992: 10.2/7.4; significant increase in SF, but not in Houston.</p> <p>The odds of being a quitter in 1992 were significantly higher in intervention compared to control community (OR: 1.65,</p>

Primary measures of smoking behaviour				
Study	Study population	Smoking prevalence	Tobacco consumption	Other outcomes
	<p>N of participants: San Francisco (SF)/Houston: Baseline (% response rate): 1990: 1133 (84)/1581 (82); Follow-up (response rate %): 1992: 1202 (94)/1209 (88). Comparability of demographic data at baseline: significant differences in educational level, English language proficiency, income, unemployment and mean immigration year.</p>	<p>nificantly lower in intervention than in control community; OR: 0.82, 95% CI: 0.68 to 0.99). The odds of being a smoker after the intervention were lower for following characteristics: age groups 18 - 24, 45+; at least a college education; good or fluent English; being a student. The odds of being a smoker were higher for unemployed and more recent immigrants.</p>		<p>95% CI: 1.27 to 2.15). Predictors for quitting included: being a student (OR: 2.19, 95% CI 1.45 to 3.33); more recent year of immigration (OR: 1.03, 95% CI 1.0 to 1.05); each additional year of age (OR: 1.03, 95% CI 1.02 to 1.04); at least high school education (OR: 1.33, 95% CI 1.04 to 1.7). Mean number of quit attempts was similar in both communities at baseline and increased significantly in Houston but not in SF. Mean number of quit attempts: SF/Houston: Baseline 1990: 1.4/1.1 Follow-up 1992: 2.1/2.5. At baseline % reporting any quit attempt in the past was significantly higher in SF. At follow-up it increased significantly in both communities, but did not differ. Percentage reporting any quit attempt in the past: SF/Houston: Baseline 1990: 61%/49% Follow-up 1992: 73%/77%.</p>
Massachusetts 2003	<p>Selection: population-based survey in Massachusetts (MA) and in the rest of USA (excluding CA) - Behavioral Risk Factor Surveillance System (BRFSS): annual, state-based, standardised, random digit dialled telephone survey of non-institutionalised US adults aged 18+; 42 states including MA and CA participated consistently in BRFSS between 1989 and 1998; MA tobacco surveys conducted since 1993-4 (baseline) in adults, and every month since March 1995, estimates of adult smoking prevalence are derived from household screening interviews with an adult informant who reported on smoking status for all adult members of the household.</p> <p>N of participants: 1990/9: 22,309 responses from MA, 946,241 from the rest of USA; BRFSS 1989/98 sample sizes in MA from 1221 to 4944; in rest of USA (excluding CA) from 63,255 to 113,214. MA surveys 1994/98 respondents: from 5736 to 21,909. Response rates for BRFSS were 77% to 84% between 1984 and 1994; Between 1995 and 1999 response rates for USA fell from 68.4% to 55.2% and in MA from 60.4% to 42.7%. Comparability of demographic data at baseline: MA respondents were more likely to be white non-Hispanic and more likely to be college graduates than the respondents from the rest of USA.</p>	<p>According to the analysis based on BRFSS 1989 to 1998 and MA Tobacco Surveys 1993 to 1999 the slope of smoking prevalence after 1992 was significantly different from zero and from the slope for the rest of USA. Based only on BRFSS 1990 - 1999 controlling for age, sex, race, and education there was a greater decline in current smoking between 1990 and 1999 among MA men than among MA women, and the decline was greater in MA than in the rest of the USA for men and for both sexes combined.</p> <p>Based on BRFSS 1989 to 1998 and MA Tobacco Surveys 1993 to 1999: for MA the slope of smoking prevalence after 1992 was -0.43% a year (95% CI -0.66% to -0.21; P = 0.001); for the rest of USA the slope after 1992 was +0.03% a year (95% CI -0.06% to 0.12%; P = 0.46), * significantly different from zero and from the slope for the rest of USA (P < 0.001). BRFSS only 1990 - 1999: Baseline % prevalence (95% CI) total pop 1990, MA/rest of USA: 23.5 (21.0 to 26.1)/24.2 (23.7 to 24.7); Follow-up 1999: 19.4 (18.0 to 20.8)/23.3 (22.9 to 23.7); significantly lower than in the rest of USA (P < 0.001); crude prevalence OR of current smoking in MA in 1999 compared to 1990: 0.78 (0.66 to 0.92, P trend = 0.01); adjusted for sex, age, race, education OR: 0.83, (0.70 to 0.99, P trend = 0.08); in rest of USA prevalence of current smoking in 1999 compared to 1990: OR 0.95 (0.92 to 0.99, P</p>	<p>Annual per capita tobacco consumption based on aggregated sales data: 1988 - 1992 - before tax increase declines in consumption for MA adults and for rest of USA were similar: 15%, 14% - this = annual decline 3 - 4%. In 1993 consumption declined by 12% in MA and by 4% in rest of USA. After 1993 there was consistent annual decline of more than 4% in MA and less than 1% in rest of USA.</p>	<p>Quit ratio: not reported. Quit attempts: % of smokers planning to quit within the next 30 days increased between 1993 and 1997 (from 22% to 42%). Percentage of past year smokers making quit attempt increased non-sig between 1993 and 1996 (from 47.5% to 54.2%). Percentage of quitters making successful quit attempt significantly increased between 1993 and 2000 (from 18% to 25%), % of smoking pregnant women decreased (from 25% in 1990 to 11% in 1999, while in the rest of US these %s were 18% and 12% respectively).</p>

Study	Study population	Primary measures of smoking behaviour		
		Smoking prevalence	Tobacco consumption	Other outcomes
		<p>trend = 0.99); adjusted for sex, age, race, education OR: 1.01 (0.97 to 1.05, P trend < 0.001). Between 1990 and 1999 average change in the log odds was -1.3% in MA and in rest of USA +0.6% (sig difference between slopes, P = 0.01). Men/women baseline prevalence % (95% CI) 1990, MA/rest of USA: M: 25.9 (22.0 to 29.8)/26.0 (25.2 to 26.7); W: 21.5 (18.2 to 24.8)/22.5 (21.9 to 23.2); Follow-up 1999: M: 19.5* (17.3 to 21.6)/25.6 (24.9 to 26.2); *significantly different from the rest of USA, P < 0.001; W: 19.3* (17.5 to 21.1). 21.2 (20.7 to 21.7), * significantly different from the rest of USA P = 0.04;</p> <p>Crude prevalence OR (95% CI) of current smoking in MA/rest of USA in 1999 compared to 1990:</p> <p>M: OR: 0.69 (0.54 to 0.89; P trend = 0.03)/0.98 (0.93 to 1.03; P trend = 0.07); Adjusted for age, race/ethnicity, education OR: 0.73 (0.56 to 0.94; P trend = 0.09)/1.03 (0.97 to 1.08, P trend < 0.001);</p> <p>W: crude OR: 0.87 (0.70 to 1.09; P trend = 0.09)/0.93 (0.88 to 0.97, P trend = 0.03);</p> <p>Adjusted for age, race/ethnicity, education OR: 0.95 (0.75 to 1.2; P trend = 0.43)/0.99 (0.95 to 1.04, P trend = 0.03);</p> <p>Average decline per year in the log odds of current smoking between 1990 and 1999 in MA was M: 1.8% (SE: 0.011) and W: 0.7% (SE: 0.010), and in rest of USA there was an average annual increase of : M: 0.8% (SE: 0.002), W: 0.4% (SE: 0.002);</p> <p>Men: significant difference between MA and USA, P = 0.016;</p> <p>W: non-sig difference between MA and USA P = 0.243.</p>		
McAlister 2004	<p>Selection: telephone surveys of randomly selected (random digit dialing) adults from Texas (including individuals not resident in treatment areas); respondent in each household with the most recent birthday aged 18+ selected. Cohort of smokers identified in baseline cross-sectional sample was followed.</p> <p>N of participants: 1069 daily cig smokers identified in baseline survey; 622 available for follow-up.</p> <p>Baseline: High media 133, low media 274, control 232: Follow-up (% of original sample): 87 (65), 158 (58), 137 (59). Comparability of demographic data at baseline: not analysed.</p>	Not reported - only levels of daily smoking given (15.7 at baseline, 17.5 at follow up)..	Not reported.	<p>Complete cessation achieved by approx 2% of panel of daily smokers.</p> <p>% quitting daily smoking, i.e. reduction, not complete cessation (data estimated from bar graph): non-significantly higher in high and low media groups compared to group without any intervention, both in the whole sample and in followed-up subsample.</p> <p>% of whole sample quitting daily smoking: high media 4.5, low media 4.7, control 3.0 (taken from graph); Followed group 7.0%, 8.0%, 5%.</p> <p>Quit attempts: Among the participants still smoking at follow-up 27.3% had made quit attempt.</p>
McPhee 1995	Selection: Phone surveys of randomly selected Vietnamese men, chosen randomly from	At baseline smoking prevalence in SC differed significantly from Houston (control com-	At baseline SC cig consumption differed significantly from Houston. It fell significantly	Quit rates in past 2 yrs differed significantly at baseline, but

Primary measures of smoking behaviour

Study	Study population	Smoking prevalence	Tobacco consumption	Other outcomes
	<p>23 most common Vietnamese surnames in area telephone books. After enumerating all men aged 18+ living in the household and speaking Vietnamese, subjects for interview were selected according to modified Kish procedure.</p> <p>N of participants: Santa Clara(SC)/Houston: Baseline (% response rate): 1990: 1322 (81)/1581 (82); Follow-up (% response rate) 1992 (response rate): 1264 (85)/1209 (88). Comparability of demographic data at baseline: sig differences in educational level, English language proficiency, mean year of immigration and unemployment.</p>	<p>munity). It slightly increased in control area and remained unchanged in intervention area - there was no intervention effect. Current smokers among Vietnamese men, SC/ Houston: Baseline 1990: 36%/40%; Followup 1992: 36%/41%.</p>	<p>in the control area , but there was no significant intervention effect. Mean cpd among smokers: SC/Houston: Baseline 1990: 9.9/13.2; Follow-up 1992: 9.6/12.0.</p>	<p>there was no significant intervention effect. SC/Houston: Baseline 1990: 8.0%/6.0%, Follow-up 1992: 10%/7%.</p> <p>Mean number of quit attempts was significantly higher in SC at baseline. At follow-up it increased significantly in both communities, but did not differ. Mean number of quit attempts: SC/Houston: Baseline 1990: 1.3/1.1. Follow-up 1992: 2.3/2.5. At baseline percentage reporting any quit attempt in the past was significantly higher in SC. At follow-up it increased significantly in both communities, but did not differ. Percentage reporting any quit attempt in the past: SC/Houston: Baseline 1990: 64%/49%. Follow-up 1992: 79%/77%. Adjusted OR for intervention in regression model was 1.1 (95% CI 0.9 to 1.4), i.e. no sig effect of programme.</p>
McVey 2000	<p>Selection: In each TV region a random sample of enumeration districts were selected (1 in 40) and within each district a random sample of households (1 in 20) using computer-generated lists. Selected households were visited by interviewers and a resident member was selected for the sample with the use of pseudo-random Kish-grid method. Only adults at least 16 yrs were sampled. Only smokers and ex-smokers were included in the study. Attempts were made to re-interview the same respondents 6m and 18m later with similar structured questionnaire.</p> <p>N of participants: TV-media (smokers/ex-smokers), Baseline sample: 1744/1256; Followed at 6m: 1064/854; Followed at 18m: 673/598; Control (smokers/ex-smokers), Baseline sample: 719/775; Followed at 6m: 475/571; Followed at 18m: 288/402. Comparability of demographic data at baseline: no statistical analyses.</p>	Not reported other than varying in different target regions.	Not reported.	<p>By 18m, more successfully followed smokers in TV media group gave up smoking than in control group (non-sig). Quit rates in smokers (TV media/control): 9.7%/8.7%; OR: 1.27 (95% CI 0.77 to 2.08), adjusted for predictors of giving up cigarettes: sex, age, manual/non-manual job, daily cig consumption, "want to reduce smoking" and sex by manual/non-manual work interaction. More ex-smokers not relapsing were observed in TV media than in control group (significant): 96.3% vs 94.5%, adjusted OR: 2.21 (95% CI 1.11 to 4.40, P = 0.025); adjusted for predictors of remaining off cigs: number of cpd before stopping, length of time since stopping, whether persuaded to stop smoking by somebody else. TV media compared to no intervention was estimated to have increased the odds of not smoking. Pooled common effect on not smoking: adjusted OR: 1.53 (1.02 to 2.29, P = 0.04).</p>
Mogielnicki 1986	<p>Selection: reception clerks asked all patients registering for clinic visits about smoking and interest in stopping.</p> <p>N of participants: In 2nd yr clinic response rates not reported (media group/control group) Baseline: 71/33; Follow-up (% retention rate): 38 (54)/17 (52); Mailing group: Baseline: no information given;</p>	Not reported.	Not reported.	<p>In clinic participants, number abstinent was higher in group receiving mass media compared to group not receiving mass media (calculated for all participants included in the study at baseline). In the mailing group in both media and no-media groups no participant was abstinent and no number of participants included in the study at baseline was given.</p>

Primary measures of smoking behaviour				
Study	Study population	Smoking prevalence	Tobacco consumption	Other outcomes
	Follow-up: 12/5, response rates not reported. Comparability of demographic data at baseline for clinic participants: non-sig differences in age, number of cigs smoked, thiocyanate level, % smoking high-tar cigarettes. No details for mailing group participants given.			Abstinence rates % (media group vs control group), clinic participants, total sample: 19.7 vs 3; Followed sample: 36.8 vs 5.9. Mailing group participants, followed sample: 0% vs 0%.
North Coast QFL 1983	Selection: systematic random sample of men and women 18+ from each town, up to 2 adults per household. N of participants: Coffs Harbour (CH)/Tamworth (control): Baseline 1978 (% response rate): 612 (71)/589 (72); 1980: 1272 (73)/1239 (74); 1981: 1195 (73)/1195 (74). Comparability of demographic data at baseline: age and sex differences across towns and yrs.	Significant effect of the intervention was found. Prevalence reported for 1978 (baseline), 1980, 1981 by town, age, sex and yr. In both towns younger people tended to have bigger declines and 65+ smallest. % points change in prevalence between 1978 and 1981: in CH Men (M) from 7.1 (65+ yrs) to 11.2 (18 - 25 yrs) decline, Women (F): from 6.0 (65+ yrs) to 11.1 (18 - 25 yrs) decline; in Tamworth M 4.1 (65+ yrs) to 5.1 (36 - 45 and 46 - 55 yrs), F 2.1 (65+ yrs) to 5.1 (18 - 25 yrs). Effect of intervention compared to control was significant (P < 0.05).	Not reported.	Quit rates not reported.
Stanford 3 City 1977	Selection: in each city random multistage probability sample of men and women 35 - 59 yrs old. N of participants: Watsonville/Gilroy/Tracy; Baseline (% of original sample): 605 (73)/542 (82)/532 (81); Completing yr 2 follow-up (% of baseline sample): 423 (70)/397 (73)/384 (72). High-risk subjects - Watsonville media only/Gilroy/Tracy, Baseline: 56, 139, 136; Completing baseline and 2 yr follow-up: 40, 94, 95. Comparability of demographic data at baseline: no statistical comparisons made.	Reported only for high-risk group (baseline/1st /2nd /3rd year follow-ups): Watsonville-randomised control (media only): 56.8/no results given as difference in the direction contrary to prediction; Gilroy: 62.4/-15.1/-15.1/-11.3; Tracy: 52.8/-6.4/-10.6/-14.9, all non-sig.	Per capita cig consumption for adults 35 - 59 yrs (baseline/% change 1973/1974): Watsonville reconstituted: 6.8/-6.9,-13.7*; Gilroy: 6.8/-2.3/-7.3; Tracy: 6.9/-1.1/-2.5; * statistically sig difference (P < 0.05) for % change values compared to Gilroy and Tracy (control). High-risk subjects (baseline 1972/% change 1973/1974): Watsonville-randomised control: 14.2/-5.8/-15.1; Gilroy: 14.6/-9.8/-13.8; Tracy: 13.7/-8.5/-17.2. In the publication presenting results for high-risk group only the results are given for 3 yrs follow-up and they differ from the main Stanford Three City publication (Maccoby 1977) as they present the results for subjects who completed baseline and all 3 annual follow-up surveys (baseline 1972/% change; 1973/1974/1975), Watsonville-randomised control: 15.4/-5.8/-15.1/-16.0; Gilroy: 13.8/-7.0/-12.3/-11.8; Tracy: 14.0/-7.4/-15.9/-21.0; all non-sig.	Quit rates not reported.
Sydney QFL 1986	Selection: random weekly selection from list of all Australian electoral subdivisions. Selected 10 separate households starting from randomly selected address from each electoral subdivision (clockwise direction around the residential block). Within household youngest person 14+ or 16+ interviewed. N of participants:	At 1st cross-sectional surveys prevalence decreased in Sydney compared to the rest of Australia (non-sig). Baseline prevalence 1983/% change at follow-up 1984; cross-sectional Sydney: Men (M): 35.9/-4.2; Women (F): 30.4/-1.6; Total: 33.1/-2.8; Rest of Australia: M: 39.2/-3.3; F: 29.3/-0.2; Total: 34.1/-1.6. Difference between Sydney and rest of Australia: 1.2% (SE 1.49; non-sig).	Cross-sectional studies after 1st issue of the campaign found decrease in cpd in Sydney compared to the rest of Australia (non-sig). Changes in mean cpd in Sydney and rest of Australia, Baseline 1983/% change in 1984: M: 20.1 (-0.6)/20.3 (+0.2); F: 18.4 (-1.3)/18.2 (-0.8).	Significantly larger proportion of Sydney smokers compared to Melbourne smokers quit smoking or cut down on cigs. Relapse rate and initiation rate were similar in both cities. Cohort Sydney/Melbourne 1983 - 1984: initial smokers % quit: 23/9; initial smokers cut down: 12/9; total quit + cut down: 35*/18; initial ex-smokers relapse: 10/11; initial non-smokers started: 4/4.

Primary measures of smoking behaviour				
Study	Study population	Smoking prevalence	Tobacco consumption	Other outcomes
	Cross-sectional surveys (Sydney/rest of Australia), Baseline 1983: 3978/ 5154; Follow-up 1984: 4051/4318. Melbourne cross sectional survey - 1518. Cohort (Sydney/Melbourne), Baseline 1983 : 900/600; Follow-up 1984 (% retention rate after excluding people moved): 570 (76)/364 (73). Australia-wide response rate of approximately 60%. Long-term follow-up weekly surveys, Sydney and Melbourne 1981 - 1987: 68,136 males, 70,634 females. Comparability of demographic data at baseline: no statistical comparisons made.	In cohort study significant decrease in smoking prevalence in Sydney compared to Melbourne. Cohort % Sydney/Melbourne: 30.9 (-3.4)/36.8 (+0.1)%. Standardised (to baseline prevalence) difference Sydney vs Melbourne: 5.4% (SE: 1.89, P < 0.01). Overall campaign effect assessed as a weighted mean of cross-sectional and cohort assessments showed significant effect of campaign on smoking prevalence. Overall campaign effect weighted mean: 2.8% (95% CI: 0.5 to 5.1). In model assessing long-term effects of the campaign (1981 - 1987) there was an immediate decrease in smoking prevalence after the beginning of the intervention (6m) in Sydney and Melbourne in males and females. Continuation of the campaign in subsequent years was associated with further drop in percentage points in Sydney and Melbourne men, but not women. Long-term effectiveness model: Sydney (baseline estimated prevalence 1981 - June 1983: immediate campaign effect 1983 - 6m % points change/continuation of the campaign 1983 - 1987 % points change per year): M: 38.7/-2.52/-1.12; F: 31.6/-2.61/no sig decline. Melbourne (baseline estimated prevalence 1981 - June 1984: immediate campaign effect 1984 - 6m % points change/continuation of the campaign 1984 - 1987 % points change per year): M: 40.1/-2.87/-1.9; F: 30.9/-2.5/no decline.		Quit attempts: Failed attempts to quit or cut down were assessed in cohort of smokers in Sydney and Melbourne - proportions were not significantly different: S vs M: quit: 11% vs 19%, cut down: 20% vs 23%. * P < 0.05.

Analysis 1.4. Comparison 1 Mass media versus no mass media, Outcome 4 Study summary by type of outcome.

Study summary by type of outcome				
Study	Type of outcome	Orientation	Cost	Effect
California TCP 2003	Prevalence	Social diffusion theory, with social marketing and social policy change	April 1990 - June 1993 USD 26m for media campaign. 1990 - 5 total programme spend USD 694m	Pre-programme prevalence 23.3 in CA vs 26.2 in rest of USA. By 1993 down to 18.0 in CA, 23.3 rest of USA; By 1996, prevalence still 18.0 in CA vs 22.4 in rest of USA. Final data (2008): CA 13.1%, rest of US: 19% Rate of decline % (SE): CA: Pre-TCP: -0.74 (0.12) > early period: -1.06 (0.17) [P < 0.05 CA vs USA, P < 0.001 change from pre-TCP] > late period 0.01 (0.21) P < 0.05 CA vs USA. USA: -0.77 (0.09) > 0.57 (0.14) > 0.28 (0.26). Final data (up to 2008):
	Packs per day			

Study summary by type of outcome				
Study	Type of outcome	Orientation	Cost	Effect
				CA 0.32% points per year, rest of US 0.24% points per year. Media campaign alone (without other Prop 99 components) led to decline in cig consumption of 12.2% between April 1990 and March 1991. Decline of 7.7 packs per capita (pc) attributable to media campaign alone, with 10% increased expenditure on media yielding 0.5% reduction in cig sales. 1989 - 96, CA spent USD 0.50 pc per year on media, leading to a fall of 3.9 packs pc per yr for each USD spent on media. Final data (1970 - 2008), per capita taxable sales: CA sales 26.1% lower than sales for the rest of the US (108.8 versus 147.2 packs per year). Faster decline in CA vs rest of the US. 2002 48 versus 101 pc per yr 2008: 40 versus 77 pc per yr,
CORIS 1997	Prevalence	Not reported	pc cost of USD 5 over 4 yrs in media-only intervention town.	After 4 yrs, Intervention (Control) prevalence in men dropped from 49.5 (45.7) to 40.4 (38.1) , and in women from 17.6 (16.1) to 14.0 (15.6) . Data contains paired and unpaired observations, in total population.
	Cigarettes per day			After 4 yrs, Intervention (Control) tobacco per day (pd) in men moved from 11.2 (8.8) to 8.6 (7.0) grams, and in women from 2.6 (2.3) to 2.2 (2.4).
Jenkins 1997	Prevalence	Not reported	Not reported	At 2 yrs, San Francisco (int) prevalence down from 36.1 to 33.9 ($P \leq 0.01$), and Houston (control) up from 39.6 to 40.9. Net change was -3.5 % points ($P = 0.004$).
	Cigarettes per day			San Francisco (Houston) cpd pretest: 11.1 (13.2); post-test: 10.3 (11.9)
	Odds of quitting			OR 1.65 (1.27 to 2.15) in favour of San Francisco
Massachusetts 2003	Prevalence	Social diffusion theory, with social marketing and social policy change	USD 39m pa for whole programme.	1990 - 9: MA prevalence declined from 23.5 (CI 21.0 to 26.1) to 19.4 (CI 18.0 to 20.8). 41 US states: 24.2 (CI 23.7 to 24.7) to 23.3 (CI 22.9 to 23.7)
	Packs per day		MA pc USD 6.50 (in 2000); cf. CA USD 3.31, UK \$0.89, Australia \$0.48 (1997), South Africa \$0.04, France \$0.32, spent on tobacco control programmes.	1993 - 6: reduction of 0.5 per annum (pa) for each pc USD spent on media. From 1993 pc MA consumption declined > 4% pa, compared with < 1% pa in comparison states.
McAlister 2004	Prevalence	Social learning theory, trans-theoretical model. using modelling, social reinforcement for behaviour change, and emotional arousal.	USD 9m pa	Prevalence of daily smoking increased from 15.7 to 17.5.
	Daily smoking cessation			% of baseline smokers ceasing daily smoking: Low-level media: 4.7, High-level media 4.5, No media 3.0
	Cessation			

Study	Type of outcome	Study summary by type of outcome		Effect
		Orientation	Cost	
McPhee 1995	Prevalence	Not reported	Not reported	Media-only areas achieved 8% cessation vs control 5%.
	Cigarettes per day			No change in prevalence in Intervention community from baseline to 2 yrs: 36.0, while controls increased (non-sig) from 40 to 41. Intervention cpd down from 9.9 to 9.6, controls down from 13.2 to 12.0.
McVey 2000	Quit and relapse rates.	No formal attributing, but 'morbid humour' used.	Not reported	At 18m, 9.8% of intervention smokers vs 8.7% of control had quit, and 4.3% of intervention ex-smokers vs 3.7% controls had relapsed. Pooled OR of not smoking was 1.53 (CI 1.02 to 2.29, P = 0.04).
Mogielnicki 1986	Cessation rates	Mass marketing techniques (situation analysis, objective definition, copy development, media plan, campaign launch) combined with traditional clinical trial approach.	Copy development and production: USD 7480, Air time: USD 15,150 (1980 USD)	Per protocol clinic cessation at 2nd year: Media only 36.8%, No media 5.9%. Mailing recipients: no quitters in either group.
North Coast QFL 1983	Prevalence	Social marketing and communication theory	Not reported	Mean declines in prevalence in Intervention community of 9.5% from baseline to Yr 3, and in controls of 4.4%.
Stanford 3 City 1977	Prevalence	Social marketing, social learning and communication theory	Not reported	All participants: Baseline: Intervention 65.5, Control 55.6. Cohort: Baseline Intervention (Control) 62.4 (52.8), declined by 11.3% (14.9%) after 3 yrs (P < 0.05).
	Cigarettes per day			Mean Intervention cpd down 7.3% over 2 yrs from 6.8 at baseline; controls down 2.5% from 6.9 at baseline. N.B. Within treatment groups, cohort baseline cpd of Int 13.8, control 14.0.

Analysis 1.5. Comparison 1 Mass media versus no mass media, Outcome 5 Baseline differences and possible confounding.

Study	Baseline differences and possible confounding		Adjusted effects
	Differences	Possible confounders	
Jenkins 1997	San Francisco (Int) respondents significantly less proficient in English, of lower education, lower income, less likely to be employed and more recent year of immigration than Houston (control) respondents.	All these factors were included in multivariate analyses.	Unadjusted ORs not reported. Strongest predictor of quitting was being a student (adjusted OR 2.19, 95% CI 1.45 to 3.33); at least high school education (OR 1.33: CI 1.04 to 1.70); more recent year of immigration (OR 1.03: CI 1.00 to 1.05); each + yr of age (OR 1.03: CI 1.02 to 1.04).
Massachusetts 2003	MA respondents were more likely to be white non-Hispanic and more likely to be college graduates than the respondents from the rest of USA.	Age, sex, race and education were treated as confounders.	Unadjusted OR for current smoking in MA in 1999 vs 1990 was 0.78 (CI 0.66 to 0.92, P trend 0.01). Adjusting for sex, age, race and education, OR was 0.83 (CI 0.70 to 0.99). Compare with USA: 1990 unadjusted OR 0.95 (CI 0.92 to 0.99). Adjusted 1.01 (CI 0.97 to 1.05). Adjusted prevalence OR for current smoking in MA showed annual decline in log odds of 1.3% pa, whereas USA

Study	Baseline differences and possible confounding		Adjusted effects
	Differences	Possible confounders	
McAlister 2004	Responders and non-responders to follow-up survey differed significantly by age, race and gender. Also significant differences in gender and education between baseline and follow-up samples.		showed average increase of 0.6% (P = 0.01). Daily smoking rate "adjusted for age, gender and educational level". No OR reported.
McPhee 1995	Small but significant differences in mean age, educational level, English language proficiency, mean year of immigration, between SC and Houston and/or between pre- and post-test samples. Larger differences in employment (8% unemployed in SC vs 6% in Houston pre-test) and income (32% below poverty level in SC vs 26% in Houston post-test).	Analyses controlled for site, time, (pre-, post-test), intervention term (site x time), age, education, English language proficiency, year of immigration, employment status, income.	Differences in prevalence between SC and Houston did not persist after controlling for sociodemographic characteristics. Strongest predictor of current non-smoking was age 65+. Age 18 - 24, immigration before 1977, college education and English fluency all predicted non-smoking, but employment and income did not. Adjusted OR for intervention term was 1.1 (95% CI 0.9 to 1.4). Adjusted OR for recent quitting 1.1 (95% CI 0.7 to 1.7).
North Coast QFL 1983	Age and sex differences across towns and years.	To counter known confounding, an AGE*SEX*TOWN term was constructed for the regression model, and a TOWN*YEAR factor.	
Sydney QFL 1986	Location of interview (Sydney vs Melbourne) was significant predictor of quitting (P < 0.05).	Sex, age, education, marital status, SES did not predict quitting or act as confounders.	No ORs reported.

APPENDICES

Appendix 1. Search strategy

Tobacco Addiction Group Specialised Register Search Strategy

Searched in CRS (Cochrane Register of Studies)

#1 (mass ADJ1 media):TI,AB,MH,EMT,KW,KY,XKY

#2 (radio or television or tv or campaign* or advert*):TI,AB,MH,EMT,KW,KY,XKY

#3 (Newspapers OR Videotape Recording OR Motion Pictures):TI,AB,MH,EMT,KW,KY,XKY

#4 (Telecommunication OR Videorecording OR Audiovisual Aids):TI,AB,MH,EMT,KW,KY,XKY

#5 (mass medium OR audiovisual equipment):EMT,KW,KY,XKY,MH

#6 #1 OR #2 OR #3 OR #4 OR #5

WHAT'S NEW

Date	Event	Description
17 August 2017	New search has been performed	New searches conducted up to November 2016
17 August 2017	New citation required but conclusions have not changed	Updated search, references, added information and references to already included studies (California TCP, Massachussets TCP), one new excluded study. 'Summary of findings' table added.

HISTORY

Protocol first published: Issue 2, 2004

Review first published: Issue 1, 2008

Date	Event	Description
28 November 2013	Amended	Contribution of authors updated and support source clarified.
25 April 2013	New citation required but conclusions have not changed	Review text updated, new author added, 10 new excluded trials, no new included trials but additional information for an existing included study (California TCP). Risk of bias tables added.
21 February 2013	New search has been performed	New searches conducted up to February 2013
1 August 2008	Amended	Converted to new review format.
12 November 2007	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

MB developed the concept for the project, formulated the search strategy and carried out searches, prescreened the abstracts, assessed relevant studies for inclusion, extracted the data and wrote the text of the review.

LS assessed relevant studies for inclusion, checked data extraction, and proofread the text of the review. RTM assessed relevant studies for inclusion and proofread the text of the review.

DECLARATIONS OF INTEREST

MB: none known.

LS: none known

RTM: none known

SOURCES OF SUPPORT

Internal sources

- Jagiellonian University Medical College, Poland.
- Medycyna Praktyczna, Poland.
- Department of Primary Care Health Sciences, University of Oxford, UK.
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External sources

- State Committee for Scientific Research, Poland.

(2008 version of this review)

- National Institute for Health Research, UK.

INDEX TERMS

Medical Subject Headings (MeSH)

*Mass Media; *Smoking Prevention; Health Behavior; Health Promotion [economics] [*methods]; Smoking [epidemiology]; Smoking Cessation [*methods]

MeSH check words

Adult; Female; Humans; Male