Cigarette tax increase and media campaign: cost of reducing smoking-related deaths

Fishman P A, Ebel B E, Garrison M M, Christakis D A, Wiehe S E, Rivara F P

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The study examined the use of an anti-smoking media campaign plus $1 per pack national tax on cigarette to reduce smoking-related deaths. The media campaign was run for 4 years and its message was assumed to be redesigned each year. The tax increase was imposed at the end of the 4-year period.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised all 18-year-olds in the USA in the year 2000.

Setting
The setting was the community. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness data were derived from studies published between 1996 and 2004. Annual media programme costs per capita were taken from studies published between 1997 and 2000, while health care costs were from studies published between 1992 and 2004. The price year was 2000.

Source of effectiveness data
The effectiveness evidence was derived from a review of published studies, augmented by authors' assumptions.

Modelling
A series of mathematical equations was employed to determine the cost-effectiveness of the interventions, the costs of the media campaign and health care, and the changes in public-sector revenue due to a per-pack tax increase. These were fully presented in the paper.

Outcomes assessed in the review
The following outcomes were assessed:

the cumulative decreased premature smoking-attributable years of potential life lost (YPLL) within the cohort;

adult price elasticity of demand for cigarettes;
the annual number of cigarette packs consumed by adults per year at baseline;

the annual number of cigarette packs consumed by cohort members per year over lifetime; and

the birth rate for women aged 18 to 40 years.

**Study designs and other criteria for inclusion in the review**
Not reported.

**Sources searched to identify primary studies**
The authors did not state whether or not the review was systematic. The sources searched were also not reported.

**Criteria used to ensure the validity of primary studies**
Not reported.

**Methods used to judge relevance and validity, and for extracting data**
Not reported.

**Number of primary studies included**
The effectiveness evidence was derived from six primary studies.

**Methods of combining primary studies**
Not reported.

**Investigation of differences between primary studies**
Not reported.

**Results of the review**
The cumulative decreased premature-smoking attributable YPLL within the cohort were estimated to be 129,529 to 630,925.

Adult price elasticity of demand for cigarettes was -0.3 to -0.6%.

The annual number of cigarette packs consumed by adults per year at baseline was 366.5.

The annual number of cigarette packs consumed by cohort members per year over lifetime was 328 to 379.

The birth rate for women aged 18 to 40 was 0.01 to 12.9%.

**Methods used to derive estimates of effectiveness**
The authors estimated the annual decrease in adult smoking rate.

**Estimates of effectiveness and key assumptions**
The annual decrease in adult smoking rate was estimated to be 2 to 6%.
Measure of benefits used in the economic analysis
The primary outcome measure used in the economic analysis was the YPLL.

Direct costs
The cost/resource boundary adopted was that of society. The economic evaluation included costs associated with the media campaign and tax, and health care among cohort members and their families due to the reduction in smoking among members of the target cohort. The revenues in public sector resulting from the $1 per-pack increase in cigarette tax were also taken into account. The quantities and the costs were not reported separately. The cost estimates were derived from the review of the literature. The time horizon was lifetime, defined as the 67-year period from ages 18 to 85. Inflation of general or medical care costs was varied between 3 and 6%, and the social rate of time preference was compared across the range of 3 to 7%. The price year for all of the cost categories appears to have been 2000, although the authors did not explicitly report that for health care costs.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
Given the method of deriving and reporting costs, it was unclear whether the indirect costs were actually included.

Currency
US dollars ($).

Sensitivity analysis
A sensitivity analysis was carried out on the cost discount rate, the smoking-attributable mean health care costs by age, and the price elasticity of demand for cigarettes within the cohort, to assess the robustness of the economic analysis. The ranges of uncertainty investigated were 3 to 6% for the medical care cost discount rate, $1,246 to $7,693 for the mean costs, and -0.3 to -0.6% for the price elasticity of demand for cigarettes. All of the ranges were obtained from the review of the literature.

Estimated benefits used in the economic analysis
The YPLL saved, which were derived directly from the literature, were 630,925 at a discount rate of 3% and 129,529 at a discount rate of 7%.

Cost results
The cost results were not presented independently of the YPLL.

Synthesis of costs and benefits
The costs per YPLL saved ranged from $528 for the low-cost media campaign using a 3% discount rate, to $19,957 for the highest cost media campaign using a 7% discount rate.

The health care cost decrease per YPLL saved ranged from $622 at a 3% discount rate to $2,353 at a 7% discount rate.

The cost savings per YPLL, owing to the net change in tax revenue, ranged from $587,133 at a 3% discount rate to $1,461,553 at a 7% discount rate.

The cost-savings per YPLL, including media programme costs and net changes in both health care costs and tax revenue, ranged from $583,606 at a 3% discount rate to $1,449,894 at a 7% discount rate.
The sensitivity analysis revealed that the overall results were dominated by the impact of the net change in tax revenue.

Authors’ conclusions
The interventions reduced overall smoking prevalence, significantly decreased smoking-attributable morbidity, and decreased net societal costs.

CRD COMMENTARY - Selection of comparators
No intervention was explicitly chosen as the comparator, although the implicit comparator would appear to have been ‘no media programme’.

Validity of estimate of measure of effectiveness
It would appear that a systematic review of the literature was not performed. Hence, it is not possible to tell if the best data available were used in the study. There was little information on the quality of the retrieved studies, which in turn makes it difficult to comment on the quality of the effectiveness estimates. The use of mathematical equations, which were presented in full, aids the reader’s understanding of the methods used to derive the cost-effectiveness ratios. However, the limited reporting of the methods of the review and the methods used to select the effectiveness parameters limit the internal validity of the study.

Validity of estimate of measure of benefit
The measure of benefit, YPLL, was able to capture the impact of interventions on life expectancy, but not on quality of life. Discounting was applied and the discount rate was investigated in a sensitivity analysis. The YPLL measure was derived directly from the literature; the methods of identifying this value were reported in limited detail.

Validity of estimate of costs
The analysis was performed from a societal perspective. It appears that all the relevant direct costs have been included in the analysis. However, due to a lack of detailed reporting, it was unclear if the indirect costs were included in the cost figures. In addition, a breakdown of the cost items was not provided, and information on the unit costs and quantities of resources used was not given. This reduces the possibility of replicating the study. Inflation adjustments and discounting were appropriately conducted, and the price year was reported. Sensitivity analyses were conducted to assess the robustness of the results and their generalisability to other settings.

Other issues
The authors compared their findings with other published results, and found some consistency. They also stated that their results were likely to be conservative estimates given several other potential sources of health benefits and costs that were excluded from this analysis, but that might be generated by the interventions. The authors’ conclusions appear to have been appropriate given the scope of the analysis.

Implications of the study
This study suggested that the media campaign targeting tobacco use in teens and young adults combined with the $1 per-pack tax increase represents an effective smoking prevention strategy, as it decreased lifetime cigarette-related deaths at potentially large cost-savings to society.

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Other publications of related interest


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