What is the potential cost-effectiveness of enforcing a prohibition on the sale of tobacco to minors

DiFranza J R, Peck R M, Radecki T E, Savageau J A

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
Enforcement programme to halt the sale of tobacco to youths across the USA.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was a cohort derived from a proportion of student smokers, and the projected number of 17-year-old youths in 1997. (The Class of 1997).

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

Dates to which data relate
Effectiveness and resource use data were collected from sources published between 1987 and 1999. Cost data were taken from sources published between 1987 and 1998. The price year was 1997.

Source of effectiveness data
Effectiveness data were derived from a literature review and expert opinion.

Modelling
A linear regression model was used to predict the number of outlets in particular states. A steady-state model was used in which all of the costs and benefits associated with a single year of enforcement were applied to a single high school graduating class.

Outcomes assessed in the review
The review assessed the number of tobacco retailers, and smoking rates.

Study designs and other criteria for inclusion in the review
Not stated.
Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Summary statistics from individual studies were used.

Number of primary studies included
At least 24 studies were included in the review.

Methods of combining primary studies
Primary studies were combined using the narrative method.

Investigation of differences between primary studies
Not stated.

Results of the review
The number of vending machines was 285,000. 284,443 companies with payroll sold tobacco products at retail. 45% of smokers were assumed to quit and 32% of remaining smokers were assumed to be killed by tobacco.

Methods used to derive estimates of effectiveness
Assumptions about effectiveness were also made by the authors.

Estimates of effectiveness and key assumptions
Current rates of smoking and mortality were assumed to continue into the indefinite future in the absence of enforcement. Given that published studies have reported reductions in youth tobacco use arising from enforcement programmes ranging from zero to 69%, the authors evaluated the effectiveness of the programme using four values from within this range: 5, 10, 25, and 50%.

Measure of benefits used in the economic analysis
Years-of-life-saved was used as the measure of benefit. Benefits were discounted at 3% and 5%.

Direct costs
Direct costs were not discounted because they were incurred within the first year. Quantities and costs were reported separately. Direct costs included payroll for personnel who license vendors, supervise inspectors, track inspection results, administer civil fines, and handle illegal challenges in court; salaries and benefits for the underage shoppers and adult inspectors; liability insurance, money to purchase tobacco; transportation costs; and overheads associated with maintenance of office space, equipment, and supplies. The quantity/cost boundary adopted was that of society. The estimation of quantities and costs was based on actual data. Costs were obtained from published and unpublished reports, the authors' personal experiences, and the Food and Drug Administration. The price year was 1997.

Statistical analysis of costs
No statistical analysis of costs was reported.

**Indirect Costs**
Indirect costs were not included.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was reported.

**Estimated benefits used in the economic analysis**
Group C states (those that were able to provide a complete count of tobacco vending outlets) had 193,147 licensed outlets, with a rate of 2.2 outlets per 1,000 people. The total number of vendors for Group I states (those with incomplete or absent data) was 267,000. The regression analysis projected 543,000 vendors in the USA. There were 1,430,000 17-year-olds with a 36.5% prevalence of smoking among the Class of 1997. 456,000 smoking-attributable deaths were expected, accounting for 6.1 million years of life lost (equals 1.24 million years discounted at 3% and 465,000 years discounted at 5%).

**Cost results**
Total enforcement costs ranged from $27 million (at a cost per vendor of $50) to $190 million (at a cost per vendor of $350).

**Synthesis of costs and benefits**
The cost per year of life saved ranged from $44 to $3,100 at a discount rate of 3% and from $120 to $8,200 at a discount rate of 5%. Caution needs to be exercised in attempting to extrapolate these results to enforcement programmes covering larger geographical areas.

**Authors’ conclusions**
At this level of cost and effectiveness, an enforcement programme could save 10 times as many lives as the same amount spent on mammography or screening for colorectal carcinoma. A one-cent per pack cigarette tax could fully fund enforcement.

**CRD COMMENTARY - Selection of comparators**
A justification was given for the comparators used, namely no prohibition programme. You, as a user of the database, should decide if this health technology is relevant to your setting.

**Validity of estimate of measure of effectiveness**
The authors did not state that a systematic review of the literature had been undertaken. More information about the design of the review and the method of pooling primary effectiveness estimates could have been reported. Additional effectiveness estimates were derived from the authors’ experiences. These features of the study suggest that the results need to be treated with some caution.

**Validity of estimate of measure of benefit**
Estimation of benefits was obtained directly from the effectiveness analysis using appropriate modelling techniques.
Validity of estimate of costs
Some good features of the cost analysis were that all relevant direct cost categories were included, quantities and costs were reported separately and the price year was reported. Charges were not used to proxy prices. However, no sensitivity analyses were undertaken although the impact of varying discount rates was assessed in the synthesis of costs and benefits.

Other issues
The authors did make appropriate comparisons of their findings with those from other studies and the issue of generalisability to other settings was addressed. The authors did not present their results selectively. The study considered a relevant population and this was reflected in the authors’ conclusions. The authors noted that, to the extent that delayed initiation is important, the results would overestimate the cost-effectiveness of enforcement. They also stated that a reduction in the number of vendors would increase the cost-effectiveness of enforcement. The model utilised some estimates that were oversimplifications, a factor that needs to be taken into account when interpreting the results.

Implications of the study
Enforcement of restrictions on the sale of tobacco products to minors is potentially a very cost-effective measure for saving lives and more research is warranted to determine its efficacy. This approach should represent only one aspect of a comprehensive tobacco control strategy targeting both youth and adult tobacco use.

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