

# The Reach and Effectiveness of a National Mass Media–Led Smoking Cessation Campaign in the Netherlands

## ABSTRACT

**Objectives.** This study examined the reach, effectiveness, and cost-effectiveness of a mass media–led smoking cessation campaign including television shows, a television clinic, a quit line, local group programs, and a comprehensive publicity campaign.

**Methods.** A random sample of baseline smokers ( $n = 1338$ ) was interviewed before and after the campaign and at a 10-month follow-up. A non-pretested control group ( $n = 508$ ) of baseline smokers was incorporated to control for test effects.

**Results.** Most smokers were aware of the campaign, although active participation rates were low. Dose–response relations between exposure and quitting were found. The follow-up point prevalence abstinence rate attributable to the campaign was estimated to be 4.5% after control for test effects and secular trends. The cost per long-term quitter was about \$12.

**Conclusions.** In spite of a massive rise in tobacco promotion expenditures prior to the campaign and the absence of governmental control over the media, the campaign under study may have increased normal cessation rates substantially. (*Am J Public Health*. 1999;89:346–350)

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From the early 1960s to the late 1980s, the percentage of smokers 15 years and older declined yearly by 1% to 2% in the Netherlands. However, the smoking prevalence rate climbed from 33% in 1989 to 35% in 1995 as a result of an increase in smoking among adolescents between 15 and 19 years of age, as well as increases in some other age groups.<sup>1</sup> A notable increase in tobacco promotion in the last decade may have contributed to the growing prevalence of smoking among adolescents.<sup>2</sup> To lower the smoking prevalence to the governmental goal of 20% in the year 2000,<sup>3</sup> the Dutch Smoking and Health Foundation planned actions to prevent smoking and to stimulate smokers to quit.<sup>4</sup> Based on the results of a pilot study,<sup>5</sup> a national mass media–led smoking cessation campaign was developed and implemented in 1991.

In a review of the role of mass media in smoking cessation programs, Flay<sup>6</sup> noted that all of the campaigns under review achieved very high exposure rates among smokers. However, only 4 of the 7 mass media campaigns examined led to substantial changes in smoking behavior. Flay attributed the successes to governmental control or monopoly over the mass media (in Greece, Norway, and Australia). The positive results of the Chicago Televised Smoking Cessation Program represented an exception to the rule. However, as a result of the inevitable lack of appropriate control groups in analyses involving nationwide mass media, conclusions about campaigns working better than indicated in historical background trends are hard to draw.<sup>7</sup>

This article reports a comprehensive study among Dutch smokers on the effects of a mass media–led smoking cessation campaign. Long-term reduction of smoking behavior, viewed against influences of baseline testing (which might increase awareness and, consequently, exposure and cessation) and historical background trends, was esti-

mated. Furthermore, dose–response relations between exposure to campaign elements and quitting behavior were examined, because these relations might support conclusions about the effectiveness of the campaign. Finally, a rough estimate of cost-effectiveness was made.

## Methods

### *The “Quit Smoking Together” Campaign*

The campaign consisted of a series of informative and entertaining television programs showing famous people trying to quit smoking in various ways (a matching booklet was available at a cost of \$3<sup>8</sup>), a TV clinic involving everyday life models (matching manual: \$10<sup>9</sup>), local group programs conducted by 73 local and regional organizations (8 meetings; matching manual: \$55), a national quit line staffed with trained counselors, and a comprehensive publicity campaign (advertisements, posters, leaflets, self-help manual,<sup>10</sup> brochure for general practitioners). The additional costs for development and implementation of the campaign of \$2.2 million were financed with grants to the Dutch Smoking and Health Foundation by the Ministry of Public Health, the Prevention Fund, the Dutch Cancer Society, the Heart Foundation, and the Asthma Foundation. Airtime for the TV and radio components was donated by the networks, since the programs were incorporated into their programming. Because of the

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charge for the group programs, these activities were mostly without cost for the executing organizations and for the Dutch Smoking and Health Foundation.

### Design and Sampling Procedures

Exposure to campaign elements and behavioral impact were evaluated in a random sample of smokers 15 years and older. This group ( $n = 1338$ ) completed 3 computer-assisted telephone interviews: a pretest before the start of the campaign (December 1990), a posttest after the campaign (April 1991), and a follow-up test 10 months later (February 1992). The follow-up was conducted within 1 year to avoid confounding by a new campaign that started in March 1992. Conceivable effects of the pretest on exposure and cessation were examined by incorporating a second independent random sample of smokers: nonpretested smokers ( $n = 508$ ), who completed only the posttest and follow-up. The samples of smokers were selected by means of telephone screening of independent random samples drawn from national private telephone numbers.

### Questionnaires

The questionnaires for the computer-assisted telephone interviews gathered information on age, gender, level of education, and the following smoking behavior variables: (1) cigarette consumption; (2) type of tobacco use; (3) addiction, defined as smoking at least 25 cigarettes a day or smoking 16 to 24 cigarettes a day (along with smoking within 30 minutes after awakening, smoking when sick and in bed, or finding it hard to refrain from smoking for 24 hours)<sup>11,12</sup>; (4) quit attempts (abstinence for at least 24 hours) in the past and between assessments; (5) abstinence (not having smoked during the 7 days before measurement); and (6) sustained abstinence (being abstinent at the posttest and the follow-up test without relapses in between). The overall effect of the program (postcampaign recall and recognition of the campaign and campaign elements, level of use of campaign elements, and acquisition of written materials) was also assessed.

### Analyses

Study attrition resulted from subjects' refusal to take part and an inability to contact subjects. For the estimation of behavioral outcomes, refusers were judged as smokers without quitting attempts, while subjects who could not be contacted were considered to be similar to those who were, in fact, contacted (behavioral measure means for the contacted

**TABLE 1—Response Rates in Samples of Pretested Smokers and Nonpretested Smokers: Quit Smoking Together Campaign, the Netherlands**

	Pretested Smokers, no. (%)	Nonpretested Smokers, no. (%)
Pretest	1338	...
Posttest	1105 (83 <sup>a</sup> )	508
Refused interview	60 (5 <sup>a</sup> )	...
Could not be contacted	173 (13 <sup>a</sup> )	...
Follow-up	918 (83 <sup>b</sup> )	377 (74 <sup>b</sup> )
Refused interview	81 (7 <sup>b</sup> )	21 (4 <sup>b</sup> )
Could not be contacted	106 (10 <sup>b</sup> )	110 (22 <sup>b</sup> )

<sup>a</sup>Percentage of baseline sample.

<sup>b</sup>Percentage of posttest sample.

subjects were substituted for those of noncontacted subjects). In all other analyses, only subjects with complete data sets were included.

Stepwise logistic regression analyses were applied to assess (1) selection caused by dropout, (2) comparability of samples, and (3) differences in self-reported exposure between samples. Since logistic regression programs have no default values for tolerance that protect users against collinearities among independent variables (highly correlated variables measuring the same construct),<sup>13</sup> significant odds ratios (ORs) revealed in forward stepwise procedures were checked through backward selection. The significance of the effect of pretesting on behavior change (quit attempts and abstinence) was tested via univariate odds ratios.

Among subjects with complete data sets, dose-response relations between exposure and behavior change were examined by means of multivariate logistic regression analyses in which behavioral change variables (quit attempts, abstinence, and sustained abstinence) served as dependent variables. Participation in the pretest was entered in the first step, together with differences between the samples, to control for conceivable test effects. Subsequently, exposure frequency variables were selected through forward stepwise selection.

## Results

### Response and Subject Characteristics

Table 1 presents the numbers and percentages of subjects who participated in the assessments. Not being contacted appeared to be the main reason for dropout. Response rates in the follow-up test did not differ between pretested smokers and nonpretested smokers.

Pretested smokers who participated in the posttest differed from dropouts: older and

more highly educated smokers, female smokers, and smokers of hand-rolled cigarettes and combinations of tobacco products tended to remain in the study. No further selection in pretested smokers occurred at the follow-up test.

Table 2 shows the baseline characteristics of the samples. Comparison of pretested smokers and nonpretested smokers with complete data sets indicated that the sample of pretested smokers was significantly younger, on average, and that the ratio between cigarettes and combinations of tobacco products differed between pretested and nonpretested smokers (see Table 2). In subsequent analyses, age and type of tobacco use were included as covariates.

### Reach

The campaign was noticed by high percentages of smokers: 88% of the nonpretested smokers recalled the campaign, and 45% could reproduce a name or description of one of the campaign elements. The pretest apparently sensitized smokers and enhanced their awareness of the campaign, because significantly more pretested smokers knew of the campaign (OR = 2.34, 95% confidence interval [CI] = 1.81, 3.04). However, their self-reported frequency of exposure to the various elements did not differ from that of nonpretested smokers. Campaign elements reached 48% of the nonpretested smokers at least once (based on self-reports), mainly by way of the TV elements, since relatively small percentages of smokers recalled posters and advertisements or reported active participation in other campaign elements.

### Behavioral Effects

Table 3 describes behavioral changes in smokers as assessed in the 3 subsequent

measurements. A short-term effect was indicated with respect to enhancing quitting attempts between the pretest and posttest. The effectiveness of quitting attempts was not affected. After the campaign, a significantly higher percentage of pretested than nonpretested smokers were abstinent. Since cessation behavior between posttest and follow-up was not influenced by the pretest, the 2% abstinence difference between groups persisted during the follow-up. However, because of the decline in abstinence percentages, the test effect was not significant after the follow-up.

#### Relation Between Exposure and Behavior

After the possible effect of the pretest had been controlled, significant dose-response relations between exposure and behavior change were observed; the direction of causality was not clear, however, since watching might have followed quitting. The frequencies of watching TV shows and the TV clinic were positively related to attempting to quit between the pretest and the posttest (OR = 1.18, 95% CI = 1.08, 1.28, and OR = 1.31, 95% CI = 1.31, 1.52, respectively). Quit attempts between the posttest and the follow-up test and abstinence after the campaign and at follow-up were each promoted by watching more TV clinic episodes (OR = 1.37, 95% CI = 1.15, 1.62; OR = 1.21, 95% CI = 1.04, 1.39; and OR = 1.27, 95% CI = 1.09, 1.48, respectively). Sustained abstinence was enhanced by recalling more campaign elements (OR = 3.28, 95% CI = 1.65, 6.48) and watching more TV clinic episodes (OR = 1.36, 95% CI = 1.13, 1.65).

#### Discussion

The present study revealed that exposure to a multifaceted, mass media-led smoking cessation campaign may have stimulated quit attempts and enhanced both short- and long-term abstinence. Since the sequence of events between measurements was not known, causal conclusions with respect to short-term cessation cannot be drawn. For instance, people who stopped smoking first may have watched TV programs on smoking later. However, the dose-response relations between recalled campaign elements and number of TV clinic episodes watched, on the one hand, and between quitting behavior during follow-up and long-term abstinence, on the other hand, support the presence of a campaign effect on smoking cessation.

**TABLE 2—Baseline Characteristics of Samples of Pretested Smokers and Nonpretested Smokers With Complete Data Sets: Quit Smoking Together Campaign, the Netherlands**

Characteristic	Pretested Smokers (n = 918)	Nonpretested Smokers (n = 377)
<b>Demographic</b>		
Age, y, mean (SD)	38.9 (13.9) <sup>a</sup>	41.4 (14.3) <sup>a</sup>
Female, %	49	45
Education, <sup>b</sup> %		
Primary school/lower vocational school	26	31
Secondary vocational school	39	41
High school	8	6
Higher vocational school, university	27	22
<b>Smoking behavior</b>		
Daily consumption, mean (SD)	16.6 (10.1)	15.9 (9.5)
Type of tobacco use, %		
Cigarettes	48	42
Hand-rolled cigarettes	40	42
Combinations	12 <sup>c</sup>	16 <sup>c</sup>
Previous quit attempt, %	77	...
No. of previous quit attempts, mean (SD)	2.7 (7.3)	...
Addicted, %	40	35

<sup>a</sup>Significant difference found in stepwise logistic regression (odds ratio [OR] = 0.99, 95% confidence interval [CI] = 0.98, 1.00,  $P < .01$ ).

<sup>b</sup>In the Netherlands, 2 major school types for adolescents prevail: lower and secondary vocational schools prepare students for vocational and domestic jobs; secondary vocational schools and high schools prepare students for higher vocational schools and choice of university.

<sup>c</sup>Significant difference found in stepwise logistic regression; relative to smokers of machine-made cigarettes, there were fewer smokers of combinations of tobacco products in pretested smokers (OR = 0.64, 95% CI = 0.45, 0.93,  $P < .05$ ).

**TABLE 3—Quit Attempts During Study Period and at 10-Month Follow-Up, Along With Postcampaign and Post-Follow-Up Abstinence: Quit Smoking Together Campaign, the Netherlands**

	Pretested Smokers	Nonpretested Smokers
Baseline no.	1338	508
Campaign period (January–March 1991)		
Quit attempts, no. (% <sup>a</sup> )	393 (29) <sup>b</sup>	89 (18) <sup>b</sup>
Success rate of quit attempts, % <sup>c</sup>	22	21
Abstinent at posttest, no. (% <sup>a</sup> )	86 (6) <sup>d</sup>	19 (4) <sup>d</sup>
Follow-up period (April 1991–February 1992)		
Quit attempts, no. (% <sup>a</sup> )	403 (30)	139 (27)
Success rate of quit attempts, % <sup>c</sup>	17	20
Abstinent at follow-up test, no. (% <sup>a</sup> )	129 (10)	39 (8)
Sustained abstinence (abstinent at posttest and follow-up test, no lapses in between), no. (% <sup>a</sup> )	59 (4)	11 (2)

<sup>a</sup>Percentage of baseline sample.

<sup>b</sup>Significant difference found through univariate logistic regression (odds ratio [OR] = 1.96, 95% confidence interval [CI] = 1.50, 2.55,  $P < .001$ ).

<sup>c</sup>Percentage of quit attempts.

<sup>d</sup>Significant difference found through univariate logistic regression (OR = 1.77, 95% CI = 1.04, 3.05,  $P < .05$ ).

#### Validity of Measurement

Self-reports are acceptable for the assessment of smoking behavior.<sup>14,15</sup> However, they may represent poor conceptualizations of actual exposure to mass media elements and participation in treatment modalities. Although percentages of self-

reported calls to the quit line in the present study were comparable to similar data from an investigation conducted in California,<sup>16</sup> comparisons of self-reported exposure data with objective measures such as network viewing rates and program records revealed considerable discrepancies (an appendix detailing these comparisons is available from

the authors). Only self-reported exposure frequency and purchase of the TV clinic manual were reasonably accurate. Because the TV clinic was a concept unfamiliar in the Netherlands, it may have left a stronger impression, and its description may not have fit other modalities (as could have been the case with the less innovative components). This supposition was supported by the dose-response relations between frequency of exposure to the TV clinic and behavior change.

### *Threats to Validity*

Evaluations of mass media campaigns incorporate unpreventable threats to internal validity,<sup>7</sup> which might partially account for the effects observed here. In a small country such as the Netherlands, national media have the potential to reach everyone. Therefore, it was impossible to incorporate a comparable control group that would be known beforehand not to be exposed. Such a control group would have accounted for most of the threats to validity in this study. The consequence was that the appraisal of which part of the observed cessation rate could be attributed to the campaign had to be based on inference and required estimates of the most important threats to validity: selection, test effects, and history.<sup>7</sup>

Selection through sampling and dropout may have contributed to finding higher abstinence rates, because those having an easier time quitting may have been sampled and participation of abstinent subjects in the post-campaign interviews may have been higher. Since middle-aged women seem to be somewhat overrepresented in baseline samples of smokers<sup>1</sup> and women's success rates generally are lower than men's,<sup>17</sup> it is unlikely that those having an easier time quitting were sampled. Dropout analyses showed that older and more highly educated smokers, female smokers, and smokers of hand-rolled cigarettes and combinations of tobacco products tended to remain in the study. Because, in general, older and more highly educated smokers are more effective in terms of cessation, and women are less effective,<sup>17</sup> quitting rates may not have been affected unacceptably (the differential quitting effectiveness of smokers of various tobacco products remains unknown at this point).

Through the incorporation of a non-pretested group of baseline smokers, the stimulating effects of the pretest on exposure and quitting were examined and could be controlled. However, the posttest may also have had its effect and may have had an impact on follow-up abstinence. The magnitude of this effect after a 10-month follow-up

was estimated to be 1%, assuming that the postcampaign interview resulted in the same 2% short-term abstinence as the pretest and that 50% were abstinent at follow-up (based on quitting rates in naturalistic samples<sup>17</sup>).

History incorporates extraneous events—both positive (e.g., other smoking cessation programs) and negative (e.g., tobacco promotion)—and secular trends (what would have happened had the campaign not been implemented). The possibility of positive extraneous events was ruled out because the Dutch Smoking and Health Foundation coordinates almost all smoking cessation activities and has contacts with all other organizations in the field, and therefore it was known that no positive extraneous events took place during the campaign. The notable increase in tobacco promotion budgets from \$66 million in 1989 to \$113 million in 1990<sup>2</sup> may have constituted a negative extraneous event for adult smokers by contributing to a smoking-permissive environment. However, the effect of this event remains unknown.

Based on unpublished results of an ongoing trend study by the Dutch Smoking and Health Foundation (B. Baan and M. Wiebing, written communication, January 1992), it was estimated that as of 1988, 2% of the Dutch population who smoked on January 1 of a given year were abstinent at the end of that year. For the study period of 14 months, the secular trend was estimated to be 2.5%. Since the trend study incorporated new samples in each assessment, no evidence was available with respect to sustained abstinence. The possible negative influence of the tobacco promotion increase was not included in this estimation, making it a conservative measure.

Through subtraction of estimates of the test effect (1%) and the secular trend (2.5%) from the long-term cessation rate revealed in nonpretested smokers (8%), a conclusive effect of 4.5% abstinence attributable to the campaign was estimated.

### *Cost-Effectiveness*

The 4.5% of Dutch smokers (4.15 million individuals) the campaign might have stimulated to quit is equivalent to 187 000 ex-smokers. Based on this estimation, the cost-effectiveness of the program appears to be on the order of \$12 per quit. It should be kept in mind that this was a rather simple analysis of costs, from the perspective of the main sponsor of the campaign. Possible extra costs for others were not investigated. Moreover, a major portion of the development costs of the campaign was included in the computation. Repetition of (parts of) the

campaign could therefore be more cost-effective. On the other hand, the Dutch Smoking and Health Foundation profited from free airtime. Recurrence might imply purchasing of TV time. In her review of cost-effectiveness studies in the field of smoking cessation, Elixhauser<sup>18</sup> reported that cost per quitter varied in studies of self-help and mass media smoking cessation programs between \$27 and \$921 per quitter after 1 year of follow-up. Sustained abstinence from tobacco may result in several years of life saved per individual. In comparison with medical interventions that require \$30 000 to \$150 000 per year of life saved,<sup>19</sup> the estimated outcomes of this mass media smoking cessation campaign are extraordinarily attractive.

### *Conclusions*

The multifaceted mass media-led smoking cessation campaign described here may have increased normal cessation rates substantially. Moreover, the campaign seemed highly cost-effective. Since the estimated abstinence rate attributable to the campaign exceeded objective rates of active participation, the conclusion emerged that the most substantial results were established in smokers who were exposed only to mass media messages. In comparison with cessation rates in previous years and a 72% rise in expenditures on tobacco promotion in 1990 in the Netherlands, the results of the present study appear meaningful, since the effects might have been greater if tobacco promotion had been less prominent. In comparison with the results of the Chicago Televised Smoking Cessation Program,<sup>20</sup> which reported a difference between quit rates of exposed participants and a nonexposed population sample of about 2.5% after a 12-month follow-up (not corrected for test effects), the results of the present study seem impressive. Positive longitudinal dose-response relations between self-reported exposure and long-term smoking cessation support the effect claim for the campaign.

Flay<sup>6</sup> suggested that governmental control over the media may be the main facilitator of the success of media interventions. The absence of such control in the Netherlands lines the present campaign up with the Chicago Televised Smoking Cessation Program as exceptions to Flay's rule. Others have stressed the importance of media coverage of smoking cessation campaigns.<sup>6</sup> The results of the present study, especially the impact of the TV clinic, support such statements. □

## Contributors

A. N. Mudde planned the study, composed the measurement instruments, coordinated the data gathering, and analyzed the data. Both A. N. Mudde and H. De Vries contributed to the writing of the paper. Both authors are guarantors for the integrity of the research.

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