

## SUPPLEMENT

# Effectiveness and cost effectiveness of television, radio and print advertisements in promoting the New York smokers' quitline

Matthew C Farrelly, Altijani Hussin, Ursula E Bauer

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**Objectives:** This study assessed the relative effectiveness and cost effectiveness of television, radio and print advertisements to generate calls to the New York smokers' quitline.

**Methods:** Regression analysis was used to link total county level monthly quitline calls to television, radio and print advertising expenditures. Based on regression results, standardised measures of the relative effectiveness and cost effectiveness of expenditures were computed.

**Results:** There was a positive and statistically significant relation between call volume and expenditures for television ( $p < 0.01$ ) and radio ( $p < 0.001$ ) advertisements and a marginally significant effect for expenditures on newspaper advertisements ( $p < 0.065$ ). The largest effect was for television advertising. However, because of differences in advertising costs, for every \$1000 increase in television, radio and newspaper expenditures, call volume increased by 0.1%, 5.7% and 2.8%, respectively.

**Conclusions:** Television, radio and print media all effectively increased calls to the New York smokers' quitline. Although increases in expenditures for television were the most effective, their relatively high costs suggest they are not currently the most cost effective means to promote a quitline. This implies that a more efficient mix of media would place greater emphasis on radio than television. However, because the current study does not adequately assess the extent to which radio expenditures would sustain their effectiveness with substantial expenditure increases, it is not feasible to determine a more optimal mix of expenditures.

A comprehensive tobacco control programme includes multiple interventions to decrease smoking initiation and increase the number of smokers who successfully quit.<sup>1</sup> Interventions shown to effectively increase cessation include smoking cessation telephone help lines (quitlines), reduced out of pocket costs for cessation therapies and mass media campaigns.<sup>2-3</sup> Exposure to antismoking television advertisements has been associated with increases in calls to quitlines<sup>4-8</sup> and a recent study indicated that publicising the availability of nicotine replacement therapy (NRT) in the news media can also increase quitline call volume.<sup>9</sup>

Quitlines usually provide a range of services, including counselling, taped messages or tips for smoking cessation, self help materials and informational websites.<sup>10</sup> Other common features include fax referral systems that allow healthcare providers to arrange for a quitline specialist to call a patient and to provide NRT free on a limited basis or at a reduced price. Smokers who receive a free NRT "starter kit" through a quitline have a higher quit rate than comparable quitline callers who do not receive NRT.<sup>11-12</sup>

While these studies show that media campaigns can increase quitline call volume, there is no published literature that compares the relative effectiveness and cost effectiveness of different media types. This study explores the relative effectiveness and cost effectiveness of television, radio and print advertisements for New York State's smokers' quitline by examining the relation between call volume and advertising expenditures for these three media. The New York smokers' quitline has been operating since 2000 and currently offers telephone counselling, taped messages, self help materials, a website and a free two-week supply of NRT to eligible callers. Quitline specialists are available from 9 am to 9 pm, Monday through Friday and from 9 am to 1 pm at the weekend. In addition, at any time of the day or night callers can leave a message to be contacted, or listen to a tip of the day and/or taped messages. The quitline also offers a fax referral programme for healthcare providers.

## METHODS

The main outcome measure was monthly total county level calls to the New York smokers' quitline from January 2005 through April 2006. New York City (comprising five counties) was considered one geographic (that is, county) unit and St Lawrence County was excluded because it is not associated with any of New York's 10 media markets. Therefore, there were 912 observations in the analysis (that is, 16 months times 57 geographic units).

The primary independent variables included monthly television, radio and print advertising expenditures. Television expenditures are reported for the 10 television media markets in New York State. Radio and print expenditures correspond to the broadcast and primary circulation area, respectively. The monthly media expenditures were then matched to monthly call volume based on the counties in each broadcast/circulation area. Expenditures on all television and newspaper advertisements were included regardless of focus (for example, smoking cessation, the dangers of secondhand smoke) because all advertisements included the quitline telephone number. Radio expenditures were limited to advertisements for which promoting the quitline was the main objective. These expenditures capture efforts to promote the quitline by the New York State Department of Health and the New York City Department of Health and Mental Hygiene. To account for the possibility that other factors unique to New York City affected average call volume during the study period, we included an indicator to identify calls originating from there.

Total county level call volume was first regressed on the three expenditure variables and the indicator for calls originating from New York City (all in one model). However, the distribution of calls was not normally distributed and a

**Abbreviation:** NRT, nicotine replacement therapy

**Table 1** Regression of log call volume on mass media expenditures

Independent variable	Regression coefficient (p value) [95% confidence interval]	Advertising elasticity	Mean monthly expenditure (SD)
Television expenditures	1.36 (0.004) [0.554 to 2.173]	0.151*	\$114 917 (350 635)
Television expenditures squared	-0.21 (0.007) [-0.353 to -0.075]	*	\$136 015 806 464 (1 567 004 033 024)
Radio expenditures	0.057 (0.000) [0.044 to 0.070]	0.037	\$652 (3194)
Newspaper expenditures	0.028 (0.065) [-0.002 to 0.059]	0.022	\$777 (2953)
Indicator variable for New York City	3.79 (0.000) [3.64 to 3.95]	-	-
Number of observations	912		

\*The elasticity for television expenditures is based on both expenditures and the square of expenditures.

subsequent model specification test indicated that a log linear specification fit the data better than a linear model. In addition, we included squared expenditures in the model to account for the possibility that additional advertising expenditures could have decreasing effects. The squared term was only significant for television expenditures; therefore, the squared expenditures variables for radio and newspapers were dropped from the model. Because television expenditures vary at the media market level rather than the county level, there are multiple counties with the same level of television expenditures. To account for this, the regression was clustered at the media market level. This procedure accounts for clustering that occurs within smaller geographic areas within the media markets, such as counties.<sup>13</sup>

We calculated elasticities to test the relative effectiveness of the television, radio and newspaper expenditures. Elasticities represent the percentage change in the outcome variable for a given percentage change in an independent variable. For example, if the elasticity for television advertising expenditures from the analyses described above is 0.2, this implies that increasing expenditures by 10% would lead to a 2% increase in call volume.

## RESULTS

The results from the regression show that increases in television expenditures were associated with an increased volume of calls to the quitline ( $p < 0.01$ ) (table 1). The square of television expenditures was also significant ( $p < 0.01$ ), indicating that as the level of expenditures increased, the positive effect they had on call volume diminished. Radio expenditures were also positively correlated with call volume ( $p < 0.001$ ) and newspaper expenditures were marginally significant ( $p = 0.065$ ). The elasticities suggest that dollar for dollar television expenditures generated more call volume than radio and newspaper expenditures (0.151 vs 0.037 and 0.022). However, because the effectiveness of television expenditures diminished as the expenditures increased, we compared the effect of a hypothetical increase of \$1000 per medium. This comparison shows that a \$1000 increase for television would lead to a 0.87% increase in mean expenditures. Multiplying this increase by the corresponding elasticities leads to a 0.1% increase in call volume ( $0.1\% = 0.87\% \times 0.151$ ). A \$1000 increase for radio (153% increase) and print (129% increase) would lead to 5.7% ( $0.037 \times 153\%$ ) and 2.8% ( $0.022 \times 129\%$ ) increases in call volume, respectively. The \$1000 increase in average monthly television, radio and print expenditures is expected to increase the average monthly number of calls from its current level by 3, 11 and 5 calls, respectively. Therefore, at the current levels of expenditures, the most cost effective advertising investment would be in radio, followed by print and television.

## DISCUSSION

Consistent with previous research and common wisdom about the effectiveness of mass media efforts to promote calls to quitlines, the findings from the current study indicate strong evidence that television and radio advertisements are effective. In addition, there is somewhat less robust evidence for the effectiveness of newspaper advertisements. For example, the findings show that television advertisements generated more calls to quitlines than did radio or print advertisements. This is not surprising given the medium's capacity to deliver high impact messages, which combine audio and visual images, to a large audience. However, television is an expensive medium and the findings suggest that radio advertisements may be a cost effective alternative. In addition, increased radio and print expenditures did not show decreasing returns in quitline call volume, although this relation could change with a large infusion of resources. Programme planners should carefully examine the relative effectiveness and cost effectiveness of the mass media channels they use to promote quitlines and identify critical points to consider shifting limited media resources from television to other media.

While the study findings are encouraging, there are several limitations to this study. Media expenditures represented the primary independent measure of media exposure. We did not measure other quitline promotions, such as internet advertisements and efforts to gain "earned" media promoting the quitline (for example, press releases). In addition, other organisations may have promoted the New York State smokers' quitline and the study did not account for those efforts. While both the placement and content of television advertisements are important components of quality and potential impact,<sup>7 8</sup> this analysis did not include these measures. Finally, it is likely that the advertising in one media market spills over into another media market. As a result, the findings may have underestimated the strength of the relation between advertising expenditures and quitline call volume.

### What this paper adds

- In addition to television advertisements, radio and print advertisements can also be effective methods to promote telephone quitlines.
- While television advertisements may be more effective than radio and print advertisements in generating quitline calls, television advertisements are not necessarily more cost effective.

**Authors' affiliations**

**Matthew C Farrelly**, Altijani Hussin, Public Health Policy Research Program, RTI International\*

**Ursula E Bauer**, Tobacco Control Program, New York State Department of Health

Funding for the study was provided by the New York State Department of Health Tobacco Control Program, Corning Tower, Room 710, Albany, NY 12237-0676, USA

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Correspondence to: Matthew C Farrelly, Public Health Policy Research Program, RTI International, 3040 Cornwallis Road, Research Triangle Park, NC 27709, USA; mcf@rti.org

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