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Cost Effectiveness of the *Tips From Former Smokers*® Campaign—U.S., 2012–2018

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Abstract

Introduction: Since 2012, the Centers for Disease Control and Prevention has conducted the national *Tips From Former Smokers*® public education campaign, which motivates smokers to quit by featuring people living with the real-life health consequences of smoking. Cost effectiveness, from the healthcare sector perspective, of the *Tips From Former Smokers*® campaign was compared over 2012–2018 with that of no campaign.

Methods: A combination of survey data from a nationally representative sample of U.S. adults that includes cigarette smokers and literature-based lifetime relapse rates were used to calculate the cumulative number of *Tips From Former Smokers*® campaign–associated lifetime quits during 2012–2018. Then, lifetime health benefits (premature deaths averted, life years saved, and quality-adjusted life years gained) and healthcare sector cost savings associated with these quits were assessed. All the costs were adjusted for inflation in 2018 U.S. dollars. The *Tips From Former Smokers*® campaign was conducted and the survey data were collected during 2012–2018. Analyses were conducted in 2019.

Results: During 2012–2018, the *Tips From Former Smokers*® campaign was associated with an estimated 129,100 premature deaths avoided, 803,800 life years gained, 1.38 million quality-adjusted life years gained, and $7.3 billion in healthcare sector cost savings on the basis of an estimated 642,200 campaign-associated lifetime quits. The *Tips From Former Smokers*® campaign was associated with cost savings per lifetime quit of $11,400, per life year gained of $9,100, per premature deaths avoided of $56,800, and per quality-adjusted life year gained of $5,300.

Conclusions: Mass-reach health education campaigns, such as *Tips From Former Smokers*®, can help smokers quit, improve health outcomes, and potentially reduce healthcare sector costs.

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INTRODUCTION

Cigarette smoking imposes a substantial health and financial burden on smokers, the healthcare sector, and society at large.[1,2] Although the prevalence of current cigarette smoking in the U.S. has been steadily declining for decades, including since 2012 (18.1%),[3] an estimated 13.7% of adults (or 34.2 million adults) remained smokers in 2018.[4] Smoking-related illness in the U.S. costs >$300 billion each year, including nearly $170 billion for direct medical care for adults[5] and >$156 billion in lost productivity.[3] Evidence-based mass-reach health education campaigns are effective in motivating people who smoke to quit and in reducing smoking prevalence.[2]

Since 2012, the Centers for Disease Control and Prevention (CDC) has conducted the national *Tips From Former Smokers*® (*Tips*®) tobacco education campaign, which encourages smokers to quit by featuring people living with real-life health consequences of smoking. Previous studies have shown that *Tips*® increased population-level quit attempts and sustained quits[6-8] and that the 2012 campaign was cost effective from CDC's perspective.[9] However, the long-term cost effectiveness of the campaign, and from the healthcare sector perspective, has not been assessed. This study estimates the cost effectiveness of the *Tips*® campaign compared with that of no campaign during 2012–2018.

METHODS

The *Tips*® campaign's cost effectiveness was assessed from the healthcare sector perspective by estimating campaign-attributable lifetime healthcare benefits and costs. A nationally representative online survey of adult cigarette smokers in the U.S. was used to estimate campaign-associated quit attempts and corresponding quits lasting ≥6 months (initial sustained quits) as a function of exposure to *Tips*®.[6] Estimated quits then were adjusted downward to account for an estimated lifetime relapse of 45.9%[10-12] to derive total campaign-associated lifetime quits (assuming no additional relapse after 11 years).[10-12] The survey-based estimates of campaign-associated quit attempts and initial quits were applied to available survival rates[13] to derive lifetime health benefits from campaign-associated smoking cessation. Premature deaths avoided, life years (LYs) gained, and quality-adjusted LYs (QALYs[14]) gained owing to *Tips*®-associated smoking cessation were estimated. Survival rates for smokers and former smokers[13] were used to estimate gains in QALYs, by age and sex group, from campaign-associated quitting. LY and QALY gains were calculated at corresponding midpoints of age groups as the difference in LYs and QALYs between former smokers and continuing smokers. Premature deaths averted were calculated as the difference between the number of former smokers and an equally sized group of continuing smokers (by age and sex groups) who survived to the projected former-smoker life expectancy at the time of quit. Health benefit calculations were repeated for each survey-based lower and upper CI of initial quits to generate lower and upper prediction intervals (PIs) for campaign-associated health benefits.

Assessed campaign-associated and healthcare sector costs included mass media and program evaluation costs, cessation treatment costs, and lifetime healthcare cost savings associated with quitting. Cessation treatment costs were estimated by multiplying the total number

of people with campaign-associated quit attempts who used cessation treatments[15] by the average cessation treatment cost per quit attempt. The estimated average cost for a quit attempt was $373 for cessation medication only, $147 for cessation counseling only, and $520 for both medication and counseling.[16] Campaign-associated quit attempts involving cessation treatment were determined on the basis of the proportion of people making quit attempts who reported using cessation medication or counseling.[17]

Lifetime healthcare cost savings associated with quitting were calculated as the product of the number of people with campaign-associated lifetime quits and per capita lifetime healthcare cost savings associated with quitting estimated on the basis of Tricare Prime data.[18] The cost effectiveness of *Tips*® was assessed by estimating campaign-associated lifetime healthcare sector costs per campaign-associated lifetime health benefits. Net present values for future health benefits and costs were discounted 3%.[14] Dollar estimates were adjusted for inflation to 2018 U.S. dollars using the Gross Domestic Product Implicit Price Deflator.[19] The *Tips*® campaign was conducted, and the survey data were collected annually, during 2012–2018. Analyses were conducted in 2019. Because the analysis was based on secondary and deidentified data, IRB review was not required.

RESULTS

During 2012–2018, the *Tips*® campaign was associated with an estimated 642,200 (95% CI=559,900, 708,100) lifetime quits (Table 1). The total estimated healthcare sector costs included $490.0 million for *Tips*® campaign implementation and evaluation and $3.2 billion for cessation treatments for quitting (Table 2). *Tips*® campaign lifetime quits were estimated to reduce healthcare spending by $11.0 billion, resulting in estimated net healthcare sector cost savings of $7.3 billion after accounting for the costs of campaign implementation and evaluation and for the cessation treatment costs (Table 2).

The 642,200 estimated lifetime quits translated into 129,100 (PI=112,500, 142,300) smoking-associated premature deaths avoided, 803,800 (PI=700,800, 886,300) discounted LYs gained, and approximately 1.38 million (PI=1.20 million, 1.52 million) QALYs gained (Table 3). The *Tips*® campaign was associated with cost savings per lifetime quit of $11,400 (PI=$11,300, $11,500), per LY gained of $9,100 (PI=$9,000, $9,200), per premature deaths avoided of $56,800 (PI=$56,200, $57,100), and per QALY gained of $5,300 (PI=$5,300, $5,400) (Table 3).

DISCUSSION

During 2012–2018, the *Tips*® campaign was associated with $7.3 billion in healthcare sector cost savings. This study builds on previous work[9] by assessing the campaign's cost effectiveness from the healthcare sector perspective and by accounting for lifetime relapse. Although both this study and the previous study[9] found *Tips*® to be cost effective, differences in the analytical perspective and methodology between these studies mean that the respective findings are not directly comparable.

Findings from this study provide additional evidence that tobacco education campaigns such as *Tips*® are effective in motivating people who smoke to quit.[6-8] The long-term impact of

quitting associated with *Tips*® campaigns include reduced smoking-attributable morbidity, mortality, and potentially healthcare sector costs.

Limitations

This study is subject to several limitations. First, the analysis assumed that no relapse occurs 11 years after smoking abstinence because the literature suggests that relapse is uncommon after 11 years.[10-12] If relapse occurs after 11 years, this study may overestimate lifetime quits. Second, this study did not account for additional healthcare costs associated with prolonged life expectancy resulting from quitting. This likely overestimates lifetime healthcare cost savings. Third, this study did not account for health benefits and healthcare cost savings associated with reductions in secondhand smoke among nonsmokers resulting from increased cessation among smokers. This likely underestimates health benefits and cost savings. Fourth, this study did not account for productivity gains associated with increased life expectancy from quitting. This likely underestimates the cost savings. Fifth, the average lifetime healthcare cost savings estimates in this analysis are based on Tricare Prime data.[18] Although this estimate might not be generalizable to the overall population, it was used because it is based on relatively recent data and similar to other previously dated estimates for the general population available in the literature.[20]

CONCLUSIONS

During 2012–2018, the *Tips*® campaign helped to reduce the burden of smoking by encouraging adults to quit. Investment in mass-reach health education campaigns such as the *Tips*® campaign can help smokers to quit, improve health outcomes, and potentially result in smoking-attributable healthcare sector cost savings.

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Table 1.

Estimated *Tips*® Campaign–Associated Total Sustained Quits by Campaign Year, 2012–2018

Campaign year	Dates on air	Quit attempts[a]	Initially sustained quits (95% CI)[b]	Lifetime quits (95% CI)[c]
2012	March 19–June 19	1,696,200	122,500 (106,800, 135,000)	66,300 (57,800, 73,100)
2013	March 4–June 17	1,964,800	141,900 (123,700, 156,400)	76,700 (66,900, 84,600)
2014	February 3–April 6, July 7–September 7	2,436,400	175,900 (153,400, 193,900)	95,200 (83,000, 104,900)
2015	March 30–August 16	2,198,500	158,700 (138,400, 175,000)	85,900 (74,900, 94,700)
2016	January 25–June 12	2,385,100	172,200 (150,100, 189,900)	93,200 (81,200, 102,700)
2017	January 9–July 30	3,083,700	222,600 (194,100, 245,500)	120,500 (105,000, 132,800)
2018	April 23–October 14	2,676,200	193,200 (168,500, 213,000)	104,500 (91,100, 115,300)
Total	—	16,440,900	1,187,000 (1,034,900, 1,308,800)	642,200 (559,900, 708,100)
Annual average	—	2,348,700	169,600 (147,800, 187,000)	91,700 (80,000, 101,200)

Note: All values are rounded to the nearest 100.

[a]Quit attempts were estimated as the number of quits associated with the *Tips*® campaign using data on exposure to the *Tips*® campaign, smoking status, and cessation behavior from a nationally representative online survey of adult cigarette smokers in the U.S.[6]

[b]Initially sustained quits were estimated as *Tips*® campaign–associated quits that lasted for at least 6 months.

[c]Lifetime quits were estimated as the number of initially sustained quits that maintained permanent quit status. These estimates accounted for a lifetime relapse rate of 45.9% after 6 months of abstinence, assuming no additional relapse after 11 years of abstinence.[10-12]

Tips®, *Tips From Former Smokers*®.

Table 2.

Estimated *Tips*® Campaign–Associated Healthcare Sector Cost Savings, 2012–2018 (2018 U.S. Dollars)

Costs/savings	Total (prediction interval), $
Costs	
Tips® campaign	490.0 million
Broadcast TV and radio	307.4 million
Print and out-of-home	47.2 million
Digital video	50.5 million
Mobile and display	29.8 million
Other campaign	10.7 million
Evaluation	44.4 million
Cessation treatment (NRT/medications and counseling)[a]	3.2 billion (2.8B, 3.5B)
Unsuccessful quit attempt	2.3 billion (2.0B, 2.5B)
Successful quit	0.9 billion (0.8B, 1.0B)
Savings	
Total healthcare cost savings associated with quitting[b]	11.0 billion (9.6B, 12.1B)
Total net healthcare sector cost savings[c]	7.3 billion (6.3B, 8.1B)

Note: Using the estimated number of adult cigarette smokers[4] and the total population in 2018 (https://www.census.gov/newsroom/press-kits/2018/pop-estimates-national-state.html), the estimated total costs of the campaign and cessation treatments were $107 ($96.2, $116.7) per cigarette smoker and $11.3 ($10.1, $12.2) per capita; total healthcare cost savings associated with quitting were $321.6 ($280.7, $353.8) per cigarette smoker and $33.6 ($29.3, $37.0) per capita; and the total net healthcare sector cost savings were $213.7 ($184.5, $236.8) per cigarette smoker and $22.3 ($19.3, $24.8) per capita. Estimates were adjusted to 2018 U.S. dollars using the Gross Domestic Product Implicit Price Deflator.

[a]The estimated costs for an average quit attempt were calculated using the proportion of quitters who utilized each of the cessation methods (medication only, counseling only, and both) and the average retail costs for these cessation methods.[15] It was assumed that smokers who attempted to quit but were unsuccessful made an average of 1 quit attempt, whereas smokers who were successful in quitting made an average of 10 quit attempts.[16]

[b]The present value of future healthcare cost savings was estimated using a 3% discount rate.[14] The estimate of lifetime healthcare cost savings from quitting does not account for prolonged life resulting from quitting.

[c]Calculated as the difference between the total healthcare cost savings and the cost of the *Tips*® campaign and cessation treatment.

B, billion; NRT, nicotine replacement therapy; *Tips*®, *Tips From Former Smokers*®.

Table 3.

Estimated *Tips*® Campaign–Associated Health Benefits and Healthcare Sector Cost Savings per Health Benefit, 2012–2018

Health benefits	Total benefits (prediction interval)[a]	Campaign cost per health benefit (prediction interval), $[b]	Net healthcare sector cost savings per health benefit (prediction interval), $[c]
Campaign-associated quits[d]	642,200 (559,900, 708,100)	800 (700, 900)	11,400 (11,300, 11,500)
Premature deaths avoided[e]	129,100 (112,500, 142,300)	3,800 (3,400, 4,400)	56,800 (56,200, 57,100)
Discounted LYs gained[f]	803,800 (700,800, 886,300)	600 (600, 700)	9,100 (9,000, 9,200)
QALYs gained[g]	1,377,500 (1,200,900, 1,518,800)	400 (300, 400)	5,300 (5,300, 5,400)

Note: All values are rounded to the nearest 100. All cost and cost savings estimates were adjusted to 2018 U.S. dollars using the Gross Domestic Product Implicit Price Deflator.

[a]The present value of future health benefits, estimated using a 3% discount rate.

[b]Calculated by dividing the total *Tips*® campaign cost ($490 million) by the total health benefits. The prediction interval was calculated by dividing the total *Tips*® campaign cost by the corresponding prediction interval for total health benefits.

[c]Calculated by dividing the total net healthcare sector cost savings ($7.3 billion) by the total health benefits. The prediction interval was calculated by dividing the prediction interval for total net health care cost savings by the corresponding prediction interval for total health benefits.

[d]Campaign-associated lifetime quits, which were estimated as the number of initially sustained quits (lasting at least 6 months) that maintained permanent quit status. These estimates accounted for a lifetime relapse rate of 45.9% assuming no additional relapse after 11 years of abstinence.[10-12] Prediction intervals for campaign-associated quits equal to 95% CIs for these estimates.

[e]Premature deaths averted was calculated as the difference in the number of deaths for each age group on the basis of life tables for smokers who quit versus continuing smokers.

[f]LY gained was calculated as the difference in the sum of the remaining LY for each age group on the basis of life tables for smokers who quit versus continuing smokers. Mean LY gains for each age group are from Jha et al.[13] and match the calculated gains from the life tables.

[g]QALY gained was calculated for up to age 75 years to be consistent with the age limitation on premature death calculation.

LY, life year; QALY, quality-adjusted life year; *Tips*®, *Tips From Former Smokers*®.