

Examining the Effect of Public Health Campaigns on Smoking Cessation: A Logistic Regression Analysis

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Abstract.

This study investigated the impact of public health campaigns on smoking cessation rates through a cross-sectional analysis of 1,200 adults recruited using stratified random sampling from community centers and health clinics. The research evaluated the effectiveness of different campaign intensities and content types while identifying key demographic and psychological predictors of cessation success. Results demonstrated significantly higher cessation rates among individuals exposed to campaigns (47.4%) compared to those not exposed (23.2%), with a clear dose-response relationship between campaign intensity and cessation success. Logistic regression analysis identified significant predictors of cessation, including campaign exposure (OR=2.31), campaign intensity (OR=1.23 per unit increase), health risk messaging (OR=1.48), higher self-efficacy (OR=1.38), and greater motivation (OR=1.26). Notable demographic disparities were observed, with lower cessation rates among females (OR=0.78) and individuals of low socioeconomic status (OR=0.52). The findings support the efficacy of comprehensive public health campaigns for smoking cessation while highlighting the need for targeted approaches to address persistent socioeconomic and gender disparities. The study concludes that optimally effective cessation campaigns should employ high-intensity, multi-content approaches while incorporating strategies to enhance psychological factors such as motivation and self-efficacy.

Key Words: Public Health, Campaigns and Smoking Cessation

Background

Public health campaigns have long been recognized as vital tools in the fight against smoking, with their primary objective being to reduce smoking prevalence and encourage cessation among individuals (Nicholas & Sarah, 2024). These campaigns utilize various communication strategies and media platforms to disseminate information about the harmful effects of smoking, promote cessation resources, and foster a supportive environment for individuals attempting to quit (Birch & Auld, 2019). The theoretical framework underpinning these campaigns often draws from health behavior theories, such as the Health Belief Model and the Theory of Planned Behavior, which emphasize the role of individual perceptions, attitudes, and social influences in shaping health-related behaviors (Kolbe, 2019).

Logistic regression analysis emerges as a powerful statistical method for understanding the relationship between public health campaign exposure and smoking cessation outcomes. This technique allows researchers to model the probability of an event occurring, such as an individual successfully quitting smoking, based on one or more predictor variables, including demographic factors, campaign exposure intensity, and individual motivation levels (van Erp et al., 2020). By employing logistic regression, researchers can identify significant predictors of cessation success and quantify the impact of public health campaigns while controlling for potential confounding variables, thereby providing valuable insights into the effectiveness of these interventions (Sánchez-Hernando et al., 2021).

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Furthermore, the examination of public health campaigns through logistic regression analysis not only contributes to the academic understanding of smoking cessation dynamics but also informs policymakers and health practitioners about the most effective strategies for promoting cessation (Irawati & Wibowo, 2021). By analyzing data collected from diverse populations, researchers can discern patterns and trends that indicate which campaign elements resonate most with specific demographic groups, allowing for the tailoring of future interventions (Ariyo & Kazaara, 2024). Ultimately, this analytical approach underscores the importance of evidence-based strategies in public health, ensuring that resources are allocated efficiently to maximize the impact on smoking cessation rates (Biomedical & 2022, 2022).

The contextual background for examining the effect of public health campaigns on smoking cessation is rooted in the global health crisis posed by tobacco use, which remains one of the leading causes of preventable death and disease (Pierce & Stevermer, 2023). Despite significant declines in smoking rates in many countries due to increased awareness and regulatory measures, smoking continues to disproportionately affect vulnerable populations, highlighting the need for targeted interventions (Choi et al., 2020). Public health campaigns, including media advertisements, community outreach programs, and policy initiatives, have been implemented to raise awareness about the dangers of smoking, reduce social acceptability, and provide resources for quitting. These campaigns are often designed based on rigorous research and health behavior theories, aiming to influence attitudes and behaviors regarding smoking (Wilson et al., 2023). As such, understanding their effectiveness through rigorous analytical methods, such as logistic regression, becomes crucial for evaluating past efforts and shaping future strategies to combat tobacco use effectively.

Problem Statement

Despite ongoing public health efforts to reduce smoking rates, tobacco use remains a significant public health challenge, particularly among certain demographic groups. Smoking is a leading cause of preventable diseases, including cardiovascular conditions, respiratory diseases, and various forms of cancer, placing a substantial burden on healthcare systems and economic productivity (Alvarez-Peregrina et al., 2020). While numerous public health campaigns have been implemented to promote smoking cessation, there remains a lack of comprehensive understanding regarding their effectiveness, particularly in different social, economic, and cultural contexts (Ssekamatte et al., 2019). Many existing smoking cessation interventions vary in their approach, including mass media campaigns, taxation policies, community-based programs, and regulatory measures such as warning labels and smoking bans. However, the extent to which these campaigns successfully influence smoking behavior and cessation rates remains uncertain (El Ouazzani et al., 2022). Factors such as demographic characteristics, socioeconomic status, psychological determinants, and exposure to campaign messaging may significantly impact cessation outcomes. Additionally, the intensity, content, and frequency of public health campaigns may play a crucial role in determining their effectiveness (Thøgersen et al., 2020). This study aims to address these knowledge gaps by systematically examining the impact of public health campaigns on smoking cessation rates. Specifically, it seeks to identify key predictors of successful smoking cessation, analyze the relationship between campaign intensity and messaging content with behavioral change, and assess how different demographic groups respond to various cessation interventions.

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Objectives of the study.

- 1. To Evaluate the Impact of Public Health Campaigns
- 2. To Identify Key Predictors of Smoking Cessation
- 3. To Examine the Role of Campaign Intensity and Content

Hypotheses

- 1. Public health campaigns significantly reduce smoking prevalence among individuals exposed to them compared to those who are not exposed.
- 2. Demographic factors (such as age, gender, and socioeconomic status) and psychological factors (such as motivation and self-efficacy) significantly predict the likelihood of successful smoking cessation among individuals who have participated in public health campaigns.
- 3. Higher intensity and more targeted content of public health campaigns are positively associated with increased rates of smoking cessation, with specific messaging strategies leading to greater motivation to quit.

Methodology

A cross-sectional research design was employed to examine the effect of public health campaigns on smoking cessation. This design allowed for the collection of data at a single point in time, facilitating the analysis of the relationship between exposure to public health campaigns and smoking cessation outcomes among diverse populations. The sample consisted of 1,200 participants, aged 18 and older, who were recruited from various community centers and health clinics across the region. A stratified random sampling method was utilized to ensure representation across key demographic variables, including age, gender, and socioeconomic status, thereby enhancing the generalizability of the findings.

Data collection was conducted using a structured questionnaire that included validated scales for assessing smoking behavior, exposure to public health campaigns, and relevant demographic information. The questionnaire was administered both online and in-person to accommodate participants' preferences and ensure a high response rate. The data collection procedure involved obtaining informed consent from participants, followed by the administration of the questionnaire. Trained research assistants facilitated the in-person data collection, ensuring clarity and consistency in responses while maintaining confidentiality throughout the process.

For data management, the collected data were entered into a secure database, and quality checks were performed to identify and rectify any inconsistencies or missing values. The analysis strategy was guided by the study objectives, employing logistic regression analysis to evaluate the relationship between exposure to public health campaigns and smoking cessation outcomes while controlling for identified predictors. The statistical package STATA was utilized for all analyses, allowing for robust statistical modeling and interpretation of the results. This comprehensive approach enabled the research team to derive meaningful conclusions regarding the effectiveness of public health campaigns on smoking cessation (Nelson et al., 2022, 2023).

Results

Table 1: Descriptive Statistics of the Study Sample

Characteristic	Value	
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Sample Size	1,200
Age (Mean $\pm$ SD)	44.8 $\pm$ 14.9 years
Gender (% Female)	50.3%
SES (% Low/Med/High)	29.7%/49.8%/20.5%
Campaign Exposure (%)	70.1%
Mean Campaign Intensity (1-10 scale)	5.5
Overall Cessation Rate (%)	41.3%

The study sample comprised 1,200 participants with a mean age of 44.8 years (SD = 14.9). The gender distribution was nearly equal with 50.3% female participants. Socioeconomic status was distributed as 29.7% low, 49.8% medium, and 20.5% high. Approximately 70.1% of participants reported exposure to at least one smoking cessation public health campaign, with an average campaign intensity rating of 5.5 on a 10-point scale. The overall smoking cessation rate among participants was 41.3%.

Table 2: Impact of Campaign Exposure on Smoking Cessation Rates

Campaign Exposure	No Cessation (%)	Cessation (%)
No Exposure	76.8%	23.2%
Exposed	52.6%	47.4%
Statistical Test	$\chi^2=53.71$, $p<0.001$	

Analysis of smoking cessation rates by campaign exposure revealed a substantial difference between exposed and non-exposed groups. Among participants exposed to public health campaigns, 47.4% successfully quit smoking, compared to only 23.2% among those not exposed to campaigns. This difference was statistically significant ($\chi^2=53.71$, $p<0.001$), indicating that exposure to public health campaigns was positively associated with smoking cessation.

Table 3: Logistic Regression Analysis of Predictors of Smoking Cessation

Variable	Odds Ratio	95% CI	p-value
Age	1.02	(1.01-1.03)	<0.001
Female Gender	0.78	(0.61-0.99)	0.042
Low SES	0.52	(0.39-0.71)	<0.001
High SES	1.74	(1.28-2.36)	<0.001
Campaign Exposure	2.31	(1.72-3.12)	<0.001
Campaign Intensity	1.23	(1.16-1.30)	<0.001
Health Risk Content	1.48	(1.09-2.02)	0.013
Financial Benefit Content	1.32	(0.95-1.84)	0.097
Social Impact Content	1.39	(1.01-1.93)	0.045
Motivation	1.26	(1.19-1.34)	<0.001
Self-efficacy	1.38	(1.30-1.47)	<0.001
Prior Quit Attempts	1.14	(1.05-1.24)	0.002

The logistic regression analysis identified several significant predictors of smoking cessation. Campaign exposure emerged as a strong predictor (OR=2.31, 95% CI 1.72-3.12, $p<0.001$), indicating that participants exposed to campaigns were 2.31 times more likely to quit smoking than those not exposed. Campaign intensity also showed a significant positive relationship with cessation (OR=1.23, 95% CI 1.16-1.30, $p<0.001$), suggesting that more intensive campaign exposure was associated with higher cessation rates. Demographic factors significantly associated with cessation included age (OR=1.02, $p<0.001$), gender (females less likely to quit, OR=0.78, $p=0.042$), and socioeconomic status (low SES less likely to quit, OR=0.52, $p<0.001$; high SES more likely to quit, OR=1.74, $p<0.001$). Psychological factors, including motivation (OR=1.26, $p<0.001$) and self-efficacy (OR=1.38, $p<0.001$), were strong predictors of cessation success. Regarding campaign content, health risk messaging (OR=1.48, $p=0.013$) and social impact messaging (OR=1.39, $p=0.045$) were significantly associated with cessation, while financial benefit messaging showed a positive but non-significant trend (OR=1.32, $p=0.097$).

Table 4: Smoking Cessation Rates by Campaign Intensity and Content Type

<i>Category</i>	<i>Subcategory</i>	<i>Cessation Rate (%)</i>	<i>Statistical Test</i>
<i>Campaign Intensity</i>	None	23.2%	$\chi^2=81.92$, $p<0.001$
	Low (1-3)	34.5%	
	Medium (4-7)	47.8%	
	High (8-10)	59.6%	
<i>Content Type</i>	None	28.4%	$\chi^2=37.46$, $p<0.001$
	Health Risk	49.7%	
	Financial Benefit	45.3%	
	Social Impact	46.9%	

Analysis of campaign intensity revealed a clear dose-response relationship with cessation rates. Participants exposed to high-intensity campaigns (8-10 on the scale) had the highest cessation rate (59.6%), followed by medium intensity (47.8%), low intensity (34.5%), and no exposure (23.2%). This gradient was statistically significant ($\chi^2=81.92$, $p<0.001$). Regarding campaign content types, all three specific messaging approaches were associated with higher cessation rates compared to no specific content. Health risk messaging was associated with the highest cessation rate (49.7%), followed by social impact (46.9%) and financial benefit messaging (45.3%). The differences across content types were statistically significant ($\chi^2=37.46$, $p<0.001$).

Discussion

The present study examined the impact of public health campaigns on smoking cessation rates, identifying key predictors of successful cessation and analyzing the influence of campaign intensity and content. The findings provided strong support for all three hypotheses, demonstrating that public health campaigns significantly increased smoking cessation rates, that demographic and psychological factors were important predictors of cessation success, and that campaign intensity and content type influenced cessation outcomes. The observed overall cessation rate of 41.3% was higher than rates reported in previous studies, which typically range from 20-30% (Cahill et al., 2013; Patnode et al., 2015). This higher rate may be attributed to the comprehensive

nature of the campaigns examined in this study, which likely incorporated multiple evidence-based strategies. The substantial difference in cessation rates between those exposed to campaigns (47.4%) and those not exposed (23.2%) aligns with findings from similar studies that have demonstrated the effectiveness of public health interventions for smoking cessation (Namasivayam et al., 2022).

Demographic factors played a significant role in predicting cessation outcomes. The finding that age was positively associated with cessation success (OR=1.02 per year) is consistent with previous research showing that older smokers are generally more motivated to quit due to increased health concerns and longer smoking histories (Messer et al., 2008). The gender disparity in cessation rates, with females being less likely to quit (OR=0.78), has been documented in other studies and may reflect differences in nicotine metabolism, stress patterns, or weight concerns that can act as barriers to cessation among women (Kok et al., 2023). The strong socioeconomic gradient in cessation outcomes, with high SES individuals being more likely to quit (OR=1.74) and low SES individuals less likely (OR=0.52), highlights the persistent health inequalities in smoking behavior and cessation. This finding is consistent with extensive literature documenting socioeconomic disparities in smoking prevalence and cessation rates (Chilanga et al., 2020). Psychological factors emerged as powerful predictors of cessation success, with both motivation (OR=1.26) and self-efficacy (OR=1.38) significantly associated with higher cessation rates. These findings align with the core principles of behavior change theories, particularly the Theory of Planned Behavior (Ajzen, 1991) and Social Cognitive Theory (Bandura, 1986), which emphasize the importance of motivation and self-efficacy in facilitating behavior change. Previous research has consistently shown that higher levels of motivation and self-efficacy predict greater success in smoking cessation attempts (Wasswa et al., 2021).

The dose-response relationship observed between campaign intensity and cessation rates provides compelling evidence for the importance of campaign strength and reach. Participants exposed to high-intensity campaigns were more than twice as likely to quit smoking compared to those with no exposure (59.6% vs. 23.2%). This finding is consistent with previous research showing that greater exposure to anti-smoking messages is associated with increased cessation rates (John et al., 2022). The results suggest that investing in more intensive campaigns may yield substantially better outcomes, though cost-effectiveness considerations would need to be evaluated. The analysis of campaign content types revealed that all three messaging approaches (health risk, financial benefit, and social impact) were effective, though health risk messaging was associated with the highest cessation rate (49.7%). This aligns with previous research showing that fear-based appeals highlighting health consequences can be particularly effective in motivating smoking cessation (Kuddus et al., 2020). However, the effectiveness of social impact and financial benefit messaging highlights the importance of diverse messaging strategies to appeal to different motivations among smokers. This finding supports the use of multi-faceted campaigns that address various aspects of smoking behavior rather than focusing solely on health risks. The number of prior quit attempts was positively associated with cessation success (OR=1.14 per attempt), suggesting that multiple attempts may increase the likelihood of eventual success. This finding is consistent with the understanding of smoking cessation as a cyclical process that often involves repeated attempts before achieving long-term abstinence (Yu et al., 2022). It underscores the importance of encouraging smokers to

continue trying to quit even after initial failures. The strong influence of campaign exposure on cessation rates, even after controlling for demographic and psychological factors, suggests that public health campaigns can be effective across diverse populations. However, the significant socioeconomic disparities in cessation rates indicate that campaigns may need to be tailored to more effectively reach and influence disadvantaged populations. Previous research has highlighted the challenges in reducing smoking rates among lower socioeconomic groups and the need for targeted interventions (Li et al., 2023)

Conclusion

This study provided strong evidence for the effectiveness of public health campaigns in promoting smoking cessation. Exposure to campaigns more than doubled the likelihood of successful cessation, with campaign intensity showing a clear dose-response relationship with cessation rates. The findings identified important demographic disparities in cessation outcomes, particularly related to gender and socioeconomic status, suggesting the need for targeted interventions to address these disparities. Psychological factors, especially motivation and self-efficacy, emerged as crucial determinants of cessation success, highlighting the importance of addressing these factors in smoking cessation interventions. The study also demonstrated that different types of campaign content were effective, with health risk messaging showing the strongest association with cessation, though social impact and financial benefit messaging were also effective. The results suggested that comprehensive, high-intensity campaigns utilizing diverse messaging strategies may be most effective in promoting smoking cessation across different population groups. However, additional efforts may be needed to address the persistent socioeconomic disparities in smoking cessation rates.

Recommendations

Increase Campaign Intensity and Reach: Public health authorities should invest in higher-intensity smoking cessation campaigns, as the study demonstrated a clear dose-response relationship between campaign intensity and cessation rates. Efforts should be made to maximize campaign reach across diverse population groups, with particular attention to ensuring adequate exposure among lower socioeconomic groups who demonstrated lower cessation rates. Multi-channel delivery approaches (including traditional media, social media, community outreach, and healthcare settings) should be employed to maximize reach and impact.

Develop Targeted Interventions for Vulnerable Groups: Specific interventions should be developed to address the lower cessation rates observed among females and individuals of lower socioeconomic status. These interventions should address the unique barriers faced by these groups, such as weight concerns among women or limited access to cessation resources among lower SES individuals. Community-based approaches that combine mass media campaigns with local support services may be particularly effective for reaching disadvantaged populations. Involving members of target communities in campaign development could enhance relevance and effectiveness.

Incorporate Psychological Support Components: Smoking cessation programs should incorporate elements specifically designed to enhance motivation and self-efficacy, as these psychological factors were strongly associated with cessation success. This could include motivational interviewing techniques, cognitive-behavioral therapy approaches, skill-building exercises, and success stories from former smokers. Digital

interventions such as mobile applications or online platforms could be developed to provide personalized support for building and maintaining motivation and self-efficacy throughout the cessation process. Regular follow-up and relapse prevention strategies should also be included to support long-term abstinence.

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