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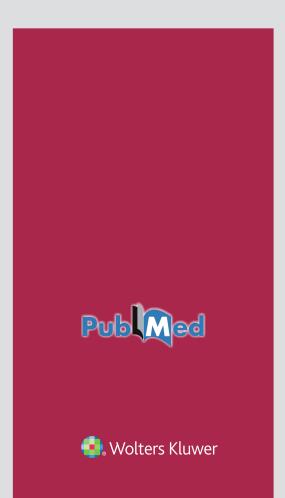
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Assessing the Efficacy of a Tobacco Prevention and Control Intervention in a Rural Area of India: A Quasi-experimental Study

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Abstract

Background: Tobacco use, disproportionately higher in rural areas, is a major cause of morbidity and mortality in India. Interventions to reduce tobacco use in rural areas are scarce. **Objectives:** The objective of this study was to assess the efficacy of a community-directed tobacco prevention intervention in reducing tobacco use in rural areas. **Materials and Methods:** A single-group pre-/postquasi-experimental study was conducted in Lakhmapur village, Maharashtra. Data were collected from one adult each in 296 and 307 randomly selected village households before and at the end of intervention, respectively. **Results:** Between pretest and posttest, reported tobacco use reduced from 56.4% to 23.5%; average daily expenditure on tobacco from INR 16.07 to INR 9.47, respectively. A logistic model, controlling for sociodemographic variables, showed that the postintervention group had a significantly lower likelihood of using tobacco; however, males and lower education subgroups were more likely to use. **Conclusions:** Multipronged community-based interventions involving schools, students, teachers, frontline workers, elected leaders, and community influencers hold promise in reducing tobacco use in rural India.

Keywords: India, intervention, prevention and control, rural areas, tobacco use, village

Introduction

India pays a high price for tobacco use: 27% of all cancers are attributed to tobacco use;[1] 90% of oral cancers to smokeless tobacco use;[2] and the economic cost of tobacco-attributable disease and death has been estimated at INR 1773.4 billion (USD$ 27.5 billion).[3] According to the Global Adults Tobacco Survey (GATS)-II, nearly 38% of adults in rural India use some form of tobacco, particularly smokeless tobacco, compared to the national average of 28.6%.[4] Tobacco use is almost three times high in rural areas compared to urban areas, with 200 million rural and 68 million urban users.[4] Tobacco use is perceived as a traditional practice; many rural India believe that tobacco is a stress and pain reliever.[4-6] Research examining interventions to address tobacco usage in rural India is scarce. The few studies which have been carried out in rural India have found community-driven approaches to be effective in tobacco prevention and cessation.[6,7]

This study assessed the efficacy of a rural tobacco prevention and control intervention. The intervention, initiated in the rural school, was expanded into the community by adding community-based components.

Objective of the study

The aim of the study was to assess the efficacy of a tobacco prevention intervention directed toward the entire community, rather than a cessation program for specific individuals, in reducing tobacco use in a rural area with scarce resources, difficulty in finding trained staff, and low access to health information and healthcare.

Materials and Methods

Study setting

This study was conducted in Lakhmapur village in Nashik district, located in Maharashtra, western India, the second-most populous state located in western India and it is one of the five major tobacco-producing states.[8] Although 26.6% of

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the population, aged 15 and above, are reported as tobacco users;[4] some studies have reported a prevalence of 46.5% in rural Maharashtra.[9]

Study design and participants

A single-group quasi-experimental pre-/poststudy was conducted in Lakhmapur village, with a population of 5500 and 1200 households, to assess the efficacy of a multipronged school and community-based intervention for tobacco prevention and control. The study population comprised all adult inhabitants of Lakhmapur. A sample of adult men and women from randomly selected households in the village constituted the study samples for a pretest survey in 2015, after which the intervention was launched and a posttest conducted in 2020 after the intervention ended.

Data collection

Data were collected through interviewer-administered household surveys. After obtaining each respondent's informed consent, trained interviewers used a structured questionnaire [attached as Appendix 1] to interview one adult each in randomly selected households in Lakhmapur. Ethical approvals were obtained at multiple levels. First, the Internal Review Committee of Salaam Mumbai Foundation approved the study. Second, approval was sought from the local village council. Finally, consent was sought from every respondent before the actual survey. The questionnaire consisted of sociodemographic items such as respondent's age, gender, and educational level and then asked about tobacco use in the past 30 days, type of tobacco used, and any health problems that respondents attributed to tobacco use.

Intervention

The intervention had three components and was initiated in steps. First, the tobacco-free school (TFS) intervention,[10] which trained teachers to fulfill criteria to convert schools into tobacco-free environments.[11] Second, training and motivating students and teachers to conduct community mobilization activities such as rallies, drawing competitions, and exhibitions; integrating anti-tobacco messages in events held on national holiday events such as Independence Day and Republic Day, and commonly held religious festivals of Ganesh Chaturthi and Holi.

Third, the community component, included training frontline workers in the area of health (called ASHAs), and in the area of nutrition and childcare (called Anganwadi workers). In addition, the head and members of Gram Panchayat (local village government), and community influencers such as police, self-help groups, Mahila Mandals (women's groups), and youth group members were also sensitized and trained. To implement the above and also for a sustained follow-up with various stakeholders, a full-time qualified social worker was hired specifically for the project. The person was specially trained for tobacco prevention and control activities and then conducted periodic refresher sessions with stakeholders, monitored the activities, and had regular feedback meetings to facilitate appropriate course corrections.

Data analysis

Data were analyzed using SPSS software version 16.0 (IBM Corp., Armonk, New York, USA). Along with descriptive frequencies for all variables, bivariate analysis compared differences between pretest and posttest measures for age, gender, education, and the outcome variable of tobacco use. Chi-square statistics and *t*-test were employed for nominal and interval-level variables, respectively. Independent variables, statistically significant at $P < 0.05$ level in bivariate analysis, and two-time points of measurement (pretest and posttest) were included in a logistic regression model with past 30-day tobacco use as the dependent variable.

RESULTS

There were 296 and 307 adult participants in the pretest and posttest measurements, respectively. Women constituted 43.6% of the pretest and 40.1% of the posttest sample. Mean ages were 46.8 years for pretest and 39.6 years for posttest. Close to half (49%) of the pretest respondents had primary school level or no education as compared to one-fourth (25.6%) of the posttest group [Table 1].

Self-reported tobacco use, in any form, in the past 30 days changed from 56.4% ($n = 167$) in the pretest to 23.5% ($n = 72$) in the posttest. With respect use of different types of tobacco products, smokeless tobacco had the maximum proportion of users with zarda (flavored chewing tobacco flakes mixed with aromatic spices, herbs, fragrances, saffron, and others) at 26% ($n = 77$) and misheri (roasted and powdered tobacco) at 19.6% ($n = 58$) in the pretest with the use reducing to 8.5% ($n = 26$) and 5.9% ($n = 18$), respectively ($P < 0.001$) in the posttest. The average daily expenditure on tobacco, INR 16.07 in the pretest, reduced to INR 9.47 in the posttest. When tobacco users were asked whether they had experienced any health problems that they attributed to tobacco use, 67.6% ($n = 48$) of 71 users in the posttest answered affirmatively as compared to 32.9% ($n = 55$) of 167 users in the pretest [Table 1].

A binomial logistic regression was performed to ascertain the effects of age, sex, educational level, and time point of measurement (i.e., pretest vs. posttest) on the likelihood of past 30-day tobacco use. We controlled for age, gender, and education in the logistic model and found that being in the post-test group was associated with a decreased likelihood of using tobacco as compared to the pre-test group. The sample in the posttest was almost three times less likely (0.268) to use tobacco compared to those in pretest. Males were 2.101 times more likely to engage in tobacco use as compared to females. Compared to individuals with education less than Grade 7, those with education level between Grade 8 and 10 were less than half (0.418), and those with education Grade 11 and above were less than one-fifth (0.139) as likely to use tobacco [Table 2].

DISCUSSION

The present study assessed the efficacy of an intervention, conducted in rural India aimed at preventing and reducing

Table 1: Comparison between pre- and posttest samples on sociodemographic variables, tobacco use, expenditure, and perceived health problems (*n*=603)

Variable	Baseline (*n*=296), *n* (%)	Posttest (*n*=307), *n* (%)	*P*
Sex			
Female	129 (43.6)	123 (40.1)	0.409
Male	167 (56.4)	184 (59.9)	
Mean age in years	46.8 (57.4)	39.6 (13.4)	0.034
Educational level			
Grade/standard 7 or less	145 (49.0)	78 (25.6)	0.000
Grade 8 to 10	82 (27.7)	119 (39.0)	
Grade 11 and above	69 (23.3)	108 (35.4)	
Used any form of tobacco in past 30 days			
Yes	167 (56)	71 (23)	0.000
No	129 (44)	236 (77)	
What type of tobacco used in past 30 days?*			
Zarda	77 (26)	18 (5.9)	0.000
Misheri (roasted, powdered tobacco)	58 (19.6)	26 (8.5)	0.000
Bidi (tobacco flakes wrapped in tendu leaf)	21 (7.1)	14 (4.6)	0.124
Gutkha (areca nut, slaked lime, catechu, tobacco, and flavoring)	17 (5.7)	12 (3.9)	0.194
Cigarette	6 (2)	1 (0.7)	0.056
Mava (mixture of thin shavings of areca nut with tobacco flakes and slaked lime)	2 (0.7)	0	0.241
Average money spent on tobacco products per day (INR)	16.07 (28.83)	9.47 (5.41)	0.055
Whether experienced any tobacco-related health problem	*n*=167	*n*=71	
Yes	55 (32.9)	48 (67.6)	0.000
No	112 (67.1)	23 (32.4)	

*Total in this item is greater than number of users in the item above because some reported using more than one variety or type of tobacco

Table 2: Summary table of the logistic regression analysis

Covariate	Exp (B)	95% CI for Exp (B)	*P*
Age	1.001	0.997-1.005	0.489
Sex			
Women	Reference		
Men	2.101	1.417-3.114	0.000
Timepoint			
Pretest	Reference		
Intervention	0.268	0.183-0.391	0.000
Educational level			
Grade 7 or less	Reference		
Grade 8 to 10	0.418	0.272-0.643	0.000
Grade 11 and above	0.139	0.083-0.231	0.000

CI: Confidence interval

tobacco use in the entire community rather than cessation among specific individuals. The intervention was initiated as a TFS intervention, then expanded to the community in the form of community mobilization activities by students, and training frontline workers, local elected members, and community influencers. Reported use of tobacco dropped by more than half after the intervention. Consistent with national-level data from GATS-II (MoHFW, 2017), smokeless tobacco was the most commonly used form in this village. Males and individuals with lower educational attainment were more likely to use tobacco. These findings are consistent with those from GATS-II, which demonstrated that the prevalence of tobacco use was higher among those from poor households, males, and illiterates.[12]

The study suggests that community-based multilevel interventions initiated from the rural school, hold promise for tobacco prevention and control in rural communities. However, this intervention may not have reached those at the highest risk of tobacco use: males and individuals with lower educational levels. Rural interventions must design different behavior change approaches, keeping at-risk subgroups in mind.

The present study did not have a control group; factors other than the intervention, such as secular trend of decreasing tobacco use, might have influenced the results. Social desirability bias and respondents' familiarity with intervention agents such as community influencers and children helping the project could have influenced responses. Tobacco-use outcome was measured using self-reports; hence, response bias could have influenced results. Educational levels of the posttest sample were significantly higher than the pretest, which could act as a confounding factor; however, the logistic regression model adjusts for the variance occurring due to the different factors accordingly.

To confirm and establish the effectiveness of community-based rural tobacco-prevention interventions, further research is required with a randomized control group, coverage of more villages, assessment of tobacco use through biological measures, local tobacco sales data, and community-based third-party ratings of tobacco use by the respondents.

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Conflicts of interest

There are no conflicts of interest.

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