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The Prevalence of Tobacco Use among Manufacturing Workers: Findings from the Baseline Survey of the Mumbai Worksite Tobacco Control Study

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Abstract

Objectives: To explore the potential role of the work context associated with tobacco use patterns among manufacturing workers in India

Methods: We used cross-sectional survey data from the Mumbai Worksite Tobacco Control Study. Workers from manufacturing worksites in the greater Mumbai region were surveyed from 20 worksites that were recruited between July 2012 and July 2013 on rolling basis for a randomized controlled trial.

Results: A total of 6880 workers out of 7633 that employed in 20 manufacturing worksites were surveyed. Current tobacco use was higher among production (23.5%) than non-production (19.2%) workers. In contrast, past tobacco use was somewhat lower among production (6.2%) than non-production (8.4%) workers. Production workers who used smokeless tobacco were twice as likely to report their workplaces did not have a policy or rule prohibiting tobacco use as compared to smokers or non-tobacco users. The prevalence of past tobacco use - compared to current use - was associated with workers' education, economic index and number of co-workers using tobacco.

Conclusions: The current study underscores the important role of co-workers and worksite tobacco control policies (that cover both smoking and smokeless forms) to support reductions in tobacco use among manufacturing workers.

Keywords: Tobacco use; Occupational health and safety; Workers health; Tobacco policies; Disparities; India

Introduction

Tobacco use is one of the most important preventable causes of death and disease globally. Tobacco kills nearly 6 million people each year globally [1] of those around 5.4 million are a direct result of tobacco use while around 0.6 million are a result of exposure to second-hand smoke. Unless urgent action is taken, the annual global death toll could rise to more than 8 million by 2030.

India, being the second most populous country in the world with over one third of the population using tobacco, [2] makes significant contributions to the global burden of disease attributable to tobacco [3-6]. Tobacco use annually kills over one million Indians [3]. However, quitting is not a common practice in India due to a lack of widely available cessation support resources and few social norms to support quitting [2,4,7-14].

Even though smoking rates are declining in many countries, the disparity among occupational groups still exists. Over the past several decades, blue-collar workers have been identified

as a high-risk group for smoking [15]. Although a few studies in India have documented the association between occupation and tobacco use [16-21], with higher rates for unskilled workers, the factors contributing to this disparity are not clear. Furthermore, most global research on the association between occupation and tobacco use relates to smoking [22-24], a prevalent form in most countries. But in India, tobacco is consumed more in smokeless forms than smoking forms [4]. Therefore the purpose of this study is to further elucidate the patterns of smoking and smokeless tobacco use among production and non-production workers and explore the potential role of the work context, including tobacco policies and co-worker tobacco use patterns, which may help explain this disparity.

This study was conducted as part of the Mumbai Worksite Tobacco Control Study (MWTCS); a cluster randomized controlled trial, which tested an intervention aimed at reducing workers' tobacco use and increasing the adoption, implementation and enforcement of worksite tobacco control policies. Data presented here were collected as a part of a baseline survey conducted in 20 manufacturing worksites in the greater Mumbai area. This paper describes the patterns of tobacco use (in smoking or smokeless forms) among these workers, and examines factors that may be associated with workers' current and/or past tobacco use.

Methods

Study sample

A total of 20 manufacturing worksites from chemical, metal, textile, printing, food and beverages, pharmacy, electricity production, and petroleum industries employing 200 to 500 workers were recruited in Mumbai District and two surrounding periphery districts (Thane and Raigad) on a rolling basis. Additional eligibility criteria included worksites employing either at least 60% of their workforce as production workers or at least 200 production workers; ability to make autonomous decisions; and willingness to allow us to conduct study activities at their worksite, to provide current employee rosters, and to be randomly assigned to either an intervention or delayed intervention control condition. More details on worksite recruitment were published earlier [25]. Study methods and materials were approved by institutional review boards at the Harvard T.H.Chan School of Public Health in the United States and the Healis-Sekhsaria Institute for Public Health in India, as well as by the Indian Council of Medical Research. This study has been registered with ClinicalTrials.gov and the Clinical Trial Registry of India.

The baseline data were collected through a survey of individual workers in each worksite immediately after recruitment (July 2012-July 2013). Within worksites, all workers listed on the employee roster were eligible to participate in the baseline survey, and included all full- and part-time workers employed directly by the worksite. Of the total 6880 surveyed workers, 554 workers who were eligible but not listed on an employee roster were added to the roster on the day of the survey after we confirmed their eligibility with the respective worksite management. Workers who reported 12 or more years of formal education were eligible to be assigned to complete a self-administered survey (SAS), and workers who reported less than 12 years of formal education were eligible to be assigned to an interviewer-administered survey (IAS), which was conducted by trained study staff. The survey was conducted in Marathi, Hindi or English, depending on respondent preference. On average, the SAS and IAS took around 20 minutes, although IAS took a little more time than SAS.

Measures

Tobacco use was measured by self-report using separate questions to assess use of smokeless (this includes applying tobacco such as mishri, snuff, dentobac, etc., chewing tobacco such as gutka or zarda, khaini, pan with tobacco or tobacco-lime-supari mixtures, tobacco-lime mixtures without supari, etc.) and smoked (this includes bidi, cigarettes, hukka, cigar, hukali, cheelim, chirut, or pipes,etc.) forms of tobacco. Questions assessed current, past or never use of tobacco. Sample characteristics assessed by the survey included age (categorized as <35/35-45/45-55/≥55 years), gender (male/female), education (none to 6th standard/7th to 10th standard/12th standard or diploma/graduation or above), marital status (currently married/currently not married), economic wellbeing index (have both refrigerator and vehicle/either refrigerator or vehicle/none), and health status (excellent/either good or fair or poor). We also assessed the number of co-workers (people who work with the respondent) using tobacco (0/1 to 2/≥3), and workers' reports on whether their workplace had a policy or rule prohibiting tobacco use (yes/no). In addition, we obtained employee's job title using information available from the worksite; we used the department and job title from employee rosters to categorize workers as either production or non-production workers.

Statistical analysis

We conducted descriptive analyses to examine difference in the prevalence of tobacco use behaviours between production and non-production workers. Multivariate logistic regression analysis was used to assess the association of each participant characteristic with current smoking and smokeless tobacco use compared to no tobacco use, and with past tobacco use compared to current tobacco use, controlling for age, gender and education. We classified current tobacco users as workers who reported either currently smoking or using smokeless forms of tobacco during last 30 days. SPSS version 20.0 was used to conduct data analysis. Associations between predictor variables and outcomes are reported as odds ratios (ORs) along with 95% confidence intervals (CIs).

Results

The average response rate for the 20 worksites (that employed 7633 workers) for the baseline survey was 90% (ranges from 78% to 94%). A total of 6880 participants

(SAS=4192; IAS=2688) were surveyed. Only those workers reporting their tobacco use status and having information about their job title available (N=6760) were included in analyses reported here.

Of the total 6760 workers (Table 1), 79% were production and 21% were non-production workers. Current tobacco use was higher among production (23.5%; of which 15.5% were smokeless and 8% were smokers) than non-production (19.2%; of which 10.2% were smokeless and 9% were smokers) workers. In contrast, past tobacco use was somewhat lower among production (6.2%) than non-production (8.4%) workers. Over 90% of workers were males, ~70% were currently married, ~50% reported one or more of their co-workers using tobacco and ~75% reported their workplace had a policy or rule prohibiting tobacco use. Even though less than 10% of production (8%) and non-production (7%) workers reported their education as 6 years or below, twice as many production workers (30%) compared to than non-production workers (15%) were from the lowest economic wellbeing index.

Table 1: Participant characteristics by type of worker and tobacco use status

	Production					Non-production				
	Current users					Current users				
Participant Characteristics	N=5374	Smokeless only (row %) 15.5%	Smokers + (row %) 8.0%	Past (row %) 6.2%	Never (row) 70.3%	N=1386	Smokeless only (row %)10.2%	Smoker+ (row %) 9.0%	Past (row %) 8.4%	Never (row %)72.3%
Age group*										
<35	2794	11.2	7.6	5.0	76.2	484	7.9	8.3	6.2	77.7
35-45	1324	18.1	7.5	6.8	67.7	422	12.3	8.5	7.8	71.3
45-55	878	22.6	9.0	7.5	60.9	305	10.8	10.8	9.8	68.5
≥55	288	25.3	11.5	10.1	53.1	145	12.4	6.9	14.5	66.2
Gender										
Female	224	7.1	0.0	0.0	92.9	142	4.2	0.0	0.7	95.1
Male	5150	15.8	8.3	6.5	69.3	1244	10.9	10.0	9.3	69.7
Education*										
Graduation and above	1141	4.2	6.5	9.8	79.5	730	2.9	9.9	11.0	76.3
12th standard or Diploma	1898	8.0	8.7	9.0	74.3	262	7.3	9.2	10.7	72.9
7th to 10th standard	1874	25.0	7.4	2.1	65.5	295	26.1	8.1	2.4	63.4
None to 6th standard	445	36.4	11.2	2.5	49.9	95	26.3	5.3	2.1	66.3
Marital status*										
Currently married	3873	19.0	8.2	6.7	66.1	1177	11.0	9.3	9.1	70.5
Currently not married	1480	6.4	7.3	5.0	81.4	206	5.8	7.3	4.9	82.0
Economic index*										
Both refrigerator and vehicle	2156	8.8	8.9	9.1	73.3	778	6.4	9.6	9.9	74.0
Either refrigerator or vehicle	1402	15.8	7.6	4.9	71.8	334	12.0	7.8	8.1	72.2
None	1599	24.9	6.8	3.1	65.2	210	22.9	7.1	2.9	67.1
Health status*										
Excellent	2012	9.7	6.7	6.8	76.9	546	7.3	9.0	9.2	74.5
Either good or fair or poor	3340	19.0	8.8	5.8	66.4	834	12.2	8.9	8.0	70.9
Number of co-workers using tobacco*										
0	2654	7.1	3.8	4.7	84.4	707	3.8	4.0	6.5	85.7
1 to 2	1224	16.6	9.9	10.1	63.4	339	12.1	11.5	13.0	63.4

≥3	1459	30.0	13.9	5.6	50.4	323	22.6	16.4	8.4	52.6
Workplace policy or rule prohibiting tobacco use*										
Yes	4173	15.3	8.9	6.1	69.7	1042	10.7	10.3	8.8	70.2
No	465	24.9	7.1	7.1	60.9	114	11.4	8.8	7.0	72.8
Don't know	699	10.6	3.7	5.0	80.7	215	7.4	2.8	6.5	83.3
Note: + smokers may include the few workers who both smoke and use smokeless tobacco, * total may not add due to respective missing cases										

Although there were very few female workers in the sample (~4%), male workers were more likely to be current tobacco users compared to female workers (Table 2). Increasing age increased the odds for production workers to be a current tobacco user. In contrast, decreasing education (a component of socio-economic status, SES) increased the odds for both production and non-production workers to be a current tobacco user. Similarly, decreasing economic wellbeing index (another component of SES) was associated with increased odds for production workers to be current smokeless tobacco users and decreased odds to be current smokers. Co-workers' tobacco use increased the odds for both production and non-production workers current tobacco use. Production workers who were current smokeless tobacco users were twice as likely to report their workplaces did not have a policy or rule prohibiting tobacco use than production workers who were smokers or non-tobacco users.

Table 2: Odds ratios (ORs) and 95% confidence intervals (CIs) for the association between participant characteristics and tobacco use status by type of worker

Participant Characteristics	**Production**						**Non-production**					
	Any tobacco		**Smokeless only**		**Smoker +**		**Any tobacco**		**Smokeless only**		**Smoker+**	
	n	OR (95% C.I.)	n	OR (95% C.I.)	n	OR (95% C.I.)	n	OR (95% C.I.)	n	OR (95% C.I.)	n	OR (95% C.I.)
Age group												
<35	524	1	312	1	212	1	78	1	38	1	40	1
35-45	338	1.39 (1.18, 1.63)	239	1.61 (1.32, 1.95)	99	1.07 (0.83, 1.38)	88	1.28 (0.90, 1.83)	52	1.51 (0.94, 2.44)	36	1.04 (0.65, 1.68)
45-55	277	1.65 (1.37, 1.98)	198	1.89 (1.52, 2.34)	79	1.31 (0.99, 1.73)	66	1.32 (0.90, 1.94)	33	1.19 (0.70, 2.02)	33	1.41 (0.86, 2.31)
≥55	106	2.12 (1.61, 2.81)	73	2.41 (1.74, 3.33)	33	1.87 (1.24, 2.82)	28	1.26 (0.76, 2.10)	18	1.62 (0.84, 3.14)	10	0.95 (0.46, 1.99)
Gender												
Female	16	1	16	1	0	1	6	1	6	1	0	1
Male	1246	5.50 (3.24, 9.33)	816	3.81 (2.23, 6.52)	430	*	261	7.56 (3.22, 17.77)	136	4.32 (1.76, 10.57)	125	*
Education												
Graduation and above	122	1	48	1	74	1	93	1	21	1	72	1
12th standard or Diploma	317	1.56 (1.24, 1.97)	152	1.94 (1.38, 2.74)	165	1.31 (0.98, 1.76)	43	1.23 (0.81, 1.85)	19	2.63 (1.37, 5.05)	24	0.83 (0.49, 1.39)

7th to 10th standard	608	3.42 (2.76, 4.25)	469	6.84 (4.99, 9.39)	139	1.28 (0.95, 1.73)	101	3.12 (2.23, 4.35)	77	10.67 (6.33, 17.19)	24	0.94 (0.57, 1.54)
None to 6th standard	212	6.66 (5.05, 8.78)	162	12.83 (8.89, 18.50)	50	2.67 (1.79, 3.99)	30	3.84 (2.28, 6.49)	25	13.65 (6.97, 26.73)	5	0.81 (0.31, 2.15)
Marital status												
Currently married	1055	1	736	1	319	1	240	1	130	1	110	1
Currently not married	202	0.52 (0.43, 0.64)	94	0.38 (0.29, 0.50)	108	0.80 (0.61, 1.06)	27	0.77 (0.46, 1.27)	12	0.65 (0.32, 1.34)	15	0.89 (0.46, 1.72)
Economic index												
Both refrigerator and vehicle	380	1	189	1	191	1	125	1	50	1	75	1
Either refrigerator or vehicle	328	1.11 (0.93, 1.33)	221	1.40 (1.11, 1.75)	107	0.84 (0.65, 1.09)	66	1.09 (0.76, 1.58)	40	1.43 (0.87, 2.34)	26	0.84 (0.51, 1.40)
None	507	1.40 (1.17, 1.68)	398	2.04 (1.64, 2.55)	109	0.74 (0.56, 0.99)	63	1.18 (0.77, 1.83)	48	1.59 (0.93, 2.69)	15	0.82 (0.42, 1.61)
Health status												
Excellent	329	1	195	1	134	1	89	1	40	1	49	1
Either good or fair or poor	928	1.41 (1.21, 1.65)	635	1.39 (1.15, 1.68)	293	1.45 (1.16, 1.82)	176	1.21 (0.89, 1.66)	102	1.25 (0.81, 1.92)	74	1.22 (0.81, 1.83)
Number of co-workers using tobacco												
0	290	1	188	1	102	1	55	1	27	1	28	1
1 to 2	324	3.57 (2.95, 4.31)	203	3.70 (2.93, 4.66)	121	3.28 (2.47, 4.35)	80	4.65 (3.11, 6.97)	41	5.97 (3.41, 10.48)	39	3.58 (2.10, 6.10)
≥3	641	6.18 (5.21, 7.34)	438	6.54 (5.33, 8.03)	203	5.71 (4.41, 7.38)	126	7.91 (5.37, 11.65)	73	9.27 (5.50, 15.64)	53	6.91 (4.13, 11.56)
Workplace policy or rule prohibiting tobacco use												
Yes	1009	1	638	1	371	1	219	1	112	1	107	1
No	149	1.46 (1.17, 1.83)	116	1.88 (1.46, 2.42)	33	0.92 (0.63, 1.35)	23	1.05 (0.63, 1.74)	13	1.32 (0.67, 2.60)	10	0.81 (0.40, 1.64)
Don't know	100	0.61 (0.48, 0.78)	74	0.81 (0.61, 1.07)	26	0.38 (0.25, 0.57)	22	0.51 (0.31, 0.82)	16	0.71 (0.39, 1.29)	6	0.28 (0.12, 0.66)
Note: ORs are adjusted for age, gender and education, + smokers may include the few workers who both smoke and use smokeless tobacco												

The prevalence of past tobacco use compared to current use (Table 3) was associated with workers' education, economic wellbeing index, and number of co-workers using tobacco.

Table 3: Odds ratios (ORs) and 95% confidence intervals (CIs) for the association between participant characteristics and tobacco use status

Participant Characteristics		Never user vs. current user	Current user vs. Past user
		OR (95% C.I.)	OR (95% C.I.)

Age (yrs)			
	<35	1	
	35-45	1.38 (1.19, 1.59)	1.13 (0.85, 1.51)
	45-55	1.59 (1.35, 1.87)	1.12 (0.81, 1.53)
	≥55	1.85 (1.46, 2.35)	1.73 (1.14, 2.64)
Gender			
	Female	1	
	Male	6.61 (4.26, 10.25)	1.67 (0.21, 13.25)
Education			
	Graduation and above	1	
	12th standard and Diploma completed	1.43 (1.19, 1.73)	0.65 (0.50, 0.85)
	7th to 10th standard passed	3.20 (2.70, 3.80)	0.07 (0.05, 0.10)
	None and up to 6th standard	6.00 (4.76, 7.56)	0.06 (0.03, 0.11)
Job categorization			
	Non-Production workers	1	
	Production workers	1.01 (0.86, 1.20)	0.97 (0.72, 1.30)
Marital status			
	Currently married	1	
	Currently not married	0.55 (0.46, 0.66)	1.38 (0.96, 1.97)
Economic Index			
	Both refrigerator and vehicle	1	
	Either refrigerator or vehicle	1.11 (0.95, 1.31)	0.86 (0.63, 1.17)
	None	1.36 (1.15, 1.60)	0.65 (0.45, 0.95)
Health status			
	Excellent	1	
	Either good or fair or poor	1.36 (1.19, 1.56)	0.84 (0.66, 1.08)
Number of co-workers using tobacco			
	0	1	
	1 to 2	3.68 (3.10, 4.36)	0.61 (0.45, 0.82)
	≥3	6.36 (5.45, 7.43)	0.30 (0.22, 0.41)
Workplace policy or rule prohibiting tobacco use			

	Yes	1	
	No	1.38 (1.13, 1.69)	1.03 (0.69, 1.53)
	Don't know	0.58 (0.47, 0.72)	1.43 (0.96, 2.13)
Note: odds ratios are adjusted for age, gender and education			

Discussion

Substantial socio-economic inequalities exist related to health. Inequities in tobacco consumption across social determinants16, 17 are well recognized and widespread. Although community smoking rates are declining in many countries, the fact remains that smoking rates are not evenly distributed across certain occupation categories, such as blue-collar workers (referred as production worker henceforth) continuing to use tobacco at higher rates compared to their white-collar (referred as non-production worker henceforth) counterparts.15 For example, in Australia the gap between non-production- and production workers smoking rates was 16% in 1976, which increased to 22% in 1995.

In line with previous studies, the current study re-confirmed that the prevalence of tobacco use is higher among production workers (23.5%) than non-production workers (19.2%). Similar findings were reported from other nationally representative surveys15, [26,27] (from Australia, USA, and UK), in which smoking rates were higher among production (includes blue-collar/manual) workers than non-production (includes white-collar/non-manual) workers. A large (~100,000 individuals) cross-sectional survey conducted in the city of Mumbai [16] also reported that the prevalence of tobacco use varied across occupational categories, with the highest tobacco use observed among unskilled workers (76%) and the lowest among professionals (45%). Studies in other Indian manufacturing worksites also reported high (ranges from 39% to 86%) prevalence of tobacco use among production workers [17-21]. Taken together, these findings indicate that tobacco use prevalence among production workers varies across India and is mostly higher than the prevalence among non-production workers or the general population [2]. Production workers are also exposed to occupational hazards and hence, are at dual health risk if they use tobacco, due to the possible synergistic effect between the exposures and tobacco use. Tobacco use initiation usually occurs before people enter the workforce but some organizational factors that may influence tobacco use are job stress, hazardous working conditions, pace of work, and the functional meaning of tobacco use among workers [28]. Smokers are known to have greater absences from work, more sick days per year, and higher health care cost than never smokers [15]. Therefore, tobacco control strategies that are targeted at production workers and implemented at workplaces will be beneficial for employer and employee in India as it was beneficial in HICs [15].

Studies in India from worksites [18-21] and from the general population [16,17,29-32] have reported an inverse association between SES (in terms of education and economic index) and tobacco use, with the highest tobacco use among those with lowest SES. In this study, in addition to an increase in current tobacco-use with decreasing education, past tobacco use decreased with decreasing education. Similar to a large cross-sectional survey in Mumbai, [32] our study also shows that the proportion of quitters was more than double among workers with higher education (12 or more years of formal education) than workers with lower education. Education is also strongly correlated with career choices, income, and health behaviors. While most professional jobs have intrinsic educational requirements, the same does not always apply to many manufacturing occupations. In our study, even though less than 10% of production and non-production workers reported their education as 6 years or below, twice as many production workers (30%) compared to non-production (15%) workers were from the lowest economic index. Thus, disparities in tobacco use and tobacco use cessation across occupational categories reflect not only occupational differences, but also the larger structural forces which shape workers' lives, beyond the work environment. Therefore, more studies might help to understand the exact reasons why certain occupational categories such as production workers continue to use tobacco at higher rates than their non-production counterparts.

As tobacco use is the most important preventable risk factor for non-communicable diseases (NCDs: the total burden of NCDs in India [33] is expected to rise from 40% in 1990 to about 75% by 2030), through knowledge of related work context factors may be useful for prevention of NCDs in workers. NCDs also place a significant financial burden on the family as only about 10% of the Indian population is covered by some form of health insurance, resulting in a greater proportion of out-of-pocket expenditures [34,35]. The Indian economy had an estimated loss of nine billion dollars in 2005 which is expected to rise to 54 billion dollars by 2015 due to loss of labour supplies and savings attributable to NCD causes. 36 In India, over 90% of 500 million workers work in unincorporated, unorganized sectors mostly earning less than US $ 1.25 a day [36,37], currently there is no comprehensive legislation for occupational health, safety and health promotion that covers employees in all economic sectors [36]. This becomes highly relevant when we observe from our study that the production workers who used tobacco were more likely to report their own health status as not being excellent compared to production workers who did not use tobacco. The problem gets compounded because of inadequacies in the health care infrastructure [36]. The occupational disparities in tobacco use behaviors observed in our study and other studies [15-17,26,28] point toward opportunities to target high-risk populations, such as production workers through worksite

tobacco control programs. Through such programs, it is possible to influence large groups of people (e.g. 500 million workers in India [36]) and provide supports for tobacco use cessation [38,39]. Effectively addressing health inequalities requires new sets of interventions, which account for disparities in social determinants of health. Worksites also provide an opportunity for sustained peer group support for quitting tobacco and modifications in social norms toward support for not using tobacco, thereby helping workers stay tobacco free, including the convenience of on-site cessation programs for employees [21,38,39].

Previous studies found that workers in worksites with smoke-free policies were more likely quit smoking than workers in worksites that had no such policy [26,38]. Prior research also highlighted the importance of co-workers' support in quitting smoking [28,39]. In India, tobacco is consumed in both smoking and smokeless forms, but tobacco control policies are mostly focused on smoking forms only. This was supported by the observation from this study that production workers who use smokeless tobacco were more likely to report their workplaces did not have policies prohibiting tobacco use compared to corresponding workers who smoke or do not use tobacco. Additionally, the prevalence of current and past tobacco use was associated with co-workers' tobacco use. A possible explanation for this finding might be that workers generally spend much of the day with their co-workers, and co-workers' behavior influences an individual's behavior. Other studies in India have also reported similar associations of an individual's tobacco use with their friend's or their co-workers' tobacco use [17-21,39]. Thus, the current study underscores the importance of the role of co-workers; tobacco use patterns and worksite policies on tobacco control. The findings from this study point towards the importance of having worksite tobacco control policies that cover for both smoking and smokeless forms, in order to support reductions in tobacco use among workers.

It is important to note several limitations to this study. This was a cross-sectional survey and findings rely on self-reported tobacco use without any biochemical validation. Biochemical validation of tobacco use was not feasible mainly because the appearance of drug testing would likely be resisted in a manufacturing worksite setting and also due to low sensitivity in detecting use of smokeless tobacco use reported from previous Indian studies [40,41]. We took numerous precautions to minimize reporting bias. We used anonymous surveys and assured confidentiality by informing workers that the results would be communicated in aggregate and no individual information collected as a part of this study would be provided to the employer. This helped and is reflected in the high participation rate in the survey; on average, 9 out of 10 workers participated in the baseline survey.

Conclusion

The high prevalence of tobacco use among production workers in India underscores the need for targeted cessation efforts especially for production workers. Production workers are less educated, are mostly from lowest economic group and are more likely to use tobacco and report their health status as poor. Creating a work environment supportive of tobacco control, including through well-enforced tobacco control policies for all forms of tobacco and through involving co-workers is very important. This can be achieved through programs that provide guidance to users on quitting their tobacco use and to non-users to support users to quit tobacco use, which may ultimately reduce tobacco-related morbidity and mortality. Future worksite interventions need to take into account the social determinants that increase the risk of tobacco use among workers. The final results of the MWTCS may provide insights as well as direction to guide tobacco control efforts among manufacturing workers in India and potentially in other low- and middle-income counties.

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Author Contributions

Mangesh S. Pednekar was a Co-Principal Investigator for the Mumbai Tobacco Control Study in India. He conceptualized this paper and took lead on writing the paper.

Eve Nagler was a Co-Investigator for the Mumbai Tobacco Control Study. She contributed to the writing and finalizing the manuscript.

Pratibha Pawar was a Research Scientist for the Mumbai Tobacco Control Study. She contributed to the writing the manuscript.

Glorian Sorensen was the Principal Investigator for the Mumbai Tobacco Control Study. She contributed to writing and finalizing the manuscript.

Sameer Narake was a statistician for the Mumbai Tobacco Control Study. He contributed to the data analysis and writing the manuscript.

Anne M. Stoddard was a Co-investigator for Mumbai Tobacco Control Study. She contributed to the writing and finalizing the manuscript.

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