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Smoking-Cough, Vaccination in Relation with Socio-Economic, Working-Living Conditions among Garment Workers

Begum, Housne ^α, Rashid, Mamunar ^σ, Flora, Meerjady ^ρ & Sayem, Amir Mohammad ^ω

Abstract - This study attempted to calculate prevalence as well as to identify the patterns of smoking, cough and vaccination (BCG) coverage among garment workers in Dhaka city, Bangladesh. In this study 5829 garment workers from 12 garment factories were interviewed with a pretested questionnaire. The results revealed that 7.3%, 12.3% and 59.6% of garment workers respectively smoked cigarette, had cough and took BCG vaccination. Smoking was significantly associated with age and gender, whereas cough was significantly associated with education (>10 years education) and monthly salary and in case of vaccination, a significant relationship was seen with age, education, monthly salary (4001 BDT), room size (6001-800 and 8001 sq. ft.), status of light and air in the working room, sitting arrangement, number of persons living in a room (5-6 persons), length of living room (9 ft.) and width of living room (5-7 and 8 ft.). In case of BCG vaccination the significant associations appeared with age (25-34 and 35 years), education (6-10 years) and amount of salary (4001 BDT). TB burden could be reduced significantly by considering the above mentioned factors.

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I. INTRODUCTION

Developing countries have reported a more rapid rise in the prevalence of tobacco consumption among the youth than developed countries.^{1,2} Researchers have investigated such multi-factorial phenomenon revealing various individual and environmental correlates of youth tobacco use onset. These variables have included age, gender, ethnicity, race, family structure, attachment to family and friends, personal and parental socio-economic status, school factors, lifestyle, stress, self-esteem and other personality characteristics, knowledge and attitudes, and parental and peer smoking.³⁻⁷ Smoking is considered a major preventable cause of morbidity and mortality, causing over four million deaths a year.⁸ This figure may increase to 10 million deaths per annum by 2030; 70% of which will be in the developing countries.⁹ Cough is a symptom that affects a large proportion of the general population¹⁰ and can cause a deterioration of an affected subject's quality of life.

Cough is a common symptom in various respiratory disorders, such as asthma, chronic bronchitis and bronchiectasis.¹¹ Immunization remains one of the most important public health interventions and a cost effective strategy to reduce both the morbidity and mortality associated with infectious diseases. The uptake of vaccination services is dependent not only on provision of these services but also on other factors including knowledge and attitude of mothers,^{12,13} density of health workers,¹⁴ accessibility to vaccination clinics and availability of safe needles and syringes.

II. GARMENT WORKERS' SITUATION: BANGLADESH PERSPECTIVES

The readymade garment (RMG) industry in Bangladesh has been expanding rapidly since the late 1970, accounting for about 76% of the country's total export earnings in 1999, making Bangladesh one of the 12 largest apparel exporters in the world¹⁵ and by 2006 providing jobs for 4.5 million people, 80% of whom are women.¹⁶

Despite such encouraging role of RMG sector in Bangladesh, the worker's life is still one the poorest in this country.¹⁷ Many of these workers have no access to the existing healthcare system due to their long working hours and financial constraints. Not surprisingly, the productivity of the Bangladeshi garment work force is low even by South Asian standards.¹⁸ Around nine-tenths of the workers go through an illness or disease such as headache, anemia, fever, chest, stomach, eye and ear pain, cough and fever, diarrhea, dysentery, urinary tract infections and reproductive health problems. Safe conditions in the garment industry are very crucial for the worker's health and productivity.¹⁹ However, this area is largely unexplored as there are very few studies in this regard in Bangladesh.²⁰ Under these circumstances, this study focused on the prevalence as well as associated factors of smoking, cough and BCG vaccination coverage among garment workers in Bangladesh.

III. METHODOLOGY

a) Participants

This study was carried out among 5829 garment workers in Dhaka city where 90% of the

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factories exist. The researchers used cross sectional study design to conduct the study. The participants were from 12 selected garment factories. As the reported prevalence of TB (pulmonary tuberculosis) in this high risk group was 9.6 per 1000²¹ with 95% confidence interval the estimated sample size was calculated from:

$$n = 1.96^2 \times pq / d^2$$

(Here, $p=9.6$ per 1000; $q=990.4$ per 1000; d (relative precision) = 12% of current prevalence. So, estimated sample size was 2762). Further considering a 10% non-response with a design effect (taken at an approximate of 2), the final sample size was 5829.

b) Procedure

Cluster sampling technique was employed for selection of the study sample. Considering the large sample size, factories having more than 500 workers were enlisted from the BGMEA (Bangladesh Garments Manufacturing Association). Each factory was considered as a cluster. From the selected clusters, workers willing to participate in the study were included. Data collection was carried out during the first half of 2009. Six trained female interviewers collected the data through face to face interviews with a pre-tested questionnaire. Pre-test of the questionnaire was carried out in five garment workers. Each of the five workers was separately interviewed with the draft questionnaire. The questionnaire was finalized incorporating the feedback from the pre-test. Written informed consent from the participants as well as permission from the garment authority was taken before carrying out the interview.

c) Study variables

This study used three dependent variables, i.e., cigarette smoking, cough and BCG vaccination. Each of these three variables was measured with two categories (0=no and 1=yes). To calculate the prevalence of cough, disease history was taken by standard guide lines²². Chest X-ray and sputum for AFB were done in those having a history of cough for more than 21 days. Several independent variables were categorized under three headings viz. socio-economic, working environment and living conditions. Participants' socio-economic variables included age (initially collected as reported and later grouped as ≤ 24 , 25 -34 and ≥ 35 years), gender (0=male and 1=female), education (later grouped as 0=no education, 1=1-5 years, 2=6-10 years and 3= >10 years of education), marital status (0=unmarried, 1=married and 2=divorced/ widowed/ others), job (initially open ended but later categorized as 0=sewing, 1=quality and 2=others) and salary (later categorized as 0= ≤ 2000 , 1=2 001-4000 and 2= ≥ 4001 BDT).

The variables within working environment included room size (later categorized as 0= ≤ 4000 ,

1=4001-6000, 2=6001-8000 and 3= ≥ 8001 sq. ft.), number of persons working in a room (categorized as 0= ≤ 100 , 1=101 -200, 2=201-300 and 3= ≥ 301), status of light-air in the working room (0=sufficient and 1=not sufficient) and sitting arrangement (0=sufficient and 1=insufficient). The variables within living environment consisted of living place (0=slum and 1=not slum), number of persons in living room (later categorized as 0= ≤ 2 , 1=3 -4, 2=5-6 and 3= ≥ 8 persons), length of living room (later categorized as 0= ≤ 6 , 1=7-8 and 2= ≥ 9 ft.) and width of living room (later categorized as 0= ≤ 4 , 1=5-7 and 2= ≥ 8 ft.).

d) Data Analysis

Data analyses were carried out in two stages: data was initially analyzed for distribution the frequency of background characteristics, working and living condition of the garment workers. In the second stage, data were analyzed to identify the differentiating patterns of smoking, cough and BCG vaccination coverage among garment workers. For this, multivariate logistic regression analyses were carried out for each of the dependent variables.

IV. RESULTS

a) Background characteristics

Out of 5829 garment workers, the under aged participants found was small 1.3% (not shown). The majority of the participants (54.6%) were ≤ 24 years of age while 26.1% were 25-34 years and 6.9% participants were ≥ 35 years of age (Table 1). Around two thirds of the participants (61.4%) were females, whereas 38.6% were males. Although more than 85% of the garment workers had some years of schooling, 82.2% had 1-10 years of schooling (34.1% had 1-5 years and 48.1% had 6-10 years), and only 4.8% had >10 years education. Around half (49.5%) were married. Most of the participants were working in the sewing section (71.3% 71.8%), while 14.6% and 14.1% 12.7% participants were working in quality and 'other' section respectively. The salary of garment workers varied from less than 2000 to more than 8000 BDT (1USD = 73 BDT) where around one third participants (31.6%) earned only ≤ 2000 BDT, two-thirds (63.7%) earned 2001-4000 BDT and only 4.8% earned ≥ 4001 BDT per month as salary.

b) Working Environment

The mean room size was 6823 (SD=1610.5) sq. ft. About half (47.1%) and 20.2% of participants were working within 6001-8000 and ≥ 8001 sq. ft. room respectively (Table 2). Around one seventh participants were working in room accommodated for ≤ 100 workers. Whereas 19.9% and 33.6% of participants were working in a room accommodated for respectively 201-300 and ≤ 301 workers. About 35% workers worked with insufficient light and air. The sitting arrangement was insufficient for 48.8% 48.7% participants.

c) *Living Environment*

Only 13.6% of participants resided in the slum areas while more than four-fifths of the participants (86.4%) resided in other places (Table 3). Just over one fifth participants were living in a room with ≤ 2 persons. Although the majority of the participants (51.2%) were living in a room with a number of 3-4 persons, 3.5% of participants were also found living with 7-8 persons in a single room. More than one-third of the participants had ≤ 6 feet length of living room while more than two thirds of the participants lived in a 5-7 feet width room.

d) *Prevalence and associations of cigarette smoking*

In this study 7.3% of the garment workers were cigarette smokers (not shown). Multivariate logistic regression analyses were done to find out associations of smoking. It appeared that garment workers aged 25-34 and ≤ 35 years were less likely to smoke compared to garment workers aged ≤ 24 years but significant relationship appeared with age 25-34 years (OR=0.576, $p<0.01$) (Table 4). Significantly, male participants were more likely to smoke (OR=24.465) compared to female counterparts. Garment workers with some years of education (1-5, 6-10 and >10 years education) were more likely to smoke but the result was not statistically significant. Although results were not significant, married and divorced/separated/others participants were more likely to smoke compared to unmarried workers. Workers working in quality section and 'other' sections were more likely to smoke compared to workers in the sewing section. Participants' salary was not significantly associated with smoking.

e) *Prevalence and associations of cough*

This study identified 12.3% of garment workers had cough (not shown). The odds ratio (Table 4) indicated that although age, gender, marital status and job status had no significant impact on cough but workers with >10 years education had significantly lower likelihood of cough (OR=0.594, $p<0.05$) compared to that of workers with no education. Workers with the salary of ≤ 4001 BDT per month were significantly more likely to report cough (OR=1.209, $p<0.05$); however, it did not appear significant at $p=0.02$.

Multi-variate logistic regression was also carried out with the working environment to examine the impact on cough (Table 5). It appeared that room size of the factory had significant impact on garment workers' cough, i.e., participants working in a room with 6001-8000 and ≤ 8001 square feet room were respectively 1.978 and 1.643 times more likely to report cough compared to those working in a ≤ 4000 square feet room size. Although more than 100 persons living in a room (101-200 and ≥ 301 persons) appeared to have lower odds except 201-300 persons living in a room, the results were not statistically significant. Insufficient status of light-air in working room and insufficient status of

sitting arrangement had significant impact on cough (OR=0.630, $p<0.01$ and OR=0.781, $p<0.05$ respectively) compared to the respective reference category.

This study further examined the impact of living environment on garment workers' cough (Table 6). It appeared that participants living in non-slum areas were more likely to have cough (OR=1.070, $p>0.05$) compared to participants living in slum areas but the result was not statistically significant. Significant relationship appeared in case of 5-6 persons living in a room (OR=0.593, $p<0.05$). Higher length of living room (7-8 and ≥ 9 square feet) appeared to have higher odds compared to lower length of living room (≤ 6 square feet). However, significant relationship appeared with the length of ≥ 9 square feet (OR=1.926, $p<0.001$). Contrary to it, lower width living had lower odds in having cough. It appeared that participants living in a room with 5-7 and ≥ 8 square feet were significantly less likely to have cough compared to that of ≤ 4 square feet.

f) *Prevalence and associations of BCG vaccination*

This study identified that 59.6% of the garment workers were vaccinated with BCG (not shown). Multivariate logistic regression analyses (Table 4) found that workers aged 25-34 and ≤ 35 years were more likely to take BCG vaccine (OR=3.812, $p<0.001$ and OR=5.265, $p<0.001$ respectively) compared to workers who were ≤ 24 years of age. Although workers' gender, marital status and job status had no significant impact on getting BCG vaccination, education and salary appeared to have a significant impact on it. Workers with 6-10 years of education were 1.409 ($p<0.05$) times more likely to take BCG compared to workers with no education; however, it did not appear significant at $p=0.02$. Workers While workers with monthly income of ≥ 4001 BDT were less likely to take BCG vaccination (OR=0.741, $p<0.001$) compared to those with a monthly income of ≤ 2000 BDT.

V. DISCUSSION

This study identified the levels and patterns of smoking, cough and BCG vaccination coverage among garment workers in Dhaka city of Bangladesh. To identify the risk factors, socio-economic, working and living conditions were taken into consideration. This study revealed that $>7\%$ of the participants smoked cigarette. Although tobacco is perceived as being cheap, its actual cost, compared with food, education, and health care, is quite high, excessively so for those for whom basic survival is a daily struggle. Another study also indicates that tobacco is most commonly used by those who can least afford it.²³ The amount spent by the average male cigarette smoker in 1997 would purchase 2,942 calories of rice per day-enough to make a difference between family members getting by or suffering from malnutrition. This is also

true for the Bangladeshi garment workers as they earn a meager amount of money that incapacitates them to run the family well. This study further revealed a high prevalence of cough (12.3%) with low vaccination coverage (59.6%) among the garment workers.

This study found that participants' age had negative impact on smoking. This is similar to other studies.^{7,24-27} Numerous studies indicate that both in developed and developing countries the prevalence of smoking is increasing in youths and this is more rapid in the developing than the developed countries.^{1,2} This study also revealed that garment workers with higher age were more likely to take BCG vaccination and male garment workers were more likely to smoke compared to female workers. Another study also revealed that in Addis-Ababa males were more likely to smoke compared to females. However, reports on gender differences in adolescents' smoking behavior in other countries are controversial, ranging from higher prevalence in boys^{6,28} or in girls^{29,30} to no significant difference.³¹ The additional concern is gender, which is gradually shifting towards increased prevalence of smoking among females, notably among youths in Iran and many other countries.^{3,7,32} Although no such inference can be drawn from this study in case of Bangladesh, concern rises because of the increasing pattern of smoking.^{24,25}

The findings of this study further revealed that male garment workers were more likely to get cough compared to female garment workers. However, in other studies a higher prevalence of nocturnal and non-productive cough was reported in women than in men.³³ Education reflects knowledge and skills which influences health-related behavior, whereas income is an indicator of the current material situation.³⁴ As expected the finding of this study revealed that garment workers with some years of formal education were more likely to take BCG vaccination compared to those with no education and were less likely to have the problem of cough. This study further revealed that cough among garment workers was associated with working as well as living environments of the workers. Unexpectedly, the finding of this study also revealed that insufficient light-air had significant lower odds of cough compared to that of sufficient light-air. If mechanical ventilation and air conditioning system is not well-maintained, it can become a reservoir or amplifier for micro-organisms.³⁵ Hence, such an outcome may not be attributed to sufficient light air rather it could be due to the maintenance of mechanical ventilation and air conditioning system.

The finding of this study also revealed that insufficient sitting arrangement had lower odds of cough than that of sufficient sitting arrangement. It is to note that crowding of any sort increases the possibility of respiratory infection because the number of microorganisms in the air a person breathes is much greater when

larger numbers of people are crowded into small spaces.^{36,37} However, lower likelihood for cough with higher number of persons living in a room may be because of other reasons including cleanliness and health awareness of the garment workers.

The finding of this study also indicated that garment workers with higher length of living room had higher odds for cough. However, this study found lower likelihoods for cough with longer width of the living room. It is to be noted that in Bangladesh, many of the garment factories are not purpose built, rather it is a rented accommodation with almost no/low facilities for the workers, and there being no health facility at all for them.

VI. ACKNOWLEDGEMENTS

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Table 1 : Distribution of Participant's Background Characteristics

Characteristics	Frequency	Percent	Cumulative Percent
Age*			
≤24	3867	66.3	66.3
25-34	1562	26.8	93.1
≥35	400	6.9	100.0
Gender status			
Female	3579	61.4	100.0
Male	2250	38.6	38.6
Respondents' level of education			
No Education	766	13.1	13.1
1-5 years education	1985	34.1	47.2
6-10 years education	2798	48.0	95.2
> 10 years education	280	4.8	100.0
Marital status			
Married	2884	49.5	49.5
Unmarried	2654	45.5	95.0
Widowed/divorced/others	291	5.0	100.0
Job status			
Sewing	4157	71.3	71.3
Quality	849	14.6	98.9
Others	823	14.1	100.0
Amount of salary			
≤2000	1841	31.6	31.6
2001-4000	3711	63.7	95.2
≥4001	277	4.8	100.0

*Mean 23.5(5.5)

Table 2 : Distribution of Participant's Working Environment

Characteristics	Frequency	Percent	Cumulative Percent
Room size at workplace (in sq ft)*			
≤4000	508	8.7	8.7
4001-6000	1396	23.9	32.7
6001-8000	2745	47.1	79.8
≥8001	1180	20.2	100.0
Number of persons working in a room			
≤100	831	14.3	14.3
101-200	1880	32.3	46.5
201-300	1158	19.9	66.4
≥301	1960	33.6	100.0
Status of light-air in working room			
Sufficient	3811	65.4	65.6
Insufficient	2008	34.6	100.0
Sitting arrangement			
Sufficient	2987	51.2	51.3
Insufficient	2842	48.8	100.0

*Mean 6823(1610.5)

Table 3 : Distribution of Participant's Living Environment

Living Environment	Frequency	Percent	Cumulative Percent
Living Place			
Slum in City	795	13.6	13.6
Not slum in City	5034	86.4	100.0
Number of person in living room			
≤2	1330	22.8	22.9
3-4	2997	51.2	74.3

5-6	1298	22.1	96.5
7-8	204	3.5	100.0
Length of living room (in ft)			
≤6	2074	36.2	36.2
7-8	2724	45.8	82.0
≥9	1031	18.0	100.0
Width of living room (in ft)			
≤4	667	11.4	11.7
5-7	4106	68.7	81.8
≥8	1056	17.8	100.0

Table 4 : Odds Ratio (OR) of Smoking, Cough and BCG vaccination by Background Characteristics

Characteristics	Smoking		Cough		BCG Vaccination	
	OR	SE	OR	SE	OR	SE
Age*						
≤24	1.000		1.000		1.000	
25-34	0.576**	0.189	1.291	0.167	3.812***	0.157
≥35	0.783	0.174	1.305	0.172	5.265***	0.159
Gender status						
Female	1.000		1.000		1.000	
Male	24.465***	0.169	1.094	0.100	1.066	0.067
Respondents' level of education						
No Education	1.000		1.000		1.000	
1-5 years education	1.153	0.182	0.781	0.228	1.058	0.138
6-10 years education	1.194	0.160	0.666	0.235	1.409*	0.159
>10 years education	1.331	0.235	0.594*	0.251	1.131	0.144
Marital status						
Married	1.000		1.000		1.000	
Unmarried	2.223	0.183	1.800	0.182	3.166	1.123
Widowed/divorced/others	2.950	0.184	1.806	0.186	3.663	1.124
Job status						
Sewing	1.000		1.000		1.000	
Quality	1.211	0.820	0.382	0.741	1.554	0.399
Others	1.886	0.822	0.406	0.739	1.341	0.404
Amount of salary						
≤2000	1.000		1.000		1.000	
2001-4000	1.033	0.160	1.010	0.227	0.798	0.154
≥4001	0.921	0.199	1.209	0.089	0.741***	0.063
			1.209*			

*** $P < 0.001$, ** $P < 0.01$ and * $P < 0.02$ * $P < 0.05$; Abbreviations: SE, standard Error; OR, odds ratio

Table 5 : Odds Ratio of Cough by Participants' Working Environment

Working environment	OR	SE
Room size at workplace (in sq ft)*		
≤4000	1.000	
4001-6000	0.866	0.127
6001-8000	1.978***	0.140
≥8001	1.643**	0.188
Number of person working in a room		
≤100	1.000	
101-200	0.883	0.153
201-300	1.208	0.137
≥301	0.794	0.155
Status of light-air in working room		
Sufficient	1.000	
Insufficient	0.630**	0.163
Sitting arrangement		
Sufficient	1.000	
Insufficient	0.781*	0.118

*** $P < 0.001$, ** $P < 0.01$ and * $P < 0.02$ * $P < 0.05$; Abbreviations: SE, standard Error; OR, odds ratio.

Table 6 : Odds Ratio of Cough by Participants' Living Environment

Living environment	OR	SE
Living place		
Slum in City	1.000	1.000
Not slum in City	1.070	0.117
Number of person in living room		
≤2	1.000	
3-4	0.905	0.108
5-6	0.593*	0.219
7-8	0.816	0.130
Length of living room (in ft)		
≤6	1.000	
7-8	1.226	0.185
≥9	1.926***	0.107
Width of living room (in ft)		
≤4	1.000	
5-7	0.407***	0.163
≥8	0.382***	0.285