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Assessment of respiratory symptoms and associated factors among solid waste collectors in Yeka Sub City, Addis Ababa, Ethiopia

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Respiratory symptoms are frequently manifested among solid waste collectors. They are suffering from respiratory diseases because of frequent exposure to waste materials containing pathogenic materials and chemicals hazards for human being. Cross-sectional study was carried out to assess prevalence of respiratory symptoms and associated factors among solid waste workers in Yeka sub city, Addis Ababa from March to April, 2016. The sub city has a total of 13 woredas. All woredas had different number of unions organized under small scale enterprises. Thirty eight micro and small enterprise unions from all woredas were selected randomly. Study subjects were taken from selected enterprise consecutively. Observational checklist and structured questionnaire were used to collect data associated with respiratory symptoms. Binary logistic regression was performed to identify the risk factors associated with respiratory symptoms; p-values less than 0.05 were considered statistically significant. The overall prevalence of respiratory symptoms among solid waste collectors in Yeka sub city was 40.7%. Multivariate analysis revealed that respiratory symptoms prevalence was 2 times less likely among individuals use facemask on job (adjusted odd ratio [AOR] 2, 95% confidence interval [CI]: 1.1-4). The prevalence of respiratory symptom was 2.6 times more likely among individuals having sleeping disorder (AOR 2.6, 95% CI: 1.5-4.42). The prevalence of respiratory symptoms was 4.8 times more likely among study subjects who had past illness (AOR 4.8, 95% CI: 3.2-7.22). Respiratory symptoms among solid waste collectors were high. So, individuals participating in collecting solid west should use facemask, while collecting the wastes, municipal should change working hours and individuals who had history of past illness should get health information during enrollment.

Key words: Respiratory symptoms, solid waste, solid waste collectors.

INTRODUCTION

Respiratory symptoms are frequently manifested among solid waste collectors. They are suffering from respiratory diseases because of frequent exposure to health determinants like pathogens and chemicals as well as vehicle exhaust fumes, noise, extreme temperatures, ultraviolet radiation, large amounts of household and

commercial wastes, which comprised decomposable organic materials (Athanasiou et al., 2010; Jacques et al., 2006).

Solid waste is defined as the solid component of any left over, surplus or unwanted by product from any business or domestic activity. Solid waste management encompasses a very wide range of activities including: collecting municipal garbage and recyclable materials; collecting, sorting, and processing of these materials; composting of green waste; collection and processing of building and demolition, of commercial and industrial waste (Mola, 2005). The waste collected is rarely stored in a plastic or metal container and covered with a lid. Sometimes the waste is placed on the ground directly, thus requiring being shoveled by hand, or it is left in an open carton or basket to be picked by hand.

In developing countries the waste collection activities are carried out in micro and small-scale enterprise, with old equipment and virtually no dust control or worker protection. The waste collector's job involves tedious motion, uncomfortable working positions, deadly hand exertion and manual handling. They wake up in the early morning hours and practicing their activities day after day without rest (Englehardt et al., 2000). They are poor in terms of economy, low grade in education; furthermore, these groups of workers are directly exposed without adequate personal protection to Municipal Solid Waste (MSW) which includes hazardous substances (Jacques et al., 2006).

Few studies conducted globally among solid waste collectors indicated that direct contact with waste could induce dry cough with exercise induced dyspnea, asthma, and Organic Dust Toxic Syndrome (ODTS) because of exposure to infectious microorganisms (Sigsgaard et al., 1990). According to a study conducted in Taiwan; being waste collector was a risk for cough, phlegm, wheezing, dyspnea, and compared with office workers of the same institution (Yang et al., 2001). Moreover, a study showed that waste collectors were prone to asthma, spasm, throat dryness, nasal discharge, and coughing symptoms than in drivers (Issever et al., 2002).

According to a study conducted among solid waste collectors, solid waste collectors are suffering from asthma, chronic coughing, breathing trouble, sinus congestion rash or skin disease (Englehardt et al., 2000). In Palestine, 44.7% of domestic waste collectors have suffered from sore throat, cough, and high temperature (8). Asthma, cold, cough, chronic bronchitis, bronchial asthma, and Upper Respiratory Tract Infection (URTI) were common respiratory ailments among MSW collectors (Ahmad, 2004; Abou-ElWafa et al., 2014).

When we see a study carried out in Egypt, Africa, it underlined shortness of breath as the most frequent respiratory complaint among MSW collectors. Prevalence of respiratory ailments among MSW collectors was higher compared with service workers (Abou-ElWafa et al., 2014). A study in Tanzania confirmed that the number of waste handlers with complaint of nasal irritation were higher than other workers (Godson, 2008).

In Addis Ababa, Ethiopia most wastes are not segregated at household level, in addition manually loaded into sacks, pushed or pulled through long distances to be loaded into storage containers which are not in close proximity to where the residents are located. However, a study conducted in Ethiopia among city solid waste collectors showed that the problem of occupational injuries is present in a level that needs immediate public health action (Daniel et al., 2014).

Ethiopia is the country with the largest population in Africa, ranking number two from all countries in Africa. There is rising demand for food and other essentials, there has been a rise in the amount of waste being generated daily by each household. Theses waste serves as a source of infection for individuals who are actively participating in cleaning solid wastes. Majority of people involved in solid waste collection were exposed to occupational hazards and this resulted in increased utilization of health care services. This in turn affects the socioeconomic status of the population (Daniel et al., 2014). However, this problem did not get Minister of Health (MoH) attention so far. Therefore, this study aimed to assess prevalence of respiratory symptoms and associated factors among solid waste workers in Yeka sub city, Addis Ababa.

METHODOLOGY

Study area

The study was done in Addis Ababa, Ethiopia. Addis Ababa is one of the regions and the federal capital of Ethiopia which lies at analtitude of 7,546 feet (2,300 m). It covers a total area of 54,000 hectares. A total of 3,207,697 populations live in ten sub-cities distributed in 116 Woredas. Yeka is one of the ten sub cities of Addis Ababa and has 85.98 km^2 with 404,336 total populations.

Study design and period

Cross-sectional study was carried out in the study area from March to April, 2016

Sample size

The sample size was determined by employing single population proportion formula; taking magnitude of cough, breathing

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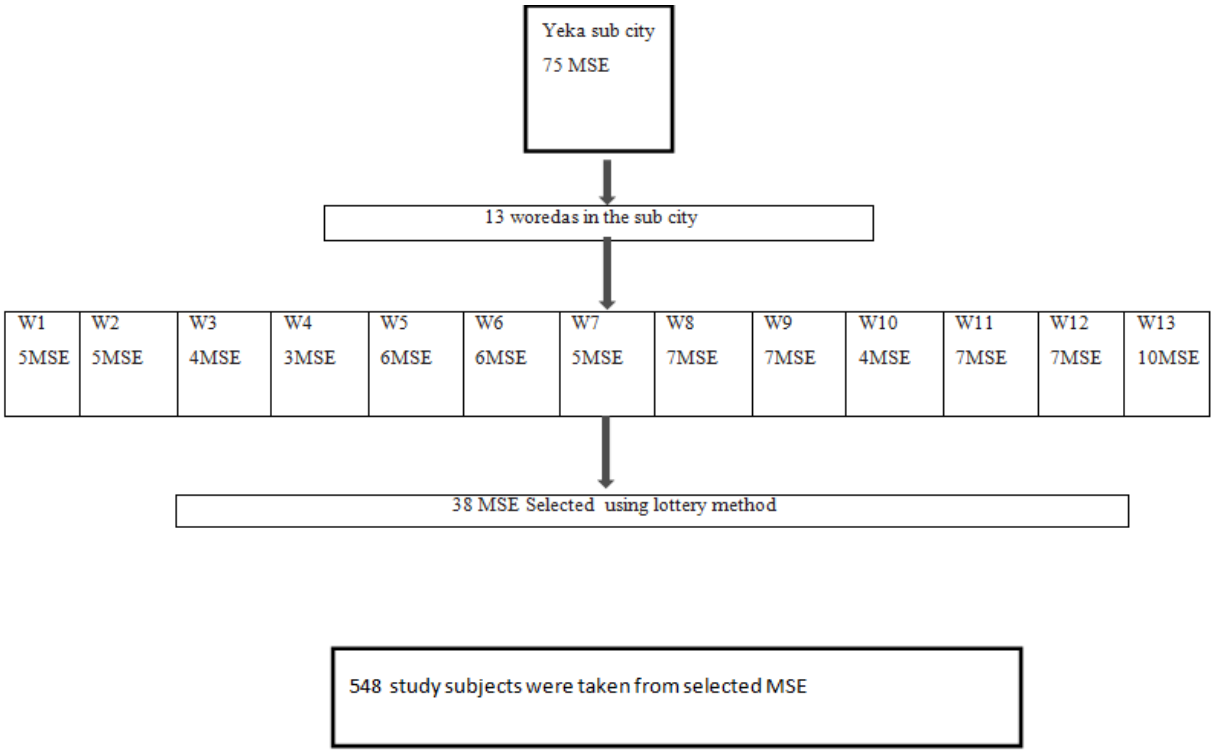

Figure 1. Sampling procedures.

trouble = 29.4% (Englehardt et al., 2000), assuming 5% margin of error and 95% confidence level and 10% for non-response rate. The final sample size was 548.

Sampling procedures

All woredas under the sub city were purposely included in the study. The sub city has a total of 13 woredas. All woredas had different number of unions organized under small scale enterprises. Since it is institution based study, more than 30% need to be included in the study. Thus, 38 micro and small enterprise unions from all woredas were chosen randomly. Study subjects were taken from selected enterprise consecutively (Figure 1).

Data collection tool and procedures

Socio-demographic, occupational safety, behavioral conditions, occupational history, and respiratory illness symptoms data were collected by four environmental health officers using structured questionnaire which was adopted from British medical research council's questionnaire (Tennant and Szuster, 2003). Moreover, observational checklist was used in order to assess personal protective devices availability and utilization. The questionnaire was prepared in English and translated to local language.

Statistical analysis

Data entry and analysis were done using Epi info 3.5.4 and SPSS 21.00 version statistical software respectively. Descriptive statistics such as frequencies, percentages and medians were computed to describe variables of the study. Crude Odds ratio with 95% CI in bivariate analysis was computed to see the presence of association between respiratory symptoms and associated factors. Multivariate logistic regression analysis was used to observe independent effects of associated factors on the respiratory symptoms by controlling the effect of confounders.

Data quality control

Filled questionnaires were checked for completeness and any incomplete information was excluded from the entry. Coded data was entered into Epi info version 3.5.4 computer software package. After the entry of every questionnaire completed, the soft copy of every questionnaire was cross checked with its hard copy to see for the consistency. Cleaned data was exported to SPSS version 21.0 software package for analysis using stat transfer software package.

Ethics approval and consent to participate

The study was approved by Ethics and Review Committee of School of Public Health Research Ethics Review Board, College of Health Sciences, Addis Ababa University. Letter of support was obtained from Addis Ababa city administration, Yeka sub city municipality. Written consent was obtained from study participants in order to collect data.

RESULTS

Socio-demographic characteristics of participants

Out of the total 518 respondents, 180 (34.7%) were

Table 1. Socio-demographic and working condition characteristics of Yeka sub city solid waste collectors (n=518) April 2016.

Variables	Frequency	Percent
Marital status		
Married	281	54.2
Single	128	24.7
Divorced/Separated	87	16.8
Widowed	22	4.2
Educational level		
Illiterate	205	39.6
Read and write	89	17.2
Primary school	184	35.5
Secondary school and above	40	7.7
Family size		
Two and less family	153	29.5
Three to four family	271	52.3
Five and above	94	18.1
Monthly income		
≤973	306	59.1
>973	212	40.9
Work experience		
≤5years	354	68.3
≥6 years	164	31.7

males and 338 (65.3%) were females with 94.5% response rate. The median age was 32 years. Four hundred and fifty three (87.5%) of participants were in the age group of 18 to 40, 205 (39.6%) of participants were illiterate and about 281 (54.2%) participants were married. About 271 (52.3%) had 3 to 4 family size and mean monthly income of participants was 973 Ethiopian birr ranging from 400 to 2000 birr (Table 1).

Occupational safety factors

Three hundred and five (59.0%) of respondents used some kinds of personal protective equipment such as glove, apron, boot and face mask. Out of these Personal Protective Equipment (PPE) users, only 63 (12.2%) used simple cloth made respiratory facemask out of which 53 (10.2%) use it all the time. Two hundred and forty eight (81.3%) of PPE users reported that they were using it all the time. The majority of PPE users, 192 (63%) purchase PPEs for themselves and 111 (36.4%) were provided by NGOs and only few 2 (0.7%) were provided by government. Two hundred and fifty eight (49.8%) had training about occupational health and safety. Out of these 188 (72.9%) on job training and 53 (20.5%) was first training and about 227 (88.0%) of these workers were trained by government.

Personal protective equipment availability and utilization

On the time of data collection, personal protective equipment whether it was new or porous tears out. Because, it allows dust and fluid perforate into workers body. Those devices not porous and tear out were identified as new personal protective device. Out of 226 observed gloves on workers on duty, 67 (25.0%), 213(80.0%), 106 (40.0%) and 173 (65.0%) were new, water proof, well dressed and perforated, respectively. Out of the total 63 observed, face mask 31 (49.0%) was perforated. Out of 233 overall clothing observed on workers on duty, 182 (78.0%) well dressed, 156 (67.0%) perforated, 78 (33.5%) new, and 37 (7%) workers used boot whereas others used short shoes (Figure 2).

Working condition and behavioral factors

Three hundred and fifty four (68.3%) had work experience

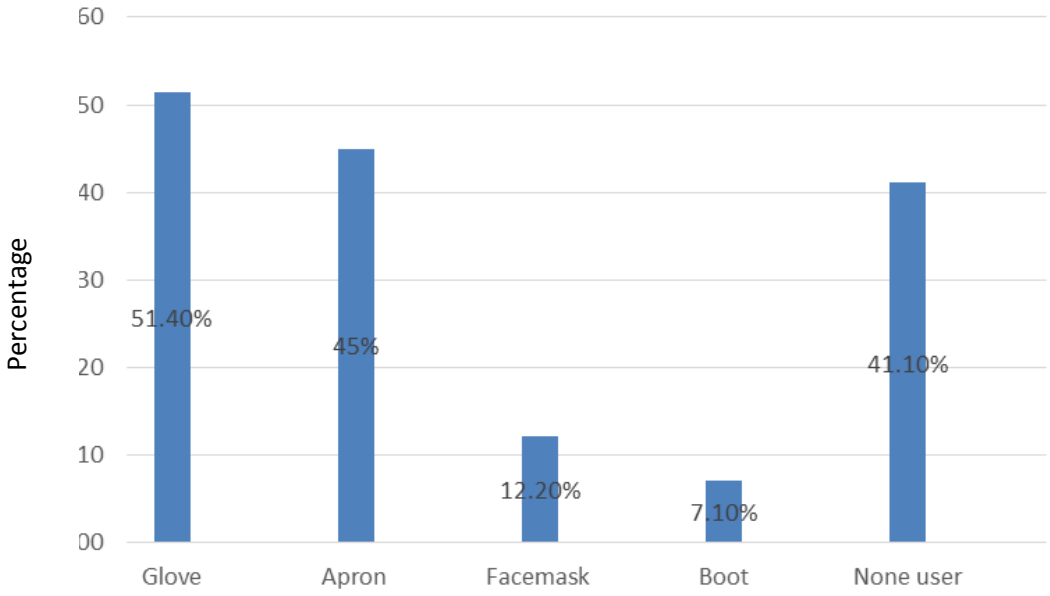

Figure 2. Types of personal protective equipment used by Yeka sub city solid waste collectors.

of five years or less. Forty nine (9.5%) participants were cigarette smokers and around 71 (13.7%) drink alcohol, and 85 (16.4%) had sleeping disorder. Eighty six (16.6%) of participants were not satisfied with the current job (Table 2).

Past illnesses

Participants were reported to have 10.2% bronchitis and asthma, 10.6% other chest trouble before they were employed to this job industry. Few workers reported the presence of heart trouble 6.6%, pneumonia 5.4%, 1.5% pulmonary TB and operation affecting chest, felt by respondents or identified by physicians before and after being employed in solid waste collection (Figure 3).

Prevalence of respiratory symptoms

The overall prevalence of respiratory symptoms among solid waste collectors in Yeka sub city was 40.7% with prevalence of cough 35.7%, wheezing 21.2%, phlegm 44%, chest illness 7.3% and breathlessness 29.2% (Figure 4).

In order to assess the predictor of respiratory symptoms socio-demographic, behavioral, occupational safety and working condition variables on respiratory health symptoms were assessed using logistic regression. All variables that were significant at bivariate level; p value < 0.2 were added to Multivariate analysis.

Multivariate logistic regression analysis revealed that respiratory symptoms prevalence was 2 times less likely among individuals use facemask on job (adjusted odd ratio [AOR] 2, 95% confidence interval [CI]: 1.1-4). The prevalence of respiratory symptom was 2.6 times more likely among individuals having sleeping disorder (AOR 2.6, 95% CI: 1.5-4.42). The prevalence of respiratory symptoms was 4.8 times more likely among study subjects who had past illness (AOR 4.8, 95% CI: 3.2-7.22), remained significant after adjusting for other socio-demographic, occupational safety and behavioral factors (Table 3).

DISCUSSION

Even though few studies were conducted before among solid waste collectors to assess respiratory symptoms globally, no study was mentioned on the overall (crude) magnitude of respiratory symptoms among solid waste collectors. In this study, the overall prevalence of respiratory symptoms was 40.7% with prevalence of cough 35.7%, wheezing 21.2%, phlegm 44%, chest illness 7.3% and breathlessness 29.2%.

This study revealed that absence of facemask on duty, sleeping disorder and past illnesses were major contributing factors for respiratory symptoms to occur. According to this study, majority of MSW collectors were less adherent to health and safety measures. Thus, giving information about the importance of personal protective measures at the time of enrollment and provision of clean protective device during collection hours might have helped to reduce the exposure to dust and the incidence of respiratory complaints (Abou-ElWafa et al., 2014). Those who never used facemask on duty had 2 times

Table 2. Utilization of PPE and behavioral status of Yeka sub city solid waste collectors April 2016.

Variable	Frequency (n = 518)	Percent
Use of respiratory facemask on duty		
Yes	63	12.2
No	455	87.8
Time facemask used		
All the time	53	10.2
Sometime	10	1.9
First training		
Yes	70	13.5
No	448	86.5
On job training		
Yes	188	36.3
No	330	63.7
Smoking cigarette		
Yes	49	9.5
No	469	90.5
Drinking alcohol		
Yes	71	13.7
No	447	86.3
Chewing chat		
Yes	31	6
No	487	94
Sleeping disorder		
Yes	85	16.4
No	433	83.6
Job satisfaction		
Yes	432	83.4
No	86	16.6
Work experience		
≤5 years	354	68.3
≥6 years	164	31.7
No of working days per week		
≤4 days	38	7.3
5-7 days	480	92.7

higher odds of respiratory symptoms than those who used respiratory facemask after some variables were adjusted. This result was consistent with a study done in Gambia on respiratory symptoms among solid waste collectors in which individuals who never used respiratory protective device significantly associated with the prevalence of respiratory symptoms ($P<0.05$) (Buba et al., 2014).

Solid waste collectors with past illness had 4.8 times greater odds of respiratory health symptoms than solid waste collectors with non-past illness. This might be because of their socio-economic status. Solid waste collectors recruitment criteria is open for all individuals with low educational background or illiterates are involved. So that municipality pays them low monthly wages

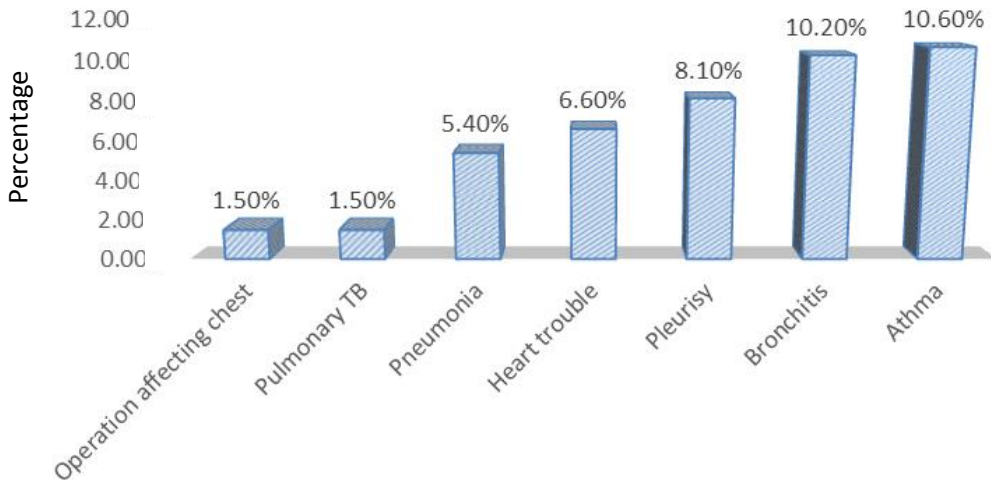

Figure 3. Distribution of past illness.

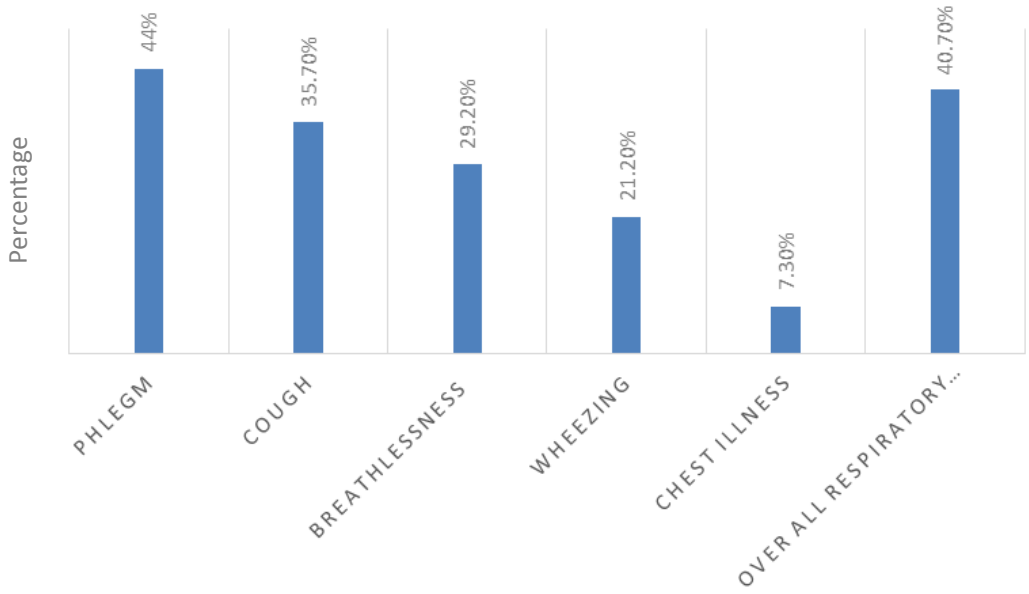

Figure 4. Distribution of respiratory symptom.

according to their educational achievement. They are relatively poor in terms of many and unable to afford the cost of medication and food (which boost their immune system). In addition to this, if the past illness had association with respiratory diseases like bronchitis and asthma make the problem more serious. This finding was inconsistent with a study done in the municipality of Keratsini, a suburb in the port city of Piraeus, Greece (Athanasiou et al., 2010) in which past illness was not significantly associated with respiratory symptoms. This might be because of in the referenced study; number of participants was very small.

Chat chewing, alcohol consumption, smoking and sleeping disorder were the main psycho-social problems assessed among the workers in this study. Sleeping disorder was significantly associated with respiratory symptoms according to our study. Solid waste collectors with sleeping disorder had 4.2 higher respiratory health symptoms than those with no sleeping disorder. This might be due to an interaction between sleep and respiratory symptoms resulting in permissive effect of sleep on respiratory failure. Similarly, there might be a negative effect of respiratory disease on sleep quality and continuity.

The difference between MSW collectors with normal and those of protecting themselves from respiratory

Table 3. Multivariable models of factors associated with respiratory symptoms among solid waste collectors in Yeka sub city, Addis Ababa, 2016.

Variable	Respiratory symptoms		COR (95 % CI)	AOR
	Yes	No		
Sex				
Male	65	115	**1**	
Female	146	192	0.743 [0.512-1.079]	0.7 [0.44-1.1]
Age				
18-35	140	201	1	
36-45	60	99	0.87 [0.591-1.281]	0.89 [0.6-1.4]
>45	11	7	2.256 [0.854-5.963]	2.5 [0.82-7.4]
Working days per week				
<=4	20	18	1	
5-7	191	289	0.59 [0.307-1.154]	0.75 [0.36-1.6]
On job occupational safety training				
Yes	95	110	1	
No	116	197	0.682 [0.477-0.975]	0.75 [0.5-1.1]
Use of facemask on job				
Yes	18	45	1	
No	193	262	1.842 [1.034-3.281]	2 [1.1-4]*****
Sleeping disorder				
No	158	275	1	
Yes	53	32	0.347 [0.215-0.561]	2.6 [1.5-4.42]*****
Past illness				
No	91	244	1	
Yes	120	63	5 [3.45-7.5]	4.8 [3.2-7.22] *****

symptoms among all educational categories with impaired pulmonary function tests was statistically significant regarding age, and duration of employment (Abou-ElWafa et al., 2014). In this study, age, work experience and educational status were not statically significant.

Conclusion

In the present study, respiratory symptoms among solid waste collectors were high. Absence of facemask on duty, sleeping disorder and past illness were independent predictors for the prevalence of respiratory symptoms. Therefore, individuals participating in collecting solid west should use facemask while collecting the wastes. Solid waste collectors working time is not appropriate to get healthy rest; it is early morning. So that government should give attention in order to alleviate the prevalence of respiratory symptoms. Past illness were also one of the factors associated with the prevalence of diseases. So that individuals who ever had history of past illness especially associated with respiratory symptoms should get health information in order to prevent health related problem during enrollment.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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