

Occupational Respiratory Health Symptoms and Associated Factor among Street Sweepers in Addis Ababa, Ethiopia

Mulugeta Tamene A*, Gebremeskel Hidat, Teklehaimanot M and Gebremedhin B

Department of Public Health, Africa Medical College, Addis Ababa University, Ethiopia

*Corresponding author: Mulugeta Tamene A, Department of Public Health, Africa Medical College, Addis Ababa University, Ethiopia, Tel: +251910609085; E-Mail: muluta.tamene@gmail.com

Rec date: May 03, 2017; Acc date: July 21, 2017; Pub date: August 01, 2017

Copyright: © 2017 Tamene MA, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Background: Occupational hazards are becoming the major concern for public health. Occupational health awareness in Ethiopia not well informed. And this resulted in extensively high prevalence of occupational respiratory symptoms. This research is aiming to assess occupational respiratory health symptoms and associated factors among street sweepers in Addis Ababa.

Methods: A cross-sectional study was conducted from January 2016 to march 2016 from five sub cities, and three weredas were selected using random sampling system. Univariate analysis, logistic regression analysis was performed to select all the independent variables with 95% Confidence Interval (CI) and $p < 0.05$. Epinfo version 3.5.1 and SPSS Version 20 used for data entry and analysis.

Result: The overall prevalence of respiratory symptoms among street sweepers were 279(68.9%), and respiratory symptoms cough 180(44.4%), shortness of breath 137(33.8%), and manifestation of eye discomfort 193(47.7%), sneezing 181(55.3%), and nose irritation 134(33.1%). Respiratory symptoms were associated with Age 28-37 (AOR=2.65; 95% CI: 1.362, 5.166) and 38-47 (AOR=2.051 95% CI: 1.018, 4.132), past history of emphysema (AOR=2.53 95% CI: 1.072, 5.97) and TB (AOR=7.24 95% CI 1.584, 3.065).

Conclusion: Respiratory symptoms were highly prevalent among street sweepers. Thus, pre-employment, on job training; improving hygienic practices and proper utilization of PPE are necessary measures to reduce the health hazards facing street sweepers in Addis Ababa.

Keywords: Occupational hazard; Coughing; Phlegm; Asthma; Street sweepers; Dust; Mist

Introduction

According to the world health organization (WHO) 2014, non-communicable diseases (NCD) were the leading explanation for death leading to loss of life concerning thirty eight million (68%) individuals globally in 2012 out of the entire fifty six million. Concerning forty two percent of all NCD deaths globally occurred before the age of seventy years old. In high-income countries twenty eight percent and in low and middle financial gain countries concerning forty eight percent deaths were in people aged less than seventy years [1]. In low and middle financial gain country, as well as Africa, occupational respiratory symptoms and diseases are immense burden attributable to the growth of investments, high unemployment rates; employees are doubtless a set of likely to continue operating even when having poor operating working environment. Seventy five percent of all NCD deaths (28 million), and therefore the majority of premature deaths (82%) occur in low- and middle-income countries.

From this, thirty eight million (68%) were attributable to cardiovascular diseases 17.5 million individuals annually, followed by cancers 8.2 million, metastasis(respiratory) diseases four million, and polygenic disease (diabetes) 1.5 million. From those non communicable diseases, metastasis diseases as well as respiratory

disease (asthma) and chronic hindering (obstructive) pneumonic diseases were higher in low financial gain countries [1-4]. Occupational connected metastasis symptoms are extensively ample low financial gain continent of Africa like Ethiopia. In Ethiopia death of non-communicable disease were around 210,200 individuals with 62.8% under seventy years.

According to WHO [2014] reports non-communicable diseases in Ethiopia accounts one third (30%) deaths, and out of it eightieth of the deaths are caused attributable to non-communicable diseases such chronic metastasis diseases, cancer, upset (cardiovascular disease) and diabetes [1-4]. The most common chronic respiratory disease in Ethiopia is asthma attack (Bronchial). It affects all age, socioeconomic groups and has worldwide distribution. Particularly children's are vulnerable individuals because it is that the commonest chronic illness among them. A study conducted in Tikur Anbessa hospital indicated that in Ethiopia chronic persistent (asthma attack) respiratory disorder may be a common explanation for chronic hindering pneumonic disease compared to smoking connected chronic bronchitis [5].

The growth of investment, in Addis Ababa exposes employees for dust-covered workplace and employees aren't well abreast of concerning health issues at their work surroundings. Addis Ababa, the capital town of Ethiopia, is one amongst the thirty five fastest-growing cities within the world [6]. The entire population is proven to be over 3.4 million with 2.5 percent annual rate of growth.

Different countries and components of Ethiopia move in view of socio-economic, cultural and political activities [7]. The perpetually escalating population has led to the assembly of enormous quantity of solid waste that cause major problem within the city surroundings. According to the Minister of Urban and housing of Ethiopia [2012] an estimation of thirty to fifty percent solid waste created in urban areas is left uncontrolled.

This waste will blocks evacuation channels that cause water stagnation and overflow that will increase the health risks of illness outbreaks, permanent damages, unpleasant odors and smells to urban population [8]. And in low financial gain countries like Ethiopia municipal waste management, that's waste assortment, street sweeping, employment and composition may be a major problem. This can be attributable to lack of resources, technologies, low customary of living, low level of education and poor planning [9].

The WHO [2005] estimated that 300 million people were suffering from asthma and 255, 000 of them died. On the other hand, asthma is under diagnosed and under-treated disease, creating a substantial economic and health burden to individuals and families. It also possibly restricts individuals' activities for a lifetime. Moreover, the major challenge is getting the expensive drugs which are taken for a lifetime [10]. According to the ILO [2000] other working environment related factors include exposure to diesel exhaust, dust, traffic accidents, sun heat and glare, smell, noise, harassment and street crime were commonly reported. Overall, street sweepers experience diseases symptoms including flu, cough, eye irritation, skin rash, chronic coughing, stomach upset and diarrhea are also reported. This shows that street sweepers are affected by more than one type of illness [11].

Street sweeping is to sweep and throw away materials scattered out of your wits at public streets. it is considered as unhealthy occupation as workers are constantly exposed to agents in the urban waste that lead them to different health problems [12]. They are exposed to significantly more amount of dust, fumes, decayed materials, microorganisms, road dust, toxins and vehicle exhausts while performing their daily activity in their workplace [13].

Road dust is suspended large size particles which is greater than 100 micro meter in diameter and fine particles with 2.5 micro meter in diameter can pass through our lungs into our blood supply [14,15]. The effects of the dust to people is chronic occupational respiratory system such as inflammation of lung tissues, chronic bronchitis, asthma [16,17]. An acute effects including runny nose, watery eyes, and sneezing for larger sized particles [18]. Currently Addis Ababa is under heavy construction with a lot of dust and suspended matter. Moreover, it has poorly networked roads, crowded and transport jams are everywhere. At the same time, the poorly protected street sweepers work on these roadsides. Thus we hypothesize that the street sweepers are facing respiratory diseases as a result of exposure to these pollutants. With this background, and fortified the prevalence of respiratory symptoms among street sweepers isn't addressed in Ethiopia. To the best of our knowledge this is the first work to address the prevalence of respiratory health symptoms among street sweepers in Ethiopia.

Method and Material

A cross-sectional study was conducted in Addis Ababa 5 selected sub cities from Dec twenty, 2015 to march thirty, 2016. AA is that the capital town of Ethiopia that geographically lays 9°1'48"N latitude and 38°44'24"E line of longitude and is found at the guts of the country.

The area covered about 526.99 km². It is the most important town in African country, with associate calculable population of 3352000, 1765000 are female and therefore the rest 1587000 are male.

The city has ten sub cities and 116 weredas. It is center for commerce, banking, national offices, small scale business embrace street seller, shop sales, craft men, demolition and construction of massive building are settled, that indicates high movement of individuals from totally different components of the planet, rural and peripheral areas for trying socioeconomic.

Due to a lot of movement of individuals and vehicle traffic, each related to abundant production of wastes and a lot of vehicle traffic which ends to fumes, aerosol, bio aerosol and dirt which can contributive to will increase prevalence of metabolism health symptoms among street sweepers WHO exposed eight hours per day for whole week while not correct and acceptable PPEs.

Sample size determination

The sample size of the study participants was determined based on single population proportion formula (Substituting in Kish Leslie (1996). In our understanding there were no similar studies previously done in Ethiopia, the prevalence of respiratory symptoms of 0.5 was taken as 50% with the aim of getting maximum sample size. With 95% confidence interval (CI) and marginal error (d) of 5%, the calculated sample size (n) was 384.

Data collection technique

For data collection, a structured questionnaire St. George's Respiratory Ruestionnaire, European community Respiratory, ATS DLD-78 Questionnaire (Annex I) was modified from British Medical Research Council Questionnaire, were made to serve our purpose. The questionnaire was translated into Amharic (Annex II) and back into English to check the consistency of meaning.

The questionnaire had four parts: socio-demographic characteristics, past history of respiratory symptoms, availability and utilization of personal protective equipment. For data collection, a structured form St. George's respiratory form, European respiratory, ATS DLD-seventy eight form (Annex I) was changed from British Medical analysis council form were created to serve our purpose. The form was translated into Amharic (Annex II) and into English to examine the consistency of that means. The form had four parts: socio-demographic characteristics, past history of metabolism symptoms, handiness and utilization of non-public protecting instrumentality.

Data processing and analysis

Data were entered into SPSS, version 20. Once observant the distribution of the info descriptive analysis of the variables was done exploitation binary logistical regressions. The socio-demographic variables were entered within the commencement, prevalence of respiratory symptoms variable on the second step and therefore the factors related to respiratory symptoms were entered within the third step consecutively.

Limitations of the study

- The study design was cross-sectional study may not establish causal-effect
- Sample size representativeness was limited due to logistic issue

- Season: some of the respiratory symptoms show seasonality

Result

A total of 405 participants, 82(20%) were males and 323(80%) were females. The mean (+SD) age of the study population was 36.4+9.4 years, ranged from 18-60 years. Majority (37.3%) of the study participants were within the age group of 28-37 years followed by 38-47 years that accounted 115(28.4%).

One-third (30.4%) of the street sweepers attended primary school and 206(50.9%) of participants were married. Working experience of participants ranged from 2-38 years, with mean (+SD) 9.35+8.6. The participants 276(68.1%) worked \leq 10 years expertise, and 399(98.5%) had work greater than five days per week and conjointly exposure to dust at work 402(99.3%) were exposed. Street sweeper workers of the total participants 399(98.5%) greater than five days per week and less than five days per week 6(1.5%) working days, and also, there were no facilities like shower, personal locker and changing cloth after and before they were work engagement.

In addition to this street sweepers sexual harassment 44(10.9%), and car accident 61(15.1%) because of the behavior of their working time is unusual (night). Around half of employees 186(46.9%) used piece of cloths instead of respirator/dust mask and also eye protection 3(0.2%) used. Pre-employment and on job training on occupational health and safety had taken only 10(2.5%) and 11(2.7%) respectively. Energy sources at home 51(12.6%) kerosene, 254 (62.3%) coal and 228(56.3%) electricity were used as fuel. Commonly street sweepers are same working hours that is 8 hours per day and also their income is the same for the entire participant that is 1123 Ethiopian Birr per month.

Participants were not used PPEs due to lack of awareness 110(27.2%), not comfort to use 154(37.8) and to save time 18(4.4) were reported. Most of the participants had no access to shower 404(99.8%), changing of clothes were not accessible before and after accomplished working activities. They are working out of the usual working days or hours and they may be face different events such as sexual harassment 44(10.9%) and car accident 61(15.1%) were reported by respondents' (Table 1).

Variable	Frequency	Percent (%)	Variable	Frequency	Percent (%)
Gender			Working days per week		
Male	82	20	<5	6	1.5
Female	323	80	>5	399	98.5
Age (in year)			Personal locker		
<27	77	19	Yes	9	2.2
28-37	151	37.3	No	396	97.8
38-47	115	28.4			
>48	62	15.3	Shower at work		
Marital Status			Yes	1	0.2
Single	109	26.9	No	404	99.8
Married	206	50.9	Personal protective equipment		
Divorced	66	16.3	Mask		
Widowed	24	5.9	Yes	186	45.9
Educational Status			No	219	54.1
Illiterate	63	15.5	Helmet		
Write and Read	64	15.8	Yes	270	66.7
Primary Education	123	30.4	No	135	33.3
Secondary Education	123	30.4	Hand glove		
TVET and Above	32	7.9	Yes	374	92.3
Service(in year)			No	31	7.7
<10	276	68.1	Foot wear		
20-Oct	76	18.8	Yes	343	84.7
>21	53	13.1	No	62	15.3

Exposure to Dust					
Yes	402	99.3			
No	3	0.7			

Table 1: Socio-demographic characteristics street sweepers in Addis Ababa, 2016.

Prevalence of respiratory health symptoms among street sweepers

The overall prevalence of occupational respiratory symptom was found to be 279(68.9%), and prevalence of respiratory symptoms cough 180(44.4%), shortness of breath 137(33.8%), phlegm 99(24.4%), wheezing 92(22.7%), chest pain 67(16.5%), and with manifestation of eye discomfort 193(47.7%), sneezing 181(44.7%) and nose irritation 134(33.1%), (Table 2).

Factors associated with respiratory symptoms

Female participants were more likely to develop respiratory symptoms (AOR=2.188 95% CI: 1.143, 4.189) than males. Age group 27-37 years and 38-48 years old were more likely to develop respiratory symptoms than age group less than 27 years (AOR=2.65 95% CI: 1.362, 5.166) (AOR=2.051 95% CI: 1.018, 4.13). Previous respiratory disease of Emphysema (AOR=2.53 95% CI: 1.072, 5.97) and TB (AOR=7.24 95% CI: 1.584, 3.065) workers were more likely easily to develop respiratory symptoms (Table 3).

Variable	Frequency	Percent (%)
Apron/Overall		
Yes	383	94.6
No	22	5.4
Eye protection		
Yes	3	0.7
No	402	99.3
Pre-employment training		
Yes	10	2.5
No	395	97.5
On job training		
Yes	11	2.7
No	394	97.3
Energy source at home		
Kerosene		
Yes	51	12.6
No	354	87.4
Coal/wood		
Yes	254	62.3
No	151	37.3

Electricity		
Yes	228	56.3
No	177	43.7
Not used PPE		
Lack of awareness	110	27.2
Not comfort	154	37.8
To save time	18	4.4
Respiratory symptom		
Yes	279	68.9
No	126	31.1
Chronic cough		
No	225	55.6
Yes	180	44.4
Shortness of breathlessness		
No	268	66.2
Yes	137	33.8
Attacks of chest		
No	338	83.5
Yes	67	16.5
Chronic wheezing		
No	313	77.3
Yes	92	22.7
Chronic phlegm		
No	306	75.6
Yes	99	24.4
Nose irritation		
No	271	66.9
Yes	134	33.1
Eye discomfort		
No	212	52.3
Yes	193	47.7
Sneezing		

No	224	55.3
Yes	181	44.7

Table 2: Socio-demographic characteristics street sweepers in Addis Ababa, 2016.

Variable	Respiratory Symptoms		COR (95%CI)		AOR (95%CI)
	Yes	No			
Gender					
Male	62	19	1		1
Female	217	107	1.609(0.916, 2.827)		2.188(1.143, 4.189)*
Age (in year)					
<27	63	14	1		1
28-37	79	36	2.653(1.362, 5.166)		2.65(1.362, 5.166)*
38-47	42	20	2.051(1.018, 4.132)		2.051(1.018, 4.132)*
> 48	95	56	2.143(0.975,4.706)		2.143(0.975,4.706)
Educational Status					
Illiterate	47	16	1.103(0.236, 5.146)		1.350(0.340, 5.356)
Write and Read	44	20	1.36(0.464, 3.984)		1.045(0.303, 3.60)
Primary education	84	39	1.635(0.705, 3.789)		1.045(0.303, 3.60)
Secondary Education	84	39	2.225(0.888, 5.578)		1.029(0.275, 3.843)
TVET and above	20	12	1		1
Past Dust Exposure (year)					
<5	105	47	1.877(0.347, 10.166)		1.014(0.651, 1.567)
>5	174	79	1		1
Home used energy					
Electricity	Yes	123	54	1.092(0.664, 2.605)	1.05(0.688, 1.608)
	No	156	72	1	1
Kerosene	Yes	250	104	1.985(1.046, 3.768)	1.827(0.946, 3.529)
	No	29	22	1	1
Coal(wood)	Yes	180	74	1	1.278(0.83, 1.966)
	No	99	52	1.395(0.845, 2.304)	1
Asthma	Yes	46	14	1	1
	No	233	112	1.546(0.751, 3.181)	1.705(0.844, 3.446)
Bronchitis	Yes	242	108	1.173(0.555, 2.477)	1.249(0.635, 2.456)
	No	37	18	1	1
Emphysema	Yes	252	111	2.616(1.022, 6.696)	2.53(1.072, 5.97)*
	No	27	15	1	1
Heart Attack	Yes	53	22	1.326(0.709, 2.482)	1.133(0.620, 2.072)

	No	226	104	1	1
TB	Yes	22	4	2.611(0.881.4.706)	7.24(1.584, 3.065)*
	No	257	122	1	1

Table 3: Factors associated with respiratory symptoms among street sweepers in Addis Ababa, 2016.

Previous history of respiratory disease

The current study showed that the street sweepers have a previous history of respiratory diseases asthma 60(23%), bronchitis 55(22%), emphysema 42(16%), cofactor heart attack 75(29%), TB 26(10%) were reported (Figure 1).

Availability of personal protective equipment

The figure 2 showed that on availability of PPE respirator (mask) 189(46.7%), hand glove 379(93.6%), helmet 274(67.7%), wear foot 364(89.9%), cloth/apron/overall 383(94.6%), and eye protection 2(0.5%) reported.

Utilization of PPEs during working

Participants culture on use of PPE, respirator (mask) 216(54.1%), hand glove 379(93.6%), helmet 31(7.7%), wear foot 135(33.3%), cloth/apron/overall 62(15.3%), and, eye protection 402(99.3%) reported. Participants complained on use of PPE due to uncomfortable 153(37.8%) especially during hot time, lack of awareness 110(27.2%), and to save time 18(4.4%) were reported (Figure 3).

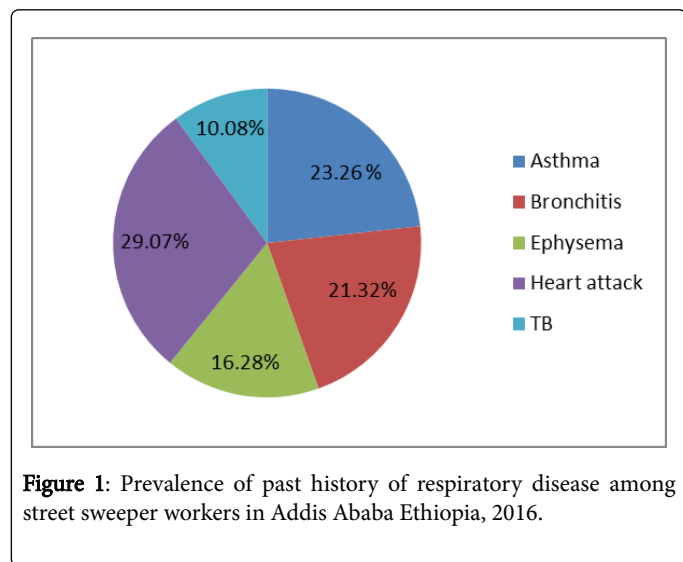


Figure 1: Prevalence of past history of respiratory disease among street sweeper workers in Addis Ababa Ethiopia, 2016.

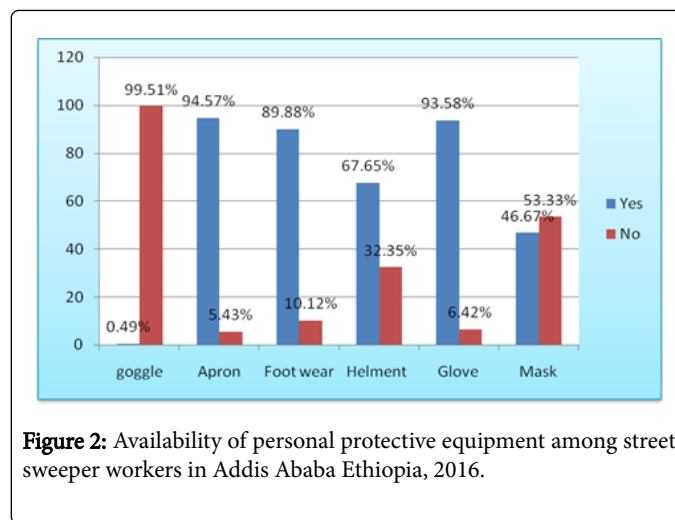


Figure 2: Availability of personal protective equipment among street sweeper workers in Addis Ababa Ethiopia, 2016.

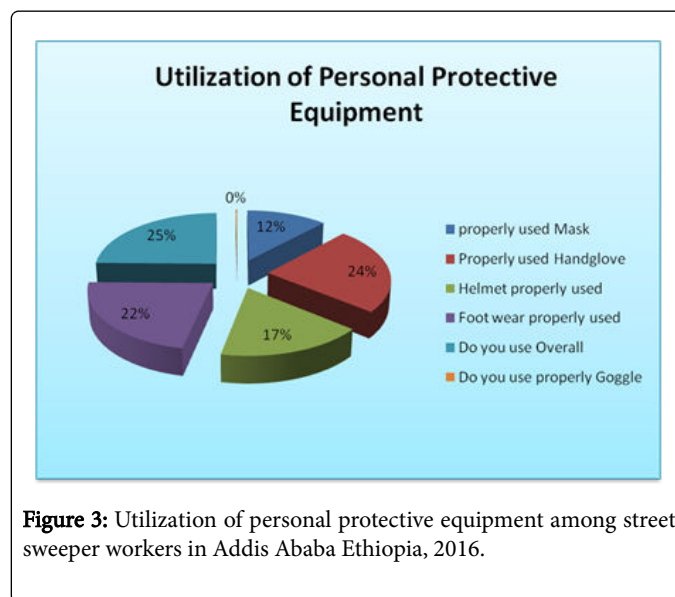


Figure 3: Utilization of personal protective equipment among street sweeper workers in Addis Ababa Ethiopia, 2016.

Discussion

The response rate of participants was 96%. The overall prevalence of respiratory symptom among street sweepers in current study was 279 (68.9%). The result of this study was slightly higher than related study conducted in cement factory workers in north Showa, Ethiopia which was 66.2% [19]. These differences might be due to effective preventive measures such as availability and proper use of personal protective equipment and training on cement factory workers.

The prevalence respiratory symptoms of street sweepers our results, cough (44.4%), shortness of breath (33.8%) was higher than study done

in India, Karnataka (36.6%), (13.3) respectively, and cough in Nigeria (25.5%). This discrepancy in the prevalence explained cough and shortness of breathing linked to the difference between the countries in level of development, status of workforce, strengths of occupational health and safety services and diversity and complexity of work tasks, and environments.

The current study shows that eye discomfort 47.7%, and sneezing 55.3% were explored from the street sweepers is higher than a similar study in India, sneezing (46.6%) and higher than that of done in Tanzania (6%). This difference may link to street sweepers had no awareness about the occupational health hazards associated with their work and they totally denied access to any of occupational health and safety trainings in Ethiopia. They also had other respiratory symptoms like phlegm and wheezing in mild form.

Studies showed an association between dust exposure and respiratory symptoms. Street sweepers extremely exposed to dust due to characteristics of their task, personal attitude toward proper use of personal protective equipment, awareness and understanding of impact of health hazard on their activity. And also street sweepers reported that high prevalence of eye discomfort and sneezing may link to lack of standardize eye protection equipment, access to shower, proper resting room and changing working clothes of personal protective equipment and an unusual working hours. This unusual working hours street sweeper workers may lead to car accident and sexual harassment, recruitment were no restriction they come from out of their residence.

This study revealed that age, gender and earlier respiratory disease emphysema and TB were determinant factors for respiratory symptoms among street sweepers. This current study shows that age of the study participants from 28-37, (AOR=2.65 95% CI: 1.362, 5.166), and 38-47 (AOR=2.051 95% CI: 1.018, 4.132) years old high risk of developing respiratory symptoms in street sweeper workers was increasing. This is due to the fact that older street sweepers had been exposed to these risk factors for long period of time in sweeping than the younger ones with short period of time in street sweeping experience. Hence they had high burden of chronic respiratory diseases. This study might be street sweeper exposed to higher concentrations of dust in the working place due to nature of work. This study disclosed that women (AOR=2.188 95% CI: 1.143, 4.189) were more likely to develop respiratory symptoms than men. This finding was not in line with the studies conducted in Ethiopia and Zambia [20,21]. This may because in the working area lacks of facilities such as post work bathing, post work changing of cloths and washing of hands and face at their work. In addition to street sweepers lack of training on occupational health hazard, and women exposed to higher indoor pollution due to biomass fuels due to the gender based segregation of domestic work.

The other determinant factor for respiratory health symptom was earlier history of respiratory diseases, such as emphysema and TB (AOR=2.53 95% CI: 1.072, 5.97) and (AOR=7.24 95% CI 1.584, 3.065) reported to the current study. This may street sweepers exposed to occupational exposure to dust, gases and fumes result in developing respiratory diseases and poor use of mask at work significant effect on developing respiratory irritation and more respiratory health symptoms reported for street sweepers who worked for more than five days per week but not statistically significant, this might be due to often high dust level exposure without proper preventive mechanisms, others have reported the same [22].

The current study also shows that demonstration of training on occupational health and safety related to dust and other factors much reduces prevalence of respiratory symptoms. A study was done in Tanzania after follow-up the cement factory workers with administration of health and safety training; much reduction on the exposed group but no difference on the control group [23]. Only (12%) of the street sweepers used mask personal protective equipment during their activities, but the mask they use is not real mask masked their mouth normal piece of cloth which is not recommended for protection of dust particles.

Accessibility of personal protective equipment's respirator (mask) 189(46.7%), hand glove 379(93.6%), helmet 274(67.7%), foot wear 364(89.9%), cloth/apron/overall 383(94.6%), available but most of the personal protective equipment were discomfort, lack of awareness and to save time to use.

Training on occupational health and safety and PPE use was not statistically significant in the present study (AOR=4.167 95% 0.522, 33.247). This finding was inconsistent with studies done in Ethiopia cement factory workers [24]. Workers who had no training was more likely to develop respiratory symptoms than workers who had got training (AOR=2.73, 95% CI=1.41, 5.29).

Lack of safety training, especially on job training, limited use of personal protective devices while on duty and prolonged duration of working hours were major factors that give to occurrence of respiratory symptoms. This discrepancy might be that training changes the attitude of workers towards respiratory health problems, and provides the skills and knowledge about the means of protecting themselves from health effects associated with dust work environments. During the interview and observation explained that street sweepers were working unusual working hours. This unusual working hour at night (3:30 PM to 10:00 AM) the busiest working hour and with high traffic jam and overcrowded. Addis Ababa is newly emerging city have high accumulation of waste from business, markets, constructions, smoke from car engine, wastes from industry improper drainage and other thrown by pedestrian, which end-up producing much dust, and other contamination in the street.

Conclusion

In this study we found that prevalence respiratory symptoms among street sweepers are much higher (68.9%) and they are vulnerable groups.

Finally we recommend the following preventive measures to cut prevalence occupational respiratory health symptoms and associated factors among street sweepers in Addis Ababa.

- The AACA should give standardized and proper PPEs
- Provide right training before and after employment training
- Should facilitated shower, personal locker, resting room and recruit employee near to their vicinity
- Further study on knowledge, attitude and practice on occupational health and safety
- And also on non-respiratory risks among street sweepers.

Acknowledgements

We thank the Africa medical college school of public health and Addis Ababa city administration cleansing and management agency participants.

References

1. Global action plan for the prevention and control of non-communicable diseases 2013–2020. Geneva: World Health Organization.
2. Global strategy for prevention and control of non-communicable diseases (2000) Geneva: World Health Organization.
3. Global status report on non-communicable diseases (2011) Geneva: World Health Organization.
4. From burden to “best buys”: Reducing the economic impact of non-communicable diseases in low-and middle-income countries (2011) Geneva: World Health Organization.
5. Public Health agency of Canadian Best practice portal report(2014).
6. Mickey L (2015) BrookTeklehaimanot Addis Ababa Housing Development project office.
7. Central Statistical Agency of Ethiopia Report on Urban Employment Unemployment, CSA Addis Ababa 26-27.
8. Ministry of Urban Development and Construction Urban Planning (2012) Solid Waste Management Manual: With Respect to Urban Plans, Sanitary Landfill Sites and Solid Waste Management Planning. Urban Planning, Sanitation and Beautification Bureau: Addis Ababa-7.
9. Bartlett IW, Dalton AJP, McGuinness A, Palmer H (1999) Substitution of organic solvent cleaning agents in the lithographic printing industry. *Annals Occupational Hygiene*43: 83-90.
10. Krajewski JA, Tarkowski S, Cyprowski M, Szarapinska KJ, Dudkiewicz B (2002) Occupational exposure to organic dust associated with municipal waste collection and management. *Int J Occup Med Environ Health* 3: 289-301.
11. Ahmed GU, Masum MK, Alam MS (2006) Status of Ambient Air Quality in the Urban and Rural Areas of Chittagong, Bangladesh.
12. WHO/SDE/OEH/99.14 (2000) hazard prevention and control in the work of Environmental health; Airborne Dust. *British occupational hygiene society* 44: 405.
13. National institute of Occupational health and Safety of America, Respiratory Diseases Research at NIOSH (2008).
14. Miguel AG, Glovsky MM, Weiss J (1999) Allergens in paved road dust and airborne particles. *Environ Sci Technol Lett* 4159-4168.
15. Mark JU (2008) Respiratory Diseases Research at NIOSH: National Institute Occupational Safety and Health.
16. Aguwa EN, Okeke TA, Asuzu MC (2007) The prevalence of occupational asthma and rhinitis among woodworkers in south-west Nigeria. *Tanzania Health ResBull* 9: 52 – 55.
17. Kebede S, Kassahun A (2014) Respiratory symptoms and associated factors among cement factory workersEthiopia.
18. Zemichael G, Takele T (2016) Chronic respiratory symptoms and associated factors among cement factory workers. *Multidiscip Respir Med* 11: 13.
19. Sundararaj A (2012) The prevalence of respiratory morbidity and the risk factors associated, among the workers of cement industry in South India: Dissertation paper.
20. Nku CO, Peters EJ, Estiet AI, Oku O, Osim EE (2005) Lung function, oxygen saturation and symptoms among street sweepers in Calabar-Nigeria. *J physiol Sci*20: 79 - 84.
21. Kebede S, Kassahun A (2014) Respiratory symptoms and associated factors among cement factory workersEthiopia.
22. Muula AS, Rudatsikira E, Siziya S (2010) Occupational illnesses in the 2009 Zambian labour force survey. *BMC Res Notes* 3: 272.
23. Zemichael G, Takele T (2015) Chronic respiratory symptoms and associated factors among cement factory workers in Dejen town, Amhara regional state, Ethiopia. *Multidiscip Respir Med* 11: 13.
24. Sundararaj A (2012) The prevalence of respiratory morbidity and the risk factors associated, among the workers of cement industry in south india: Dissertation paper.