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Occupational hazards and health problems among street sweepers in Uyo, Nigeria

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Abstract

Introduction: The job of street sweepers is a vigorous task which exposes workers to many hazards and health problems. This study assessed the occupational hazards, health problems and utilization of personal protective equipment (PPE) among street sweepers in Uyo, Nigeria.
Method: This was a descriptive cross-sectional study among street sweepers. Data collection was carried out using an interviewer administered semi-structured questionnaire. Data obtained was analysed with the Statistical Package for the Social Sciences (SPSS) version 20. The level of significance was set at 0.05.
Result: A total of 150 sweepers participated in the study. The mean age was 37.47±10.58 years, the median was 37 years and 88 (58.7%) were females. The mean period of employment was 2.89±1.20 years. No sweeper received any safety training about the job. Majority (77.1%) swept approximately 238m daily. The commonest hazards reported were dust 141(94.0%), cold 129 (86.0%), mosquitoes 74 (49.3%) and prolonged bending 149 (99.3%). Health problems reported included musculoskeletal diseases 63.3%, respiratory symptoms 47.3%, fever 32.0% and hand/foot injuries 18%. The most commonly utilized PPE was reflectors 98 (65.3%). None used goggles and boots. Musculoskeletal pain occurred with increasing age, distance and duration of sweeping ($p<0.001$). There was a significant association between lack of use of face mask and the occurrence of respiratory symptoms ($p<0.05$).
Conclusion: Sweepers in Uyo were exposed to several workplace hazards. The availability and use of PPEs were low. Consequently, several health challenges were faced. Adequate provision of PPEs should be ensured by employers in order to mitigate the effects of hazards on sweepers.

Key words: Occupational hazards, sweepers, PPE, health problems, Uyo, Nigeria

Introduction

Street sweeping is an increasingly popular outdoor occupation in major cities of Nigeria and has contributed to creating jobs for the lower class citizens.[1] Presently, street sweepers are a common sight in many cities in Nigeria. They play an important role in maintaining the health and hygiene of communities.[2] The job of a street sweeper is however a vigorous task that usually involves cleaning of assigned areas, such as roads, footpaths, parks, markets and open settlements, using brooms and deposition of the waste in nearby dustbins.[3] It often entails standing for long durations, bending either while sweeping or collecting the swept waste, pushing and pulling wheelbarrow and manually lifting containers to deposit waste.[3,4] These activities expose workers to many hazards. Many street sweepers are women, while the collection of waste from households and enterprises is done by men as well as women.[5]

At present, in developing countries, unlike industrialized countries, street sweepers manually

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collect generated wastes with little or no protection, thus having direct contact with injurious substances at the workplaces.[6] These workers are chronically exposed to diverse occupational hazards leading to health problems. Occupational hazards among street sweepers are a cause for concern. Such occupational hazards could be physical, chemical, biological, psychosocial or ergonomic hazards. Several studies have reported the vulnerability of this group of workers to a combination of these hazards.[1,7,8]

Physical hazards can be from constructions, falling objects, slippery muddy ground, noise and road traffic accidents (RTAs). The physical hazards identified in a study included noise from moving vehicles, injuries from sharps, exposure to the risk of violence and hit-and-run accident.[2,9] Biological hazards may occur due to microorganisms that sweepers are exposed to during their work.[9,10] Chemical hazards that may be experienced include dust particles, bio-aerosols, volatile organic matter, exhaust fumes, toxic substances, unexhausted chemicals inside cans of pesticides and insecticides.[7,9,11] Psycho-social hazards though commonly intangible, often affects the wellbeing of the workers. Such hazards identified amongst sweepers in a study included low level of job satisfaction (58.3%) due to poor remuneration, the rigor of the job and stigmatization.[2] Street workers work for long hours or do a lot of work in limited time which often impacts on them negatively.

Ergonomic hazards are physical factors within the work environment that affect musculoskeletal system such as awkward positions and mechanical stress. Factors associated with its occurrence include awkward posture of bending to sweep long distance, length of the broom, weight of broom and dustpan leading to attendant musculoskeletal disorders.[8,12,13] Work related hazardous exposures in street sweepers are further complicated or aggravated by various socioeconomic factors such as poverty, illiteracy or inadequate education, poor diet, and poor housing conditions.[14]

Exposure to these hazards often leads to various health problems among street sweepers which include respiratory disorders, such as mucous membrane irritation, rhinitis, allergy, asthma, bronchitis, hypersensitivity pneumonitis and allergic broncho-pulmonary mycosis.[7,13] Other health problems include musculoskeletal disorders, dermatological problems, ocular problems, headache, fatigue, dizziness, anaemia, gastrointestinal problems and injury/accident.[1,2,11,12,15,16,17]

Street sweepers often do not use personal protective equipment (PPE) which is meant to be used or worn by a person to minimize risk from exposure to workplace hazards. Studies have shown low utilization of PPE among street sweepers.[1,2] According to the occupational health and safety laws at work in Nigeria, any workplace where workers are employed in processes involving exposure to injurious or offensive substance or environment, effective protective equipment should be provided and maintained by employer for the use of such persons employed.[18] By wearing appropriate PPE, employees can help reduce some of the hazards that are inherent to their jobs and prevent occupational injuries and illnesses.[19] A study done at Addis Ababa showed that utilization of personal protective devices by workers while on duty was protective against associated injury.[20] In view of the numerous health conditions associated with street sweeping and the paucity of published studies on street sweepers, particularly in Uyo, Nigeria, the objectives of this study were to assess the occupational hazards, health problems and level of utilization of PPEs among street sweepers with the intention of giving feedback to the sweepers and their employers on safer work practices.

Methodology

Study Area: The study was conducted in Uyo, the capital city of Akwa Ibom State in South-South geopolitical zone of Nigeria. The city covers an area of 362 km^2 with an estimated population of 436,606 in 2019.[21] Uyo is a rapidly developing city with several road networks which ease movement within the metropolis. Uyo is an urban area where much of commerce, banking, national offices, small scale businesses such as street vending, shop sales, demolition and construction of big buildings occur. These activities generate much waste such as municipal solid waste, road dust, garbage and hazardous wastes. Theses wastes are being collected by workers which include manual scavengers and street sweepers.

Study Design: This was a descriptive cross-

sectional study among street sweepers in Uyo.

Study Population: The target population was street sweepers working in Uyo metropolis, Nigeria. Street sweepers in Uyo are temporary workers hired by contractors working for the State Ministry of Environment. There are about 360 street sweepers covering Uyo metropolis. They are recruited to perform the services of daily sweeping of streets in the capital city.

Inclusion Criteria

1. Persons who have worked for at least one year as street sweepers.
2. Persons who are 18 years and above working as street sweepers.

Sample Size Calculation: Sample size estimation for this study was calculated using the formula for single proportion for cross sectional studies (z^2pq/d^2), where z = Confidence interval (95% or 1.96) , with a prevalence of 7.3% being the proportion of street sweepers who complained of upper respiratory tract infection in a previous study[16], q=1-p and d=degree of precision (0.05). The calculated sample size was 104. Additional 10% was added to cushion for non- response, giving a total sample size of 115.

Sampling Technique: The study was conducted among street sweepers in Uyo between January and February 2020. There are twelve major dual carriage roads in Uyo metroplolis with several smaller roads linking them. Different supervisors oversee street sweeping of these roads and the environs. According to the respective supervisors, there are about 30 sweepers operating on each of the major roads and the surrounding streets. Six out of the 12 major roads were selected by simple random sampling method. All consenting street sweepers in the selected roads who met the inclusion criteria were included in the study.

Data collection: Data collection was carried out by four adequately trained research assistants with the aid of an interviewer administered semi-structured questionnaire. The tool consisted of four sections which examined the demographic profile and work history of respondents, exposure to workplace hazards, occupationally related health disorders, awareness, availability and use of PPE. The questionnaire was pretested on 10 street sweepers on Itu road which is in a nearby local government area in order to ensure adequate comprehension by the respondents. The tool was subsequently fine - tuned accordingly. Data collection took place within a period of two months.

Ethical Consideration: Ethical clearance was obtained from Akwa Ibom State Health Research Committee. Permission was also obtained from the respective managers in charge of the sweepers on the selected roads. The purpose, content and significance of the study were explained to the respondents after which consent was obtained from each of them. Participation was entirely voluntary and the questionnaires were anonymised to ensure confidentiality.

Data management: The data obtained was analysed using the Statistical Package for the Social Sciences (SPSS) version 23. The scope of analysis carried out included descriptive statistics (frequency and proportions) and inferential statistics (Chi -square to test the significance of association between two categorical variables). The level of significance was set at 0.05.

Results

A total of 150 sweepers participated in the study. The mean age was 37.47±10.58 years and the median was 37 years. More than half, 88 (58.7%) were females. Only 44 (29.3%) were single, while the most common level of education was primary 113 (59.3%). (Table 1) The monthly income of majority (70.0%) was 20,000 Naira. The mean period of employment of the respondents was 2.89±1.20 years. All of them worked daily, commonly for 2 hours, 138 (92.0%). The highest proportion of respondents, 65 (43.3%) swept from 4-6am and 144(96.0%) used brooms attached to long sticks of 1.5-1.8meters. (Table 2a) No sweeper received any health and safety training prior to commencing the job. Majority (77.1%) swept a distance of 15 poles (238 meters) daily on one side of the road. All were temporary workers. Most 116 (77.3%) had other occupations, the commonest being trading, 44 (29.3%). (Table 2b)

The respondents reported being exposed to many physical, chemical, biological and ergonomic hazards, top among them being cold 129(86.0%), dust 141(94.0%), mosquitoes 74 (49.3%) and prolonged bending 149 (99.3%) respectively. Moreover, 63 (42.0%) were not happy with their pay, which is a psychosocial hazard. Components of

Table 1: Socio-demographic characteristics of respondents

Characteristic	Frequency n=150	Percentage (%)
Age (years)		
=20	6	4.0
21-30	41	27.3
31-40	55	36.7
41-50	30	20.0
>50	18	12.0
Mean Age 37.47±10.58	Range 19-65	
Sex		
Male	62	41.3
Female	88	58.7
Marital status		
Single	44	29.3
Married	70	46.7
Widowed	26	17.3
Divorced	10	6.7
Level of education		
No formal education	14	9.3
Completed Primary	113	59.3
Completed Secondary	47	31.4

Table 2a: Occupational history of respondents

Characteristic	Frequency n=150	Percentage (%)
Monthly income (Naira)		
10,000	23	15.3
15,000	14	9.3
20,000	105	70.0
30,000	8	5.4
Mean income 18,533±4,581	Range 10,000-30,000	
Period of employment (years)		
1-2	72	48.0
3-4	60	40.0
5-6	18	12.0
Mean 2.89±1.20	Range 1-6	
Number of work days weekly		
7	150	100.0
Daily sweeping hours		
2	138	92.0
3	12	8.0
Sweeping Time		
4-6am	65	43.3
4-7am	12	8.0
5-7am	53	35.3
6-8am	20	13.4
***Length of sweeping broom**		
Long	144	96.0
Short	6	4.0

*Long= broom attached to a long stick (1.5-1.8meters); short= broom not attached to a stick

Table 2b: Occupational history of respondents

Characteristic	Frequency n=150	Percentage (%)
Training on health and safety		
Yes	0	0.0
No	150	100.0
***Distance swept daily**		
<15 poles	10	6.7
15 poles	116	77.3
>15 poles	24	16.0
Nature of employment		
Temporary	150	100.0
Permanent	0	0.0
Doing other jobs		
Yes	116	77.3
No	34	22.7
Type of other jobs		
Trading	44	29.3
Artisan	43	28.7
Farming	14	9.3
Beautician	15	10.0
None	34	22.7

*1 pole= 15.86 meters

Table 3: Perceived occupational hazards of respondents and component of refuse

*Hazards	Frequency (N=150)	Percentage
Physical hazards		
Cold	129	86.0
Noise	70	46.7
Robbery	26	17.3
Lunatic attack	19	12.7
Injuries	17	11.3
RTA	15	10.0
Chemical hazards		
Dust	141	94.0
Fumes	30	20.0
Biological hazards		
Mosquitoes	74	49.3
Snakes	8	5.3
Ergonomic hazards		
Prolonged Bending	149	99.3
Long walk	147	98.0
Use of short broom	6	4.0
Psycho-social hazards		
Unhappy doing the job	15	10.0
Unhappy with pay	63	42.0
Components of refuse		
Sand	150	100.0
Polythene	146	97.3
Leaves	145	96.7
Broken bottles	117	78.0

*multiple responses allowed

Table 4: Health problems experienced by respondents

* Health problems	Frequency N=150	Percentage (%)
Musculoskeletal symptoms	95	63.3
Waist pain	70	46.7
Back pains	60	40.0
Joint pains	46	30.7
Respiratory symptoms	71	47.3
Catarrh	58	38.7
Cough	46	30.7
Breathlessness	12	8.0
Other health problems		
Fever	48	32.0
Frequent headaches	47	31.3
Rashes	28	18.7
Eye irritation	28	18.7
Injuries		
Yes	27	18.0
No	123	82.0
Location of injuries	**N=27**	
Hand injuries	19	70.4
Foot injuries	8	29.6
Cause of injury		
Broken bottles	23	85.2
Nail puncture	2	7.4
RTA	2	7.4
Type of injury		
Laceration	24	88.9
Fracture	1	3.7
Puncture wound	2	7.4

*Multiple responses allowed

Table 5: Knowledge, ownership and use of personal protective equipment among sweepers

*Variable	Frequency	Percentage (%)
Knowledge of function of PPE		
Apron	104	69.3
Boots	73	48.7
Gloves	128	85.3
Goggles	63	42.0
Facemask	116	77.3
Reflector	135	90.0
Ownership of protective equipment		
Apron	31	20.7
Boots	0	0.0
Gloves	60	40.0
Goggles	0	0.0
Facemask	57	38.0
Reflector	104	69.3
Use of protective equipment		
Apron	21	14.0
Boots	0	0.0
Gloves	50	33.3
Goggles	0	0.0
Face mask	47	31.3
Reflector	98	65.3

*Multiple responses allowed

Table 6: Association between selected characteristics of respondents and musculoskeletal pains

Variable	Musculoskeletal pain		Statistics
	Yes N=95 n (%)	No N=55 n (%)	
Age(years)			
=20	0(0.0)	6(100.0)	
21-30	15(36.6)	26(63.4)	χ^2=48.83
31-40	36(65.5)	19(34.5)	p<0.001*
41-50	26 (86.7)	4 (13.3)	
>50	18(100.0)	0(0)	
Period of employment (years)			
1-2	44(61.1)	28(38.9)	χ^2=1.84
3-4	37(61.7)	23(38.3)	p=0.40
5-6	14(77.8)	4(22.2)	
+Distance swept			
<15 poles	2(20.0)	8(80.0)	χ^2=8.66
15 poles	77(66.4)	39(33.6)	p=0.01*
>15 poles	16 (66.7)	8 (33.3)	
Daily work hours			
2	84(60.9)	54(39.1)	Fishers
3	11(91.7)	1(8.3)	exact=0.03*
****Length of sweeping broom**			
Long	90(62.5)	54(37.5)	Fishers
Short	5(83.3)	1(16.7)	exact=0.42

* Statistically significant +1pole=15.86meters

**Long= broom attached to a long stick (1.5-1.8meters); short= broom not attached to a stick

Table 7: Association between use of face mask by respondents and respiratory symptoms

Variable	Use of Face Mask		Statistics
	Yes N=47 n (%)	No N=103 n(%)	
Cough			
Yes	1(2.2)	45(97.8)	Fishers
No	46 (44.2)	58 (55.8)	exact<0.001*
Catarrh			
Yes	1(1.7)	57 (98.3)	Fishers
No	46 (50.0)	46 (50.0)	exact<0.001*
Breathlessness			
Yes	2(16.7)	10 (83.3)	Fishers
No	45 (32.6)	93 (67.4)	exact= 0.34
Any respiratory symptom			
Yes	3 (4.2)	68 (95.8)	Fishers
No	44 (55.7)	35 (44.3)	exact<0.001*

* Statistically significant

the refuse included sand (100.0%) and broken bottles (78.0%). (Table 3)

Almost two thirds (63.3%) of the respondents experienced musculoskeletal symptoms, topmost on the list being waist pain 70 (46.7%), while 47.3% complained of respiratory symptoms such as catarrh (38.7%) and cough (30.7%). Other health problems included fever, 32.0% and hand/foot injuries 18%. The commonest cause of injury was broken bottles. (Table 4)

Majority 135 (90.0%) knew the function of the reflector jacket, while the least known PPE was goggles 63 (42.0%). More than two thirds (69.3%) owned reflectors, while none of them owned boots and goggles. The most commonly utilized PPE among the sweepers was a reflector 98 (65.3%). (Table 5) There was a statistically significant association between age and musculoskeletal pain with the prevalence increasing with age. Musculoskeletal pain was also associated with increasing distance and duration of sweeping ($p<0.001$). (Table 6) Moreover, there was a statistically significant relationship between lack of use of face mask and occurrence of respiratory symptoms ($p<0.05$). Majority, 97.8%, 98.3% and 95.8% of those with cough, catarrh and any respiratory symptoms respectively, were not using face mask. (Table 7)

Discussion

Street sweepers play a key role in maintaining the cleanliness of roads in any city. This study assessed the occupational hazards, health problems and level of utilization of PPEs among this occupational group in Uyo, Nigeria. The respondents were mainly at the peak of their productive lives with a mean age of 37.47±10.58 years. Both sexes were observed to be involved in this occupation with the females constituting 58% of the population. This is in contrast to similar previous studies carried out in India and western Nigeria respectively, where 67.1% and 100% of street sweepers were females.[12,2] In Nigeria, sweeping, even in households is traditionally more commonly carried out by females but with the increasing level of unemployment, any available paying job opportunity is attractive to job seekers irrespective of the sex or cultural inclinations.

Several hazards have been identified to be associated with street sweeping. In the present study, such hazards included cold (86.0%), dust (94.0%), mosquitoes (49.3%) and prolonged bending (99.3%). Hazards reported in a similar study included exhaust fumes 56.5 %, dust particles 52.2% and extreme noise 18.8%.[10] In order to mitigate the effects of many of these hazards, it is important that sweepers use PPEs. Unfortunately, use of PPEs in the present study was not optimal. The most commonly used item was the reflector jacket which was used by about two thirds of the respondents. This was also the most commonly known and owned PPE among the sweepers. The use of reflector jackets by street sweepers improves their visibility by oncoming motorists thereby reducing their proneness to road traffic accidents. The use of reflector jacket therefore ought to be a compulsory requirement for the sweeping job.

Some of the other PPEs were not in use at all in the present study. None of them owned or used both goggles and boots. This, therefore, would easily expose them to eye problems and injuries from broken bottles and nails respectively. A similar study among street sweepers in Calabar, Nigeria reported that only 19% of workers used personal protective devices (PPD), while only 1% used protective goggles while at work.[1] The workers are meant to be trained and provided with PPE by their employers. Majority of those who were provided PPE items in the present study used them. Similar studies reported that sweepers were not provided with PPE.[9,10] The implication of this is that many of the sweepers would not be protected from the hazards that different parts of their bodies are exposed to on daily basis while carrying out their duties. Also, as no safety training was organized for any of the sweepers, many of them may not have fully understood the importance of each PPE.

With the poor use of PPEs by sweepers in different studies,[1,9,10] including the present study, it was not surprising that many of them experienced several health conditions. The health problems reported in a study in south western Nigeria, included joint pain (96.1%), catarrh (91.3%), cough (83.5%) eye infection (70.8%) asthma (46.6%) and malaria (31.1%).[2] In an Indian study, majority of the sweepers (82.2%) reported having musculoskeletal problems followed by respiratory problems

(61.6%), ophthalmic problems (53.4%), skin problems (38.4%) and mental health problems (39.7%). Most of the respondents had multiple problems.[12]

A higher prevalence of musculoskeletal disease has been illustrated among sweepers in studies[3,7] when compared to the general population. The prevalence of musculoskeletal diseases in a study was significantly higher among sweepers for shoulders (32%), wrists/hands (29%), elbows (27%) and neck (17%) compared with the comparison group, in which the prevalence was 11%, 19%, 9% and 11%, respectively.[3] A similar study in Calabar, Nigeria reported higher prevalence of back pain (40.5% versus 2.0%; P<0.001) among the test group compared to the control.[7] Street sweepers are exposed to back pain when they engage in repetitive movements like bending, sweeping and long walks picking dirt.[8] Different studies in India reported prevalence of ergonomic risk factor of 82.2%, 88% and 100% respectively, rating it as the highest reported hazard among the sweepers.[12,8,13]In the present study, almost two thirds of the respondents experienced musculoskeletal symptoms. This was associated with increasing distance of sweeping as more than a tenth (16%) of the respondents swept above 238 meters daily. Sweeping such distances entailed prolonged bending. Even though most of them swept with long brooms, they still needed to bend while sweeping and also while packing the swept materials. Also, almost all who swept up to 3 hours daily experienced musculoskeletal diseases. The extent of the musculoskeletal conditions among sweepers could sometimes be disabling. A study reported that 27% of the street sweepers were disabled due to the pain in the lower back and upper back, while 26% were disabled from pain in wrists/hands.[4] Sweeping of long distances should therefore be discouraged. This may entail increase in the number of sweepers in order to reduce the workload on each individual.

In the present study, the proportion of those with musculoskeletal pain increased with the number of years of sweeping. The mean occupational history of sweepers in the present study of about 3 years is however lower than both the sweeping period of 5-10 years for 52.3% of the respondents in a Kenyan study [10] and a mean duration of 9.33 years in a Nepal study.[22] It was not surprising that 97% of sweepers in the Nepal study experienced waist pain considering the average length of time they had worked as sweepers.

The occurrence of respiratory problems has also been reported to be higher among sweepers when compared to other populations. A study done in Cairo, Egypt showed that cough was significantly more common among street sweepers (17.5%) than among office workers (5.8%).[23] Similar studies also showed a positive relationship between the extent of exposure to street dust and decreasing lung function.[24,25] In the present study, about a third reported experiencing catarrh, cough and fever. These were similar to findings of a previous study.[7] Many of these symptoms would have been reduced by adequate use of PPEs. The use of face mask would have limited the amount of dust inhaled to a large extent, thus reducing the occurrence of respiratory symptoms. This is illustrated in the present study by a significant association between lack of use of face mask and occurrence of respiratory symptoms. A similar study also revealed an association between not wearing personal protective clothes and the development of chronic cough (X^2=5.7, OR: 2.9).[11] Precautionary measures like watering the streets before sweeping to minimize the raising of dust can be introduced. The number of sweeping days per week can also be reduced in order to reduce exposure to dust and other hazards.

Poor remuneration was one of the issues raised by the sweepers in the present study. About four out of every ten were not happy with their pay. Also, there was no job security as all of them were temporary workers. Similar findings were reported in previous studies.[2,4] It was therefore not surprising that many of them were engaged in other occupations in order to augment the pay. This was possible as the sweeping activity was carried out in the early hours of the morning. Over 40% in the present study swept from 4-6am. This enabled them finish early, thus giving them the opportunity to engage in other money generating activities. The risks however associated with working in the early hours include RTA from poor visibility, assault by hoodlums, exposure to cold and mosquito bites.[2]It may therefore be safer to sweep at daybreak to avoid these risks.

Conclusion

Sweepers in Uyo were exposed to several hazards while at work. The availability and use of PPEs were low. Consequently, they faced several health challenges. It is recommended that training and adequate provision of PPEs be ensured by employers in order to mitigate the effects of the hazards encountered by road sweepers. An increase in the number of sweepers assigned to the respective roads is also recommended in order to reduce the work load on each sweeper and consequently reduce exposure to the hazards associated with this occupation.

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