Occupational Health Hazards and Safety Measure among Sweeper Workers in Ismailia City

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Abstract

Background: Street sweeper workers play an important role in maintaining the health and cleanness in the communities. However, their work exposes them to various hazards while little or no attention is paid to their health condition. **Aim of the work:** This study was carried out to assess knowledge and practice regarding the occupational health hazards and safety measure practices among sweeper workers at Ismailia city. **Setting:** the study was conducted on sweeper workers in the first, second and third district at Ismailia city. **Study Design:** A descriptive study design was conducted **Sample:** convenient sampling from selected areas, sample size (330). **Tools:** A structured interview questionnaire consisting of 4 parts were used, basic characteristics of the sweepers, their knowledge, their practice of the safety measures, and fourth part assessed the actual application for the use of safety measure. **Results:** the results in this study revealed that the total knowledge is unsatisfactory (82.1 %) as well as inadequate practices of safety measures. There was a positive correlation between total knowledge of hazards and total practices of safety measures **Conclusions:** The exposure of the street sweepers to health hazards (physical, chemical, psychological, and ergonomic hazards) at their workplace was increased and this was resulting from the unsatisfactory awareness of health hazards related to the occupation of street sweepings, as well as lack of training especially regarding the use of personal protective equipment. **Recommendations:** Periodic health programs are needed to increase knowledge of street sweepers on different occupational health hazards, ergonomic principles and train them on using safety protective measures.

Key Words: Occupational Health Hazards, Safety Protective measures, Street sweeper workers, Ismailia

1. Introduction

Occupational health and safety is a multidisciplinary field of health care concerned with enabling individuals to practice their profession in the manner that causes the least harm to their health. Health has been defined as the ability to adapt and manage physical, mental and social challenges throughout life.**(Rothmore& Boucaut, 2015).** A street sweeper or street cleaner is an occupation applied to a person or a device that cleans streets, usually in an urban area **(Aucott & Caldarelli, 2012)**

Street cleaning is an essential part of the solid waste management system and an important duty to ensure a clean environment. Growing populations, especially in Africa, Asia and South America, have placed severe pressures on urban land, utilities and services. In those areas, the main objective is to prevent the transmission of communicable diseases, which is why street cleaners play an important role in maintaining health in communities. **(Gebremedhn & Raman, 2020).**

Street sweepers can be exposed to physical health hazard such as fatigue rash, sunburn, stress, headache, breathlessness, skin cancer, chemical health hazard such as irritation of the eyes and mucous membranes, skin dermatitis, respiratory disorders, including asthma, and cancers, biological health hazard as bacterial endotoxins, fungal secretions. **(Salve & Chokhandre, 2016)** Psychosocial health risks are varied, such as the need to work 8 hour days from the workforce and the relaxing effects of street cleaners, such as social isolation and increased risk of becoming a victim of violence. **(Palve, Shidhaye, Chaturvedi, Pandit, & Giri, 2017).**

Significance of the study:

In Alexandria, Egypt, nearly 90 % of the sweepers had health problems, 83% had skin problems, 57.7% had itching and sore nail, and 49.3% of the sweepers had cough and dyspnea. In addition, 74.5% of them had musculoskeletal pain, and 44.3% had low back pain **(Madian, & Abd El-Wahed, 2018).** No studies have been conducted in Ismailia Governorate regarding relationship between occupational health hazards and the use of protective measures among sweeper workers, so this study carried out to assessment occupational health hazards and safety measures among sweeper workers in Ismailia city.

The aim of the study: The current study aims to assess the occupational health hazards and safety measure among sweeper workers in Ismailia city.

Research Objectives:

1. Assess sweeper workers' knowledge about occupational health hazards and safety measure .2.Assess sweeper

workers' safety measure practices about occupational hazards

2. Subject and Methods

Design: A descriptive study design was adopted in the present study.

The sample of the study: A convenience sample Tanique applied to recruited study subjects from street sweeper workers (330 workers).

Study setting: The study was conducted in Ismailia city on sweeper workers in first, second and third district (these districts are responsible for the distribution of sweeper workers in Ismailia city).

Tools of data collection:

Tool structured interview questionnaire:

It included five parts:

Part I:

a. **Socio demographic characteristics**: as gender, age, educational background, working years, marital status monthly incomes, type of employment, etc.

b. **The health status of the workers and health history as** health problems before joining the job (hypertension, respiratory disease, headache, back pain…..etc.), smoking, accidents due to work and current health problem …etc.

Part II:

Assessment of sweeper worker's knowledge about occupational health hazards, and safety measures, it include items related to definition safety and occupational health, general knowledge about occupational hazards as Physical, Chemical, Biological, Mechanical hazards(ergonomic hazards, psychosocial hazards, and safety measures, barriers of work.

Score system: There are 9 items for assessment knowledge, add the scores of the items, and then divide the total score by the number of items to get the average score for that part. These scores are converted into percentage scores. If the percentage score is 60%, the sweeper workers' knowledge is considered satisfactory, and if the percentage score is less than 60%, the sweeper workers' knowledge is considered unsatisfactory.

Part III:

Assess safety measures practices among sweeper workers (methods to protect against work environment hazards), it include questions related to: training in the use of cleaning agents before use, where clothes change in the workplace, change clothes after work, hand wash and vaccines against the risks of infectious work (infectious diseases)…….. Etc.

There are 14 items, the answer is yes or no, if the answer is yes, it takes (1) and if it does not take a zero, if the total is If the percentage score is 60%, the sweeper workers is considered satisfactory, and if the percentage score is less than 60%, the sweeper workers' practices is considered unsatisfactory. (**Awad, 2016).**

Part IV: observational checklist: Assess actual application for the use of safety measure actual practices for the use of personal protective equipment. This part was used to assess the actual workers' performance related to safety standards, precautions and to observe their compliance to use safety measures

Scoring system:

An observational score: which was developed from Reinhold (2000) and modified by the researcher where some items not available for me such as outfit visible signs. The street sweeper workers practices regarding the personal protective equipment; it consists of 10 items as using of normal overall, head cap, using of masks, using of gloves, using of rubber shoes, change wear at the beginning of the shift, change wear at the end of the shift, hand washing, washing face and wash the feet.

Practice score: for utilization of personal protective equipment, 1 grade for a correct response & zero grade for incorrect response. All grades of each correct item summed –up and converted into percent score. Not done score was < 60 %. Done score was ≥ 50%.

Reliability of the Tool:

Reliability was done by Cronbach's Alpha Coefficient Test, which revealed that each item of the utilized tools consisted relatively homogeneous items.

Field work:

Prior to commencing data collection, an approval permission was obtained from the directors of the first, second and third districts in Ismailia. Data were collected from all available sweepers who were working in the previously mentioned settings. All sweepers were interviewed personally after taking their oral consent to conduct the study and explaining the aim of the research.

The data was collected over a period of eight months and it was collected by the researcher through interviews with street sweeper workers, asking those questions in simple language and clarifying it and ensuring that they understand the questions. The evening gathers information from them by asking them questions in a questionnaire form.

The complete answers was gathered from the sweeper workers within 30 to 45 minutes and then the researcher observed each sweeper worker his actual application of the using of safety measures (actual practices of

using personal protective equipment such as gloves, masks, shoes, etc.) as well, the researcher interviewed 5 cleaners per day.

The researcher gathered the data from the first of June 2019 until the first week of February 2020. Data typed, organized and analyses through personal computer from the beginning of July 2020 to the end of October 2020.The study took approximately 14 months. Approximately, One month for to obtain the official permits, pilot studies and testing tools for clarity and feasibility, 8 months to collect the data, two months for data entry, and three months for statistical analysis as well as the study delayed due to Corona virus during the data collection period.

Administrative design:

Official permission was obtained using appropriate communication channels. An official letter was issued by the Faculty of Nursing at Suez Canal University to the Director of the First District, the Director of the Second District, and the Director of the Third District in Ismailia.

Ethical considerations:

The approval of the Scientific Research Ethics Committee was obtained. The oral consent form was signed by each sweeper worker before collecting any data. Participants had the opportunity to decline participation, were informed of their right to withdraw from the study, and were assured that the information would be confidential and used for the purpose of research only.

Statistical design

After collecting the research data, encode and convert them into a specially designed format for computer input after the data input check and verification process to avoid any errors in the data input process, frequency analysis, cross-tabulation, and manual use restore to detect any errors. SPSS (Statistical Software Package for Social Sciences), version 23 is used for-statistical analysis and presentation of measures using data. Descriptive metrics include count, percentage, and standard deviation. The difference is considered significant when $P \leq 0.05$

2. Results

Table (1)

Presents the socio-demographic characteristics of the studied sweeper workers. It clarified that (70.0 %) of the studied sweeper workers were males and less than half (40.6 %) were in the age group of 30 to 40 years with a mean age of 25.3 (± 3.6). In addition, 67.9% of them were rural residents and 40.9% of them can read and write. Moreover, 68.8 % of them were married and 71.8 % had permanent work as well as 89.1 % working morning shifts.

Regarding their income, 67.0% of them did not have enough income.

Table (2)

It revealed that 69.7% of sweeper workers did not know what occupational hazards leads to, (75.8%) do not know the factors that cause occupational hazards,(68.2%) do not know The most barriers affecting the level of cleanliness (40.0 %) of the sweeper workers answered with educating citizens about their role in the cleanliness of their city is the main priorities which is important to improve cleaning services (Figure 1).

Table (3)

The results illustrated that (80.9 %) of the sweeper workers did not attend any training programs for safety and health as well as (86.1%) of them never attended any training programs for first aid. Regarding personal protective equipment's (PPE), the results showed that the sweeper workers did not receive PPE from the institute. Furthermore, (60.6%) of the sweepers reported that they were supervised by safety supervisors. Concerning vaccinations, the vast majority (88.2%) of the sweeper workers did not receive vaccinations against job infectious hazards as well as (99.1%) of them did not have pre-employment and periodic examination. Moreover, most of the sweeper workers (87.0%) did not have health insurance.

Table (4)

Reveals correlation between practices and totals level of Knowledge of occupational hazards. it cleared that a positive correlation between the sweeper workers' knowledge about hazards, hazards as general, biological, psychosocial, physical, chemical, mechanical 'ergonomic' hazards, and their prentices with p

≤ 0.05.

Table (5)

Illustrated that, there was statistically significant difference between total level practices of the sweeper workers about occupational health hazards and personal protective equipment (PPE) among all types of hazards ($P < 0.05$).

Figure (2)

It clarified the percentage distribution of the sweeper workers according to their practice regarding safety measures. It indicated that more than two thirds (78.5 %) of the sweeper workers did not wear suits and shoes. As well as, it clarified that, most of the sweeper workers (91.8 %) did not wear suitable protective clothes. In addition, more than two thirds of them did not change their clothes and did not wash their hands in percentages (83.9 & 68.2) respectively.

Figure (3)

It showed that (89.4%) of the sweepers were inadequate regarding their total practices as regards to safety measures in the work environment, (10.6%) of the sweepers were adequate in terms of their total practices as regards to safety measures in the work environment.

4.Discussion

International labor Organization (2000) observed that the world's total occupational hazards burden is much higher up to 250 million infections and injuries **(Salmah, 2017)**. In Egypt, Egyptian sweeper workers usually deal with hazardous waste manually which increase risks on their health. Data and studies about mortalities among sweeper workers from occupational exposure are rare. hazards as a result of scarcity of using control measures, using of old equipment in dealing with waste, poor knowledge about work related risks, and lack of evaluation of occupational safety and health hazard in local councils **(Ewis et al, 2016)**.

In the study carried out in Alexandria, the researchers reported that more than 90% of the sweeper workers had health problems. All of the study sample had gastrointestinal complaints, 68.1% had worm infestations. The majority of the collectors complained about eye problems, 83% had skin problems, 57.7% had itching and nail infection, 49.3% of the collectors had cough and dyspnea. In addition, 74.5% of them had musculoskeletal pain. 54.3% of sweeper workers complained from neck pain and 44.3% of them had low back pain **(Madian, & Abd El-Wahed, 2018)**.

No studies have been conducted in Ismailia Governorate regarding relationship between occupational health hazards and the use of protective measures among sweeper workers, so this study carried out to assessment occupational health hazards and safety measures among sweeper workers in Ismailia city.

These results were supported by studies that were done by **Gizaw et al. (2014),** that was conducted in north west of Ethiopia upon 482 municipal solid waste management workers, as well as **Mohd & Haliza (2015)** who carried out their study in Saudi Arabia and stated that the majority of the sample were aged between 35 to 44 years, followed by ages of 25 to 34. Most of the sample were married, illiterate and also read and write. This agreement with these findings might be due to the low educational level demands in this field for employment in our community.

On the other hand, these findings were not supported by studies were done by (**Zemichaelet al, 2015 & Marahatta et al., 2017**) who They reported that the majority of studied sample were females and illiterate .This

disagreement in findings might be due to differences in setting and sample characteristics that were taken.

Concerning the presence of chronic diseases, the current study reported that the majority of the studied sample had chronic diseases. Also, it showed that two thirds of the sample were smokers. These findings were supported by a study done by (**Jariwala, 2013 & Pradeep, 2016)** titled "A Study of Prevalence of Morbidities in Door to Door Waste Collecting Collectors of Surat City" that was carried on 292 workers of Surat city who are involved in daily door to door waste collecting activity. They reported that majority of the studied sample had chronic diseases and were smoker. This agreement in findings might be due to the habit of smoking is found among this group to be used as anesthesia during the working hours.

Also, as a result of their exposure to waste loading work, street sweepers' workers were vulnerable to exposed to communicable and non- communicable diseases. But, these findings were not supported by a study was done by **(Singh, 2017)** title is "Factors Associated with Chronic Bronchitis among Municipal Sanitary Collectors in Varanasi, India**".** This study was conducted on 316 workers in Varanasi, and their study reported that only one third of the collectors were smokers. The disagreement in findings might be due to the nature of the present study that included the majority of male workers than other study included female workers that displayed a higher prevalence as compared to males.

Findings were supported by studies were done by **Zaky, el- magrabi & Mohammed (2018)** title is" Prevalence of Occupational Health Hazards and Safety Measures Among Municipal Waste Workers at Assiut city" that was conducted upon 400 participants, and the study by **Nayera et al. (2015)** carried on 107 street workers in Cairo, where they assessed the work-related respiratory disorders among them. They reported that more than one third of the sample mentioned heat stroke and as physical hazards, regarding the biological hazards only one third mentioned infection. Work-related respiratory disorders among street sweepers in Cairo, Egypt, a comparative study regarding to chemical hazards more than two thirds mentioned inhalation of insecticide/ herbicides, solvents, paints, and cleaning products. Regarding mechanical hazards, nearly one half of the sample mentioned back pain. Regarding accidental hazards, nearly two thirds of them slipped or fell from the truck. Regarding psychological hazards, nearly one third of the sample mentioned job stress as psychological hazards while one quarter had family problem.

These findings were in agreement with the studies that were done by **Eskezia et al. (2016)** that was conducted upon a total of 561 members of solid waste collection workers from 12 associations found in the four zone capital cities of Northwest Ethiopia, as well as a study carried out by **Shafik et al. (2019)** upon 15 sewage treatment plants in Beni-Suef Governorate. They reported that nearly one half of the sample had job stress and nervous tension, while one fifth had family problems. This agreement could be due to that there is increasing workload, violence from the public and exposed to other types of the hazards can increase their psychological hazards.

In relation to exposure of studied street sweepers workers to different types occupational health hazards, the current study revealed that two thirds of the sample were exposed to physical hazards, while more than half of the sample exposed to psychological, ergonomic, chemical, biological and accidental hazards.

These findings were supported by a study that was done by **Shafik et al, 2019** who assessed occupational health hazards among workers in sewage treatment plants in Beni-Suef Who reported that more than half of the sample was exposed to physical hazards and more than three quarters were exposed to biological hazard. In addition, the majority of the waste workers were exposed to chemical hazards, mechanical and psychological hazards. From the researcher's point of view, this may be due to those street sweepers workers who did not receive any educational or training program about occupational hazards they will be exposed to in the workplace.

Regarding to sweeper workers knowledge about occupational health hazards, the result is in agreement with the study of assessing the knowledge about occupational health hazard among street sweepers in Delhi, India, among the respondents of about one third which were studied sweepers, claimed to have been trained while two thirds did not receive any form of training on occupational health and safety, they was said that the knowledge about occupational hazards among trained respondents are more compared to untrained respondent. Major population of the street sweepers were also noted to have the understanding of adverse effect of their occupation on their health and well-being, this is in contrast with what we have in Ilorin, Nigeria where the only knowledge the street sweepers has is how to clean the environment and how to stay safe and majority of those that claim to have a knowledge on occupational health only has a fair knowledge **(Patel et al. 2020).**

These findings were supported by a study that was done by(**Shafik et al, 2019)** title is" Occupational Health Hazards among Workers in Sewage Treatment Plants in Beni-Suef" Who reported that more than half of the sample were exposed to physical hazards and more than three quarters were exposed to biological hazard. In addition, the majority of the waste workers were exposed to chemical hazards, mechanical and psychological hazards. From the researcher's point of view, this may be due to that street sweepers workers did not receive any educational or training program about occupational hazards they will be exposed in the work place.

Opposite to our study data a study by (**Rahma, et al in Egypt in 2009*)*** on awareness of street sweepers on awareness and knowledge of occupational health hazards and diseases as related to their jobs, it was noted the majority of the respondents but not completely were aware about occupational diseases and hazards and dangers relating to the job. The researcher point of view as differ setting so differ characters of workers.

5. Conclusion

The exposure of the street sweepers to health hazards (physical, chemical, psychological, and ergonomic hazards) at their workplace was increased and this was resulting from the unsatisfactory awareness of health hazards related to the occupation of street sweepings, as well as lack of training especially regarding the use of personal protective equipment.

6. Recommendations:

Based on the results of the present study, the following recommendations were suggested

Emphasizing on the importance and usefulness of personal protective equipment to be used in the right way and first aid for the promotion of personal fitness of the workers by health promotion programs.

The Workers not only in the proper use of protective equipment, but also in the care and maintenance of that equipment's including any pre-fitting, testing, or inspection that may be required.

Table (1): Distribution of the sweeper workers according to their socio-demographic characteristics (n=330)

Socio-Demographic Characteristics	Frequency (n=330)	Percent 100%
Age		
20 -	101	30.6%
30 -	**134**	**40.6%**
40 -	50	15.2%
50 -60	45	13.6%
$\bar{x}$ ± SD	**25.3 ± 3.6**	
Gender		
Male	**231**	**70.0%**
Female	99	30.0%
Residence		
Urban	106	32.1%
Rural	**224**	**67.9%**
Education level		
Cannot read and write	70	21.2%
Read and write	**135**	**40.9%**
Basic Education	125	37.9%
Marital Status		
Single	79	23.9%
Married	**227**	**68.8%**
Divorced	20	6.1%
Widow	4	1.2%
Type of Employment		
Permanent	**237**	**71.8%**
Temporary	93	28.2%
Working shifts		
Morning	**294**	**89.1%**
Afternoon	29	8.8%
Night	7	2.1%
Income		
Enough	109	33.0%
Not enough	**221**	**67.0%**

Table (2): Distribution of the sweeper workers according to their general information about occupational health hazards (n=330)

General knowledge about occupational health hazards	Frequency (n=330)	Percent 100%
Occupational hazards leads to		
The occurrence of diseases	30	9.1
Job dissatisfaction	40	12.1
Stress	22	6.7
All of the above	8	2.4
Don't know	**230**	**69.7**
Factors that cause occupational hazards.		
Neglecting safety rules and instructions	35	10.6
Using machines and equipment in a wrong way	24	7.3
Do not use personal protective measures	13	3.9
All of the above	8	2.4
Do not know	**250**	**75.8**
Priorities which is important to improve cleaning services		
Tightening control over the work of cleaning companies	93	28.2%
Carrying out periodic cleaning campaigns	105	31.8%
Educating citizens about their role in the cleanliness of their city	**132**	**40.0%**
The most barriers affecting the level of cleanliness:		
Construction waste and debris	75	22.7%
Abandoned and damaged cars	67	20.3
Waste in types	82	24.8
Flying dust and sand in the streets	16	4.8
Do not know	**225**	**68.2**

Table (3): Distribution of the sweeper workers as regards to safety measures of occupational hazards (n=330)

Prevention Measures	Frequency (n=330)	Percent 100%
Attending training programs for safety & health		
Attended	63	19.1%
Never attended	**267**	**80.9%**
Presence of safety measures supervisor	**200**	**60.6%**
Attending training programs for first aid measures		
Attended	46	13.9%
Never attended	**284**	**86.1%**
Personal protective equipment		
Received from district	82	24.8%
Not received from district	**248**	**75.2%**
Receiving vaccinations against job infectious hazards		
Yes	39	11.8%
Never	**291**	**88.2%**
Pre-employment and Periodic examination		
Yes	3	0.9
No	**327**	**99.1%**
Health Insurance		
Yes	43	13.0%
No	**287**	**87.0%**

Table (4): Correlation between Practices and Total Level of Knowledge of Occupational Health Hazards (n = 330)

	Total practices	
	R	**p**
General information	0.300*	<0.001*
Physical hazard	0.188*	0.001*
Biological hazard	0.179*	0.001*
Chemical hazard	0.223*	<0.001*
Psychological, social hazard	0.245*	<0.001*
Mechanical hazard	0.407*	<0.001*
Overall knowledge	0.375*	<0.001*

Table (5): Relationship between total level of practices of sweeper workers and occupational health hazards. (n=330)

Occupational Hazards	Level of practices				χ^2	P
	Not Used		Used			
	No	%	No	%		
Physical Hazards:						
Not Exposed	83	25.2%	12	3.6%	10.138	0.004*
Exposed	132	40.0%	103	31.2%		
Chemical Hazards:						
Not Exposed	61	18.5%	73	22.1%	8.789	0.003*
Exposed	139	42.1%	43	13.0%		
Biological Hazards:						
Not Exposed	61	18.5%	72	21.8%	12.368	0.000*
Exposed	157	47.6%	41	12.4%		
Psychological hazard:						
Not Exposed	53	16.1%	71	21.5%	16.61	0.000*
Exposed	163	49.4%	47	14.2%		
Accidental hazards:						
Not Exposed	63	19.1%	66	20.0%	13.168	0.000*
Exposed	151	45.8%	45	13.6%		
Ergonomic hazards:						
Not Exposed	63	19.1%	66	20.0%	13.168	0.000*
Exposed	151	45.8%	45	13.6%		

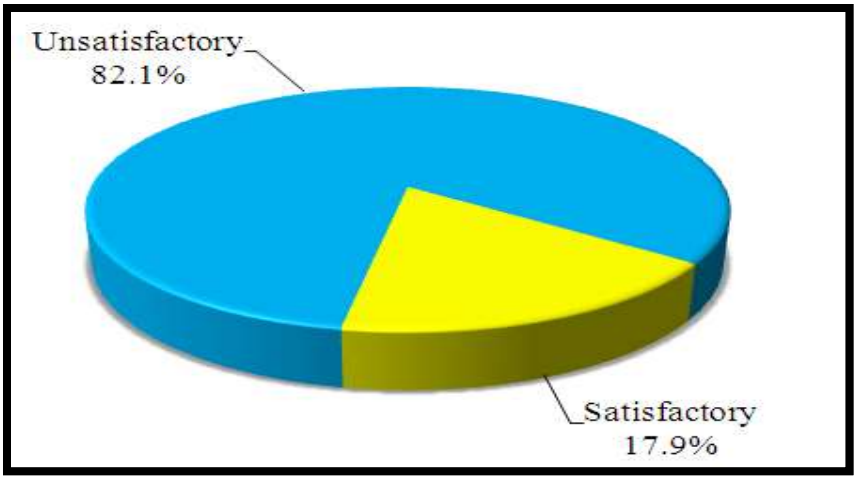

Figure (1): Distribution of the sweeper workers according to their total knowledge about hazards in the work environment (n=330)

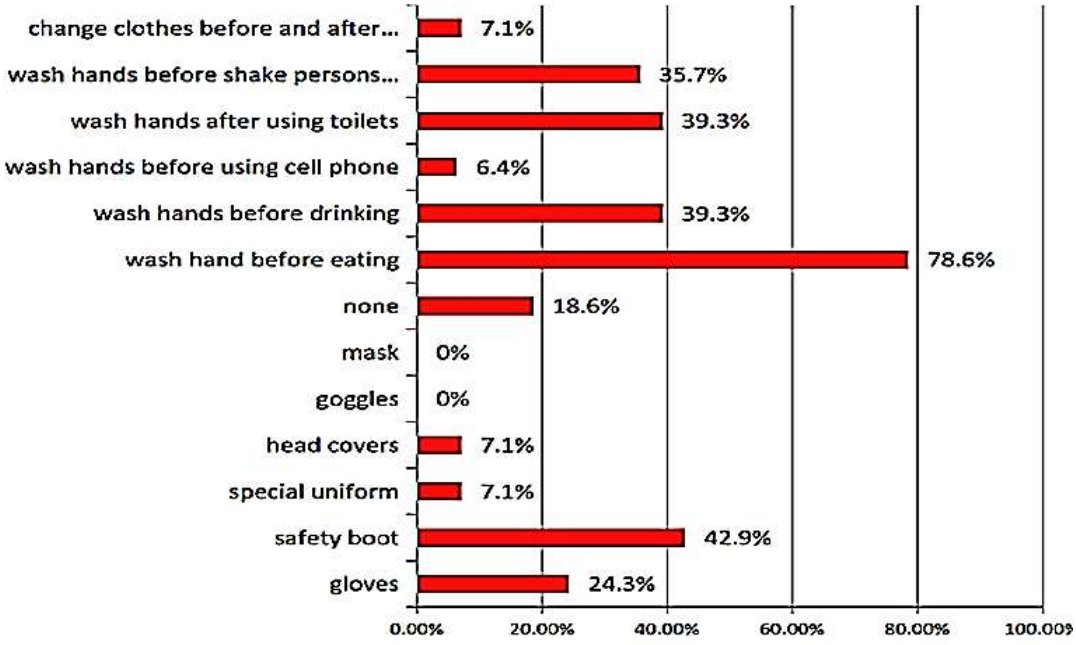

Figure (2): distribution of the sweeper workers according to personal hygiene (n=330).

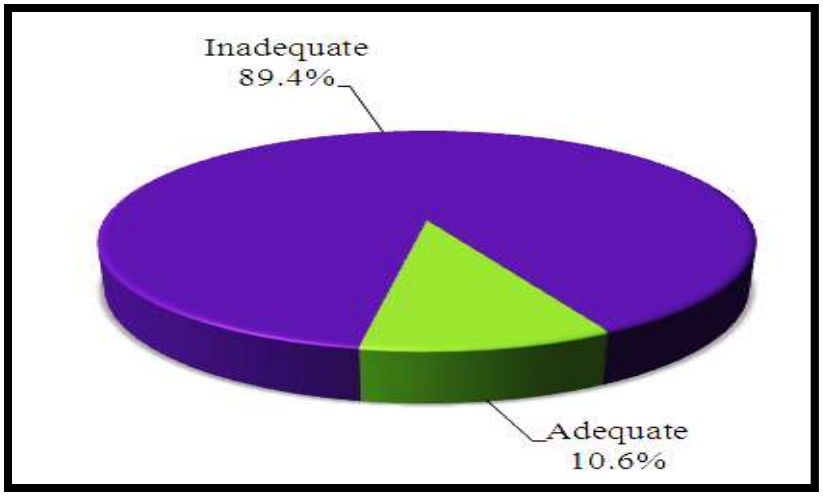

Figure (3): distribution of the sweeper workers according to their total practices as regards safety measures in the work environment.

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