

Occupational Hazards and Preventive Measures Among Waste Collection Workers

Howida Ebeid Awad¹, Suheir A .H. Mekhemar², Nadia Hamed Farahat³,

Hala Mohammed Hussein⁴

¹Nursing Supervisor in Family Center- Suez Governorate-Suez Canal University,

²Professor of Community Health Nursing, Faculty of Nursing, Ain Shams University,

³Professor of Community Health Nursing, Faculty of Nursing, Ain Shams University,

⁴Professor of Community, Health Nursing, Faculty of Nursing, Ain Shams University.

Abstract

Background: Waste collection is a necessary activity all around the world. Fortunately for the health and living conditions of inhabitants, waste collection workers risk to disease resulting from exposure to various work hazards fatal and non-fatal occupational accidents. The aim of the study is to assess the occupational hazards and preventive measures among waste collection workers (WCWs) through :a) Assessing the WCWs knowledge regarding hazards of waste collection; b) Determining the WCWs knowledge regarding health related preventive measures; c) Determining the knowledge of the WCWs knowledge regarding health related preventive measures; and d) Identify the community health services provided for the WCWs .**Design:** A descriptive design was adopted in the study. **Settings:** all five zones of Suez Governorate through the General Authority for Cleanliness and Beauty (GACB). **Sample:** A purposive sample was used; it included 95 from formal WCWs. **Tools:** two tools were used for collected data. **First tool:** An interview questionnaire used to collect data from waste collection workers related to demographic data, work characteristics, medical history and waste collection workers habits. Knowledge of the waste collection workers regarding types of occupational hazards, preventive measures, **Second tool:** Observational check list adopted from Kawakami (2010) and modified by the investigator to assess the waste collection worker's practices regarding the preventive measures, **Results:** Findings reported that 45.3 % of the WCWs' knowledge was unsatisfactory about the hazards of waste collection. Statistically Significant relation was found among knowledge and practices of WCWs 69.5% of their practices was unsafe. **Conclusion:** around half the WCWs had satisfactory level of knowledge and two third of them had unsafe level of practice. Hence, it was **recommended** to provide occupational health program training for the WCWs and provide appropriate protection devices and tools.

Key Word: Waste Collection Workers, Knowledge, Preventive Measures.

Introduction:

No doubt that around the world, waste generation rates is rising. In 2016, the worlds' cities generated tons of solid waste, with rapid population growth and urbanization, annual waste generation is expected to increase by 70% from 2016 levels to 3.40 billion tones in 2050. In low-income countries, over 90% of waste is often disposed in unregulated dumps or openly burned. These practices create serious health, safety, and environmental consequences. Poorly managed waste serves as a breeding ground for disease vectors, contributes to global climate change through methane generation and even promotes urban violence (*ISWA, 2018*).

Uncollected municipal solid waste (MSW) and substandard disposal practices are estimated to result in adverse health impacts across Egypt equivalent to 1.5% of Gross Domestic Product (GDP). It is give rise to diminished air and water quality, adverse impacts on tourism, trade, and the attractiveness of Egypt as a place to do business. Also, uncollected waste appears to be a more prominent problem in poor neighborhoods and low income individuals increase their risk exposure as they engage in waste collection seeking to recover and resell materials from the waste stream with economic value (*Ministry of International Cooperation, 2016*).

Additionally, solid waste is movable solid items, arising from human activities, which discarded as useless or unwanted and that have no positive value¹. It is also the source of many health and hygiene problems. The uncollected wastes hold water and clog drains, which lead to stagnant waters and encourage mosquito vector abundance as well as uncollected wastes providing a food and breeding sites for insect and rodent disease vectors. Also, waste collection workers preparing meals immediately after returning home without using hygiene measure as bath which lead to many communicable diseases for them and their family (*WHO, 2017*).

In Egypt, the waste collection gets more challenging as there are no clearly-defined strategies for an efficient waste collection, which lead to serious environmental risks on Egyptian communities and drains a considerable portion of the local economy. Effective waste management is expensive, often comprising 20%–50% of municipal budgets. So that, exploring the options which solid waste can be sustainably managed, reviewing international models of sustainable management systems and occupational health program for waste collection workers gain improvement of waste management (*Ibrahim and Mohamed, 2016*).

On another hand, the general public can be infected by health care work HCRW either directly or indirectly through several routes of contamination. Dumping healthcare waste in open areas is a practice that can have major adverse effects on the population by the “recycling” practices which most serious problem reported in a number of countries. The WHO estimates that over 23 million infections of hepatitis B, C and HIV occur yearly due to unsafe injection practices. The waste collection workers are victims to many diseases as a result of mixing medical waste with municipal waste. Safe disposal responsibility from home and health care unit (*WHO, 2017*).

Environmental contaminations lead to health hazards are due to substances mix in waste such as pesticides, organophosphates and carbonate, which damage the nervous system and can cause cancer. Some may cause

reproductive and endocrinal damage, as well as few are carcinogens. While, synthetic organics such as benzene and other petrochemicals can cause cancers. As for industrial waste like mercury and electronic waste, exposure for short term may lead to altered liver function and skin lesion, whereas long terms exposure leads to impairment of immune system, nervous, endocrine and reproductive system (*DEQ, 2017*).

Preventive measures and safety policies among waste management is a crucial area related to the economic status of a country and the lifestyle of its population. The global 3R initiative (Reduce, Reuse and Recycle) aims to promote the "3Rs" globally, in order to build a sound material-cycle society through the effective use of resources and materials. Waste **Reduction** helps to create less waste in the first place before recycling. Meanwhile, waste reduction helps to reduce waste disposal and handling costs. **Reuse** is to use an item more than once for the same function and new-life reuse where it is used for a different function. **Recycling** is using a waste material for another purpose, treating and reusing by remanufacturing the recycled raw materials into new products (*Abas & Seow, 2014*).

So that, Waste collection is a necessary activity all around the world. Fortunately for the health and living conditions of inhabitants, waste collection workers risk to disease resulting from exposure to various work hazards fatal and non-fatal occupational accidents, Waste collection can be practiced as either an occupation or an essential means of survival. Many preventative measures have been proposed and implemented to reduce the risk of accidents and occupational disease. Such measures involve increasing safety and reducing the risk of musculoskeletal, respiratory and gastrointestinal disorders (*Olorunnishola et al., 2010*).

In Egypt, waste collection workers (WCWs) contribute to the cleaning of environment through their daily waste collection, The health impacts could also musculoskeletal disorder, gastro-intestinal allergic, other diseases of the respiratory system and infectious diseases as well as injuries caused

by work related accidents. Occupational health refers to the identification and control of the risks arising from physical, chemical and other workplace hazards in order to establish and maintain a safe and healthy working environment to gain the safe and efficient waste collection systems (*AbdEl-Wahab et al., 2014*).

Furthermore, the waste collection workers are potentially exposed to a variety of health risk and health symptom factors. Collection of the domestic waste is also a job which requires repeated heavy physical activity such as lifting, carrying, pulling, and pushing. By the functional element of collection which includes not only the gathering of solid waste and recyclable materials, but also the transport of these materials, after collection to the location where the collection vehicle is empty. This location may be materials processing facility, a transfer station or a landfill disposal site (*Kelantan, 2015*).

Egyptian waste collection workers dealing manually with mixed hazardous wastes with substantially increased occupational health impacts. Waste management practice in Egypt has been largely focused on the issues of collection and disposal with little or no attention paid to the health status of waste collection workers. Many hazards that can adversely affect their health and well-being. Long hours, changing shifts, physically demanding tasks, violence, exposures to infectious diseases and harmful chemicals are examples of hazards that put these workers at risk for illness and injury. However, WCWs, often face many risks associated with their collection work, such as handling heavy and dangerous waste, traffic accidents and hot working environment (*Ewis et al., 2014*).

Occupational health nurses are a part of larger occupational health service team run their own business providing occupational health advice on a consultancy basis and support for health problems protection at work by understanding the effects of work on health and health at work, screening for the early signs of health problems, assessing and managing workplace risks, training and education.

Knowledge of health promotion and education is desirable for waste collection workers as well as an understanding of case management, health and safety issues, health screening, stress management and basic first aid (*RCN, 2011*).

Significance of the study:

According to *International Labor Organization (ILO) (2017)* every day, people die as a result of occupational accidents or work-related diseases more than 2.78 million deaths per year. Additionally, there are 374 million non-fatal work-related injuries and illnesses each year, many of these resulting in extended absences from work. The human cost of this daily adversity is vast and the economic burden of poor occupational safety and health practices is estimated at 3.94 percent of global Gross Domestic Product each year. Even more, employers face costly early retirements, loss of skilled staff, absenteeism and high insurance premiums due to work-related accidents and diseases. The ILO aims to create worldwide awareness of the dimensions and consequences of work-related accidents, injuries, diseases and place the health and safety of all workers on the international agenda to stimulate and support practical action at all levels.

In Egypt waste collection workers exposed daily to domestic waste including papers, cardboard, plastics, canes, rage, food waste (60.9%), feces in diaper or incontinence pads and blood in sanitary pads used by women during menses (59.8%), animal and domestic pets excreta, waste produced from pens or hutches, poultry and fish shops (52.5%), dead animals and rodent carcasses (51.9%) sometimes they find dead human bodies, particularly newborns in the waste stream, `pins and used syringe/ needles (53.9%; 32.7% reported needle stick injury), broken glass and other sharp items (59.2%), laboratory waste (39.4%), hospital waste including papers, cardboard, plastics, canes, rage, food waste (41.4%), dust (41.3%) and repugnant odor (63.8%), sludge, debris, decayed matters remaining in vehicle hopper and containers (14%), leachates and sludge that sometimes contains worms (15%) and tan (13.8%) (*AbdEl-Wahab et al., 2014*).

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Through using the principle of preventive measures to create worldwide awareness of work-related accidents, injuries and diseases to place the health and safety of all waste collection workers on the international agenda to stimulate and support practical action at all levels. Occupational health programs coordinated and comprehensive set of health promotion and protection strategies implemented at the worksite that includes programs, policies, benefits, environmental supports and links to the surrounding community designed to encourage the health and safety of all workers (*ILO, 2017*).

Aim of the study:

Assess the occupational hazards and preventive measures among waste collection workers (street sweepers & waste collectors) through: a) Assessing knowledge of the WCWs knowledge regarding hazards of waste collection. b) Determining the knowledge of the WCWs knowledge regarding health related preventive measures. c) Determining the practices of the WCWs regarding the preventive measures (protection devices). d) Identify the community health services provided for the WCWs.

Research Hypothesis:

- 1) Are waste collection workers having enough knowledge and practices regarding waste collection?
- 2) Are there any relation between the knowledge of the WCWs and their practice?

Subjects and Methods:

Research Design:

A descriptive design was used to achieve the aim of the study.

Setting:

The present study was conducted at the all five zones of Suez Governorate (Ataqa, Faisal, Arbaeen, Suez and Ganayen), through the General Authority for Cleanliness and Beauty (GACB).

Sample calculation:

A purposive sample of 95 from formal waste collection workers which representing 25% as sample size from total number of (380) formal waste collection workers at all five zones of Suez Governorate 19 WCWs for every pre-mentioned setting. And exclusion the low intellectual level and psychotic WCWs. Finally; the estimated total sample number is equal to 95 WCWs from Suez Governorate.

Tools:

Two tools were used for data collection.

The first tool: An Interview Questionnaire included the following.

Part I- Demographic data of the waste collection workers as following:

A- Concerned with demographic data of the WCWs: It consists of 5 closed ended questions that included: gender, age, educational level, marital status, number of family members.

B- Concerned with work characteristics of the WCWs: It consists of 14 closed ended questions include: years of occupation, working system, number of working hours (per day), types of motor activity at work, work training course and its types, Water source, bathroom, basins for

washing hands, place for rest, food place, place to wash work tools, place for saving tools, locker for saving protective clothes and recreational place.

C- Concerned with medical history of the WCWs: It consists of 14 closed ended questions include: health insurance system, medical examination before assigned to work, periodic medical examination and every what, medical and therapeutic services, preventive vaccination and types of vaccine, clinic at work and its service, suffer from any disease, take any medications, medication types, side effects with this medications, exposure to hazards of injuries during work, body part injured and types of injuries.

D- Concerned with waste collection workers habits: It consists of 6 closed ended questions include: smoking, smoking during work, drinking coffee/tea, practicing sports, types of sports and frequency of practicing sporting.

Part II- Concerned with knowledge of the waste collection workers regarding the following:

A- Knowledge of the WCWs regarding types of occupational hazards it is one questions divided to asked for each types of hazard exposure during work. This part was used before and after the program.

B- Knowledge of the waste collection workers regarding preventive measures. It consists of 9 closed ended questions include: Protection from hazards during work by, work requires protective clothes and its types, work requires specific tools and its types, doing personal hygiene measures during work and doing what. This part was used before and after the program.

C- Knowledge of the waste collection workers regarding occupational health and safety measures. It consists of 2 closed ended questions includes: Knowledge about occupational health and safety meaning, objectives of occupational safety programs. This part was used before and after the program.

D- Knowledge of the waste collection workers about first aid practices as reported by WCWs. It consists of 13 closed ended questions include: Knowing ambulance number meaning of first aid, important of first aid, four components of first aid bag and doing at the accident, protection practices during first aid, principal of first aid, the first thing doing to assess the consciousness and conscious injured, the first thing doing with unconscious injured, safe way to open air passages for unconscious injured, dealing with wounds and with burned person by. This part was used before and after the program.

Part III: Assess the waste collection worker's practices regarding the preventive measures, facilities and others, distributed on:

A- Practices of the waste collection workers regarding preventive measures. It consists of 3 items includes: Using personal protective clothes, special clothes for bad weather (rains) and wears glasses when handling hazardous waste. This part was used before and after the program.

B- Practices of the waste collection workers about safety handling for waste collection. It consists of 9 items includes: Safe waste collection places, bins covered for insect and dust protection, waste at waist level of WCWs, proper size of waste bins, arms for waste collection boxes, heavy boxes are raised between two workers, waste separated from cans, glass, etc. in separate boxes, special box for Sharpe wastes and left the waste collection area clean. This part was used before and after the program.

C- Practices of the waste collection workers about safety handling with waste car. It consists of 6 items includes: Stands away from box and vehicle movement place, emergency stop on the vehicle, control panel easy to handle with simple language, workers sitting inside the cabin during waste transportation, the vehicle parked in a safe place away from traffic and water source in a vehicle to protect workers from thirst. This part was used before and after the program.

❖ Scoring system:

Answers of WCWs regarding the knowledge, items were classified into two score

levels; (a) correct answers were scored as 1. (b) Incorrect answers were scored as zero for each area of knowledge, the score of the items was summed-up and the total was divided by the number of the items, giving the mean score for each part. These scores were converted into percent score; also means and standard deviation were computed. Knowledge score level: (a) Satisfactory if the score was 50%. (b) Unsatisfactory if the score was < 50%.

The second tool: Observational check list, it was concerned with waste collection workers practices regarding waste collection were adopted from *Kawakami (2010)* and modified by the investigator to assess the following:

Part III: Assess the waste collection worker's practices regarding the preventive measures, facilities and others.

❖ The Scoring System of practice:

Responses of the WCWs regarding their practices items were classified into two score levels; (a) done was scored as 1; (b) not done was scored as zero for each item. The score of total items were summed-up and divided by the number of the items, giving the mean score value. These scores were converted into percent score; means and standard deviation were computed. Safe practice for wearing protective clothes and devices were considered if the total percent score was 65% and unsafe if the total percent score was < 65%.

Content validity and reliability:

A Panel of five experts from the Head of community health nursing department. Faculty of Nursing, Ain Shams University, reviewed the tools for clarity, relevance. Comprehensiveness, understanding and applicability. Reliability was done using test-retest Cronbach's test (0.87).

Field of work:

▪ The overall time consumed for data collection was extended to three months from the beginning of July 2016 until the end of September 2016.

- At the begging, approvals were obtained from the head directors of Suez governmental office and General Authority for Cleanliness and Beauty (GACB) to get their agreement to conduct the study.
- After taking the study setting approvals and proper coordination for the suitable dates and times to implement the study.
- The investigator got used to do phone calls before going to each zone for WCWs supervisor to get their agreement for the appropriate date and time which is based on the availability of WCWs at rest time or in between shifting to avoid any work interruption.
- After the investigator reaching each work sites, sit on the daily signature room which considers a place of data collection from the study subjects, either between the shifts or at their rest time or according to the order of the WCWs supervisor.
- After seeking the data collections permission, verbal informed consent before starting the interview taken from each WCWs. a structural interview with explanation to the aims and the purpose of study for it will never be used for purposes other was done.
- The data was collected and coded by the investigator, all the participants with confirming confidentiality of their information that than scientific research.
- The investigator followed these methods for data collection until the sample size completed.

Ethical Consideration:

Approval was taken from the Dean and faculty ethical committee before starting the study and agreement of the waste collection workers to participate in the study, after explaining the aim of the study. Anonymity and confidentiality was assured. Ethics, values, culture and beliefs was respected WCWs were informed that they allowed choosing to

participate or withdraw from the study at any time.

Pilot study

The pilot study was conducted on 10% WCWs from the total sample 95 WCWs, which equal the number size of 10 workers who were excluded out of the total sample to test the applicability of the developed tools, clarity of the included questions and practicability; identify the obstacles and problems that may be encountered with data collection; and estimate the average time needed to complete all the questionnaire. Modification needed was done included rephrasing of some questions, rearrangement of the questions and omission. The subjects of the pilot study were excluded from study sample.

Statistical Analysis:

All data were coded, collected, tabulated and subjected to statistical analysis. Statistical analysis is performed by SPSS in general (version 17), Excel programs and power point were used for data registration and graphical presentation.

Since all the research variables are qualitative categorical variables, they are described by proportions and percentages. For the Inferential statistics, Chi-square test is used or Fisher Exact test, if the expected frequencies per cell are less than 5. Significance level is considered at $P < 0.05$.

Significance of the Result:

Not significant if $p > 0.05$

Significant $p < 0.05$

Highly significant $p < 0.01$

Results:

Table (1): shows that 100% of waste collection workers (WCWs) were male. 50.5 % of WCWs aged 35- <45 years. 51.6 % of WCWs could read and write, 82.1% of WCWs were married. Regarding the number of family members, 44.2% of the WCWs had 2-4 members.

Table (2): The table shows 44.2% of WCWs had 5-9 years of occupation. Concerning to types of motor activities at work,

93.7% of WCWs were carrying, 91.6% of them were bending, also, 52.6% of WCWs were walking for a long time, 76.8% of WCWs climbing waste vehicle, followed by 88.4% of them pulling. Finally, 100% of WCWs were doing Pushing as motor activities at work. Meanwhile, the WCWs had not got any training course at work field. Also, Work resources shows that, 80% the WCWs had water source, bathroom and basins for washing hands. But, no food place, washing work tool, locker for saving protective clothes and recreational place.

Table (3): Shows that, 35.8% of waste collection workers had high blood pressure and 34.7% of WCWs were suffering from chest allergy, while 16.8% of them had diabetes. 92.6% of WCWs were taking medications. 59.1% of them were taking analgesic and 42.4% of WCWs were taking blood pressure medications. 92.6% of WCWs had injured during work. 60.3% of them were exposed to injury during work from less than one year.

Table (4): shows that, 78.9% of the WCWs were smoking, 85.3% of them were smoking during their work. 91.6% of WCWs were drinking coffee/tea. Also, 23.2% of the WCWs are practicing sports, 59.1% of them walking, 36.4% playing football and 45.4% of the WCWs were practicing sporting every day.

Table (5): Clarifies that, 54.7 % of the WCWs' knowledge was unsatisfactory about the hazards of waste collection, 8.4% of waste collection workers had knowledge about hazards regarding burns, and 3.2% of WCWs had knowledge about accidents, and nature hazards by 2.1%, while show 69.5% of WCWs had knowledge regarding psychological stress and hazards of infections by 60%.

Table (6): show that, unsafe practices of WCWs by 63.1 % of the WCWs using uniform (suit / overall) with visible signs as personal protective clothes as practices of the preventive measures, 90.5 % of them wear cap, 1.1% of WCWs had not wear mask, gloves was presented by 20%, after that rubber boots by 22.1%, then any one wear special clothes for

bad weather (rains) and glasses when handling hazardous waste.

Table (7): Correlation coefficient between satisfactory knowledge and safe practice showed that there was none statistically significant deference between knowledge and practice when p-value was >0.05 .

Fig (1): Illustrated that body part injured of WCWs, the hand of them was the most part injured by 56.8%, followed by fingers and feet had 45.5% for each of them.

Fig (2): Illustrated that types of injury for WCWs, cut wound & hematoma (hands-foot) were the highest diagnosis presented by 64.7%, after that puncture by 39.7%, then 27.3% fallen and 23.8% of WCWs had fracture & Lumber desk lower limbs during work.

Table (1): Distribution of the waste collection workers regarding to their demographic characteristics (n=95).

| Items | No. | % |
|----------------------------------|------------------|------|
| Gender: | | |
| ▪ Male | 95 | 100 |
| Age (years): | | |
| ▪ 25 - <35 | 9 | 9.5 |
| ▪ 35 - < 45 | 48 | 50.5 |
| ▪ ≥ 45 | 38 | 40.0 |
| ▪ Mean \pm SD | 38.76 \pm 5.13 | |
| Educational level: | | |
| ▪ Illiterate. | 27 | 28.4 |
| ▪ Read and write. | 49 | 51.6 |
| ▪ Basic education. | 13 | 13.7 |
| ▪ Technical & Intermediate. | 6 | 6.3 |
| Marital status: | | |
| ▪ Single | 13 | 13.7 |
| ▪ Divorced. | 4 | 4.2 |
| ▪ Married | 78 | 82.1 |
| Number of family members: | | |
| ▪ 2-<4 | 42 | 44.2 |
| ▪ 5-<6 | 41 | 43.2 |
| ▪ 6 or more | 12 | 12.6 |

Table (2):Distribution of the Waste Collection Workers according to their work characteristics.

| Work characteristics | No. | % |
|---|------------|----------|
| Years of occupation | | |
| ▪ 1-<5 | 12 | 12.63 |
| ▪ 5-<10 | 42 | 44.21 |
| ▪ 10-<15 | 37 | 38.95 |
| ▪ 15 or more | 4 | 4.21 |
| ▪ Mean±SD | 10.59±4.84 | |
| Working system: | | |
| ▪ Shifting | 17 | 17.9 |
| ▪ Morning shift | 40 | 42.1 |
| ▪ Evening shift | 16 | 16.8 |
| ▪ Night shift | 22 | 23.2 |
| Number of Working Hours (per day): | | |
| ▪ 6 - 8 hours | 93 | 97.9 |
| ▪ < 8 hours | 2 | 2.1 |
| Health services: | | |
| Insured with Health insurance system | 95 | 100 |
| Medical examination before assigned to work | 95 | 100 |
| Periodic medical examination | 0 | 0 |
| Medical and therapeutic services | 95 | 100 |
| Preventive vaccination | 92 | 96.8 |
| Hepatitis vaccination | 92 | 96.8 |
| Clinic at the headquarters of the work | 0 | 0 |
| Types of motor activities at work: | | |
| Carrying. | 89 | 93.7 |
| Bending | 87 | 91.6 |
| Walking for a long time. | 50 | 52.6 |
| Stand for long time. | 30 | 31.6 |
| Climbing waste vehicle | 73 | 76.8 |
| Pulling. | 84 | 88.4 |
| Pushing. | 95 | 100 |
| Training: | | |
| Work training course | 0 | 0 |
| Types of training course | 0 | 0 |
| Work resources: | | |
| Water source | 76 | 80.0 |
| Bathroom | 76 | 80.0 |
| Basins for washing hands | 76 | 80.0 |
| Place for rest | 6 | 6.3 |
| Food place | 0 | 0 |
| Place to wash work tools | 0 | 0 |
| Place for saving tools | 91 | 95.8 |
| locker for saving protective clothes | 0 | 0 |
| Recreational Place | 0 | 0 |

N.B: Responses are not mutually exclusive

Table (3):Distribution of the Waste Collection Workers according to their Medical History (n=95).

| Items | No. | % |
|--|-----|------|
| Suffer from any disease | | |
| • High blood pressure | 34 | 35.8 |
| • Low blood pressure | 6 | 6.3 |
| • Diabetes | 16 | 16.8 |
| • Chest allergy | 33 | 34.7 |
| • Others | 73 | 76.8 |
| • Do not suffer | 4 | 4.2 |
| Take any medications | 88 | 92.6 |
| Medication types (n=88) | | |
| • Blood pressure medications | 37 | 42.0 |
| • Diabetic medications | 14 | 15.9 |
| • Heart medications | 2 | 2.3 |
| • Renal medications | 11 | 12.5 |
| • Analgesic | 52 | 59.1 |
| • Others | 57 | 64.8 |
| Side effects with this medications (n=88) | | |
| • Headache | 10 | 11.3 |
| • Dizziness | 4 | 4.5 |
| • Blurred | 6 | 6.8 |
| • Shortness of breath | 2 | 2.3 |
| • Drowsiness | 5 | 5.7 |
| • I do not know | 70 | 79.5 |
| Injured during work (n=95) | 88 | 92.6 |
| Injured from (n=88) | | |
| • <One year | 42 | 47.7 |
| • >One year | 53 | 60.3 |

N.B: Responses are not mutually exclusive

Table (4):Distribution of the waste collection workers according to their personal habits (n=95).

| Personal habits | No. | % |
|---|-----|------|
| Smoking: | 75 | 78.9 |
| Smoking during work | 64 | 85.3 |
| Drinking Coffee/tea | 87 | 91.6 |
| Practicing sports: | 22 | 23.2 |
| Types of sports: n=22 | | |
| ▪ Walking | 13 | 59.1 |
| ▪ Foot Ball. | 8 | 36.4 |
| ▪ Bodybuilding. | 2 | 9.1 |
| ▪ Running. | 2 | 9.1 |
| N.B : Responses are not mutually exclusive | | |
| Frequency of practicing sporting: n=22 | | |
| ▪ Daily. | 10 | 45.4 |
| ▪ Twice per week. | 10 | 45.4 |
| ▪ Three times per week. | 2 | 9.2 |

Table (5): Distribution of the Waste Collection Workers regarding to their correct knowledge about types of occupational hazards of waste collection (n =95).

| Knowledge regarding types of occupational hazards of waste collection | Correct answers | |
|---|-----------------|-------------|
| | No. | % |
| Types of hazard exposure | | |
| ▪ Wounds (e.g. broken glass & another sharp instrument... Etc.). | 92 | 96.8 |
| ▪ Punctures (e.g. Contaminated syringes – tree thorns. etc.) | 87 | 91.6 |
| ▪ Psychological stress from occupation. | 66 | 69.5 |
| ▪ Infections (e.g. Dust, insects ... etc). | 57 | 60.0 |
| ▪ Burns (e.g., building materials - electric. medications....etc). | 8 | 8.4 |
| ▪ Accidents (e.g. falling of container objects - slip... etc). | 3 | 3.2 |
| ▪ Nature (e.g. Sunstroke, noise, hot & cold weather... etc) | 2 | 2.1 |
| Total | 52 | 54.7 |

Significant level: Non-significant >0.05 Significant <0.05* High significant <0.001**

Table (6): Distribution of observation checks list of the waste collection workers, according to practices of the preventive measures (n =95).

| Practices of the preventive measures | Done | |
|--|-----------|-------------|
| | No. | % |
| Using personal protective clothes | | |
| ▪ Uniform (Suit / overall). | 60 | 63.1 |
| ▪ Visible signs on work Suit / overall. | 60 | 63.1 |
| ▪ Cap (helmet). | 86 | 90.5 |
| ▪ Mask. | 1 | 1.1 |
| ▪ Gloves. | 19 | 20 |
| ▪ Rubber boots. | 21 | 22.1 |
| Responses are not mutually exclusive | | |
| Special clothes for bad weather (rains) | 0 | 0.0 |
| Wears glasses when handling hazardous waste | 0 | 0.0 |
| Total | 27 | 28.4 |

Table (7): Relation between knowledge score level of the waste collection workers and score level of practice (n=95).

| Practice | Knowledge | |
|----------|-----------|---------|
| | r | P-value |
| Practice | 0.078 | 0.738 |

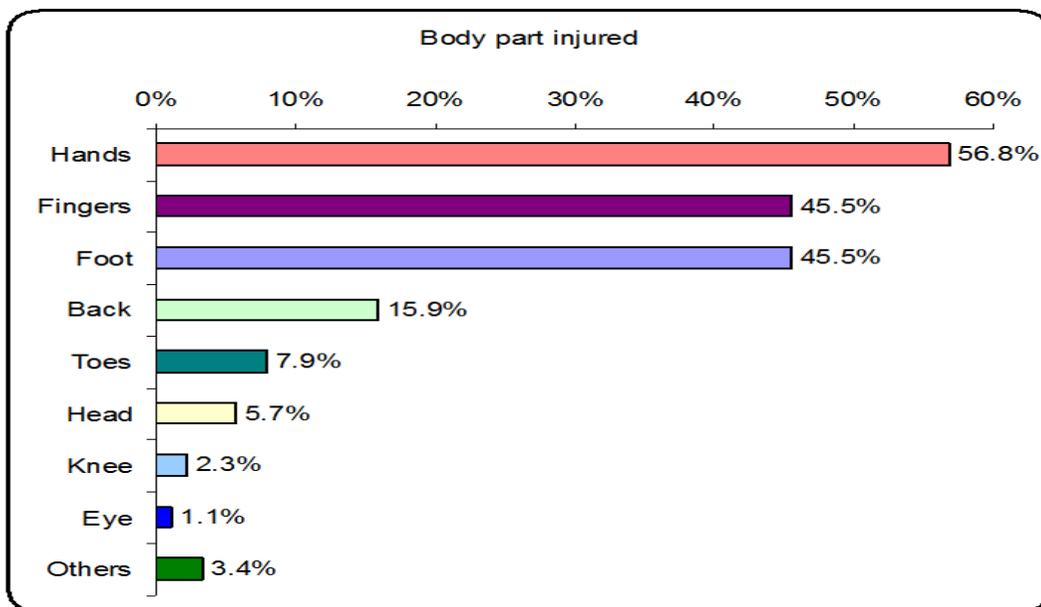


Figure (1): Distribution of the Waste Collection Workers according to their Body part injured

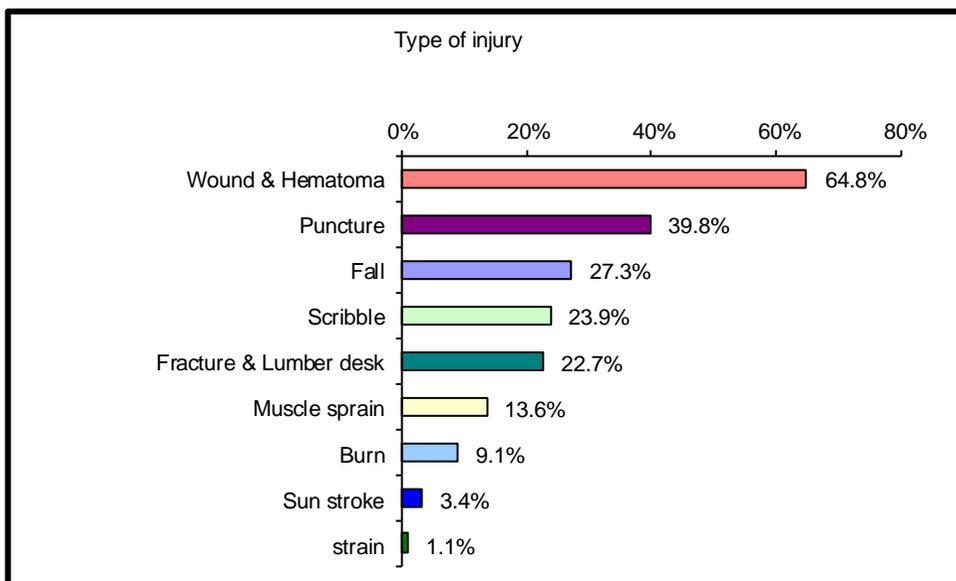


Figure (2): Distribution of the waste collection workers according to type of their injury (n=88).

Discussion:

Waste collection workers pick up garbage for deposit at transfer stations. Waste collection workers laden with health hazards.

They are exposed to foul odours, dust, ants, flies and they get dirty easily even when they wear protective clothing. Furthermore, collecting wastes is a physically demanding job, which is associated with a high prevalence rate is a

hazardous job that exposes its workers to infections especially with the little, in any, protective measures they apply. Occupational health program work as guidelines for safety measures and controlling for waste collection hazards (*Ahmed et al., 2018*).

Part I:- Demographic data of the waste collection workers

The present study showed that *demographic characteristics* of WCWs, all of them were male and more than half of them were 35-years in the middle-age group (*Table 1*). In Egypt, the findings were agreement with *AbdElWahab et al., (2014)* who stated that waste collection work is mainly performed by male workers was represented by **99.4%** also **82.4%** aged above 30year This could be attributed to waste collection work is hard work which needs muscular efforts.

Concerning the educational level of WCWs more than one quarter of them were illiterate and more than half of them were read & write (*Table 1*). This finding was harmony with *Snel (2012)* reported that the recognition of waste collection workers is easily by training program does not require literacy with vocational training by audio visual material and periodic training.

This could attribute to various socioeconomic factors e.g., illiteracy or inadequate education. Therefore, there is a relationship between level of education and knowledge, which considered more realistic way of presenting the effect of education on Knowledge. General Authority for Cleanliness and Beauty is currently providing literacy courses to elevate their educational level, which will reflects on knowledge level but this courses not applied actually it is just routine done in paper only.

As regards the years of occupation level of WCWs almost half of them had 5–10 years of experience (*Table 1*). The finding is in accordance with *Byung et al. (2016)* who reported that 41.7% of the occurred in workers with 5–10 years of experience. This could be,

WCWs in the past work day by day basis informal worker. Now, as a result of increasing the need for WCWs, with the increase in the volume of waste and the residents in developing countries are more affected by uncontrolled waste. Recruitment is considered to be the best option.

According to **work characteristic**, the current study revealed that the all most of sample had doing types of motor activities as carrying, bending and all of them doing pushing during daily work. Meanwhile, the WCWs had not got any training course at work field about safe handling of waste (*Table 2*). These results did not come in harmony with *Endreddy and Sandul (2015)* who mentioned that the 30 % of studied samples did not take training about safe handling of waste. Training and health education programs should be provided to all workers from the start of work.

However, training course level no training course in work field for waste collection workers (*Table 2*) The finding is un harmony with (*HSE, 2017*) recommendation reported that ,WCWs must be trained within occupational health program to be safe and efficient handling of waste. As a plan to decrease the incident of occupational accidents in waste collection workers has been found to be higher than the general workforce. This could be attributed to manual training help WCWs, managers and the community to improve their safety, health working conditions.

Another study done by *Ibrahim and Mohamed (2016)* In Egypt had harmony with the researcher opinion for recommendation training services: the Ministry of Local Development with the participation of NGOs could formulate clear and more extensive solid waste management training services and resource centers in all the municipalities of Egypt. Ensuring the provision and use of personal protective devices are highly advisable. This could be attributed providing ergonomically designed work-tools can reduce or prevent musculoskeletal disorders.

This could be attributed to ineffectively handling of heavy waste and repetitive motions by false using of muscular skeletal system which leads to suffering from joint pain and muscles strain. Also, heavy physical loads in their daily work motor activities may be to be as results muscular skeletal injury. These musculoskeletal conditions are due to handling of heavy waste bags or bins. Training of using body mechanic very important as control physical hazards showed insignificant rates of low back pain.

Regarding *medical history* level one third of the sample suffers from chest allergy (*Table 3*). This result comes in a contrast with *Jayakrishnan et al. (2013)*. The increased risk of respiratory disease chest allergy by 35% related to exposure to organic dusts containing high concentrations of bacteria and fungi, biologically active agents, gases, bioaerosols in Bombay.

This finding was also supported by *AbdEl-Wahab et al. (2014)* who mentioned that the higher prevalence of respiratory complains particularly cough by 29.1% (dry or productive), found specifically with WCWs who ride on footplates on the backs of the trucks exposed to exhaust fumes, dust, carbon mono-oxide and welding fumes containing heavy metals. This could be attributed to exposure to organic dust, which relationship between working in open dumps and increased respiratory illness.

Another study done by *Bansod (2016)* reported that in Germany 55% of them had cough and sneezing symptoms chronic bronchitis supported these findings in their study titled waste collection have potential risk for development of chronic respiratory diseases higher prevalence of respiratory complains particularly cough (dry or productive).

Regarding *medical history* for waste collection workers, the results of this study showed that, majority of them injured during work (*Table 3*). The finding in a similar study in Ethiopia with *Tefera and Negussie (2015)* stated that, 95% of WCWs were exposed to

injuries. By picking openly disposed wastes which include hazardous substances lead to exposed directly and without adequate personal protection. This might be due to the fact that WCWs manual handling of waste which increases the probability of cut, bruises and Puncture.

In relation with body parts injured of WCWs the present study showed that more than half for hands, around half for fingers and foot as results from unsafely practices of waste collection (*figure 1*). Conduct study by *Desta et al (2014)* in Addis Ababa, Ethiopia , who studies reported that hands by 80% which commonly injured body part followed by 75% for finger .This could be attributed manual handling municipal solid wastes with various hazards, unsuitable protective measures and absence of safety training.

Regarding body parts injured and types of injury for WCWs, more than half of them hands were injured followed by fingers, foot as cutting wound, hematoma and puncture (*figure 1 & 2*), and no special box for sharper wastes as a part of safety handling to prevent injuries in waste collection. the study have significantly more direct contact with *Bleck and Wettberg (2017)* who asserted that injuries among waste collection hazards were found dermatological problems especially on hands by 55% regarding to manual handling as sources of accidents and long-term injuries.

In the investigator opinion, this could be attributed to real fact of mixed waste to be WCWs high risk wounds and puncture. Due to manipulation of waste which mixed by glass, sharp material and needles by hand with inadequate protective measures. The duties of waste collection workers and injury limitation by emptying of refuse bins into the truck using hydraulic lift with proper disposal standards.

Moreover waste collection workers personal habits score level clarified that, more than three quarter of WCWs smoking, most of them smoking during work (*Table 4*). In Egypt, these results a similar study was carried out by *Ewis et al. (2014)* who mentioned that,

relatively high percentage of current smokers in WCWs than non-smokers by using comparison group 30.4% compared to only 18.1% of the to gain the relationship between WCWs and the prevalence of respiratory complaints after eliminating the effect of smoking. Waste collection workers who were exposed to organic dusts might have a high prevalence of work-related respiratory tract symptoms, which were not related to dust exposures only but to their smoking habits.

Waste collection work associated with the smoking. This habit is found to be more common and they work as anesthesia during the working hours. Due to the exposure of waste loading work, WCWs were vulnerable to the development of communicable as well as non-communicable disease, adverse health effects among WCWs. This congruent with the results of current study in Egypt which 80% of waste collection workers were smoking. Also factors associated with chronic bronchitis among WCWs smoking (*Madian, 2018*) supported the present study.

Regarding **waste collection workers knowledge about types of occupational hazards** of waste collection level. it was noticed in (*table 5*) that half of them had satisfactory knowledge. This was confirmed by *OSHA (2015)* who reported that the modern occupational safety and health legislation usually demands that risk assessment must be carried out prior to making an intervention. It should be kept in mind that risk management requires risk to be managed to a level which is as low as is reasonably practical. This assessment should identify: the hazards, all affected by the hazard and how identify and prioritize appropriate control measures and evaluate the risk.

The finding is in a contrast with *HSE (2017)*, stated that occupational health program help waste collection workers which face many risks associated with their collection work, such as handling heavy and dangerous waste, traffic accidents. Also, to avoid accident two collectors work together when throwing heavy waste bins into the hopper of car. Understanding hot work

environment to understand how to be control. By training materials such as video and poster presentations may be effectively used for practice.

This could be attributed to knowing of waste collection hazards easy to gain but knowing the link between the hazards and disease injures so hard by thinking of fact. So that, the types of occupational hazards identified, assessed and controlled as close to the source (location of the hazard) as reasonable and possible.

Concerning waste collection workers practice about preventive measures (*Table 6*), more than two third of them had unsafe although, WCWs know that the work require protective clothing. Practice had insignificant relation with WCWs age groups. Some workers cover their hands with plastic bags because they did not get gloves and they cannot afford to buy them. Their practices rely on giving protection tools and replace if damaged or lost. This finding is in contrast with *ILO (2014)*, who stated that the waste management work is dirty work. Many workers do not get proper protective clothing, tools, changing rooms and proper washing facilities equipment.

In relation to waste collection workers knowledge and their practices were none statistically significant deference, it was noticed in *Table (7)* this finding was supported by *Decharat (2017)* who said that routinely touch waste while collecting and sorting without wearing gloves lead to exposure to injury wound and puncture. Easy contact by number of pathogens (bacteria, fungi, viruses, parasites and cysts), toxic substances, chemicals that come from the waste itself and from its decomposition. Lead to oral fecal contamination, skin diseases. This could be attributed to the important of the essential knowledge by using program.

Conclusion:

In the light of the present study findings and research questions it could be concluded that: **(1)** Around half of WCWs had unsatisfactory

knowledge regarding hazards of waste collection, more than one quarter of the WCWs had unsatisfactory knowledge regarding preventive measures and two third of WCWs had unsafe practice level regarding the preventive measures and work environment. Work facilities not available for majority of WCWs; (2) on another hand, most of the WCWs had inadequate available community health services.

Recommendation:

Based on the findings of the current study, the following recommendations are suggested for: **General Authority for Cleanliness and Beauty (GACB):** (1) An educational programs related to waste collection hazards& preventive measures (protection devices and hygiene measures) should be held periodically implemented for all WCWs whether; (2) Proper utilization for specific T.V. channel for raising public awareness and WCWs regarding waste hazards, healthy and safe preventive measures; and (3) Availability of supervision by GACB to provide protection devices and equipment should be appropriate for waste collection work e.g. puncture resistant shoes and gloves& litter picking tongs, shovels, ventilation equipment, sharps boxes, containers and lighting. **For researchers:** (1) Further studies should be implemented for WCWs regarding manual collection, old devices as well as Egyptian realities.

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