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Municipal Solid Waste workers

# Control of Solid Waste Associated Health hazards and Safety Practices Guidelines for Municipal Solid Waste workers

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## Abstract

**Background:** Municipal Solid Waste (MSW) consists of everyday items that are used and then thrown away, such as product packaging, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries. This comes from homes, schools, hospitals, and businesses. The success of primary health care strategies and health outcomes lies with one's ability to engage and empower individuals and communities. Health education has continuously evolved and taken several distinctive forms over the decades. The emergence of new concepts such as health promotion and health literacy have helped to shape and refine our understanding of how the purpose, content and methods of health education can adapt with to new public health methods and priorities. Health education can be delivered through diverse channels including mass media, social media, group discussions or presentations, and printed materials. Evidence indicates positive change in a community's health behaviors is best achieved through the use of multiple communication activities and channels that direct specific messages to target populations.

**Keywords:** Control of Solid Waste, Health hazards, Safety Practices Guidelines, Municipal Solid Waste workers

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## Introduction:

Municipal Solid Waste workers MSWWs should be treated as a vulnerable group that needs special care (1). The Occupational Safety and Health Administration (OSHA) calls for all possible measures to be adopted for the occupational safety and health of workers from workplace hazards and risks (2). **In addition**, ILO calls for promotion the fundamental right to a safe and healthy working environment (3).

Harmful substances in waste products should be reduced by elimination, substitution, collection techniques or actions in working habits. If workers are still exposed this needs to be prevented by using personal protective equipment. In this case, the workers have to be trained in the appropriate use of personal protective equipment (2).

❖ **Hierarchy of control (4):**

**A-Elimination :**

Law 202 for 2020 promulgating the Waste Management Regulation. However, the executive regulation of the law has not yet been released. The law aims to develop the integrated management of municipal, industrial, agricultural, and construction waste as well as their safe disposal. The law also aims to reduce waste generation, promote reuse, and ensure the recycling, treatment, and final disposal of waste, and finally, to manage waste in a way that reduces damage to public health and the environment, also Law # 202/2020 contains provisions that, for the first time, limit the use of single use plastic bags (5).

Moreover, The Ministry of Environment has emphasized the importance of raising public awareness on the safe disposal of electronic waste and has taken the following steps (5):

- Providing support to factories to formalize the e-waste management sector.
- Supporting initiatives such as E-TADWEER app for e-waste management.
- Supporting initiatives such as PHONES FOR GOOD to ensure the safe disposal of e-waste, especially phones.
- Partnering with civil society to launch projects supporting the Government's e-waste management vision.
- Posting instructional videos on social media platforms to increase public awareness.

**B-Engineering:** mechanization of waste collection process (6);

- Use automated collection vehicles when feasible.
- Utilize lifting equipment where possible to limit overexertion exposures.

**C-Administrative:**

There is the need for, particularly in tropical countries, rescheduling summer waste collection services for early morning hours or at night when temperatures are cooler and low and traffic volume low. Additionally, waste workers need to be encouraged to take regular breaks and rest in cooler shades where oral rehydration fluids can be given to refresh them (7).

**D-Personal protective equipment:**

Personal protective equipment "PPE" is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses which may result from contact with physical, chemical, mechanical, or other workplace hazards. PPE includes items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits (2). MSWWs can be safeguarded in the workplace by following safety protocols and wearing appropriate personal protective equipment (PPE) (8).

All personal protective equipment should be safely designed and should be kept clean. It should fit comfortably, encouraging workers to use (2). The high rate of occupational injuries could be avoided by ensuring proper use of effective PPE which provides first line of defense against hazards that the MSWWs exposed to (9).

➤ **Different types of PPE:**

**1-Respiratory protection (mask):**

If the risk of exposure to bioaerosols or airborne hazardous chemicals cannot be controlled by more effective preventive measures, respiratory protection equipment (RPE) must be worn. When selecting the appropriate RPE, it is important to take into account the risks, the tasks, the work environment and the individual characteristics of the worker. RPE such as facepieces (quarter, half and full-face mask and filtering half mask) must fit well to the face and must not show any leaks (2). Dust mask like n95 mask preferable to be used by MSWWs (10).

**2-Body protection (Protective clothing):**

The use of protective coveralls can reduce workers' exposure to biological and chemical agents in waste management. Leak thickness and resistance to permeation and penetration by biological and chemical substances have to be considered in the selection of protective clothing (6). Also, high visibility clothing capable of being seen by car drivers from a reasonable distance, clothing suitable for rain, heat or cold should be considered (1).

**3-Hand protection (Gloves):**

Appropriate hand protection needed when workers' hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes. (6).

The mechanical strength of gloves is very important for manual operation conducted by waste workers to prevent cuts and stings. Similar protection is needed for the feet against hazardous substances (6).

▪ **Some Types of gloves according to OSHA (6):**

a) **Aramid fiber gloves:** protect against heat and cold, are cut- and abrasive-resistant and wear well. There are different glove types available in multiple knits and coating combinations, Super Fabric added to the palm of the knit gloves to provide extra protection against needlesticks.

b) **Natural (latex) rubber gloves** are comfortable to wear. They feature outstanding tensile strength, elasticity, and temperature resistance. In addition to resisting, these gloves protect employees' hands from most water solutions of acids, alkalis, salts and ketone.

○ **Care of Protective Gloves** Inspect protective gloves before each use to ensure that they are not torn, punctured or made ineffective in any way. Discard and replace any gloves with impaired protective ability (6).

**4-Foodprotection (Safety shoes) (6):**

- Hard bottomed, nonslip Safety shoes with impact-resistant toes. The metal insoles of safety shoes protect against puncture wounds.
- Reinforced trousers are also needed to minimize punctured wounds from sharp objects (1).
- **Care of Protective Footwear:** As with all protective equipment, safety footwear should be inspected prior to each use. Shoes should be checked for wear and tear at reasonable intervals. This includes looking for cracks or holes (6).

### 5-Eye protection (6):

According to OSHA, the most common types of eyes and face protection include:

1-**Safety spectacles**, these protective eyeglasses have safety frames constructed of metal or plastic and impact-resistant lenses.

2-**Goggles**. These are tight-fitting eye protection that completely covers the eyes, eye sockets and the facial area immediately surrounding the eyes and provide protection from impact, dust and splashes. Some goggles will fit over corrective lenses.

Examples of potential eye or face injuries include Dust, dirt, metal or wood chips entering the eye from activities and even strong wind forces. Also, Chemical splashes from corrosive substances, hot liquids, solvents or other hazardous solutions.

### ➤ Training for using PPE;

Employees must be trained to know at least the following (6):

- When PPE is necessary.
- What PPE is necessary.
- How to properly put on, take off, adjust and wear the PPE.
- The limitations of the PPE.
- Proper care, maintenance, useful life and disposal of PPE.

If PPE is to be used, a PPE program should be implemented. This program should address the hazards present; the selection, maintenance, and use of PPE; the training of employees; and monitoring of the program to ensure its ongoing effectiveness (6).

However, waste management is dominated by poor individuals in the informal sector who have limited access to health services (9) as well as resources for occupational safety. As a result, the use of PPE is low in most low- and middle-income countries, which leads to a high incidence of occupational injuries (11).

Several studies unfortunately have shown the deficiency of using personal protective equipment. Shams El-Din et al. (12) found that most MSWWs do not use PPE. AHMED et al. (1) found that 58% of studied waste workers not using PPE and 70% of them did not receive training. Elkhateeb et al. (13) reported also that 76.5% of the workers were not using PPE. Also, Amer

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and Hussein (14) reported in their studies that there was a lack of provision of personal protective equipment or lack of using them Also, Other workers reported that they lacked PPE resulting in skin rashes, nose bleeding and eye problems (15).

**Medical measures for MSWWs:**

### 1. Medical surveillance for MSWWs

It is important to value those workers and the work they do, periodic worker health surveillance, including baseline and follow-up medical examinations (regular health surveillance) should be done (12).

For examples, individuals with asthma who are sensitized to *A. fumigatus* or who have some other respiratory disease or who are immunosuppressed should avoid working with biological waste, unless their exposure to bioaerosols can be controlled (16).

But unfortunately, Shams El-Din et al. (12) in their study reported that No worker gets periodic checkup.

### 2. Vaccination of MSWWs:

Vaccine-preventable diseases are hepatitis A and B and tetanus. The available vaccines should be given to those workers who are not already immune or have not been immunized against the biological agents to which they may be exposed. (6). Hepatitis B can be prevented by vaccines that are safe, available and effective as recommended by World Health Organization (17). In Egypt, the HBV vaccination is provided free of charge only through the national expanded programme on immunization EPI; otherwise, it is provided at a high cost for voluntary vaccinations and cannot be afforded by such a group of workers whose salary was described as barely enough (18).

But in fact, as shown by number of studies; the vaccination history of the studied solid waste workers was not pleasing. Rachiotis et al. (19) in their study suggested importance of vaccination of waste workers against HAV. Shams El-Din et al. (12) in their study reported that, none of the workers were vaccinated. Moreover, Abd El-Wahab and Eassa (18) found at their study that 96.2% of the workers did not receive the HBV vaccination,

### 3. Role of occupational physician; Focus on Prevention (6):

Effective health and safety programs which include hazard recognition and controls can reduce occupational injuries and illnesses and improve work conditions in the waste industry.

- Implement comprehensive health and safety programs.
- Develop a positive safety culture that emanates from the top management.
- Establish joint management/employee health and safety committees.
- Evaluate safety practices during waste collection and control all recognized hazards.
- Complete health and safety training for all new employees.
- Conduct task specific worker training that is repeated at regular intervals.

○ **Role of physicians in the prevention and control of MSDs:**

The prevention and control of MSDs among MSW collectors could be achieved through health education of workers about early signs of MSDs and when to seek medical advice, provide training to improve the workers' ability to avoid musculoskeletal problems, assist in consultation when planning for new work activities, and implementation of the occupational health programme for their prevention (20).

**Hygienic Measures and Safety Rules for MSWWs:**

**A. General safety procedures (10):**

1. All waste collector and sorting personnel should: be in good physical condition, have had a recent medical exam, maintain a current tetanus booster and Hepatitis B shot, not be sensitive to odors and dust, and be able to read warning signs/labels on waste containers.
2. Absolutely no eating, smoking, or drinking during working activities. Plenty of fluids (e.g., water) must be available and drinking frequently during hot days.
3. Always wear both pairs of gloves (outer rubber and inner latex), chemical goggles or safety glasses with splash shields, a dust mask, and overalls before the waste collection or sorting. Use safety boots especially when getting into bins.
4. Make noise when approaching the actual waste site to allow any wildlife/pest animals to flee. Look for snakes around and inside a dumpster/bin by probing with a long stick.
5. Do not attempt to identify unknown chemical substances present in the waste stream: vials of chemicals, unlabeled pesticide containers, and substances (e.g., chemicals, or needles) in unlabeled plastic/glass bottles.
6. Hazardous wastes should not be present in non-residential sources of municipal solid waste. If hazardous waste is present in the municipal waste stream, from a commercial or industrial source, the Site Safety Officer must be notified.
7. Bio-hazardous wastes are generally disposed of in red, plastic bags. Treated bio-hazardous wastes (by incineration, autoclave, chemical sterilization, etc.), are also usually in red bags. If biohazardous wastes are detected, the Site Safety Officer must be notified.
8. Workers must be on alert for the fugitive bio-hazardous wastes (bio-hazardous wastes that are not in red bags): hypodermic needles, needle covers, medical tubing, articles contaminated with red (blood) colored substances, and medical device packaging. If fugitive bio-hazardous wastes are detected, the Site Safety Officer notified.
9. At the end of each shift, remove all disposable PPE into a plastic trash bag, and place the bag into a solid waste receptacle. All MSWWs must shower at the end of each shift.

**B. Safety Standards for Mobile Refuse Collection and Compaction Equipment (6):**

The American National Standards Institute (ANSI) has published Safety Standards for Mobile Refuse Collection and Compaction Equipment, (21). These standards recommend that workers:

- Ride only in the vehicle cab or on steps specifically designed for riding,
- Remain inside the vehicle cab until the vehicle is completely stopped,
- Ensure that no riders are using the riding steps when the vehicle is backing.
- Ensure that no one rides on the loading sills.

The National Solid Waste Management Association (NSWMA) has developed comprehensive safety practices for workers engaged in solid waste collection. These procedures include the following:

- Maintaining visual contact between the driver and workers on foot when working close to the vehicle and when backing.
- Checking both side mirrors repeatedly when backing.
- Using standard hand signals when backing.
- Remaining clear of the rear of the vehicle when the backup lights are on or the alarm is sounding.

### *Role of Health and Safety Education and Training Programme for MSWWs*

The success of primary health care strategies and health outcomes lies with one's ability to engage and empower individuals and communities (17).

Health education has continuously evolved and taken several distinctive forms over the decades. The emergence of new concepts such as health promotion and health literacy have helped to shape and refine our understanding of how the purpose, content and methods of health education can adapt with to new public health methods and priorities (22).

Health education is a complex process that encompasses the acquisition of health knowledge, the skills required to make informed health decisions, and the motivation to foster positive health behaviors. Health education activities must be supported by programs that enable individuals from low socioeconomic or marginalized backgrounds to modify health behaviors as needed (23).

Health education can be delivered through diverse channels including mass media, social media, group discussions or presentations, and printed materials. Evidence indicates positive change in a community's health behaviors is best achieved through the use of multiple communication activities and channels that direct specific messages to target populations (24).

Information for MSW workers is required to raise their awareness about the risks and the importance of work safety. Workers have also to be trained for safe working practices. The training should ensure that workers are aware of the risk of exposure and how they can control their exposure to the risk (2). Safe occupational safety practices are a priority across most low- and middle-income countries (11).

Adequate training on occupational health and safety issues, as well as workers' rights within the workplace, should be provided to help workers understand work-related hazards and protect their health. The training must cover knowledge of materials and equipment, operational hazards, ways of control, hygiene requirements, and how to wear and use personal protective equipment in addition to how to behave during extraordinary events like incidents and accidents (2). Employers should train outdoor workers about their workplace hazards, including hazard identification and recommendations for preventing and controlling their exposures (6).

Health education had an important role in changing knowledge, attitude, and practice KAP among municipal solid waste workers in many studies; The interventions made by conducting the training programme in a study done by Rajapaksha et al. (25) had effectively created a significant improvement in knowledge, attitude and practices of the municipal waste workers.

Kasemy et al. (26) reported in their study unsatisfactory knowledge among solid waste workers, negative attitude and unsafe practice among them then after conducting health education their KAP became significantly higher than pre-health education.

Lack of training also reported by solid waste workers in south Africa as they were not trained on how to use PPE, and this lack of knowledge exposes them to health hazards (15).

Moreover, AbouZeid et al. (27) found that there was highly statistically significant increase in workers' knowledge about PPE and improvements in their utilization level after the implementation of health educational program on Municipal Waste Workers at Minia City, Egypt.

In Egypt, most studies (12) have focused on assessing occupational injuries caused by exposure to street sweeping and waste collection and all their results recommended the need for urgent educational/training programs for improving workers' knowledge about occupational hazards and the utilization of PPE. Also, providing personal protective equipment should also be offered (12). In addition, better education on the effectiveness of immunization, as well as the importance of completing the vaccination course should be prioritized by the health system and municipalities (28).

#### **Egyptian legislations (29):**

- **Labor law No. 12 (29)**, According to the law, the establishment shall undertake the following:
  - (A) Training the worker on intact bases for the performance of his occupation.
  - (B) Informing the worker the risks of his occupation and convincing him to use the means of protection determined.
- The establishment shall not charge any costs to the worker against providing the means of protection necessary for him.

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