

## KNOWLEDGE ASSESSMENT OF WASTE MANAGEMENT WORKERS IN DEBAR REGARDING OCCUPATIONAL SAFETY AND HEALTH

**Hadisa Nasufi<sup>1</sup>, Monika Lutovska<sup>2</sup>, Vladimir Mijakovski<sup>3</sup>**

<sup>1</sup>Faculty of Technical Sciences, “Mother Teresa” University, Skopje, MK

e-mail: [hadisa.nasufi@students.unt.edu.mk](mailto:hadisa.nasufi@students.unt.edu.mk)

<sup>2</sup>Faculty of Technical Sciences, “Mother Teresa” University, Skopje, MK

e-mail: [monika.lutovska@unt.edu.mk](mailto:monika.lutovska@unt.edu.mk)

<sup>3</sup>Faculty of Technical Sciences, University „St. Kliment Ohridski”, Bitola, MK

e-mail: [vladimir.mijakovski@tfb.uklo.edu.mk](mailto:vladimir.mijakovski@tfb.uklo.edu.mk)

**Abstract:** The purpose of this study is to find the relationship between workplace accidents and the lack of education and training for Occupational Safety and Health (OSH) among municipal waste management workers. The study focused on determining the level of understanding of the importance of preventing injuries at work, as well as the level of awareness of employees about the risks they face in the workplace. For this purpose, 26 workers were engaged, checklists were made, and a risk assessment was conducted. The research was carried in the public waste management enterprise in Debar, North Macedonia. The obtained results show that the largest number of identified hazards, as much as 58%, are assessed as high risk, most of workers (all employees were male) belonged to the 46-60 age group and none of them had the necessary training on OSH.

**Key words:** municipal solid waste, occupational safety and health, risk

### INTRODUCTION

The process of waste management consists of several steps: collection of waste, transport and disposal, as well as selection and processing. All this process is important for the public health, as well as for the employees who deal with its realization, without neglecting the aesthetic and environmental reasons, [1].

Every year, about 1.3 billion tons of solid waste is generated worldwide. By 2025, this volume is expected to reach up to 2.2 billion tons per year, which is a cause of concern for governments and the society,[2]. With the excessive generation of waste, serious problems have also been created in landfills, [3].

All activities in solid waste management involve risks for the worker directly involved in the collection of waste, but also for the operators in enterprises, [4]. Hazards occur at every step of the process, from the collection of household waste to final disposal [5]. Workers and waste collectors who handle solid waste are exposed to different hazards, health risks and numerous accidents resulting from the composition of the waste being handled, the emissions from those materials and the equipment being used, [6].

Exposure to biological and chemical hazards can result in musculoskeletal, skin, respiratory and gastrointestinal problems. Moreover, solid waste collection workers are exposed to safety hazards associated with the containers or the truck, such as the risk of being hit or run over by their truck, [7].

In the city of Debar, there are 26 workers engaged in waste collection.

Therefore, it is important to determine the level of awareness of their safety at work, and whether they need adequate education and training for the prevention of work-related injuries, accidents and occupational diseases. This is the first time that research of this nature has been conducted in the Debar region.

### MATERIAL AND METHODS

The methodology of the study is based on the collection of data through checklists completed by workers, as well as identification of hazards and implementation of risk assessment by Occupational Safety and Health (OSH) experts.

Research begins with observing the work process. In these facilities, the analysis of work, processes and work materials is carried out, where the research was conducted during the months of July and August 2022, which are considered the busiest months.

This research includes 26 employees classified into 4 groups participating in the work process. Checklists containing a demographic questionnaire, awareness questions, and observational control questions, were developed and used as research instruments. In that way, the necessary methodology was created and consisted of several steps:

- Data collection;
- Identification of risks;
- Conducting a risk assessment;
- Data processing and analysis;
- Presentation of the results.

## RESULTS AND DISCUSSION

The results of the demographic questionnaire in the checklists indicate that the most (38.5%) employees are in the age group from 46 to 60 years old, followed by the group from 31 to 45 years old with 26.9%, and with the lowest participation of 3.8% in the work process are in the age group 0-18 years.

Socio-demographic data on waste management workers show that all employees were male and there were no women employed in this sector. Most of the respondents had completed primary education and none of them had completed higher education (Table 1).

Based on respondents' answers, the results show that 30.8% have 5-10 years of work experience, 26.9% are those with 10-20 years of work experience, and 23.1% of participants have 20+ years of work experience. The lowest representation of 19.2% are those with 0-5 years of work experience.

From the responses received from the checklist, the majority of workers (57.7%) deal with house-to-house/container collectors, 34.6% are street sweepers, 23.1% of respondents were drivers and 15.4% are drain cleaners.

**Table 1.** Sociodemographic characteristics

Variables	Percent
<b>Gender</b>	
Male	100%
Female	0%
<b>Age</b>	
0-18 years	3.8%
19-30 years	15.4%
31-45 years	26.9%
46-60 years	38.5%
61+ years	15.4%
<b>Education</b>	
No education	15.4%
Primary	53.8%
Secondary	30.8%
Tertiary	0%
<b>Work experience</b>	
0-5 years	19.2%
5-10 years	30.8%
10-20 years	26.9%
20+ years	23.1%

Job position	
Street sweepers	34.6%
House-to-house/Container collector	57.7%
Driver	23.1%
Drain cleaner	15.4%

Also, one of the biggest problems is the training of workers for safety and health at work, where they stated (Figure 1) that none (100%) of the employees had training on safety and health at work and only the drivers had training on the use of machinery.

### *Identifying risks and risk assessment*

During the identification of the dangers, all situations are taken into account, especially those that have the greatest potential for creating a high risk. In table 2, the following labels are used: R - risk, H - high risk, M - moderate risk, L - low risk.

**Table 2.** Identifying risks

Condition	Hazard	R	
1	Mechanical hazards	Catching hands or parts of clothing in moving parts of the truck, during placing the containers on the holders	H
		Detaching the container from the truck supports and pushing the worker	H
2	Hazards due to the characteristics of the terrain work	Slipping or missing the stand on the back of the truck when getting on or off	H
		Slipping due to not wearing proper non-slip shoes	H
		Falling when getting on or off the truck while it is moving	H
		Slippery and dirty handrails that can cause falls when climbing onto the garbage truck stand	H
		Moving on wet or uneven surfaces when picking up, carrying to the truck, and emptying trash cans	L
		Moving past scattered or scattered municipal waste	L
		Danger due to dog attack when working outdoors	H
3	Chemical hazards	Inhalation of unpleasant odors, dangerous volatile substances, gases or dust during garbage collection	M
4	Physical harm	Noise generated by the waste collection truck as well as other sources of noise	L
5	Climatic conditions	Outdoor work, exposure to high or low temperatures, wind, rain, snow and other unfavorable atmospheric influences	H
6	Biological hazards	Infectious agents, microorganisms, allergens and bacteria, hazardous waste and other decomposed substances	H
7	Psycho-physiological exertions	Manual lifting of garbage cans and placing them in position for emptying in the garbage truck	H
		Exertions due to a non-physiological state of the body associated with prolonged standing	M
		Bending, pushing and pulling when lifting bins and picking up scattered rubbish	M
		Stress due to performing heavy physical work with increased intensity	M
8	Organization of work	Activities during increased workload, shift work, overtime	M
		Lack of education about the safety of one's workplace and the	H

	importance of taking care of oneself and one's colleagues	
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It can be seen from the identification of hazards and the conducted risk assessment at the workplace of a waste management worker, that the largest number of identified hazards, as much as 58%, are assessed as H. It is characteristic that in this group also belongs the hazard of lack of education about own safety in the workplace, which shows a worryingly low level of awareness about OSH. The remaining hazards are divided so that 26% are of M, and 16% are of L. The conducted analyzes only confirm that this is a high-risk workplace for which the state institutions in the communal area should take more care in educating the workers and building a concept in which the health and well-being of the worker will have a primary position.

As a precondition to the risk assessment, a checklist for the workers in the company is conducted. Considering that all waste management steps pose a risk to workers, personal protection of workers is essential. Personal protective equipment was provided by the company to all workers. However, from the responses received from the checklist presented in Figure 1, we see that the majority of workers lack knowledge, and do not use personal protective equipment (PPE). Gloves are the most used PPE by the workers. Lack of knowledge about PPE can also be a result of low education of workers.

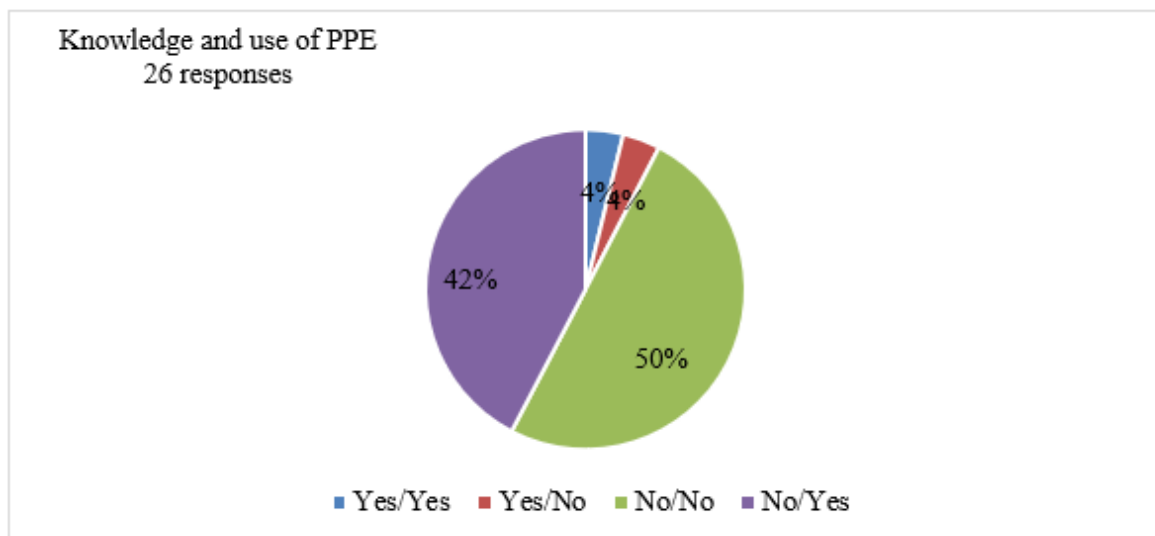


Fig. 1. Knowledge and use of PPE

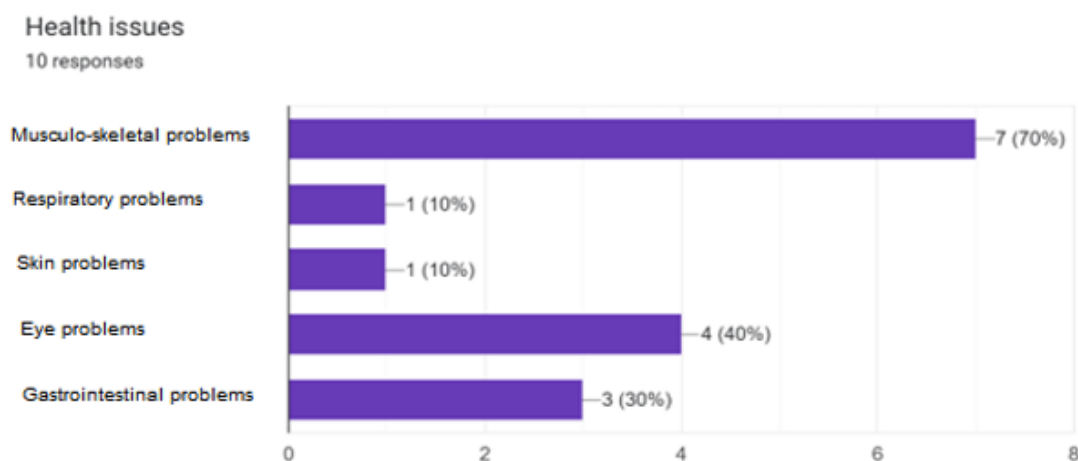


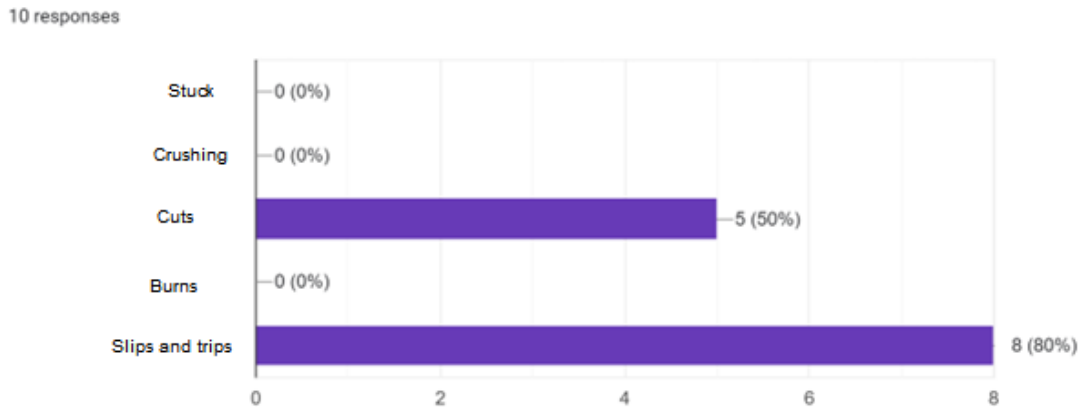
Fig. 2. Health-related issues

As for the questions related to health-related issues and accidents at work with machinery and tools, the majority of the respondents chose not to fill the checklist. From the responses received (Figure 2)

from the interviewed workers on health issues, the majority (70%) stated that they have musculoskeletal problems, 40% stated eye problems, 30% gastrointestinal problems and 10% answered that they have respiratory problems and skin problems.

*The literature points out that those workers who deal with waste management are exposed to injuries from sharp objects such as glasses, syringes, nails, spikes and thorns and also some authors also note the risk of slipping and falling,[2]. The most accidents among workers (Figure 3), 80% reported slips/trips, and 50%*

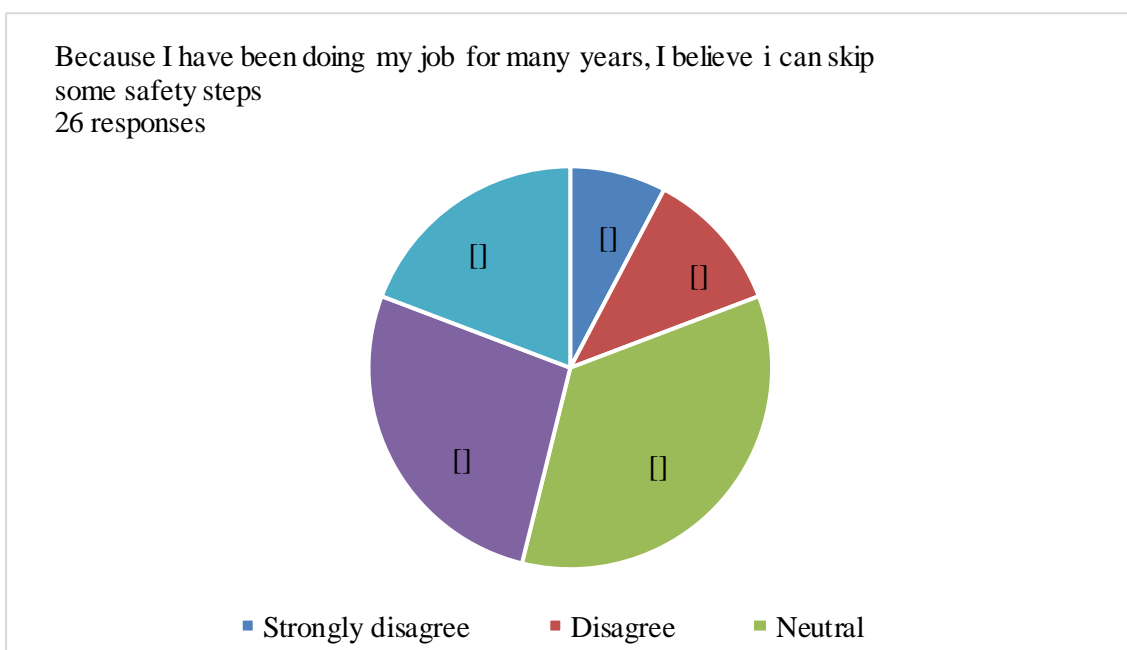
Accidents while working with machinery/tools



*cuts.*

**Fig. 3.** Accidents while working with machinery/tools

When the workers were asked about their attitude on the idea of whether they can bypass some security measures when they have practiced a profession for a long time, that is, in some way, by means of this question, overconfidence was assessed. The results (Figure 4) are mixed, where unfortunately 19% of workers chose the answer that they completely agree that security measures could be bypassed. While only 8% answered that they think that security measures should always be followed.



**Fig. 4.** Results about the question “Because I have been doing my job for many years, I believe i can skip some safety steps”

## CONCLUSIONS

Waste management is known as a problem in Debar, since the place where the waste is disposed and stored for a long time is an unregulated and improvised landfill. This becomes even more worrying when the health risks threaten the population and the workers who deal with the waste management are known.

This research highlights the unsatisfactory and unsafe work environment among waste management workers in the city of Debar, which results from the lack of training of workers in relation to OSH, the lack of adequate use of personal protective equipment and the lack of workers' knowledge of the health risks that come as a result of the workplace.

In general, the most common problems reported among workers were Musculo-skeletal problems that pose a risk to their health, and more workers had experienced slips, trips and falls during their work.

Changing the attitude of the workers towards personal protective equipment and towards the safe work should be aimed through education and training on safety and health in the workplace as well as increasing the confidence that the OSH law can bring changes in their lives is necessary.

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