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Use of personal protective equipment and work accident prevention habits adopted by waste collection and cleaning and conservation agents in urban area

Utilização de Equipamentos de Proteção Individual e hábitos de prevenção de acidentes de trabalho adotados por agentes de coleta de resíduos e limpeza e conservação das áreas urbanas

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ABSTRACT
Introduction: The inadequate use of Personal Protective Equipment (PPE), as well as the lack of accident prevention habits by waste collection, cleaning and conservation agents in urban areas, can have a direct impact on workers' health and safety indices. Objective: The aim of this study was to investigate how Personal Protective Equipment (PPE) is used and the accident prevention habits adopted by waste collection and cleaning and conservation agents in urban areas. Methodology: Quantitative, exploratory and descriptive research was carried out with a sample of 10 workers (8 direct collectors and 2 drivers) from the municipality of Nanuque-MG. The research sought to identify which PPE is provided to these professionals and the reasons why they may not use it properly. Through a literature review and the application of questionnaires, it was possible to obtain information on the safety practices adopted and to identify the role that employers should play in worker safety. Results: It was observed that 20% of workers claim to have already suffered an accident at work, of these 90% say that their employer distributed PPE. Of those interviewed, 10% said that they had already suffered an accident and had been absent from their current job, the same percentage who confirmed that they had already suffered a minor complication and had not reported it to their employer. When asked if the company offered any kind of training, 50% said yes and 50% said no. Conclusion: The results revealed that the inappropriate use of PPE is influenced by various factors, such as discomfort and lack of training.

Keywords: Safety at work, Personal protective equipment, Accident prevention.

1 INTRODUCTION

The subject proposed for this end-of-course research is the use of PPE by waste collection, cleaning and conservation agents in urban areas. This is an important and relevant issue, since professionals working in this area face significant risks in their daily work.

The relevance of this research is that it could contribute to the development of more effective strategies to ensure the safety and protection of professionals working in this area, as well as raising awareness among employers and workers about the importance of using personal protective equipment and accident prevention habits.

Although there are specific regulations and guidelines for occupational safety in this area, many professionals still face difficulties in complying with these standards. The aim of this research is therefore to understand the main challenges faced by waste collection and cleaning and conservation agents in urban areas with regard to the use of personal protective equipment and accident prevention habits, and how these professionals can be better prepared to deal with these issues.

2 THEORETICAL FRAMEWORK

2.1 BACKGROUND ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personal Protective Equipment (PPE) is a safety device used to protect workers in various fields from occupational risks that could damage their health or physical integrity. These risks can include contracting physical illnesses or mental disorders, as well as accidents at work. According to De Sousa (2015), public cleaning agents are very prone to developing some types of physical illness, such as respiratory infections, dermatitis, diarrhea, leptospirosis and even psychological problems.

In this context, according to Regulatory Standard 6 (NR6) of the Ministry of Labor and Employment, PPE is defined as any individual device or product used by workers to protect them from risks that could threaten their safety or health during the course of their work (BRASIL, 2014).

Maganin and Queluz (2009) state that several studies do not sufficiently emphasize the need to use PPE, even though it is extremely necessary, even if there are collective safety measures in place in companies. This means that even if safety measures are implemented in the workplace, such as isolating sources of risk or using ventilation systems, the use of PPE is still necessary to ensure the individual protection of each worker.

Furthermore, the importance of choosing the right PPE should be emphasized, taking into account not only the type of risk to which the worker is exposed, but also the individual characteristics of each person, such as the size and shape of their face (MORAES et al., 2015). In this context, it is worth noting that the PPE provided by companies should be made taking into account the variety of body sizes of their employees.

In the meantime, Anjos and Ferreira (2001) state that there are six types of occupational risk to which urban cleaning workers are subjected:

1. Physical: noise, vibration, heat, cold, humidity;
2. Chemical: gases, mist, fog, dust, toxic chemicals;
3. Mechanical: run-ins, falls, crushing by the compactor, fractures;
4. Ergonomic: overload of the musculoskeletal function and the spine, with consequent pathological impairment and adoption of uncomfortable forced postures;
5. Biological: contact with pathogenic biological agents (bacteria, fungi, parasites, viruses), mainly through sharps;
6. Social: lack of training and inadequate working conditions.

Furthermore, it is essential that PPE is used correctly and in a good state of repair so that it can fulfill its protective function. Therefore, it is worth noting that improper use of PPE greatly increases the chance that it will not work (CHOI et al., 2018). Therefore, it is essential to check that workers are not only receiving the necessary PPE, but also that this equipment is in perfect condition, in order to guarantee the safety of citizens.

2.2 PPE TO BE WORN BY URBAN CLEANING WORKERS

Urban cleaning workers are exposed to various occupational risks, such as contact with chemical agents (cleaning products, leftover reactive liquids, methane gas released by waste), biological agents (bacteria, fungi, viruses, protozoa, worms) and physical agents (glass, flying objects, stones, gravel, among others), which can affect their health and physical integrity. It is therefore necessary for these workers to use appropriate PPE, according to the activities they carry out and the risks to which they are exposed. In addition, the use of personal protective equipment can reduce the incidence of accidents at work among urban cleaning workers (QUEIROZ et al., 2017).

In the context of urban cleaning workers, they need to wear gloves, boots and respiratory protection masks, as well as appropriate uniforms, to minimize exposure to chemical and biological agents present in the waste. This equipment is basic, but other PPE may be necessary depending on the activity to be carried out (SILVA et al., 2013).

In addition, it is important to emphasize the need for urban cleaning workers to wear suitable safety goggles to prevent eye injuries caused by sharp or piercing objects in the waste. These goggles should have side protection, ventilation valves and be made of resistant material (COELHO, 2012).

Another essential factor for the effectiveness of PPE is the proper training of urban cleaning workers on the correct use of PPE, as well as on the risks associated with the activities they carry out (CHOI et al., 2018).

In summary, the PPE that should be used by urban cleaning workers includes, at the very least: gloves, boots, respiratory protection masks, suitable uniforms and goggles. It is important that this equipment is used correctly and in good repair, and that workers receive adequate training in its use and in the occupational risks associated with their work. In this sense, the use of personal protective equipment can reduce the incidence of accidents at work among urban cleaning workers (SILVA et al., 2019).

2.3 ACTIVITIES PERFORMED BY URBAN CLEANING WORKERS

The urban cleaning service consists of activities to manage sanitation on the surface of cities, and sweeping is responsible for removing waste from public places. The execution criteria are based on environmental conditions and the economic occupation of spaces (MOTTA et al., 2016).

Therefore, the activities performed by Brazilian urban cleaning workers include collecting household waste, cleaning public roads, sweeping streets and operating various cleaning machines (SILVA et al., 2018).

In Brazil, solid waste management is the responsibility of the local government, administered directly or indirectly by municipalities, with the majority being managed by private companies, thus outsourcing the service. According to the National Basic Sanitation Survey carried out by the IBGE (Brazilian Institute of Geography and Statistics) in 2010, there was a 26.9% reduction in the provision of services by direct administration. The economic impact of public cleaning corresponds to up to 20% of public spending (MOTTA et al., 2016).

The activities carried out by urban cleaning workers involve occupational risks, and it is essential that workers use appropriate PPE and receive training on the various risks associated with their activity. It is possible to find disease vectors in the materials swept from Brazilian streets, as it shows that street sweeping can significantly reduce the amount of disease vectors present in urban spaces (ARANTES et al., 2017).

2.4 OCCUPATIONAL SAFETY FOR URBAN CLEANING WORKERS

The waste collection, cleaning and conservation sector in urban areas is one of the most critical in terms of occupational safety. Professionals working in this area are exposed to a range

of occupational risks, including falls, cuts, burns and exposure to toxic chemicals. In this sense, the use of personal protective equipment and accident prevention habits is fundamental to ensuring the safety and health of workers. (MOTTA, et al., 2016)

In this context, urban cleaning workers can also be exposed to risks other than burns and chemical exposure, such as handling sharp objects (BARBOZA, 2017).

It is also important to emphasize the importance of considering the occupational exposure of urban cleaning workers to air pollutants, such as dust and gases emitted by waste transport vehicles (NASCIMENTO et al., 2021).

Most accidents at work can be the result of a combination of one or more unsafe acts and conditions: unsafe equipment, workplace conditions, incorrect use or non-use of PPE and unsafe methods of performing tasks (FERREIRA et al., 2020).

In addition, there are biological factors, such as direct contact with bacteria, fungi, parasites and viruses; and social factors, related to the lack of adequate training for workers, as well as the lack of information about their labor rights, focusing on Individual Safety Equipment. Public cleaning agents end up becoming frequent targets for accidents at work because they have not received adequate instruction on correct handling with the proper precautions for using gloves, clothing, facial protection and hearing protection (VELLOSO et al., 2001).

Also according to the aforementioned work, waste collectors are forced to deal with the reality that they do not receive decent, socially equitable salaries, even when compared to other categories belonging to the tertiary sector. In addition, urban cleaning workers are often associated with a low social status, being seen as low-skilled workers who are not valued by society. Therefore, the social and economic issues mentioned above, added to the low level of regulation, are determining factors for the problems related to raising awareness and organizing the category (BATISTA et. al, 2015).

2.5 LAWS PROTECTING URBAN CLEANING WORKERS

Although there are laws and regulations aimed at protecting workers, these rules are often ignored or neglected by the professionals themselves or by the companies that employ them. Lack of awareness about the importance of safety at work, lack of adequate training and an organizational culture that prioritizes productivity over safety are some of the main factors contributing to the high incidence of accidents in this sector (OLIVEIRA et al., 2021).

In 2022, CONASCON - the National Confederation of Workers in Companies that Provide Cleaning and Conservation Services, Urban Cleaning and Green Areas - published a Regulatory

Standard for urban cleaning services. NR 38 encompasses the so-called garis - a term replaced in this research by agents of waste collection, cleaning and conservation of urban areas. Its purpose is to establish minimum requirements for the management of safety, health and comfort in urban cleaning activities, without prejudice to compliance with the other Regulatory Standards of the Ministry of Labor (BRASIL, 2014).

In addition, NR 38 contains points about the occupational health and well-being of workers, and points that should serve to prevent accidents and adverse events, such as illnesses caused by work. NR 38 also creates the Environmental Risk Prevention Program and the Occupational Health Medical Control Program, which include the prevention of alcoholism and psychosocial care (BRASIL, 2015).

There are other types of factors, such as the mechanical ones associated with the working hours of these professionals and the high traffic flow, which make them easy targets for being run over and accidents in general. The researchers also consider ergonomic risks. They state that these are associated with overwork and can cause musculoskeletal injuries (VELLOSO et al., 2001).

3 METHODOLOGY

This is a quantitative, exploratory and descriptive study which analyzed the use of Personal Protective Equipment (PPE) and the techniques for preventing accidents at work adopted by waste collection, cleaning and conservation agents in urban areas.

Two structured, validated and modified questionnaires were used.

The first questionnaire was based on the study by Ferreira et. al (2020), adapted from the research "The use of personal protective equipment and accident prevention in the construction industry". This questionnaire consists of ten structured questions with open-ended options.

The second questionnaire used was adapted from the study by Oliveira et. al (2021), from their work entitled "Evaluation of the use of personal protective equipment by the nursing team". It is a questionnaire made up of eight structured questions.

The sample consisted of 10 waste collection, cleaning and conservation agents in urban areas employed by the municipality of Nanuque, MG. The questionnaires were administered from the 13th to the 15th of May 2023.

The inclusion criteria were employees who were present on the date described. Excluded were waste collection, cleaning and conservation agents in urban areas who were not present, on leave or vacation, or who for some reason refused to take part in the survey.

All the participants signed the Free and Informed Consent Form, agreeing to take part in the research. It is important to note that the interviewees can withdraw from the study at any time if they wish. Under no circumstances will the participants be identified or their names disclosed.

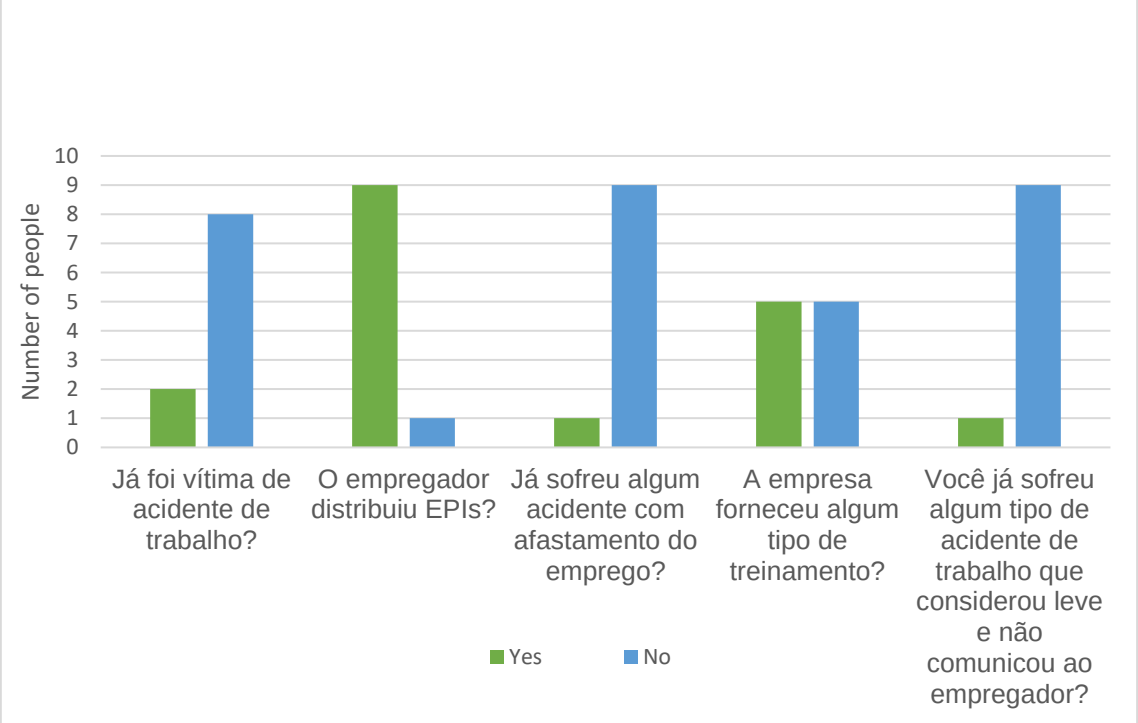
4 RESULTS AND DISCUSSION

By analyzing the results of the two questionnaires applied to 10 waste collection workers in the city of Nanuque-MG, all of whom are male, it was possible to find out a little more about the use of PPE by these workers.

Of these 10 workers, 1 is between 18 and 24 years old (10%), 4 are between 24 and 30 years old (40%), 3 are between 30 and 50 years old (30%) and 2 are over 50 years old (20%).

According to Graph 1, 20% of workers say they have already suffered an accident at work, while 90% say that their employer has distributed PPE. In addition, only 10% say that they have already suffered an accident while away from their current job, the same percentage who confirm that they have already suffered a minor complication and did not inform their employer. However, when asked if the company offered any kind of training, 50% said yes and 50% said no.

Graph 1 - Use of personal protective equipment and habits for preventing accidents at work



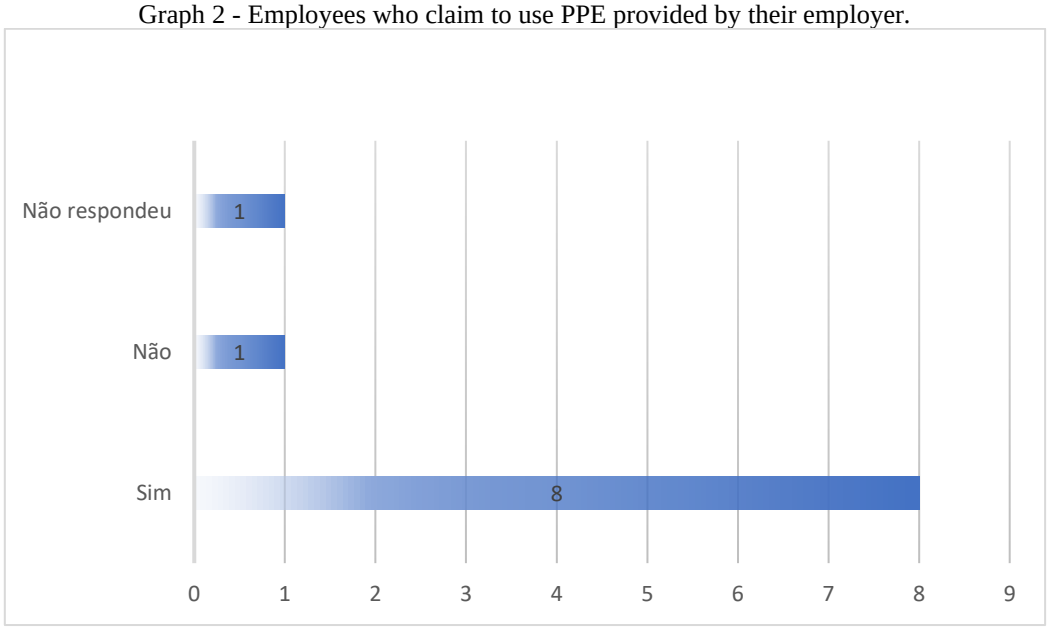
Source: Survey data, 2023

Certainly, the fact that 50% of workers say that the company has provided training is very worrying, since the employer not only has the responsibility to provide PPE, but also to monitor

the use of the equipment and take advantage of opportunities to instruct employees on the subject (CRUZ et.al, 2021).

When asked about the use of personal protective equipment, in fact, 80% answered that they use it, while 10% admitted that they don't and 10% didn't answer this question. The results are shown in Graph 2.

Graph 2 - Employees who claim to use PPE provided by their employer.



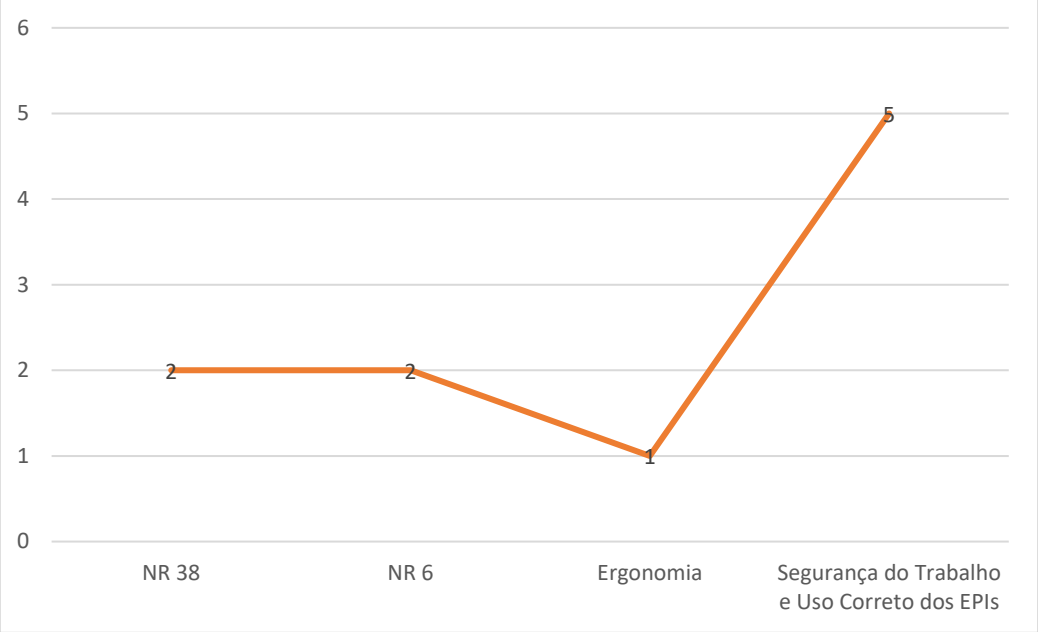
Source: Survey data, 2023

This result can be considered pleasing, but it is still necessary to keep a close eye on the percentage who did not answer or who answered negatively, namely 20% of workers, since the lack of use of PPE can cause damage to both the employee and the employer. In other words, "PPE is extremely important for carrying out work safely and with quality" (BRAZ et.al, 2013, p.3).

Some workers' awareness of the need to wear PPE is reflected in the self-responsibility that many take for their own safety. When an accident happens, according to Velloso et al (1998), around a third of workers take the blame, while more than half relate it to the inherent risks of the job. However, there is also a marginalization of these professionals encouraged by the way the state conducts policies related to the integrity of urban cleaning professionals, in a way that emphasizes the culpability of these employees.

Graph 3 shows that, among those who responded positively that the company provided training on the use of PPE, two responses are recorded indicating that one of them was on NR38, two for NR6, one response for ergonomics and five responses for courses on work safety and the correct use of PPE.

Graph 3 - Training offered by the employer.



Source: Survey data, 2023

In fact, training on Occupational Safety and Correct Use of PPE is more relevant to be offered to employees, since NR 38 is the standard that provides for occupational safety and health in urban cleaning and solid waste management activities, while NR6 is more directed at the companies themselves, since it deals, among other information, with the employer's obligation to ensure the safety of employees, guide them and make them aware of the benefits of PPE (CONASCON, 2022).

In addition, it is important to note that if the company is not fulfilling its duty to provide workers with occupational safety training, it is possible that the institution could be legally sued for non-compliance with labor rights. In this context, it is beneficial for the company itself that its employees are properly instructed on this subject (ROCHA et.al, 2022).

As one worker said he had already suffered a minor accident and had not reported it to his employer, the survey identified one response citing the accident that had occurred. This represented 10% of all respondents.

Considering, therefore, the insignificant volume of this occurrence, we can consider that employers are aware of the events that happen to workers, but because they are minor accidents and do not result in time off work, they do not receive due attention, and are sometimes not related to the improper use of PPE or negligent practices during the execution of routine activities.

In this sense, Lima (2022) states that falls are one of the most common accidents that happen to urban waste collection workers. The impact of falls on urban waste collection workers

can be serious. In addition to physical injuries such as fractures, bruises and sprains, falls can also lead to permanent damage, incapacity for work and even loss of life. Recovery from these injuries can be lengthy and require appropriate medical treatment, resulting in lost productivity and additional costs for workers and their families.

Furthermore, according to Oliveira et al. (2015), the majority of falls suffered by urban waste collection workers are due to the practice of standing in the stirrups of vehicles while they are in motion. Normally, four waste pickers are assigned to each vehicle, but only two are able to sit in the cab. The author emphasizes the importance of limiting the number of waste pickers per truck in order to ensure that everyone can be properly accommodated in the cab while on the move.

Table 1 shows the answers obtained when the cleaning agents were asked which equipment was provided to them by their employer. More than one answer was allowed on this question. As a result, 20% of those interviewed said they had received caps, 40% protective glasses, 20% clothing to protect against different agents, 100% gloves, 10% hoods to protect the skull and neck, 10% FFP2 masks, 80% sleeves to protect the arm and forearm, 90% suitable footwear and 90% pants to protect the legs and thighs. However, the group surveyed is made up of workers who work at night, so there is no need, specifically for this group, to use protectors against sunlight.

Table 1 - PPE provided by the employer.

Equipment	**Positive responses**
Cap to protect the head and face from sunlight;	20%
Goggles to protect against flying particles and sunlight;	40%
Hearing protection;	0
Clothing to protect against humidity and thermal, mechanical and chemical agents;	20%
Gloves to protect against moisture and chemical, abrasive, thermal, biological or piercing agents;	10%
Hood to protect the skull and neck from chemical agents, abrasives or moisture;	10%
Face shield to protect against heat, flying particles or bright light;	0
PFF2 particulate filtering face mask for protecting the respiratory tract against dust, mists and fumes;	10%
Sleeve to protect the arm and forearm against moisture and chemical, abrasive, thermal, biological or piercing agents;	80%
Footwear to protect against impacts from falling objects, humidity and chemical, abrasive, thermal, biological or piercing agents.	90%
Pants to protect legs and thighs against moisture and chemical, abrasive, thermal, biological or piercing agents.	90%

Source: Survey data, 2023

According to Deud (2015), frequent exposure to vibrating equipment in waste collection can result in low back pain, body aches and stress in workers, while heat can cause bodily discomfort. The more frequently workers are exposed to these risks, the greater the number of individuals who will develop occupational problems, reducing their ability to remain in their jobs

for long periods. Therefore, in order to minimize the adverse effects of these risks on workers, it is essential to use Personal Protective Equipment (PPE), such as hearing protectors to reduce noise exposure. It is therefore worrying that none of the workers in this survey said they had received ear protectors from their employer.

In the meantime, it is important to note that ideally all employees should have received all the equipment mentioned in the table, since, as well as working in traffic, these agents have to deal with waste on a daily basis, and their job is classified by the Ministry of Labor as unhealthy to the maximum degree (NEVES, 2003).

As mentioned by Cohn (1985), governments often attribute the unsafe acts of workers and the lack of accident prevention campaigns aimed exclusively at them as the main causes of accidents at work. In this approach, employers are excluded from this responsibility. This view places the blame for accidents at work primarily on workers, ignoring the role of employers in creating safe working environments.

Table 2 lists the reasons why workers stop using PPE and how often this happens for each reason. Only 10% said that they always stop using it because of discomfort, 10% always because the equipment is inadequate and 10% sometimes because the amount of equipment is insufficient. The majority said that they never stop using it for the reasons given.

Table 2 - Reasons that have prevented workers from using PPE properly

Factors	**Number of "never" answers**	**Number of "sometimes" answers**	**Number of "always" answers**	**No Answer**
Discomfort	8	-	-	2
Uncomfortable	8	-	1	1
Carelessness	8	-	-	2
Forgetfulness	8	-	-	2
Lack of habit	8	-	-	2
Inadequate equipment	6	-	1	3
Insufficient equipment	8	1	-	1
Disbelief in its use	8	-	-	2

Source: Survey data, 2023

However, it is possible that, as much as they were informed about the anonymity of the survey, some workers may have said they never stopped using PPE for the above reasons out of fear of management. Regarding this common behavior among employees, Saladini (2018) states that, in today's business culture, many managers have imposed fear on their subordinates as a way of increasing productivity or control.

In addition, according to Rodrigues (2017), PPE is often provided only for basic compliance with the law, with no concern on the part of the employer about the appropriate sizes,

often causing discomfort for workers. This would therefore explain the fact that 20% of those interviewed said that they always stopped using the equipment because it was uncomfortable or unsuitable.

5 CONCLUSION

With regard to the use of PPE, it was found that although there is some awareness of the importance of this equipment, there is still a need for more training, since only half of the interviewees confirmed that they had received this type of guidance from their employer. It is also important to point out that, according to the answers provided, the workers did not receive all the PPE that the legislation indicates is necessary for the activity carried out.

Among the professionals interviewed in this survey, 40% said they had received protective goggles, and an even smaller number for PFF2 masks, hoods to protect the skull and neck, clothing to protect against humidity and thermal, mechanical and chemical agents, around 10%. In addition, none of the interviewees confirmed that the company provided earplugs or face shields against intense light. However, it should be noted once again that the specific group interviewed works at night, so there is no need to use sunscreen.

This shows that, even if the interviewees commit themselves even more to using the available PPE properly, they will still be at physical risk, mainly due to the heat and excessive noise, especially as they carry out their urban collection duties outdoors and face the city's traffic on a daily basis.

In addition, some agents said they still had reasons for not using PPE. Several factors influence this lack of adherence, including the discomfort caused by the equipment and the lack of suitability of the materials provided. These obstacles represent a challenge for occupational health and safety policies, requiring the implementation of specific measures to promote the correct and effective use of PPE.

Based on the findings of this research, there is a clear need for a collaborative approach between workers, employers and regulatory bodies to foster awareness, training and adequate supervision in relation to the use of Personal Protective Equipment (PPE) and the adoption of work accident prevention practices among urban cleaning agents in Nanuque-MG. It is therefore essential to implement effective intervention measures, such as more training and awareness programs, an adequate supply of PPE, improvements in working conditions and adequate supervision, in order to ensure the safety and health of these professionals.

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