

**Working Conditions and Health of Recyclable Material Collectors During
the COVID-19 Pandemic**

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ABSTRACT

Recyclable material collectors belong to a professional category frequently exposed to various risks associated with working conditions in waste management. This study aimed to identify the working conditions and health of collectors in the municipality of Ponta Grossa-PR during the COVID-19 pandemic. The research utilized a sample composed of 83 associated collectors. Among the findings, it was identified that the majority of collectors were female (72.3%). The professional profile demonstrated that collectors engaged in this work out of necessity (34.0%) and because it was the only opportunity available (26.0%). Regarding health and occupational risks during the pandemic, it was found that although the collectors had developed protective strategies to avoid COVID-19 infection (94.0%), nearly half of the workers (47.0%) had contact with potentially infectious waste. During this period, activities were suspended only for those of advanced age (16.9%). Concerning COVID-19 cases, 98.8% of participants reported not having contracted the disease, but this result does not dismiss the fact that the collectors were exposed to contagion risks. From this diagnosis, it was possible to conclude that the COVID-19 pandemic caused various changes in the lives of the collectors, revealing the need for the development of emergency preventive actions for the health of these workers. For this reason, it is suggested that studies continue to guide the development of strategies that can be adopted in other widespread epidemic situations, similar to those experienced during the COVID-19 period.

KEYWORDS: Working conditions. Health conditions. COVID-19. Waste management.

1 INTRODUCTION

The exponential population growth, combined with unrestrained consumption habits, poses a threat to the environment and human health. As a result of this phenomenon, there is a high generation and significant concentration of waste, particularly in urban centers. The consequence of increased consumption implies a greater demand for proper disposal of products, making collection and sorting services fundamental stages in the proper management of waste.

Currently, with the rise of sustainable development, recyclable material collectors have played a fundamental role in solid waste management and the recycling industry in the country (Gouveia, 2012). The prominence of collectors is further intensified when considering the common understanding that society still does not adequately collect, segregate, or treat its waste, causing serious harm to human health and the environment. Additionally, the waste collected by these collectors constitutes a portion of the materials that reach recycling industries, with these professionals being responsible for incorporating these materials into new production cycles. It is worth noting that the administrative efficiency of this sector enables greater valorization of waste, generates employment, promotes inclusion, and facilitates the formalization of collectors in the labor market.

In the context of formalization, the role of cooperatives and associations of recyclable material collectors becomes evident, as they aim to increase productivity and promote better working conditions. This would be the ideal scenario if the system operated effectively; however, it is not uncommon to find gaps in studies related to this topic, particularly concerning the inadequate health and working conditions of collectors.

In this context, the National Solid Waste Policy (PNRS), established by Law No. 12,305 and regulated by Decree No. 10,936, stands out. It presents principles, guidelines, instruments, responsibilities, and goals for the elimination and recovery of landfills, associated with encouraging waste valorization, social inclusion, promoting logistics and selective collection, as

well as the economic empowerment of recyclable material collectors (Brasil, 2010; 2022). Additionally, the PNRS mentions the inclusion of collectors' organizations in municipal selective collection systems, in inductive measures, and financing lines that prioritize initiatives for implementing physical infrastructure and acquiring equipment for cooperatives and other forms of collectors' organizations (Brasil, 2010).

Despite the socio-environmental importance of recyclable material collectors, for a long time, they were perceived as "hidden" or invisible figures in the social landscape. Their work was primarily associated with activities in "landfills." The lack of social support and precarious working conditions render collectors vulnerable to various situations, with poor working conditions leading to severe health consequences. These workers are constantly exposed to risk factors that can lead to accidents and various types of illnesses (Moura; Dias; Junqueira, 2018; Silva, 2006).

Moura, Dias, and Junqueira (2018) emphasize that the health and work of recyclable material collectors must be regulated by safety standards, as they are frequently exposed to risk incidents in the workplace. In this context, Personal Protective Equipment (PPE) is an important protective tool to prevent workplace accidents and contamination (Silva, 2006).

With the advent of Coronavirus Disease 2019 (COVID-19), the Brazilian landscape of working conditions and health for recyclable material collectors has received increased attention in many municipalities due to the potential contamination of the waste they manage, particularly those with biological risks. This new reality altered the patterns of infectious waste generation. It is important to highlight that during this period, Household Solid Waste (HSW) could contain Health Service Waste (HSW), originating from infected patients. According to Law No. 11,445, updated by the Legal Framework for Basic Sanitation, the responsibility for the final disposal of infectious waste generated at home falls to the public urban cleaning service (Brasil, 2007; 2020a). The individuals responsible for this service are often recyclable material collectors who do not always use PPE, which exacerbates the risk of contamination and, consequently, workplace accidents.

According to the PNRS, Health Service Waste (HSW) is classified as hazardous due to its potential characteristics such as pathogenicity, toxicity, carcinogenicity, mutagenicity, among others (Brasil, 2010). According to NBR 10.004 and NBR 10.007 from the Brazilian Association of Technical Standards (ABNT), HSW can also be classified as Hazardous Waste, Class I, due to its biological risk and pathogenic characteristics (ABNT, 2004a; 2004b). According to Technical Note GVIMS/GGTES/ANVISA No. 04 from the National Health Surveillance Agency (ANVISA), HSW originating from patients with COVID-19 is categorized as Risk 3, which includes biological agents with high individual risk and moderate risk to the community (Brasil, 2020b).

In this context, according to Penteadó and Castro (2020), the risk of increased virus transmission through waste generated by infected individuals cannot be overlooked, as a sudden increase in infectious waste may exceed the capacity of municipal collection systems.

Given that the management of infectious waste generated at home is the responsibility of the public cleaning service and that collectors handle this waste, there is a risk associated not only with COVID-19 but also with other diseases that can be transmitted under precarious working conditions (Brasil, 2007; 2020a).

2 OBJECTIVE

The aim of this research was to develop a diagnosis of the working and health conditions of recyclable material collectors in the municipality of Ponta Grossa-PR during the COVID-19 pandemic.

3 METHODOLOGY

This research employed a quantitative, descriptive, and exploratory approach to diagnose the challenges faced by recyclable material collectors involved in collection and sorting activities during the COVID-19 pandemic in the municipality of Ponta Grossa, state of Paraná.

The study municipality is located in the Campos Gerais region, 115 km from the capital city, Curitiba, with a territorial area of 2,054.732 km². According to data from the Brazilian Institute of Geography and Statistics (IBGE), Ponta Grossa has a population of 311,611 inhabitants (IBGE, 2010).

According to the Municipal Secretariat of the Environment of Ponta Grossa (SMMA-PG), the associations of recyclable material collectors currently involve 110 collectors distributed among associations located in four zones of the municipality (SMMA-PG, 2021).

Data collection took place between November 2020 and September 2021. During this period, 83 collectors who worked in these associations during the COVID-19 pandemic were interviewed. The approach to recruiting collectors for participation in the study was consistent across all associations.

The instrument developed for the research was a questionnaire adapted from the studies conducted by Machado (2016) and Silva (2017). However, due to the focus on the working conditions and health of these workers during the pandemic—a recent situation in the global and Brazilian context—additional questions were included based on the guidelines of the current legislation in Brazil (Brasil, 2005; 2010; 2018; 2020b).

The construction of the instrument was carried out by a study group and underwent evaluation by six judges—doctors and specialists in areas related to urban solid waste management—to validate its face and content. The instrument consisted of 60 questions, including some technical questions with semi-structured queries and items utilizing a *Likert* scale. The technical questions aimed at analysis using statistical measures of mean, standard deviation, and percentage. The questionnaire was divided into four sections: personal data; professional profile; occupational health; and occupational risks during the COVID-19 pandemic.

Following the application of the instrument, the results were organized into spreadsheets using *Microsoft Excel*[®] and the graphical presentation was created with the same software. The data were analyzed using descriptive statistics. This analysis was conducted based on the items covered in the questionnaires, aiming for a clearer visualization of the results.

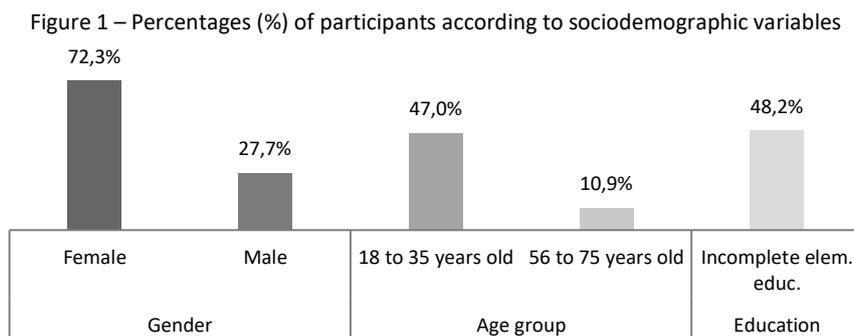
It is noteworthy that this study was approved by the Research Ethics Committee of the State University of the Center-West, under opinion no. 4,464,822, in accordance with the

ethical requirements of the current legislation for studies involving human subjects (Brasil, 2012; 2016).

4 RESULTS AND DISCUSSION

4.1 Personal Data

Regarding personal data, the aim was to identify the main sociodemographic variables in order to characterize the investigated group. For better visualization, the percentages of sociodemographic variables such as gender, age group, and education level are presented in Figure 1.



Source: Authors (2023)

The majority of the collectors in the sample were female (72.3%). Approximately 47.0% of the sample was in the age range of 18 to 35 years, with an incomplete elementary education (48.2%). The demographic profile found in the study based on variables such as gender, age, and education level is consistent with the literature reported in other studies in the field (Castilhos Junior *et al.*, 2013; Teixeira, 2015).

Although the age range of 18 to 35 years showed the highest percentage, this research revealed that at least 10.8% of the members were between 56 and 75 years old. These data are consistent with findings from studies such as Rozman *et al.* (2010) and Jesus *et al.* (2012), where difficulty in entering the job market for individuals over 40 years old is one of the reasons for this age group's involvement in waste management work.

Another aspect justifying the engagement in waste collecting work is the low education level, which was similar to the study by Moura, Szul, and Sene (2020). The proportion (48.2%) of participants with incomplete elementary education found in this study aligns with the research by Silva, Goes, and Alvarez (2013), which provided a national overview of the education level of waste collectors. In Brazil, the average percentage of workers with complete elementary education is only 24.1%.

Regarding the general average income, the same pattern observed in previous studies on waste collectors is evident (Lazzari; Reis, 2011; Castilhos Junior *et al.*, 2013). Considering the current value of the Brazilian minimum wage of R\$ 1,320.00, this research found an average salary of R\$ 936.54. Therefore, the collectors continued to receive a salary below the minimum wage, consistent with the findings of the mentioned studies.

One of the factors influencing the remuneration of waste collectors is the variation in the values assigned to each type of material. The collectors participating in this research revealed that, after the implementation of the Feira-Verde Program by the public authorities, their income improved significantly. Through this project, the population exchanges their recyclables for vegetables produced by small-scale farmers in the municipality under study (Lamp, 2012). The outcome of the program includes more selective segregation by the population, leading to the collection of recyclables with higher commercial value.

One of the most appropriate ways to change the social scenario of waste collectors is based on the guidelines of the current legislation. The National Policy on Solid Waste (PNRS) aims to encourage the recycling industry through public authorities and uses as a tool the promotion of the creation and development of cooperatives and associations of waste collectors (Brasil, 2010).

4.2 Professional Profile

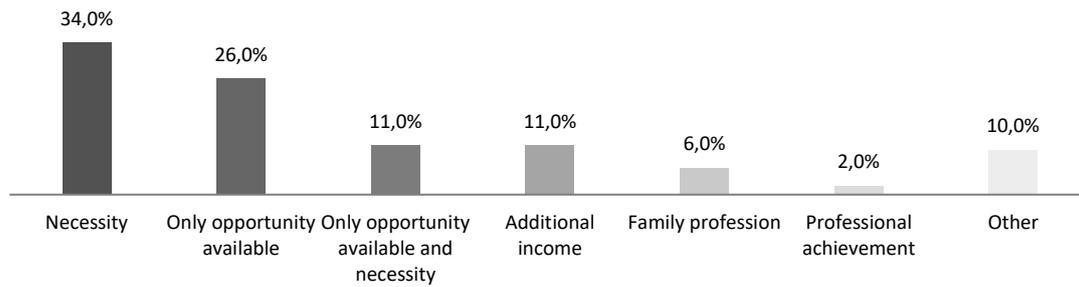
It is worth noting that the municipality of Ponta Grossa-PR has four active associations of recyclable material collectors. All participants in the research were affiliated with one of these associations, where the work arrangement was entirely based on the total profit-sharing model. Thus, the profit and any potential losses arising from this work are equally divided among the members of the association. This type of remuneration is common in collector associations, as identified in the study by Galdino, Malysz, and Martins (2015).

Regarding the vehicle used in the work, participants reported not using one. This is because the majority (97.6%) of the collectors worked exclusively within the associations, with selective collection services outsourced by the municipality. Among the participants who worked in the associations and also conducted street collection through informal work (2.4%), one participant stated that the vehicle used for work was lightweight and easy to handle, while the other mentioned it was heavy but still easy to maneuver. The vehicle used by these collectors for informal collection activities is the electric cart. In 2009, the Itaipu Technological Park (PTI), in partnership with private companies, provided prototypes of Electric Vehicles for Collectors (VEC) to cooperatives in various municipalities for the purpose of validating the project. The report on the use of the VEC in this research illustrates an example of the project developed by PTI to improve working conditions for collectors (ITAIPU... 2007); however, it is an isolated situation in the municipality studied.

According to the data collected, the average period of working with recyclable materials was 5 years, with at least 3 years working as professional members. The average number of years working in the associations identified in this research aligns with findings by Machado (2016). Regarding working hours, the average was 7 hours per day. This average working time is close to the results of other studies on associations (Machado, 2016; Teixeira, 2015).

The collectors were asked about the reasons that sparked their interest in working with recyclable materials. Among the main responses, the reasons identified were necessity (34.0%), the only opportunity available (26.0%), and additional income (11.0%) (Figure 2).

Figure 2 – Reason for choosing to work with recyclable materials by collectors



Source: Authors (2023)

The results of this study regarding the reasons collectors choose recycling activities are similar to those found in other studies. According to Galdino, Malysz, and Martins (2015), the lack of job opportunities and the need to support one's family are the main reasons that lead collectors to work with recyclable materials. Another study revealed that unemployment and lack of qualifications are the reasons for collectors engaging in this type of work (Silva, 2017).

Although the choice to work in the collection activity was not viewed positively by the collectors, it is worth noting that the interviewees reported some optimistic reasons regarding the work. Among these were family tradition and professional fulfillment. Feelings about the work and current life, relationships with colleagues, and financial return were some of the most prominent factors.

In the participants' view, working with recyclables was considered an advantageous activity (60.0%). The findings of Miura and Sawaia (2013) corroborate the results obtained in this study. Collectors believe that working with waste provides a decent living, as it meets their basic needs, which explains the positive sentiment towards the activity performed.

Regarding the treatment received from society, the sentiment was considered moderate by 43.0%, and poor or extremely poor by 28.0%. Other studies, such as those by Sidegum *et al.* (2015) and Amate, Carneiro, and Hoefel (2017), have demonstrated that the social aspects of working with waste are perceived negatively by collectors. Discrimination and social exclusion to which they are subjected are factors that justify this sentiment. Despite some negative aspects related to the scavenging activity, the collectors in this research showed no doubt about their important role in environmental care.

4.3 Occupational Health

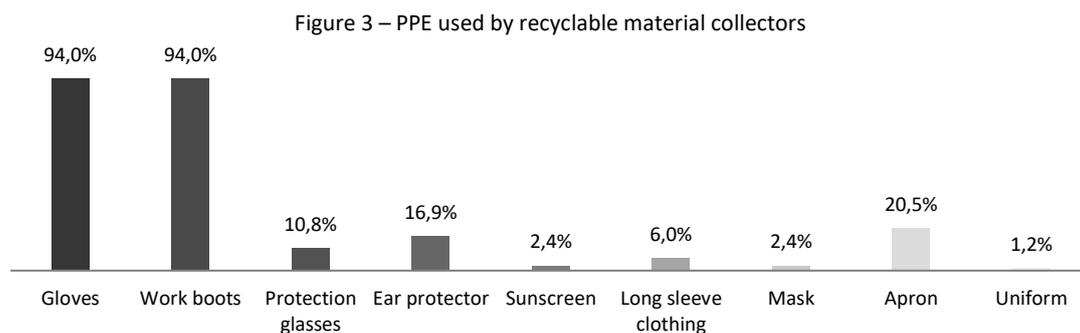
The participants revealed that they were informed or highly informed about the importance of using personal protective equipment (PPE) (88.0%), which is significant for the health of waste pickers, as the main cause of workplace accidents in this context is the lack of information (Silva, 2006). Regarding the risks of diseases associated with working with recyclables and the safety measures that can be adopted to reduce exposure, the majority of participants stated that they were informed (71.0%). These data differ from the findings of Machado (2016), who, in his research on the importance of using PPE, observed that 58.0% of

waste pickers had not received any information regarding disease risks and protective measures.

The waste pickers in this study indicated that training sessions aimed at explaining the various types of diseases associated with working with recyclables and the protective measures were conducted with moderate frequency in the associations (30.0%). This result differs from another study, also conducted in the state of Paraná, where 82.0% of respondents reported that no meetings were held for this purpose, and when they were conducted, they only addressed internal matters of the association (Machado, 2016). Thus, this result may reflect a characteristic specific to the municipality under study.

Regarding their working position, 44.6% of the waste pickers reported spending most of their time standing. Equivalent results were found in the study conducted by Silva (2006). Concerning the use of personal protective equipment (PPE), a minority reported never using it (1.2%), citing discomfort as the reason, a finding also identified in the study by Barboza *et al.* (2015), where waste pickers stated that they did not use PPE because it was ineffective, too tight, or considered uncomfortable.

Another reason for not using PPE identified in this research relates to the variety of activities carried out in the associations that participated in the study, such as kitchen services, which led to the perception that PPE was not necessary. It was found that frequent use of PPE is common among waste pickers, as demonstrated in the study by Castilhos Junior *et al.* (2013). This study identified the most commonly used equipment, which included gloves, work boots, and aprons (Figure 3).



Source: Authors (2023).

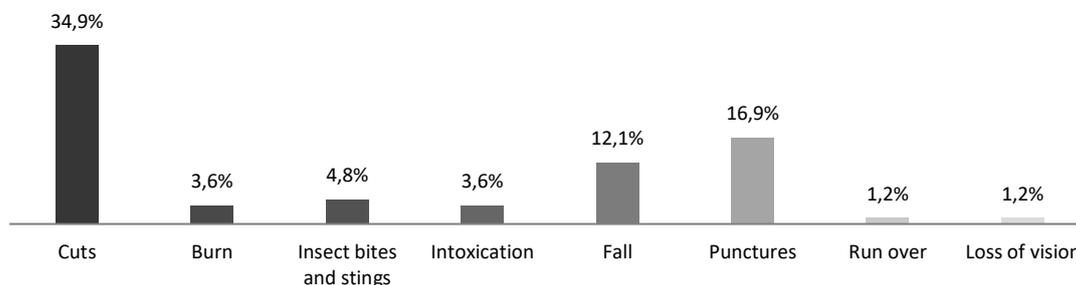
The majority of waste pickers reported that the PPE was in good condition (55.4%) or in excellent condition (20.5%). In 82.7% of cases, the association itself was responsible for providing the equipment. Additionally, they indicated that there was oversight regarding the use of this PPE (87.9%), with this control often (48.2%) being carried out by the association's manager.

The majority of waste pickers reported that they were not trained to perform the activities in the association upon being hired (51.8%). These findings are consistent with the study by Machado (2016). However, a significant number of respondents (48.2%) indicated that training did occur, with the training being provided by their own colleagues.

Among the participants, 38.5% reported having experienced some type of workplace accident, but indicated that there was a procedure in place at the association for such

incidents (59.0%). The data collected from the study reveal the types of accidents suffered by the waste pickers, with cuts (34.9%) and punctures (16.9%) being the most frequently mentioned (Figure 4).

Figure 4 – Work accidents suffered by recyclable material collectors



Source: Authors (2023).

The categories of accidents reported in this study align with those frequently identified in the studies by Machado (2016) and Castilhos Junior *et al.* (2013). The lack of information among waste pickers results in the ineffective use of PPE. Barboza *et al.* (2015) emphasize that to increase adherence to the use of equipment, it is crucial not only to enhance workers' awareness but also to provide PPE that is appropriately sized and of good quality.

4.4 Occupational Risks During the COVID-19 Pandemic

Although the onset of the COVID-19 pandemic introduced the possibility of alternative work modalities, such as remote work and hybrid models, many workers had to continue with exclusively in-person activities in situations where virtual models were not feasible. This was the case for waste collection and sorting activities, where, in many municipalities, waste pickers continued to work on-site throughout the pandemic. The results related to suspension, hours, income, and motivations for work during the COVID-19 pandemic are presented in Table 1.

Table 1 - Results regarding suspension, hours, income and motivation to work during the pandemic

Categories	Variables	Frequency	Percentage
There was a suspension of work at the association	Yes	14	16,9%
	No	69	83,1%
Continuity of work	Yes	72	86,7%
	No	11	13,2%
Days away	Up to 15 days	6	7,2%
	More than 15 days	5	6,0%
Motivation to continue with the work	Necessity	58	69,9%
	Income supplementation	10	12,0%
	So as not to stay at home	1	1,2%
	There was no influence	1	1,2%
	There was no routine change	1	1,2%
	temporarily laid off	11	13,2%
	He/she didn't know how to answer	1	1,2%
Received any monthly government assistance during the pandemic	Yes	64	77,1%
	No	19	22,9%
Categories		Average	Standard Deviation
Months of receiving government aid		4,8	1,0
Daily working hours during the pandemic		7,9	1,0
Income		R\$ 1.198,15	R\$ 384,91

Source: Authors (2023).

Regarding the question about the suspension of work at the association, 16.9% of participants reported that a halt in activities occurred. However, the suspension was limited to older individuals (16.9%), who needed to be away for 15 days (7.2%). Consequently, it was found that the majority of waste pickers continued their work normally in the study municipality (86.7%), despite many Brazilian cities having suspended recycling programs as a measure to prevent the transmission of COVID-19 (Urban; Nakada, 2021).

Regarding the motivation to continue working during the pandemic, 69.9% of participants reported continuing their activities out of necessity, while 12.0% did so to supplement their income. Both necessity and income supplementation remain key motivators for working with recyclables, both before and during the pandemic. However, prior to the pandemic, the motivation of "necessity" accounted for only 34.0%. This increase suggests that, before the COVID-19 pandemic, other motivations existed for working with recyclables, but now necessity has become a primary motivation. This comparison also underscores that, despite the fear of COVID-19 infection, the need for work prevails.

The waste pickers in this study worked an average of 8 hours per day during the pandemic, indicating an increase in daily working hours compared to the pre-pandemic period, when they reported working an average of 7 hours per day. This increase may be attributed to the rise in waste production during the pandemic (Silva Filho, 2022).

According to this research, the average income of waste pickers increased by 21.8% compared to the previous period. This may be attributed to two factors: the increase in waste generation, which could have improved the recyclable market, and the emergency aid provided by the federal government, which was added to their fixed income (Brasil, 2020c). Among the waste pickers interviewed, 77.1% received some form of aid for a period of 5 months up to the date of data collection for the study.

The research participants answered questions regarding the use of personal protective equipment (PPE) during the pandemic, and the results were compiled and presented in Table 2.

Table 2 - Results Related to the Use of Personal Protective Equipment (PPE) During the COVID-19 Pandemic

Categories	Variables	Frequency	Percentage
Different types of Personal Protective Equipment (PPE) were provided	Yes	65	78,3%
	No	17	20,5%
	No answer	1	1,2%
Responsible for providing Personal Protective Equipment (PPE)	Municipal Government	19	22,9%
	Purchased with its own funds	25	30,1%
	The association	41	49,4%
Was there any specific training during this period	Donations	9	10,8%
	Yes	31	37,3%
	No	52	62,6%
Responsible for conducting the training	Municipal Government	12	14,5%
	Person in charge of the association	18	21,7%
	No answer	1	1,2%

Source: Authors (2023).

Participants reported that they were provided with different PPE than usual, with masks being the most commonly cited equipment in the survey (78.3%). Among the interviewed waste pickers, 49.4% said that the equipment was supplied by the association itself, 30.1% purchased their own equipment, 22.9% received PPE from the Ponta Grossa municipal government, and only 1.2% reported not using PPE because it was not provided. These results are consistent with data from the study by Dias *et al.* (2020), which identified that among the practices adopted for COVID-19 prevention, the use of PPE was the most frequently cited.

Regarding training during the pandemic, 62.6% reported that no training sessions were conducted. Among the participants who indicated receiving some form of training (37.3%), 21.7% stated that the training was conducted by the head of the association. Overall, no specific protocol was identified to guide the sector on COVID-19 prevention. Instead, associations developed their own contagion prevention strategies (Dias *et al.*, 2020).

During the pandemic, 47.0% of participants reported having had contact with potentially infectious material. However, despite this contact, they indicated that there were no guidelines provided by the association regarding precautions in case of contact with infectious waste (61.4%).

These results illustrate a concerning scenario that jeopardizes the health of waste pickers. Masks, some RSS (healthcare waste), and RDO (household waste) generated by COVID-19 patients at home fall under potentially infectious materials and were often directed to selective collection. The presence of infectious waste in selective collection is supported by several studies that reported an increase in the use of facial masks and RSS due to COVID-19, leading to a higher number of improper disposal of this waste in the environment (Nzediegwu; Chang, 2020; Asim; Badiei; Sopian, 2021; Amuah *et al.*, 2022). Evidence of this type of waste in selective collection was also identified by Rocha *et al.* (2021).

Regarding the safety procedures adopted, 94.0% of research participants reported that some safety strategies were implemented, with the most cited being: the use of masks (95.2%), frequent handwashing with water and soap (89.2%), use of 70% alcohol (85.5%), and social distancing (63.9%). These results are similar to those of another study, which found that waste pickers adhered to all these safety procedures and rapidly adapted to the developed protocols (Dias *et al.*, 2020).

Although 47.0% of the participants reported contact with infectious waste, the waste pickers stated that they had not suffered any work-related accidents during the pandemic (98.8%). The only participant who claimed to have suffered an accident did not want to specify the type. This is because, in most cases, waste pickers are unable to identify occupational risks (Medeiros; Macedo, 2006).

An intriguing result of this study was that 98.8% of the participants reported not having contracted the disease, and the respondent who did contract COVID-19 was not yet working with waste at the time of infection. This could have occurred for several reasons: not all suspected cases had access to tests for confirmation of the disease, or not all suspected cases sought the Unified Health System (SUS) for detection. This result is similar to the findings of Dias *et al.* (2020). Additionally, there may have been fear among the respondents of reporting the infection due to concerns about losing their jobs. Another possibility is that at the time of data collection, the peaks of COVID-19 contagion had not yet reached high levels.

The waste pickers were also asked about the changes observed in the receipt of waste, with 68.7% identifying that there were changes in this regard. The most cited response was that the amount of waste received increased, while separation at the source remained the same (37.3%). The result of this study, concerning the increase in the volume of waste generated during the COVID-19 pandemic, is similar to the findings reported by the Brazilian Association of Public Cleaning and Special Waste Companies (ABRELPE), which identified an increase in waste production in Brazil during this period (Silva Filho, 2022).

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Regarding the measures taken to minimize the spread of COVID-19, participants were asked if there were any changes to reinforce hygiene practices. A total of 53.0% reported that hygiene reinforcements in the association were frequent.

The participants in this study were asked about the frequency of contact with materials labeled as "hazardous waste" in their work routine during the COVID-19 pandemic. They stated that this circumstance did not apply to them, as the majority reported never having seen such identification on plastic bags from the general public (83.1%). However, in the same study, participants confirmed having come into contact with potentially infectious waste. Despite the numerous guidelines and recommendations issued by health and environmental institutions regarding the proper handling of hazardous waste during this

period, it appears that these instructions did not have the intended effect on waste management by the population.

When asked about feelings that may have affected their mental health during the pandemic, 19.3% revealed experiencing these feelings frequently, and 37.3% reported moderate frequency. Yang *et al.* (2020), Wang *et al.* (2020), and Duan and Zhu (2020) studied the negative effects of the COVID-19 pandemic on adolescents and the elderly, revealing psychological issues in these studies. In unsanitary environments with poor hygiene conditions, such as some sorting centers, this state of negative feelings caused by fear of contamination tends to increase.

During the pandemic, 48.2% of the participants considered their feelings about work to be positive. This perception among the waste pickers may have occurred because there were no significant changes in their work routine. Another reason for this positive sentiment could be that a large portion of the participants reported being informed about the contamination risks associated with their work during this period (49.4%).

Regarding awareness of the importance of continuing their work during the pandemic, 57.8% of the participants stated they were aware, and 38.5% reported being extremely aware. None of the waste pickers indicated being "not at all aware" of the importance of their work during this period.

In this context, participants were asked whether they believed that, now at the end of the COVID-19 pandemic, people would place greater importance on the work of waste pickers. Of the participants, 36.1% agreed, and 19.3% fully agreed. This result suggests that waste pickers are aware of the significant social role they play and believe that this public health crisis represents an opportunity for society to become more aware and recognize their role more fully, given that waste pickers were on the front line of maintaining urban cleanliness in a hostile environment.

5 CONCLUSION

The sociodemographic profile investigated revealed a prevalence of women among the waste pickers who participated in the study. Regarding income, it was identified that the waste pickers were earning a salary below the current minimum wage. The education level variable was found to be similar to what is reported in the literature, thus confirming the common understanding that many individuals enter this activity in search of resources necessary for their survival.

Regarding the professional profile, a significant issue observed that negatively affected the waste pickers was the treatment they received from society, with "exclusion" and "discrimination" being the most frequently mentioned terms to describe their negative feelings. In this sense, it is evident that psychosocial issues should be a subject of study, highlighting the need to address scenarios that cause suffering to waste pickers.

The waste pickers' perceptions of occupational health varied depending on the dimension analyzed. This indicates that their perceptions of occupational health are not yet well understood in accordance with regulatory requirements and, therefore, remain subject to the recurring risks of their work environment.

Regarding occupational risks during the COVID-19 pandemic, diverse results were observed. Despite the instability and economic crisis resulting from the pandemic, the participants in this research reported a certain level of satisfaction with their income. As for the motivations to continue working during the pandemic, necessity outweighed the fear of infection.

The waste pickers demonstrated awareness of the risks faced during the pandemic and, consequently, developed their strategies to contain the spread of the virus. These results allowed for a diagnosis of the working conditions and health of waste pickers in the municipality of Ponta Grossa-PR during the COVID-19 pandemic. During this period, inadequately managed waste became an obstacle for the management of Brazilian cities. In this context, the work of waste pickers proved to be even more crucial, underscoring the importance of recognizing their professional role and ensuring their civil rights. Furthermore, it is necessary for this issue to be on the administrative agendas of municipalities, so that new actions can be developed to promote an integrated and sustainable waste management system, with active involvement of waste pickers in the process, in order to achieve urban environmental management based on the principles of sustainable development goals.

REFERENCES

- ABNT – Associação Brasileira de Normas Técnicas. **NBR 10.004**: Resíduos Sólidos – Classificação. Rio de Janeiro: 2004a. 71 p.
- ABNT – Associação Brasileira de Normas Técnicas. **NBR 10.007**: Amostragem de resíduos sólidos. Rio de Janeiro: 2004b. 25 p.
- AMATE, E. M.; CARNEIRO, F. F.; HOEFEL, M. G. L. Percepção dos catadores sobre serviço de saúde (RS) no lixão da estrutural. *Revista Eletrônica Gestão & Saúde*, v. 8, n. 1, p. 37-55, 2017.
- AMUAH, E. E. Y. *et al.* Are used face masks handled as infectious waste? Novel pollution driven by the COVID-19 pandemic. *Resources, Conservation & Recycling Advances*, v. 13, 2022.
- ASIM, N.; BADIEI, M.; SOPIAN, K. Review of the valorization options for the proper disposal of face masks during the COVID-19 pandemic. *Environmental Technology & Innovation*, v. 23, 2021.
- BARBOZA, M. C. N. *et al.* Manipuladores de lixo reciclável em Pelotas/RS: utilização de equipamentos de proteção individual e riscos ocupacionais. *Revista Eletrônica & Saúde*, v. 3, n. 3, p. 2553-65, 2015.
- BRASIL. Conselho Nacional do Meio Ambiente. Resolução nº 358. Dispõe sobre o tratamento e a disposição final dos resíduos de saúde e dá outras providências. *Diário Oficial da União*. Brasília, DF, 04 mai. 2005.
- BRASIL. Lei nº 11.445, de 05 de janeiro de 2007. Estabelece diretrizes nacionais para o saneamento básico. *Diário Oficial da União*. Brasília, DF, 08 jan. 2007.
- BRASIL. Política Nacional dos Resíduos Sólidos. Lei nº 12.305, de 02 de agosto de 2010. Institui a Política Nacional de Resíduos Sólidos. *Diário Oficial da União*. Brasília, DF, 03 ago. 2010.
- BRASIL. Conselho Nacional de Saúde. Resolução nº 466, de 12 de dezembro de 2012. Diretrizes e normas regulamentadoras sobre pesquisa envolvendo seres humanos. *Diário Oficial da União*. Brasília, DF, 12 dez. 2012.
- BRASIL. Conselho Nacional de Saúde. Resolução nº 510, de 7 de abril de 2016. *Diário Oficial da União*. Brasília, DF, 24 mai. 2016.
- BRASIL. Agência Nacional de Vigilância Sanitária. Resolução RDC nº 222, de 28 de março de 2018. Regulamenta as Boas Práticas de Gerenciamento dos Resíduos de Serviços de Saúde e dá outras providências. *Diário Oficial da União*. Brasília, DF. 2018.

BRASIL. Lei nº 14.026 de 15 de julho de 2020. Atualiza o marco legal do saneamento básico. **Diário Oficial da União**. Brasília, DF. 2020a.

BRASIL. Agência Nacional de Vigilância Sanitária. Nota Técnica GVIMS/GGTES/ANVISA nº 04, de 31 de março de 2020. **Orientações para serviços de saúde**: medidas de prevenção e controle que devem ser adotadas durante a assistência aos casos suspeitos ou confirmados de infecção pelo novo coronavírus (SARS-CoV-2). Disponível em: <http://portal.anvisa.gov.br/documents/33852/271858/Nota+T%C3%A9cnica+n+04-2020+GVIMS-GGTES-ANVISA/ab598660-3de4-4f14-8e6f-b9341c196b28>. Acesso em: 29 abr. 2020b.

BRASIL. Lei nº 13.982, de 2 de abril de 2020. Dispõe sobre parâmetros adicionais de caracterização da situação de vulnerabilidade social para fins de elegibilidade ao benefício [...]. **Diário Oficial da União**. Brasília, DF, 2 abr. 2020c

BRASIL. Decreto nº 10.936, de 12 de janeiro de 2022. Regulamenta a Lei nº 12.305, que institui a Política Nacional de Resíduos Sólidos. **Diário Oficial da União**. Brasília, DF, 12 jan. 2022.

CASTILHOS, JUNIOR. A. B. *et al.* Catadores de materiais recicláveis: análise das condições de trabalho e infraestrutura operacional no Sul, Sudeste e Nordeste do Brasil. **Ciência & Saúde Coletiva**, v. 18, 2013.

DIAS, S. *et al.* **Impactos da pandemia de COVID-19 sobre Reciclagem Inclusiva no Brasil**, 2020. Disponível em: <https://www.wiego.org/sites/default/files/publications/file/Impacts%20of%20the%20COVID19%20Pandemic%20on%20Inclusive%20Recycling%20in%20Brazil%20Portuguese%20for%20web.pdf/>. Acesso em: 22 abr. 2022.

DUAN, L.; ZHU, G. Psychological interventions for people affected by the COVID-19 epidemic. **Lancet Psychiatry**, v. 7, p. 300-302, 2020.

GALDINO, S. J.; MALYSZ, S. T.; MARTINS, C. H. As condições de trabalho dos catadores de materiais recicláveis em associações de Mamborê- PR. **Revista Percurso**, v. 7, p. 165-183, 2015.

GOMES, P. C. R. *et al.* **Medidas de controle dos riscos para retomada do serviço de triagem de materiais recicláveis por catadores em tempos de covid-19**. São Paulo: 2020. 7 p. Disponível em: <https://limpezapublica.com.br/medidas-de-controle-dos-riscos-para-retomadado-servico-de-triagem-de-materiais-reciclaveis-por-catadores-em-tempos-de-covid-19/>. Acesso em: 23 jul. 2022.

GOUVEIA, N. Resíduos sólidos urbanos: impactos socioambientais e perspectiva de manejo sustentável com inclusão social. **Ciência e Saúde Coletiva**, v. 17, n. 6, p. 1503-1510, 2012.

IBGE – Instituto Brasileiro de Geografia e Estatística. **Censo Brasileiro de 2010**, Rio de Janeiro: IBGE, 2010.

ITAIPÚ apresenta veículo elétrico para catadores. **Itaipú Binacional**, 2007. Disponível em: <https://www.itaipu.gov.br/sala-de-imprensa/noticia/itaipu-apresenta-veiculo-eletrico-paracatadores/>. Acesso em: 21 de jul. de 2022.

JESUS, M. C. P. *et al.* Avaliação da qualidade de vida de catadores de materiais recicláveis. **Revista Eletrônica de Enfermagem**, v. 14, n. 2, p. 277- 285, 2012.

KAMPF, A. G. *et al.* Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. **Journal of Hospital Infection**, v. 104, p. 246- 251, 2020.

LAMP, L. **Qualidade de vida dos catadores de reciclado das associações da prefeitura municipal de Ponta Grossa-PR**. 2012. 41 f. Trabalho de monografia (Especialização em gestão industrial: conhecimento e inovação) Universidade Tecnológica Federal do Paraná, Ponta Grossa, 2012.

LAZZARI, M.; REIS, C. B. Os coletores de lixo no município de Dourados (MS) e sua percepção sobre os riscos biológicos em processo de trabalho. **Ciência & Saúde Coletiva**, v. 6, n. 8, p. 3437-3442, 2011.

MACHADO, D. M. R. **A importância dos equipamentos de proteção individual para catadores de materiais recicláveis em uma associação de catadores no estado do Paraná**. 2016. 73 f. Trabalho de Conclusão de Curso (Especialização Engenharia de Segurança do Trabalho) - Universidade Tecnológica Federal do Paraná, Curitiba, 2016.

MEDEIROS, L. F. R.; MACEDO, K. B. Catador de material reciclável: uma profissão para além da sobrevivência? **Psicologia & Sociedade**, v.18, n.2, p. 62-71, 2006.

MIURA, P. U.; SAWAIA, B. B. Tornar-se catador: sofrimento ético político e potência de ação. **Psicologia & Sociedade**, v. 25, p. 331-341, 2013.

MOURA, L. R.; DIAS, S. L. F. G.; JUNQUEIRA, L. A. P. Um olhar sobre a saúde do catador de material reciclável: uma proposta de quadro analítico. **Ambiente & Sociedade**, v. 21, p. 1-20, 2018.

- MOURA, R. R.; SZUL, K. D.; SENE, T. S. O catador de materiais recicláveis no município de Ponta Grossa, Paraná: perspectivas e necessidade de intervenção numa sociedade desigual. **Revista Desenvol. Social**, v. 26, n. 2, 2020.
- NZEDIEGWU, C.; CHANG, S. X. Improper solid waste management increases potential for COVID-19 spread in developing countries. **Resources, Conservation & Recycling**, v. 161, p. 1-2, 2020.
- PENTEADO, C. S. G.; CASTRO, M. A. S.; Covid-19 effects on municipal solid waste management: What can effectively be done in the Brazilian scenario? **Resources, Conservation & Recycling**, v. 164, 1- 9, 2020.
- ROCHA, I. C. S. *et al.* Covid-19 e os catadores de materiais recicláveis: riscos, medos e angústias de uma profissão esquecida. **Revista Eletrônica de Extensão**, v. 18, n. 40, p. 17-35, 2021.
- ROZMAN, M. A. *et al.* Anemia in recyclable waste pickers using human driven pushcarts in the city of Santos, southeastern. **Brazil. Rev Braz Epidemiol**, v.13, p. 326-336, 2010.
- SIDEGUM, J. *et al.* The perception of scavengers on the centrality and significance of his work: A study in southern Brazil. **Espacios**, v. 36, n. 21, p. 4, 2015.
- SILVA, M. C. **Trabalho e Saúde dos catadores de materiais recicláveis em uma cidade do sul do Brasil**. 2006. Tese (Doutorado em Epidemiologia) - Faculdade de Medicina da Universidade Federal de Pelotas, Pelotas, 2006.
- SILVA, S. P.; GOES, F. L.; ALVAREZ, A. R. **Situação social das catadoras e dos catadores de material reciclável e reutilizável** – Brasil. Brasília: Ipea, 2013.
- SILVA, T. M. **Desafios e oportunidades dos catadores de materiais recicláveis na Amazônia: um olhar com base na ferramenta UCINET em Guajará-Mirim/Rondônia**. 2017. 87 f. Trabalho de Conclusão de Curso (Bacharelado em Gestão Ambiental) - Fundação Universidade Federal de Rondônia, Guajará-Mirim, 2017.
- SILVA FILHO, C. Brasil aumenta produção de lixo durante a pandemia. **Abrelpe notícias**, 2022. Disponível em: <https://abrelpe.org.br/noticias/>. Acesso em: 22 jul. 2022.
- SMMA-PG – Secretaria Municipal de Meio Ambiente. **Reciclagem - O que separar**. Ponta Grossa, 2021.
- TEIXEIRA, K. M. D. Trabalho e perspectivas na percepção dos catadores de materiais recicláveis. **Psicologia & Sociedade**, v. 27, n. 1, p. 98-105, 2015.
- URBAN, R. C.; NAKADA, L. Y. K. COVID-19 pandemic: Solid waste and environmental impacts in Brazil. **Science of the Total Environment**, v. 775, 2021.
- WANG, C. *et al.* Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. **International Journal of Environmental Research and Public Health**, v. 15, 2020.
- YANG, Y. *et al.* Mental health services for older adults in China during the COVID-19 outbreak. **The Lancet Discovery Science**, v. 7, 2020.