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Case study of solid waste and the perception of urban inhabitants and waste pickers in the town of Mundo Novo - Mato Grosso do Sul

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Abstract

Introduction: The generation of solid waste has been shown to be a serious environmental and social problem.

Objective: Conduct a case study of solid waste and the perception of urban inhabitants and waste pickers in the town of Mundo Novo - MS.

Methodology: Case study, through questionnaires.

Originality/Relevance: Contributes to discussions and debates about the increase in urbanization versus solid waste, bringing the perception of inhabitants and waste pickers in relation to them, making it possible to outline strategies to improve sustainability.

Main results: Many residents have the concept that garbage is useless and give little importance to the correct separation of it. Pickers' income is low and most of the collected waste is stored uncovered in their own yard. Many pickers use the human-powered cart to collect and transport materials.

Contributions: Through the discussion, associated with empirical research, the main contributions are added to the environmental, social and economic perception of inhabitants and collectors regarding solid waste.

Conclusion: Although the data are of a regional character, in research from other states the same problem of socio-environmental perception with the population is clear, such as the perception of economic development and environmental conservation of waste pickers in relation to recyclable materials.

Keywords: Selective collection. Sustainability. Solid waste. Recycling. Garbage.

Estudo de caso dos resíduos sólidos e a percepção dos habitantes urbanos e catadores na cidade de Mundo Novo – Mato Grosso do Sul

Resumo

Introdução: A geração de resíduos sólidos tem se mostrado como um grave problema ambiental e social.

Objetivo: Realizar um estudo de caso dos resíduos sólidos e a percepção dos habitantes urbanos e catadores na cidade de Mundo Novo - MS.

Metodologia: Estudo de caso, através da realização de questionários.

Originalidade/Relevância: Contribui para discussões e debates sobre o aumento da urbanização versus resíduos sólidos, trazendo a percepção dos habitantes e catadores em relação a estes, sendo possível traçar estratégias para melhorar a sustentabilidade.

Principais resultados: Muitos moradores têm a concepção que lixo é algo sem serventia e dão pouca importância para a separação de forma correta do lixo. A renda dos catadores é baixa, grande parte dos resíduos coletados ficam armazenados descobertos no fundo do quintal. Muitos coletores utilizam o carrinho de tração humana para a coleta e transporte dos materiais.

Contribuições: Através da discussão, associada à pesquisa empírica, as principais contribuições estão agregadas à percepção ambiental, social e econômica dos habitantes e catadores quanto aos resíduos sólidos.

Conclusão: Apesar dos dados serem de caráter regional, em pesquisas de outros estados é nítido o mesmo problema de percepção sócio-ambiental com a população, como a percepção do desenvolvimento econômico e conservação ambiental dos catadores em relação aos materiais recicláveis.

Palavras-Chave: Coleta seletiva. Sustentabilidade. Resíduos sólidos. Reciclagem. Lixo.

Estudio de caso de residuos sólidos y percepción de habitantes urbanos y recicladores de la ciudad de Mundo Novo - Mato Grosso do Sul

Resumen

Introducción: Se ha demostrado que la generación de residuos sólidos es un grave problema ambiental y social.

Objetivo: Realizar un estudio de caso de residuos sólidos y la percepción de habitantes urbanos y recicladores de la ciudad de Mundo Novo - MS.

Metodología: Estudio de caso, mediante cuestionarios.

Originalidad/Relevancia: Contribuye a las discusiones y debates sobre el incremento de la urbanización versus los residuos sólidos, acercando la percepción de los habitantes y recicladores en relación a ellos, posibilitando delinear estrategias para mejorar la sostenibilidad.

Principales resultados: Muchos habitantes tienen el concepto de que la basura es inútil y le dan poca importancia a la correcta separación. Los ingresos de los recolectores son bajos, la mayoría de los desechos recolectados se almacenan descubiertos en el fondo del patio. Muchos recolectores usan el carro impulsado por humanos para recolectar y transportar materiales.

Aportes: A través de la discusión, asociada a la investigación empírica, se suman los principales aportes a la percepción ambiental, social y económica de los habitantes y recolectores sobre los residuos sólidos.

Conclusión: Si bien los datos son de carácter regional, en investigaciones de otros estados se

evidencia el mismo problema de percepción socioambiental con la población, como es la percepción de desarrollo económico y conservación ambiental de los recicladores en relación a los materiales reciclables.

Palabras clave: Colección selectiva. Sustentabilidad. Residuos sólidos. Reciclaje. Basura.

1 Introduction

The generation of solid waste has been shown to be a serious environmental and social problem, as the amount of solid waste has been increasing daily.

Because of the urbanization process, the urban environment has become the most polluted due to the production of large quantities of solid waste and, as a result, it caused several environmental impacts of a physical, chemical and biological character (Mucelin and Bellini, 2008).

In rich countries that generate greater amounts of waste, there is a capacity for equating management, due to factors that include economic resources, population's environmental concern and technological development (Jacobi and Bessen, 2011). However, in many places without planning and without adequate infrastructure, as occurs mainly in poor countries, the residues are still discarded on the open ground (although prohibited), without environmental protection and human health measures (Siqueira and Moraes, 2009).

Thus, solid waste generated in Brazilian cities and in locations in different countries is still a problem.

In this context, there are people who earn their income through selective collection and sale of recyclable discarded materials. These collectors, also called cardboard or tin pickers, are under unacceptable human conditions from a social, technical and sanitary point of view (Dionysio and Dionysio, 2013).

The selective collection of solid urban waste is of paramount importance for the recycling process, and consists of the separation of waste in organic matter, papers, glass, plastics, cardboard, among others (Remedio, Marcini and Zanin, 2002).

With recycling, a large part of the waste can be reused and what cannot be reused must be disposed of in an appropriate place, so as not to pollute and contaminate the environment. Recycling allows reducing the accumulation of waste in urban areas and the use of natural resources (Dionysio and Dionysio, 2013).

Despite the importance of the pickers' work, they are still treated with prejudice. Also, they do not have an adequate environment for the separation and storage of materials, are exposed to physical, chemical and biological risks due to the lack of personal protective equipment (PPE); they lack information about management strategies and organization of their workspace and do not have equipment for processing and adding value to the materials (Lutinski and Souza, 2009).

Organic matter can be reused if treated correctly (Remedio, Mancini and Zanin, 2002). This practice of reusing organic waste is significant because, in addition to minimizing pollution, it helps in the formation of a compound that is used in the production of food with excellent quality and in the production of clean and sustainable energy (Santos *et al*., 2017).

Sustainable development must encompass economic, environmental, human, social and cultural elements. Economic development being an indicator that serves to measure the overcoming of poverty, while the human axis must take into account the quality of life. Regarding to the environmental, for sustainable development it is necessary to evaluate issues involving environmental conservation, global environmentalism, among other attributes, differing from the cultural axis, which has the action of changing the modes of behavior towards consumerism (Oliveira, 2002). Therefore, recycling practices play a major role in sustainable development, considering that it encompasses three of the proposed axes (economic, environmental and social). To achieve sustainable development, these axes need to be in line.

According to the United Nations (UN), in 2015, countries adopted the 2030 sustainable development agenda to reach a new global agreement on climate change. Among the governments, civil society and partners, 17 objectives and 169 goals were established, taking into account the themes: people, peace, prosperity, planet and partnership.

The impacts caused by solid waste was one of the central themes of Rio +20, and has caused a lot of reflection, being important to carry out research in this area (Gouveia, 2012).

In this context, studies involving the population and recyclable material pickers must be taken into account, since we must take in relation to the social and economic aspect of the pickers, and the point of view of the population, especially regarding to the environmental and social axis.

This work tested the hypothesis that the population has been exempt from its role in the integrated management of solid waste and the pickers present a fragile quality of life, based on their economic and social development.

Thus, this work aimed to carry out a case study on the perception of urban residents regarding solid waste and the social and economic aspects of waste pickers in the town of Mundo Novo/MS.

2 Material and methods

2.1 Study area

The study was carried out in the municipality of Mundo Novo, located in southern Mato Grosso do Sul (23º56'17 " South and 54º16'15 " West) (Figure 1), with a total area of 477,780 km2 and 17,043 inhabitants, with 89.6% of the urban population and only 10.4% with representatives of the rural area (IBGE, 2010).

Figure 1 – Mundo Novo, Mato Grosso do Sul

Source: Google Earth.

2.2 Methodology

Based on the case study methodology, two questionnaires were prepared: one for residents and the other for pickers.

The questionnaire for residents presented eight essay and objective questions, evaluating, above all, the final disposition that respondents submit their waste, concepts and responsibilities on the topic in question, satisfaction with the public service of collection and destination of solid urban waste and the work of recyclable material pickers. It was applied to twenty people, between the months of March and May 2011, with sampling being randomized with residents in different neighborhoods: 03 in São Jorge, 02 in Fleck, 02 Downtown, 02 in Berneck, 02 in Vila Militar, 02 in Copagril, 03 in Tapajós, 02 in Itaipu e 02 in Vila Nova.

The questionnaire to characterize the profile of recyclable material pickers had 25

essay and objective questions. In a small selective collection industry, in which each one had their own collection cart, ten workers were randomly chosen to answer the questionnaire between April and May 2011.

To analyze the results, the data were entered into a Microsoft Excel spreadsheet and, subsequently, graphs were made for better understanding of the data.

3 Results and discussion

3.1 Of the questionnaires applied to residents

As the question about what garbage is was a discursive one, 70% of the respondents answered that garbage is everything that cannot really be reused, that is, unusable. Moreover, 30% answered that it is something that can be reused or recycled. Through the answers, we can see that a large amount associates garbage as something useless, while a small fraction has the perception of recycling.

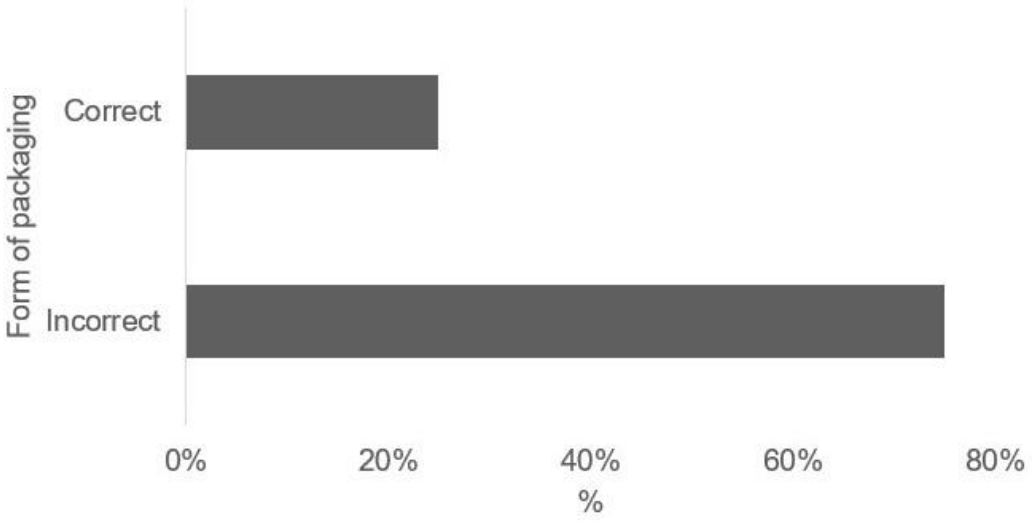
The study corroborates the research carried out on the perception of the residents of São Sebastião de Lagoa da Roça, in Paraíba. The authors Querino and Pereira (2016) reported that the majority of residents (49%) answered that garbage was useless, making it clear that the residents have no idea of recycling or reuse.

This perception of garbage by the population demonstrates the lack of environmental awareness and education, requiring programs that will provide actions by the population in the integrated management of solid waste.

Garbage was described as useless according to the population. With selective collection, what was unusable, in case of separation, can be transformed and reused (Vellozo, Valadares and Santos, 1998). However, most human beings have the understanding that “garbage” is something that can bring disease, something dirty, or come with thoughts of disorganization and neglect (Souza and France, 2014).

The packaging of solid waste by 75% of the inhabitants questioned is wrong from an ecological and economic point of view; only 25% correctly stores it, separating the materials and facilitating the work of recyclable materials pickers (Figure 2). This question is still in line with the previous one, regarding responsibilities, in which it is the population's responsibility to provide conditions for their waste so that, later on, they can have an appropriate destination. With the national solid waste policy, recycling is a process that is successful if all agents of a society are participating. According to Leme (2009), several studies show that socio-demographic and cultural factors can influence the behavior towards the separation of recyclable materials, as well as the direct incentive for popular participation.

Figure 2 – Correct and Incorrect waste packaging.



Source: The authors.

From the question of the collection of solid waste, we found that the garbage truck collects all the people questioned. The frequency is between once and three times a week, depending on the neighborhood. This highlights that many do not have a defined schedule, demonstrating that they are not concerned with this service provided by the public agency. It would be important for the garbage truck to pass with the same frequency in all neighborhoods.

This situation is worrying, because when the truck does not collect all the waste, the volume increases and, consequently, generates a bad smell and the presence of pests, such as rodents and flies.

Almeida Jr *et al*. (2015), in their research in Santa Maria (RS), observed that, for the selective collection process to be carried out, it is necessary the participation of the population. Citizens call the green line at the environmental sector of the city hall, register and choose the appropriate day and time to collect residues from their residence.

Regarding the responsibility for the disposal and correct disposal of solid waste, most people replied that the obligation lies with the municipal government, exempting itself from responsibility and passing it on to the public authorities, perhaps due to the lack of knowledge that socio-environmental problems are everyone's.

According to Bringhenti and Gunther (2011), in their study with social participation in selective waste collection programs, the interviewed population replied that the city has responsibility for the collection of solid waste.

Residents do not see themselves as social agents and responsible for public spaces, with the thought that each one should take care for what is theirs. Therefore, they are the last to put themselves as one of those responsible for the environment, adding to the tendency of

Brazilians to wait for assistance measures (Lermen and Fisher, 2010).

Although the national solid waste policy has numerous goals, there will only be successful with the population as the main collaborator.

Even though the waste, in its majority, is destined for a properly planned and carried out sanitary landfill, it will not cause aggravating problems in the environment. Nevertheless, it is necessary to separate the materials according to their levels of dangerousness and must consider it before their final destination (Ferreira, 1995).

However, the greater the amount of solid waste generated by the population, the less is the useful life of landfills, making it essential to use other sites that will serve as new ones (Silva *et al*., 2015). Thus, there must be awareness and actions to reduce consumption and decrease waste by the population, not only in Mundo Novo, but also throughout the world, to ensure sustainability and encompass all the axes that guide it.

Human beings have been changing the environment for their own comfort, making use of natural resources. Over time, these resources will become insufficient and, if there is no change to ensure their sustainability, it will have consequences for the biosphere (Costa and Rodrigues, 2014).

Therefore, the population of Mundo Novo, according to the result obtained with the respondents, disposes of 100% of their waste. Since the packaging and the destination of the waste are the responsibility of both the population and the government.

Each citizen must be responsible and control their actions in relation to their solid waste, they must be aware in relation to not only the human being but also the environment as a whole, as several other living beings depend on it (Souza and France, 2014).

More than half of the population (55%) know the place where the municipal solid waste is deposited. This shows that a large part of the population has tried to learn about the issue of the destination of urban waste. However, as was observed in the answers to the question on the form of packaging, just knowing the destination of the remains produced is not enough, since most of the residents do not separate them correctly.

The improper final disposal of solid waste can cause several environmental problems, making it an essential issue for public management (Guimarães and Rocha, 2015). According to Virgens *et al*. (2020), in their study with the perception of residents about the impacts of garbage on public health in Guanambi (BA), on the issue involving the disposal of garbage, the vast majority of respondents have a lack of knowledge about the destination and the collection process.

One of the interviewees reported on hospital waste, mentioning that the collection is carried out by a third-party company and the material related to the company that performs the service in the municipality has been passed on to the authors. This demonstrates that the waste generated by the health services is not mixed with the waste produced by the

population, thus avoiding contamination.

The correct destination for hospital waste is of paramount importance, as it can cause countless types of pollution, from water to soil and air (Silva et al., 2015).

When verifying how the population sees the work of recyclable material collectors, we concluded that the population perceives it as a good job for society, that is, that it collaborates with cleaning the city, with the environmental issue and as the opportunity to have a source of income. People who rated the work as bad, related to the conditions they are subject to in order to survive. Most respondents proposed that waste pickers should be more valued by society in general. This way, we can see the population has been concerned with the valorization of this work, due to the countless benefits it brings to the environment and society, this is important for planning regarding solid waste.

Many recyclable material pickers suffer from prejudice, lack of recognition of the benefits they bring to both the environment and the economy, their working conditions are very precarious, no labor rights, concluding that management actions must be taken in relation to workers in recyclable materials (Medeiros and Macedo, 2006; Amaral and Lopez, 2016).

3.2 Of the questionnaires applied to recyclable material collectors

It was found that 70% of respondents are male and 30% female, with ages varying between 25 and 73 years, with the majority being over forty years old; 90% are married, have established families and have children, averaging 06 children per family.

In a study carried out in Santarém (PA), the majority (54%) of recyclable material collectors were also male (Santos *et al*., 2011); however, in other studies, the proportion of women was higher. Female people predominated in Chapecó (SC), with 64.1% women and 35.9% men of the total of interviewees who work in recycling centers and cooperatives (Neves *et al*., 2017). In Petrolina (PE) and Juazeiro (BA), the result was 59.4% women and 40.6% men (Silva, Lubarino and Souza, 2010), showing that there is no gender distinction among recyclable materials pickers. The age of the pickers also varied in other studies (Silva, Lubarino and Souza, 2010; Neves *et al*., 2017). In work carried out in Santarém (PA), there was a predominance of pickers who were married or in a stable union, which corresponded to 70% of the interviewees (Cruz *et al*., 2016).

Factors such as age, education, income and gender are used in investigations by researchers with the aim of evaluating the behavior of a certain group and seeking solutions for a given problem-situation. In this study, we can see, from the socio-demographic results, that waste pickers are concerned with their quality of life, especially when we think of income divided by the number of people in the household.

The results indicate that the need and social conditions are related to the choice of profession, since in these studies, there were workers classified among the economically active population, which was the majority of respondents, but there were also some elderly and young people. Alencar (2012), in his work with the perception of the pickers of Mundo Novo (MS), observed that the majority are predominantly male, between 40 and 50 years old, remembering that the greater the time spent in the profession, the greater the health risks, mainly in the elderly phase.

The author, in her results, comments that the majority did not complete elementary school, being removed from the job market because they have a low education. Such observation is similar to the studies carried out in Chapecó (SC), with 79.5% of the pickers with incomplete Elementary Education (Neves *et al.*, 2017), and in Dourados (MS), with 11 pickers with incomplete primary education and only 1 with a High School degree. It was commented that most do not aim to attend technical courses because they believe in the growth of the cooperative; others are in the profession for lack of opportunity in the job market and the association is the only one that provides this job. Only the youngest member wishes to enroll in technical courses to have the opportunity for professional growth (Silva and Vieira, 2016).

Education is very important for those who want a place in the job market, because the greater the professional training, the greater the options. Therefore, it should be noted that there should be an incentive from the government for waste pickers to finish high school, ensuring better job opportunities.

The time spent in collecting recyclable materials ranged from 04 months to 25 years, constituting an overall average of 12 years of activity. The average income, in general, is between R$ 150.00 and R$ 600.00, generating a monthly average of R$ 370.00. It is noteworthy that the average value is low in relation to the minimum wage, which in 2011 (research period) was R$ 545.00.

The quality of life is assessed through hopes and expectations related to the current context, although the difference between the two is large, life expectancy is considered lower (Almeida Jr *et al*., 2009).

Alencar (2012) showed that the majority of the pickers' income was between R$ 300.00 and R$ 700.00, and points out that the income depends on what they are able to collect, the climatic conditions and the population's awareness. Meireles and Moraes (2018) commented that, since January 2012, the Mundo Novo's Recyclers Association (ARAM) has a responsible for articulating the entity's actions. The collected material is sold to a company in the city of Amambai (MS), and the amount collected from the sale of the material is R$ 9,200.00, on average.

Of those questioned, 70% of people have another form of income, such as a pension

or social benefit, among others. The low amount received (which is less than a minimum wage) and the receipt of other forms of extra income, in addition to work as a picker, recyclable material pickers were also seen in works carried out in other states such as Pará (Cruz *et al*, 2017), Pernambuco and Bahia (Silva, Lubarino and Souza, 2010).

It is worth mentioning that, in this last study, 75% of the interviewees reported that the value obtained from the sale of the materials is insufficient to support the family. However, as a way to increase the income of waste pickers, the authors Meireles and Moraes (2018) comment that ARAM receives support from the City Hall together with Itaipu Binacional. The city pays the rent of the association's headquarters, the utilities and provides a basic goods basket on a monthly basis, Itaipu supplies carts and uniforms, from the Solidary Collection program.

Income variability is related to physical conditions, the availability of time and practice with the work of each material picker. Corroborating this, it is seen that some of the collectors have to make part of the time available to take care of the house, some have health problems, others have little experience, little sociability and little knowledge of the activity.

According to Ferreira (1986), the meaning of the word trash gives the impression that it is something worthless, unimportant and that must be thrown away. However, the collectors questioned conceptualized garbage as something discarded by society, but which can be reused, serving as a source of income and survival. Environmental perception is linked to social groups, in which waste pickers present different norms, behaviors, sensations and feelings from residents, in addition, waste pickers describe that garbage is their way of survival (Lermen and Fisher, 2010).

In summary, we found that the interviewees, for the most part, responded even empirically, within expectations. Therefore, they know the concept about the theme, although in practice, verified in the answer to a question, they do not correctly classify the materials.

When we consult Law No. 12,305/10, one of the instruments for the national solid waste policy is on tax, financial and credit incentives. The importance of a financial incentive for these pickers to attend courses such as the Adult Education (EJA) would make it possible to improve their understanding of the environmental, social and economic issues, since these themes are well studied and explored at school.

For 70% of respondents, after the implantation of the Waste Processing Plant (UPL), there was an improvement in relation to the environmental and social issue in the municipality. However, some people responded that the plant does not provide much income; others stated that, with the change, income was improved and there was more respect for the people, the city became cleaner, and the pickers were more valued by society.

The organization of the service carried out in a recycling warehouse allows the social

recovery of which the picker is a part, enabling his/her social and financial (re) insertion through his/her work, often rescuing unknown values such as solidarity, cooperation and democracy (Oliveira and Ribeiro; Mendes and Mattos, 2012).

Among the respondents, 70% reported that they do not have a picker association in the municipality, and only 30% of the respondents said it exists and are part of it. In fact, there is a formalized and legalized association. One of the pickers proved, during the research period, he served as president, and he presented the Minutes of Constitution, National Register of Legal Entities - CNPJ and the statute of the said association. According to Meireles and Moraes (2018), as of 2013, the pickers' association is called so according to the founding and statute minutes.

Associations are relevant because they are the axis of any development policy.

As for the implementation of selective collection in the municipality, 90% of the pickers answered about their living conditions and are in favor of the activity; only 10% answered that it would not influence anything in their work. It is known that selective collection seeks to add values both to the collected materials and to the pickers, who will no longer have to turn over the waste that is currently deposited in bins and most in plastic bags without the correct separation, according to data collected in the questionnaire applied to residents of several neighborhoods.

With the issue of implementing the UPL, we sought to analyze people's knowledge of recyclable materials in relation to the collection and separation of that can actually be recycled or reused, and of the ones that must be separate from the others, as batteries and old tires. We observed that most waste pickers collect all types of materials they find and take them to the shed or to their homes. What is not sold is often discarded irregularly.

Thus, it is noticeable the environmental and health problems that irregular disposals can cause, requiring actions that will reduce and eradicate this type of activities that some independent waste pickers have. However, there is no data in the literature showing that waste pickers act inappropriately; in fact, the majority of the population performs the inappropriate waste disposal in the environment.

The inadequate deposition of solid waste causes impacts on the quality of life, property devaluation, proliferation of diseases, visual pollution, soil, water and air (Silva and Liporone, 2011).

Preventive and corrective actions to be taken, including a program for monitoring and diagnosing the situation of solid waste generated in the respective territory, containing the origin, volume, characterization of waste and the forms of destination and final disposal adopted are some of the contents that must be present in the municipal plan for integrated solid waste management.

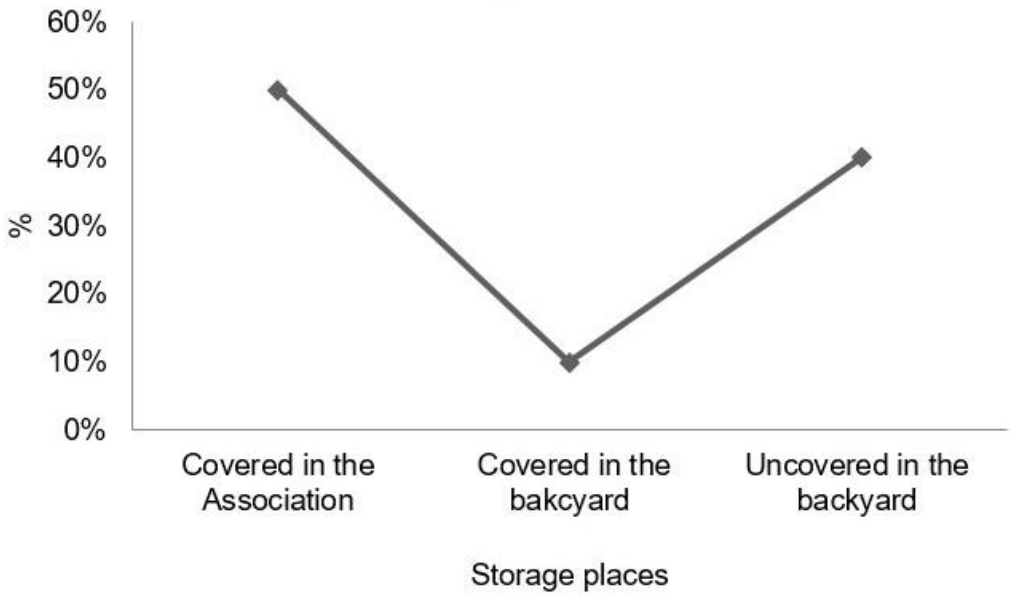
As for the storage of recyclable materials, 50% are deposited in an association’s

covered area, 40% in an uncovered area in the pickers' houses backyard and 10% in a covered area in their backyard (Figure 3), inferring that there is a lack of structure to store and handle the collected materials.

Autonomous and associated waste pickers store recyclable materials in their own homes with the purpose of selling them to scrap dealers after they reach a certain amount (Silva, Silva and Joia, 2010). The lack of an adequate physical structure to store the collected material compromises its quality and, consequently, their income (Neves *et al*., 2014).

We observed, in some of the pickers' residences, the precariousness existing in the storage of the materials. These workers do not have an adequate structure that is intended only for the storage, and the ideal would be that everyone should have a suitable place separated from their homes.

Figure 3 – Storage places for recyclable materials

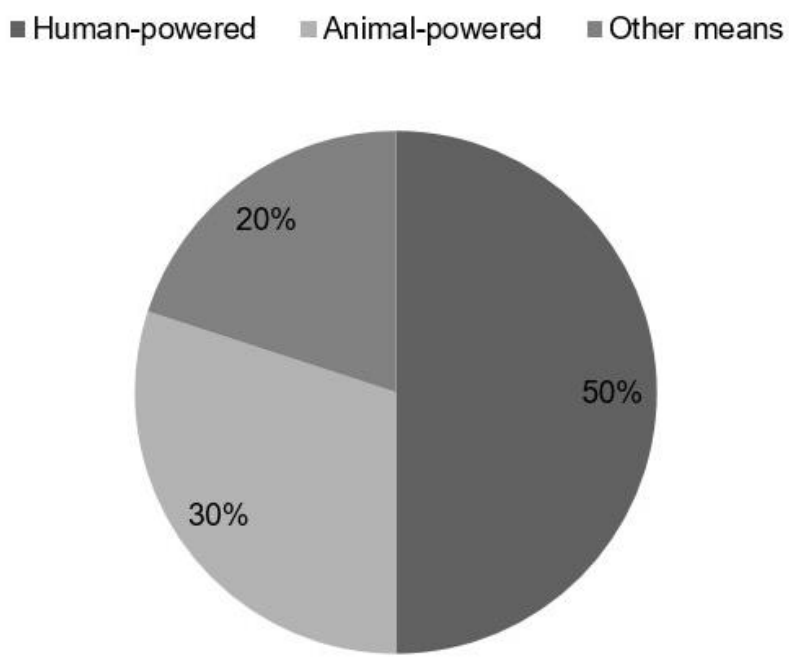


Source: The authors.

The means used to transport the collected materials, according to the answers obtained, showed that 50% use human-powered carts, 30% with animal-powered vehicles and 20% use other means, with a donated motorized cart by Itaipu Binacional and a small truck (Figure 4.). Animal-drawn vehicles (wagons) are adapted with a trailer.

Most pickers use human-powered carts. Despite being a low-cost vehicle, it requires a good physical condition compared to the use of animal traction, which supports a larger load, but the animal may not present proper care (Junior *et al*., 2013).

Figure 4 – Means used to transport collected materials



Source: The authors.

We understand, after analyzing the responses, that the pickers have a huge variability in production and income, which involves numerous factors such as the availability of time to perform the task, sociability and physical conditions.

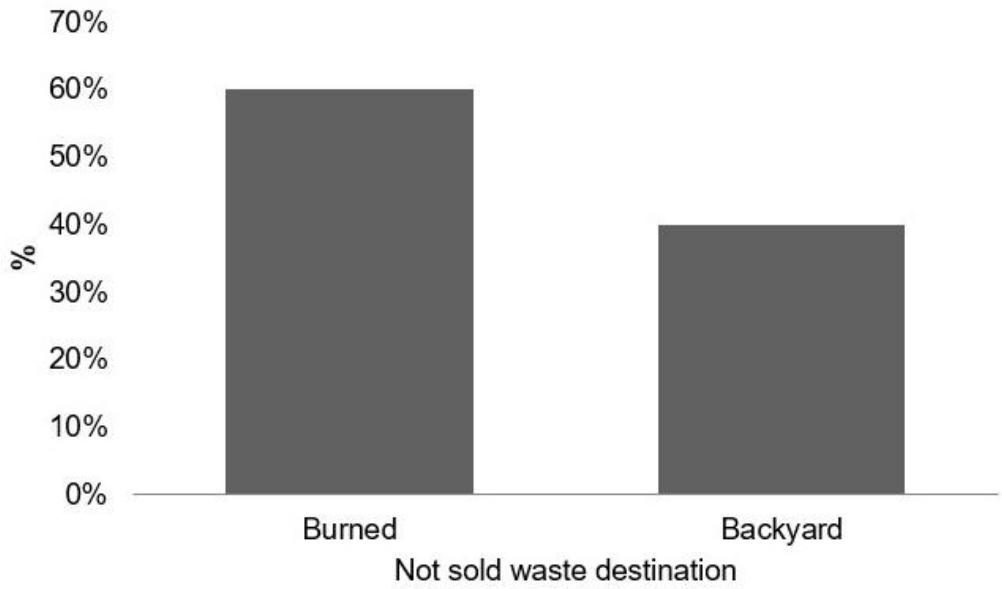
After the sale, what is not sold is discarded at the landfill or has other means of disposal. Of these, 60% are burned and 40% are stored in the yard, as shown in Figure 5. It is noteworthy that this type of action performed by scavengers is not reported in the literature, with the act of burning garbage being more frequent by the population. Demonstrating that not everything that was collected is used and that the correct destination for this waste is not given, even though the collection was carried out in a traditional way.

According to law 12.305/2010, in art. 47, item III and IV, burning in the open or in containers, installations and equipment not licensed for this purpose are prohibited by the government. The burning of garbage, in addition to causing air pollution, can release toxic components that may be present in solid waste (Brasil, 2010). According to law No. 9.605 of 1998, art. 54 says that it is illegal to cause pollution of any kind at levels that result or may result in damage to human health, or that cause the death of animals or the significant destruction of flora. In item II of the same law, cause air pollution that provoke the withdrawal, even if momentary, of the inhabitants of the affected areas, or that causes direct damage to the health of the population (Brasil, 1998).

Waldman (2013) points out that the burning of waste results in toxic components, such as dioxins and furans, in gases and in final ash. These substances can be persistent in

nature with toxic and carcinogenic actions.

Figure 5 – Not sold waste destination



Source: The authors.

Hospital waste, on the other hand, is collected by a vehicle from the Municipal Health Department, suitable for this service. These residues are not mixed with the other solid residues, and are deposited in a landfill in a separate location, since they were previously incinerated at the UPL.

According to Anvisa (2004), the management of hospital waste (Health Services Residues - RSS) consists of a set of procedures, based on the objective of minimizing its production and providing the generated waste with a safe, efficient routing for better protection of workers, preservation of public health, natural resources and the environment.

A form of waste management for companies that involve the issue of health, both human and animal, would be the use of applications and software in waste management. Both for companies and the population (such as Cataki, My Waste, among others) such applications allow generators, transporters and attendants to act in accordance with the legislation and generate all necessary documentation automatically. These applications could be available on the City Hall website free of charge.

In relation to the current situation (2020) of the collection and destination of solid waste in the municipality, the service was outsourced in 2018 and 2019, but in 2020 it is not. City hall and pickers carry out the collection. A company is responsible for the collection and transport. The waste, after separation, goes to the controlled landfill, according to the person responsible for the environment department. A responsible company carries out the leachate treatment. The recyclable materials go to the sorting shed, which has equipment to facilitate the handling and storage process until the products are sold.

Much of the landfill problem is leachate because, as it is aggressive to the environment, adequate treatment is necessary as an environmental protection measure, providing quality of life for the population (Serafim *et al*., 2003).

This shows that the town has been paying attention to the environmental issue and quality of life of waste pickers and the population, however, in many aspects, an evolution regarding the population's behavior is essential.

4 Conclusion

With the completion of this work, we conclude that many residents have the concept that garbage is useless, besides giving little importance to the correct separation of garbage. As for the pickers, their incomes are low; the storage of the collected waste is inappropriate, with a large part being uncovered at the bottom of the yard. As for the equipment used for collection and transportation, many use the human-powered cart.

Although the data are of a regional character, in research from other states we clearly found the same problem of socio-environmental perception with the population, such as the perception of economic development and environmental conservation of waste pickers, in relation to recyclable materials. We believe that the improvement of the recycling process would occur with the awareness and assistance of environmental education of the population in separating the recyclable material in their homes before leaving for collection, through encouraging lectures with the support of psychologists, doctors, among others, focusing on behavioral change and awareness of the population and waste pickers. In addition to that, Federal Government incentives for waste pickers to attend technical courses and finish their studies, providing better opportunities. If the municipality fails to take action on shared responsibility, these problems will persist.

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