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Socio-spatial impacts of solid waste on the population of Vila Lídia, Bairro Noal, Santa Maria, RS

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ABSTRACT

The universalization of basic sanitation, in terms of water, solid waste, and sewage, is still a challenge for countries with great socio-spatial inequalities, such as Brazil. Although the United Nations (UN) has been creating goals to combat the problem of sanitation, very little progress has been made towards a better distribution and quality of service in poor countries. In this sense, the theme of this study is linked to the assessment of the impacts of solid waste on the population of Vila Lídia, a poor locality in the city of Santa Maria, RS. Therefore, the objectives of the work are: to analyze the current situation of disposal of solid waste in the territory of Vila Lídia, neighborhood Noal, Santa Maria; and discuss the socio-environmental reality arising from the disposal of solid waste. Data were collected from interviews, fieldwork, photographic records, and bibliographical and documental surveys. The data show that two of the four micro areas that comprise Vila Lídia have low percentages of households with public waste collection (71% and 78%). These data, combined with the interviews, demonstrate the problem of solid waste disposal, especially on the banks of the Arroio Cadena, which in times of flood causes flooding in homes, exposing the population to economic risks and diseases. It should be noted that the incorrect disposal of waste in Vila Lídia is the result of a historical and socio-spatial process of the population that is marked by deprivations of all kinds, including the denial of the use of the territory itself.

KEYWORDS: Basic Sanitation. Social Deprivation. Santa Maria.

INTRODUCTION

The United Nations (UN) has been warning for years about the state of basic sanitation in the Millennium Development Goals (MDGs), proposing targets agreed upon by Member States in the year 2000. However, more than two decades later, the results are not satisfactory, as the proposed goals have not yet been achieved in various countries, including Brazil.

Therefore, new objectives and goals were proposed in the so-called "2030 Agenda for Sustainable Development (SDGs)," which suggested 17 Sustainable Development Goals (SDGs) that could, in a balanced manner, address sustainable development in economic, social, and environmental terms. Among these SDGs, Goal number 6 stands out, intending to ensure the availability and sustainable management of water and sanitation for all. Furthermore, by integrating the Millennium Goals, this agenda is adopted by UN member countries to be fulfilled by the year 2030 (AGENDA PLATFORM, 2030).

This lack of basic sanitation has followed human society since antiquity and, in the 21st century, remains a chronic problem in countries with significant socio-spatial inequalities, such as Brazil. Despite Law 11.445/2007 representing a new milestone, establishing national guidelines for basic sanitation, we still experience situations of complete lack of access to a service that is fundamental to human development. Article 3 of the aforementioned law provides an expanded and integrated definition of basic sanitation services, including the supply of potable water, sewage, urban cleaning, and solid waste management, as well as urban rainwater drainage and management (BRAZIL, 2007).

It is also worth noting that since 2010, basic sanitation services have been regulated by Law No. 12,305, the National Solid Waste Policy (PNRS), which addresses the management and final disposal of solid waste, as well as Law No. 14,026/2020, which updates the legal framework for basic sanitation. Therefore, as can be observed, there is a series of legislation and legal

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frameworks surrounding the issue of basic sanitation in Brazil, and yet, a large part of the population does not have access to these resources in the country, especially the poor.

It is within this socio-spatial and legal context of basic sanitation in Brazil, where the poor are deprived of this resource, that this study is situated. That is, the study seeks to address the management and disposal of solid waste generated by the population of Vila Lídia, in the Noal neighborhood, in the central-western portion of the urban area of Santa Maria, RS. As such, the details of the objectives and methodological procedures used in this study are described in the following sections.

OBJECTIVES

i) To analyze the current situation of solid waste disposal in the territory of Vila Lídia, Noal neighborhood, Santa Maria, RS;
ii) To discuss the socio-environmental reality resulting from solid waste disposal.

METHODOLOGICAL AND OPERATIONAL PROCEDURES

The research was conducted in Vila Lídia, located in the Noal neighborhood, in the central-west administrative region, in the urban area of the municipality of Santa Maria, Rio Grande do Sul (RS) (Figure 1). According to IBGE (2010), the neighborhood had a population of 7,582 inhabitants and is situated in a transitional area between the center and west of the city. Vila Lídia is a subarea of the Noal neighborhood, considered to be the most deprived in terms of socio-spatial conditions in this neighborhood and one of the areas most deprived of basic sanitation in Santa Maria (FARIA; SAVIAN; VARGAS, 2019).

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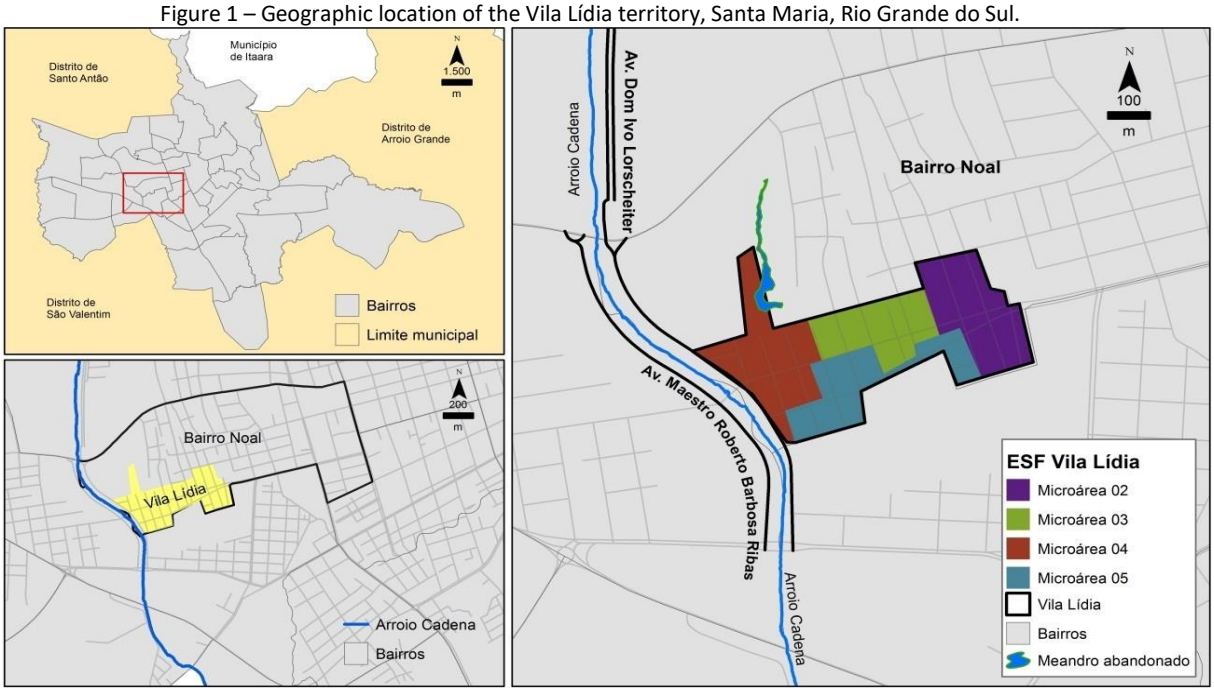
Figure 1 – Geographic location of the Vila Lídia territory, Santa Maria, Rio Grande do Sul.



Elaboration: Douglas Bouvier Erthal (2023).

The definition of the study area was based on two main criteria: firstly because it is an impoverished and socially deprived area, and secondly, because it is one of the few socially disadvantaged areas that is fully served by the Family Health Strategy (ESF), a public institution that assisted in gathering data on the local population, as well as in fieldwork in the study area.

As the first criterion used to define the study area, the levels of social deprivation and poverty to which the population of Santa Maria is subjected were considered (SAVIAN, 2016; FARIA, SAVIAN, and VARGAS, 2019; SPODE, 2020; SPODE; FARIA, 2020). The second criterion is related to the fact that the local population is registered with the ESF Vila Lídia. This allowed for access to the territory of Vila Lídia, with the support of healthcare professionals and Community Health Agents (ACS), thereby enabling the observation of the study area and dialogue with the population.

It is important to note that Vila Lídia is served only by one ESF, ESF Vila Lídia, which has a territorialized service subdivided into four micro-areas of ACS operation, with 2,102 registered people, the target population of this study.

Moreover, an analysis of the legislation related to the subject was carried out, examining the following documents: the Land Use and Occupation Law (Complementary Law No. 117/2018), the Territorial Development Master Plan of the municipality of Santa Maria (PDDT); the Municipal Environmental Sanitation Plan of Santa Maria (PLAMSAB). Other documents were also reviewed, including the City Statute (Law No. 10,257/2001), which, under the Constitution of 1988, establishes the general guidelines for urban policy. Furthermore, Law No. 12,305/2010,

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established the National Solid Waste Policy (PNRS), as well as the new regulatory framework for basic sanitation, Law No. 14,026/2020.

Data collection was carried out from secondary and primary sources. Secondary data was obtained through the digital platform of the Brazilian Institute of Geography and Statistics (IBGE), the 2010 Demographic Census; from CORSAN - the state-owned company responsible for water supply and sanitation services in Santa Maria, RS; and from the Primary Health Care (PHC) service located in the study area, ESF Vila Lídia.

Primary data were obtained through field research, which allowed for direct contact with the observed reality and enabled the collection of information and data that contributed to achieving the research objective. Two techniques were used for this purpose. One of them is systematic observation, which, according to Gil (2008), is a widely used technique in research for the precise description of phenomena as they occur, always establishing what should be observed, and when, as well as the method of recording and organizing information. To support systematic observation, a field diary was used, with the assistance of imaging resources such as GPS and a camera.

Semi-structured interviews were also conducted, following Minayo's (2013) guidance. According to the author, this technique includes a script that combines closed and open-ended questions, allowing the interviewee to discuss the topic without being restricted to the formulated questions. Eleven (11) interviews were conducted with a target audience that included some members of the local community, as well as professionals from ESF Vila Lídia, CORSAN, and the municipal government. It is worth noting that the interviews were recorded using an audio recorder (without the use of the interviewees' images), and subsequently, the interviews were transcribed and analyzed.

RESULTS AND DISCUSSION

The collected data allowed for the determination of the destination of solid waste within the study area. It was observed that 84.8% of the households in Vila Lídia are serviced by public waste collection, a percentage very close to the national average, where 83% of Brazilian households have their waste collected (IBGE, 2018). However, these data warrant a more in-depth discussion, as 87 households located in Vila Lídia do not dispose of their waste through the collection service, a process that results in impacts such as soil, air, and water contamination, both within the study area and its surroundings (MMA, 2009).

Of these 87 households, the majority are in micro areas 04 and 05 (Figure 1), accounting for 28.2% and 21.8% of their respective micro areas. These figures are noteworthy because there is a significant disparity compared to the total index for the area (15.2%). In other words, out of the 87 households improperly disposing of their waste, 75 are situated in these two micro areas. These data can be seen in Table 1. Indeed, there is a substantial amount of waste being discarded without any control and proper public supervision, which may potentially create a conducive

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environment for the proliferation of vectors and microorganisms responsible for the transmission of numerous diseases.

Chart 1 – Solid waste collection per household in Vila Lídia, Noal neighborhood, Santa Maria, RS, in absolute and percentile amounts

		Micro Areas				Total
		02	03	04	05	
Number of Households		144	132	156	142	574
Waste	Public Collection (%)	134 (93,1)	130 (98,5)	112 (71,8)	111 (78,2)	487 (84,8)
	Non-Public Collection (%)	10 (6,9)	2 (1,5)	44 (28,2)	31 (21,8)	87 (15,2)

Source: Estratégia Saúde da Família Vila Lídia (2019). Elaboration: Liliane Milani de Moraes (2023).

Some interviewees point to problematic issues regarding how these residues are disposed of in several areas of Vila Lídia, mainly, by the margins of Cadena Stream, the main urban river of Santa Maria, in which micro areas 04 and 05 are located.

> […] when you pass by the little stream there, if you look you'll see that the majority of the products there the garbageman takes away [...]. They are street smart, they throw it after the schedule, at night when there's no one. (Interviewee EA04. Testimony was collected in January 2020)[1].
> There's a lot of outsiders that come, because it's a ghetto and throw trash, leave their houses' trash […]. Even the animals, right, they tend to discard. (Interviewee EA01. Testimony was collected in December 2019)[2].

The amount and variety of discarded residue can be clearly noted in the entire study area. This residue does not decompose easily, and its long exposition produces favorable conditions for diseases to manifest. It is worth noting that in addition to dumping waste in the streets and along the watercourses, the practices of burying and burning waste are still very prevalent in Vila Lídia, as can be observed in the mosaic of images in Figure 2.

[1] Depoimento no original: [...] quando tu passa pela sanga ali se tu olha tu vai ver que a maioria dos produtos que tem ali o lixeiro leva [...]. Eles são malandros, largam depois do horário, de noite quando não tem ninguém. (Entrevistado EA04. Depoimento coletado em janeiro de 2020).

[2] Depoimento no original: Tem muita gente que vem de fora, por ser uma vila e joga o lixo, deixa o lixo de suas residências [...]. Até os bichos né, eles costumam descartar (Entrevistado EA01. Depoimento coletado em dezembro de 2019).

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Figure 2 – Deposit and burning of waste in areas with public collection, in Vila Lídia, Noal neighborhood.

Source: Moraes (2020). A, B, C, and D – Registers of waste disposal by the margins of Maestro Roberto Barbosa Ribas Avenue, parallel to the Cadena Stream, Vila Lídia, Noal neighborhood.

The camp incursions, along with the declarations of the interviewees, allowed for an analysis matching the reality of this territory, as presented in the following account:

> That's one of the problems. They burn. Those who feel bothered by so much trash go there and burn. But the more you set fire then other people come and put the trash in the same spot again. [...] one sets fire and another one throws trash. And the smoke that (it) has is really toxic. (Interviewee EA04. Testimony collected in January 2020).[3]

[3] Depoimento no original: Esse é um dos problemas. Eles queimam. Aqueles que se sentem incomodados com tanto lixo vão lá e queimam. Só que quanto mais bota fogo daí outras pessoas vem e colocam de novo o lixo no mesmo local. [...] um bota fogo e o outro vai lá e toca o lixo. E a fumaça que tem é bem tóxica (Entrevistado EA04. Depoimento coletado em janeiro de 2020).

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> [...] They really like burning, and it's not some specific thing of our micro area here, it is from this territory actually. There's a culture, oh let's burn because otherwise it'll stay there, or it'll get to the storm drains and clog [...] (Interviewee EA01. Testimony collected in December 2019)[4].

It is important to recall the socio-spatial context in which the population of the Noal neighborhood, especially Vila Lídia, is situated. The population of Vila Lídia resides in an area characterized by various forms of social deprivation, such as income, sanitation, and adequate housing deprivations (MORAES, 2020; SPODE, 2020; SAVIAN, 2019; FARIA; SAVIAN; VARGAS, 2019). This reality marked by deprivations of various orders results in problems such as this, linked to the inadequate residue destination, despite the frequency with which public collection is made. The collection by the company responsible occurs three times a week, however, a great deal of residue is discarded in the streets and the Cadena Stream, highlighting the unsanitary conditions within which the population in Vila Lídia is situated. This reality can be observed in Figure 2.

This process leads us to ponder that perhaps beyond the 87 households not disposing of their waste through public collection, many others may be contributing to the terrible socio-spatial and environmental conditions observed in Vila Lídia. The issues related to residue aggravate with the clogging of the storm drains and drainage system, further intensifying in precipitation periods, when drainage is compromised, mainly the sewage reflux that goes back to the houses.

Another aspect is related to the practices of burning and household landfilling of waste, both by the people who are catered for by the public collection service, as well as the people who reside in areas where collection is conducted. It is essential to highlight how this practice is forbidden in the municipality. The Organic Law of the municipality, in article 238, Section III of Complementary Law Nº 3/02 of January 22, 2002, determines the prohibition of burning, even in private areas, of waste or any material. Currently in the development process through Complementary Law Nº 8905/2019, especially article 114 complements the aforementioned Law. However, there is still an integrating element in article 118 of this bill that, beyond burning, prohibits the discarding of waste in the open.

There is an enormous gap between theory and practice, that is, between the law and the socio-spatial reality of the people of Vila Lídia. Both the buried waste, as well as those that end up adrift and/or are burned, have made the environment unhealthy for life. In the practice of waste disposal, no technical criteria are followed, thus contradicting Article 3, Section III of Law No. 12,305, dated August 2, 2010, which establishes the National Solid Waste Policy. Similarly, the waste found in the vicinity of residences, streets, and streams in Vila Lídia may create a perfect environment for the proliferation of vectors and microorganisms, which will in some way compromise the environment and lead to various health-related issues for this population. This reality can be confirmed through the statements of some interviewees:

[4] Depoimento no original: [...] Eles gostam muito de queimar, e não é uma coisa específica só da nossa microárea aqui, é desse território na verdade. Tem uma cultura, a vamos queimar porque senão vai ficar ali, ou vai pro bueiro e vai entupir [...] (Entrevistado EA01. Depoimento coletado em dezembro de 2019).

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> […] The burned trash generally they burn lots of wire, light wire, these things that have toxic smoke right. Then that smoke engulfs the whole area, you know, the smell is really strong […] (Interviewee EA01. Testimony collected in December 2019)[5].
> […] Generally we notice the difference in rodents when there's a flood, in the surroundings of households, the sewers, when there's flash floods the number of rats increases a kot, in some time they go away and when there are floods they come back again. (Interviewee EA04. Testimony collected in January 2020).[6]
> […] it gathers trash, bugs, cockroaches, rats, it's inevitable (Interviewee EA01. Testimony collected in December 2019)[7].

The environmental fragility of this area poses a threat to the quality of life and health of the population. Supporting the findings of this research is the study conducted by Spode (2020), which differentiated social deprivation situations in the urban area of Santa Maria using a multicriteria assessment technique (ranging from 0 to 1), based on the dimensions of education, income, and housing/sanitation. Among the neighborhoods with more pronounced deprivation indices, the author highlights the Noal neighborhood, with Vila Lídia being the poorest area within it. Therefore, Vila Lídia can be identified as a poverty-stricken territory in the city of Santa Maria, marked by significant deprivations ranging from income to the absence of sanitation and other basic infrastructure. It is worth noting that poverty is not evenly distributed within Vila Lídia, with visible inequalities among the four micro areas analyzed.

In this regard, it can be affirmed that micro area 04 exhibits the most precarious conditions, particularly in terms of the discharge of sanitary sewage and a vast variety of solid waste. During periods of heavy rainfall and flooding, the waste materials mix with rainwater, resulting in various adverse consequences. This concentration of sewage and solid waste can be observed in Figure 3, which also identifies the formation of a lake from an abandoned meander of the Cadena Stream (as shown in the map of Figure 1). This lake formation is the result of the urban watercourse straightening process carried out by the municipal government, which has significantly altered the riverbed since the 1960s (FERRARI, 2018).

[5] Depoimento no original: [...] O lixo queimado geralmente eles queimam muito fio, de luz, essas coisas que, a fumaça é tóxica né. [...] Daí aquela fumaça engloba toda a área, sabe, e o cheiro é fortíssimo [...] (Entrevistado EA01. Depoimento coletado em dezembro de 2019).
[6] Depoimento no original: [...] geralmente a gente nota a diferença de roedores assim quando dá enchente, no entorno das residências, no esgoto, quando dá aquelas enxurradas aumenta bastante o número de ratazanas, dali um tempo eles somem e quando tem enchentes eles voltam de novo (Entrevistado EA04. Depoimento coletado em janeiro de 2020).
[7]Depoimento no original: [...] junta lixo, junta bicho, junta barata, junta rato, é inevitável (Entrevistado EA01. Depoimento coletado em dezembro de 2019).

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Figure 3 - Households at the margins of an abandoned meander in micro área 04 of Vila Lídia, Santa Maria, Rio Grande do Sul.

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Source: Moraes (2020).

The precariousness of occupation and the lack of basic sanitation in micro area 04 spatially demonstrate a crucial aspect within the social dimension of deprivation. It brings to light an entire historical and social process that dates to the occupation of Vila Lídia when the municipal government filled the area where the old landfill was located. The initial occupation of Vila Lídia's residents took place precisely around micro area 04, which is the oldest, situated along the banks of the Cadena Stream, and, above all, it houses a population that resides around the abandoned meander (as indicated in the map of Figure 1 and Figure 3). There is no doubt that this contributes to micro area 04 being the most deprived and socially deprived, as the population is surrounded by an environment hostile to human life. This explains the inadequate waste disposal practices and more. In other words, within a territory marked by deprivation of all types of resources and conditions for human life, vulnerability to diseases, and constant flooding in their homes, it is not to be expected that the population would properly dispose of waste.

This socio-spatial reality of micro area 04 is also corroborated by interviewee EA03:

> [...] As for basic sanitation, it is one of the deficient point of the micro area. That is most unassisted by society, most lacking resources. Society itself closes its eyes to this micro

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> area. For them (referring to public power), it would be great if they (referring to the population) didn't exist [...] (Interviewee EA03. Testimony collected in December 2019)[8].

Indeed, the formation process of Vila Lídia has resulted in the creation of a territory marked by profound social inequalities, unhygienic conditions, and a lack of the most basic conditions for habitation. These are areas that should never have been inhabited and are characterized by the deprivation of most resources and structures. The socio-spatial inequalities in Vila Lídia are evident, representing opaque spaces or territories of scarcity, as referred to by Santos and Silveira (2011).

Figure 3 allows us to observe that besides the complete absence of basic sanitation services in the homes located along the abandoned meander of the Cadena Stream, there is a significant deposition of waste generated by the resident population. This becomes an even more significant concern as the area is prone to flooding. In this regard, the statement of interviewee EA03 corroborates these findings:

> It's all left directly in the river, right, be it urine or feces, it's left directly in the river and it floats. Imagine what will happen right, later when it rains, due to lots of debris and tree branches and stuff, it ends up going to the households and entering the households. The rats, they stay inside some storm drains, when it floods they come out and leave swimming. (Interviewee EA03. Testimony collected in December 2019)[9].

Micro area 04 appears to face a double challenge, marked by the complete absence of basic sanitation on one hand and susceptibility to flooding on the other. Supporting this assertion, Fernandes (2016) reveals in their study about flood-prone areas in Santa Maria that Vila Lídia is in a highly susceptible area, with the situation becoming even worse in micro area 04, which indicates an extremely high degree of susceptibility. The consequences arising from this process will be felt primarily in the form of potential flooding, which will have implications for the health of the population, especially in this micro area.

The absence of sewage and waste collection services, as pointed out by Interviewee EA03, creates a favorable environment for the reproduction of rodent populations in the area. The situation becomes even more serious because, during floods, the water that is dammed up (Figure 3) reaches the residences, and inevitably, the population ends up having direct contact with contaminated water, mainly due to the urine of these rodents. Thus, the socio-spatial issues in Vila Lídia, especially in micro area 04, go far beyond the irregular disposal of garbage by individuals and

[8] Depoimento no original: [...] Quanto ao saneamento básico, é um dos pontos deficitário da microárea. Que é mais desassistida pela sociedade, mais desprovida de recursos. A sociedade em si fecha os olhos totalmente pra essa microárea. Pra eles (referindo-se ao poder público), seria ótimo se eles (referindo-se à população) não existissem [...] (Entrevistado EA03. Depoimento coletado em dezembro de 2019).

[9] Depoimento no original: É tudo largado diretamente no rio né, seja a urina, ou seja, fezes, é largado diretamente no rio, e sai boiando. Imagina o que vai acontecer né, depois quando chove devido a muitos entulhos e bastante galhos de árvores e tal acaba indo pras residências e entrando dentro das residências. Os ratos eles ficam dentro de alguns bueiros, alagando eles saem pra fora e saem nadando (Entrevistado EA03. Depoimento coletado em dezembro de 2019).

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are linked to the very process of depriving the population of the use of the territory, which has been ongoing since the formation of the area.

FINAL CONSIDERATIONS

The population of Vila Lídia is inserted in a historical process of deprivations of all kinds, beginning with the area where these families were settled by the municipal government in the past. A territory marked by social exclusion, situated in an area that once housed the old landfill, along the banks of the Cadena Stream, lacking the necessary infrastructure and environmental conditions for human development. Therein lies the biggest issue regarding waste disposal, lack of basic sanitation, and the unhealthiness that the people of Vila Lídia face.

Considering this, it can be asserted that the practices of improper disposal and burning of waste are remnants of this historical process linked to numerous deprivations, including the lack of even the most basic services such as piped water, sanitation, and proper waste collection. These resources are still offered in a very limited manner to the impoverished populations of Santa Maria, as is the case in Vila Lídia.

Despite significant advancements in legislation regarding the basic sanitation sector, such as Law 11.445/2007 and more recently, the new regulatory framework, Law 14.026/2020, the universalization of services remains a distant goal. An example of this is evident in Law No. 12.305/2010, which established the National Solid Waste Policy (PNRS). Although this legislation aims at integrated management and environmentally sound waste management, such practices do not effectively function in the city's peripheries, given all the challenges that these populations face. In other words, some services and resources are concentrated in specific areas of the cities, selectively and spatially. Proper waste disposal is just one of the many deprivations experienced by this population, deprived of opportunities.

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