

# On the brink of invisibility: peripheral women, basic sanitation, and environmental racism

**À beira da invisibilidade:** mulheres periféricas, saneamento básico e racismo ambiental

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Article received on  
**September 23, 2024**

Final version accepted on  
**September 1, 2025**

Published on  
**July 6, 2026**

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**Abstract:** This study aimed to characterize the socioeconomic profile and identify the main challenges faced by peripheral women in the city of Chapecó, state of Santa Catarina, Brazil, regarding access to basic sanitation services. The methodological approach was based on applied research using a qualitative-quantitative design and was conducted through interviews with a sample of women living in two peripheral communities within the municipality. The findings indicate that the term periphery cannot be treated as a generic concept encompassing all realities equally. There are peripheries within peripheries, and, in this sense, public policies must always consider local specificities. Furthermore, by relating socioeconomic profile data, particularly the racial background of the study participants, to the diagnostic situation of sanitation services, the manifestation of environmental racism becomes evident.

**Keywords:** peripheral communities; environmental and sanitary engineering; Science, Technology and Society (STS).

**Resumo:** A pesquisa teve como objetivo traçar o perfil socioeconômico e (re)conhecer os principais problemas enfrentados por mulheres periféricas da cidade de Chapecó/SC acerca dos serviços de saneamento básico. A proposta metodológica teve como base a pesquisa aplicada com abordagem quali-quantitativa e foi desenvolvida por meio da realização de entrevistas com uma parcela das mulheres residentes em duas comunidades da periferia do município. Os resultados indicam que periferia não pode ser usada como um termo genérico que abarca todas as realidades igualmente. Há periferias dentro de periferias e, nesse sentido, as políticas públicas devem sempre levar em conta as especificidades locais. Para além disso, ao relacionar os dados do perfil socioeconômico, principalmente o marcador racial das participantes da pesquisa, com a situação diagnóstica sobre os serviços de saneamento, fica evidente a manifestação de racismo ambiental.

**Palavras-chave:** comunidades periféricas; engenharia ambiental e sanitária; Ciência, Tecnologia e Sociedade (CTS).

## 1. Introduction

According to the National Basic Sanitation Plan, basic sanitation comprises a set of services aimed at eliminating environmental conditions that pose health risks or contribute to the emergence of diseases. These services encompass four components: drinking water supply, sanitary sewage systems, solid waste collection and management, and urban stormwater drainage and management (Ministério do Desenvolvimento Regional [MDR], 2019).

Access to these services is a universal human right (Organização das

Nações Unidas [ONU], 2020). However, in peripheral communities in developing countries, a large proportion of the population lacks access to such services. In a context where households are located in unhealthy environments and underserved by basic services, social groups living under these conditions are, to a great extent, neglected by public authorities (Gomes, 2009).

When evaluating the factors that contribute to inadequate basic sanitation in Brazil, economic constraints cannot be considered the sole explanation for the issue, as structural problems associated with different forms of inequality (including racial and gender inequalities) become evident. Thus, according to Santos (2013), inequalities and their multiple intersections are responsible for triggering a range of social deprivations.

Specifically regarding race, Santos (2013) also points out that peripheral communities, predominantly inhabited by Black and mixed-race families, have historically experienced inadequate access to infrastructure and basic sanitation services. Similarly, Santos and Jesus (2023) emphasize that many studies show that predominantly Black and low-income neighborhoods tend not to have full access to basic sanitation services, which, according to the authors, reveals a relationship between poverty, racism, and precarious access to sanitation.

Within this context, basic sanitation issues may be examined through the lens of environmental racism, which refers to environmental injustices that disproportionately affect vulnerable and, as a rule, racialized groups. According to Herculano (2008), environmental injustices occur in societies marked by social and economic inequalities, in which the greatest impacts and harms arising from development are directed primarily toward low-income populations, racialized groups, traditional peoples, working-class communities, and other marginalized and vulnerable segments.

Pereira and Amparo (2023) emphasize that environmental injustice necessarily requires bringing racial issues to the forefront, as racism creates substantially more severe environmental consequences for vulnerable populations. It is precisely this focus on race, which gives environmental racism its name, that redefines environmental injustice as a racialized phenomenon.

D'Ávila Neto and Jardim (2015) and Felício (2021) further argue that women are more vulnerable to environmental risks than men due to i) biological differences and ii) gender-related factors, that is, the social, economic, political, and cultural roles assigned to women. Among the 17 sustainable development goals (SDGs), SDG 6, which addresses Clean Water and Sanitation, recognizes the urgency of “paying special attention to the needs of women and girls and those in vulnerable situations” (United Nations [UN], 2015, p. 18, free translation).

Accordingly, the primary aim of the present study is to characterize the socioeconomic profile and identify the main challenges faced by peripheral

women in the city of Chapecó, Santa Catarina, regarding basic sanitation services. The main justification for conducting this research lies in the importance of basic sanitation for population health and human dignity, aiming to encourage and support policies, projects, and solutions that improve the quality of life of women living in situations of socioeconomic vulnerability.

## **2. Women and the margins of basic sanitation services**

Issues related to basic sanitation extend far beyond the income versus purchasing power framework, as they encompass a series of additional challenges experienced by individuals within their communities. Abramovay (2012) argues that the reason poverty reduction cannot be limited solely to income is that even when financial resources increase, individuals may continue facing barriers to accessing essential services such as sanitation, education, and health care, while also living in territories marked by systematic discrimination.

Predominantly inhabited by Black and mixed-race families, peripheral communities have historically experienced precarious access to infrastructure and basic sanitation services. In cases involving irregular settlements (according to existing legislation), the process of providing adequate sanitation services becomes even more complex, as these locations are not included in municipal urban infrastructure plans (Santos, 2013).

Fonseca (2008) and Gomes (2009) emphasize that sanitation solutions in peripheral communities extend beyond the limits imposed on sanitary engineering, as interventions proposed for these locations are constrained by the country's political, economic, and social context. Traditional sanitation technologies, which provide standardized and high-cost solutions, commonly employed by engineering practice and endorsed by public authorities are usually unsuitable for application in peripheral communities, thereby allowing these populations to remain deliberately excluded from society.

Gomes (2009) argues that implementing small-scale structures for water supply and wastewater treatment in vulnerable communities is essential to overcoming exclusion and improving quality of life. With full access to sanitation services, peripheral populations and individuals living under social inequalities could devote more time to leisure activities, education, and paid work.

When this issue is examined from the perspective of gender inequalities, the even greater challenges faced by peripheral women become evident. In addition to suffering from a lack of fundamental rights related to health care, housing, food security, education, and safety, gender inequality affects specific needs associated primarily with access to water and sanitation services. These needs range from basic menstrual hygiene-related issues

to gender stereotypes, particularly regarding domestic responsibilities and caregiving roles involving children and family members (BRK Ambiental, 2018; Felicio, 2021).

Chifamba (2014) points out that precisely because women are the most affected by inadequate sanitation and the first to perceive its impacts, they play a leading role in the implementation and management of sanitation services. By managing household water use, ensuring proper disposal of solid waste, and taking responsibility for children's hygiene (including educating them about locations where untreated sewage is discharged) women help reduce socioenvironmental vulnerability not only for their families but for the community as a whole (Silva, 2017).

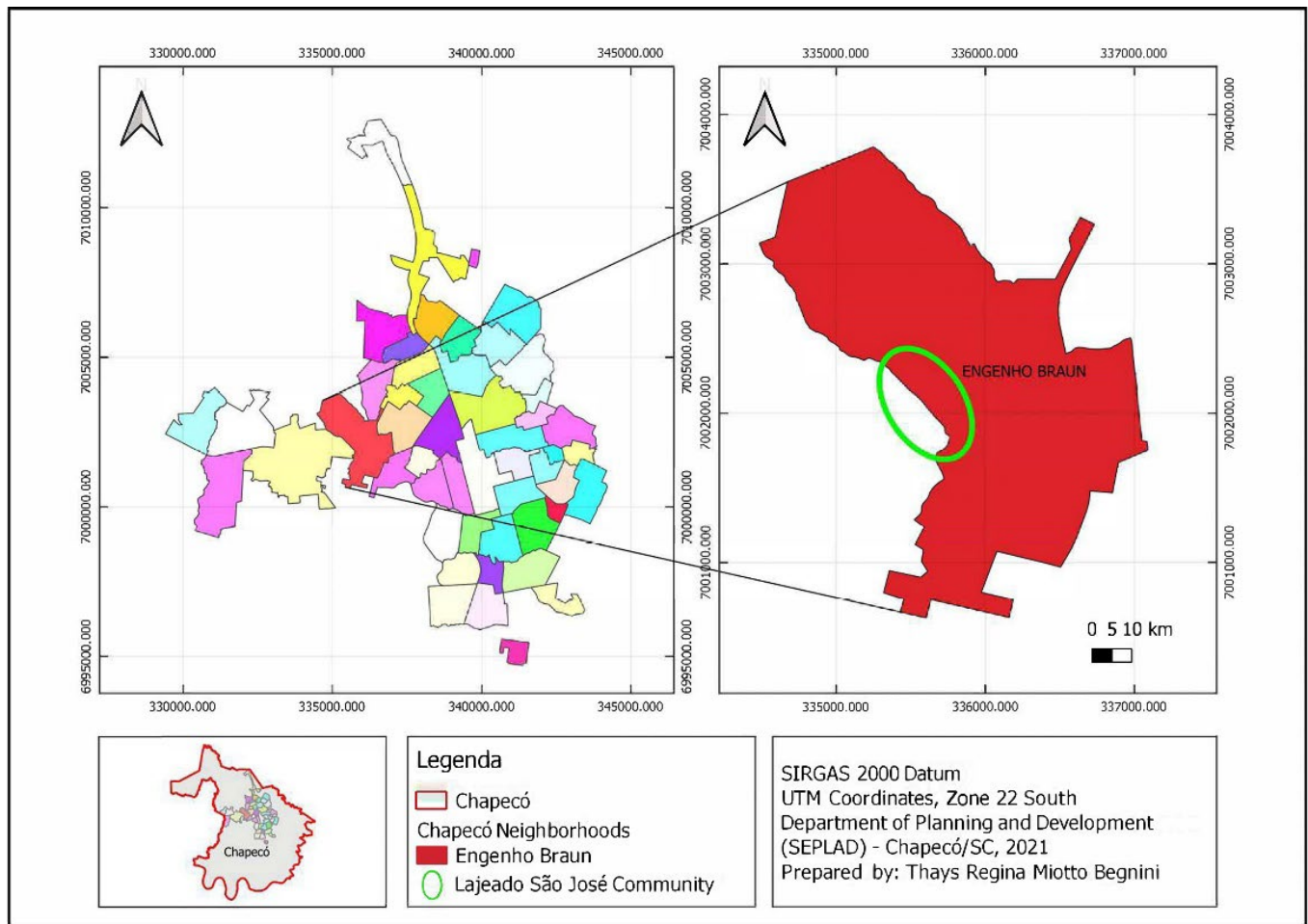
### 3. Methodological procedures

The methodological framework of the present investigation was based on applied research using a qualitative-quantitative approach characterized as exploratory and descriptive (Ludke & André, 1986; Gil, 2002; Minayo et al., 2011). The search for answers to the research objectives was conducted through a multi-case study design (Yin, 2005), with data collection carried out through semi-structured interviews with peripheral women living in the city of Chapecó, Santa Catarina.

For area selection, characteristics related to basic sanitation dimensions, as well as land regularization status, were considered. Two areas were selected: Lajeado São José Community – partially composed of irregular settlements – located in the Engenho Braun neighborhood (Figure 1), and Vila Rica neighborhood – a regularized area – (Figure 2), both located within the municipality's urban perimeter.

Based on field visits to Lajeado São José Community and information provided by female leadership within the study area, 48 families currently reside there. It is important to emphasize that the area is located near the municipality's main water intake source, Lajeado São José, and that some households are situated within Permanent Preservation Areas. Vila Rica neighborhood, in turn, is home to approximately 400 families, according to field observations and information provided by local female leadership. The neighborhood is predominantly composed of families previously living in irregular settlements in Chapecó who were relocated through land regularization processes.

Both locations have organized women's groups that meet regularly for activities such as lectures, training courses, and, most importantly, social interaction and advocacy aimed at improving community and neighborhood conditions. Therefore, interviews were conducted within these groups. All participating women were invited to take part in the study. In Lajeado São José Community, data collection resulted in 24 participants, corresponding to 50% of households in the area. In Vila Rica neighborhood,



**Figure 1**

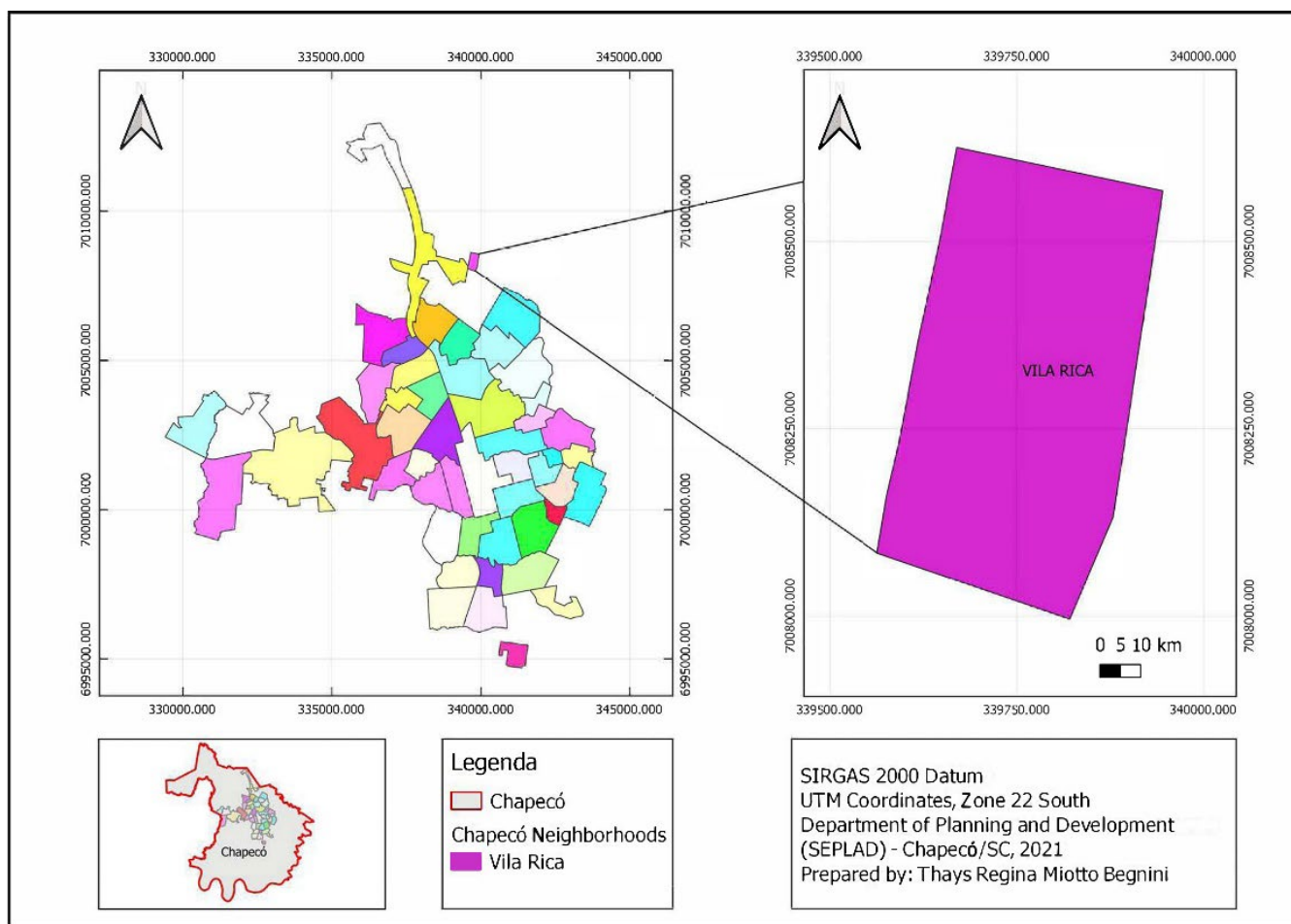
Location of Lajeado São José Community in the Engenho Braun neighborhood.

18 women were interviewed, corresponding to 45% of group members and 4.5% of households in the neighborhood.

Women aged over 18 years residing in the study areas were included in the research. To ensure data consistency, only one woman per household was interviewed. Women not residing in the study areas, such as visitors or temporary individuals, were excluded from the sample. Data collection took place during the last quarter of 2022.

The interview guide included multiple-choice and open-ended questions. To facilitate analysis, especially of open-ended responses, interviews were audio-recorded and subsequently transcribed. Multiple-choice questions were presented and analyzed using descriptive statistics. Open-ended responses were analyzed using Bardin's (1977) Content Analysis methodology.

Responses to open-ended questions were identified by the abbreviations LSJ, referring to Lajeado São José, and VR, referring to Vila Rica. Each abbreviation was followed by a number ranging from 1 to 24 for Lajeado São José Community and from 1 to 18 for Vila Rica neighborhood.



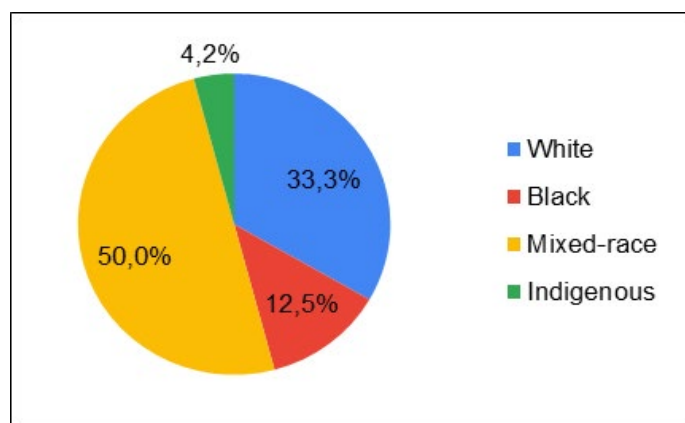
**Figure 2**  
 Location of Vila Rica neighborhood.

## 4. Results and discussions

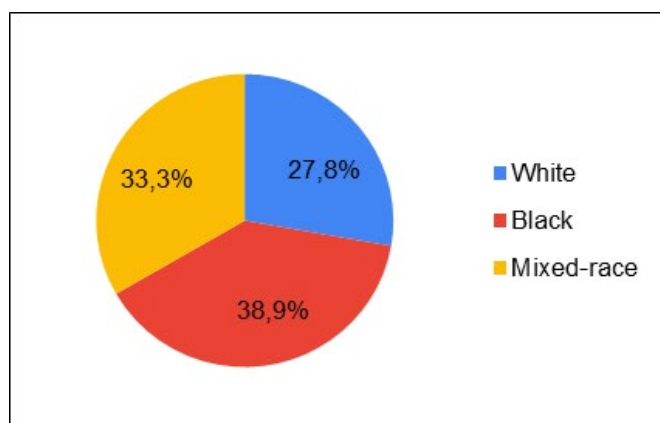
This section first presents and discusses the socioeconomic profile data of the interviewees, followed by results specifically related to the four dimensions of basic sanitation.

### 4.1. Socioeconomic profile

Grounded in the theoretical framework addressing the lack/precariousness of sanitation services through a racial perspective, participants were initially asked about the race with which they identify (Figures 3 and 4). It is important to emphasize that in both locations, Black, mixed-race, and Indigenous women represented the majority, accounting for approximately or more than 70% of participants. When these figures are compared with data from the 2022 Census (Instituto Brasileiro de Geografia e Estatística [IBGE], 2022), a significant inversion is observed in relation to Santa Catarina state and the municipality of Chapecó. Whereas White women constitute a minority in the two peripheral communities analyzed, census data indicate that White individuals account for 76.28% of the population in Santa Catarina and 69.25% in Chapecó. This contrast highlights how race



**Figure 3** Self-identified race of women from Lajeado São José Community.

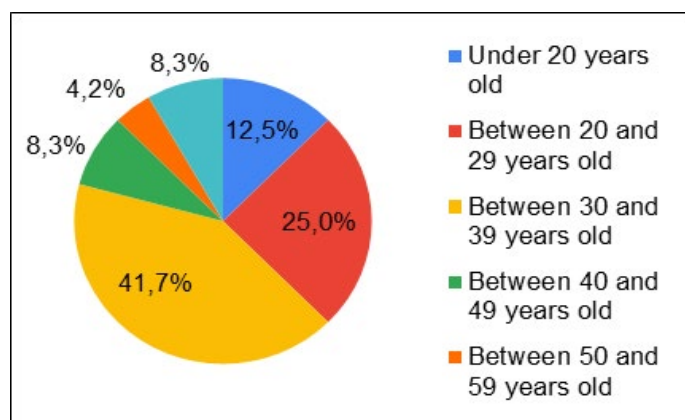


**Figure 4** Self-identified race of women from Vila Rica neighborhood.

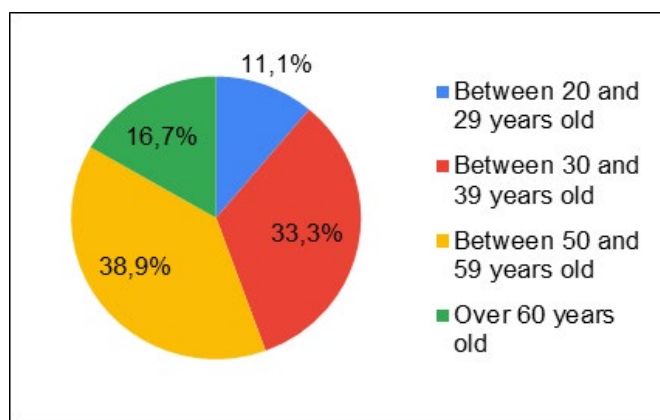
directly intersects with the configuration of peripheral territories and as will be demonstrated later with inequalities in access to sanitation services.

The following question addressed participants' age. As shown in Figures 5 and 6, women living in Lajeado São José Community were generally younger than those residing in Vila Rica neighborhood. While most women in Lajeado were between 30 and 39 years old, the predominant age group in Vila Rica ranged from 50 to 59 years.

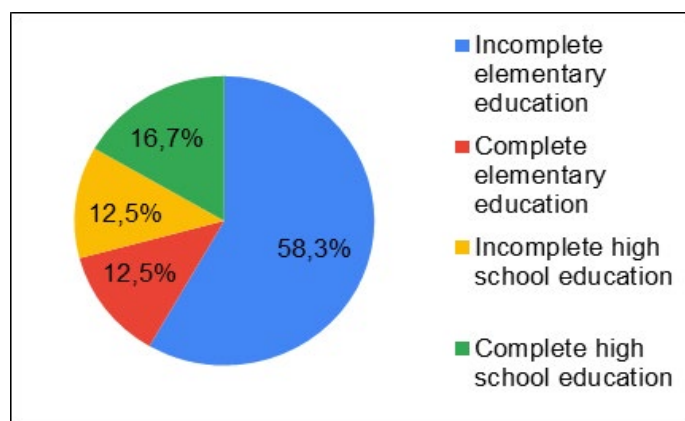
Regarding educational attainment, participants were asked to indicate their highest level of education, ranging from incomplete elementary education to completed higher education. In Lajeado São José Community (Figure 7), 58.3% of women had not completed elementary education, while the highest educational level achieved, completed secondary education, accounted for 16.7%. In Vila Rica neighborhood (Figure 8), 50% had not completed elementary education. Notably, in Vila Rica, 11.1% of women had completed vocational technical education or higher education, with qualifications in health care-related fields (one nursing technician and one registered nurse). When compared with the most recent census data (IBGE, 2022), individuals without formal education or with incomplete elementary education represent 27.57% of the state population and 23.77% of the municipal population, indicating that these percentages are proportionally



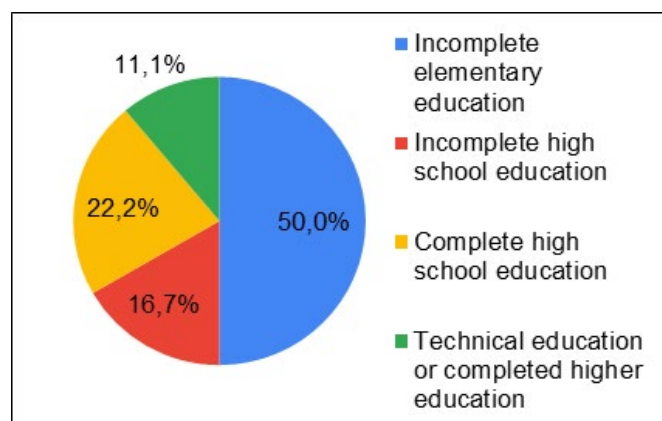
**Figure 5** Age group of women from Lajeado São José Community.



**Figure 6** Age group of women from Vila Rica neighborhood.



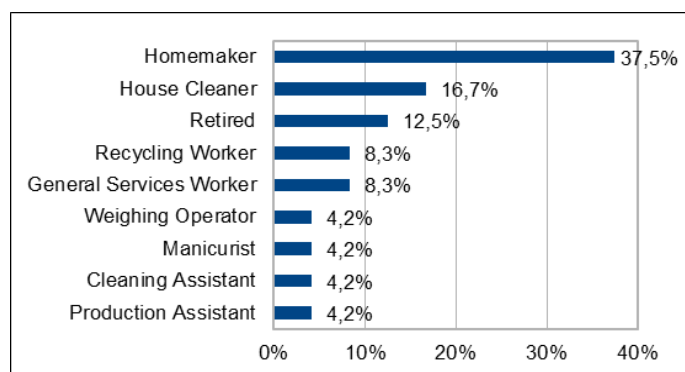
**Figure 7** Educational attainment of women from Lajeado São José Community.



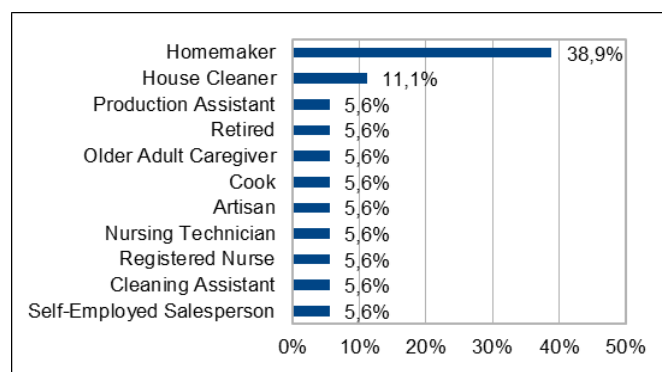
**Figure 8** Educational attainment of women from Vila Rica neighborhood.

much higher in the investigated communities. This discrepancy reinforces the intersection between educational attainment and race, given that, as previously noted, Black, mixed-race, and Indigenous women constitute the majority in these locations. Thus, low educational attainment cannot be dissociated from race, as both factors operate jointly in intensifying social vulnerability, restricting employment and income opportunities and, consequently, contributing to the concentration of these women in peripheral territories, where urban precarity and the absence of basic services become even more evident.

Participants were then asked about their occupation/profession, and the results are presented in Figures 9 and 10. Considerable variation in occupations was observed in both locations; however, approximately 40% of women identified themselves as homemakers. House cleaning services also emerged as the most frequent paid occupation, encompassing 16.7% of women in Lajeado São José Community and 11.1% in Vila Rica neighborhood.

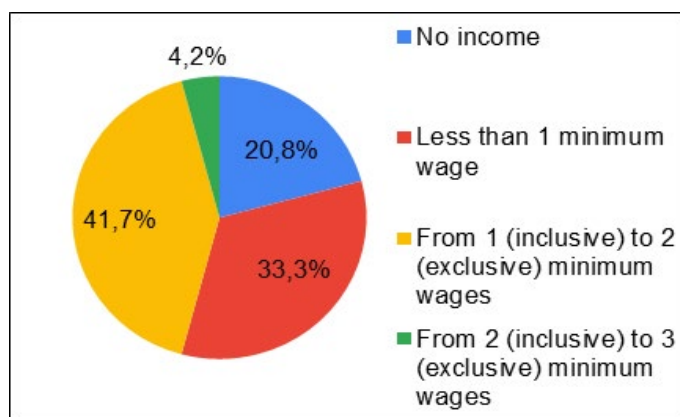


**Figure 9** Occupation/profession of women from Lajeado São José Community.

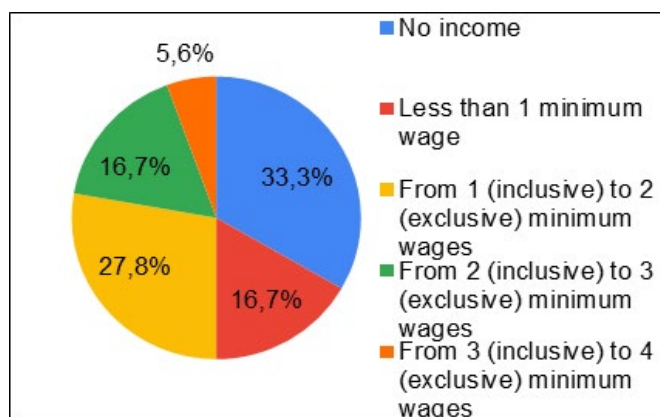


**Figure 10** Occupation/profession of women from Vila Rica neighborhood.

Participants were subsequently asked about their average monthly income. Results shown in Figures 11 and 12 indicate that in Lajeado São José Community, 20.8% of women reported having no income, while an



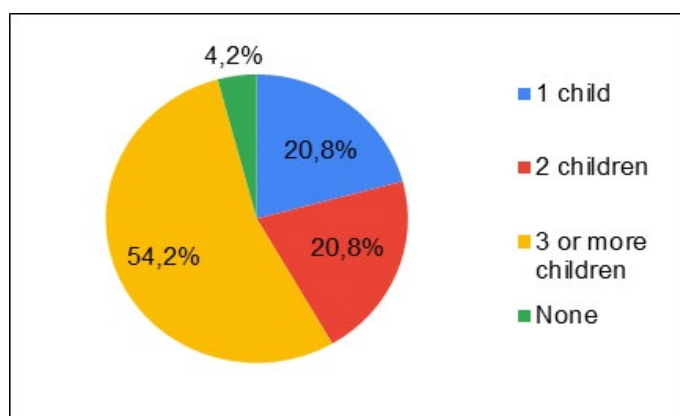
**Figure 11** Average monthly income of women from Lajeado São José Community.



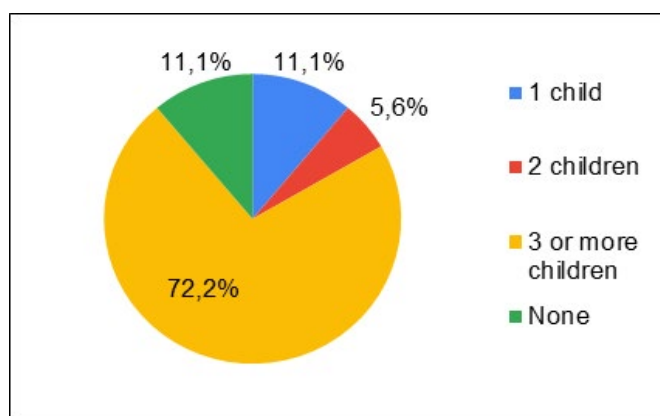
**Figure 12** Average monthly income of women from Vila Rica neighborhood.

additional 33.3% earned less than one minimum wage; the highest income category reached up to three minimum wages (4.2%). In Vila Rica neighborhood, 33.3% reported having no income, while another 16.7% earned less than one minimum wage. The highest income range corresponded to 3 (inclusive) to 4 (exclusive) minimum wages, representing a modest 5.6% of respondents.

Results regarding the number of children are presented in Figures 13 and 14. In Lajeado São José Community, 54.2% of women reported having three or more children (with one case involving eight children). Only 4.2% reported having no children. Similarly, in Vila Rica neighborhood, 72.2% of women reported having three or more children (including cases of nine children). Compared with Lajeado São José Community, Vila Rica had a higher proportion of women with larger families, which may be associated, among other factors, with the older age profile observed in Figure 6.

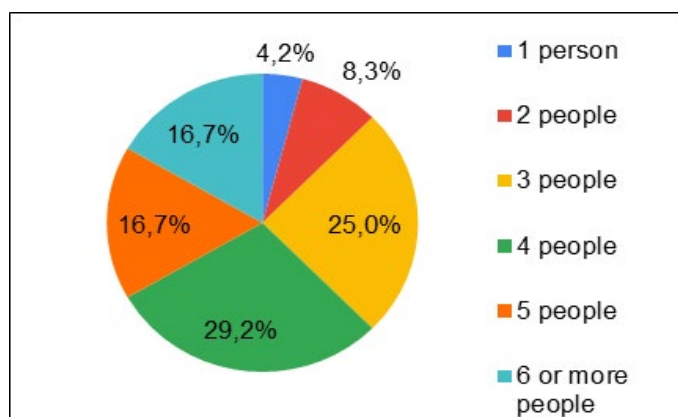


**Figure 13** Number of children among women from Lajeado São José Community.

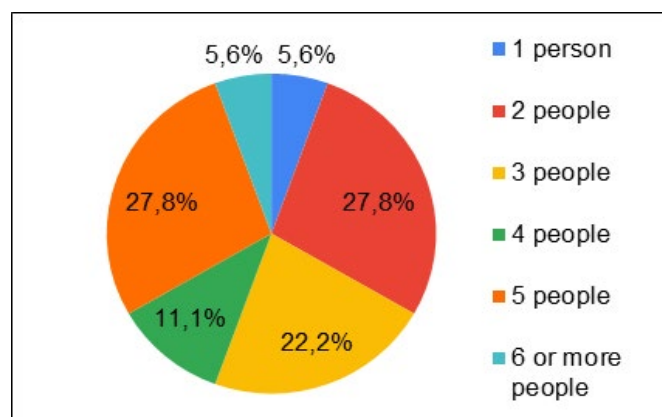


**Figure 14** Number of children among women from Vila Rica neighborhood.

Regarding household size (Figures 15 and 16), in Lajeado São José Community, 4.2% of women reported living alone, while at the opposite extreme, 16.7% indicated living in households with six or more people. In Vila Rica neighborhood, 5.6% lived alone, and compared with Lajeado São



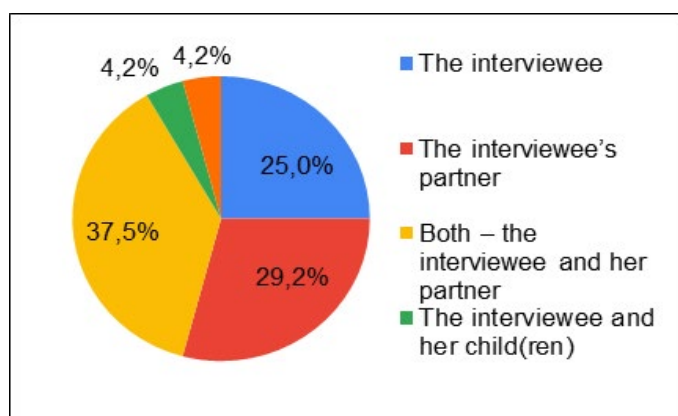
**Figure 15** Number of people living in households of women from Lajeado São José Community.



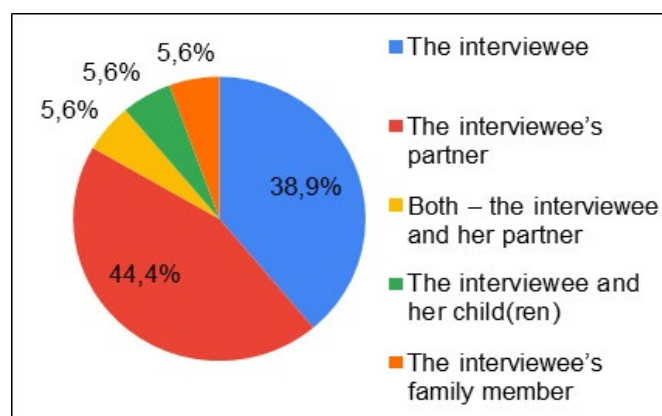
**Figure 16** Number of people living in households of women from Vila Rica neighborhood.

José, a lower proportion (5.6%) fell within the category of six or more household members.

Participants were then asked about the primary financial provider in the household, considered the head of the family, and results are presented in Figures 17 and 18. In Lajeado São José Community, 25% of women reported being the primary providers in their households, while 37.5% shared this responsibility with their partner. In Vila Rica neighborhood, 38.9% were the primary providers, whereas 5.6% shared financial responsibility with their partner. In both locations, the number of female-headed households closely approximated the number of households solely supported by men, placing these communities near the Brazilian average according to data from the Instituto de Pesquisa Econômica Aplicada (IPEA, 2017).

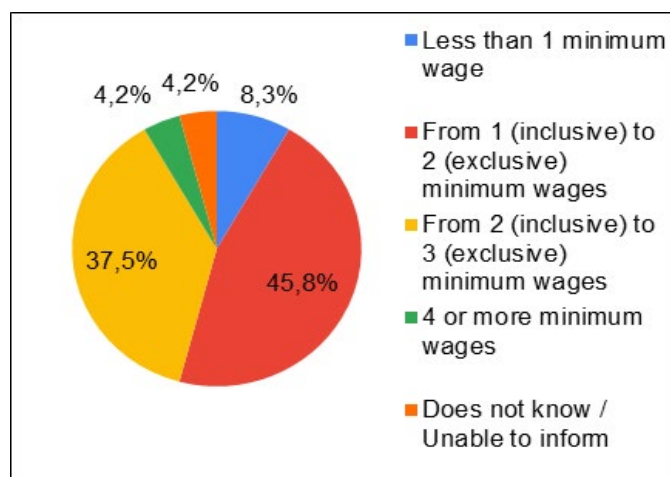


**Figure 17** Primary financial provider in households of women from Lajeado São José Community.

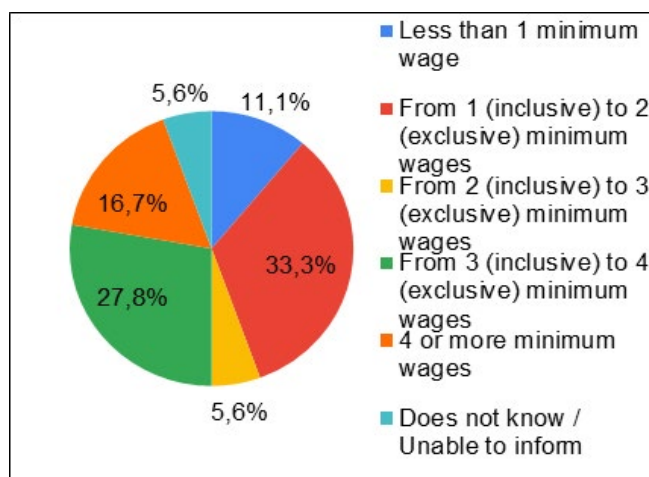


**Figure 18** Primary financial provider in households of women from Vila Rica neighborhood.

Participants were subsequently asked about average household income (Figures 19 and 20). In Lajeado São José Community, 54.1% of households lived on less than two minimum wages. Only 4.2% of respondents reported household incomes exceeding four minimum wages. Considering that 62.6% of women lived in households with more than four residents (Figure 15), the financial difficulties experienced by these families can be



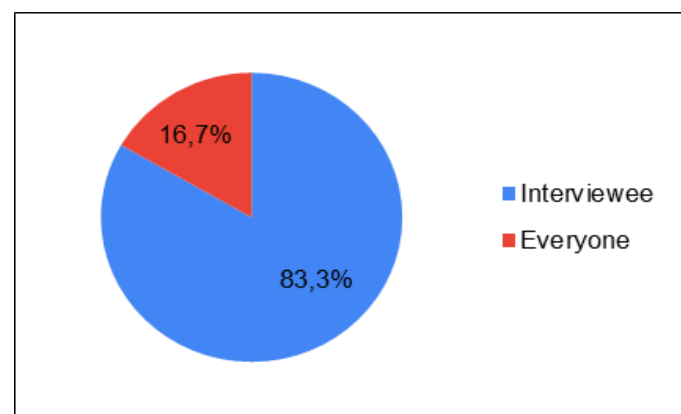
**Figure 19** Average household income of women from Lajeado São José Community.



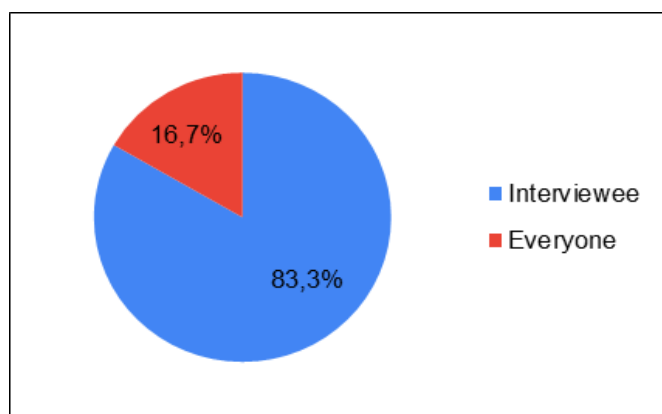
**Figure 20** Average household income of women from Vila Rica neighborhood.

inferred. Vila Rica neighborhood generally exhibited higher household income levels. Although 44.4% of households lived on less than two minimum wages, 44.5% reported household incomes equal to or above three minimum wages.

Finally, information was gathered regarding the primary person responsible for household care. Identical results were observed in both locations: 83.3% of women reported being primarily responsible for domestic work, whereas in only 16.7% of households this responsibility was shared among all residents (Figures 21 and 22).



**Figure 21** Primary person responsible for household care in Lajeado São José Community.

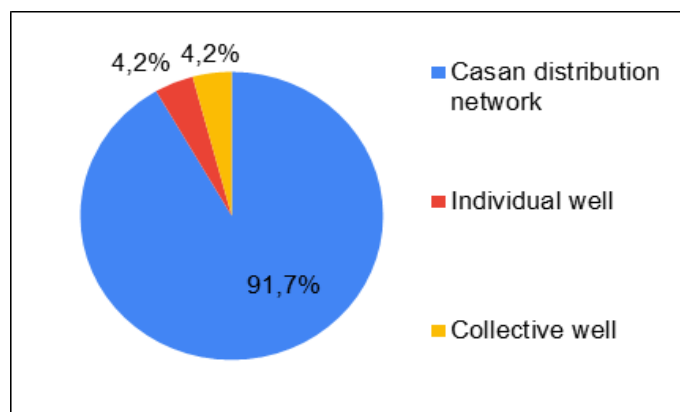


**Figure 22** Primary person responsible for household care in Vila Rica neighborhood.

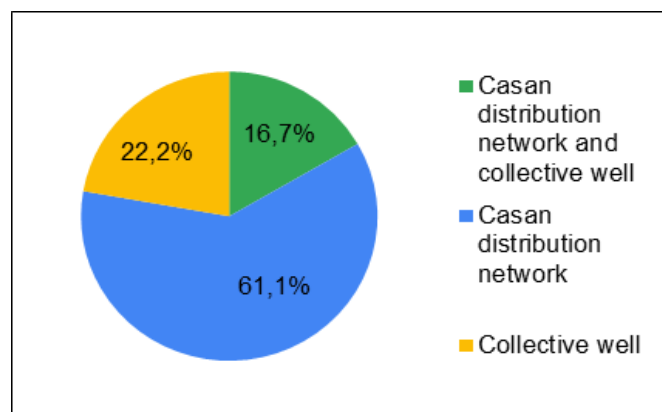
These findings support the notion that women experience longer working hours than men, since, in addition to participating in the labor market, they remain primarily responsible for domestic work. According to Figures 9 and 10, excluding homemakers and retired women, 58.3% of women residing in Lajeado São José Community and 55.5% of those living in Vila Rica neighborhood also participate in the formal labor market. This represents yet another example of gender inequality.

## 4.2. Diagnostic situation of basic sanitation dimensions

Regarding sanitation systems, participants were initially asked about the form of household water supply. Results presented in Figures 23 and 24 demonstrate that 91.7% of women residing in Lajeado São José Community are connected to the water distribution network of Santa Catarina Water and Sanitation Company (Casan). It is important to note, however, that in part of the community there is a single water meter, and the water bill is shared under a condominium arrangement. Only two interviewees (8.4%) reported using individual or collective wells. In Vila Rica neighborhood, in turn, Casan's distribution network serves 61.1% of women, 22.2% use a collective neighborhood well, and 16.7% rely on mixed solutions.



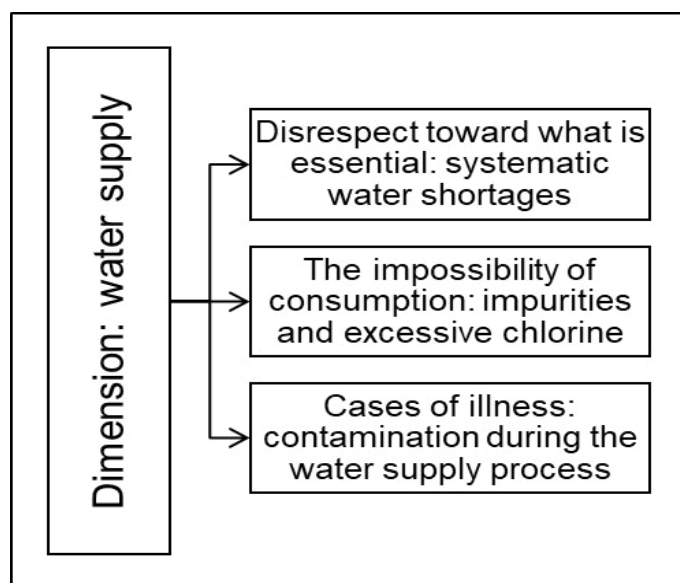
**Figure 23** Water supply source in Lajeado São José Community.



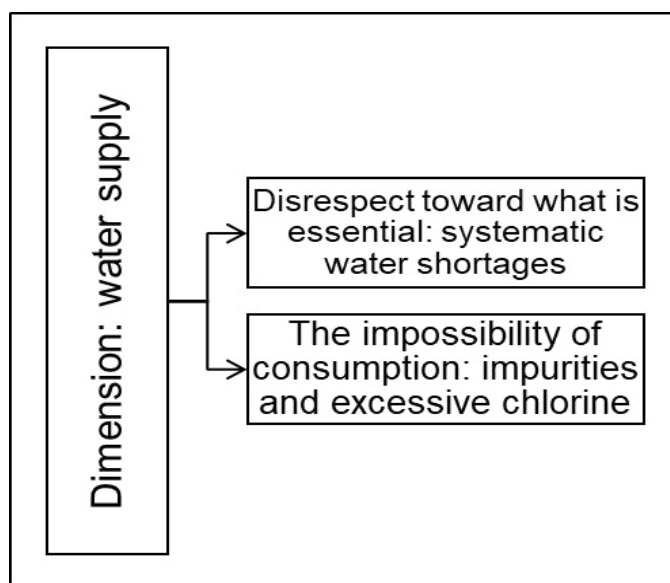
**Figure 24** Water supply source in Vila Rica neighborhood.

At this point in the interview, an open-ended question was included to encourage participants to freely discuss problems related to water availability. Responses were organized and classified into emerging analytical categories based on identifying and highlighting the most representative terms and expressions from each analytical unit derived from participants' answers. Figures 25 and 26 summarize the categories identified for each locality.

Both in Lajeado São José Community and Vila Rica neighborhood, the first group of analytical units resulted in a category entitled **Disrespect toward what is essential: systematic – water – shortages**. Water unavailability – *During the summer, water shortages are very frequent. We have gone up to 3 days without water* (VR13) – prevents the performance of basic activities such as personal hygiene. It also reveals difficulties experienced by children, who are sometimes unable to attend school. Statements such as [...] *I even told the teacher at school today that the children would not come tomorrow because today there wasn't even [water] to cook [...]. They came back all dirty from daycare, and it becomes very difficult when you have children [...]* (LSJ23) reinforce Felicio's (2021) argument that women are disproportionately affected by inadequate sanitation services because they are primarily responsible for household work and caregiving duties.



**Figure 25** Summary of categories related to the water supply dimension in Lajeado São José Community.



**Figure 26** Summary of categories related to the water supply dimension in Vila Rica neighborhood.

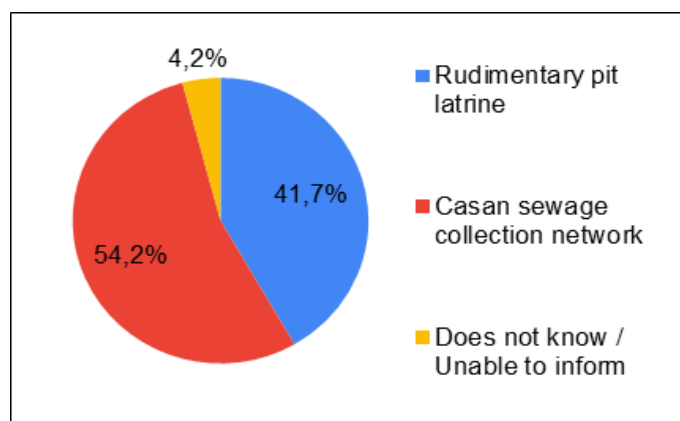
Furthermore, as previously discussed (BRK Ambiental, 2018), gender inequalities associated with water scarcity become even more evident, as they directly affect women's specific needs, including basic menstrual hygiene management – [...] *I get very irritated because I would like to shower, but I can't* (LSJ13).

The second category emerging in both locations was entitled **The impossibility of consumption: impurities and excessive chlorine**. Responses in this category highlight problems related to water potability, as several interviewees reported being unable to use the supplied water for drinking, food preparation, or washing clothes: *It has already come [through the pipes] with too much chlorine. When we spend 2 or 3 days without water, it comes back very black, dirty, dark. They say it is dirt from the pipes* (LSJ13).

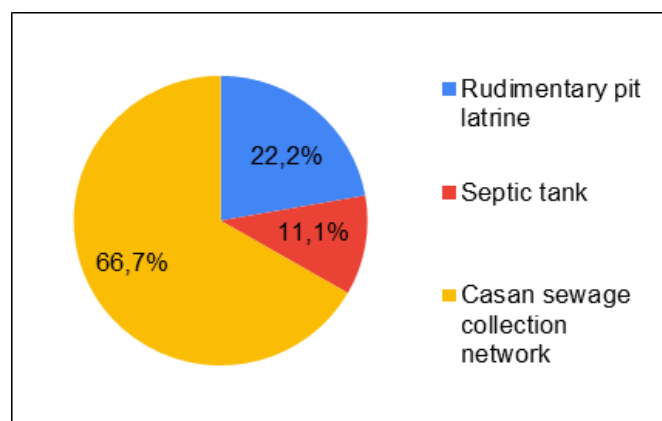
The final analytical category, identified exclusively in Lajeado São José Community, was **Cases of illness: contamination during the water supply process**. Although problems involving water availability and potability were common in both locations, their severity and magnitude were greater in Lajeado São José, where cases of illness linked to water consumption were reported: *My children have had severe stomach pain very often [...]. Tests were performed, and it was confirmed that it was because of the water [...]. This week [mentions son's name] missed daycare for 2 days because of stomach pain* (LSJ5).

Regarding sewage disposal, 54.2% of women residing in Lajeado São José reported using Casan's sewage collection network, while 41.7% still relied on rudimentary pits (Figure 27). In fact, there is a sewage collection network covering housing units located in the regularized section of the community. However, this figure is considered overestimated, as considerable misunderstanding exists among participants regarding what effec-

tively constitutes a sewage collection network. In Vila Rica neighborhood, 66.7% reported using Casan's network, 22.2% relied on rudimentary pits, and 11.1% used individual systems involving septic tanks (Figure 28). It is important to clarify that Vila Rica neighborhood has a collective septic tank system built by the municipality. Thus, references to a collection network do not correspond to a system connected to the municipal Wastewater Treatment Plant.

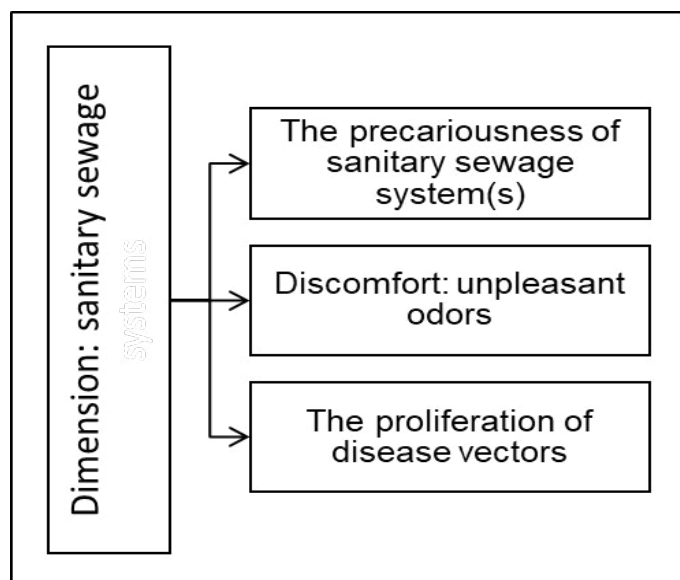


**Figure 27** Sewage disposal systems in Lajeado São José Community.

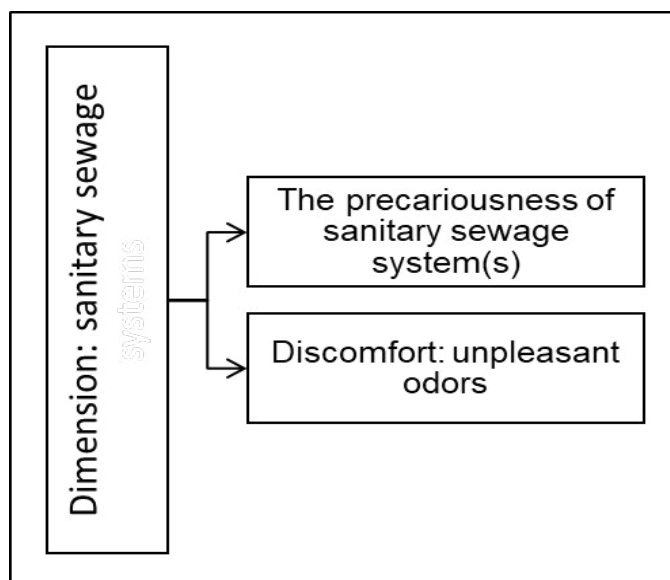


**Figure 28** Sewage disposal systems in Vila Rica neighborhood.

As conducted for the water dimension, participants were asked open-ended questions about sanitation-related problems, and responses were categorized as shown in Figures 29 and 30.



**Figure 29** Summary of categories related to sanitary sewage systems in Lajeado São José Community.



**Figure 30** Summary of categories related to sanitary sewage systems in Vila Rica neighborhood.

The first category identified was **The precariousness of sewage systems**. In Lajeado São José Community, responses indicated that although

sanitation infrastructure had improved in some aspects, such as no longer discharging directly into the Lajeado stream, the current disposal system remains inadequate.

In both neighborhoods, as shown in Figures 27 and 28, sewage disposal in several households occurs through rudimentary stone-lined pits known locally as “fossas negras” – *Sewage is our problem. It’s a stone pit, but it fills up [...] (VR3) –*. The use of rudimentary pits reflects the lack of urban infrastructure in these areas, where public sewage networks are unavailable. Residents therefore rely on disposal alternatives compatible with their socioeconomic reality. However, even households connected to sanitation systems frequently experience inefficiencies, with recurrent blockages and pipeline failures: *Every now and then, it bursts there in front [...] (LSJ10)*.

The second category identified was **Discomfort: unpleasant odors**. Statements such as [...] *There is that strong smell. Sometimes eating lunch at noon becomes very difficult because the smell is very strong (LSJ20)* and *I think there is too much exposed sewage, a lot of bad smell, and then diseases come, right, from that dirty water (VR1)* indicate that unpleasant odors disproportionately affect women who spend more time at home, such as retirees and homemakers.

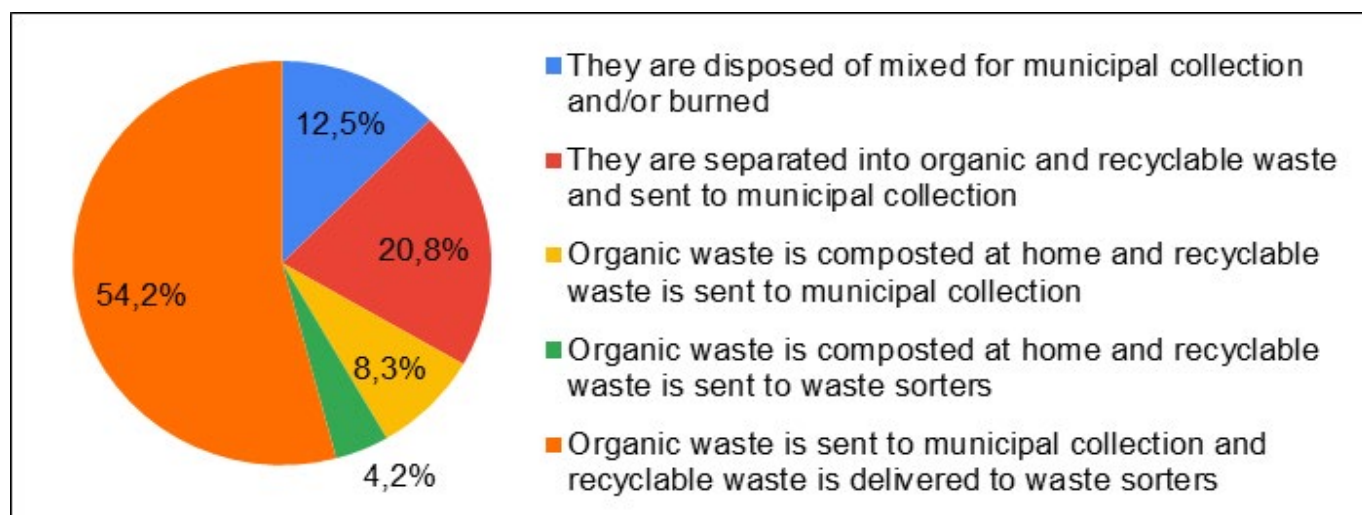
The final category, identified exclusively in Lajeado São José Community, was **The proliferation of disease vectors**. Similar to unpleasant odors, problems within this category arise from inadequate sewage systems: *There are people washing clothes and letting the wastewater flow outside, and that creates odor. Mud accumulates and mosquitoes gather there (LSJ18); [...] And animals – cockroaches, spiders, and sometimes even rats. Recently there was one in the bathroom drain, but it could not come up because of the drain cover (LSJ21)*.

As observed regarding water supply, women from both communities experience sanitation-related challenges. However, residents of Lajeado São José Community face more severe and complex conditions.

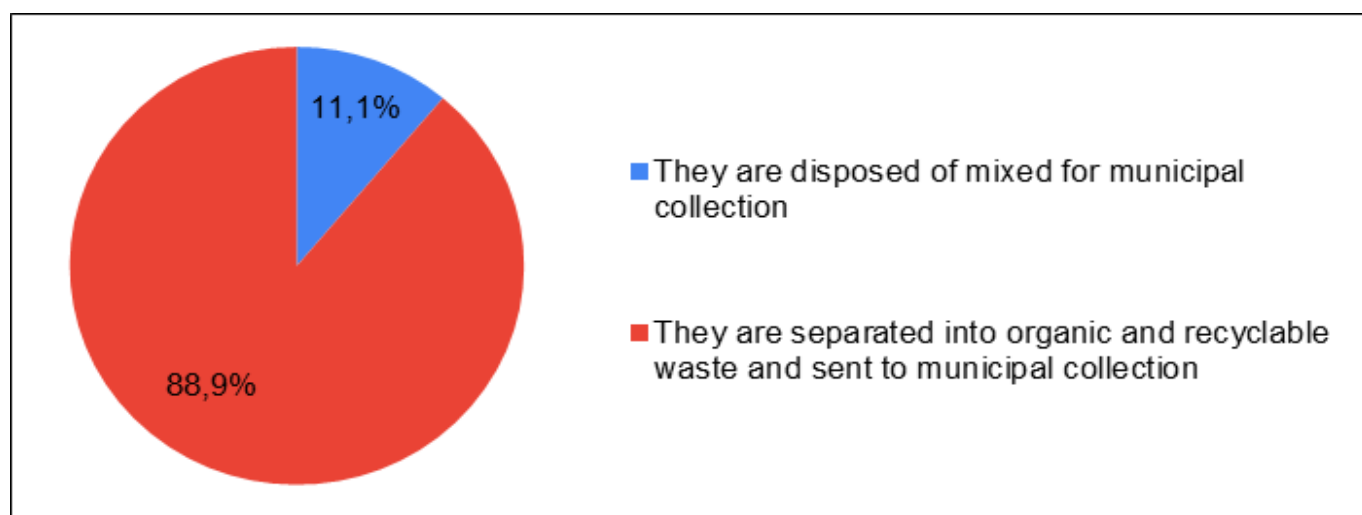
Participants were subsequently asked about household solid waste disposal methods. Figure 31 indicates that in Lajeado São José, 54.2% of women direct organic waste to municipal collection and recyclable materials to waste collectors/sorting workers because a recycling association exists within the neighborhood. Another 12.5% reported sending mixed waste to selective collection or, more critically, burning it. A small but important proportion (4.2%) reported composting organic waste at home while sending recyclables to the recycling association, indicating potential environmental awareness regarding waste disposal.

Whereas disposal practices varied considerably in Lajeado São José, Figure 32 demonstrates that in Vila Rica neighborhood the vast majority (88.9%) separate organic and recyclable waste for selective collection. Another 11.1% dispose of waste in mixed form.

Regarding selective collection frequency, 58.3% of women residing in



**Figure 31** Solid waste disposal methods in Lajeado São José Community.

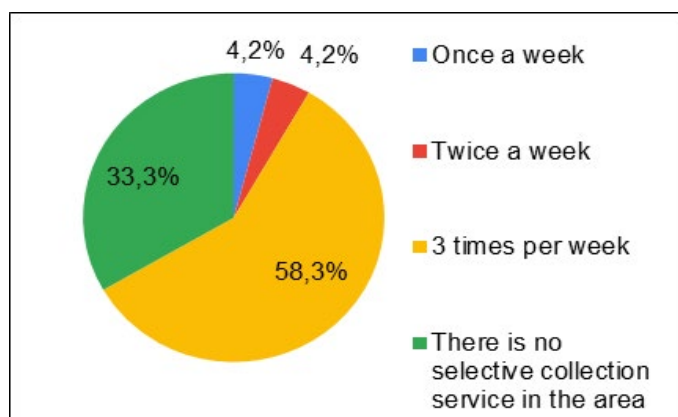


**Figure 32** Solid waste disposal methods in Vila Rica neighborhood.

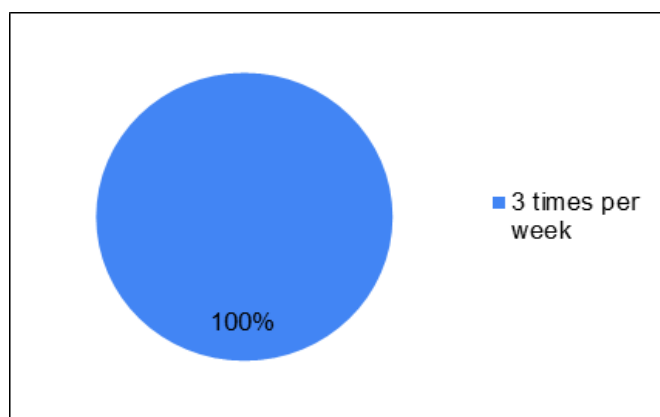
Lajeado São José Community reported that collection occurs three times per week, while 33.3% indicated that selective collection services are unavailable in the region (Figure 33). Indeed, municipal selective collection does not cover the irregular section of the community. In Vila Rica neighborhood, responses were unanimous: 100% reported municipal collection occurring three times per week, consistent with the municipal schedule (Figure 34).

Regarding the “solid waste disposal” dimension, the open-ended question led to the emergence of the categories presented in Figures 35 and 36.

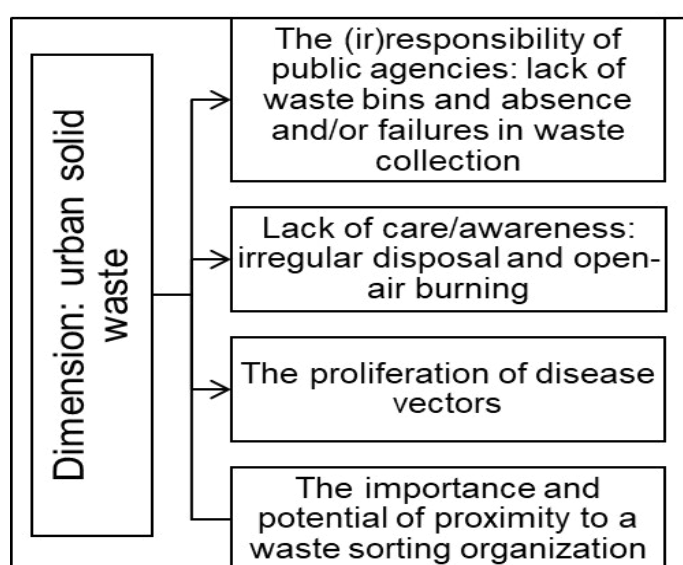
The first category identified in both communities was entitled **The (ir) responsibility of public agencies: lack of waste bins and absence and/or failures in waste collection**. Although grouped under the same category, reflecting problems resulting from public service inefficiency, the difficulties faced in each location differ. In Lajeado São José Community, particularly in the irregular settlement area, there is no waste collection system; therefore, residents dispose of waste in neighboring communities:



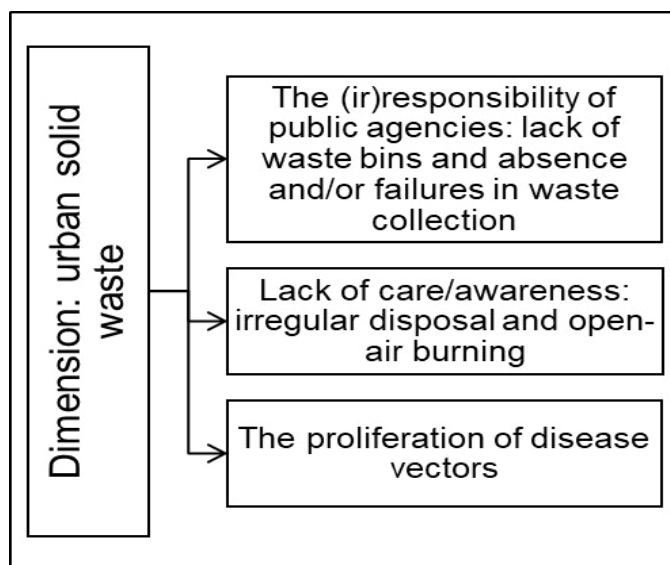
**Figure 33** Frequency of selective collection in Lajeado São José Community.



**Figure 34** Frequency of selective collection in Vila Rica neighborhood.



**Figure 35** Summary of categories related to the urban solid waste dimension in Lajeado São José Community.



**Figure 36** Summary of categories related to the urban solid waste dimension in Vila Rica neighborhood.

*The only problem is that we have to take it there. I have a small baby, so I have to take both the trash and the baby, and it's far away (LSJ3); There are containers, but they are about a 20-minute walk away (LSJ22).*

Vila Rica neighborhood, in contrast, is covered by the municipal solid waste collection system through door-to-door collection services. In this neighborhood, problems were mainly related to the insufficient number of containers and/or waste bins and failures in collection services provided by the responsible company. As participants reported: *We have to take it to the corner so the garbage collector can pick it up. But sometimes the garbage truck passes by and leaves some things behind while taking others [...] (VR9).* The result is waste accumulation in streets and its dispersal by animals: *People have already asked them [the city government] to bring some containers, but they don't. People throw everything in the street, others take trash there and leave it there. Dogs come and rummage through the garbage; it's terrible (VR1).*

The second emerging category was **Lack of care/awareness: irregular disposal and open-air burning**. In this category, it becomes evident that in Lajeado São José Community, the absence of waste collection services leads residents to dispose of waste improperly, either through burning or disposal in inappropriate locations: [...] *Many people throw garbage around because of the difficulty of having to take it far away* (LSJ5); *Every now and then some neighbors leave garbage out front to burn* [...] (LSJ10). In Vila Rica neighborhood, problems involving irregular waste disposal were mainly associated with the lack of suitable temporary storage facilities (which relates to the previous category). It was also observed that residents dispose of waste in vacant lots to keep it away from their homes: *There are [problems], but it's people who sometimes pile things up near the neighborhood entrance where there is an empty lot and throw things there* [...] (VR14); *There is a lot [of garbage] on the streets* (VR18).

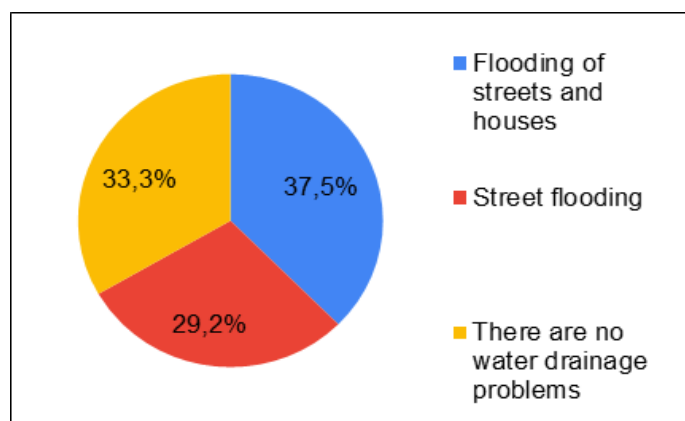
The following category identified in both locations was entitled **The proliferation of disease vectors**. This category is understood as connected to the previous ones, as inadequate waste disposal attracts vectors such as rats, cockroaches, and mosquitoes, which are potential disease carriers. In addition to inadequate waste disposal practices, women from Lajeado São José Community reported that the recycling association located near their homes strongly attracts these vectors: *There is a problem with rats and cockroaches because next to my house there is a recycling shed* (LSJ12).

Despite these disturbances, this recycling site has become an important reference point for community waste disposal. As previously shown in Figure 31, 58.4% of women direct their waste to waste sorters, largely because of proximity to both the facility and the people working there.

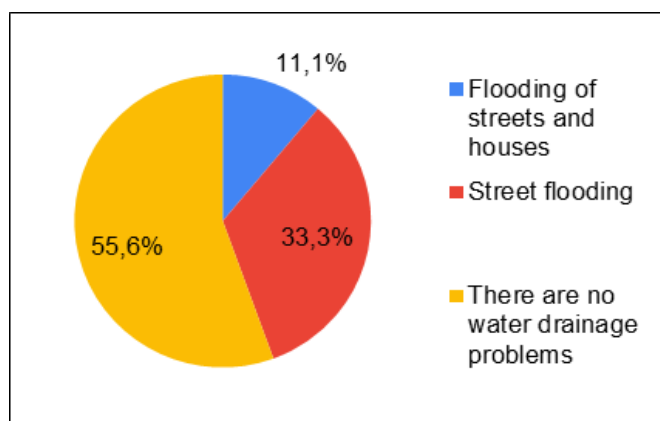
Based on this analysis, a fourth and final category emerged, exclusive to Lajeado São José Community: **The importance and potential of proximity to a waste sorting organization**. Women clearly recognize the importance of recycling facilities – *I separate everything, then I take recyclables to the recycling shed* [...] (LSJ15); *We separate everything because my mother-in-law works with recycling, so we send recyclables to her* (LSJ13) – although they also report problems associated with vector attraction. Thus, it is understood that actions aimed at improving sanitation conditions at the site, combined with educational workshops on proper waste separation, could strengthen ties with the community and further leverage recycling practices.

Finally, focusing on urban drainage issues, participants were asked about problems related to continuous and/or intense rainfall events, and results are presented in Figures 37 and 38. As Vila Rica is a better-structured neighborhood, its drainage-related problems are visibly less severe.

House flooding, for example, occurs at substantially lower rates. Notably, more than half (55.6%) of respondents reported no drainage-related problems.



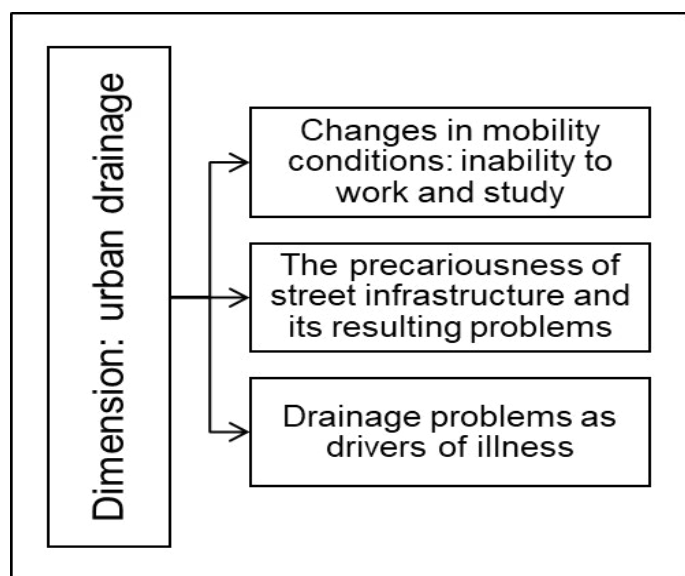
**Figure 37** Immediate consequences of rainfall events in Lajeado São José Community.



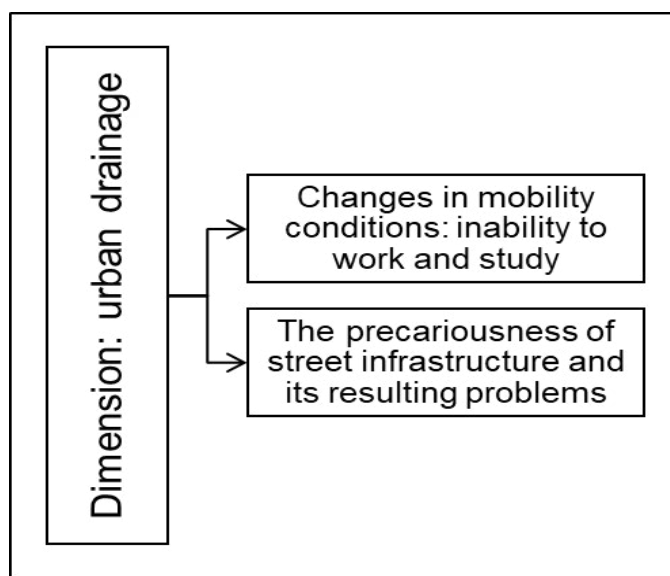
**Figure 38** Immediate consequences of rainfall events in Vila Rica neighborhood.

Notably, due to proximity to the watercourse, events occurring in Lajeado São José Community are conceptually classified as flooding.

The open-ended question regarding the final sanitation dimension – urban drainage – resulted in the analytical categories presented in Figures 39 and 40.



**Figure 39** Summary of categories related to the urban drainage dimension in Lajeado São José Community.



**Figure 40** Summary of categories related to the urban drainage dimension in Vila Rica neighborhood.

The first category identified in both neighborhoods was entitled **Changes in mobility conditions: inability to work and study**. This category highlights that beyond being denied access to adequate sanitation services, women are prevented from leaving home to work and perform daily activities. In addition, they face challenges involving their children, who are also unable to attend school: *We can't get through there [when it rains]. My daughters have already missed school because of flooding. I also missed work. I would just call my boss saying I couldn't go and send pictures*

*as proof* (LSJ7); *There are many [problems]. The streets flood, and it becomes very difficult to get out* (VR17).

The second category was entitled **the precariousness of street infrastructure and its resulting problems**. Beyond mobility-related difficulties discussed previously, respondents reported material losses – [...] *My wardrobe and my baby's wardrobe were ruined recently; everything got soaked [...]* *The problem is cleaning everything afterward* (LSJ4) – the need to carry out extensive cleaning activities after flooding – *My house has never flooded, but at my mother's house we spent the morning removing water because everything flooded. Many houses did* (VR1) – and problems associated with sanitary sewage systems, including flooded pits and resulting sewage overflows.

The final category was exclusive to Lajeado São José Community and was entitled **Drainage problems as drivers of illness**. Multiple reports described children and adults becoming ill after exposure to floodwater. Reported illnesses were primarily associated with inadequate solid waste disposal and precarious sewage infrastructure: *When it rains heavily, garbage comes with the water and stays here. Children have gotten sick because of flooding – I have seen 3 or 4 who became ill after walking through floodwater. Flooding brings diseases and mosquitoes* (LSJ5).

Given the scenario presented here, it is important to mention that, regarding public policy, the Municipal Basic Sanitation Plan (PMSB) (Chapecó, 2021) addresses social vulnerability in generic terms, such as expanding service coverage in underserved areas and adopting universalization guidelines that prioritize investments in sectors with greater deficits. By avoiding explicitly identifying social groups or specific territories, such as urban peripheral communities, the document limits both identification of beneficiaries and evaluation of how inequalities are being addressed.

Furthermore, the findings presented here, which reveal precarious sanitation conditions in the peripheral areas studied, indicate that PMSB's generic approach creates challenges in translating plans into concrete improvements. This gap highlights that without clearly defining priority groups or territories, planned actions tend to reproduce existing inequalities, disproportionately benefiting different areas of the city and hindering equitable access to essential services.

Notably, a considerable period elapsed between data collection conducted at the end of 2022 and publication of this article, which may have allowed implementation of measures not reflected in the present analysis.

## 5. Final considerations

The socioeconomic profile revealed that most participants self-identified as Black, mixed-race, or Indigenous, which, combined with low educational attainment and low income levels, constitutes a scenario of multiple social

vulnerabilities. A substantial proportion of these women hold low-paying occupations or have no personal income at all. Furthermore, they carry significant responsibility for family support, accumulating workloads that combine paid activities, when present, with responsibilities related to household management and childcare. This intersection of gender, race, and class intensifies inequalities and limits these women's access to opportunities for social mobility.

The analysis of the four sanitation dimensions revealed the breadth of the challenges faced by these women, with conditions experienced in Lajeado São José Community being more severe and complex than those observed in Vila Rica neighborhood. In general terms, regarding water supply, persistent failures, contamination, and the unavailability of water for safe consumption stand out. Concerning sanitary sewage systems, the existence of rudimentary pits and inefficient systems exposes families to disease risks and daily discomfort. In solid waste management, the absence of service coverage in irregular settlements forces unsafe disposal practices, favoring vector proliferation. In urban drainage, flooding compromises mobility rights, causes material losses, and increases illness risks.

By being required to face precarious sanitation services daily, these women not only suffer from the denial of fundamental rights but also experience the concrete effects of environmental racism, as risks and impacts arising from structural exclusion disproportionately affect them, i.e., a racialized population.

Ultimately, it can be concluded that periphery cannot be treated as a generic term encompassing all realities equally. It is necessary to recognize that there are peripheries within peripheries and, therefore, public policies must account for local specificities. It is possible to affirm that peripheral women are the first to perceive and experience the impacts of inadequate sanitation services. In this regard, carefully listening to what these women have to say, complain about, and suggest may contribute substantially to decision-making by public – environmental – managers and professionals in Environmental and Sanitary Engineering.

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