



## **ANALYSIS OF SOCIO-ENVIRONMENTAL, ECONOMIC AND SANITARY ASPECTS OF AN INFORMAL SETTLEMENT IN THE MUNICIPALITY OF GUARULHOS, SP**

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### **ABSTRACT**

The objective of this study was to analyse the socioenvironmental, economic and sanitary aspects of an informal settlement located in the neighborhood of Parque São Luiz, in the municipality of Guarulhos, state of São Paulo. It is an anthropized area on the right bank of the Cocho Velho stream, part of the Baquirivu Guaçu river, a tributary of the Tietê river. In order to better understand human impact on the local environment, we carried out a geographical characterization of the site using satellite images, a historical survey of the occupation through in loco visits, literature data, and an evaluation of the socio-environmental, economic and sanitary indicators. To this end, residents of 34 homes were formally interviewed. The number of dwellers varied from one to four per household. The mean age of the interviewees was 33.4 years old (SD = 13.75; min = 12; max = 63). The results revealed lack of sanitary sewage in all residences, inadequate ventilation due to the absence of windows in 23.5% of them, and 29% of the residents stated that their garbage is dumped directly into the river and agglomeration of people in 32% of households (more than four inhabitants), presence of synanthropic animals inside all houses, among other socio-

environmental aspects with a strong influence on human and environmental health. This investigation revealed situations of inequities in terms of health and socio-environmental vulnerability, to which the population of this informal settlement is exposed. This is especially due to overlapping risks, such as precarious health, poor housing, low income and educational level. It was concluded that there is a need for a closer look from public management at such local issues and the development of programs and actions aiming to improve the living conditions of this population.

**KEYWORDS:** Subnormal agglomerates; Environmental degradation; public health policy.

## **ANÁLISE DE ASPECTOS SOCIOAMBIENTAIS, ECONÔMICOS E SANITÁRIOS DE UM ASSENTAMENTO INFORMAL NO MUNICÍPIO DE GUARULHOS, SP**

### **RESUMO**

O presente estudo teve por objetivo analisar aspectos socioambientais, econômicos e sanitários em um assentamento informal localizado em Guarulhos, SP, no bairro Parque São Luiz. Trata-se de uma área antropizada à margem direita do córrego Cocho Velho, trecho do rio Baquirivu Guaçu, afluente do rio Tietê. A fim de melhor compreender a degradação causada nesse ambiente, foi realizada uma caracterização geográfica do local por imagem de satélite, um levantamento pessoal e em periódico do histórico da ocupação e de indicadores socioambientais, econômicos e sanitários. Para tal, os residentes de 34 moradias foram entrevistados formalmente. O número de residente variou um e mais quatro por moradia e a idade média foi de  $33,36 \pm 13,75$ , sendo a mínima de 12 e a máxima de 63 anos. Os resultados revelaram a falta de esgotamento sanitário em 91% das moradias, ventilação inadequada em 23,5% devido à ausência de janelas, lixo descartado diretamente no rio por 29% dos moradores, aglomeração de pessoas em 32% das residências (mais de quatro moradores) e a presença de animais sinantrópicos no interior de todas as casas, entre outros aspectos socioambientais com forte influência na saúde humana e ambiental. A análise evidenciou situações de iniquidades em saúde e de vulnerabilidade socioambiental, as quais a população local está exposta, especialmente pela sobreposição de riscos, como a precariedade sanitária, habitacional, educacional e a baixa renda. Concluiu-se que há necessidade de um olhar mais atento da gestão pública para a problemática local e o desenvolvimento de ações e programas voltados à melhoria das condições de vida daquela população.

**PALAVRAS-CHAVE:** aglomerados subnormais; degradação ambiental; política de saúde pública.

### **INTRODUCTION**

Most Brazilian municipalities present problems related to different forms of irregular occupations, resulting from the housing deficit that affects a socially excluded population. Throughout the 20th century, the urbanization and housing policy promoted by the state of São Paulo became an exclusionary process for a large part of the population (BALTRUSIS, 2004; BALTRUSIS; MOURAD, 2014).

This socially excluded parcel of society occupies peripheral districts of the cities, either in tenements or other types of precarious housing. The increasing speculation in real estate, especially in the larger cities, caused this poorer population to agglomerate in clandestine dwellings or informal settlements, characterized by irregularly subdivided land areas without legal registration and

deprivation of public services. The people occupying these areas are violating the law of property; however, this is by necessity and not by choice (COSTA, 2014).

The bourgeoisie associated to the European movement for the hygienist reform began the construction of avenues and implementation of basic sanitation during the industrial period. This movement created forms of illegal housing or “favelas” in the peripheral area of several growing cities (BALTRUSIS, 2004, BALTRUSIS, MOURAD, 2014).

This movement of unbridled urbanization, accompanied by the emergence of favelas (possible spelling mistake) also occurred in the Municipality of Guarulhos, located in the northern sector of the São Paulo Metropolitan Region, which is composed by another 38 municipalities. Guarulhos has 47 neighborhoods and an estimated population of 1,349,113 inhabitants, according to the Brazilian Institute of Geography and Statistics – IBGE (2017). It is the second most populous city in the state of São Paulo, the 13<sup>th</sup> most populous municipality in Brazil and the first among those that are not a state capital (OLIVEIRA et al., 2010, NOVAES, 2012, VARGAS et al., 2018, PREFEITURA DE GUARULHOS, 2019).

Guarulhos has the ninth largest GDP in Brazil and the second largest among the municipalities of São Paulo. It is also in a rapid process of urban expansion, due to industrial, road and airport development. Unfortunately, this economic potential has not been converted into a better quality of life for the larger part of its population. This is mostly due to the inefficiency of urban planning (NOVAES, 2012; OLIVEIRA et al., 2018; VARGAS et al., 2018).

Its rapid urban expansion forced the poorest population to develop informal settlements in the outskirts of Guarulhos. The first favela dates from 1970 and there were 343 in 2002, which are occupying environmentally protected areas on the native forested hillsides and along watercourses (NOVAES, 2012; OLIVEIRA et al., 2018; VARGAS et al., 2018).

This process of irregular occupation becomes even more damaging, because 32% of Guarulhos is comprised by Atlantic Forest fragments, including the Cabuçu Nucleus of the Cantareira State Park, which are protected by federal laws. Unfortunately, the invasion of these conservation areas has increased considerably, and they are under serious social and environmental impact (SUSTAINABLE CITIES PROGRAM, 2017).

The process of urban growth requires new land for building, but it does not justify the degradation of the vegetation, soil and water courses. This environment degradation ends up directly affecting the quality of human life regarding health, safety and well-being (NASCIMENTO, 2007; CORAZZA et al., 2018, VARGAS et al., 2018). Jacobi et al. (2015a) remind us of the importance of implementing programs to recover urban streams and rivers because of their ecosystem services, such as water supply as well as aesthetic, cultural and leisure aspects, favoring a better quality of life for the population.

Informal settlements normally grow along water courses and are the main cause for their degradation, mostly due to lack of sanitation. This process of contamination is aggravated by its own residents which adopt environmentally unfriendly practices as a consequence of their low educational level. Thus, the absence of adequate sanitation services and the inefficiency of environmental and health education are factors that have a special impact on the health of people living in low-income urban settings (BRASIL, 2015; SIQUEIRA et al., 2017; SILVA et al., 2017; OLIVEIRA et al., 2018). Obviously, health equity in urban settings can be improved through public interventions like the construction of sewage services,





were also inquired about the possible sharing with unfamiliar residents of sanitary facilities in their homes and the way in which the packaging and disposal of their garbage was carried out, as well as whether there was or not regular public garbage collection in the area.

Regarding the health indicators, the residents were inquired about access to public health services and the quality of service provided by the public ambulatory serving their neighborhood; the presence or absence of sick individuals at home; age of the patient; the type of illness and whether the patient was under treatment; occurrence of respiratory diseases, like asthma, rhinitis, pneumonia or infection of the airways.

Socio-demographic, housing, sanitation and health conditions were described using means and proportions. The research was duly authorized by the Research Ethics Committee (Protocol CAAE 88749217.4.0000.5512).

## RESULTS AND DISCUSSION

The interviews were conducted in 34 of the 281 households in the study area, representing 12.1%. The low adherence of the population to participate in the research was mostly attributed to a situation of distrust as the residents are not accustomed to regular visits of health professionals. This is due to the fact that there are no public health assistance programs in the settlement area, such as the Family Health Strategy. Besides, some residents alleged that the settlement people fear interacting with an unknown person, especially if he/she does not work or reside in the area. They were also afraid of the consequences of their answers, as they felt these could be used to “remove them from there”.

### SOCIAL, DEMOGRAPHIC AND ECONOMIC DATA

The mean age of the interviewees was 33.36 years old (yo) [Standard deviation (st): 13.75; minimum age (min):12 yo; maximum age (max): 63 yo]. The number of residents per household ranged from 1 to more than 4: 1 house (3%) with 1 resident; 9 houses (27%) with 2 residents; 4 houses (12%) with 3 residents; 9 houses (27%) with 4 residents and 10 houses (29%) with more than four residents.

Table 1 summarizes the data for schooling, employment and familial gross income.

**TABLE 1.** Social, demographic and economic data for the community of Cocho Velho, Municipality of Guarulhos.

<b><i>Number of residents per household</i></b>	<b><i>[number of houses (%)]</i></b>
1	1 (3%)
2	9 (26.5%)
3	4 (12%)
4	9 (26.5%)
4>	11 (32%)
<b><i>Schooling</i></b>	<b><i>[number of houses (%)]</i></b>
None	0 (0%)
1° to 5° grade	13 (38%)
6° a 9° grade	7 (21%)
Secondary school	13 (38%)
College/Undergrad	1 (3%)
<b><i>Number of working residents per household</i></b>	<b><i>[number of houses (%)]</i></b>

None	2 (6%)
Retired	3 (9%)
1	9 (26%)
2	15 (44%)
3	4 (12%)
4	1 (3%)
<b>Family gross income</b>	<b>[number of houses (%)]</b>
None	2 (6%)
1 minimum waiver	18 (53%)
2 minimum waivers	13 (38%)
Up to 5 minimum waivers	1 (3%)

### HOUSING CONDITIONS DATA

Regarding housing conditions, the majority had an electric power grid, the residences were masonry made, had at least one window and the floor had impermeable covering. Table 2 summarizes the data gathered for housing conditions in the Cocho Velho community.

**TABLE 2.** Household conditions in the community of Cocho Velho, Municipality of Guarulhos.

<b>Construction material</b>	<b>[number of houses (%)]</b>
Masonry	28 (82%)
Wooden	6 (18%)
<b>Presence/Absence of windows</b>	<b>[number of houses (%)]</b>
Yes	26 (76%)
No	8 (24%)
<b>Number of windows</b>	<b>[number of houses (%)]</b>
None	8 (23%)
1	6 (18%)
2	8 (23%)
3	6 (18%)
3>	6 (18%)
<b>Presence/Absence of floor covering</b>	<b>[number of houses (%)]</b>
Yes	26 (76%)
No	8 (24%)
<b>Presence/Absence of electric power grid</b>	<b>[number of houses (%)]</b>
Yes	33 (97%)
No	1 (3%)

### HOUSEHOLD SANITARY CONDITIONS

All interviewees (100%) stated that they did not have access to sanitary sewage in their homes. Most of the residences (91%) were supplied by the public treated water system and presented minimal sanitary installation (porcelain toilet).

Regarding waste disposal, 94% of the households were serviced by the public garbage collection system three times a week. However, in the eventual absence of

garbage collection, 29% of the residents stated that the garbage is dumped directly into the river, accounting for unhealthy living conditions, pollution and flooding.

Rodent, cockroaches and other insects were reported in all residences. Pets inhabit 32% of the Cocho Velho community houses, constantly interacting with the synanthropic animals.

Table 3 summarizes the sanitary conditions for the homes in the Cocho Velho community.

**TABLE 3.** Sanitary conditions of dwellings of interviewees of the community Cocho Velho, Municipality of Guarulhos, SP.

<b>Public sanitary sewage system</b>	<b>[number of houses (%)]</b>
Yes	0 (0%)
No	34 (100%)
<b>Public treated water servicing</b>	<b>[number of houses (%)]</b>
Yes	31 (91%)
No	3 (9%)
<b>Public garbage collection</b>	<b>[number of houses (%)]</b>
Yes	32 (94%)
No	2 (6%)
<b>Garbage collection per week (days)</b>	<b>[number of houses (%)]</b>
None	2 (6%)
3	32 (94%)
<b>Garbage destination (collection fail)</b>	<b>[number of houses (%)]</b>
By the house	16 (47%)
Away from the house	8 (24%)
Into the river	10 (29%)
<b>Waste packaging habits</b>	<b>[number of houses (%)]</b>
Private owned container kept outside the house	13 (38%)
Private owned container kept inside the house	12 (35%)
Any container available kept outside the house	3 (9%)
No container (plastic bags)	3 (9%)
Other	3 (9%)
<b>Presence of synanthropic animals</b>	<b>[number of houses (%)]</b>
Rodents/ cockroaches/ other insects	34 (100%)
<b>Presence of pets</b>	<b>[number of houses (%)]</b>
Yes	11 (32%)
No	23 (68%)
<b>Presence of sanitary instalation</b>	<b>[number of houses (%)]</b>
Yes	31 (91%)
No	3 (9%)
<b>Toilet material</b>	<b>[number of houses (%)]</b>
Porcelain	31 (91%)
<b>Sanitary instalaton sharing</b>	<b>[number of houses (%)]</b>
Yes	3 (9%)
No	31 (91%)

## HEALTH PRACTICES AND OCCURRENCE OF DISEASES

In general, all residents reported that they consume treated water, which can be considered a positive fact. However, this “public treated water” distributed in the community of Cocho Velho seems to start off from only one main pipe, which ramifies along the neighborhood and there are many clandestine water links as well. Besides, no one could be precise about whether the local water grid could also be connected to other sources of non-treated water, like the sewage itself. The majority of them (85%) also share the good habit of washing their hands before meals and after leaving the toilet. Regarding medical consultations, the residents (76%) declared to regularly have medical appointments, but were disappointed with the long interval between them, that could be from 3 to 6 months. Finally, 79% of the residents said to have their vaccination card up-to-date, but there was no opportunity to check any of them. About the prevalence of diseases, 46% of the interviewees or somebody else in their household declared suffering of respiratory illnesses and another quarter have chronic diseases such as diabetes or hypertension. Table 4 summarizes these health indicators.

**TABLE 4.** Sanitary and prophylactic practices of the residents from the community Cocho Velho, Municipality of Guarulhos.

<b>Drinking water source</b>	<b><i>[number of houses (%)]</i></b>
Public system	34 (100%)
<b>Washing hands before meals and after toilet</b>	<b><i>[number of houses (%)]</i></b>
Yes	29 (85%)
No	5 (15%)
<b>Regular medical appointments</b>	<b><i>[number of houses (%)]</i></b>
Yes	26 (76%)
No	8 (24%)
<b>Prevalence of diseases</b>	<b><i>[number of houses (%)]</i></b>
Respiratory	5 (46%)
Cronic	3 (27%)
Cutaneous	1 (9%)
Other	1 (9%)
<b>Vaccination card up to date</b>	<b><i>[number of houses (%)]</i></b>
Yes	27 (79%)
No or could not inform	7 (21%)

According to Porto et al. (2015), informal settlements and the socio-spatial inequalities are characterized by anthropization, socio-environmental vulnerability and population health problems (PORTO et al., 2015). All these factors were present in the Cocho Velho settlement, where the lack of basic sanitation services, presence of open sewage, accumulation of garbage, and precarious housing were the main issues exposing the local population to high health problems risks.

Approximately 15% of Guarulhos urban area communities are a product of a large number of episodes of invasions and irregular occupation of public and private land (NOVAES, 2012). The absence or inefficient public sanitation systems, especially sewage treatment, since the presence of a single sanitary installation is not sufficient, has contributed to the poor water quality of the Cachoeirinha Invernada Hydrographic Basin, which is part of the Baquirivu Guaçu River Basin. Oliveira et al.



(2018) identified high concentrations of *Escherichia coli* and high levels of BOD (Biochemical Oxygen Demand) and TO (Total Phosphorus) because of the direct discharge of sewage into watercourses derived from such communities. The informal settlement object of this study is one of the historical contributors that aggravate this environmental problem.

The Autonomous Water and Sewage Service (SAEE) is the company responsible for supplying treated drinking water and the installation of sanitation system in the Municipality of Guarulhos (CAMPOS, 2017). Unfortunately, the community that inhabits the area along the Cocho Velho stream has not benefited much from its public services and has thrown its sewage straight into the river ever since.

According to Jacobi et al. (2015b), the public housing policies have favored the occupation of protected watershed areas by the most socioeconomically vulnerable parcel of the population. This practice is the cause for the degradation of these important ecosystems. The consequences are the contamination of the water, the water shortage and the lower quality of life for the residents itself.

Almost all the current households of the oldest section of the informal settlement of the Parque São Luiz neighborhood are masonry made. According to Aranha et al. (2006), this type of construction represents an improvement in the quality of life of the residents. However, they help to conceal that the real environmental issues, like the raw sewage being drained straight into the river from these houses, remain unresolved.

Besides, despite being masonry built, the precarious conditions of some houses were evidenced by the insufficient number of windows, absence of impermeable flooring and lack of sanitary and electric installations. According to Pasternak (2016), these factors can increase the risk of disease transmission.

Aranha et al. (2006) also directly linked the health condition of a population to the adequacy of their housing in terms of basic sanitation and overall environmental conditions. Precarious health conditions were associated with the number of residences that still did not have their garbage collected or that inadequately discarded it around their own residence.

In this study, it was observed that in almost half of the households, residents presented respiratory diseases (asthma, rinite, bronchopneumonia and pneumonia), as well as dermatological diseases, diabetes and hypertension. Also, according to Pasternak (2016), the high prevalence of respiratory diseases observed in the study may be associated with the presence of mold due to poor ventilation and poor waterproofing of the soil, walls or cover.

The agglomeration of people inside a home provides a greater risk of acute lower respiratory diseases and greater environmental pollution, especially in small and precarious housing, as identified in the present study. Similarly, studies carried out in informal settlements in the cities of Londrina (State of Paraná), in Porto Alegre (State of Rio Grande do Sul), Grajaú (State of São Paulo) and Favela da Rocinha (State of Rio de Janeiro) found an average of 4 to 5 inhabitants suffering of respiratory illnesses (ARANHA et al., 2006).

## CONCLUSION

The households of the oldest section of the informal settlement of the Cocho Velho Stream were masonry constructed in comparison to the wooden ones recently placed in the most recent occupation section of this neighborhood.

These masonry houses possess impermeable floor covering, sanitary facilities, treated water supply and electric lighting. These are factors that may favor the adoption of better sanitary and hygienic practices, with less impact on human and environmental health.

Most of the residences had insufficient number of windows, depriving the houses of enough ventilation and favoring the prevalence and transmission of respiratory diseases in the local population.

The whole informal settlement lacks a public sewage drainage system, contributing to water born disease transmission.

This study evidenced the urge for public management programs aiming to improve the quality of life of the Cocho Velho community population and the recovery of the local ecosystem to its native condition.

Such programs could be based in the integration between human, animal and environmental health (Single Health – One Health) (GERBREYES et al., 2014, BENITEZ et al., 2016, OIE, 2018).

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