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Analysis of inclusion in the public transportation of people with reduced mobility that live in segregated areas

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Abstract

This research aims to analyze the inclusion in public transportation for people with mobility restrictions who live in segregated areas, composing a portion of society that besides the physical condition they are in, permanently or temporarily, belong to the less wealthy economic class. The methodology was based in the investigate the pattern of travel of this population. The results of this analysis showed perceptions about mobility urban of the people socio-spatial segregated in the Brazilian city of Salvador, Bahia.

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1. Introduction

The urbanization process in Brazilian cities is characterized by the expulsion of the population that has lower purchasing power of urban centers to the periphery, contributing to the social exclusion of this class, which meets urban mobility achieved by the difficulty in accessing the desired urban facilities. This resulting increase in this form of urbanization has led to setting up a framework of extreme social inequality.

The case study of this research project - Canabrava neighborhood in the city of Salvador, Bahia - represents a scenario of segregation and social exclusion, since, even if it is geographically located in the central area of the city, is pretty far from the places that hold the diversity of services and attractiveness, which are mostly concentrated on the waterfront and the city's commercial center, also emphasizing that this socio-spatial segregation confining Canabrava dwellers is further evidenced, principally, by the precarious basic road and transport infrastructure.

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The occupation of Canabrava neighborhood occurred initially through referral seized by the Town of natural disasters (rain) homeless that were affected by slopes landslides occupied in other areas of the city. On occupying Canabrava, the population continued its occupation of the steep terrain of the neighborhood, especially the unemployed seeking survival by the disposal of city's solid waste, for three decades since 1970.

People with mobility restrictions add the amount released by statistics research related to disabled people, covering all individuals who present difficulties to move for any reason, permanently or temporarily, generating effective reduction of mobility, flexibility, coordination and perception, which also include those who are over sixty years old, pregnant women, nursing mothers, people with infants and obese.

2. Characterization of Inclusion in Public Transport - Brazil

This work is based on the premise that the losses entailed to those dependent on a precarious public transportation are socio-spatially segregated, people who often encounter difficulties to use the basic functions that the urban environment offers, still intensifying more that social exclusion when dealing with people with low mobility. Thus, given the need to reflect on the importance of the service offered by public transportation to make proper urban mobility, the subject is presented in the following topics.

2.1. Brazilian Policy on Urban Mobility

Urban transport is one of the four basic functions of the city - the movement - priority to ensure the functionality of the other three, which are: housing, work and leisure. Nowadays, with the exaggerated increase in car use, planning and traffic management in the urban environment has become one of the main actions of the public authorities, in order to avoid damage to the dehumanization of the city.

Law No. 12,587, also titled Law of Urban Mobility (Brazil, 2012), establishes the National Policy on Urban Mobility in Brazil, requiring all municipalities with over 20,000 inhabitants approve and enjoy sustainable results in planning and traffic management and urban transportation. Previous to this, Law No. 10,257 (Brazil, 2001), known as the City Statute, mandated that all municipalities with over 200 thousand inhabitants had their Master Plan for Urban Development (PDDU). According to Vasconcellos (2012) these legal instruments define (in the spheres of federal, state and local governments) “[...] how the space of the city can be occupied, the type use accepted in every part of it, the infrastructure of movement and allowed mode of transport, be it motorized or non-motorized”. In the definition of this planning it is required the active participation of the community in the discussion of action proposals actions with the rulers.

In a general way a plan of transportation comprises the following steps: defining the objectives and deadlines; diagnosis of transportation systems; collecting data; choosing the models to be used for evaluation of future demand; transport offer alternatives; evaluation of alternatives (costs and impacts); alternative choice; development of the transportation plan with a funding program; implementation of the alternatives according to a schedule of disbursement of funds; updating procedures.

The passenger of public transport is primarily to promote social inclusion to be the mode of motorized transport with lower unit cost and therefore more accessible to low-income population. However, many are the reasons for the decline in the performance of public transportation: “[...] concentration of population in urban areas, inadequate road infrastructure, reduction of quality of service offered by public transportation; negative image on the public transportation, among others” (Vasconcellos, 2012). Not to mention that with increased congestion people who have some financial condition end up investing in more comfort when buying a car itself, helping to make even more chaotic urban traffic, and consequently worsening the flow of public transport, among other indicators of quality of service offered by passenger public transportation.

To indicate actions that prioritize social inclusion, in other words, the care of everyone by the public transport services with quality, it is found that the required benefits include practical actions that determine achievable goals, and that will benefit all the society.

2.2. Brazilian law for inclusion of people with reduced mobility

People with mobility restrictions equate to disabled people on the concept that those people are the ones who

have impediments of physical, mental, intellectual or sensory nature, which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others, adding the representation of the disclosed statistical data that 24% of Brazilians have some kind of disability, you can not ignore the importance of transforming the urban environment into a more accessible space (IBGE 2010).

People with mobility restrictions have their needs met when laws are fulfilled, decrees and standards developed for disabled people who earn more protection by demanding their rights with Laws No. 10,048 and No. 10,098, passed by Congress national and regulated by Decree No. 5.296 (Brazil, 2004). However, for ensuring the compliance of the outstanding legislation it is necessary to define the directives of the Brazilian technical rules to be followed with the obligatory constructed environments.

The Brazilian technical, NBR 9050 (ABNT, 2004) establishes criteria and technical parameters to be observed at the time of designing, building, installation and adaptation of buildings, furniture, spaces and urban equipment for the conditions of accessibility, determining various conditions of mobility, such as prostheses, appliances support, wheelchairs, tracking canes, assistive listening systems or anything else that will complement individual needs. The NBR 14022 (ABNT, 2006) aims to meet the provisions of Decree No. 5,296 (Brazil, 2004) who guides the promotion of accessibility in vehicles of urban characteristics for collective passenger transportation. Recalling that among other requirements it is indispensable for the application of this standard the Brazilian Traffic Code (CTB), established by Law No. 9,503 (Brazil, 1997).

Emphasizing also that Law No. 12,587 (Brazil, 2012) that talks about a new policy of urban mobility, in its Article 5 provides the basic principles and guidelines to meet its goals:

- I - universal accessibility;
- II - sustainable development of cities in socio-economic and environmental dimensions;
- III - equal access of citizens to public transportation;
- IV - effectiveness and efficiency in the provision of urban transport services;
- V - democratic management and social control of the planning and evaluation of the National Policy on Urban Mobility;
- VI - safety in displacement of people;
- VII - fair distribution of benefits and burdens arising from the use of different modes and services;
- VIII - equitable use of public circulation space, roads and public parks, and
- IX - effectiveness and efficiency in urban traffic (BRAZIL, 2012).

The Convention on the Rights of Disabled People of the United Nations (UN) is the first international human rights treaty approved by Congress with equivalent constitutional amendment. The Legislative Decree No. 186 (Brazil, 2008) approved the text of this Convention in order to promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all disabled people and to promote respect for their inherent dignity.

As noted above, we agree that the current legislation protecting the rights of disabled people benefits the people with reduced mobility to minimize the physical barriers in urban areas, however, these people still complain much of attitudinal barriers, stating that it one did not exist, the other ones would be more easily minimized, being necessary to educate the society about the importance of actions that demonstrate acceptance, respect and inclusion.

2.3. Social segregation in Brazil

Brazilian studies denote the occurrence of migration to the cities and the occupation of the peripheral areas of urban centers by the lower income classes, who in search of job opportunities and without the proper technical training, end up not able to keep wages reaching close to local housing work, then, for those people with no option left to occupy homes in the vicinity, or in areas of hazards, which most often is devoid of basic infrastructure services such as sanitation, health, education and public transport, resulting in spatial segregation of this class.

The deteriorating conditions of passenger public transportation associated with urban sprawl of Brazilian cities and the fast pace of motorization are factors that increase the social exclusion of those who reside in segregated areas, areas in the outskirts of cities, far from urban centers that focus their job opportunities and

leisure major factor in ensuring social equity between citizens.

The socio-spatial segregation divided by socioeconomic classes is the way to live that is seen today, as Baltrusis (2010) observes in Article published in Brazil, *Rich and poor, each in its place (Ricos e pobres, cada qual em seu lugar)*, which brings research findings in the metropolis of São Paulo:

[...] The socio-territorial segregation has occurred in the context of Brazilian cities historically in several ways: tenements, segregated neighborhoods, high and low neighborhoods [...] is not a recent phenomenon, slums and subdivisions and closed condominiums consolidate as a paradigm of Brazilian socio-spatial segregation from the mid-1980s [...] represent two extremes of the current socio-territorial inequality in metropolitan urban context.

Marcuse (2004) contributes to the theme in Article entitled - *Enclaves yes, Ghettos No: Segregation and the State* - by exposing the differences between the socially acceptable segregation, which happens voluntarily and non-hierarchical, and also the involuntary, unwanted segregation. And he discusses the contradiction due to the existence of ghettos in a democratic society when necessary to change this setting policies are strong enough.

When the capital gets involved in fights on the urban built environment, in general it is done through the intermediation of state power (Harvey, 1980). As well as the governance of basic and road infrastructure, as reported by Rolnik (1988) by showing comparative analysis of the issue and criticize the outlying areas “[...] without water, electricity or sewage as it shows the discriminatory policy of the government, one of the strong elements that produce segregation”.

Villaça (1998) supports the idea that it is real estate that decides, through its projects, the location and shape of districts layers of high income, “[...] but blaming it for the socio-spatial exclusion is very different, as it is for the government to primarily provide basic infrastructure [...]”, including the neighborhoods occupied by low-income class located on the outskirts of Brazilian cities.

Finally, we emphasize that the problems exposed in the preceding paragraphs will be even more harmful for people with low mobility, also segregated by the limited physical or sensory condition, setting another segregating aspect for the portion of these people who have low financial income.

3. Methodology

3.1. Summary of method

The methodology developed for this study was comprised of the steps summarized below:

- 1st) Characterization barrio;
- 2nd) Survey of information on the infrastructure of the collective transport system barrio Canabrava;
- 3rd) Collection of socioeconomic data of the residents of Canabrava neighborhood in public agencies;
- 4th) Application questionnaires to residents of Canabrava neighborhood who are reduced mobility aim to know the pattern of travel of this population and what are their greatest difficulties in relation to public transport.

3.2. Application of the methodology - Case Study: The barrio Canabrava

3.2.1. Characterization barrio Canabrava

Salvador, capital of Bahia state, which currently is the third city in the Brazilian population, is divided for purposes of analysis, into four regions: (1) Suburb, characterized as areas of extreme poverty in the city; (2) Kernels is located in the central part of the city in geographical terms and is demographically dense; (3) Coast is the prime area of the city, concentrating public investment in urban infrastructure, and thus coveted by real estate production; and (4) Center composed of neighborhoods well attended services and urban equipment, covering the historic center of Salvador, historical patrimony of the city visited by tourists

worldwide.

Canabrava neighborhood, case study of this article, is located in the "Kernel" region, indicated by the letter B (See Figure 1) region, comprising about 41 districts occupying approximately 36 % of the surface of the city, with population density between 15000-25000 inhab/km². This bairro began to be occupied by the deployment of residential units for the low-income class, with its continued expansion for popular subdivisions and collective successive invasions. The neighborhood has a high declivity and its occupation, initially on the ridges, was by the homeless originating from the slopes landslides located in the neighborhoods of the city center, with continued expansion with invasions of steep terrain, because of the attraction for city solid waste disposal as a source of income. Note that Canabrava residents are also penalized for lack of a model for use planning and land occupation for the universalization of access to the city and the depreciation of the road infrastructure and transportation.

There is a marked difference in level that prevails in Canabrava neighborhood, in this bairro there are places that even showed a gap of 50 meters between the lowest and the highest elevation, one of the determinants of socio-spatial segregation that affect the local population.

3.2.2. The collective transport system of the bairro Canabrava

The system of passenger collective transport that meets the resident community in Canabrava district consists of the following lines, as quoted in Table 1 below:

Table 1. Buses serving Canabrava neighborhood.

Lines	Frequency
<i>Estação Mussurunga-Fazenda Grande</i>	each 60 min
<i>Canabrava/Nova Cidade-Lapa</i>	each 15 min
<i>Canabrava-Estação Pirajá R1</i>	each 30 min
<i>Canabrava-Estação Pirajá R2</i>	each 30 min
<i>Jardim Nova Esperança-Circular</i>	each 30 min
<i>Vale dos Rios-Trobogy</i>	each 10 min
<i>Jardim Nova Esperança-Lapa/Barra</i>	each 60 min
<i>Pituba-Trobogy</i>	each 15 min

Source: Prepared by author

From Table 1 it can be seen that the lines: *Estação Mussurunga / Fazenda Grange, Canabrava / Cidade Nova-Lapa, Canabrava / Estação Pirajá and Canabrava R1 / R2 Estação Pirajá* are from the first bus stop in Canabrava and covers the districts of outskirts of the city until Lapa Station, one of the main stations of the city and is located near the Historic Center of Salvador.

Lines: *Jardim Nova Esperança / Circular and Vale dos Rios / Trobogy*, with circular lines are between the neighboring districts Canabrava itinerary. And the lines: *Jardim Nova Esperança / Lapa / Barra and Pituba / Trobogy* make connection with the neighborhoods of *Pituba and Barra*, part of the coastline of Salvador.

Relating the collective transport system lines presented in Table 1 with the city regions shown in Figure 1 can be seen that the coverage area of this transportation system is very restricted because only offers a few options for bairros in the city. Furthermore, most of the lines is reduced and a high frequency (over 30 minutes) fleet.

3.2.3. Socio-economic aspects of the population

Continuing the collection of local data, appropriated of the consolidated data from families registered by the Family Health Unit (FHU) Canabrava Primary Care Information System (SIAB 2013) was possible to limit the area of the case study of this research, which is divided into 3 microregions: *Mangueiras, Novos Baianos and Pássaros*, as shown in Table 2:

It is worth mentioning that using Information System Primary Care Unit Family Health Canabrava was adopted by this study as a basis to provide socio-economic information as it was considered the available

document containing more detailed and reliable information on the population of this neighborhood.

Table 2. Population by microregion.

Microregions	<i>Mangueiras</i>	<i>Novos Baianos</i>	<i>Pássaros</i>	Total
Population	2.995	3.311	3.203	9.509
%	31,50%	34,82%	33,68%	100%

Source: SIAB (2013). Prepared by author.

The Table 3 shows that the population, in the three microregions, is balanced for the number of people and gender.

Table 3: Gender by population.

Gender	<i>Mangueiras</i>		<i>Novos Baianos</i>		<i>Pássaros</i>	
Male	1.389	(46,38%)	1.578	(47,66%)	1.483	(46,30%)
Female	1.606	(53,62%)	1.733	(52,34%)	1.720	(53,70%)
Sub total	2.995	(31,50%)	3.311	(34,82%)	3.203	(33,68%)

Source: SIAB (2013). Prepared by author.

And then, it is observed in Table 4 how is the age distribution, verifying a majority in the age group 20-39 years old of age in the three microregions, and the number of people about to reach seniors matches with the second age group with the most significant quantitative.

Table 4: Age group by population.

Age group	<i>Mangueiras</i>		<i>Novos Baianos</i>		<i>Pássaros</i>	
Until 4 years old	100	(3,34%)	177	(5,35%)	185	(5,78%)
Of 5 the 14 years old	539	(18,00%)	617	(18,63%)	666	(20,79%)
Of 15 the 19 years old	268	(8,95%)	279	(8,43%)	362	(11,30%)
Of 20 the 39 years old	1.210	(40,40%)	1.359	(41,05%)	1.240	(38,71%)
Of 40 the 59 years old	711	(23,74%)	648	(19,57%)	586	(18,30%)
More than 60 years old	167	(5,58%)	231	(6,98%)	164	(5,12%)
Sub total	2.995	(31,50%)	3.311	(34,82%)	3.203	(33,68%)

Source: SIAB (2013). Prepared by author.

In Table 5 have the quantity of school attendance, particularly in the age group between 7 and 14 years old, showing a low percentage of children and adolescents studying.

Table 5: School attendance.

School attendance	<i>Mangueiras</i>		<i>Novos Baianos</i>		<i>Pássaros</i>	
	Total	School	Total	School	Total	School
7 a 14 year old	475	232	506	291	572	293
		(48,84%)		(57,51%)		(51,22%)

Source: SIAB (2013). Prepared by author.

Low educational level indicated in Table 5 allows to infer the continuity of the picture of extreme poverty, as evidenced by the significant majority of families on less than a living wage in the absence of foresight in entering the employment market of these young people who have acquired sufficient technical capacity.

Other data collected in the Health Unit Family of the Canabrava, and of great importance to this work, was the amount of people with mobility restrictions, according to Table 6.

Table 6. Canabrava residents with low mobility.

People with reduced mobility	<i>Mangueiras</i>	<i>Novos Baianos</i>	<i>Pássaros</i>	TOTAL (%)
Children (<4 years)	100	177	185	462 (39,4%)
Eldery (>60 years)	167	231	164	562 (47,9%)
Pregnant	11	22	18	51 (4,4%)
Handicap	28	33	38	99 (8,3%)

306	463	405	1.174 (100%)
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Source: SIAB (2013). Prepared by author.

The basis of consolidated data in Table 6 was possible to say that 12.14% of people with mobility restrictions: 39.4% children of 0-4 years of age; 47.9% are elderly; 4.4% are pregnant; and 8.3% are handicap.

The collection of this information see the degree of social vulnerability of this population that added to topographical features and precariousness of the public transport system intensify their situation socio-spatial segregation.

3.2.4. Questionnaires to residents of the neighborhood the Canabrava

Adopting a population of 1,174 people with mobility restrictions, 90% confidence in the results of the findings, and using statistical equation to calculate the minimum sample size, defined the need for application of 90 household interviews about the standard of trip of residents with mobility restrictions. To that end, was developed and applied a questionnaire consisting of 30 questions which were investigated: the socioeconomic characteristics, condition of the property and how long the interviewee lived in the neighborhood; workplaces, schools and health care frequented by the respondent; displacements performed on the day before the interview, also, the mode and reason to be satisfied; and finally comment on mobility in Canabrava neighborhood.

4. Results

The results found determined that people with mobility restrictions do not go regularly. None of the interviewees frequently travels for work. None of the interviewees have a formal contract. Only five out of the 90 interviewees attending school regularly. Only seven of the 90 interviewees have individual motorized transport, a fact that is considered important: “[...] because at the time of emergency help much”. Two testimonials from car owners emphasize this importance: “[...] The resident says that only goes out if the car”; and one that also has a car says: “[...] car helps to fuel purchases in the diner that works in your own home”.

Most attend monthly medical care, however they informed they do this activity in their own neighborhood, in the Family Health Unit (FHU-Canabrava), even noting that complaints and grievances about the lack of medical procedures and basic choices of the area health, a reality observed continuously.

In the interview with the mother of a person with cerebral palsy it was observed that the Physiotherapy Unit of *Unijorge*, faculty located next to the Canabrava neighborhood and providing free social services to the population in its area of around, was praised: “[...] if not this help next to us, my daughter would be without this service”.

A man of 61 years old is a retired shoemaker and commented that he receives benefits from a company, and said it: “[...] only comes out once in a while to go to church or to visit her daughter who lives in Canabrava same”.

Answers such as: “I go out a little, only occasionally, I stay more at home”, were the most frequent ones.

A lady of 66 years old reported that she only goes out when one of the son comes to take her out.

A 17 year old man who has a baby in his arms commented that he only goes out to visit his mother who lives in Canabrava too.

A 60 year old man reported that: I do more small works in the community, but yesterday a boss who lives in Pituba came by to pick me up and another man who is 63 years old said he rendered outsourced services in electrical maintenance: the company car always comes to pick me up when they have some work for me.

And a lady who is 63 years old, physically disabled person, almost never leaves the house: when I need to go out, I pay a neighbor who takes me out.

From a comparative analysis of the various interviewees showed up the two characteristic types of individuals who are more spatially segregated in Canabrava community, and that normally are not considered in studies of mobility restrictions:

- On one side the person who already is older than 60, mostly no longer works, is self-employed, and in the past was also not able to enter and remain in the labor market and therefore did not pay the taxes, and does not receive retirement. Some few managed (due to evidence of health complications) to obtain the right to receive the benefit of the government monthly, but this fact does not reflect the reality of the majority. Thus, these people can not enjoy a healthy old age, when perhaps they would have more time to walk around places in Salvador that are also sought by tourists from other countries. They also fail to get the right for basic and necessary health care and more frequently due to the old age.
- On the other hand women, mostly still young, between 16 and 30 years old, who are already a mother loses the opportunity to secure technical job training to compete and acquire recognized and paid work. These people, therefore, will not be able to also ensure proper education to their children. Thus both mothers and their children later are falling inside the standard of extreme poverty experienced by the elderly who reside in the same community.

5. Conclusions

The focus of this case study work concentrates on socio-spatial exclusion due to the low quality of the transport system in a region with steep declivity, a situation that is aggravated by the presence of a large number of houses built on the slopes. The research showed that the condition of socio-spatial segregation caused from the condition of belonging to the class of low-income stands in relation to other factors, since secreted people like this are not so much by physical or sensory condition, but the lack of income monthly minimum necessary to ensure insertion in the social life of urban space, thus resulting in a scenario of extreme social injustice.

It is noteworthy that in the Canabrava public transportation offers a insufficient to attend needs of the community in general: the fleet that serves the neighborhood is small; There are few buses adapted for people with reduced mobility, routes of the bus lines that pass through the main floor include a limited number of neighborhoods in the city of Salvador (very limited network coverage).

Indeed, the results of this study reflect very particular, related to the historical, socioeconomic, topographic and occupation Canabrava district (ex-homeless, come from areas at risk, low income, sharp topography) and indicating a strong relationship context situations between the levels of segregation and low mobility.

It stands out that the results of this study may not be generalizable because they are based on a small sample of exploratory research and fundamentally, in the perceptions of respondents. Meantime, this case study can serve as the beginning of a discussion with other researches wishing to address the topic inclusive mobility and also as a warning to the government of how (in) mobility and exclusion go together and that only with the implementation integrated and participatory public policies that scenario can be reverted. Therefore it is suggested to continue this research in order to develop comparative case studies with other locations in Brazil and abroad where poor segregated and restricted mobility areas exist.

Finally it is worth mentioning also that the effectiveness of urban laws and transport is in the exercise of its application and its instruments of social control, for example, a System of Planning and Transport Management and Use of Participatory and Integrated Soil. This system should be as deliberative body with a council participatory instances where pervades public debate on integrating transportation and land use and social development. From this point of view is proposed mutual cooperation between public authorities and organized community leaders, aiming to provide planning, operation and shared among all stakeholders supervision.

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