DESIGUALDADES SOCIOESPACIAIS NO TRANSPORTE URBANO

Profa. Mariana Giannotti

INPE Maio 2023

Contribuições

1 Evidências empíricas no **sul global**

2 Variabilidade **espaço-temporal**

3 Desigualdades de classe e **raça**

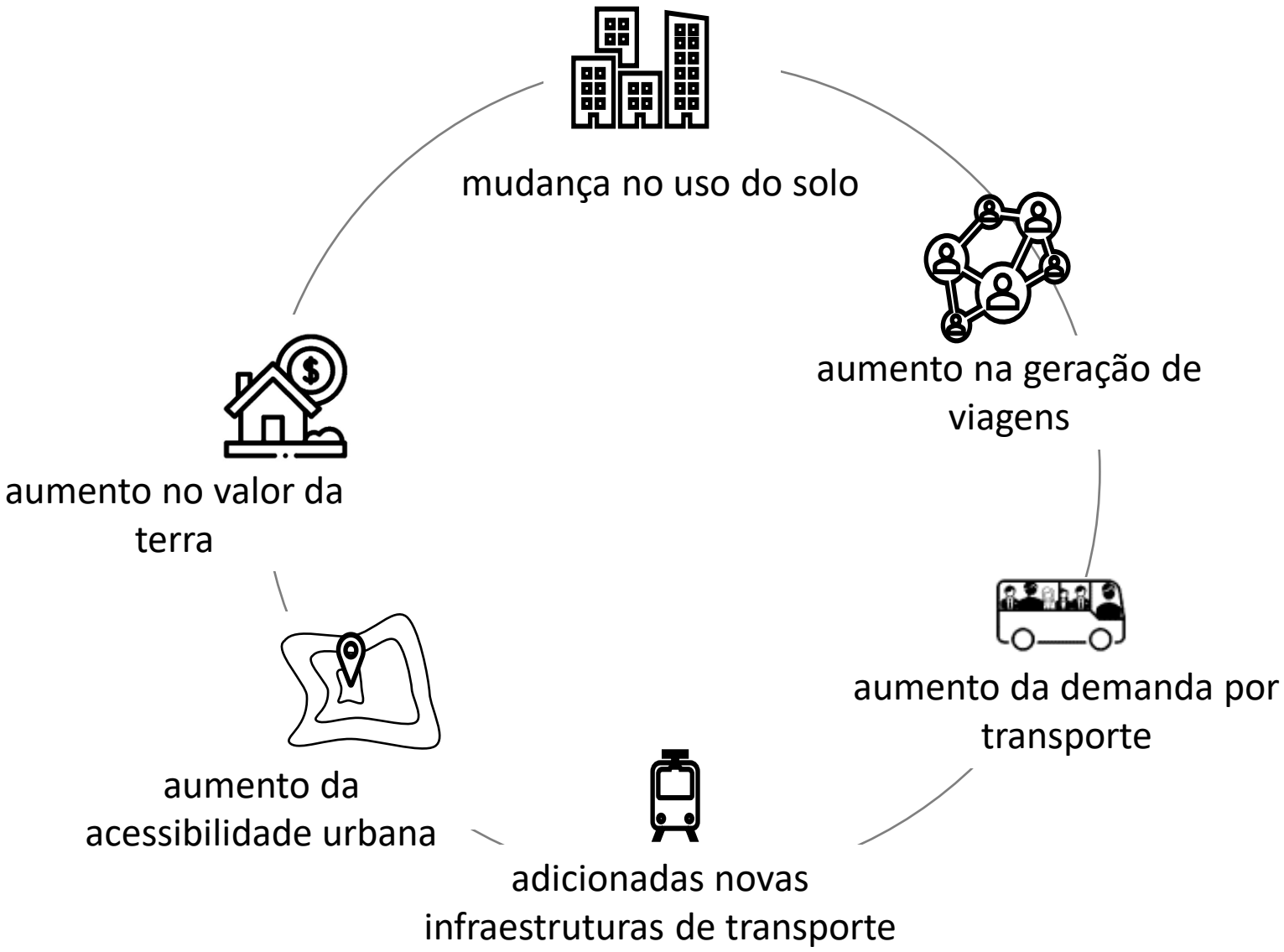
4 **Custo** para além do tempo

5 **Viés** de métrica para captar desigualdade

Desigualdades socioespaciais no transporte urbano

✓Investigar as **desigualdades socioespaciais** no **transporte urbano**

✓Buscar **evidências empíricas** em **diferentes contextos** urbanos, a partir de ***Spatial Data Science***, como suporte às **políticas públicas**



Ciclo do uso do solo e transportes (traduzido de Paquette et al., 1972)

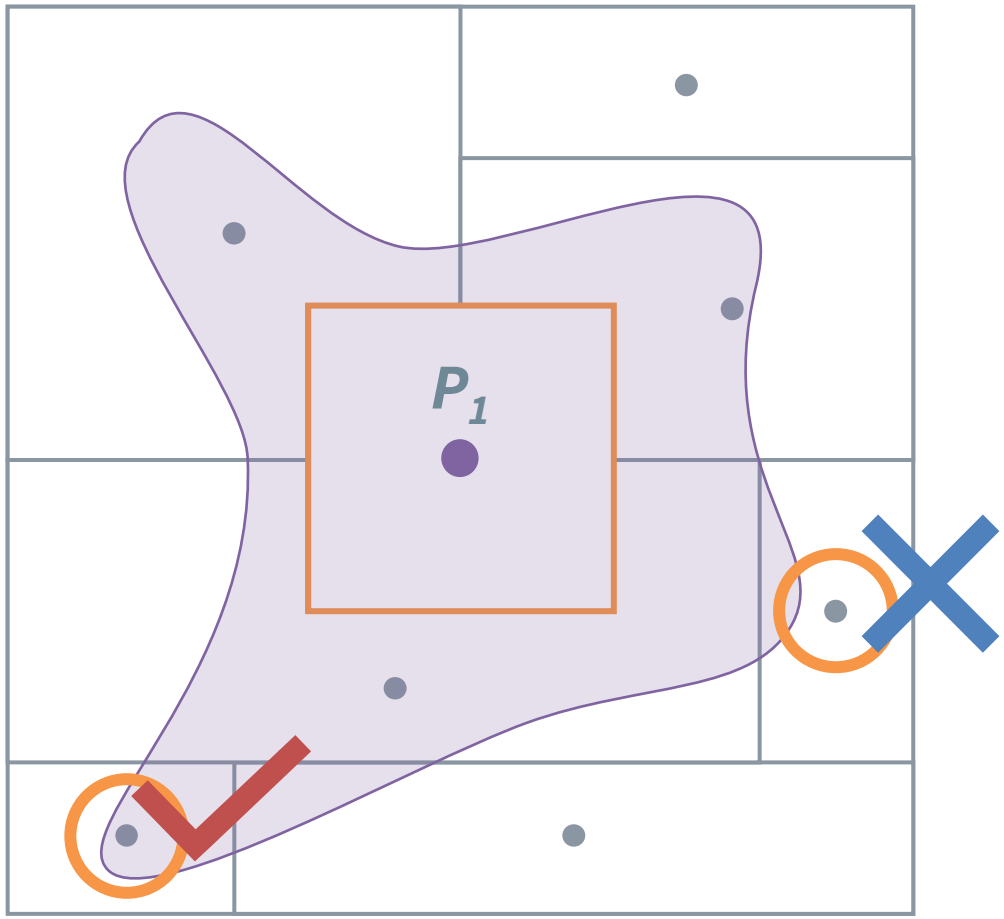
Acessibilidade como “potencial de alcançar oportunidades espacialmente distribuídas”, relacionando informações de uso do solo e de transporte

(Páez; Scott; Morency, 2012)

Qual indicador de **acessibilidade** devo usar?

- ✓ **Fácil** interpretação
- ✓ Oportunidades dentro de um **limite** são igualmente contabilizadas

(Geurs & van Wee, 2004)

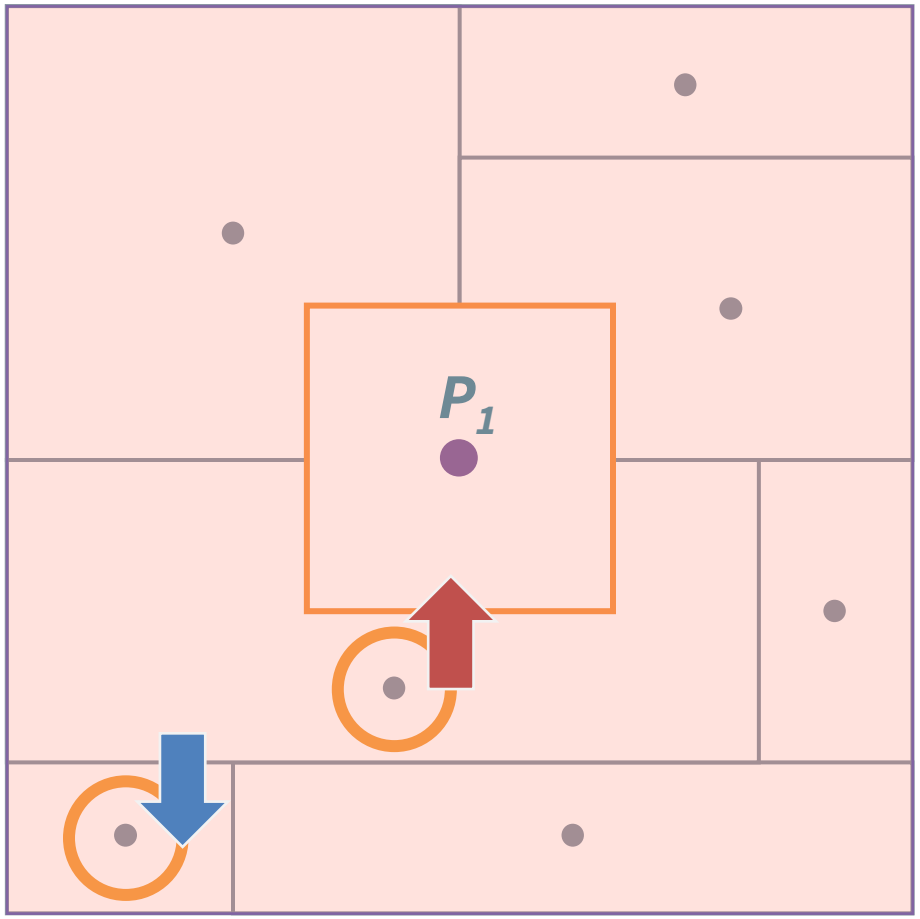


Fonte: Slide adaptado de Beatriz Moura Santos

$$A_i = \sum_{j=1}^{n} O_j \ \ if \ c_{ij} < c_{max}$$

Acessibilidade **cumulativa**

(Wachs & Kumagai, 1973)



- ✓ **Difícil** interpretação
- ✓ Oportunidades são ponderadas

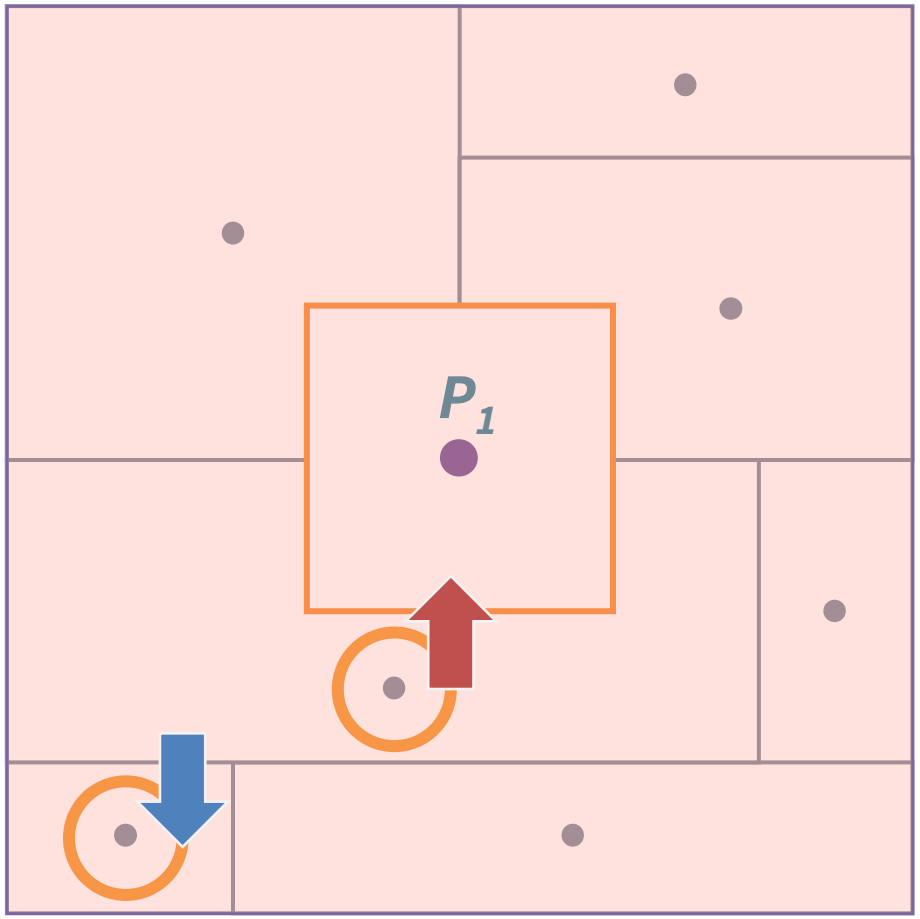
(Batty, 2009)

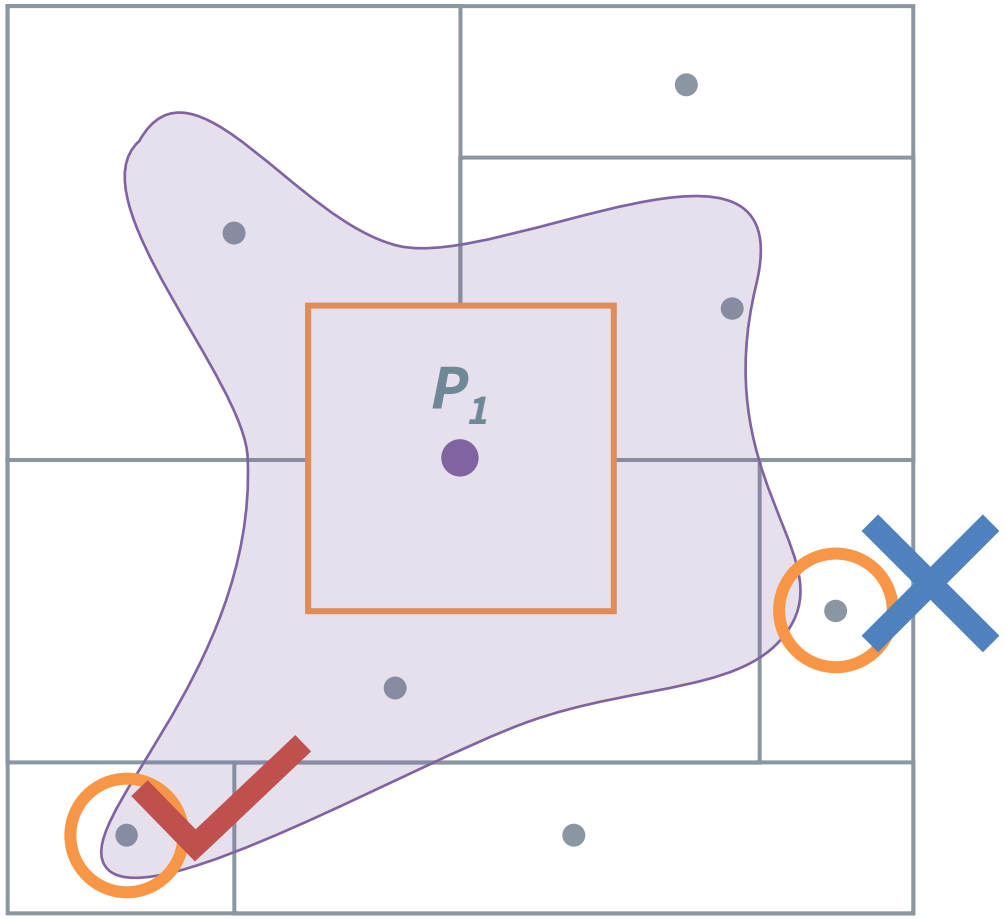
Fonte: Slide adaptado de Beatriz Moura Santos

$$A_i = \sum_{j=1}^{n} O_j . f(c_{ij})$$

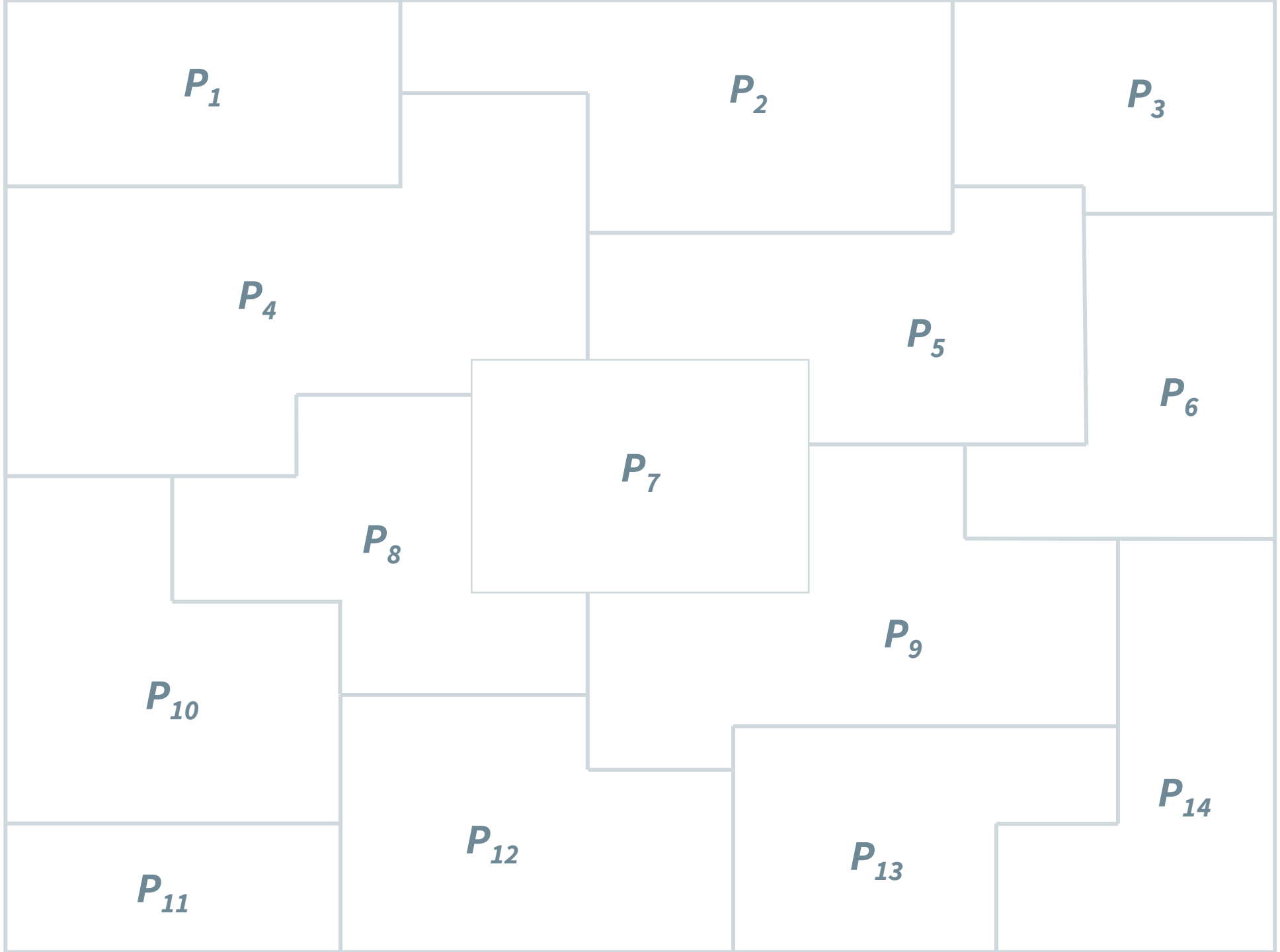
Acessibilidade **gravitacional**

(Hansen,1959)

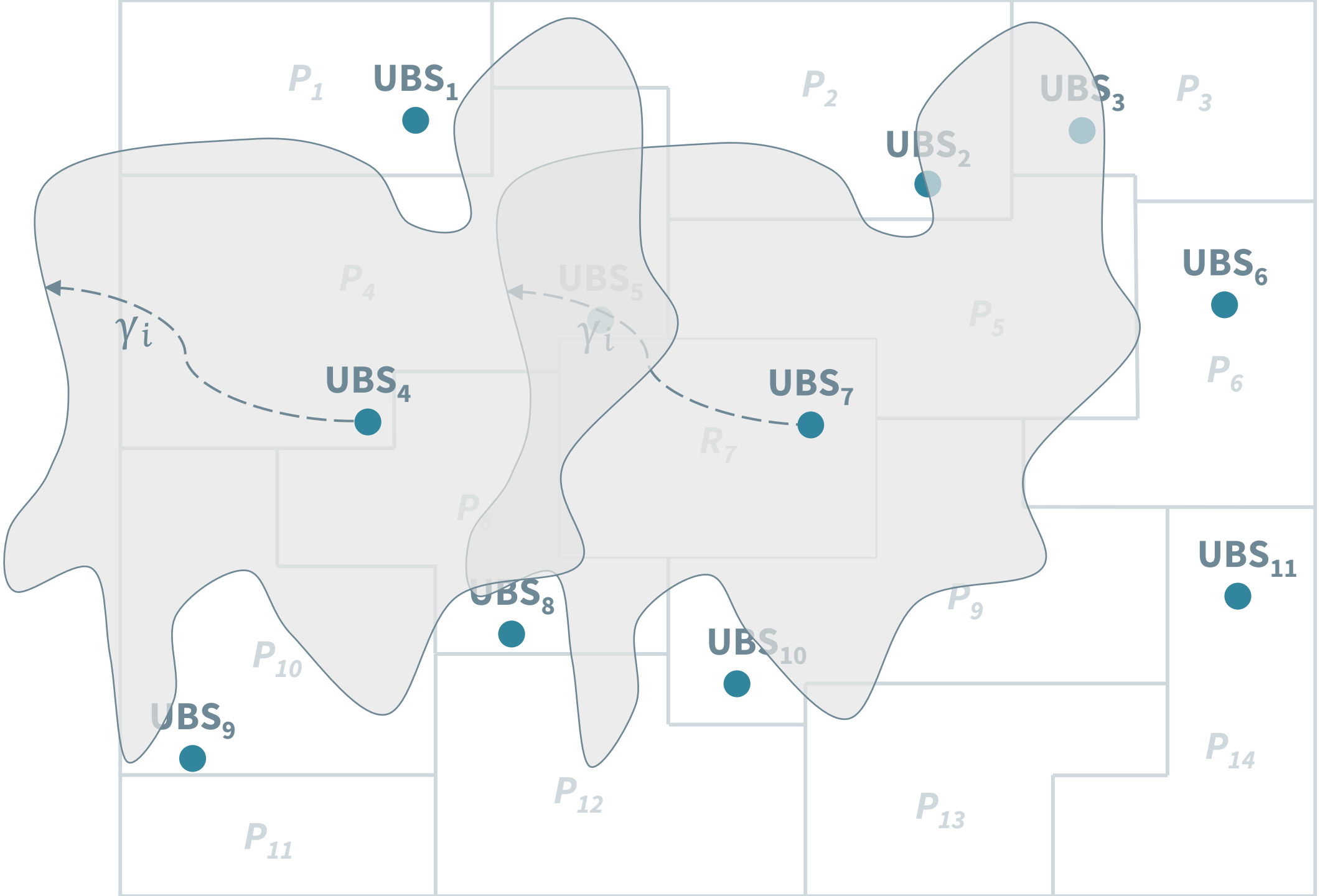




Fonte: Slide adaptado de Beatriz Moura Santos



Fonte: Slide adaptado de (Beato, Elias, Rodrigues e Tarifa, 2018)

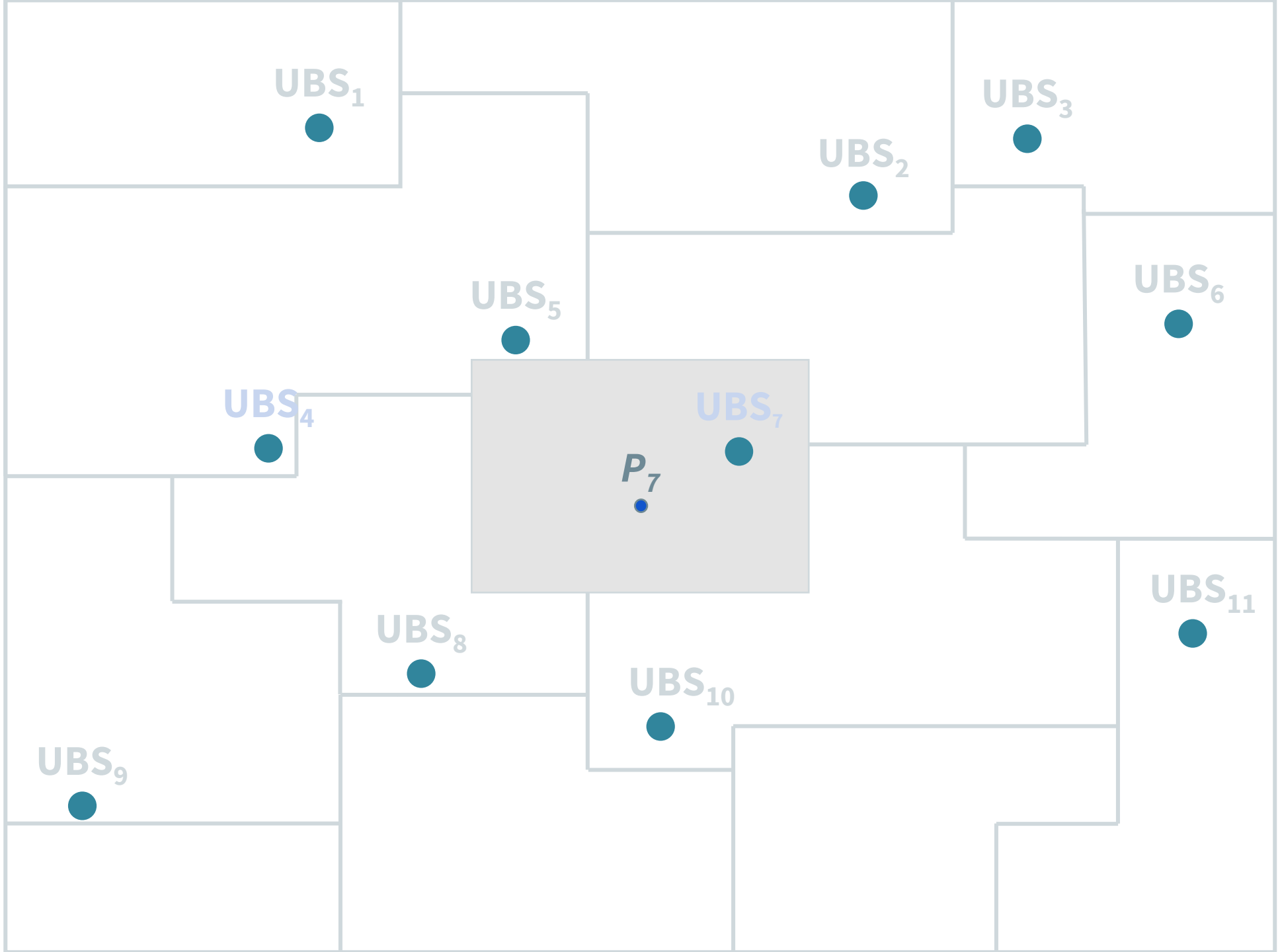


Fonte: Slide adaptado de (Beato, Elias, Rodrigues e Tarifa, 2018)

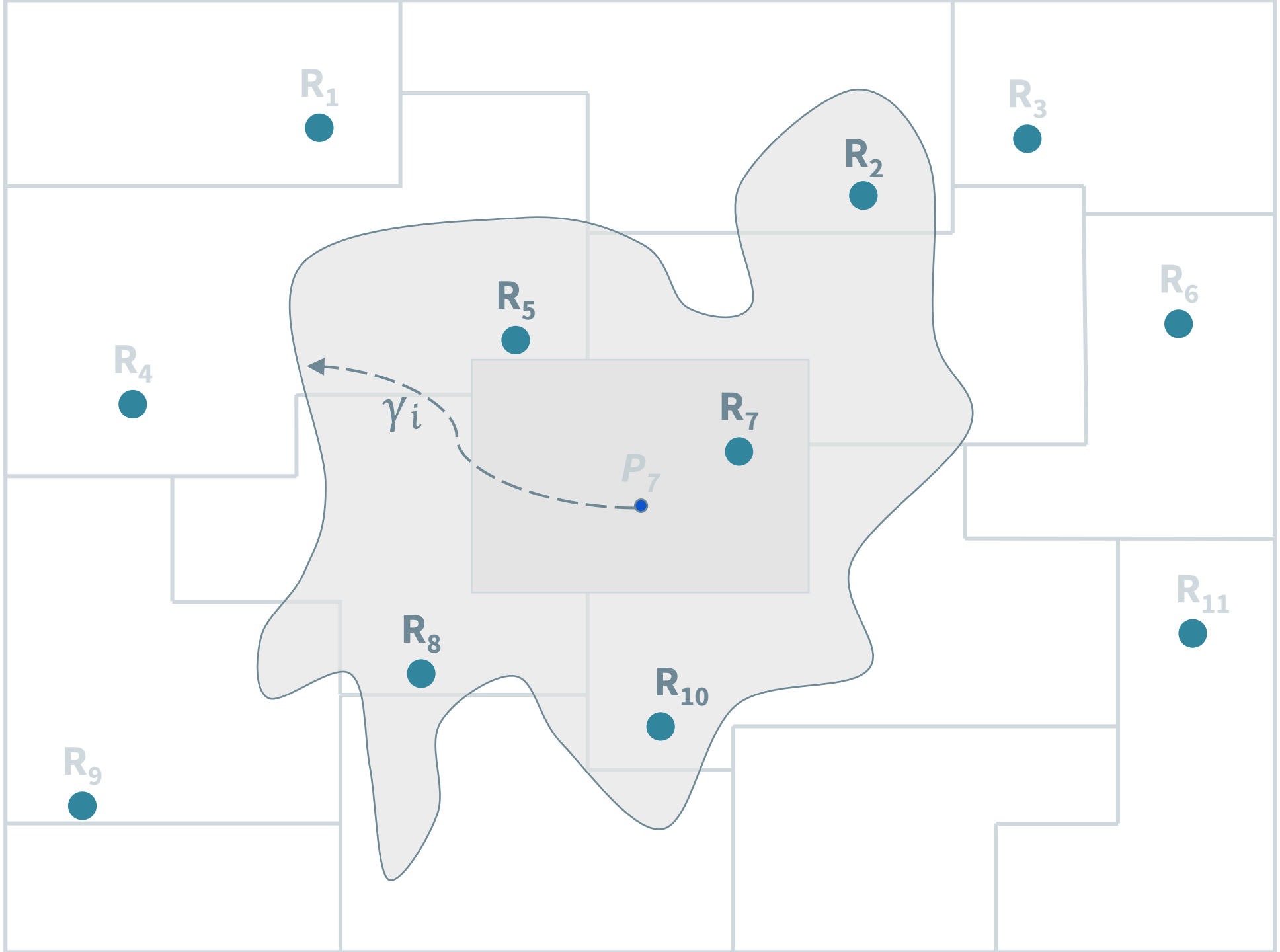
$$R_j = \frac{O_j}{\sum_{k \in \{c_{kj} \leq c_{max}\}} P_k}$$

Acessibilidade **2SFCA** (STEP 1)

(Luo & Wang, 2003)



Fonte: Slide adaptado de (Beato, Elias, Rodrigues e Tarifa, 2018)



Fonte: Slide adaptado de (Beato, Elias, Rodrigues e Tarifa, 2018)

$$A_i^F = \sum_{j \in \{c_{ij} \leq t_{max}\}} R_j = \sum_{j \in \{c_{ij} \leq c_{max}\}} \frac{O_j}{\sum_{k \in \{t_{kj} \leq c_{max}\}} P_k}$$

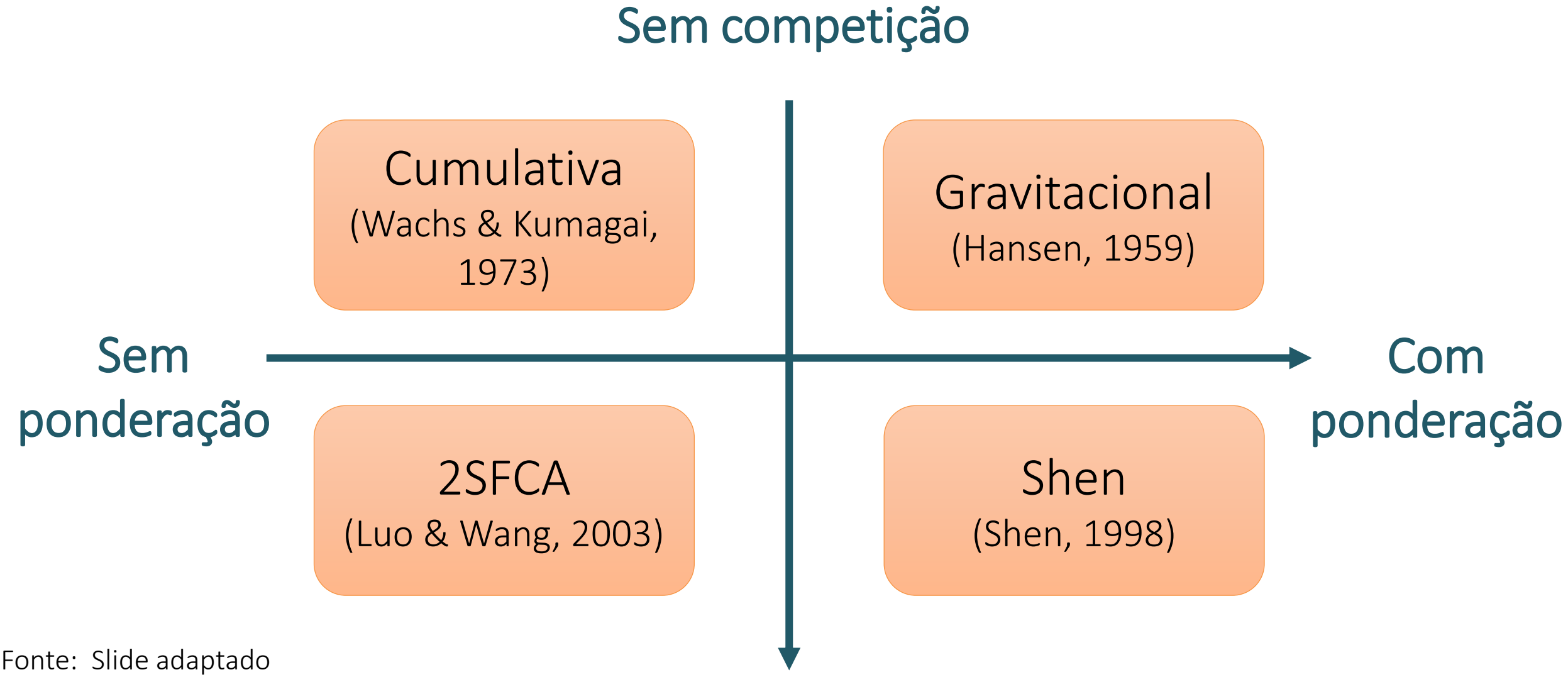
Acessibilidade **2SFCA** (STEP 2)

(Luo & Wang, 2003)

$$A_i = \Sigma \frac{O_j \cdot f(C_{ij})}{D_j}$$

Acessibilidade **gravitacional**

(Shen,1998)



Fonte: Slide adaptado de Beatriz Moura Santos

$$A_i^g = \sum_{j=1}^{n} O_j^g . f\left(c_{ij}^g\right)$$

Acessibilidade **gravitacional**

(Giannotti et al., 2021)

$$A_i^g = \sum_j O_j^g \; if \; c_{ij} < c_{max}$$

Acessibilidade **cumulativa**

(Giannotti et al., 2021)

$$A_i^{Fg} = \sum_{j \in \{c_{ij} \leq c_{max}\}} R_j^g = \sum_{j \in \{c_{ij} \leq c_{max}\}} \frac{O_j^g}{\sum_{k \in \{c_{kj} \leq c_{max}\}} P'^g_k}$$

Acessibilidade **2SFCA**

(Giannotti et al., 2021)

Qual indicador de **desigualdades** devo usar?

$$G = 1 - \Sigma^{n}_{k=1} (X_k - X_{k-1}) (Y_k + Y_{k-1})$$

Proporção acumulada da população

Proporção acumulada da acessibilidade

GINI adaptado para acessibilidade

(Delbosc e Currie, 2011)

$$P = \frac{\bar{A}_{i\ D10}}{\bar{A}_{i\ D1-D4}}$$

pseudo-Palma adaptado para acessibilidade

(Guzman & Oviedo, 2018)

As **desigualdades socioespaciais** no sistema de **transporte urbano** constituem uma barreira adicional no contexto das desigualdades **cumulativas** enfrentadas pela população com baixa renda nas cidades brasileiras?

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RESEARCH ARTICLE

WILEY Transactions in GIS

Multi-temporal transport network models for accessibility studies

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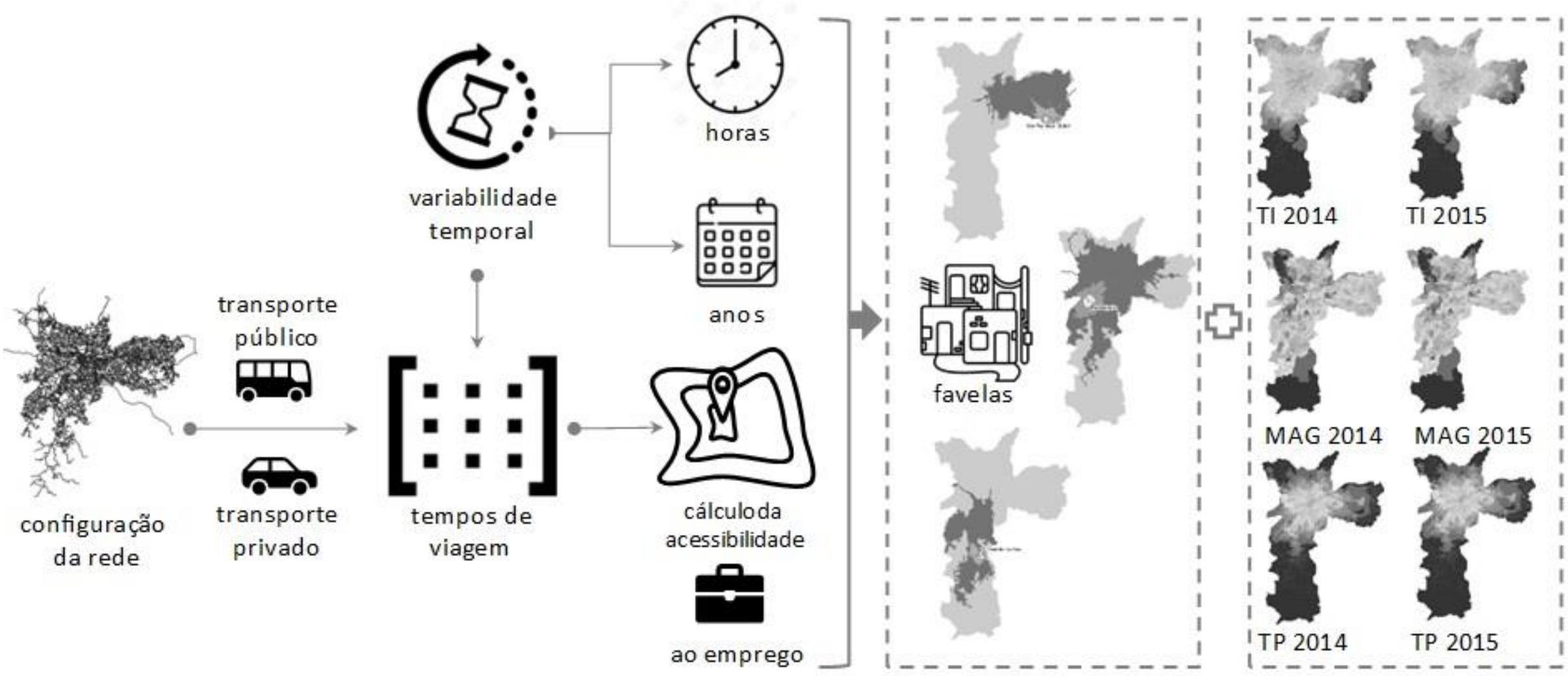
Abstract

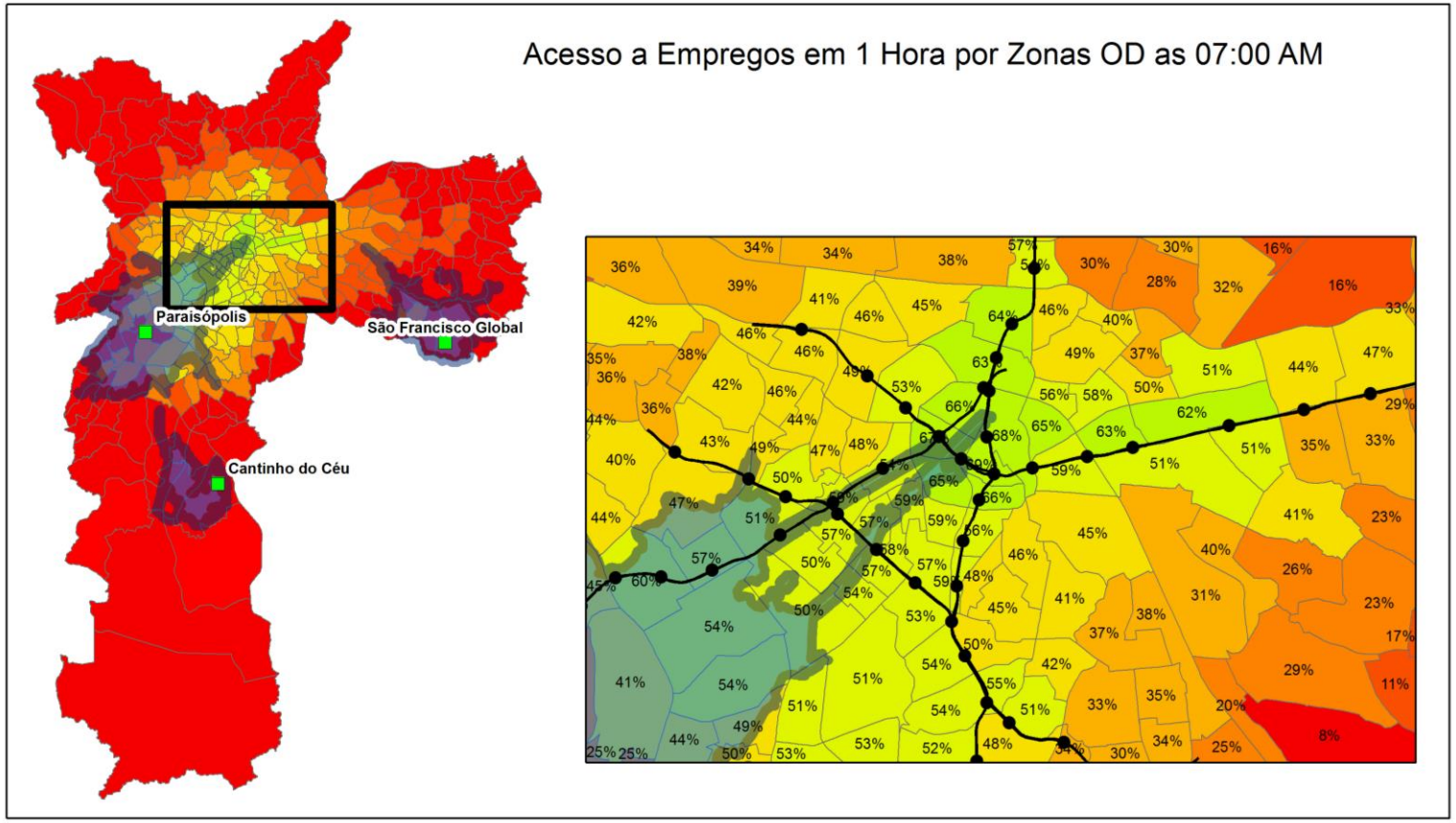
Vehicle tracking is a spatio-temporal source of high-granularity travel time information that can be used for transportation planning. However, it is still a challenge to combine data from heterogeneous sources into a dynamic transport network, while allowing for network modifications over time. This article uses conceptual modeling to develop multi-temporal transport networks in geographic information systems (GIS) for accessibility studies. The proposed multi-temporal network enables accessibility studies with different temporal granularities and from any location inside the city, resulting in a flexible tool for transport and urban planning. The implemented network is tested in two case studies that focus on socially excluded people in a large

Desigualdades, acessibilidade e mobilidade



MAG: Modal Accessibility GAP (Kwok & Yeh, 2004)

Desigualdades, acessibilidade e mobilidade



Fonte: Tomasiello et al., 2019.

- ✓ Paraisópolis (central) com maior regularidade de condições de transporte público, sob a perspectiva temporal durante o dia, em comparação a São Francisco Global e Cantinho do Céu.
- ✓ A relação entre transporte privado e transporte público, piorou de 2014 para 2015: atenção à zona leste!

Special Issue: Data Science for Developing Cities

Urban Analytics and City Science

EPB: Urban Analytics and City Science
2022, Vol. 0(0) 1–15

DOI: 10.1177/23998083221111405
journals.sagepub.com/home/epb
SAGE

Unfolding time, race and class inequalities to access leisure

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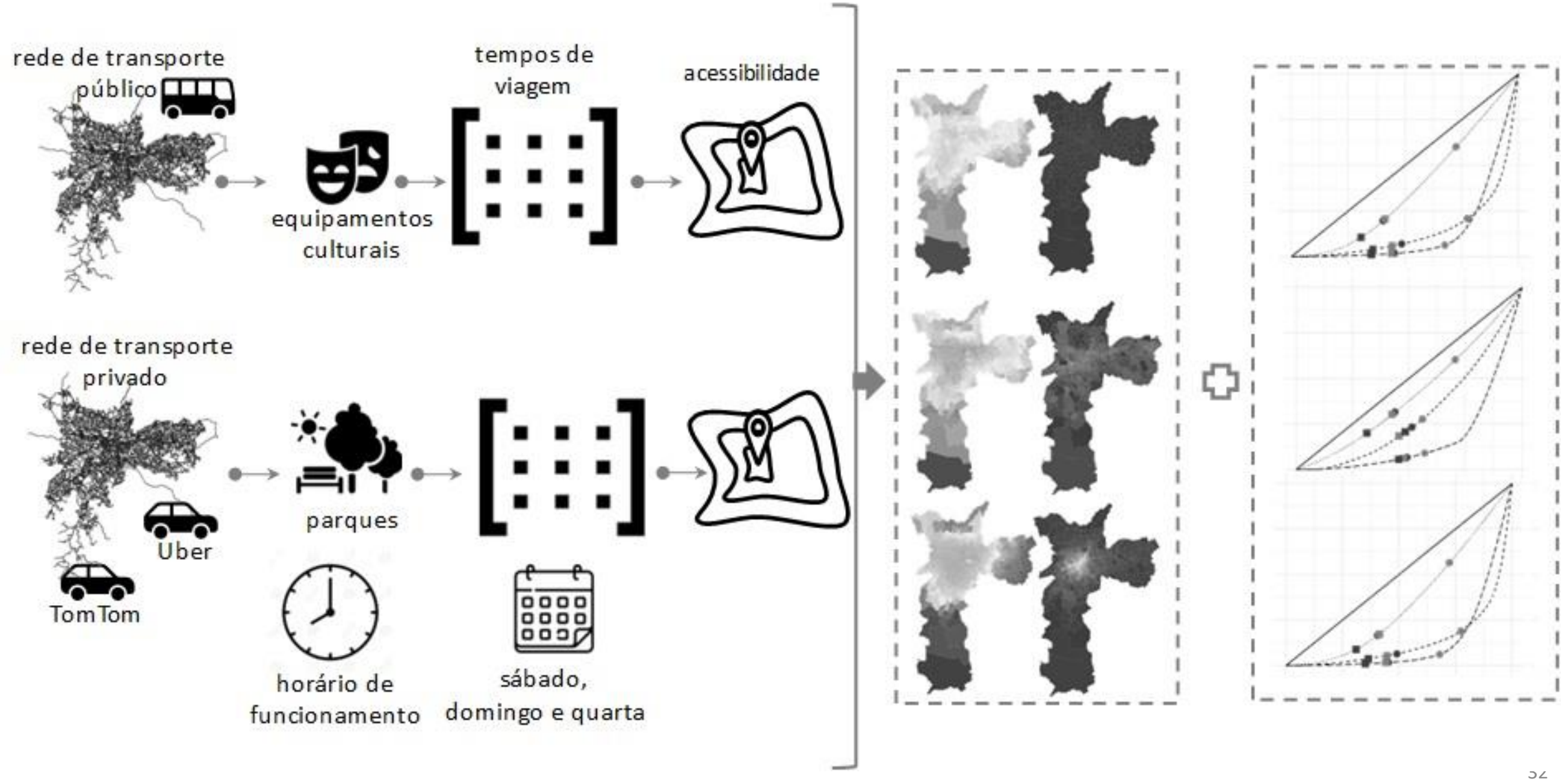
Abstract

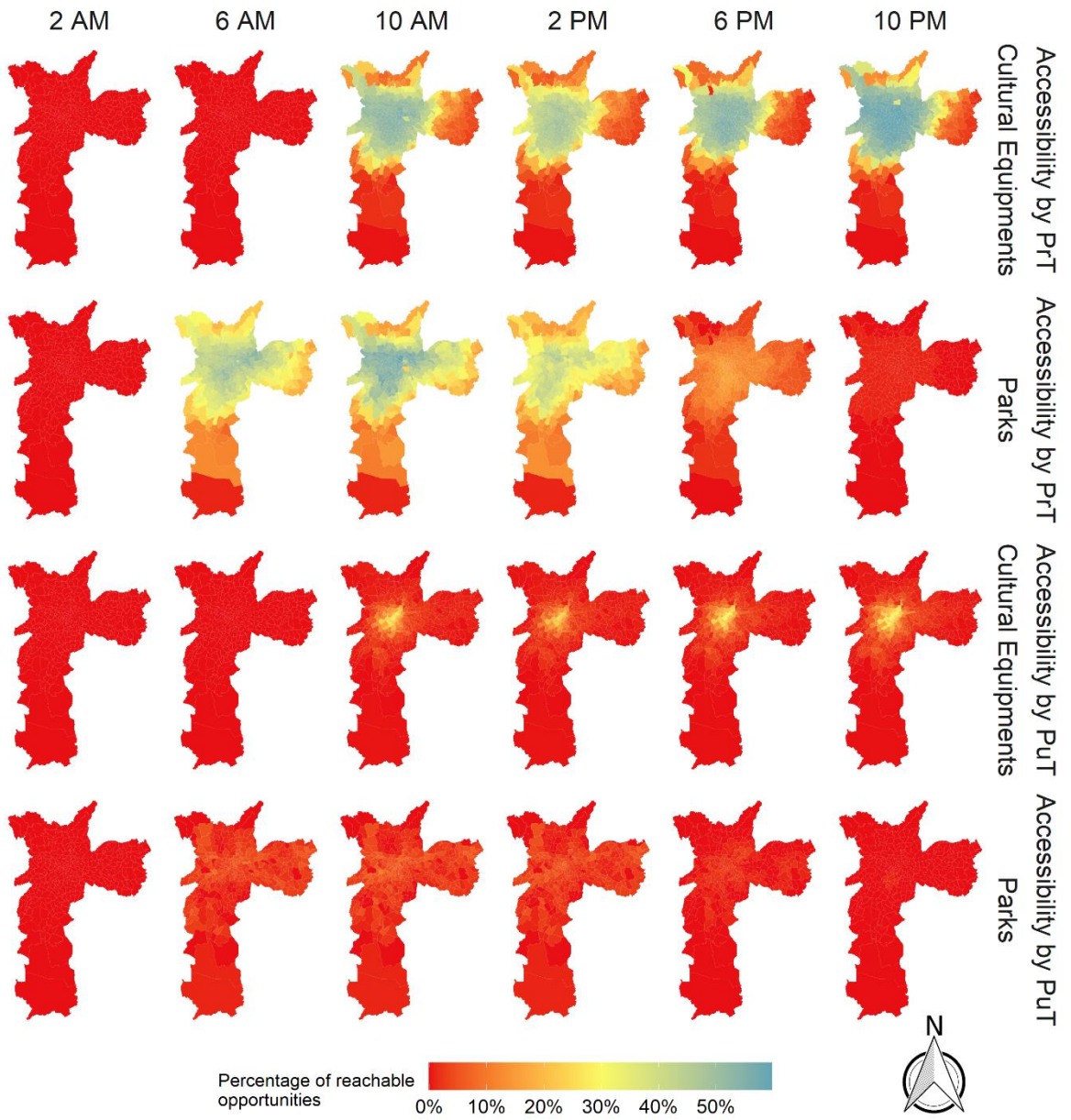
The access to leisure activities is an important element to understand the potential participation and integration of individuals in the society. Despite its importance, urban planners in large urban centers in developing countries seek to prioritize access to mandatory activities. This study quantifies the accessibility to leisure and its inequalities in the municipality of São Paulo, considering the opening hours of leisure opportunities and racial and class population groups. Tracking data from buses and TomTom speed profile were used in the public and the private transport networks, respectively, to analyze and compare accessibility to parks and cultural equipment. A multitemporal analysis was performed to better understand the fluctuation of accessibility to leisure through different hours considering the opening hours of parks and cultural equipment. The population was stratified into four groups according to race and class (higher black, higher white, lower black, and lower white) to perform accessibility inequalities analysis. Results show that accessibility to leisure is higher for private transport users, it decreases from the central to the peripheral areas, and it changes significantly during the day due to traffic conditions, transit supply, and leisure opportunities opening hours. The Lorenz curves, Gini, and the Palma coefficients showed a highly unequal level of accessibility to leisure for different population groups, with the low-black population having the lowest level of leisure accessibility. Our findings may support policy makers in designing strategies to provide more spatial equity in the access to leisure opportunities.

Desigualdades, acessibilidade e mobilidade



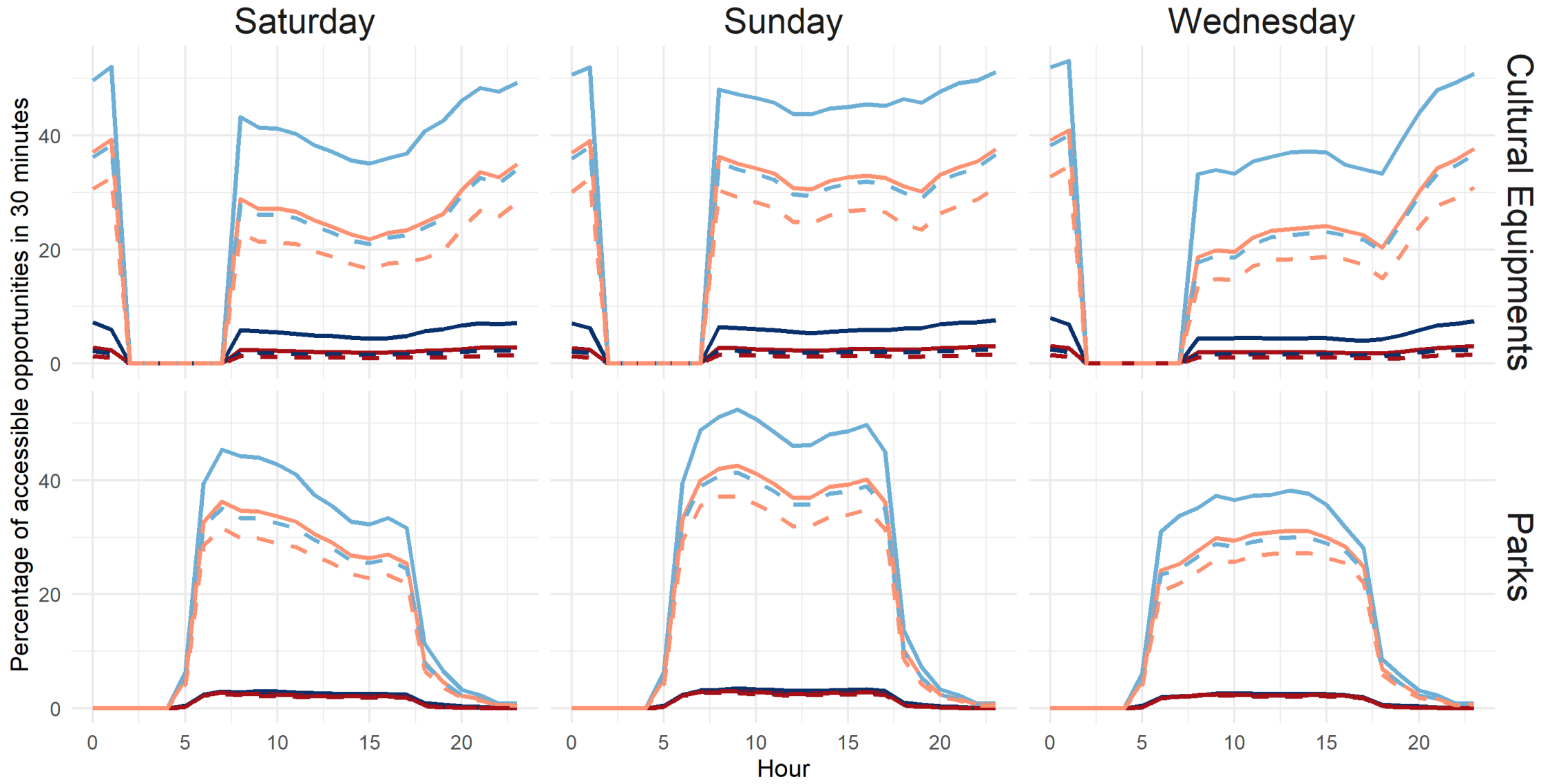
Desigualdades, acessibilidade e mobilidade

- ✓ Áreas **centrais** com alta acessibilidade se **quarta ou domingo**.
- ✓ Usuários de transporte público mal conseguem atingir **30%**, enquanto de transporte privado chegam a **60%**.
- ✓ Consideradas as **restrições temporais** dos serviços de lazer



Fonte: Tomasiello & Giannotti., 2022.

Desigualdades, acessibilidade e mobilidade



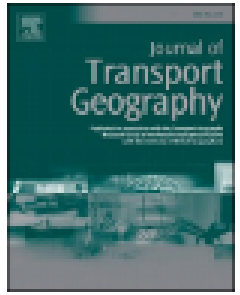
Fonte: Tomasiello & Giannotti., 2022.

Journal of Transport Geography 96 (2021) 103199

Contents lists available at ScienceDirect

Journal of Transport Geography

journal homepage: www.elsevier.com/locate/jtrangeo



Qualifying accessibility to education to investigate spatial equity

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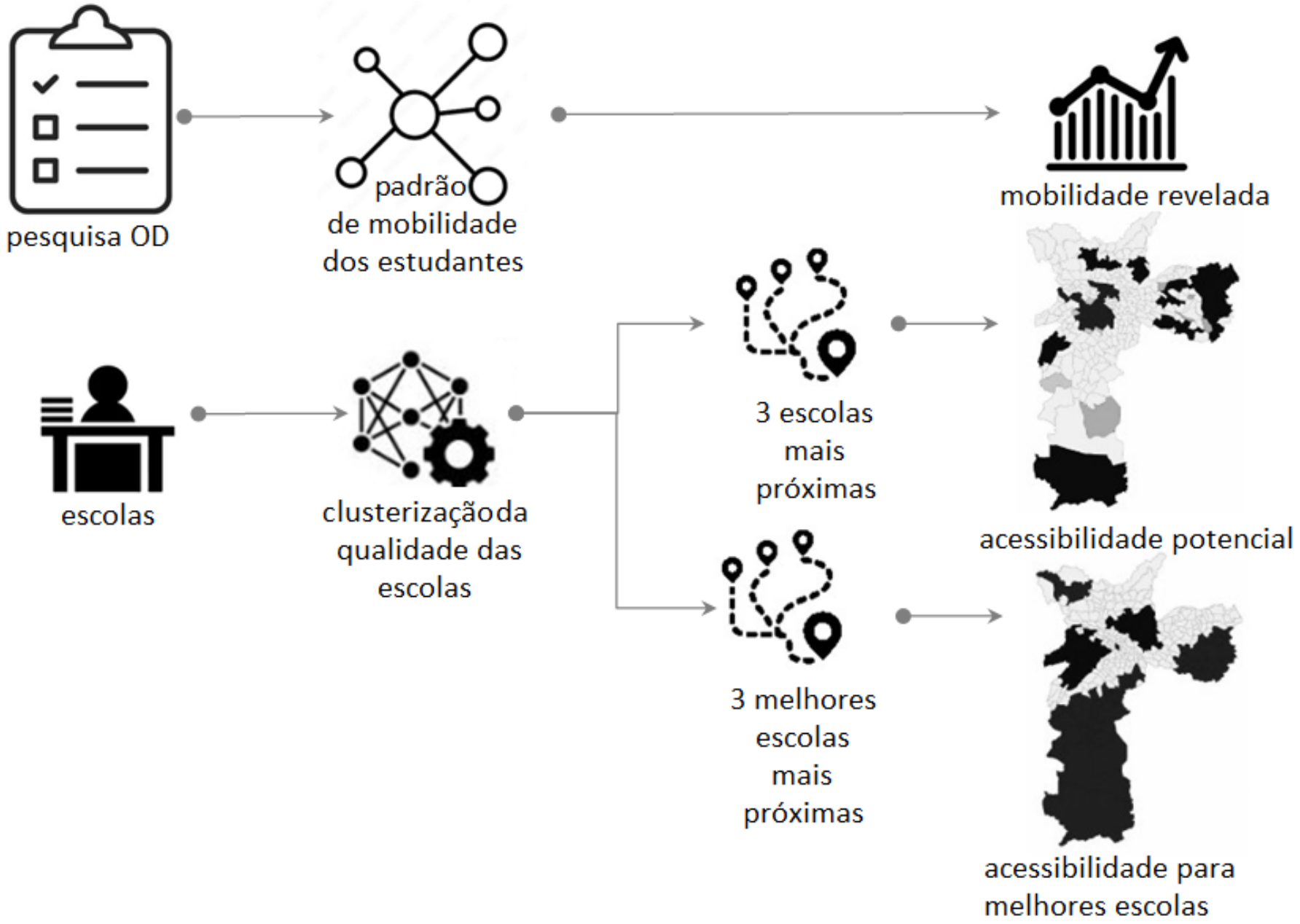
ARTICLE INFO

Keywords:
Potential accessibility
Revealed mobility
Education
Quality of service
Spatial equity

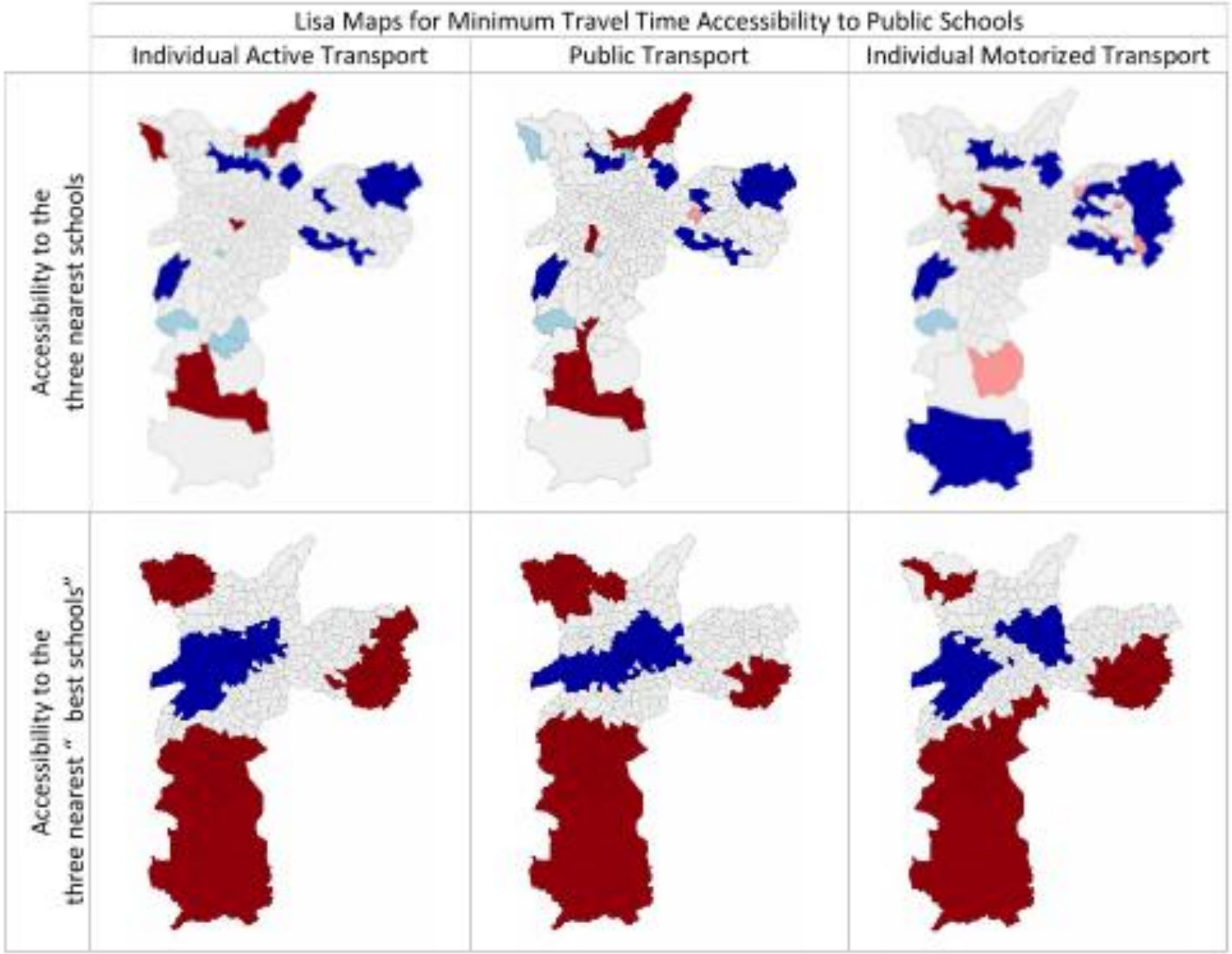
ABSTRACT

Most accessibility studies are usually related to the number of potential reachable opportunities, disregarding attributes related to quality. Schools are usually distributed in the city, but does the quality of the service in these schools provide spatial equity to access the educational system? This study investigates accessibility to education considering different modes of transport and the quality of schools. It calculates and compares potential accessibility and revealed mobility in a highly unequal context, focusing on elementary schools in São Paulo, the largest city in Latin America. The empirical research reveals disparities between public and private schools regarding the quality and transport mode, unfolding spatial inequity. We hope that these findings provide further insights into better planning our cities for young people to move, study and live.

Desigualdades, acessibilidade e mobilidade



Desigualdades, acessibilidade e mobilidade



$$MC_i = min(c_{ij})$$

✓ A **qualidade** revela a inequidade espacial no acesso à **educação**

Fonte: Pizzol, Giannotti & Tomasiello, 2021.

Journal of Transport Geography 96 (2021) 103203

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/jtrangeo

Big data for big issues: Revealing travel patterns of low-income population based on smart card data mining in a global south unequal city

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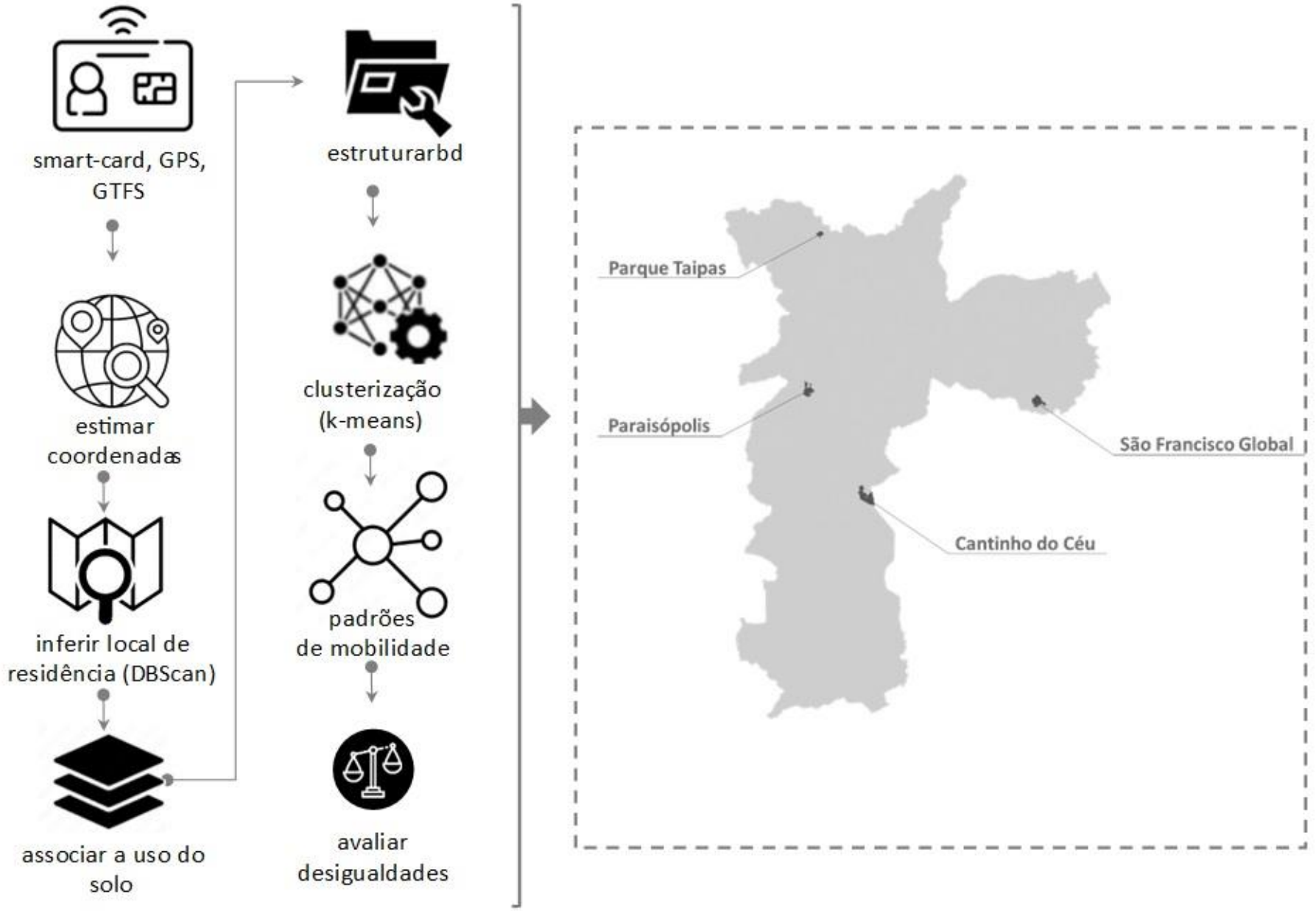
ARTICLE INFO

Keywords:
Transportation planning
Smart card
Clustering methods
Travel behavior

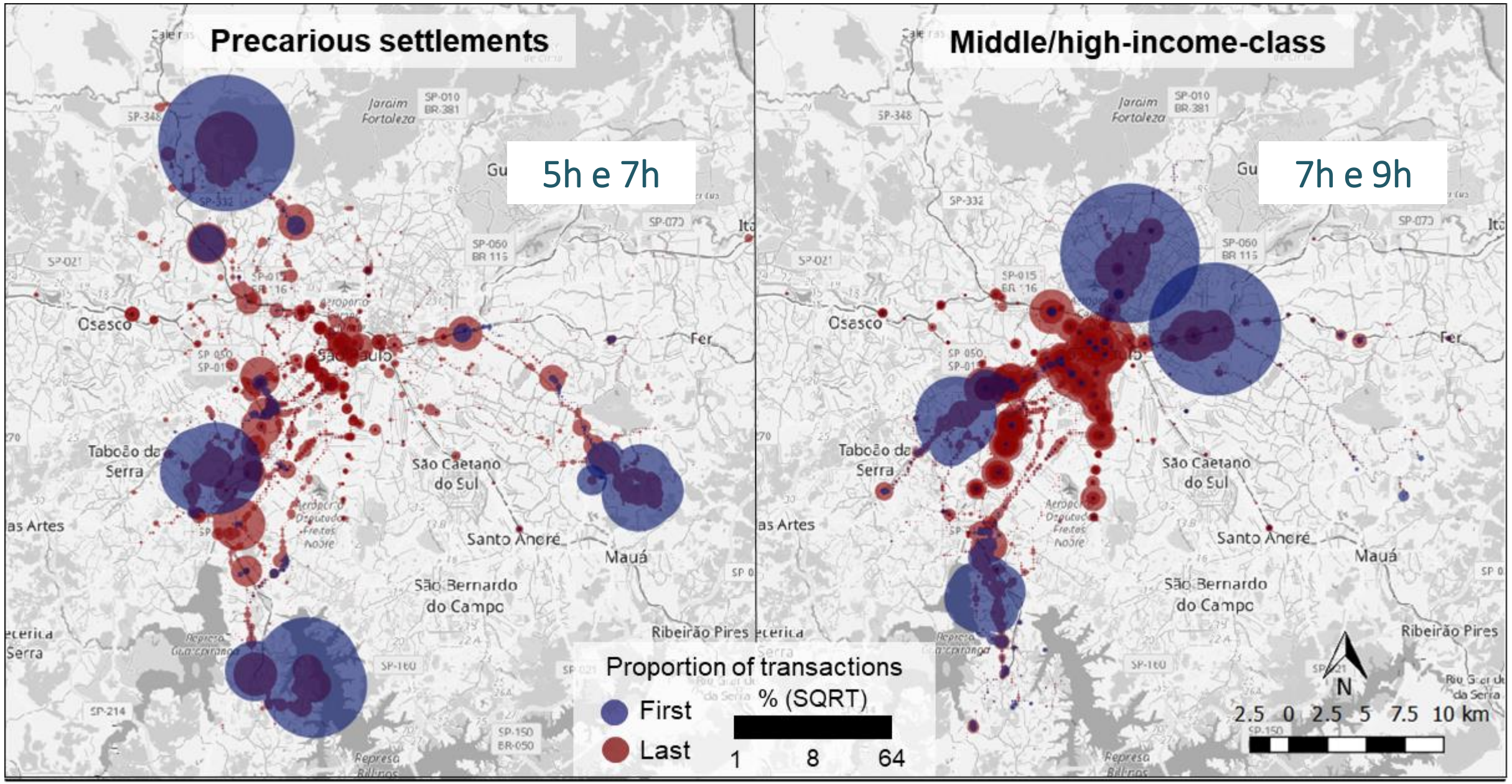
ABSTRACT

Smart card data (SCD) allow analyzing mobility at a fine level of detail, despite the remaining challenges such as identifying trip purpose. The use of the SCD may improve the understanding of transit users' travel patterns from precarious settlements areas, where the residents have historically limited access to opportunities and are usually underrepresented in surveys. In this paper, we explore smart card data mining to analyze the temporal and spatial patterns of the urban transit movements from residents of precarious settlements areas in São Paulo, Brazil, and compare the similarities and differences in travel behavior with middle/high-income-class residents. One of our concerns is to identify low-paid employment travel patterns from the low-income-class residents, that are also underrepresented in transportation planning modeling due to the lack of data. We employ the k-means clustering algorithm for the analysis, and the DBSCAN algorithm is used to infer passengers' residence locations. The results reveal that most of the low-income residents of precarious settlements begin their first trip before, between 5 and 7 AM, while the better-off group begins from 7 to 9 AM. At least two clusters formed by commuters from precarious settlement areas suggest an association of these residents with low-paid employment, with their activities placed in medium / high-income residential areas. So, the empirical evidence revealed in this paper highlights smart card data potential to unfold low-paid employment spatial and temporal patterns.

Desigualdades, acessibilidade e mobilidade



Desigualdades, acessibilidade e mobilidade



Fonte: Pieroni et al., 2021.

Habitat International 110 (2021) 102346

Contents lists available at ScienceDirect

Habitat International

journal homepage: http://www.elsevier.com/locate/habitatint

Measuring mobility inequalities of favela residents based on mobile phone data

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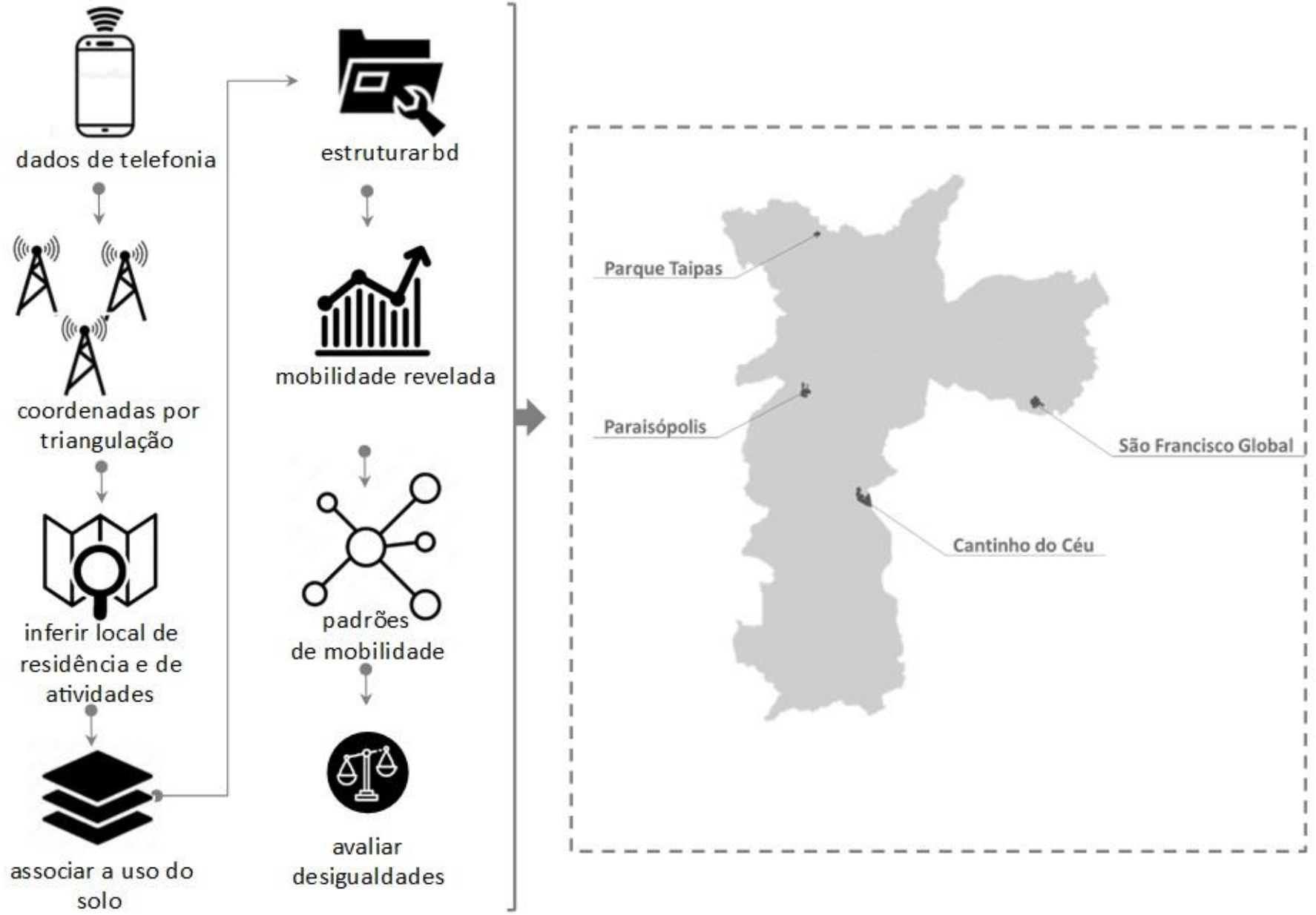
ARTICLE INFO

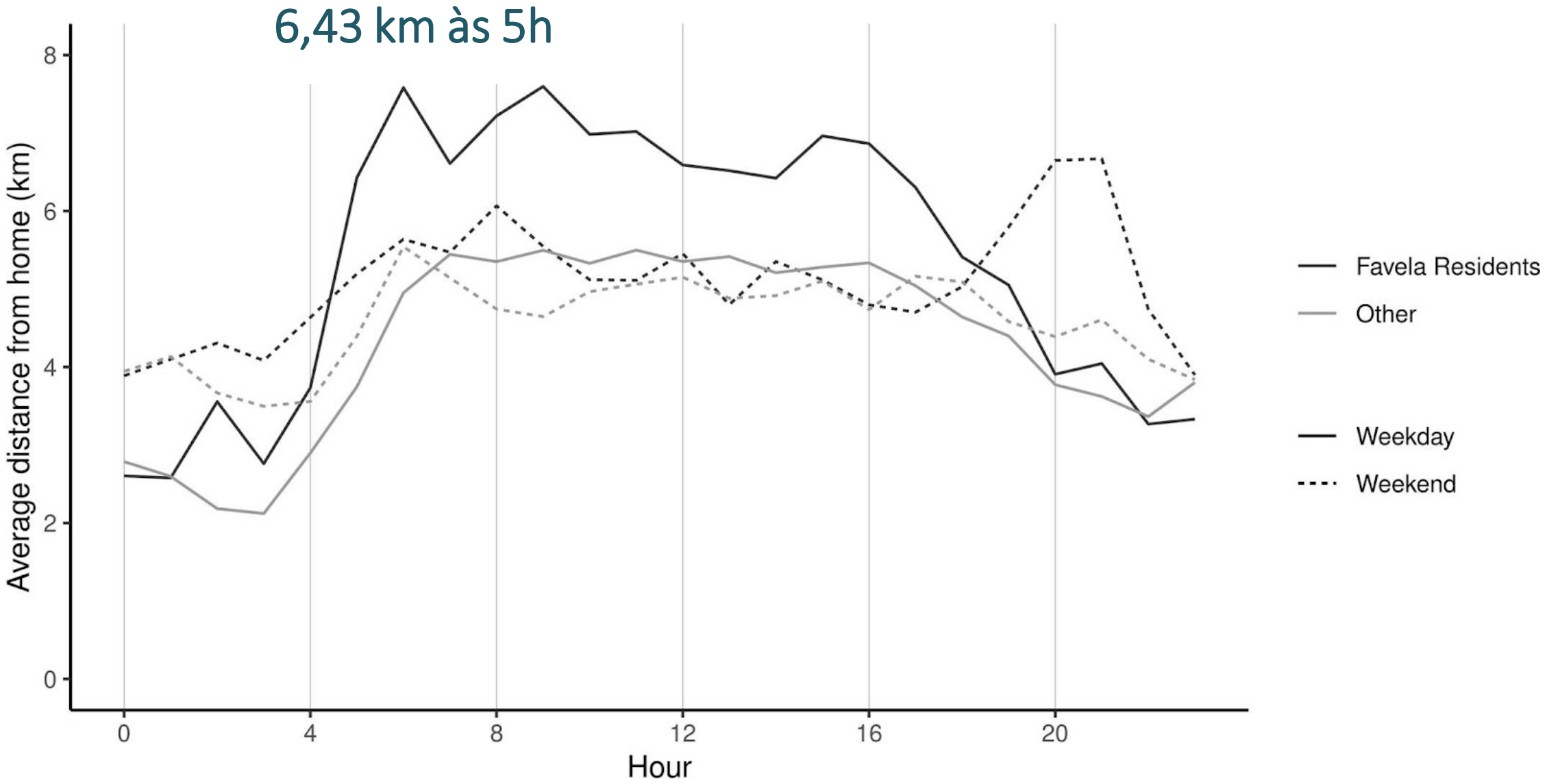
Keywords:
Mobile phone data
Space-time analysis
Favelas
Urban mobility
Mobility inequalities

ABSTRACT

This study investigated the mobility patterns of favela residents based on an analysis of their daily movements derived from high-frequency mobile phone data. Daily movements were measured considering the distance traveled at different times of day over the course of more than two months. Potential trip purposes for the most frequently visited locations were inferred based on land use data from property taxes. The high volume of geocoded data from mobile phones enabled the analysis during multiple days, also covering weekends, usually not considered in traditional transport surveys. The mobile phone data indicated that, on average, favela residents go farther from home during business days and perform less out of home activities during weekends when compared with non-favela residents. Further, distinct patterns for favelas and non-favela residents were mapped, considering different geographical areas, revealing space and time mobility inequalities.

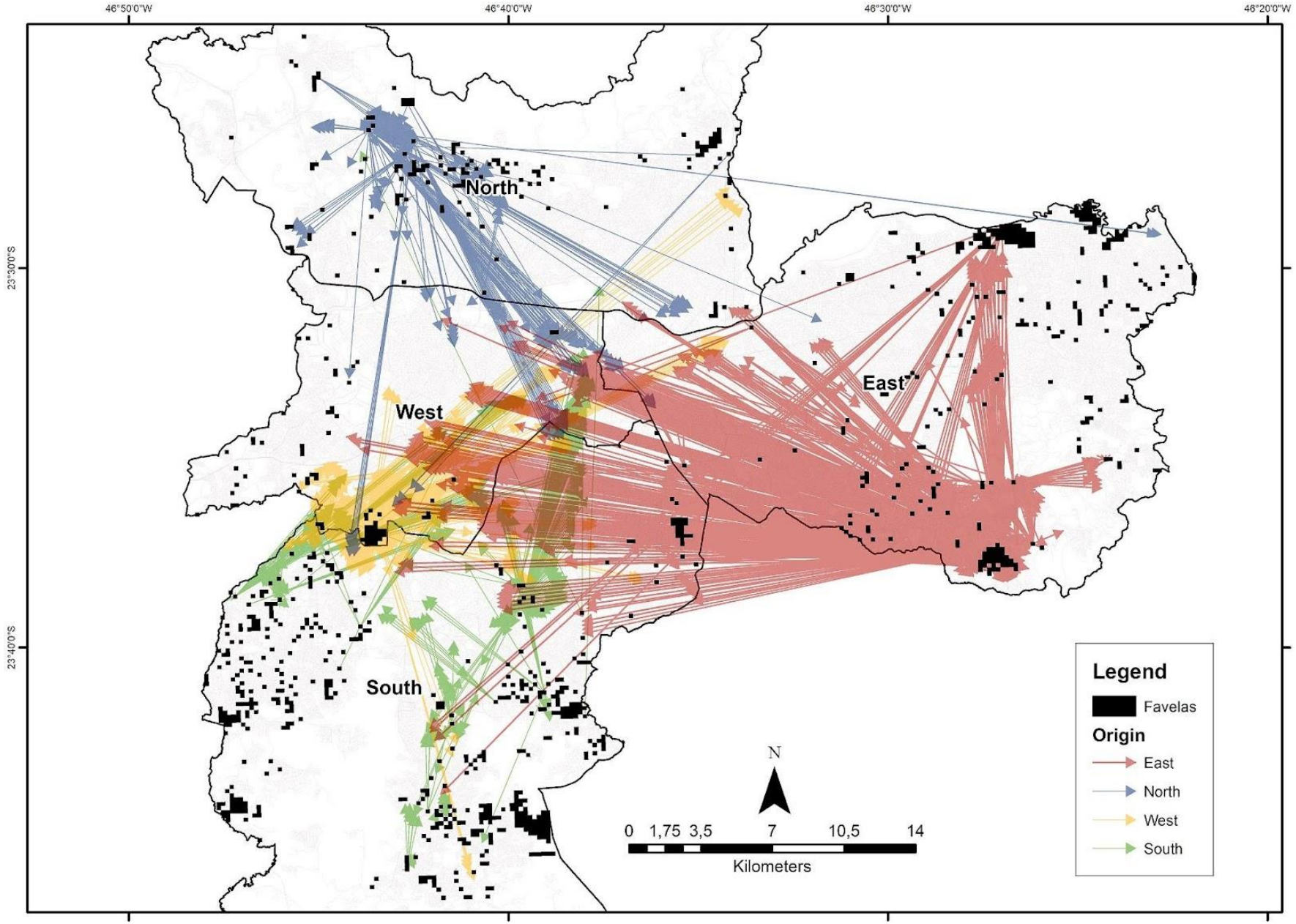
Desigualdades, acessibilidade e mobilidade





Fonte: Rodrigues et al., 2021.

Desigualdades, acessibilidade e mobilidade



Fonte: Rodrigues et al., 2021.

Como modelar os **mecanismos** interdependentes entre os sistemas de **transporte e uso do solo**, para avaliar o impacto distributivo de políticas de transporte?

Journal of Cleaner Production 237 (2019) 117732

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Learning about spatial inequalities: Capturing the heterogeneity in the urban environment

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ARTICLE INFO

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Keywords:
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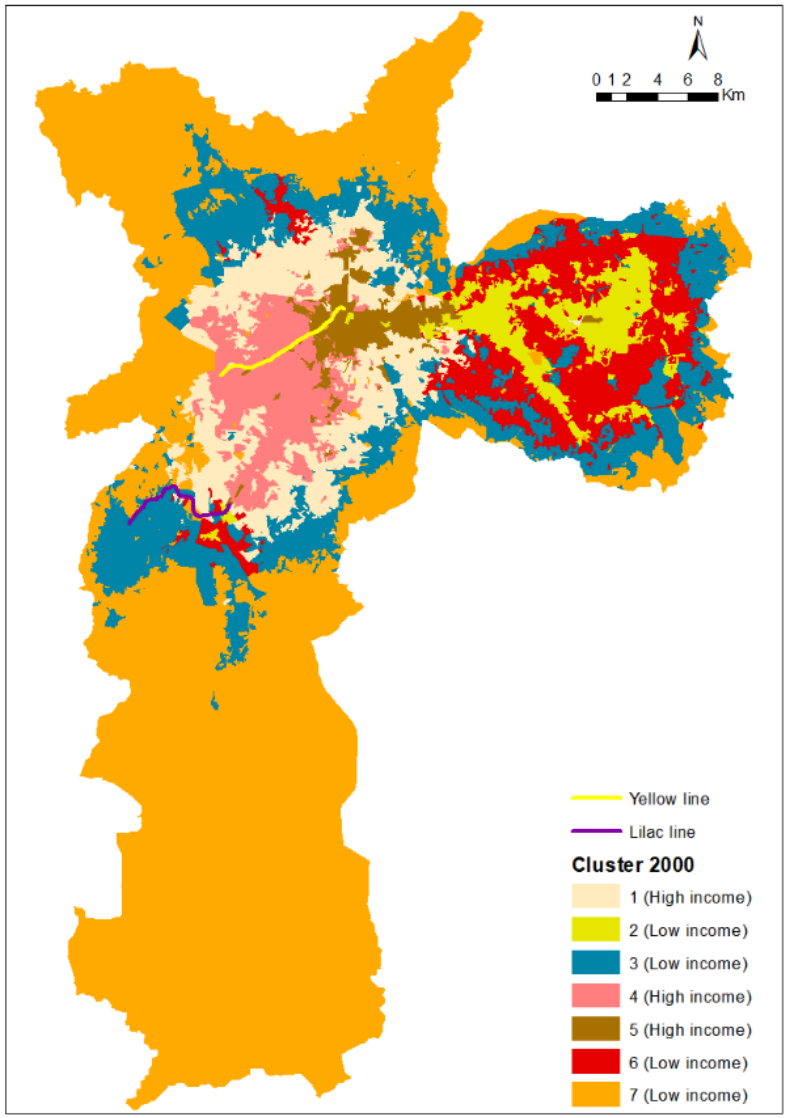
São Paulo
Urban planning

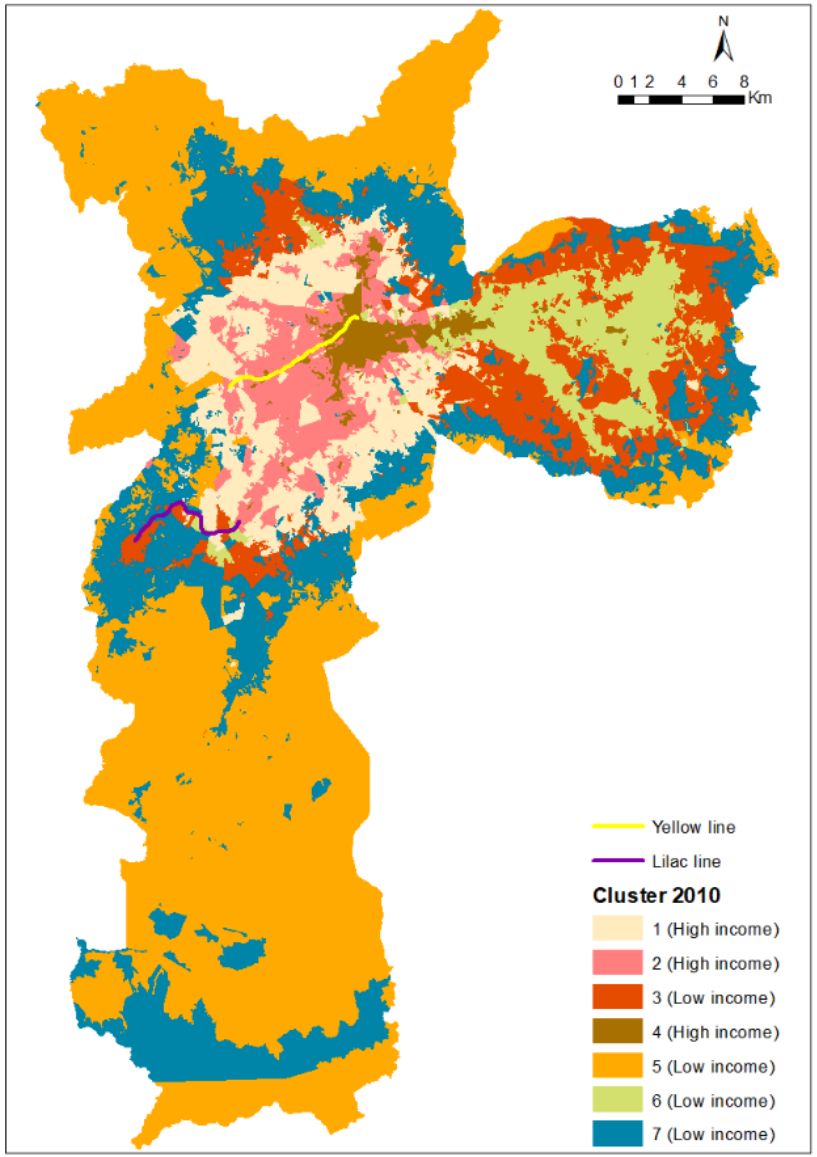
ABSTRACT

Transportation systems can be conceptualized as an instrument of connecting people and their activities over the territory, playing an important role in developing sustainable cities. The current rationale of transport provision is based on population demand and rarely considers the potential of minimizing spatial disparities and uneven distribution of services. To meet the challenge of supporting a more equitable resources distribution, this work aims at identifying and describing patterns of urban services supply, their accessibility, and household income. By using a multidimensional approach, the spatial inequalities of a large city of the global south reveal that the low-income population has low access mainly to hospitals and cultural centers. A low-income group presents an intermediate level of accessibility to public schools and sports centers, evidencing the diverse condition of citizens in the peripheries. These complex outcomes generated by the interaction of land use and public transportation emphasize the importance of comprehensive methodological approaches to support decisions of urban projects, plans and programs. Reducing spatial inequalities, especially providing services for deprived groups, is fundamental to promote the sustainable use of resources and optimize the daily commuting.

Políticas de transporte e desigualdades



✓ As diferenças são maiores na composição de clusters da linha lilás em comparação com a amarela



Fonte: Siqueira-Gay, Giannotti e Sester, 2020.

Land Use Policy 99 (2020) 104992

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Dynamic modeling to support an integrated analysis among land use change, accessibility and gentrification

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[b] Center for Metropolitan Studies (CEM), Av. Prof. Luciano Gualberto, 315 - Sala 116 B, 05508-010, São Paulo, Brazil
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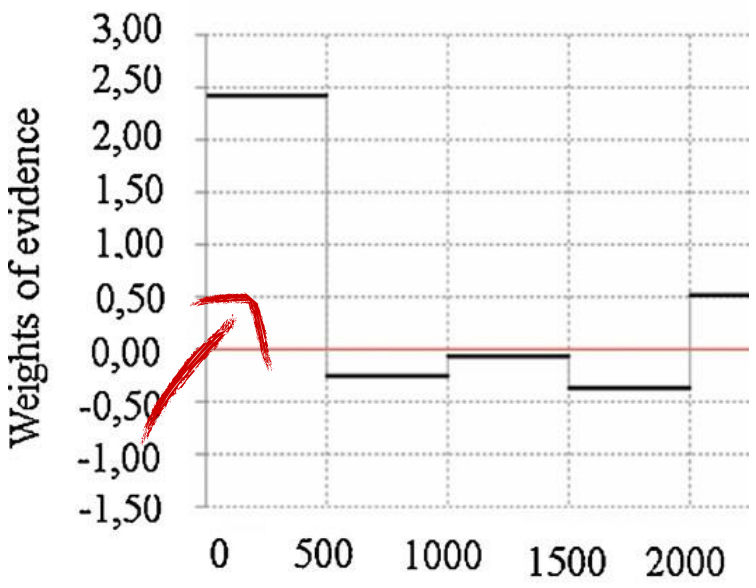
ARTICLE INFO

Keywords:
Urban land use transition
Gentrification
Accessibility
Cellular automata

ABSTRACT

The gentrification phenomenon is characterized by the replacement of the prevailing social class living in a residential area by another one with a higher income due to improvements in technical and social infrastructures, such as upgrades in the accessibility conditions. Gentrification is a matter of great concern, especially in big cities of developing countries, where infrastructure provision should not reinforce patterns of sociospatial segregation. The main motivation of this work is to verify if land use transitions could lead to possible gentrification, under the influence of accessibility-related variables – such as the public transportation network, education and health equipments and the availability of employment. In order to represent a phenomenon that varies over time and space, the study proposes a dynamic modeling via cellular automata, using the validation of past simulations to measure the suitability of each accessibility variable to explain the observed land use transitions. The probability of each cell´s transition was calculated using the weights of evidence method considering the explanatory variables, based on the Bayes´ Theorem. The proposed model is applied in a case study that comprises districts in the southwestern sector of São Paulo city, Brazil, an area marked by the heterogeneity of its land use, with a considerable predominance of low-income dwellings. The work was based on spatial data from more than a decade (2000 – 2016), which besides providing information on land use, also enable the categorization of residential and retail buildings according to their standard and size. The modeling process revealed that for different ranges of each variable, transition trends usually associated with gentrification took place, such as the increasing presence of retail and services, the construction of new buildings in previously non-residential areas, the occupation of vacant land and the reduction of industrial use. However, observing the occurrence spots of those changes, it is reasonable to state that most of the occupation patterns found in each area tended to remain throughout the years, which means that low-income areas were not totally eliminated. Distinct levels of added value granted to the urban tissue were observed as a function of the predominant land use in each area – highlighting the complexity of the relationship between urban form and gentrification. The satisfactory results in the model validation confirmed the good performance of the explaining variables in modeling the urban form dynamics within the study area.

Políticas de transporte e desigualdades



- ✓ Modelagem como estratégia para identificar mecanismos subjacentes

Main trends	
●	Increasing prevalence of retail and services – 1 or 2 storeys
●	Increasing prevalence of retail and services buildings
●	Increase in residential standards.
●	Increasing prevalence of residential use of low and medium standard
●	Low standard verticalization
●	Medium standard verticalization
●	Increasing prevalence of special uses
●	Occupation of vacant land
●	Decreasing prevalence of industries and warehouses

Variables of proximity	Possible trends per period			
	2000 – 2002	2002 – 2008	2008 – 2014	2014 – 2016
	● ● ● ● ●	● ● ● ● ● ● ● ● ●	● ● ● ● ● ● ●	● ● ● ● ●
Metro stations	Unavailable data	● ● ●	● ● ● ●	● ●
Train stations	●	● ● ● ● ●	●	● ●
BRT stops	●	● ● ● ●	● ● ● ●	● ● ● ●
Bus terminals	●	● ● ● ●	● ●	●
Structural roads	● ● ● ● ●	● ● ● ● ● ● ● ●	● ● ● ● ● ● ●	● ● ● ● ●

Fonte: Silva, Giannotti e Almeida, 2020.

Computers, Environment and Urban Systems 81 (2020) 101462

Contents lists available at ScienceDirect

Computers, Environment and Urban Systems

journal homepage: www.elsevier.com/locate/ceus

ACCESS: An agent-based model to explore job accessibility inequalities

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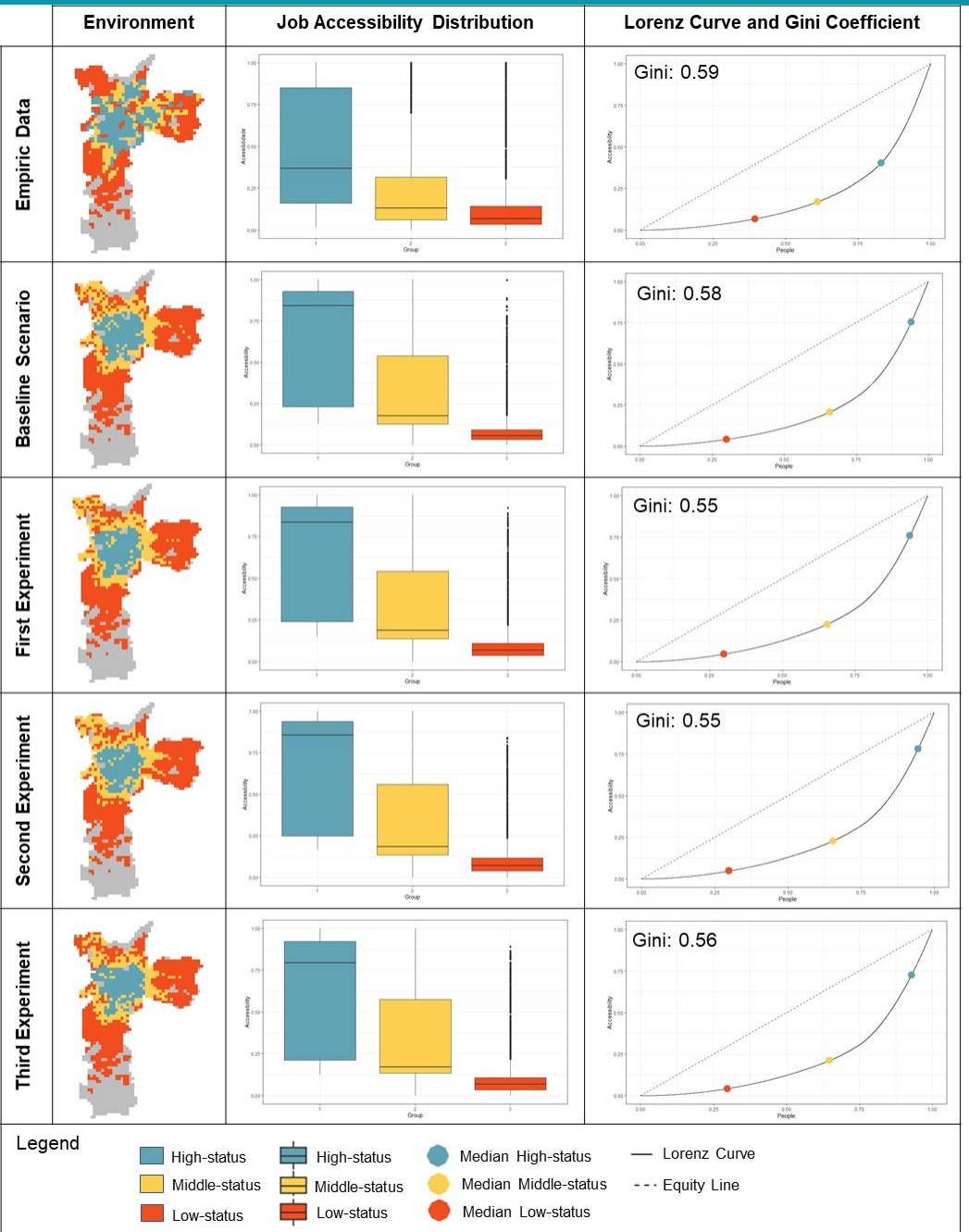
ARTICLE INFO

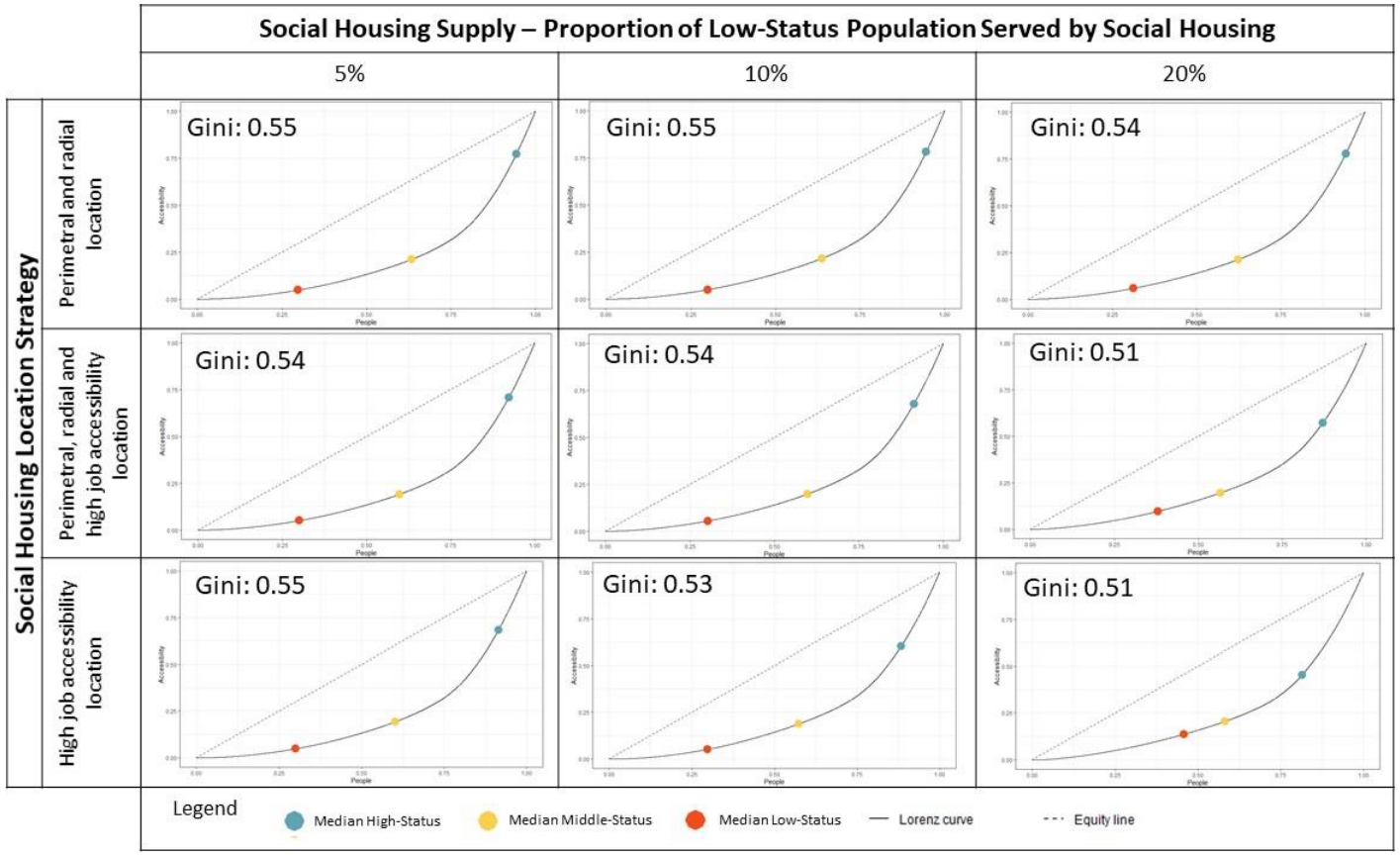
Keywords:
Job accessibility
Inequality
Gini coefficient
Agent-based model

ABSTRACT

This paper presents ACCESS, an agent-based model for exploring job accessibility inequalities among different social groups. ACCESS allows for investigation on the impact of public transport and land use policies on the residential location of the working population and their accessibility to job opportunities. ACCESS can be adapted to different realities, allowing to represent societies with diverse socioeconomic disparities. A utility function composed of job accessibility and neighborhood status is maximized by agents during the residential location choice process. The model outputs include Lorenz curves considering the accessibility dimension, as well as Gini metrics to support the analysis of interventions impacts on accessibility inequalities. An empirical case study is performed on the municipality of Sao Paulo, which is characterized by high levels of inequality. Five experiments were simulated considering three different socio-occupational groups. The first experiment includes (i) new public mass rail transport lines, and the other four experiments consider the new transport infrastructure from the first experiment and add (ii) new social housing location strategies; (iii) new job locations; (iv) new jobs and different social housing supplies and location strategies; and (v) provision of social housing based on a government housing program. The results show that ACCESS allowed the residential location of different social status groups to be depicted with a high correlation to the observed situation. Regarding the case study, the results indicate that only having interventions on transport system is insufficient to provide a significant change in terms of inequality. Better results that impact inequality are reached with public mass rail transport interventions associated with land use policies with different social housing and job location programs.

Políticas de transporte e desigualdades





- ✓ É preciso integrar **políticas de transporte** com políticas de **uso do solo** (habitação e incentivo a subcentralidades)

Fonte: Tomasiello, Giannotti e Feitosa, 2020

Estudos comparativos, incluindo cidades do **sul global**, permitem a investigação dos **mecanismos estruturantes** das desigualdades, bem como o **questionamento** sobre métodos e teorias originalmente propostos com base em evidências empíricas do **norte global**?

Cities 109 (2021) 103016

Contents lists available at ScienceDirect

Cities

journal homepage: www.elsevier.com/locate/cities

Inequalities in transit accessibility: Contributions from a comparative study between Global South and North metropolitan regions

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ARTICLE INFO

Keywords:
Inequalities
Accessibility
Comparability studies
Lorenz curve

ABSTRACT

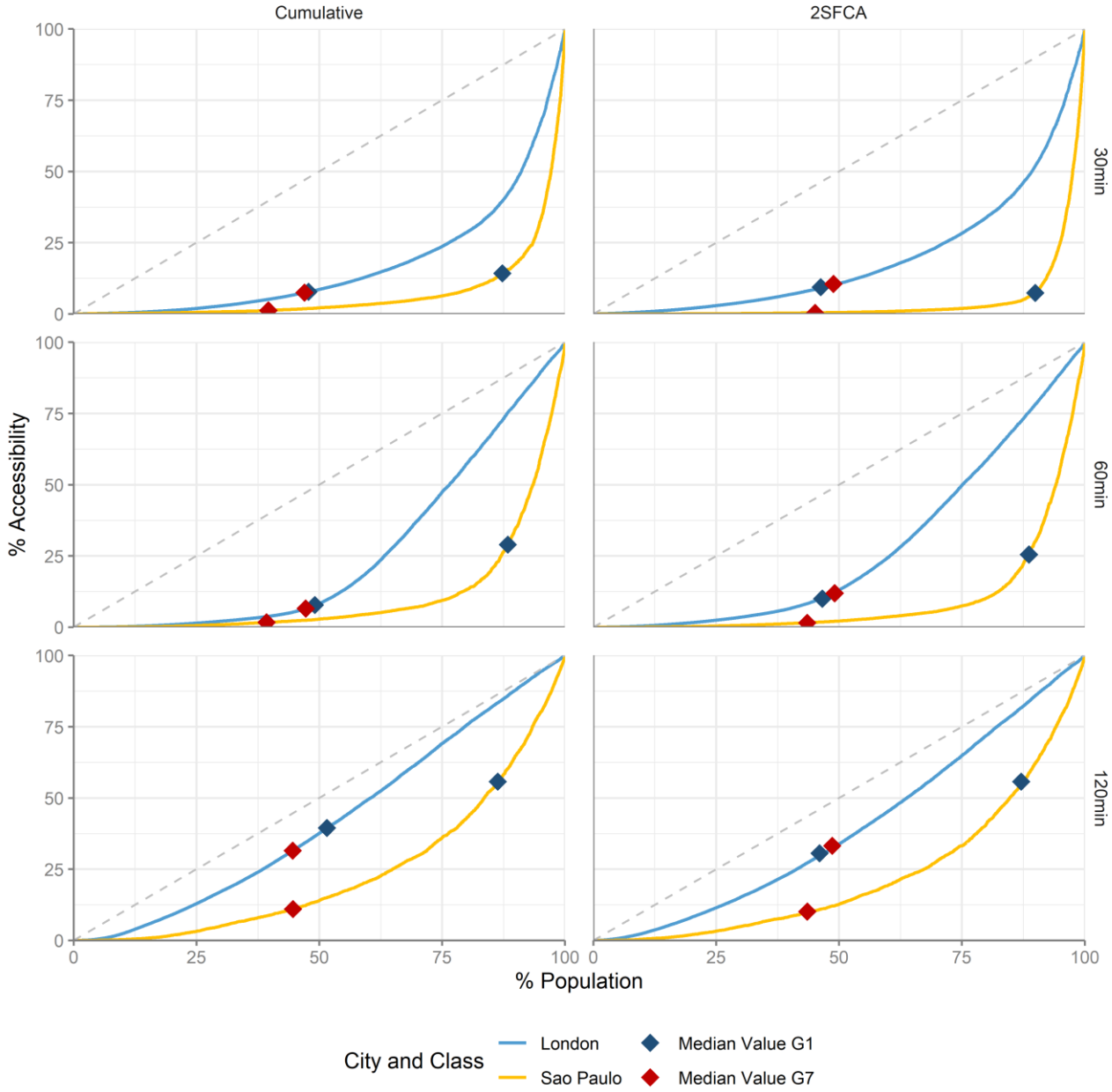
Accessibility metrics have been increasingly employed as a tool to explore the social impacts of transport systems and policies. However, few empirical studies of accessibility involve comparisons between cities from countries with different levels of development, in particular, across the Global South and North. This paper attempts to bridge this gap by focusing on two very distinct, but similarly sized, large metropolitan regions: São Paulo and London, for which we develop comparative metrics.

These metrics are used to identify patterns for different occupational groups (used as a proxy to socioeconomic groups) and discuss transit accessibility inequalities. The issues imposed by a comparative study of urban regions with particular characteristics are discussed. The study applies the results of one metropolitan region to contrast with the other and explore how characteristics of each region's public transport system and spatial mismatch between residential and workplace locations are related to inequalities.

Group's condition was represented in the Lorenz curve, also revealing a new strategy to be adopted by comparability studies on inequalities. The results from Lorenz curve and Gini coefficient reveal larger transit

Estudos comparativos, acessibilidade e desigualdades

- ✓ **Mediana** de grupos na Lorenz para evidenciar desigualdades



Fonte: Giannotti et al., 2021.

Article

B Urban Analytics and City Science

EPB: Urban Analytics and City Science
2021, Vol. 48(7) 1989–2005

DOI: 10.1177/2399808320958426
journals.sagepub.com/home/epb
SAGE

Cumulative (and self-reinforcing) spatial inequalities: Interactions between accessibility and segregation in four Brazilian metropolises

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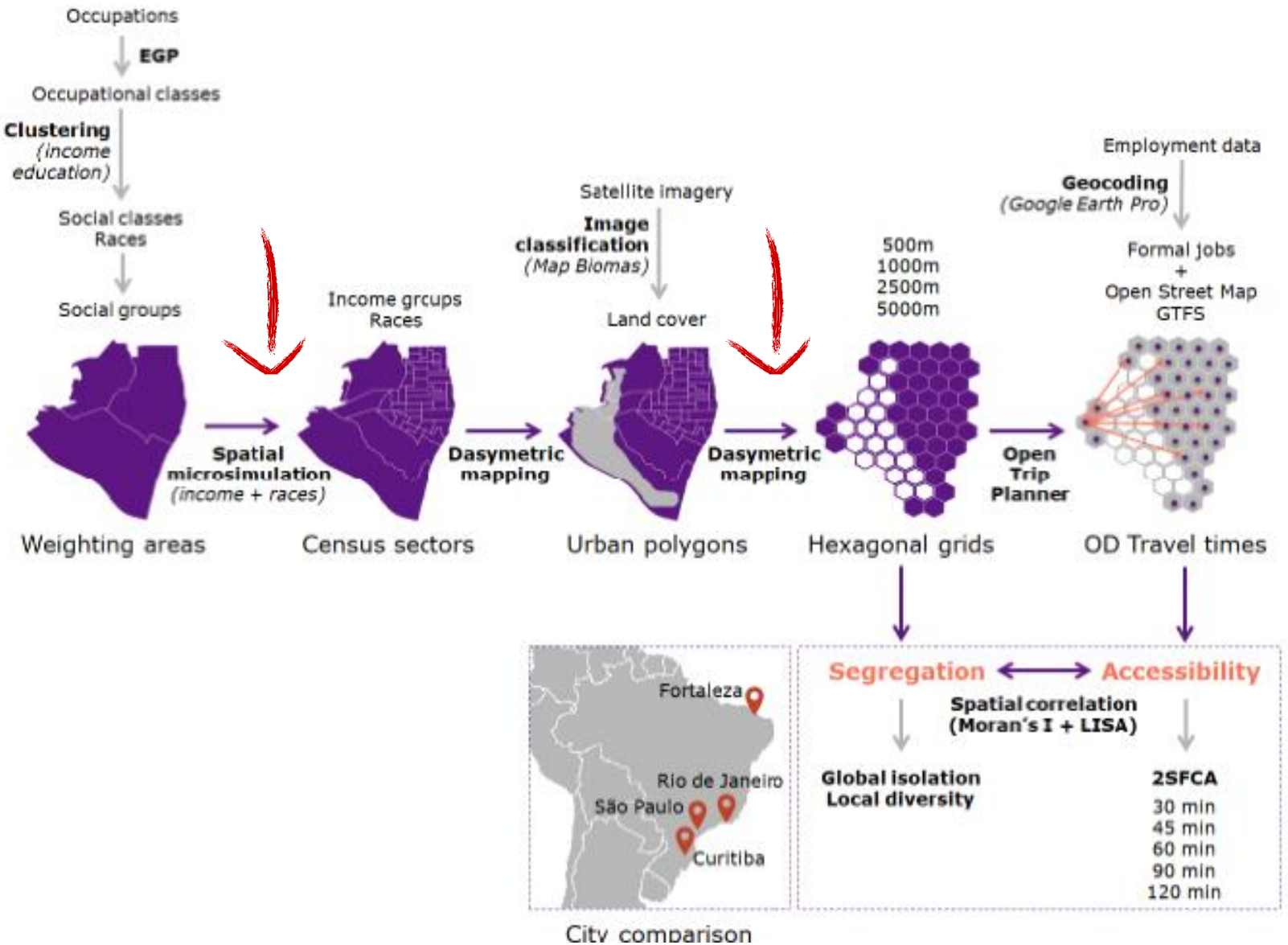
University of São Paulo, Brazil

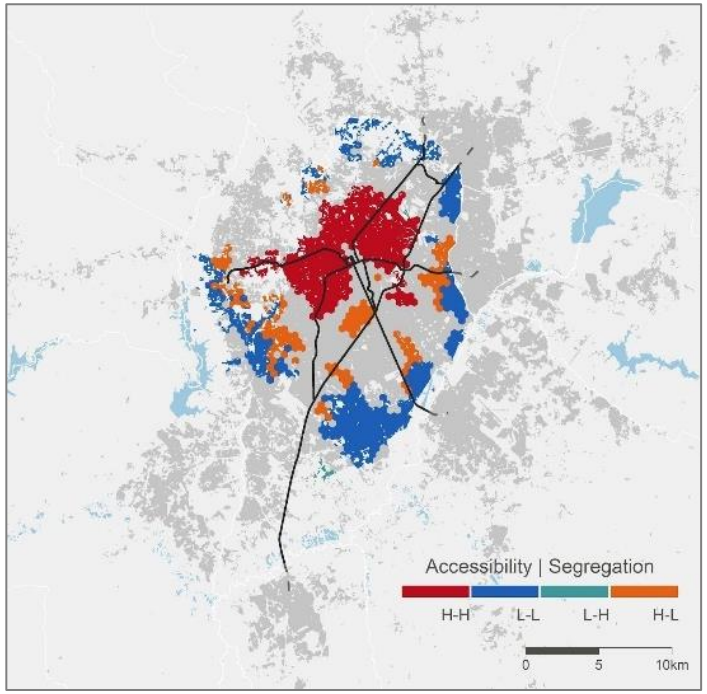
Abstract
The inequalities that mark global society have been deepening worldwide. They materialize in cities, putting pressure on public transport systems for spatial and temporal supply, at the same time as mobility itself generates multifaceted inequalities. From empirical evidence of four socially and spatially distinct Brazilian cities — São Paulo, Rio de Janeiro, Curitiba, and Fortaleza — we explore how differences in scale, geography, class, and race are related to spatial segregation, leading to different levels of access to jobs by public transport in the global peripheral context. These juxtaposed and combined inequalities create highly unfair and strongly cumulative effects on some social groups, contributing to the reproduction of inequality. Based on public and open data and combining methodologies of spatial analysis to enhance comparability and reproducibil-
ity, we explore different areal units, time thresholds, and metrics in order to examine transport

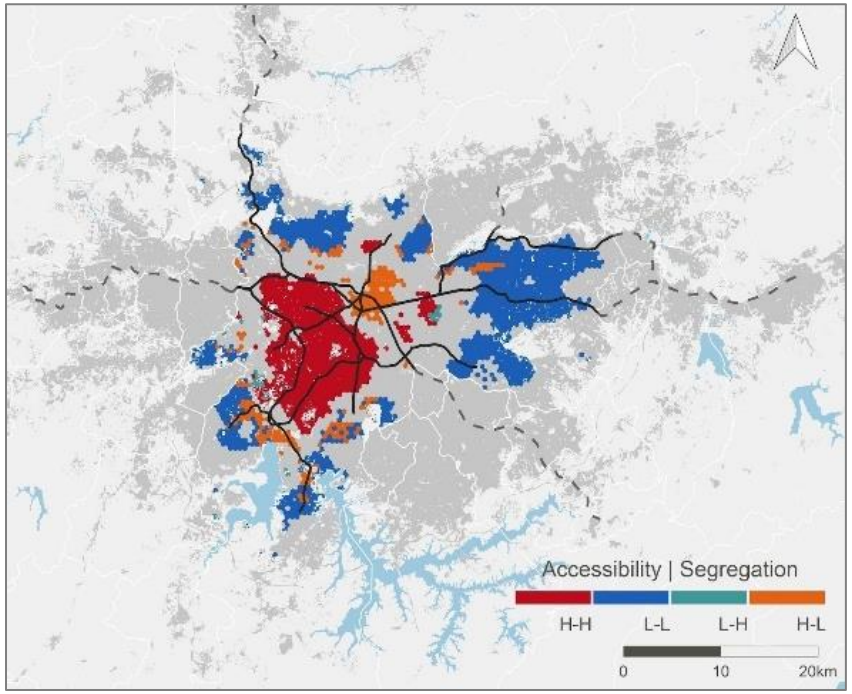
Estudos comparativos, acessibilidade e desigualdades

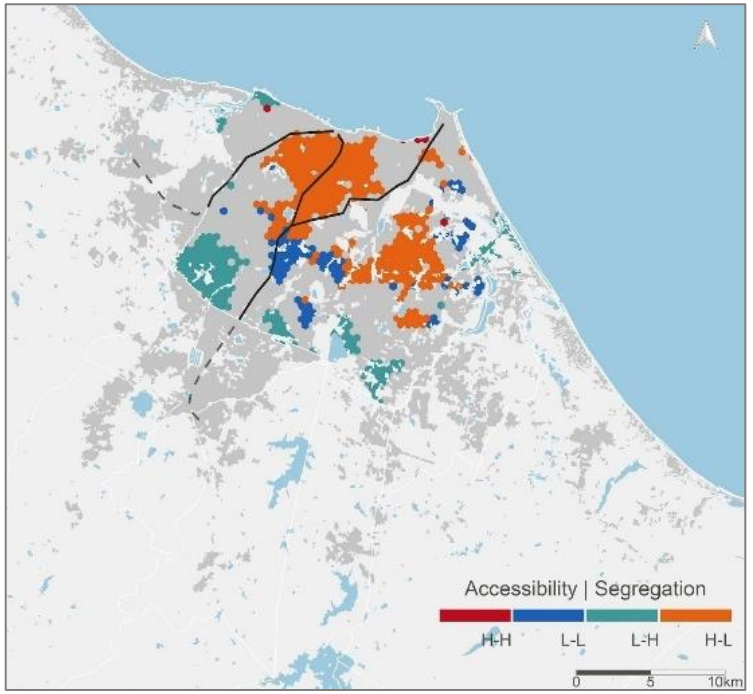


Fonte: Bittencourt, Giannotti & Marques, 2020.

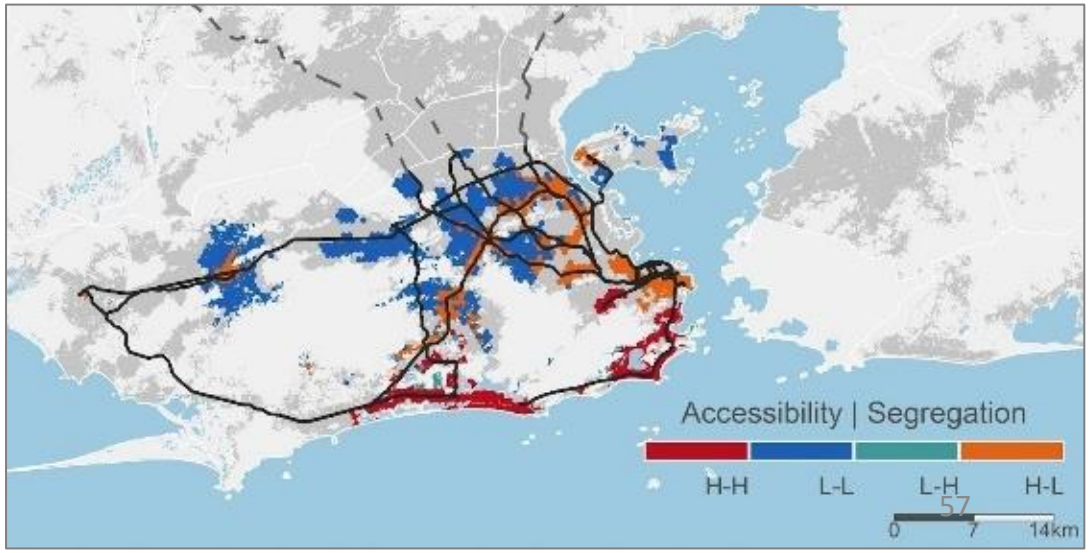
Estudos comparativos, acessibilidade e desigualdades







- ✓ Brancos de classe alta e negros de classe baixa polarizam estruturas espaciais e sociais.



Fonte: Bittencourt, Giannotti & Marques, 2020.

Cities 116 (2021) 103257

Contents lists available at ScienceDirect

Cities

journal homepage: www.elsevier.com/locate/cities

The unequal impacts of time, cost and transfer accessibility on cities, classes and races

Tainá A. Bittencourt *, Mariana Giannotti

Polytechnic School and Center for Metropolitan Studies, University of São Paulo, Brazil

ARTICLE INFO

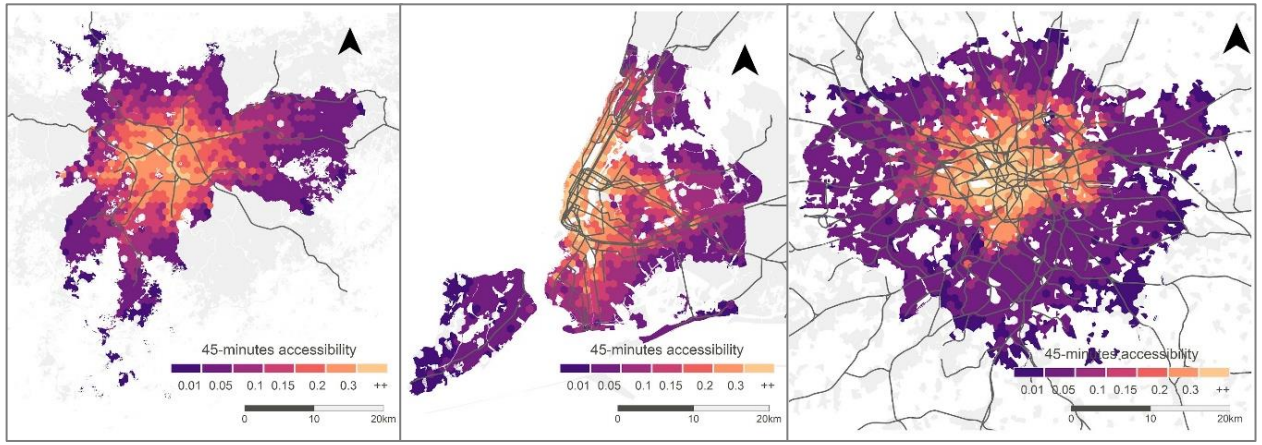
Keywords:
Inequalities
Accessibility
Affordability
Public transport
Class
Race

ABSTRACT

Inequalities are structured and reproduced in multiple dimensions and scales. From countries to neighborhoods, socio-spatial structure interacts with urban and public transportation development and results in uneven access to opportunities in manifold aspects. By looking at cities in distinct positions of the globalized world, São Paulo, New York City and London, we demonstrate that travel times, costs and transfers have different impacts on job accessibility of social classes and ethnic-racial groups living in different areas of cities in different parts of the world. At the global scale, while the monetary cost of travel relative to income has a small impact on accessibility in central and *developed* countries, it substantially diminishes the access to opportunities of a large share of the population in peripheral and *developing* countries. Also, social class has a strong influence on accessibility levels among whites, and upper classes are far better than middle and lower classes. Among blacks, however, historical trajectories of development have a major role in explaining accessibility. The analysis of socio-spatial inequalities in multiple dimensions and scales highlights the centrality of the affordability dimension in transport studies and also its importance to the evaluation and formulation of contextualized policies, particularly in the peripheral world.

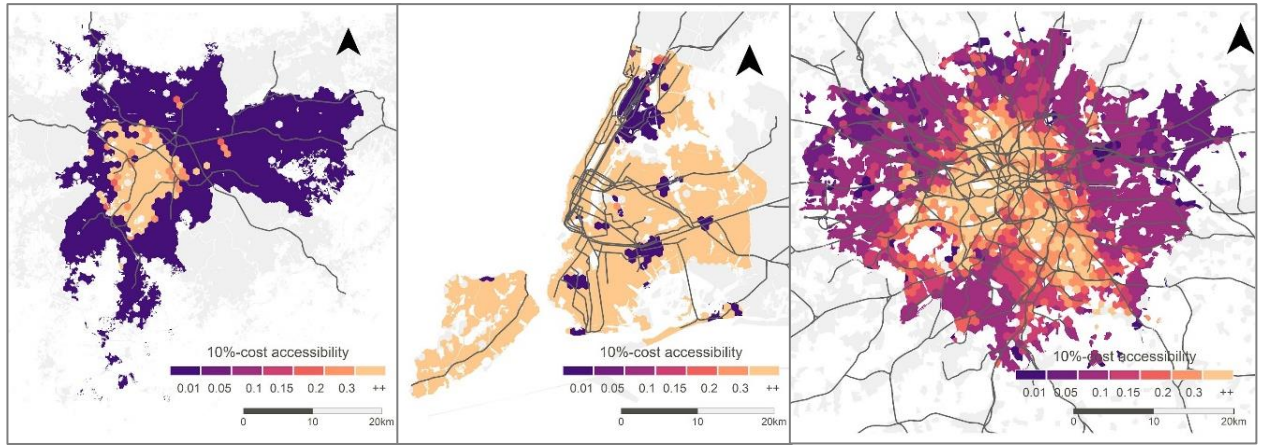
Estudos comparativos, acessibilidade e desigualdades

Time

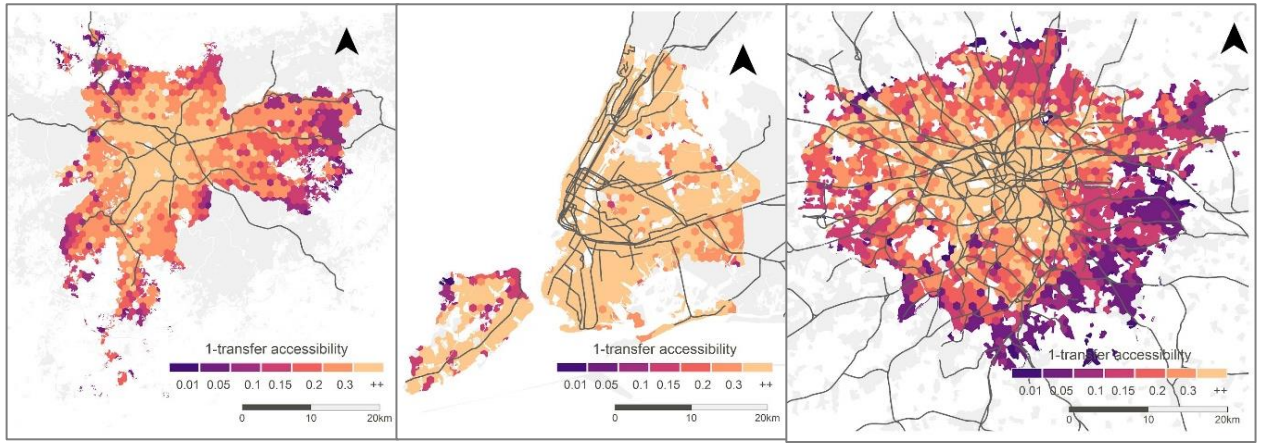


Cost

30-40 % x 5-10%



Transfer



- ✓ Baixa renda combinada com políticas tarifárias resultam em barreiras para viagens e oportunidades de acesso

Fonte: Bittencourt & Giannotti, 2021.

Journal of Transport Geography 101 (2022) 103337

Contents lists available at ScienceDirect

Journal of Transport Geography

journal homepage: www.elsevier.com/locate/jtrangeo

The bias in estimating accessibility inequalities using gravity-based metrics

Mariana Giannotti *, Diego B. Tomasiello, Taina A. Bittencourt

Center for Metropolitan Studies and Laboratory for Geospatial Analysis at Polytechnic School, University of São Paulo, São Paulo 05508-070, SP, Brazil

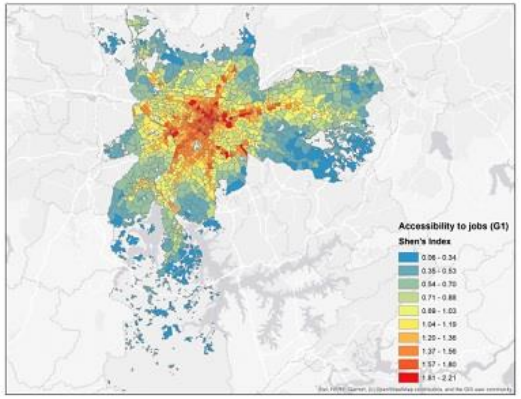
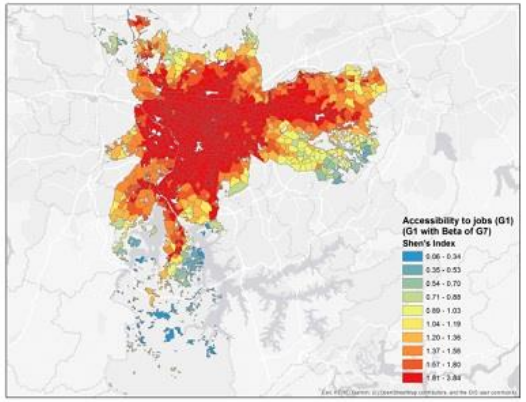
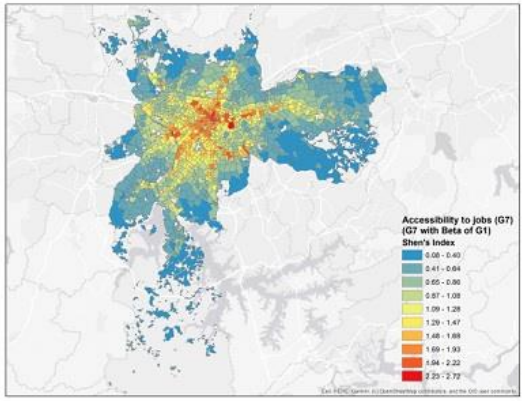
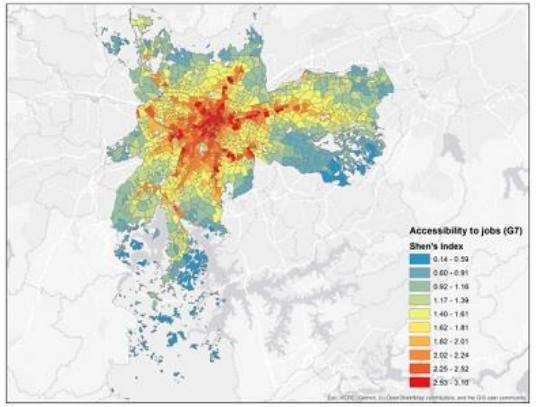
ARTICLE INFO

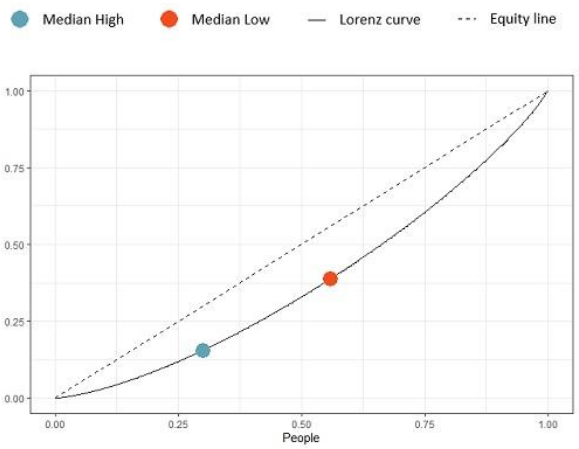
Keywords:
Accessibility measures
Inequalities
Public transport

ABSTRACT

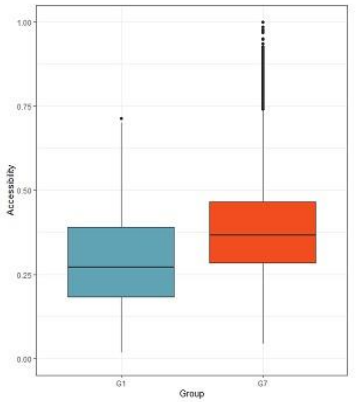
Accessibility measures have been extensively used to explore the outcomes of the spatial distribution of transport, jobs, and population groups in cities. Despite its wide use, identifying the population groups that most benefit from accessibility is not straightforward and different metrics might result in different conclusions. The present work aims to analyze the potential bias of using gravity-based measures based on revealed mobilities to identify job accessibility inequalities. By looking at two large and very different regions, the municipality of São Paulo (SP) and the Greater London Area (GLA), we argue that distance decay functions built from current trip behaviors should be carefully used in evaluations of accessibility inequalities because it may underestimate disparities between socio-occupational groups and also result in a misleading interpretation of impedance factors. Two distinct approaches were implemented to support those claims. We first estimate group-specific distance decay functions, considering only travel time. Secondly, we consider both travel time and travel cost relative to income to estimate zone-specific and city-specific distance decay functions for each one of the study areas. The population of both cases studies was stratified according to the NS-SEC standard to select the highest and the lowest socio-occupational groups and to explore job accessibility inequalities. It was found that higher-level and lower-level socio-occupational groups of SP and GLA present striking differences in terms of travel times and relative travel costs, with SP being more unequal. By applying the distance decay function of the lowest level socio-occupational group to the calculations of the job accessibility of the highest level group, and by adding travel cost to the analysis, we highlight inconsistencies between gravity-based accessibility calculations and theory, as trips taken by different groups can be mistakenly associated with willingness to travel. From a

Estudos comparativos, acessibilidade e desigualdades

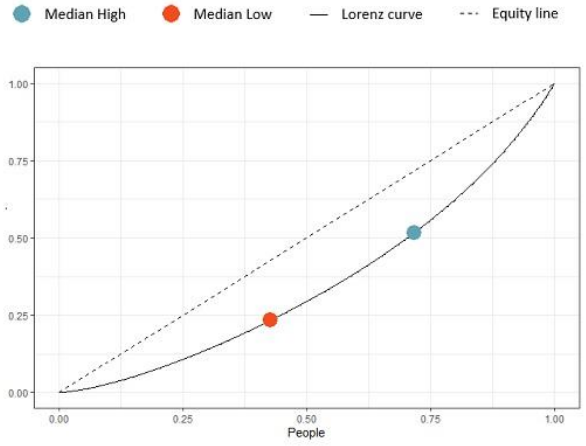
	Distance decay function Group High (Beta Group High)	Distance decay function Group Low (Beta Group Low)
Group high		
	(a) Group high (1) with beta of Group high (1).	(b) Group high (1) with beta of Group low (7).
Group low		
	(c) Group low (7) with beta of Group high (1).	(d) Group low (7) with beta of Group low (7).



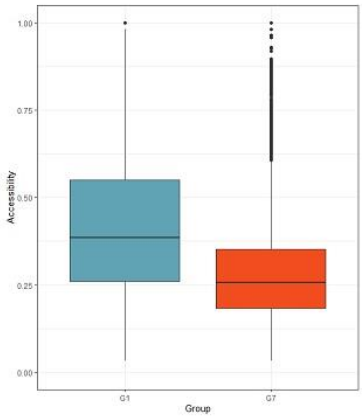
(a) Shen's index Lorenz Curve for Group high (1) and Group low (7). Gini: 0.24.



(b) Job accessibility distribution.

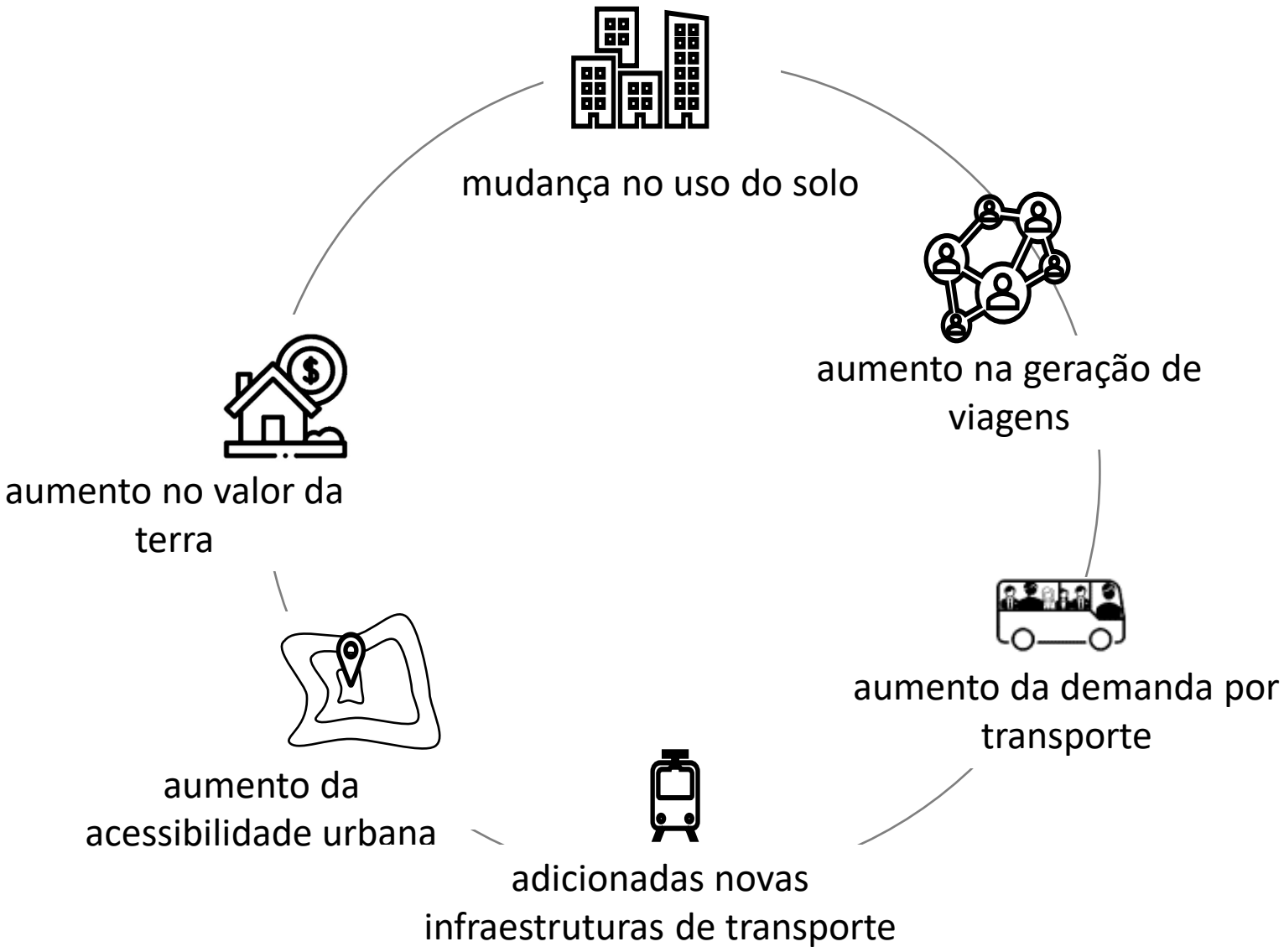


(c) Shen's index Lorenz curve for G high (1) and G low (7) (with G high beta). Gini: 0.29.



(d) Job accessibility distribution for G high (1) and G low (7) (with G high beta).

Fonte: Giannotti, Tomasiello & Bittencourt, 2021.

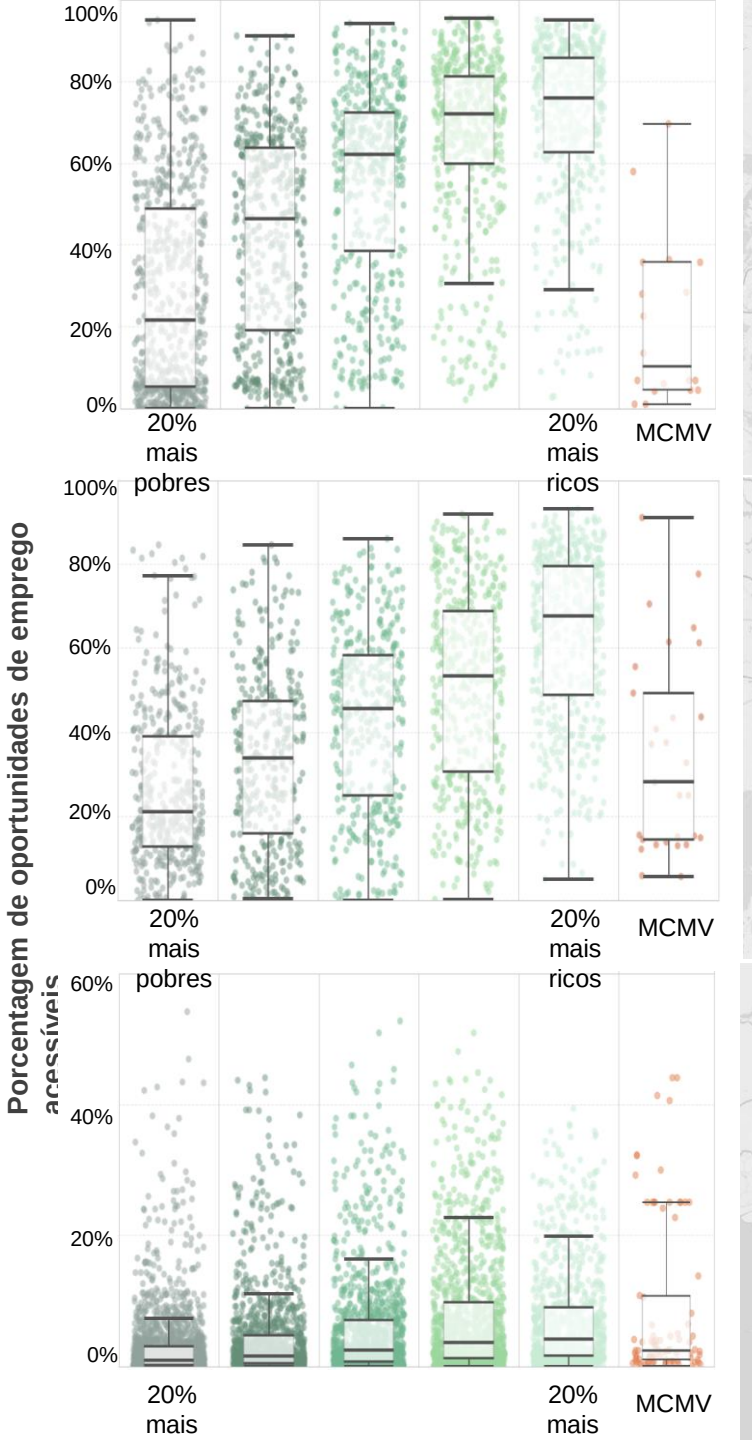


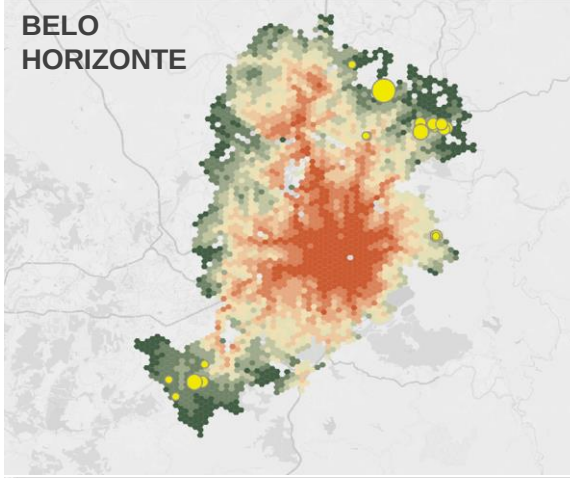
Ciclo do uso do solo e transportes (traduzido de Paquette et al., 1972)

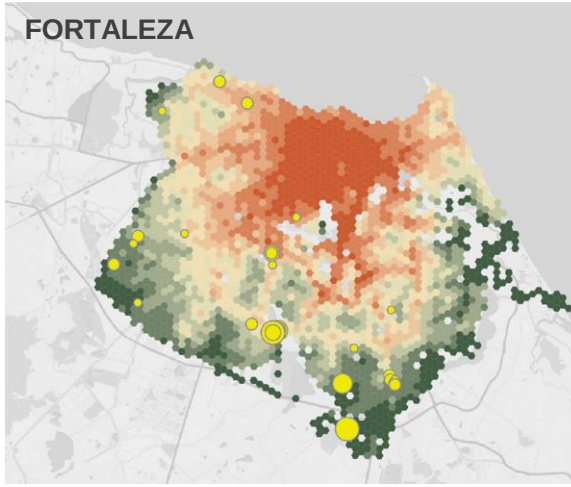
(Giannotti, 2022)

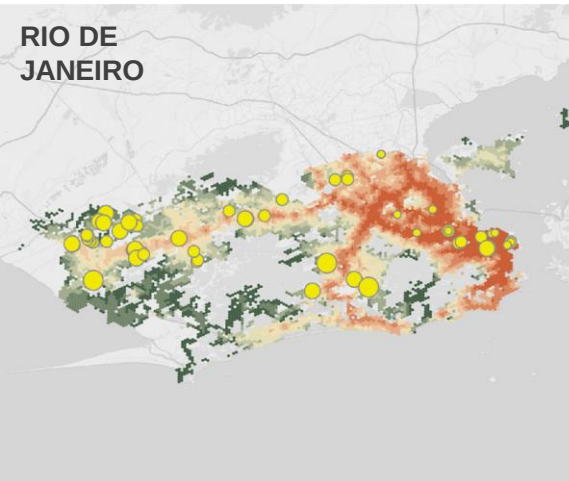
Habitação de Interesse Social

- Em Fortaleza, acessibilidade do MCMV é comparável à dos 20% mais pobres.
- Em Belo Horizonte, ela chega a ser ainda pior.
- No Rio de Janeiro, o total de oportunidades acessíveis pelo MCMV supera o observado no terceiro quintil de renda.









Contents lists available at ScienceDirect

Habitat International

journal homepage: www.elsevier.com/locate/habitatint

Social housing and accessibility in Brazil's unequal cities

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ARTICLE INFO

Keywords:
Social housing
Accessibility inequalities
Spatial equity

ABSTRACT

Ensuring equal access to opportunities while assessing the housing needs of low-income populations has been a significant challenge in many global south countries. Social housing programs have been recurrently criticized for reinforcing inequalities by ignoring the poor conditions of urban access. This study evaluates the urban access of a national social housing program, *My House My Life* (Minha Casa Minha Vida, MCMV), in Brazil, one of the most unequal countries in the world. This program is renowned for building many of its housing projects in urban

Perspectivas e sistematização crítica

1. Grupos de renda x sócio-ocupacionais
2. Avançar para os modos ativos para além dos motorizados
3. Big data x Mix data
   Quanti x Quali
4. Open Science (está perto, mas está longe!)
5. Testar indicadores x propor indicadores
6. Caracterizar desigualdades x identificar mecanismos de inferência causal

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