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Accessibility, affordability and equity: Assessing 'pro-poor' public transport subsidies in Bogotá

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ABSTRACT

Public transport has claimed a preferential position in recent urban development agendas internationally. Rising interest on inclusive development of cities at different levels of urban policy involves new opportunities and challenges for increasingly urban societies. In cities of the Global South, in addition to institutional and physical challenges for the development of efficient and inclusive public transport, local governments face the challenge of making public transport affordable for a large share of the population in conditions of poverty. In order to meet these challenges, several public transport systems throughout have implemented targeted subsidies for specific social groups such as students, the elderly and people with reduced mobility, and more recently for the poor. The government of Bogotá has implemented a pro-poor public transport subsidy scheme that aims at alleviating the financial burden of poor households for accessing the city's public transport system. This research develops an analysis of the effects of such subsidy from an accessibility perspective using potential accessibility measures to employment opportunities and assess its impact on equity. The research builds on the hypothesis that accessibility is a multi-dimensional construct that can benefit from the decrease in economic as much as gains in time costs. Results from the analysis show that both the current structure of the pro-poor subsidies in Bogotá and alternative scenarios for increasing its coverage are progressive, improving accessibility and equity for those with access to the subsidy. The paper provides valuable insights for the analysis of similar policies in other urban contexts in the Global South.

1. Introduction

Transport costs can represent a heavy burden for household expenditures, particularly in low-income households. The poor invest an important part of their income on their commutes, which restricts disposable income for other travel purposes and activities. Lack of transport can translate into difficulties for access to social life, education and health facilities and economic opportunities (Willoughby, 2002). Low-income workers have a pressing need for adequate and affordable transport services (El-Geneidy et al., 2016). In developing contexts, low-income groups have a narrow absolute limit to the number of journeys possible by low and often erratic monetary incomes, which in turn limits their chances of becoming less poor. Therefore, the development an improved understanding of these travel behaviours (Lucas et al., 2016a) and their impacts on access to opportunities should become a priority in current research and policy agendas.

In Latin America, urban poverty and 'peripherality' often come hand in hand, which restricts further accessibility by adding a spatial dimension to already limited travel choices due to low purchasing power (Dávila et al., 2006, Gilbert and Ward, 1982). Ureta (2008), finds that peripheral location limits people's ability to travel by foot, at the same time as high costs of public transport in relation to household income restricts people's movement to the strictly essential (work and education). As employment is the main source of income that facilitates other activities (Loo and Chow, 2011), governments have the responsibility to improve access to jobs for the most disadvantaged. This is linked with design of transport policies aiming at closing the access gap between residents. Although the goal of increased access to economic opportunities can be instrumental in reducing poverty and improving quality of life, available mechanisms for doing so are often impaired by financial constraints both in the demand and supply side of urban transport.

Public transport plays a central role in the accessibility levels of urban populations. In cities with low car-ownership rates, public transport becomes the main mechanism to articulate urban structures and provide access to the territory within goals of sustainability. In

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Bogotá and Soacha (the most populous neighbouring municipality), public transport supplies the largest share of the demand of low-income populations, excluding walking and cycling. Unfortunately, one of the main characteristics of Bogotá's transport structure -and that of cities with similar public transport systems-is that fares for public transport services are designed to cover the entirety of operating costs (Hidalgo and Gutierrez, 2013). As it is nearly impossible to make fares both affordable and financially sustainable, transport fares tend to become too expensive for the city's poor (Rodriguez et al., 2016). To balance the needs for economic and social sustainability, some cities have tried to implement targeted transport subsidies for specific segments of the population. However, these policies are yet to gain sufficient traction at the international and national levels to become a mainstream response to widespread affordability concerns for low-income communities throughout cities of the Global South.

In Bogotá, the implementation of the Integrated Public Transport System (SITP in Spanish) has incorporated not only an integrated fare for the operation of all its public transport sub-systems, like Transmilenio (TM, local BRT system) and traditional buses. The SITP is a large-scale initiative by which the city's nearly 700 bus routes and more than 15,000 traditional urban buses are being transformed into a regulated, publicly tendered system with high level of service. The SITP aims to eliminate the inefficiencies of the traditional bus system by introducing *ppp* contracts that restructure bus routes, regulate oversupply and change contractual arrangements and incentives with operators to eliminate the infamous *penny war* that characterized the traditional bus system (Ardila, 2005). In 2014, the local government introduced a pro-poor public transport subsidy that builds upon a social policy targeting mechanism developed by the national government called SISBEN to allocate public transport subsidies that allow discounted access to lower income households to the SITP.

Our research places itself in recent debates around the links between affordability, accessibility and transport equity, documenting the targeted subsidies as an example of implementation of a transport policy with a social focus in a well-known case of urban transport development in Latin America such as Bogotá. The paper seeks to highlight the contribution of targeted policies aiming to improve affordability of socially vulnerable populations to accessibility using consolidated accessibility metrics and easily understandable and readily available information in most cities of the Global South. While transport evaluation continues to hold a primary place in current transport policy and planning, equity assessments are less than frequent and imply increasingly complex understandings of the role of transport on issues such as accessibility, mobility, and health wellbeing (Oviedo et al., 2017, Di Ciommo and Shiftan, 2017). The paper is supported by relatively simple, accessible and intelligible information for both specialist and non-specialist audiences in practice and decision-making. The paper reflects on the moral concern of equity, described as the need to reduce systematic discrimination and marginalisation, and sometimes understood as the absence of systemic inequalities between different social groups (Wiles and Kobayashi, 2009). In this regard, the paper proposes the understanding of accessible opportunities as an unequally distributed outcome of the configuration of the land-use and transport systems in Bogotá. By recognising that transport can play a differentiating role in enabling a redistribution of accessibility (Lucas et al., 2016), we argue that broader discussions are necessary to introduce equity considerations and the complex effects of transport on human development.

We explore the effects on accessibility to income-generating opportunities and affordability of the implementation of a targeted public transport subsidy for low-income populations in the city of Bogotá. Despite the long history of accessibility metrics in the international literature and practice in many cities of the Global North, traditional approaches to public transport policy evaluation in most cities in the Global South do not consider accessibility changes. This research focuses on potential accessibility calculations for Bogotá and Soacha. We analysed the development of potential accessibility to employment for the 2011–2015 period, because of the implementation of the SITP and its fare subsidies, keeping land-use changes constant. This is based on the calculation of potential accessibility levels to the labour market per zone for Bogotá and Soacha, by introducing a function of impedance composed by travel time and monetary costs.

The article does not attempt to suggest new methodological approaches to the analysis of accessibility or the assessment of transport subsidies or similar policies. However, we suggest that the use of equity measures, often applied only to income distribution at zonal level, may be applied to accessible opportunities, understanding these as an inequitably distributed asset. In turn, the paper seeks to showcase how can targeted policies be justified from an equity perspective using well-known methodologies and easily understandable information. Our work seeks to add elements to the debates at the national and international levels in relation to the understudied benefits of pro-poor public transport subsidies, and how can readily available evidence be used to bridge the gaps between technical and non-technical criteria. The research therefore responds to two overarching hypotheses: (i) that pro-poor public transport subsidies can reduce the accessibility gaps between better-off and lower income population; and (ii) that accessibility and equity metrics are an effective form of evidence for supporting moral arguments related to the reduction of inequalities through transport policy.

2. Location of activities and transport in Bogotá

Bogotá is a city of 7.8 million people and an urbanized area of approximately 414 km^2 in 2015. It currently forms a conurbation with 17 of the surrounding municipalities, amongst which the most important is Soacha with about 511,000 inhabitants (Guzman et al., 2017b). The latter is forms a complex functional area with Bogotá, which has been gradually emerging as the cities extend beyond their administrative boundaries (Oviedo and Dávila, 2016). For this analysis purpose, Bogotá is divided into 112 urban "zonal planning units" (UPZ), which are territorial units used to plan urban development at the zonal level and follow recognizable boundaries such as roads and natural barriers. Soacha is divided into four different zones.

The study area (Bogotá and Soacha) has some particularities in terms of spatial distribution of activities (residing and work). Fig. 1 shows the spatial distribution of population (left) and employment density (right). The employment data includes both formal and informal workplaces. Because of an historic housing deficit, many informal neighbourhoods emerged on the city's peripheries characterized by poor urban living conditions, which have been formalized over time. It is in these border zones where the highest population densities occur.

Fig. 1 shows very high population densities in urban peripheries where there is a deficit of local employment in comparison with the resident population. Regarding location of jobs, there is a clear dominance of a large concentration of employment in an extended centre along major road corridors in the northern and eastern sides of the city (the wealthier zones). Just over one-third of the city's employment occurs in zones occupying only 10% of its urban land area. The evidence in Fig. 1 suggests a particularly stark reality: people do not live where the jobs are. The 2011 mobility survey[1] reports the monthly income of each household in USD[2] within eight predefined ranges as shown below (see Table 1).

The spatial distribution of households in Bogotá and Soacha under the above income classification is shown in Fig. 2. The evidence shows 66% of the households in Bogotá belong to the lowest income ranges (1 and 2), while in Soacha this proportion is 86%. As shown in Fig. 2,

[1] It was not possible to use the last mobility survey (2015), because it statistical representativeness is not enough for the spatial disaggregation of this study.

[2] Colombian Peso in 2011: 1 USD = 1900 COP.