



Assessing inequalities on public transport affordability in two latin American cities: Montevideo (Uruguay) and Córdoba (Argentina)



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ARTICLE INFO

Article history:

Received 29 October 2014

Received in revised form

16 September 2015

Accepted 21 September 2015

Keywords:

Affordability
Public Transport
Urban mobility
Latin America

ABSTRACT

This paper addresses public transport affordability inequities for Córdoba, Argentina, and Montevideo, Uruguay. In calculating public transport affordability, we consider two different criteria based on the “observed mobility” and the “potential mobility”. Using household travel survey data, we estimate that on average, observed public transport affordability indexes are below 7% (6.2% in Córdoba and 3.8% in Montevideo). Nonetheless, for the lower quintile, this index reaches 11.7% in Córdoba and 6.4% in Montevideo. The observed affordability index is based on the expenditure on observed public transport trips, which does not consider those trips that, even when necessary, may not be performed due to financial restrictions. Because this measure underestimates financial constraints for the poorest groups, we propose to consider a new measure: potential affordability as an attempt into build a more realistic basket trip. It is computed considering motorized trip rates of the middle-class groups’ as a benchmark. After analyzing potential affordability results, assessing its limitations and controlling by household composition we conclude that this is a very promising complementary measure since it helps to better understand the affordability gap for low-income groups.

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1. Introduction

The ability of people to overcome geographical distances in a city is not equally distributed among different social groups. Therefore, it is necessary to include equity analysis in transport policy research to improve the decision-making process. In Latin American cities, public transport affordability is one of the main obstacles to mobility. As a result, some citizens use motorcycles as alternative mode and others have no choice but to walk or bike long distances and they even have to resign necessary transit trips.

The paper aims to contribute to the debate on financial burden as an obstacle for accessibility. To do so, we estimate affordability and its stratification pattern across income levels for two mid-size Latin American cities, both located in the Southern Cone: Montevideo, the capital of Uruguay, and Córdoba, the second-largest city in Argentina. One of the most important measures to assess transport affordability is household’s actual expenditure – as the share of household disposable income– on public transport, i.e. the affordability index based on observed trips. Even though we

describe this variable, it is also true that affordability measures based on observed trips do not take account of sacrificed trips.

For this reason, we propose a possible correction through the estimation of a potential affordability measure. Potential affordability is a way to consider a more realistic basket-based measure that transcends a fixed number of trips that could be artificial. This basket is equal to the number of necessary public transport trips to equalize middle-income motorized trips rate. The assumption behind this decision is that middle-income groups are capable to fulfill their motorized transport needs. So, if poorer households reach their motorized trip rates, it is reasonable to assume that they are satisfying their transport needs as well.

To consider observed and potential affordability measures in a complementary way is an input to grasp the different nature of affordability challenges in both studied cities. This will help public officials to intervene in public transport policies to achieve the fare policy objectives of reducing financial obstacles for accessibility.

The paper proceeds as follows. Section two reviews the transport affordability concept, focusing on equity assumptions behind several measures mentioned in the literature. Section three describes the data and research methods, while section four presents the main features of the studied cities and their transport systems. Section five presents the results and, finally, section six discusses the primary findings and conclusions of the paper in terms of

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mobility equity.

2. Literature review and theoretical framework

2.1. Affordability as an obstacle for accessibility

According to the literature, one could define accessibility as the ability to overcome geographical distances (Hernández, 2012a; Massot and Orfeuil, 2005; Miralles-Guasch, 2002). This ability is crucial for people to take advantage of urban resources and opportunities (e.g. jobs or health and education services) especially when motorized trips are necessary.

Litman (2013) defines affordability as the capacity to afford access to goods and services any time transport is required. In this vein, the transport affordability concept represents the adjustment between households' purchasing power (defined by income) and transport costs (in the case of public transport, the fare policy). When these two dimensions do not fit, the household is highly vulnerable in regards to mobility and accessibility (Hernández, 2014). In other words, a person can live close to several transit routes, but if he is not able to afford the fare, he is vulnerable in terms of accessibility.

In the Latin American context, where social inequalities are significant, affordability is one of the most relevant obstacles for the urban poor to have decent levels of accessibility. Previous studies in the region have shown that inadequate public transportation policies could lead to financial stress for disadvantaged groups who have to make sacrifices to travel or avoid some trips and allocate those resources for other basic activities (Avellaneda García, 2007; Bocarejo and Oviedo, 2010; Gutierrez, 2009; Hernández, 2012b).

For this reason, we propose to measure public transport affordability considering vertical equity criteria with regard to income (Litman, 2013). This implies to focus on affordability levels for those groups that have to sacrifice some trips in order to satisfy other basic needs with a small budget.

This includes the question on how much is spent on public transportation. But it also implies to consider if the number of trips in public transportation paid by a household is enough to access necessary goods and services. In that sense, the conceptual core of this discussion must address measures that consider actual expenditure as well as those which take into account the necessary amount of money in order to afford all necessary trips to have access to good and services. This approach poses some methodological issues, especially regarding measurement. It requires complementing some classical measures with a new one that depict the unobserved dimension.

2.2. Measuring public transport affordability

Measuring affordability is a well-known challenge. There are two different groups of measures in the literature. The first group – observed affordability measures – focuses in the actual behavior of the individuals (or households). The second group of measures is based on a fixed basket of trips which should satisfy household's basic needs (see Table 1).

Observed affordability could be measured in reference to household income (e.g. Eq. (1)) (Armstrong and Thiriez, 1987; Diaz Olvera et al., 2013, 2008; Venter and Behrens, 2005) or to total household expenditure (e.g. Eq. (3)) (Blumenberg, 2003), i.e., the percentage of household income (or expenditure) devoted to transport. According to Fan and Huang (2011) these types of measures have some limitations because they need to set a benchmark and do not account for the substitution of time for money.

Using a different approach, Fan and Huang (2011) propose to measure transport affordability under a context-sensitive framework. To do so, apart from income and expenditures, they also consider time availability as a socio-demographic criterion (Eqs. (9) and (10)). They assume that different household composition has different resources. For example, married individuals in dual-income households, with or without children, have higher family incomes compared to all other groups but have significantly less time availability. On the contrary, a household with a single unemployed individual has more time available but significantly lower income. Thus, the authors propose to measure two affordability thresholds: one refers to transportation-related time expenditures and the other refers to transportation-related monetary expenditures for each population group according to their socio-demographic characteristics and the built environment of the neighborhood.

An additional approach of the observed affordability is the housing-plus-transportation affordability measures, also called the H+T index (CNT, 2012; CNT and CTOD, 2006). It is defined as the sum of housing costs and transportation costs divided by household income (Eq. (5)). This measure takes into account the location of the activities and services among the spaces and characteristics of the neighborhood; thus, transport expenditure will also depend on residential choice. The assumption behind this measure is that there is a trade-off between housing and transportation costs (Isalou et al., 2014).

Observed affordability measures are frequently adopted in the literature. Nevertheless, some considerations regarding developing countries should be noticed. The urban poor sometimes are just excluded from public transport for financial reasons (Avellaneda García, 2009; Gomide, 2003; Hernández, 2014; Jiron, 2007; Vasconcellos, 2001). As a result, the relation between transport affordability and household income is an upside down “U-shape” curve (Estupiñán et al., 2007; Venter and Behrens, 2005). Indeed, it is possible that the “poorest of the poor” may actually spend less than lower-middle- and middle-class inhabitants. However, this could hide the fact that those disadvantaged groups are excluded from public transport for financial reasons. The urban poor sacrifice some trips or become “captive walkers”, walking long distances to substitute for the unaffordable motorized option (Diaz Olvera et al., 2013, 2008; Venter and Behrens, 2005). In other words, measures based on the observed mobility do not explain the whole picture.¹

To overcome this limitation, some authors argue that transport affordability should be calculated using a fixed number of trips (fixed basket trips affordability measures). Carruthers et al. (2005) compute this number based on the necessary public transport trips to commute to work plus some extra trips. In particular, they consider 60 trips per month times the fare values for single trips (Eqs. (6) and (7)). ECLAC (1992) also evaluates affordability for different Latin American cities using a fixed number of trips per month (50 trips) and the minimum wage instead of income² (see Eq. (2)). In Brazil, Gomide et al. (2005) estimates public transport affordability using 44 trips per month and considering the impact of the Vale-Transporte policy when informal workers are included (Eq. (4)). These measures are interesting as a comparative index or to evaluate a policy initiative with a before-after analysis. One of the shortcomings of this measure, though, is that it does not take

¹ It is noteworthy that the housing-plus-transportation type of measures also present the same limitations because they are based on actual mobility and do not capture the unsatisfied transportation needs and are thus limited in providing policy implications (Fan and Huang, 2011).

² The same methodology is adopted for the Latin American Urban Mobility Observatory of the Latin American Development Bank CAF (Observatorio de la Movilidad Urbana – CAF, <http://www.omu.caf.com>).

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