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Spatial analysis of transportation-related social exclusion in the Lisbon metropolitan area

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Abstract

Social exclusion (SE) is a multi-faceted issue that is often conflated with economic poverty, but the poor are not always excluded, and the rich can also be excluded. In addition to the more commonly acknowledged socio-demographic and socio-economic dimensions, SE has temporal and contextual components that are especially relevant to daily mobility patterns. The goal was to identify socially excluded individuals and any potential areas of the Lisbon metropolitan area where accessibility and mobility restrictions could potentially exacerbate the issue. A cluster analysis to identify population segments with common accessibility patterns was performed using information from the latest mobility survey. In addition to this, the complexity of average daily trip chains was characterized in order to better understand the relationship between the identified clusters and their social and economic activity (under the assumption that more complex trip chains are correlated with more intense social and economic activity). Finally, within-neighborhood variability of certain relevant mobility variables was explored by computing bivariate local indicators of spatial association (LISA) to identify areas with individuals at-risk for SE.

1. Introduction

Individual daily mobility can be characterized as a series of trips, organized into chains (series of trips linking an origin to a destination) that can compose a tour (beginning and ending at the same location, e.g., home). They enable access to opportunities and participation in social and economic activities. These activities can be grouped into three general categories: foundational/anchoring, mandatory and non-mandatory. If an individual is not able to participate in activities of civil society that are considered normal and expected, he is considered to be socially excluded. This means that by examining accessibility and daily trip chains, it can be possible to identify individuals at-risk for social exclusion since inadequate daily mobility limits access to opportunities.

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The main research objective is the identification of accessibility and mobility-related social exclusion through cluster and spatial correlation analysis. The expected outcomes are the identification of population segments with common accessibility patterns and of areas where within-zonal variability of selected socio-economic, accessibility and mobility indicators highlights the potential for social exclusion. Section 2 of this paper contextualizes the research goal by reviewing the literature of the associated concepts and their interrelationships. Section 3 describes the methodology followed and the methods used. Finally, the results are presented in Section 4 and the corresponding discussion and conclusions are included in Section 5.

2. Research Context

2.1. Why we travel

Within transport planning, travelling is treated almost exclusively as a derived demand. With the exception of some specific leisure trips (e.g. road-trips, Sunday drives) generally speaking individuals travel, not for the sake of travelling but in order to perform activities and meet others. This generalization has been contested by many within the field, especially in the last 15 years, who do not see travel as a disutility that should be minimized. In fact, they propose that there is a positive utility to travel (e.g. Choo et al., 2005; Jain & Lyons, 2008). Whatever the motivation for travel, belonging to a community means that personal travel decisions are influenced by who and what is around you. As far back as 1979, Ben-Akiva and Lerman (1979) identified that many household and individual decisions impacted personal travel. Van Acker et al. (2010) presented travel decision-making as three-tiered process influenced and constrained by the individual, the social environment, and the spatial environment.

Given the decision-making process involved in trip-making we present the following framework of the main building blocks determining individual daily mobility:

1. Motivation:
   a. Perceived desires and needs of the individuals;
   b. Activities required to satisfy the wishes and needs;
2. Available capacity of the transport system:
   a. Infrastructure, equipment (including, but not limited to, vehicles) and services;
3. Barriers and conditions:
   a. Restrictions to mobility (e.g., impairment, age, etc.);
   b. Interpersonal relationships (e.g., children);
   c. Available time intervals (e.g., non-working hours) for daily mobility (daily travel time-budget - TTB); and
   d. Daily travel money-budget (TMB) allotted for transportation.

Trips vary by their purpose and by how they are organized. They have been defined by the type of activity they serve; grouped into three general categories: anchoring, mandatory, and non-mandatory. These categories have also been referred to as subsistence, maintenance, and discretionary (Bhat & Misra, 1999) and as mandatory, flexible, and optional (Primerano et al., 2007). The nomenclature is interchangeable and does not vary in definition. The first set includes activities around which the day is organized that tend to be the result of long-term decisions and are nearly immovable, such as work. The mandatory activities include essential, complementary activities that must be performed but are much more flexible, e.g. necessary shopping where the date, time and place can change. The non-mandatory activities are still an essential part of normalcy but they vary and tend to be even more flexible, e.g. leisure activities. We propose that the trips related with non-mandatory activities are the first and most obviously affected by social exclusion. These trips are more likely to be avoided by socially-disadvantaged groups and individuals.