



An activity pattern – destination land use choice model of low income households of informal settlements – Case study of Delhi



S.L.N. Sarma Sadhu*, Geetam Tiwari

Transportation Research and Injury Prevention Programme (TRIPP), Indian Institute of Technology, Delhi, India

ARTICLE INFO

Article history:

Received 4 January 2015

Received in revised form 24 January 2016

Accepted 28 January 2016

Available online 16 February 2016

Keywords:

Destination land use choice

Informal settlements

Urban poor

Tour based model

Delhi

ABSTRACT

Various transportation studies carried out in India, while estimating the travel demand, do not take into consideration the travel characteristics of different income groups. The conventional transportation travel demand model lacks the ability to address the travel needs of the urban poor. This paper explores the factors influencing the travel destinations of urban poor living in informal settlements and finds that travel times have a significant negative impact on the choice to travel and influences the choice of the destinations. The study also finds that the inhabitants of informal settlements are adversely affected by urban policies that displace them and rehabilitate them far from their employment opportunities and that the travel characteristics of low income households living in informal settlements are significantly different from higher income households.

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1. Introduction

Major transportation planning studies carried out in India have used four step model (FSM) to arrive at future transportation demand in various cities across the country which form the basis for major decisions on transportation infrastructure (RITES, 1998; Wilbur Smith Associates, 2008). For arriving at the travel demands, these studies predominantly depend on the population of the traffic analysis zone (TAZ) as there is, invariably, a direct correlation between the population of the zone and the travel demand. However, several factors that influence the travel behavior remain unexplored, making it impossible to understand the dynamics of transportation demand. Thus, the recommendations of the studies invariably aim at meeting future demand within the existing framework of transportation systems rather than attempting systemic changes to address the symptomatic imperfections in the existing transportation systems.

The recommendations of the transportation planning studies often include infrastructure-heavy transportation systems such as metro rail systems or elevated highways with scant regard to environmental impacts, aesthetics or even their usefulness to the majority of the urban population (Tiwari, 2002). The urban poor, who form the bulk of the population in urban India (Planning Commission, 2012), bear the brunt of the adverse effects of these policies such as their displacement (Anand and Tiwari, 2007), environmental degradation, declining safety and convenience. The first step towards correcting this aberration is to understand the travel behavior of the urban poor. This study makes an effort to find the factors that influence the travel behavior of the urban poor by analyzing their travel destinations.

This study, is based on an activity based travel survey carried out in 1669 households of informal settlements in Delhi, India in 2012, and explores the choice of destinations of inhabitants of informal settlements. The study investigates the rela-

* Corresponding author.

relationship of choice of travel and travel destinations with various socioeconomic, land use and travel characteristics and their implied policy implications. The next section gives brief overview of literature on informal settlements in Delhi, travel behavior of urban poor and activity models and destination choice models. Section 3 covers the methodology of data collection, brief overview of data and the methodology of destination choice model and finally, Section 4 discusses the results and policy implications.

2. Informal settlements in Delhi

With rapid growth of urban population in India in the last decade ([Census of India, 2011](#)) there is a growing necessity of provision of shelter, employment and urban services. However, the failure of urban economies in developing countries to meet more than a fraction of these needs has impelled the informal sector for providing most of the new employment and housing in informal settlements or slums, where more than half of the population in many cities and towns of developing countries are currently living and working ([UN-HABITAT, 2003](#)). Several studies highlighted have explored travel habits of poor ([Bryceson et al., 2003](#); [Hook and Howe, 2005](#); [Nuworsoo et al., 2009](#); [Palmer et al., 1996](#); [Tiwari, 1999](#)), who generally inhabit informal settlements, which differ from those living in formal residential areas. The conventional transportation surveys and transportation planning techniques do not respond to these diversities in travel behavior of inhabitants of informal settlements use and fail to cater for their travel needs equanimously ([Badami et al., 2004](#)).

Squatter settlements house the poor and the poorest of the poor in cities where the housing markets are tight which partly indicate the inadequate supplies from the formal housing sector, reflecting mass poverty, underdeveloped housing finance systems, and inadequacies in land policy and land delivery systems ([Chand, 2008](#); [Ibrahim et al., 2012](#)). [UN-HABITAT \(2003\)](#) sees the slums as a result of a failure of housing policies, laws and delivery systems and of national and urban policies while [Ahmed et al. \(2008\)](#) finds land monopoly and poor governance as the reason for informal settlements.

Organizations such as UNHABITAT, Census of India, National Sample Survey Organization and National Buildings Organization have defined the informal settlements with common characteristics such as lack of access to safe water, sanitation and such other infrastructure, poor quality of housing, overcrowding ([Census of India, 2011](#); [NBO, 2010](#); [UN-HABITAT, 2003](#)). While [UN-HABITAT \(2003\)](#) also has security of tenure as one of the characteristics, the same is absent in the definitions of Indian organizations.

The exact number of informal settlements, which are locally referred to as Jhuggi Jhompri Clusters or JJ Clusters (JJC), as enumerated in a survey conducted by Government of Delhi in 1990 were 929 JJ Clusters with 259,000 households. The estimates of Slum Wing of Municipal Corporation of Delhi, indicated about 1100 JJ Clusters with 600,000 households in the year 2002 in Delhi ([GNCTD, 2013](#)). The estimates by the Delhi Urban Environment and Infrastructure Improvement Project (DUEIIP) give different figures of the break-up but the proportion in sub-standard shelter is still over 65% ([Hazards Centre, 2003](#)). It is evident that a large number of informal settlements housing mainly poor migrants exist in Delhi that are an integral part of the city dynamics and are sensitive to transport policies that influence their access to their employment.

3. Travel behavior of inhabitants of informal settlements

A number of studies have been done on the travel behavior of urban poor and many studies bring out the dependency of that low-income groups on walking and non-motorized transport as their main means of daily transport ([Bryceson et al., 2003](#); [Palmer et al., 1996, 1997](#); [Tiwari, 1995, 2009](#)) and are faced with higher risks of crashes ([Salon and Aligula, 2012](#)). In the absence of reliable public transport, many low income households turn to para transit ([Kirby et al., 1974](#); [Lave and Mathias, 2003](#)) and for their commuting ([Tiwari, 1999](#)). Also, low income groups tend to resort to more transfers than high income groups, because of which, the public transport fare structure adversely affects them more ([Nuworsoo et al., 2009](#)).

Accessibility to employment is one of the most important criteria of urban planning. However, some the urban poor face the problems of access in terms of long travel times in unsafe and inconvenient environment. At the same time, many of the urban poor retain fair level of access, in spite of their disadvantaged mobility, by residing close to employment and other income generating opportunities, even if it means living in precarious sites that are rife with problems of security of tenure ([Barter, 2002](#)). The travel burden on the working poor seems to be more severe in larger, more heavily motorized cities and in very poor rural areas (particularly in Africa) than in smaller and secondary cities with lower levels of private motor vehicle use ([Hook and Howe, 2005](#)).

The poor tend to travel less frequently than higher income groups and they travel more slowly than higher income groups and reducing commuting costs directly increases disposable income for the poor ([Hook and Howe, 2005](#)). The urban poor travel slower over shorter distances than higher income groups who rely heavily on motorized transport, which causes their late arrival at work and physical fatigue resulting in cycles of low output, low earnings and low levels of material welfare are implicit in this scenario ([Bryceson et al., 2003](#)). Thus, poor physical access to urban opportunities is not only an effect, but also a cause of poverty ([Barter, 2002](#)).

Residential location significantly affects the access and mobility conditions faced by low-income urban communities ([Srinivasan and Rogers, 2005](#); [Venter et al., 2007](#)). Urban poor prefer to stay close to their employment opportunities in order to avoid the burden of expenditure on transportation, often against the rules, in unplanned settlements ([Badami et al., 2004](#)).

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