



Understanding the multiple dimensions of transportation disadvantage: the case of rural North Carolina



Tabitha S. Combs^{a,*}, Elizabeth Shay^b, David Salvesen^c, Carl Kolosna^c, Michelle Madeley^d

^a Faculty of Environment, Society, & Design, Lincoln University, Lincoln 7647, New Zealand

^b Department of Geography and Planning, Appalachian State University, Boone NC 28608, USA

^c Institute for the Environment, University of North Carolina at Chapel Hill, NC 27599-1105, USA

^d Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill NC 27599, USA

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ABSTRACT

Transportation disadvantage, which may be described in simple terms as a mismatch between the need for mobility and accessibility and the travel options available, often is assumed to correlate with certain socio-demographic characteristics, such as age (young and old), physical mobility, income, English proficiency, and vehicle access. This paper reports on a study that combined quantitative Census data with qualitative field data collected in interviews and focus groups, to better understand which individuals may in fact be transportation-disadvantaged, and which personal and household factors or environmental conditions correlate with concentrations of transportation-disadvantaged populations. In five rural counties of North Carolina, maps showing areas of elevated risk of transportation disadvantage were used in key informant interviews with planners and other transportation-relevant professionals, as well as in focus groups that probed the travel experiences and patterns of residents. Content analysis of interview and focus group data yielded insights into who is transportation-disadvantaged; what personal, household and environmental factors are notable; and what strategies they use to manage their travel needs. Qualitative data revealed populations not identified by Census data, and yielded rich and nuanced insights into how rural residents perceive their travel needs and habits and how they respond to limits on their mobility and access to routine destinations.

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1. Introduction

Approximately one-fifth of the US population lives in rural areas, according to the 2010 US Census. Compared to their urban counterparts, rural residents tend to be more dependent on automobiles, endure longer commutes, and have limited options for travel via transit or non-motorized modes (Mattson, 2012). Changing economic bases and land use patterns have left many rural areas facing dwindling employment opportunities and spatially dispersed goods, services, and worksites, requiring rural residents to travel even farther to meet routine needs. These challenges put many rural residents at a tremendous social and economic disadvantage. Such residents—most often the poor, the elderly and, increasingly, racial and ethnic minorities—may

struggle to get to work, medical appointments, a grocery store, and other essential destinations, and often must rely on family, friends, neighbors, or associates for travel.

In this paper, we use the term *transportation disadvantage* (TD) to describe barriers or limits on access to participation in essential activities outside the home, including employment, education, shopping, recreation, socializing, and health care. Consequences of TD—and related mobility-based social exclusion—have been well documented (e.g., Currie et al., 2009; Lucas, 2012; Power, 2012; Stanley et al., 2011). Researchers across academic fields have also found connections between transportation disadvantage and intergenerational poverty (Chetty et al., 2015), obesity and chronic disease (Frank et al., 2006; Wright, 2008), and diminished quality of life (Kolodinsky et al., 2013). However, development of cost-effective solutions to address transportation disadvantage has been hampered by a lack of understanding of the complex travel needs of at-risk populations, particularly in rural areas.

This paper describes the results of exploratory research conducted in five rural counties in North Carolina. The objective of this research was to develop and apply a method of combining Census data with qualitative field data to (1) improve

* Corresponding author. Present address: Faculty of Environment, Society, & Design, Lincoln University, PO Box 85084, Lincoln University, Lincoln 7647, New Zealand.

E-mail addresses: tabitha.s.combs@gmail.com (T.S. Combs), shayed@appstate.edu (E. Shay), dsalv@email.unc.edu (D. Salvesen), ckolosna@live.unc.edu (C. Kolosna), madeley@live.unc.edu (M. Madeley).

understanding of transportation disadvantage and unmet travel needs and (2) to identify strategies adopted by rural residents to cope with or overcome transportation barriers.¹

Transportation disadvantage and the burden it may place on individuals are of interest for several reasons. First, federal laws, including Title VI of the 1964 Civil Rights Act (which bars discrimination based on race, color or national origin) and Executive Order 12898 of 1994 (which protects minority, low-income, and low English proficiency individuals), among others, dictate that all transportation projects must be reviewed for the potential for disproportionately high and adverse effects on certain populations.

In addition, public service and social inclusion are stated goals—as well as a professional point of pride—for most transportation planners and agencies. While the goal of serving the traveling public, particularly those with high unmet need, is nearly universal among transportation planners and other public servants, knowledge about the extent and location of those needs remain somewhat elusive (Karner and Niemeier, 2013).

Transportation planning and investment decisions generally rely on *a priori* determinations of need based largely on socio-demographic characteristics. However, while socio-demographics profoundly influence the risk of experiencing TD, transportation disadvantage actually arises from mismatches between individuals' travel demand—determined in part by socio-demographic characteristics—and the options available to meet that demand. Transportation options are, in turn, influenced by land use patterns, built environments, transportation infrastructure, and public transit services, as well as individuals' abilities to exercise those options. Thus, socio-demographic characteristics are one set of many interacting factors that enter into the transportation disadvantage puzzle. However, there has been limited empirical research on transportation disadvantage that attempts to take all of these factors into consideration, and little knowledge on how these factors interact in a rural setting. The present study begins to address these gaps by combining qualitative data from key informant interviews and focus groups with Census data and maps to explore the socio-demographic and environmental characteristics associated with transportation disadvantage in five rural North Carolina counties.

2. Literature review

Transportation disadvantage has been addressed in literature across a range of disciplines, including travel behavior and its correlates with built and physical environment; transportation infrastructure, operations and services; transportation investment and technical planning processes; health dimensions of travel behavior and transportation systems; and others.

Both the literature and prevailing practice identify certain socio-demographic characteristics that make people more likely to be transportation-disadvantaged. These include:

- People too young or too old to drive
- Low-income households
- LEP (low English proficiency) households
- Minority households
- Immigrants
- Households without reliable motor vehicles
- People with physical or cognitive mobility impairments

The impacts of environmental factors and transportation infrastructure and services on travelers may be moderated or compounded by the characteristics of those travelers. That is, people already at risk for disadvantage by virtue of socio-demographic characteristics such as age, poverty, language ability or physical condition may particularly struggle to gain access to key destinations when the environment includes distant and separated land uses, with few options to connect them to those destinations (Currie et al., 2009; Lucas, 2012). Public transportation is particularly limited in rural areas, where people are often older, less healthy, and less affluent than in urban areas, and where transportation agencies deal with managing the tension between goals of providing adequate coverage to meet need against providing only those services that will generate reasonable farebox receipts to partially cover costs (Walker, 2008).

The conceptual and practical distinction between mobility (the capacity and operations to move people and freight across space) and accessibility (to allow people to access the goods, services and activities they value) plays out in the interplay between the personal and household characteristics of travelers, and the environments they inhabit and move through. Several recent studies have attempted to bridge the gap in our knowledge about the supply-side factors leading to transportation disadvantage (for example, Aparicio et al., 2008; Aparicio and Seguin, 2006; Casas et al., 2009; Scott and Horner, 2008).

Most of the existing literature seeks to quantify transportation disadvantage using standard measures of land use patterns, transportation infrastructure, and transit services. However, no single standard exists for what level or quality of transportation options would be adequate or equitable across geographic regions or across various populations (Farrington and Farrington, 2005). Particularly in rural communities, it is not clear what aspects of transportation options are relevant to travel decisions, and for whom, thus raising questions about the validity of the quantitative measures used to assess transportation disadvantage. Furthermore, there is limited empirical research available on how relationships between socio-demographic and environmental characteristics may relate to *consequences* of transportation disadvantage, such as diminished ability to obtain and keep employment, reduced participation in social and recreational activities, or poorer overall health and well-being.

The goal of the present study was to examine, through interviews, focus groups, and mapping exercises, how socio-demographic characteristics, land use patterns, transportation infrastructure, and public transit services—as well as interactions among these factors—affect transportation disadvantage among rural residents. In the absence of empirically validated quantitative measures of transportation disadvantage, we rely on a qualitative research design that allows for nuanced exploration of the many factors thought to contribute to transportation disadvantage, from the perspective of local experts and individual travelers.

3. Methods

We conducted interviews with key informants and convened focus groups in each of five rural counties in North Carolina. Key informants provided insights into the particular kinds of transportation challenges in a community as informed by professional training and experience, while focus groups elicited personal attitudes and experiences typically faced by people in the communities in which they live or work. Key informants included local planners, elected officials, social service workers, and those in similar professions who, due to their knowledge and experience, can “speak for” a community. By contrast, focus groups allowed a small group of people from the community to speak for themselves. We conducted a total of 33 interviews with 47 key

¹ The development of the research method is described in detail in Shay et al. (under review); the current paper focuses largely on the results of the research effort.

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