

Evaluation of Rural Travel Constraints and Travel Burdens in the U.S. and in Rural Zero- Car Households

December
2024

A Research Report from the National Center
for Sustainable Transportation

Sierra Espeland, University of Vermont

Julia LanzDuret-Hernandez, University of Vermont

Sarah Grajdura, Ph.D., University of Vermont

Dana Rowangould, Ph.D., University of Vermont



National Center
for Sustainable
Transportation

A USDOT University Transportation Center



THE UNIVERSITY OF VERMONT
TRANSPORTATION
RESEARCH CENTER

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. NCST-UVM-RR-24-36	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A	
4. Title and Subtitle Evaluation of Rural Travel Constraints and Travel Burdens in the U.S. and in Rural Zero-Car Households		5. Report Date December 2024	
		6. Performing Organization Code N/A	
7. Author(s) Sierra Espeland, https://orcid.org/0000-0002-4272-618X Julia LanzDuret-Hernandez, https://orcid.org/0009-0008-0256-7269 Sarah A. Grajdura, Ph.D., https://orcid.org/0000-0003-2317-4305 Dana Rowangould, Ph.D., https://orcid.org/0000-0001-9839-368X		8. Performing Organization Report No. N/A	
		9. Performing Organization Name and Address University of Vermont Transportation Research Center Mansfield House, 25 Colchester Avenue, Burlington, VT 05405	
12. Sponsoring Agency Name and Address U.S. Department of Transportation Office of the Assistant Secretary for Research and Technology 1200 New Jersey Avenue, SE, Washington, DC 20590		11. Contract or Grant No. USDOT Grant 69A3551747114	
		13. Type of Report and Period Covered Final Research Report (October 2020 – June 2023)	
15. Supplementary Notes DOI: https://doi.org/10.7922/G23F4MZ7 Updated portions of this report are published at https://doi.org/10.1016/j.jtrangeo.2024.104016 and https://doi.org/10.1016/j.jtrangeo.2024.103947 .		14. Sponsoring Agency Code USDOT OST-R	
		16. Abstract The challenge of meeting transportation needs is heightened in rural contexts, where destinations are more dispersed and there are fewer transportation options. A growing body of literature has established that accessibility, or the ability to reach valued destinations, is critical to satisfying a person's fundamental needs. Conversely, difficulty accessing destinations can result in travel burdens such as high transportation costs or unmet needs, adversely affecting well-being. This study evaluates differences in travel burdens and the factors that drive them in rural and urban contexts in the United States. Using the 2017 National Household Transportation Survey, the authors first evaluate differences in travel burdens across rural versus urban communities, including i) the magnitude of travel burdens, ii) who experiences travel burdens, and iii) the individual and environmental factors that are associated with travel burdens. This study finds that people living in rural areas are more likely to report burdensome travel costs and unmet travel needs compared to people living in nonrural areas, and these differences are exacerbated for people earning a low income and those without vehicle access. The authors also observe variation across rural contexts, pointing to the role that proximity to town centers plays for providing access for those without a vehicle. To better understand the relationship between unmet need and vehicle access, the authors conducted 59 semi-structured interviews with two populations living in Vermont: i) people living in the largely rural Northeast Kingdom of Vermont, and ii) Latinx migrant workers living in Vermont. The qualitative interview results illustrate the transportation experiences, barriers, and adaptations of rural car-limited populations. Findings underscore the importance of vehicle access as a determinant of mobility for many people living in rural communities. The interview findings highlight barriers to mobility such as vehicle maintenance costs as well as the mobility that personal networks and limited public transportation provide for many people without a personal vehicle. The interview results also point to substantial variation in experiences and needs across rural populations, as Latinx migrant workers' mobility was also related to English proficiency, proximity to an international border, and availability of a driver's privilege card. As decision makers seek more sustainable rural transportation systems and a reduced reliance on vehicles, the findings from this study underscore the importance of addressing the needs of car-limited rural populations to ensure an equitable and just climate transition.	
17. Key Words Transport disadvantage, unmet need, rural, carless, migrant		18. Distribution Statement No restrictions.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 112	22. Price N/A

About the National Center for Sustainable Transportation

The National Center for Sustainable Transportation is a consortium of leading universities committed to advancing an environmentally sustainable transportation system through cutting-edge research, direct policy engagement, and education of our future leaders. Consortium members include: the University of California, Davis; California State University, Long Beach; Georgia Institute of Technology; Texas Southern University; the University of California, Riverside; the University of Southern California; and the University of Vermont. More information can be found at: ncst.ucdavis.edu.

Disclaimer

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the information presented herein. This document is disseminated in the interest of information exchange. The report is funded, partially or entirely, by a grant from the U.S. Department of Transportation's University Transportation Centers Program. However, the U.S. Government assumes no liability for the contents or use thereof.

The U.S. Department of Transportation requires that all University Transportation Center reports be published publicly. To fulfill this requirement, the National Center for Sustainable Transportation publishes reports on the University of California open access publication repository, eScholarship. The authors may copyright any books, publications, or other copyrightable materials developed in the course of, or under, or as a result of the funding grant; however, the U.S. Department of Transportation reserves a royalty-free, nonexclusive and irrevocable license to reproduce, publish, or otherwise use and to authorize others to use the work for government purposes.

Acknowledgments

This study was funded by a grant from the National Center for Sustainable Transportation (NCST), supported by the U.S. Department of Transportation (USDOT) through the University Transportation Centers program and by the USDOT Dwight D. Eisenhower Fellowship Program. The Federal Highway Administration provided access to detailed National Household Travel Survey data. The authors would like to thank the NCST and the USDOT for their support of university-based research in transportation, and especially for the funding provided in support of this project. The authors would also like to thank community partners at Northeast Kingdom Community Action, Migrant Justice, Rural Edge, as well as the members of the Community Advisory Committee for their research advice and assistance with recruitment and interview logistics. Peggy O'Neill-Vivanco, Holly Foster, Maisie Melican, Calvin Wuthrich, Alvaro Nadal-Alvarez, Lauren Cater, and Harrison Schukei provided valuable research assistance.

Evaluation of Rural Travel Constraints and Travel Burdens in the U.S. and in Rural Zero-Car Households

A National Center for Sustainable Transportation Research Report

December 2024

Sierra Espeland, Department of Civil & Environmental Engineering, University of Vermont

Julia LanzDuret-Hernandez, Department of Community and International Development, University of Vermont

Sarah Grajdura, Ph.D., Department of Civil & Environmental Engineering, University of Vermont

Dana Rowangould, Ph.D., Department of Civil & Environmental Engineering, University of Vermont

[page intentionally left blank]

TABLE OF CONTENTS

EXECUTIVE SUMMARY	v
Part 1: Quantitative Evaluation of Travel Burdens in the U.S.....	1
Abstract.....	1
Introduction	2
Literature Review.....	2
Data and Methods	5
Results.....	10
Discussion and Conclusions	20
Acknowledgements	22
Declarations	22
References	23
Part 2: Qualitative Evaluation of Transportation Experiences of People with Limited Access to a Vehicle Living in Vermont’s Northeast Kingdom	26
Abstract.....	26
Literature Review.....	27
Methods & Data.....	31
Results.....	33
Discussion and Conclusion	40
Acknowledgements	42
Author Contributions	42
References	43
Part 3: Qualitative Evaluation of Transportation Experiences of Latinx Migrant Workers with Limited Access to a Vehicle Living in Vermont	47
Abstract.....	47
Introduction	48
Literature Review.....	48
Study context	51
Data and Methods	52
Results.....	56
Discussion and Conclusions	62

Acknowledgements	63
Declarations	63
References	64
Data Summary.....	70
Appendix A: Qualitative Interview Study Details.....	71
Advisory Committee Members’ Organizations (Parts 2 and 3)	71
Translated Quotations (Part 3)	72
NEK Interview Protocol (Part 2)	77
Migrant Worker Interview Protocol in English (Part 3)	81
Migrant Worker Interview Protocol in Spanish (Part 3) / Protocolo de entrevista para Trabajadores Agrícolas.....	86
Full Code Book NEK Interviews (Part 2)	91
Full Code Book Migrant Worker Interviews (Part 3)	97

List of Tables

Table 1. Summary of NHTS Explanatory Variables Used in Analysis by Claritas Classification. 8

Table 2. Comparison of the percent of people who experience travel burdens in each community context relative to the urban context. 11

Table 3. Comparison of Unmet Need on Travel Day Across Person Characteristics and Contexts. 14

Table 4. Comparison of Rates of Financially Burdensome Travel Across Person Characteristics and Contexts. 15

Table 5. Binary Logistic Regression Models for Unmet Need on the Travel Day. 18

Table 6. Binary Logistic Regression Models for Whether Travel is a Financial Burden. 18

Table 7. Demographics of Interview Subjects and NEK Adults..... 33

Table 8. Demographic characteristics of interview subjects 54

List of Figures

Figure 1. Graphical representation of the five Claritas Urban-Rural Continuum and terms used in this study..... 7

Figure 2. Rural Mobility Interconnections 40

Figure 3. Home counties of interview subjects 55

Figure 4. Contributors to Latine migrant mobility in Vermont..... 56

Evaluation of Travel Constraints and Travel Burdens in the U.S. and in Rural Zero-Car Households

EXECUTIVE SUMMARY

The challenge of meeting transportation needs is heightened in rural contexts, where destinations are more dispersed and there are fewer transportation options. A growing body of literature has established that accessibility, or the ability to reach valued destinations, is critical to satisfying a person's fundamental needs. Conversely, difficulty accessing destinations can result in travel burdens such as high transportation costs or unmet needs, adversely affecting well-being. The ability to reach destinations varies depending on a person's resources, capabilities, and needs as well as the environment in which they live. Prior research establishes the inverse relationship between travel burdens and access to transportation options such as public transit or a personal vehicle, financial resources, and proximity to destinations. A subset of these studies highlight the heightened challenges encountered in rural regions. However, little is known about the differences in who experiences travel burdens and the factors that drive travel burdens in rural communities.

This study evaluates differences in travel burdens and the factors that drive them in rural and urban communities in the United States. This research includes quantitative and qualitative research conducted in three parts. Part 1, which was conducted first, quantitatively evaluates unmet need and financially burdensome travel in rural communities across the U.S. Using the 2017 National Household Transportation Survey, this study evaluates differences in travel burdens across rural versus urban communities, including i) the magnitude of travel burdens, ii) who experiences travel burdens, and iii) the individual and environmental factors that are associated with travel burdens. This analysis demonstrates that people living in rural areas are more likely to report burdensome travel costs and unmet travel needs compared to people living in nonrural areas, and these differences are exacerbated for people earning a low income and those without vehicle access. The findings also highlight variation across rural contexts, pointing to the role that proximity to town centers plays for providing access for those without a vehicle.

Parts 2 and 3 of this study followed the Part 1 analysis, building on the key findings of Part 1 to provide greater insight about the experiences of rural populations with limited access to vehicles. These studies evaluate the relationship between vehicle access and unmet need more deeply using qualitative analysis of the travel experiences of two car-limited populations in Vermont. These studies use information collected in 59 semi-structured interviews with two populations living in Vermont i) people living in the largely rural Northeast Kingdom of Vermont (with particular attention to those with limited access to a vehicle) and ii) Latinx migrant workers living in Vermont, who are often undocumented and isolated. These qualitative interview results underscore the importance of vehicle access as a determinant of mobility and meeting travel needs for many people. The results indicate that for both groups personal vehicles are strongly tied to mobility. Barriers to vehicle access include financial costs, and for

those with limited vehicle access personal networks and limited public transportation options are important means for getting around. Among Latinx migrant workers interviewed, the primary means of getting around are personal vehicles and informal ride networks. Driver privilege cards, community networks, and English proficiency contribute to mobility in this population.

The findings of these three studies point to the unique and complex transportation challenges facing rural communities in the U.S. As decision makers work to improve the sustainability of rural transportation systems by reducing reliance on vehicles, these findings underscore the importance of addressing the needs of car-limited rural populations to ensure an equitable and just climate transition and to increase resilience to climate impacts in these communities. Addressing both equity and sustainability objectives in rural contexts may require a suite of strategies to support rural mobility for those with limited vehicle access. Thoughtful expansion of vehicle access and programs to defray vehicle maintenance costs may be an important strategy, which can be implemented alongside strategies that center on developing vehicle and ride-sharing programs, advancing innovative transit service models and lifeline transit services, leveraging land use planning (including strengthening rural town centers and strategic placement of affordable housing), and support for community networks and social services. Additionally, consideration of population-specific barriers and needs, which can include legal and administrative strategies for migrant workers, may be needed to ensure that these populations can meet their transportation needs.

We present this research in three chapters that follow. Two chapters (Parts 1 and 3) are preprints of manuscripts that have now been published in peer reviewed journals. Part 2 is under revision and will be submitted for peer reviewed publication in the near future.

Part 1: Quantitative Evaluation of Travel Burdens in the U.S.

Abstract

Transportation accessibility, or the ease of reaching valued destinations, is a critical determinant of a person's ability to satisfy their essential needs. A lack of accessibility can result in travel burdens such as high transportation costs or unmet needs and adversely affect well-being. Prior research establishes the inverse relationship between travel burdens and access to transportation options such as public transit and proximity to destinations. A person's resources, including their income and access to a personal vehicle, are also determinants of their accessibility and travel burdens. Although travel behavior is understood to differ across rural versus urban contexts, little is known about the nature of travel burdens in rural communities. Using the 2017 National Household Travel Survey, this study evaluates travel burdens and the factors that drive them in rural versus nonrural communities in the United States. We evaluate i) the magnitude of travel burdens, ii) who experiences travel burdens, and iii) the individual and environmental factors that are associated with travel burdens. We find higher rates of burdensome travel among rural residents. People who live in rural areas are more likely to report burdensome travel costs and unmet travel needs due to a lack of transportation options compared to people living in nonrural areas, and these differences are exacerbated for people without car access. Within rural areas, financial and mobility burdens are lessened for those who live in a small town when compared with those living in more dispersed areas, which suggests that even a small concentration of services and opportunities helps alleviate burden. Collectively, our results highlight the need for context-specific strategies to meet travel needs in rural communities.

Keywords: unmet need, transport disadvantage, rural, transportation equity, mobility

This portion of this report is a preprint of a manuscript that has been revised and published:

Espeland, S., Rowangould, D. (2024) Rural travel burdens in the United States: Unmet need and travel costs. *Journal of Transport Geography*. 121, 104016.

<https://doi.org/10.1016/j.jtrangeo.2024.104016>

Introduction

The ability to travel to and from essential destinations is necessary to satisfy fundamental needs. Accessibility, the ease with which people can reach desired destinations, varies depending on a person's identity, resources, abilities, and needs as well as the transportation and land use environment in which they live (S. Handy, 2020; S. L. Handy & Niemeier, 1997; Lucas, 2012; van Wee & Geurs, 2004). Difficulty traveling between essential destinations due to personal or environmental factors can result in burdensome travel outcomes such as financially burdensome travel, or even unmet need resulting from an inability to travel at all. These burdensome travel outcomes can adversely impact quality of life (Currie & Delbosc, 2011).

Prior research evaluates the effects of individual and built environment characteristics on travel outcomes that reflect burdens. This research highlights the relationship between burdensome travel outcomes (such as financial stressors and unmet needs) and access to transportation options (such as public transit or a personal vehicle, financial resources, and proximity to destinations) (Allen & Farber, 2020; Blumenberg & Pierce, 2012; Coren et al., 2022). A related body of research highlights differences in travel burdens across rural and urban contexts, noting the greater prevalence of travel burdens (such as high financial costs and longer travel times) in rural and small communities, where the distance to destinations is farther and there are fewer transportation options (Gray, 2004; Kamruzzaman & Hine, 2012; Kolodinsky et al., 2013; Mattioli, 2014, 2021; Smith et al., 2012). Despite distinct differences in the built environment, sociodemographic characteristics, and the magnitude of travel burdens in rural contexts, little is known about the differences in who experiences travel burdens in rural versus nonrural areas and the factors that drive travel burdens in rural communities relative to their nonrural counterparts.

This study evaluates differences in travel burdens and the factors that drive them in rural and nonrural communities in the United States. We evaluate unmet travel needs and financially burdensome travel using the 2017 National Household Travel Survey (NHTS) (FHWA, 2018). We evaluate the prevalence of each travel burden and who experiences it in both rural and nonrural contexts. We then use multivariate analysis to assess the individual and built environment factors that relate to the likelihood of experiencing each travel outcome in both rural and nonrural contexts. We also evaluate variation in rural travel burdens and the factors that drive them in two types of rural contexts: small towns and more dispersed rural communities.

Literature Review

Prior research that focuses on burdensome travel outcomes evaluates long travel times, high financial costs, inability to travel, reduction of mobility or access, and unmet need. The effects of these outcomes on people's lives can be complex and pervasive. Transport disadvantage can be defined as the inability to reach desired destinations due to lack of accessibility to destinations using transit or a personal vehicle (with reference to transportation networks and land use systems) as well as the individual capability of people to reach necessary goods and services. In this context, accessibility refers to how well a transportation system facilitates

travel between a range of necessary destinations, while capability refers to the specific ability of an individual to travel (Bantis & Haworth, 2020; Lucas, 2012; Lucas & Jones, 2012; Preston & Rajé, 2007).

Prior work also finds that people with sociodemographic characteristics that reflect lower levels of relative privilege (women, people of color, those earning a low income, etc.) are more likely to experience transport disadvantage (Lucas & Jones, 2012). Another vein of research explores the relationship between “forced” car access in car-dependent communities and transport disadvantage. In these communities, car access may be necessary to reach minimum mobility thresholds but conversely impose financial transport disadvantage through the financial stressors of car ownership (purchase, fuel, maintenance), especially among lower-income groups (Brown, 2017; Mattioli, 2014). The implications of forced car access, especially in car-dependent rural communities are complex; to mitigate the high costs of car ownership, some people use alternative modes to driving, ask for rides or make fewer trips (Currie & Delbosc, 2011).

The majority of prior research on transport disadvantage, vehicle access, and related scholarship focuses on urban and suburban regions. Rural contexts have distinct built environment and sociodemographic characteristics, which may lead to differences in the nature of transport disadvantage. In a nationwide characterization of neighborhood type, Voulgaris et al. establishes the differences between rural and urban areas (Voulgaris et al., 2016). Consistent with prior work, they establish that rural communities are structurally dissimilar from other neighborhood types, including urban and suburban (Voulgaris et al., 2016). Relative to urban and suburban contexts, rural communities have relatively weak transportation infrastructure, long distance between destinations, and few destinations (Cutsinger & Galster, 2006; Hoggart, 1990; Millward & Spinney, 2011; Voulgaris et al., 2016). Where public transit does exist, services are often infrequent and few destinations are serviced (McAndrews et al., 2018). Rural walk and bike infrastructure is similarly poor, and greater travel distances between destinations make walking or biking unappealing (McAndrews et al., 2018). In contrast, urban communities benefit from more robust transportation infrastructure and greater density of destinations, yielding greater access to jobs, services, and opportunities (Millward & Spinney, 2011; Voulgaris et al., 2016). Suburban communities tend to experience more modest but similar benefits in terms of transportation infrastructure and density due to their proximity to urban cores (Cutsinger & Galster, 2006).

Though much prior work addresses rural contexts as a whole, there is wide heterogeneity within these contexts (Brown, 2017; Mattioli, 2014). The proximity of rural destinations and number of feasible travel routes are more limited in rural communities than in urban contexts, but rural communities reflect a broad spectrum of both features (Gray, 2004; Mattioli, 2014; Smith et al., 2012). “Rural” has come to encompass the spectrum of small towns to highly dispersed communities. Along this spectrum, people have vastly different levels of access to jobs, services, and opportunities, and transportation infrastructure (Millward & Spinney, 2011). Small towns benefit from concentrated employment, shopping and recreation cores that contribute to meeting the needs of the surrounding community, and some have bicycle,

pedestrian, and transit infrastructure. These cores help to meet the minimum needs of the community and residents, even if they don't provide the same levels of opportunity as a more urban community (Cutsinger & Galster, 2006).

A subset of transportation literature seeks to understand the ways in which the differences between rural and nonrural communities affect travel behavior and, in some cases, travel burdens. This literature indicates that the lower density of rural communities coupled with fewer transportation options leads to increased car dependency and higher transportation costs amongst rural populations (Gray, 2004; Kamruzzaman & Hine, 2012; Smith et al., 2012). In car-dependent rural communities owning a car generally confers relative advantage and greater mobility, whereas lack of a car is tied to reduced mobility (Kamruzzaman & Hine, 2012). People who have access to a car are able to make faster and more frequent trips at times that are convenient to them, travel longer distances, and reach a wider range of destinations (Mattioli, 2014; Wang et al., 2023). As a community transitions from a dense cityscape to a sparsely populated area, the number of households without cars decreases, and the travel activity and accessibility gaps between households with and without cars widens (Mattioli, 2014, 2021; Wang et al., 2023).

Overall, it is well established that rural households take less frequent but longer trips than urban households resulting in greater overall miles traveled per person (Esekhaigbe & Bills, 2021; Kolodinsky et al., 2013; Pucher & Renne, 2005; Voulgaris et al., 2016). For rural communities with high rates of travel, greater mobility and travel cost likely reflect the necessity of traveling farther to reach destinations rather than greater realized access. In fact, some vulnerable rural populations travel less than their urban counterparts and are more likely to report difficulties meeting their essential travel needs (Delbosc & Currie, 2011; Smith et al., 2012) and lack of a vehicle is more strongly tied to unmet travel need in rural areas when compared with nonrural areas (Wang et al., 2023). Unmet travel needs, though uncommon, have substantial impacts on the ability to fulfill basic needs (Kolodinsky et al., 2013).

Existing research on travel burdens, mobility, and accessibility in rural contexts provides an indication of the potential for significant disparities across and within rural and nonrural contexts. Many of these studies rely on commonly assessed travel behaviors (such as trip distances and rates) either because their focus is on travel behavior more generally, or because those measures may point to the existence of burdens, although in some cases they may also reflect unmeasured differences in need. Furthermore, those that focus on the implications of travel outcomes in terms of rural travel burdens are relatively small scale, qualitative, or rely on aggregate comparisons rather than examining the factors that relate to outcomes (e.g., through multivariate modeling designed to control for differences in travel needs). In short, little is known about the extent to which people who live in rural areas are more transportation burdened than people who live in urban areas, who experiences burdensome travel and if sociodemographic disparities are deeper in rural areas, and whether the factors that relate to burden are different than those in urban areas.

This research evaluates the extent and nature of rural travel burdens across the US using a large sample of people living in the US, captured in the 2017 National Household Transportation Survey (NHTS). Our analysis focuses on two measures of travel burdens: unmet needs (not traveling because a person lacks a transportation option) and financial burden (self-report that travel is a financial burden). We divide our analysis of rural travel burdens into three parts. We evaluate i) the extent to which people who live in rural areas are more transportation burdened than people who live in nonrural areas, ii) differences in sociodemographic disparities in travel burdens experienced by people who live in rural versus nonrural areas, and iii) whether the individual and environmental factors that relate to burdensome travel differ across rural and nonrural contexts. We evaluate these questions across two types of rural contexts, including small town and dispersed. We focus on differences between these contexts and urban contexts, although we also attend to differences between rural contexts and suburban and second city contexts.

Data and Methods

We evaluate who experiences burdensome travel outcomes and the personal and built environment factors that relate to burdensome travel across five types of communities, including three that we define as nonrural (urban, second city, suburban) and two that we define as rural (small town, and rural dispersed). Personal characteristics evaluated include individual and household sociodemographic characteristics and vehicle access. We represent the built environment using measures of accessibility by car, presence of transit, and population density. Burdensome travel outcomes are measured as self-reported financial burden of travel and unmet travel need.

Data

We obtain travel behavior data and personal characteristics from the Federal Highway Administration's 2017 National Household Travel Survey (NHTS) (FHWA, 2018). The NHTS collects information about travel behavior of US households. The survey includes a travel diary of all trips taken during a 24-hour period for a sample of 129,696 households. To avoid covarying respondents, we randomly sample one person per household, and use this sample in all parts of our analysis. This snapshot of daily travel can be linked to respondents' individual and household sociodemographic characteristics as well as vehicle data. The NHTS also includes community classifications developed by Claritas, which defines five classes of urbanicity and rurality based on population density, commuting patterns, and other built environment attributes. Demographic weights allow analysts to use survey responses to estimate US-wide estimates that are intended to be representative of the population as a whole.

Sociodemographic factors are from the NHTS dataset and include age, presence of children in a household, number of adults in a household, education, race and ethnicity, gender, country of origin, household income, employment status, and household car access. Vehicle access is based on the number of cars per driver in a household, where households with no cars are designated as zero-car or car-less, households with less than one car per driver are defined as car-deficit, and households with one or more cars per driver are car-fully equipped, consistent

with Blumenberg et al. (2020). All sociodemographic factors are person level measures except for income, car access, number of household adults, and presence of children. These household characteristics are applied to each person in the household.

We use confidential NHTS spatial location data at the US Census block group level obtained from the Federal Highway Administration (FHWA) to join the 2017 NHTS data with the Environmental Protection Agency's (EPA) Smart Location Database (SLD), which includes built environment measures at the block group level (EPA, 2018). We use three built environment factors from the EPA SLD: access to transit within 1600 meters, jobs reachable within a 45-minute drive, and population density.

The analysis focuses on two travel outcomes that directly represent burdens, as indicated by survey responses about the nature of the observed travel behavior that indicate reasons or effects. These measures of burden are self-reported financially burdensome travel and unmet travel needs. The financial burden outcome is measured based on responses to a question asking respondents to indicate their level of agreement with the statement "getting from place to place costs too much" using a five-level Likert scale. This measure is operationalized by designating people who "agree" or "strongly agree" with the statement as financially burdened, and those who were neutral, "disagree," or "strongly disagree" as not financially burdened. Our measure of unmet need is estimated based on whether someone did not make a trip on the surveyed travel day and the reason they gave. Respondents were asked to indicate one of ten reasons for not traveling on the travel day, including several options that reflect a lack of need as well as one that we ascribe to unmet need: not traveling due to lack of transportation options. Those who did not travel on the travel day due to a lack of transportation options are classified as experiencing unmet travel need. Both burdensome travel outcomes are evaluated using people as the unit of analysis.

We use the Claritas classifications to identify community types. In addition to identifying population clusters, the Claritas definition characterizes the land use surrounding the sampled household location with more granularity than a binary urban-rural indicator. There are five categories within this classification scheme: urban, second city, suburban, small town, and rural. The small town and rural designations in the Claritas scheme capture the highest proportions of households classified as rural under the US Census definition (15% and 83% respectively, estimated based on household location). According to the parameters of the Claritas definitions, the rural category encompasses more dispersed areas with the lowest population density, while the small town designation captures rural villages that have small population clusters. Suburban areas have residential population clusters that commute into surrounding areas for employment, shopping, and recreation opportunities. Communities classified as second city have smaller population clusters and less robust public transit options than urban areas. Urban areas encompass the most dense population centers, and feature the highest concentration of employment, shopping, and recreation opportunities along with the most robust transport infrastructure. This analysis focuses on rural and small town areas as two types of rural communities, and treats urban, second city and suburban as nonrural. Throughout the rest of the analysis we refer to the Claritas small-town category as rural: small-

town, and the Claritas rural category as rural: dispersed. Our analysis focuses primarily on urban versus rural areas, although we also address urban versus non-urban areas and rural versus non-rural areas. Figure 1 illustrates the Claritas-Urban rural continuum and the terminology we use to refer to different types of community contexts in our analysis. Table 1 summarizes the NHTS explanatory variables used in the analysis for each Claritas classification.

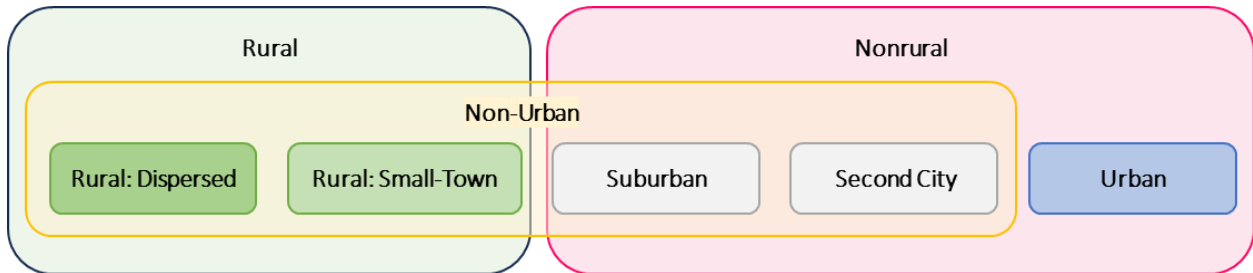


Figure 1. Graphical representation of the five Claritas Urban-Rural Continuum and terms used in this study

Table 1. Summary of NHTS Explanatory Variables Used in Analysis by Claritas Classification.

	Urban		Second City		Suburban		Rural: Small-Town		Rural: Dispersed	
	N	Wt. % or Mean (SD)	N	Wt. % or Mean (SD)	N	Wt. % or Mean (SD)	N	Wt. % or Mean (SD)	N	Wt. % or Mean (SD)
Age	15,719		25,886		28,723		29,042		29,624	
22 to 35 years	3,168	27%	4,110	24%	3,863	17%	3,148	17%	2,460	15%
36 to 50 years	3,627	27%	5,299	26%	6,215	27%	5,564	27%	4,693	23%
51 to 65 years	4,843	29%	8,572	30%	9,585	33%	9,909	33%	10,850	35%
> 65 years	4,081	18%	7,905	20%	9,060	23%	10,421	23%	11,621	26%
Children	15,719		25,886		28,723		29,042		29,624	
Yes	3,144	28%	5,631	34%	6,974	38%	6,635	38%	5,869	35%
Multiple adults	15,719		25,886		28,723		29,042		29,624	
2 +	8,970	60%	15,258	62%	19,135	72%	19,749	72%	20,938	76%
Education	15,715		25,884		28,719		29,033		29,606	
High School or Less	9,415	54%	13,043	43%	17,429	46%	14,477	46%	11,287	33%
Some College	2,389	20%	4,856	24%	3,733	22%	5,487	22%	8,203	32%
Bachelor's or more	3,911	26%	7,985	33%	7,557	32%	9,069	32%	10,116	35%
Race and Ethnicity	15,664		25,795		28,628		28,944		29,521	
Non-Hisp White	9,572	45%	19,028	57%	21,690	76%	24,451	76%	26,302	83%
Non-Hisp Black	1,571	18%	2,586	18%	2,278	9%	1,863	9%	1,359	7%
Hispanic	2,334	25%	2,269	18%	2,206	10%	1,322	10%	838	6%
Multiple or Other	2,187	12%	1,912	8%	2,454	5%	1,308	5%	1,022	4%
Gender	15,700		25,870		28,704		29,022		29,610	
Male	7,074	44%	11,630	44%	13,869	47%	13,911	47%	14,295	47%
Female	8,626	56%	14,240	57%	14,835	53%	15,111	53%	15,315	53%
Country of Origin	15,714		25,875		28,711		29,030		29,612	
Born outside USA	3,026	25%	2,639	15%	3,522	9%	1,715	9%	918	3%
Income	15,223		25,126		27,730		27,967		28,598	
Less than \$25,000	3,129	26%	5,789	29%	3,779	20%	4,910	20%	6,269	25%
Employment	15,718		25,886		28,723		29,041		29,623	
Employed	9,664	66%	14,648	64%	16,731	63%	15,084	63%	14,114	56%
Car Access	15,719		25,886		28,723		29,042		29,624	
Car-fully equipped	12,228	64%	22,031	78%	25,853	87%	26,176	87%	27,223	87%
Car-deficit	1,470	13%	1,922	10%	1,932	9%	1,879	9%	1,652	9%
Zero-car	2,021	23%	1,933	11%	938	5%	987	5%	749	5%
Log (Jobs within 45-min drive)	15,719	12.3 (0.79)	25,886	10.8 (0.96)	28,723	11.3 (0.87)	29,042	9.8 (1.03)	29,624	8.36 (1.24)
Access to Transit	15,719		25,886		28,723		29,042		29,624	
Yes	14,778	96%	12,260	56%	12,003	49%	3,210	9%	691	1%
Log (Population Density)	15,719	39.6 (56.4)	25,886	9.96 (10.1)	28,723	5.55 (4.25)	29,042	2.08 (3.76)	29,624	0.33 (1.71)

Methods

Our first research question evaluates the extent to which people in rural and urban areas experience differences in burdensome travel outcomes. We evaluate this question by conducting weighted group comparisons for each of the two burdensome travel outcomes using the sample weights provided in the NHTS. We determine whether there are differences in the likelihood that people living in rural and urban areas experience unmet need using a χ^2 test of complete independence. The likelihood that a person experiences unmet need is relatively low, in part because the variable is observed during the snapshot of the surveyed travel day. We might expect that a measure of whether a person experienced unmet need over the course of a year would have a higher prevalence. We also compare whether people who travel in rural and urban areas experience financially burdensome travel at different rates with a χ^2 test of complete independence.

To evaluate the second research question, which focuses on the differences in sociodemographic disparities in travel burdens experienced by people who live in rural versus urban areas, we conduct χ^2 tests of conditional independence for each outcome to evaluate whether different sociodemographic groups experience burdensome travel outcomes differently in each context. We stratify these groups by race and ethnicity, household car access, and household income. These findings provide an indication of the populations most affected by travel burdens across rural and urban contexts and inform the final stage of the analysis.

The third research question focuses on whether factors that lead to transportation burdens are different in rural areas when compared to urban areas. To evaluate this question, we separate survey respondents into populations living in each community type, as defined using the five Claritas classifications. Next, we evaluate separate multivariate models for each travel burden variable (two) for each community type (five), for a total of 10 models. This formulation allows us to evaluate the relationships between person and built environment characteristics and the burdensome travel outcomes *in each community context* to address our research question. To assess whether the factors that relate to travel burdens are significantly different across community contexts, we evaluate whether the 95% confidence interval of the estimated or odds ratios in models for rural and nonrural contexts overlap.

Note that most evaluations of travel behavior model the entire population in one model, representing differences across community types using a categorical variable. In order to compare our stratified modeling approach to a more traditional modeling approach, we also evaluate a joint model that includes a categorical variable representing the community type. This joint model indicates whether the community context variable is a significant predictor of travel burden using a traditional approach that assumes that the relationship between travel outcomes and person and built environment characteristics does not vary across contexts.

We evaluate both burdensome travel outcomes using binary logistic regression models. The demographic weights are omitted from all multivariate models because the models include many of the demographic factors used to create weights as explanatory variables.

Results

RQ1: Magnitude of Travel Burdens in Rural Versus Urban Contexts

We evaluate the first research question by comparing the weighted share of people that experience unmet need and financially burdensome travel in urban contexts versus each non-urban context (Table 2). The Community Comparison Ratio (CCR) shown in Table 2 indicates disparities between urban and each non-urban context by showing the rate with which non-urban populations in each context experience burdens relative to urban populations. We used a chi-squared test of independence to evaluate whether the rate at which people experience burdensome travel in each nonurban context is significantly different than the rate at which people who live in urban contexts experience burdensome travel. Test statistics for all tests conducted had a significance level of $\alpha = 0.001$.

This analysis indicates that people who live in rural: small-town and rural: dispersed areas are 1.7 and 2.2 times as likely to report unmet travel need than urban people, respectively. Differences in second city and suburban contexts are greater at 2.3 and 2.8, respectively. Note that the observed instances of unmet travel are relatively rare across all contexts (although it may be concerning when it does occur), ranging from 0.19% in urban areas to 0.54% in suburban areas. This may be due to the variability in the experience of unmet need from one day to the next; our measure captures unmet need on just one day.

The prevalence of financially burdensome travel is far higher than unmet need, ranging from 38% to 48% across contexts. Financially burdensome travel is most commonly reported in rural: dispersed contexts, followed by urban contexts. Relative to people who live in urban areas, people who live in rural: dispersed areas are 10% more likely to report financially burdensome travel, consistent with prior research that establishes that rural households allocate 30% more of their household income to transport costs (Bureau of Transportation Statistics, 2022). In contrast, people living in rural: small-towns are 10% less likely to report financially burdensome travel when compared with urban areas. Results for second city and suburban contexts are similar to those in rural: small town contexts.

Table 2. Comparison of the percent of people who experience travel burdens in each community context relative to the urban context.

Burdensome Travel Outcome	Urban			Second City			Suburban			Rural: Small Town			Rural: Dispersed		
	N ¹	Wt. % ²	CCR ³	N ¹	Wt. % ²	CCR ³	N ¹	Wt. % ²	CCR ³	N ¹	Wt. % ²	CCR ³	N ¹	Wt. % ²	CCR ³
Travel is a Financial Burden ⁴	15,293			25,232			28,138			28,331			28,756		
	5,698	44%	1	9,157	42%	0.9	9,145	38%	0.9	10,645	40%	0.9	12,878	48%	1.1
Unmet Need ⁴	15,719			25,886			28,723			29,042			29,624		
	23	0.19%	1	94	0.44%	2.3	68	0.54%	2.8	74	0.33%	1.7	87	0.42%	2.2

¹ N is the total number of survey respondents within each context.

² Wt. % indicates the weighted percentage of people who experienced the burdensome travel outcome in each context.

³ The Community Comparison Ratio (CCR) is calculated by dividing the weighted percent of burdened people in each context by the weighted percent of burdened people in the urban context. Cells highlighted in red indicate contexts with a higher percentage of people who experienced travel burdens relative to the urban context, while cells highlighted in blue indicate a lower percentage of people who experienced travel burdens relative to the urban context.

⁴ For unmet travel need and travel is a financial burden, the statistical test is a χ^2 test of independence with a test statistic of χ^2 , and all chi-squared tests of independence (urban versus all non-urban contexts) are significant at $\alpha = 0.001$.

RQ2: Differences in Who Experiences Travel Burdens in Rural vs Urban Contexts

To better understand the differences in the travel burdens experienced by people who live in rural and urban communities, we evaluate differences in outcomes for people of different groups (including race and ethnicity, country of origin, and car access) within and across community contexts (Table 3 and Table 4). We conducted χ^2 tests of conditional independence to determine the significance of differences in the rates at which different sociodemographic groups experience travel burdens in each non-urban context versus the urban context. All results shown in

Table 3 and Table 4 are statistically significant at $\alpha = 0.001$.

These tables summarize the share of people in each group that experience each burden as well as two ratios that provide an indication of the differences between groups. As in Table 2, the CCR indicates differences in the disparities in each context relative to the urban context, with a value of 1 indicating parity. For example, people without a car in suburban areas are 1.6 times as likely to have unmet need than people without a car living in urban areas. The other ratio shown in Table 3 and Table 4 is the Sociodemographic Comparison Ratio (SCR). The SCR is a measure of the sociodemographic disparities within each context, reflecting the rate with which disadvantaged populations experience burdens relative to their more advantaged counterparts within a given context. For example, zero-car people living in suburban areas are 6.6 times as likely to experience unmet need when compared with people with a car in suburban areas.

Looking first at disparities in unmet need for each population across contexts (shown in CCRs in Table 3), we see that for nearly all groups with less advantage (those born outside the USA, Black, Hispanic, car-deficit, and car-limited), people living in rural: small town contexts are more likely to experience unmet need when compared with their urban counterparts, with CCRs ranging from 3.8 to 24. Groups with more advantage exhibit more modest differences from urban, with CCRs ranging from 1.0 to 7.6. Results are similar in rural: dispersed contexts with Black, Hispanic, car-deficit, and car-limited populations exhibiting CCRs ranging from 1.5 to 24, while their more advantaged counterparts have CCRs ranging from 1.2 to 1.7. The exception to this trend is for those born outside the USA (CCR = 0.3), indicating that this population fares better in rural: dispersed contexts than their urban counterparts.

Most CCRs for groups with less advantage are higher in small town and dispersed rural contexts when compared with the CCRs in second city and suburban contexts, indicating that disadvantages these populations face may be greater in rural contexts than in nonrural contexts. Disparities for those with limited or no access to a vehicle in particular stand out. People who live in rural: small-towns or rural: dispersed areas that do not have car access are by far the most likely to not travel due to a lack of transportation options, with 5% of zero-car people who reside in a rural: small-town and 5.6% of zero-car rural: dispersed people experience unmet need on a given day, nearly 10 times the rate observed in urban areas (0.6%), and greater than the rates experienced in second city (2.5%) and suburban (1.0%) areas.

Differences in financial burden across contexts burden for populations with less advantage are more modest, as shown in the CCRs in Table 4. Most rural populations with less advantage have CCRs ranging from 0.9 to 1.1, indicating that differences are relatively modest. The exception is the CCR of 1.4 for car-deficit people living in rural: dispersed contexts. It may be that car-deficit households in these contexts are also those with limited financial means, which may point to both the necessity and the financial challenge of owning and operating at least one vehicle in dispersed rural contexts.

Looking at the SCR to understand sociodemographic disparities within rural contexts, we see that the greatest disparities occur for zero-car residents of rural: small town and rural: dispersed contexts, where they are 70 times more likely to not travel due to a lack of options than their car fully-equipped counterparts. This finding likely reflects the heightened necessity of car ownership in dispersed rural areas due to the infeasibility of using public transit, cyclist, and pedestrian infrastructure to get from place to place. Interestingly, the disparity in unmet need for zero car people in the rural: small-town context (SCR = 9.9) is more closely aligned with urban contexts (SCR = 9.3), indicating that living in dispersed rural areas leads to greater disparities between those with and without a car, likely due to the greater level of access experienced by people living in small town contexts which may allow carless residents to better meet their needs.

People who identify as Black in all contexts are more than twice as likely to not travel due to lack of options relative to white people, with SCRs starting at 2.6 urban contexts and getting higher in less urban contexts. This difference is most pronounced in rural: small-town and rural: dispersed locations, with Black people being 10 and 7 times more likely to have unmet need relative to White people in the respective contexts. Hispanic people experience disparities in unmet need relative to white people in all contexts except for second city (SCR = 0.3), with the greatest disparities in rural small town contexts (SCR = 10).

Looking at sociodemographic disparities in financial burden within contexts, we again see more moderate trends with SCRs ranging from 0.9 to 1.6. All contexts except for rural small towns show consistent disparities for populations with less advantage, and most of the disparities shown in rural: dispersed contexts are more modest than in nonrural contexts.

Table 3. Comparison of Unmet Need on Travel Day Across Person Characteristics and Contexts.

		Country of Origin								
		Origin		Race and Ethnicity				Car Access		
		Born in USA	Born Outside USA	White	Black	Hispanic	Multiple or Other	Car-fully Equipped	Car-deficit	Zero-car
Urban	N ¹	13,364	2,336	11,029	1,620	2,336	2,935	12,228	1,470	2,021
	n ²	19	4	13	5	4	4	10	3	10
	Wt. % ³	0.2%	0.1%	0.1%	0.4%	0.4%	0.1%	0.1%	0.04%	0.6%
	SCR ⁴		0.4		2.6	2.7	0.7		0.6	9.3
	CCR ⁵	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Second City	N ¹	23,595	2,269	20,547	2,632	2,269	2,548	22,031	1,922	1,933
	n ²	88	6	59	27	6	8	23	11	60
	Wt. % ³	0.5%	0.4%	0.3%	1.0%	0.1%	0.1%	0.1%	0.9%	2.5%
	SCR ⁴		0.8		2.9	0.3	0.3		13	36
	CCR ⁵	2.1	3.7	2.3	2.6	0.3	1.1	1.1	24	4.2
Suburban	N ¹	26,486	2,206	23,256	2,332	2,206	2,996	25,853	1,932	938
	n ²	119	16	42	15	16	11	25	9	34
	Wt. % ³	0.5%	0.7%	0.4%	1.2%	1.2%	0.6%	0.1%	0.1%	1.0%
	SCR ⁴		1.5		3.1	3.0	1.5		0.5	6.6
	CCR ⁵	2.3	7.8	2.7	3.2	3.0	5.7	2.3	1.8	1.6
Rural: Small-Town	N ¹	27,684	1,322	25,370	1,894	1,322	1,658	26,176	1,879	987
	n ²	68	13	51	11	13	12	24	9	41
	Wt. % ³	0.2%	1.2%	0.1%	1.5%	1.5%	0.8%	0.5%	1.0%	5.0%
	SCR ⁴		5.0		10	10	5.7		1.9	9.9
	CCR ⁵	1.1	13	1.0	3.9	3.8	8.1	7.6	24	8.1
Rural: Dispersed	N ¹	28,738	838	26,870	1,374	838	1,258	27,223	1,652	749
	n ²	83	3	65	16	3	6	32	11	44
	Wt. % ³	0.4%	0.03%	0.3%	1.8%	0.6%	1.2%	0.1%	1.0%	5.6%
	SCR ⁴		0.1		7.2	2.3	4.8		12.1	70
	CCR ⁵	2.0	0.3	1.7	4.7	1.5	12	1.2	24	9.1

¹ N is the total number of survey respondents within each context.

² n is the number of survey respondents who reported experiencing the burdensome travel outcome.

³ Wt. % indicates the weighted percentage of people who experienced the burdensome travel outcome in each context.

⁴ The Sociodemographic Comparison Ratio (SCR) is calculated by dividing the weighted percent of burdened people in the group indicated in each context by the weighted percent of burdened people in the group with the highest level of privilege (born in USA, White, Car-fully equipped) in each context. Cells highlighted in red indicate groups with a higher percentage of people who experienced travel burdens relative to the group with the highest level of relative privilege in a given context, while cells highlighted in blue indicate a lower percentage of people who experienced travel burdens.

⁵ The Community Comparison Ratio (CCR) is calculated by dividing the weighted percent of burdened people in each context by the weighted percent of burdened people in the urban context. Cells highlighted in red indicate contexts with a higher percentage of people who experienced travel burdens relative to the urban context, while cells highlighted in blue indicate a lower percentage of people who experienced travel burdens relative to the urban context.

NOTE: The statistical test is a χ^2 test of conditional independence comparing sociodemographic groups conditional on location with a test statistic of χ^2 , and all statistical tests are significant at $\alpha = 0.001$.

Table 4. Comparison of Rates of Financially Burdensome Travel Across Person Characteristics and Contexts.

		Country of Origin		Race and Ethnicity			Car Access			
		Born in USA	Born Outside USA	White	Black	Hispanic	Multiple or Other	Car-fully Equipped	Car-deficit	Zero-car
Urban	N ¹	12,410	2,878	10,797	1,520	2,231	2,850	11,989	1,445	1,859
	n ²	4,282	1,414	3,423	789	1,188	1,414	4,195	572	931
	Wt. % ³	41.0%	53.9%	36.5%	55.7%	57.6%	55.6%	41.6%	40.5%	54.2%
	SCR ⁴		1.3		1.5	1.6	1.5		1.0	1.3
	CCR ⁵	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Second City	N ¹	22,689	2,532	20,138	2,462	2,193	2,479	21,583	1,878	1,771
	n ²	13,629	1,164	6,672	1,210	1,101	1,210	7,465	786	906
	Wt. % ³	40%	50.3%	36.7%	51.1%	53.6%	52.8%	39.3%	46.8%	54.1%
	SCR ⁴		1.26		1.4	1.5	1.4		1.2	1.4
	CCR ⁵	1.0	0.9	1.0	0.9	0.9	0.9	0.9	1.2	1.0
Suburban	N ¹	24,730	3,396	22,842	2,232	2,136	2,925	25,405	1,904	829
	n ²	7,716	1,423	6,765	1,020	957	1,308	7,966	751	428
	Wt. % ³	35.2%	49.6%	33.3%	37.5%	47.3%	44.2%	35.7%	38.9%	54.7%
	SCR ⁴		1.41		1.1	1.4	1.3		1.1	1.5
	CCR ⁵	0.9	0.9	0.9	0.7	0.8	0.8	0.86	1.0	1.0
Rural: Small-Town	N ¹	26,669	1,650	24,816	1,784	1,281	1,612	25,605	1,840	886
	n ²	9,911	727	8,903	885	638	803	9,371	786	488
	Wt. % ³	39.6%	48.0%	55.8%	49.0%	49.8%	51.0%	45.3%	42.4%	57.6%
	SCR ⁴		1.21		0.9	0.9	0.9		0.9	1.3
	CCR ⁵	1.0	1	1.5	0.9	0.9	0.9	1.1	1	1.1
Rural: Dispersed	N ¹	27,863	881	26,153	1,264	806	1,218	26,481	1,602	673
	n ²	12,516	355	11,407	739	432	684	11,662	837	379
	Wt. % ³	48%	50.8%	46.6%	62.1%	50.2%	54.6%	47.1%	55.4%	53.2%
	SCR ⁴		1.1		1.3	1.1	1.2		1.2	1.1
	CCR ⁵	1.2	0.9	1.3	1.1	0.9	1.0	1.1	1.4	1.0

1 N is the total number of survey respondents within each context.

2 n is the number of survey respondents who reported experiencing the burdensome travel outcome.

3 Wt. % indicates the weighted percentage of people who experienced the burdensome travel outcome in each context.

4 The Sociodemographic Comparison Ratio (SCR) is calculated by dividing the weighted percent of burdened people in each context by the weighted percent of burdened people in each context that have the highest level of relative privilege. Cells highlighted in red indicate contexts with a higher percentage of people who experienced travel burdens relative to the group with the highest level of relative privilege, while cells highlighted in blue indicate a lower percentage of people who experienced travel burdens.

5 The Community Comparison Ratio (CCR) is calculated by dividing the weighted percent of burdened people in each context by the weighted percent of burdened people in the urban context. Cells highlighted in red indicate contexts with a higher percentage of people who experienced travel burdens relative to the urban context, while cells highlighted in blue indicate a lower percentage of people who experienced travel burdens relative to the urban context.

NOTE: The statistical test is a χ^2 test of conditional independence comparing sociodemographic groups conditional on location with a test statistic of χ^2 , and all statistical tests are significant at $\alpha = 0.001$.

RQ3: Differences in Factors That Lead to Transportation Burdens in Rural vs Urban Contexts

To explore whether the factors that relate to travel burdens differ between rural and urban areas, we employ two binary logistic regression models. We focus on an analysis of unmet travel needs and financially burdensome travel nationwide, as well as for the five community contexts.

First, we evaluate the factors relating to unmet travel need (Table 5), with a focus on how these factors vary across contexts. First, looking at the nationwide model, the odds ratios that represent Claritas community classifications are significantly greater than 1 for second city, suburban, and rural: dispersed contexts relative to urban. This indicates that the people living in these contexts are more likely to experience unmet need than their urban counterparts when controlling for other person and household-level characteristics. The rural: small-town coefficient is not significantly different from urban, indicating that unmet needs may be modestly mitigated by the access afforded by small towns. Car access is also an important predictor of unmet need in the nationwide model, as are employment status, income, and level of education.

We then break the data into five sub-models, each evaluating the factors that relate to unmet need in each context. Across all nonurban models, car access and employment status stand out as the most important predictors of whether a person experienced unmet travel needs. When controlling for other factors, rural: small-town and rural: dispersed zero-car people are 24 and 19 times more likely to not travel due to lack of options than their car-fully equipped counterparts. Comparing the confidence intervals of the odds ratios estimated across models, we observe that the confidence interval for zero-car status in both rural models does not overlap with the confidence interval in the urban model, indicating that the relationship between car access and unmet need is significantly higher in rural: small-town and rural: dispersed contexts when compared with the urban context, likely due to differences in access in these contexts.

We then assess whether the factors that relate to financially burdensome travel differ across contexts (Table 6). As with unmet need, in the full nationwide model, all contexts except for rural: small town are significantly different from urban contexts, again pointing to potential similarities in travel burdens across urban and rural: small-town contexts. On the other hand, people living in dispersed rural areas most likely to report financially burdensome travel when controlling for other factors, Education level, race, and income are all also substantively related to financially burdensome travel in the nationwide model.

As in the nationwide model, for financial burden models in all community contexts, we observe that sociodemographic factors (presence of children, education, income, race and ethnicity, place of birth) largely behave as we expect across contexts, with the least privileged identities being the most likely to report experiencing financial burden from travel in most contexts.

Examining the confidence intervals of the odds ratios in each model reveals significant differences in the relationships between some sociodemographics and financially burdensome travel. Being Black or Hispanic has a significantly greater relationship with financially burdensome travel in urban contexts when compared with both rural contexts, while in dispersed rural contexts a lower level of education has a greater relationship than in second city and suburban contexts. Being born outside the US is related to a higher likelihood of financially burdensome travel in all contexts except for rural: dispersed, where the opposite is true.

The car access variable tells an interesting story. The car access predictor is statistically significant in both the rural: small-town and rural: dispersed models. Interestingly, people living in zero car households are less likely to report that travel is a financial burden than their car fully equipped counterparts in the rural: dispersed context, while this predictor is not significant in the rural: small town context. Conversely, people living in car-deficit households in both rural contexts are more likely to report financially burdensome travel than their fully equipped counterparts. This observation may reflect the necessity of car access in rural areas to meet mobility needs, pointing to people who undertake the financial stressors of vehicle ownership to attain car-deficit status to meet their mobility needs. Coupled with the sociodemographic group comparisons capturing unmet need shown in Table 3, this points to a tradeoff in rural areas. Rural car-deficit households may undertake the financial burden of owning a car to meet mobility needs, while rural zero-car households do not undertake the financial burden of owning a car and fail to meet mobility needs.

Finally, we can examine differences in the relationship between financially burdensome travel and built environment measures across contexts. Again, examining confidence intervals that do not overlap, we observe that jobs reachable in 45 minutes by car is inversely related to financial burden in most contexts, with a stronger relationship in dispersed and small town rural contexts than nonrural contexts, indicating that regional access plays a greater role in determining financial burden in rural contexts.

Table 5. Binary Logistic Regression Models for Unmet Need on the Travel Day.

Predictors	Nationwide			Urban			Second City			Suburban			Rural: Small-Town			Rural: Dispersed		
	OR ¹	CI ²	p ³	OR ¹	CI ²	p ³	OR ¹	CI ²	p ³	OR ¹	CI ²	p ³	OR ¹	CI ²	p ³	OR ¹	CI ²	p ³
(Intercept)	0	0.00–0.00	*	0	0.00–9.18		0	0.00–0.04	*	0	0.00–0.00	*	0	0.00–0.00	*	0	0.00–0.01	*
Age (ref: 22 to 34 years)																		
36 to 50 years	1.03	0.63–1.69		1.09	0.18–8.35		1.11	0.45–2.89		0.97	0.30–3.33		1.06	0.40–3.15		0.8	0.29–2.44	
51 to 65 years	0.83	0.52–1.35		1.3	0.28–9.35		0.79	0.34–1.98		0.98	0.33–3.28		0.65	0.24–1.96		0.76	0.29–2.28	
> 65 years	1.18	0.74–1.92		1.39	0.28–10.61		1.05	0.47–2.65		2.19	0.78–7.40		1.16	0.44–3.54		0.8	0.31–2.40	
Children	1.05	0.70–1.54		1.68	0.39–6.21		0.67	0.28–1.47		2.18	0.87–5.24		0.96	0.40–2.17		0.91	0.39–2.00	
Multiple Adults	1.01	0.75–1.34		0.49	0.13–1.50		1.15	0.65–1.98		0.54	0.25–1.10		1.39	0.73–2.62		1.21	0.70–2.07	
Education (ref: Bachelor's or more)																		
High School or Less	1.72	1.23–2.44	*	2.06	0.60–7.84		1.19	0.64–2.30		3.05	1.41–7.01	*	1.96	0.95–4.22		1.35	0.69–2.84	
Some College	1.52	1.09–2.14	*	1.76	0.52–6.35		1.18	0.64–2.23		2.55	1.20–5.74	*	1.54	0.74–3.28		1.27	0.63–2.68	
Race and Ethnicity (ref: White)																		
Black	1.28	0.94–1.73		1.26	0.36–4.01		1.4	0.82–2.36		1.24	0.60–2.45		1.09	0.49–2.24		1.2	0.61–2.23	
Hispanic	0.92	0.56–1.46		0.45	0.09–1.73		0.61	0.20–1.49		1.06	0.36–2.64		1.89	0.62–4.71		1.08	0.26–3.10	
Multiple or Other	1.71	1.11–2.56	*	0.79	0.16–3.05		1.01	0.36–2.38		2.2	0.85–5.12		3.43	1.39–7.57	*	1.46	0.54–3.29	
Female	1.54	1.20–1.99	*	1.19	0.48–3.23		1.53	0.96–2.50		0.95	0.55–1.69		1.9	1.08–3.49	*	1.97	1.20–3.36	*
Born outside USA	1.41	0.91–2.12		2.95	0.94–8.55		1.65	0.71–3.49		1.6	0.70–3.42		0.73	0.21–2.00		0.52	0.03–2.49	
Household Income (ref: >\$25,000)																		
Less than \$25,000	2.09	1.54–2.85	*	3.15	1.03–10.53		1.66	0.90–3.09		3.18	1.63–6.35	*	1.46	0.74–2.90		2.15	1.18–4.00	*
Employed	0.25	0.17–0.36	*	0.34	0.08–1.13		0.18	0.08–0.37	*	0.36	0.15–0.80	*	0.38	0.17–0.81	*	0.15	0.05–0.35	*
Car Access (ref: Car-Fully Equipped)																		
Car-deficit	4.49	3.05–6.52	*	3.88	0.75–17.37		4.67	2.10–9.96	*	5.62	2.25–13.45	*	4.26	1.80–9.36	*	4.08	1.89–8.29	*
Zero-car	13	9.63–17.71	*	2.56	0.87–7.62		12.4	6.84–23.38	*	8.9	4.72–17.17	*	23.7	11.82–49.31	*	19	10.71–34.20	*
Log (Jobs within 45-min drive)	1.08	0.97–1.21		0.85	0.45–1.63		0.94	0.75–1.17		1.14	0.87–1.51		2	1.12–1.86	*	1.03	0.86–1.25	
Access to Transit	0.74	0.55–1.00		1.06	0.21–19.31		0.77	0.48–1.22		0.75	0.43–1.30		0.83	0.36–1.70		0.68	0.11–2.34	
Log (Population Density)	0.98	0.96–0.99	*	0.99	0.97–1.01		0.96	0.92–1.00		1	0.93–1.05		0.99	0.87–1.03		0.89	0.54–1.06	
Location (ref: Urban)																		
Second City	2.06	1.21–3.64	*															
Suburban	1.97	1.12–3.58	*															
Rural: Small-Town	1.76	0.93–3.44																
Rural: Dispersed	2.39	1.18–4.95	*															
Observations		124,223			15,165			25,037			27,643			27,874			28,504	
R ² Tjur		0.025			0.006			0.028			0.028			0.032			0.034	

¹ The OR column contains the odds ratio calculated for each variable in the binary logistic regression model.

² The CI column contains the confidence intervals calculated for each odds ratio at the $\alpha = 0.05$ threshold.

³ The odds ratios denoted with an asterisk (*) in the p column are statistically significant at a threshold of $\alpha = 0.05$.

Table 6. Binary Logistic Regression Models for Whether Travel is a Financial Burden.

	Nationwide	Urban	Second City	Suburban	Rural: Small-Town	Rural: Dispersed
--	------------	-------	-------------	----------	-------------------	------------------

Predictors	<i>OR</i> ¹	<i>CI</i> ²	<i>P</i> ³	<i>OR</i> ¹	<i>CI</i> ²	<i>P</i> ³	<i>OR</i> ¹	<i>CI</i> ²	<i>P</i> ³	<i>OR</i> ¹	<i>CI</i> ²	<i>P</i> ₃	<i>OR</i> ¹	<i>CI</i> ²	<i>P</i> ³	<i>OR</i> ¹	<i>CI</i> ²	<i>P</i> ³	
(Intercept)	0.78	0.67 – 0.91	*	0.4	0.21 – 0.75	*	0.77	0.57 – 1.03	0.078	0.4	0.29 – 0.55	*	0.91	0.70 – 1.19		1.24	1.01 – 1.53	*	
Age (ref: 22 to 34 years)																			
36 to 50 years	1.07	1.03 – 1.12	*	0.95	0.85 – 1.05		1.2	1.10 – 1.32	*	1.01	0.92 – 1.11		1.07	0.97 – 1.17		1.12	1.01 – 1.24	*	
51 to 65 years	1.06	1.01 – 1.10	*	1.02	0.92 – 1.13		1.16	1.06 – 1.26	*	1.05	0.96 – 1.14		1.06	0.96 – 1.16		1.01	0.92 – 1.12		
> 65 years	0.89	0.85 – 0.93	*	0.82	0.73 – 0.93	*	0.87	0.79 – 0.96	*	0.9	0.81 – 0.99	*	0.95	0.86 – 1.06		0.88	0.79 – 0.98	*	
Children	1.15	1.11 – 1.19	*	1.29	1.17 – 1.42	*	1.15	1.06 – 1.23	*	1.08	1.00 – 1.16	*	1.15	1.06 – 1.23	*	1.19	1.10 – 1.28	*	
Multiple Adults	1.01	0.98 – 1.04		1.07	0.98 – 1.16		1.01	0.95 – 1.08		0.96	0.90 – 1.02		1.02	0.96 – 1.08	*	1.02	0.96 – 1.08		
Education (ref: Bachelor's or more)																			
High School or Less	1.92	1.85 – 1.98	*	1.81	1.62 – 2.03	*	1.8	1.66 – 1.94	*	1.79	1.64 – 1.94	*	1.91	1.78 – 2.06	*	2.12	1.98 – 2.26	*	
Some College	1.56	1.52 – 1.60	*	1.55	1.42 – 1.69	*	1.55	1.45 – 1.65	*	1.44	1.36 – 1.53	*	1.59	1.50 – 1.68	*	1.64	1.55 – 1.74	*	
Race and Ethnicity (ref: White)																			
Black	1.59	1.51 – 1.66	*	1.85	1.64 – 2.09	*	1.57	1.43 – 1.72	*	1.66	1.51 – 1.83	*	1.46	1.31 – 1.62	*	1.45	1.28 – 1.64	*	
Hispanic	1.66	1.58 – 1.75	*	1.96	1.77 – 2.18	*	1.65	1.50 – 1.82	*	1.67	1.51 – 1.84	*	1.56	1.38 – 1.76	*	1.41	1.21 – 1.64	*	
Multiple or Other	1.71	1.62 – 1.79	*	1.73	1.55 – 1.93	*	1.71	1.53 – 1.90	*	1.78	1.61 – 1.97	*	1.65	1.45 – 1.86	*	1.53	1.33 – 1.75	*	
Female	1.06	1.04 – 1.09	*	1.09	1.01 – 1.17	*	0.99	0.94 – 1.05		1.11	1.05 – 1.17	*	1.08	1.02 – 1.14	*	1.06	1.01 – 1.12	*	
Born outside of USA	1.25	1.20 – 1.31	*	1.38	1.25 – 1.52	*	1.3	1.18 – 1.43	*	1.27	1.16 – 1.39	*	1.18	1.05 – 1.32	*	0.83	0.72 – 0.96	*	
Household Income (ref: >\$25,000)																			
Less than \$25,000	1.76	1.70 – 1.82	*	1.77	1.60 – 1.95	*	1.76	1.63 – 1.89	*	1.72	1.58 – 1.87	*	1.84	1.70 – 1.98	*	1.71	1.60 – 1.84	*	
Employed	0.94	0.91 – 0.97	*	0.93	0.85 – 1.02		0.89	0.83 – 0.95	*	0.96	0.90 – 1.03		0.98	0.92 – 1.05		0.92	0.87 – 0.98	*	
Car Access (ref: Car-Fully Equipped)																			
Car-deficit	1.19	1.13 – 1.25	*	1.09	0.97 – 1.24		1.18	1.06 – 1.31	*	1.32	1.19 – 1.46	*	1.14	1.03 – 1.26	*	1.18	1.06 – 1.32	*	
Zero-car	1.06	1.00 – 1.13	*	1.15	1.02 – 1.30	*	1.05	0.93 – 1.17		1.23	1.05 – 1.44	*	1.04	0.90 – 1.22	*	0.82	0.70 – 0.98	*	
Log (Jobs within 45-min drive)	0.92	0.91 – 0.93	*	0.98	0.93 – 1.03		0.92	0.89 – 0.94	*	0.97	0.94 – 1.00	*	0.9	0.88 – 0.92	*	0.89	0.87 – 0.91	*	
Access to Transit	1.03	1.00 – 1.07		0.89	0.77 – 1.03		1.04	0.98 – 1.10		1.01	0.95 – 1.06		1.01	0.93 – 1.10		0.96	0.82 – 1.14		
Log (Population Density)	1	1.001 – 1.003	*	1	1.001 – 1.004	*	1	1.00 – 1.01		1.01	1.01 – 1.02	*	1.01	1.00 – 1.02		1.01	0.98 – 1.03		
Location (ref: Urban)																			
Second City	0.94	0.90 – 0.99	*																
Suburban	0.95	0.90 – 1.00	*																
Rural: Small-Town	1.05	0.99 – 1.12																	
Rural: Dispersed	1.23	1.15 – 1.31	*																
Observations		121,231			14,776			24,428			27,094			27,235			27,698		
R ² Tjur		0.067			0.090			0.066			0.052			0.056			0.058		

¹ The OR column contains the odds ratio calculated for each variable in the binary logistic regression model.

² The CI column contains the confidence intervals calculated for each odds ratio at the $\alpha = 0.05$ threshold.

³ The odds ratios denoted with an asterisk (*) in the p column are statistically significant at a threshold of $\alpha = 0.05$.

Discussion and Conclusions

Our findings deepen our understanding of travel burdens in rural contexts. Overall we find that there are important differences between rural and nonrural areas in terms of unmet travel needs, the role of vehicles in securing mobility, and the financial and mobility tradeoffs that people face.

People living in dispersed rural areas report higher rates of travel burdens, including both unmet travel need and financially burdensome travel, when compared with residents of urban contexts. This is the case when comparing across groups as well as when we control for potentially confounding personal and built environment factors. People living in rural small towns exhibit some of the burdens that those living in dispersed rural areas face, although they are also more similar to urban areas in terms of exhibiting mitigated burdens in some cases. This may indicate that the access afforded by rural small towns is tied to better mobility outcomes in those communities than in more dispersed rural communities.

More granular group comparisons across all community types demonstrate that specific populations more commonly experience unmet travel needs (Hispanic, Black, and those with limited vehicle access), and that most of these disparities are more pronounced in dispersed rural areas when compared with urban areas. Disparities in financially burdensome travel are more modest, with rural contexts having the smallest disparities relative to nonrural contexts. Those with limited or no vehicle access see the greatest disparities in unmet need.

When we evaluate the factors that lead to unmet travel needs using multivariate modeling, we observe that car access is one of the strongest predictors of unmet travel need, and that this relationship is stronger in rural contexts than in urban contexts. Compared to their car-fully equipped peers, rural: dispersed carless and car-deficit residents are 4 times and 19 times more likely to make no trips on a given day due to a lack of transportation options when controlling for other factors. In contrast, when controlling for other factors, car access is not a significant predictor of unmet need in urban areas.

In terms of financial burden, our multivariate modeling indicates that education, race and ethnicity, and income are important predictors, consistent with prior research evaluating primarily urban contexts (Currie et al., 2009; Currie & Delbosc, 2011). When we control for other factors, we observe that populations that typically exhibit privilege are associated with lower rates of financially burdensome travel in most cases. Interestingly, race plays more of a role in urban communities while education is more important in rural contexts. Partial vehicle access is also related to greater financially burdensome travel in rural contexts whereas lack of a vehicle is not, pointing to potential economic and mobility tradeoffs faced by rural travelers. Interestingly, regional access plays a more important role in financially burdensome travel in rural contexts than in nonrural contexts. At the same time, small towns exhibit similarities to urban contexts in nationwide models of both unmet need and financial burden, again pointing to the potential mitigation of travel burdens that small town access may provide.

Collectively, our findings indicate that living in rural communities is related to higher rates of unmet need and financially burdensome travel when compared with urban areas, even when controlling for other characteristics. One of our central findings, that car access is highly related to the likelihood that people experience unmet need across contexts, and in particular in dispersed and small town contexts, expands upon prior work focused on the determinants and impacts of car access (Blumenberg et al., 2020; Blumenberg & Pierce, 2012; Mattioli, 2014, 2021). Blumenberg's work on the spectrum of car access (zero-car, car-deficit, car-fully equipped) addresses the activity gaps between levels of motorization (activity increases with car access) and the determinants of car access (Blumenberg et al., 2020). Our findings also emphasize the activity gaps between levels of car access by looking not at trip rates but at whether people are able to travel when they need to. In other words, while prior research primarily focuses on reduced activity for people with limited resources (Blumenberg et al., 2020; Kamruzzaman & Hine, 2012; Mattioli, 2014, 2021), our work provides an important addition to this body of research, demonstrating *why* people exhibit reduced activity; they do not have adequate transport options to travel where they want or need to go.

Our findings also build upon the concept of “forced car ownership” that Blumenberg, Mattioli, and other scholars have brought forth. Our findings provide important insight into the financial and mobility tradeoffs that people with limited car access in rural small town and dispersed communities face.

Finally, we find that there is important variation in outcomes across rural contexts. Rural: small-towns differ from rural: dispersed contexts in that they exhibit similarities to urban areas in terms both unmet need and financially burdensome travel, suggesting that even the micro-scale density of small towns may alleviate financial burdens and unmet need for many people living in these areas.

In terms of lessening travel burdens in small and rural communities, our findings point to a few potential policy strategies. There are substantial mobility benefits when a household gains access to at least one car. Programs to support vehicle maintenance and the implementation of car-share or ride-sharing programs may be effective strategies for ensuring that people can get where they need to go while also mitigating the costs of car ownership.

Additionally, we find that living in a small town may provide greater accessibility than living in a more dispersed rural context. Supporting rural housing and economic development in small town centers may be a means to reduce rural travel burdens. Our findings show that even a small concentration of services and opportunities helps alleviate financial burden and unmet need in rural contexts. This micro-density may also increase the viability of rural transit services, ride and car-share programs and expand the number of people who can meet their needs.

While these findings provide critical insight into burdensome travel, there are several limitations to this work. The population sampled in the NHTS underrepresents some racial and ethnic minorities, immigrants, people with limited phone or internet access, and those without a permanent home address. While the NHTS provides sample weights based on US Census data to correct for some of these issues, it is possible that unmeasured (and unweighted)

characteristics affect our analysis. Lastly, we acknowledge that the definition of rural and nonrural that we use in this analysis greatly simplifies the rich heterogeneity of rural landscapes. Rural community landscapes do not fit neatly into binary categories, or even a spectrum from urban to rural.

Our findings also point to the importance of additional research on rural mobility solutions to address unmet need in rural communities, particularly for those without a vehicle in rural contexts. Ultimately, a deeper understanding of rural transportation experiences and outcomes and their drivers are needed to design policies and programs to address rural travel burdens.

Acknowledgements

The authors would like to acknowledge the sponsors in supporting this study: the National Center for Sustainable Transportation (NCST) at The University of Vermont (UVM), the U.S. Department of Transportation's University Transportation Centers Program, and the U.S. Department of Transportation Dwight D. Eisenhower Transportation Fellowship Program.

Declarations

Ethical Approval

Not applicable.

Competing Interests

The authors declare no competing interests.

Authors' Contributions

The authors confirm contribution to the paper as follows: study conception and design: SE and DR, data collection: SE; analysis and interpretation of results: SE and DR; draft manuscript preparation: SE and DR. All authors reviewed the results and approved the final version of the manuscript.

Funding

This research was funded by a grant from the National Center for Sustainable Transportation (NCST), supported by U.S. Department of Transportation's University Transportation Centers Program, and by the Dwight D. Eisenhower Transportation Fellowship Program. FHWA provided spatially detailed NHTS survey data.

Availability of Data and Materials

The publicly available data and materials used in the study are available for download at the following link: <https://nhts.ornl.gov/>. Detailed spatial information for the NHTS survey can be requested from FHWA.

References

- Allen, J., & Farber, S. (2020). Planning transport for social inclusion: An accessibility-activity participation approach. *Transportation Research Part D: Transport and Environment*, 78, 102212. <https://doi.org/10.1016/j.trd.2019.102212>
- Bantis, T., & Haworth, J. (2020). Assessing transport related social exclusion using a capabilities approach to accessibility framework: A dynamic Bayesian network approach. *Journal of Transport Geography*, 84, 102673. <https://doi.org/10.1016/j.jtrangeo.2020.102673>
- Blumenberg, E., Brown, A., & Schouten, A. (2020). Car-deficit households: Determinants and implications for household travel in the U.S. *Transportation*, 47(3), 1103–1125. <https://doi.org/10.1007/s11116-018-9956-6>
- Blumenberg, E., & Pierce, G. (2012). Automobile Ownership and Travel by the Poor: Evidence from the 2009 National Household Travel Survey. *Transportation Research Record: Journal of the Transportation Research Board*, 2320(1), 28–36. <https://doi.org/10.3141/2320-04>
- Brown, A. E. (2017). Car-less or car-free? Socioeconomic and mobility differences among zero-car households. *Transport Policy*, 60, 152–159. <https://doi.org/10.1016/j.tranpol.2017.09.016>
- Bureau of Transportation Statistics. (2022). *Transportation Economic Trends | Bureau of Transportation Statistics*. <https://www.bts.gov/product/transportation-economic-trends>
- Coren, C., Lowe, K., & Barajas, J. M. (2022). Commuting Carless: A Qualitative Study of Transportation Challenges for Disadvantaged Job Seekers in Chicago, IL. *Transportation Research Record*, 2676(6), 673–684. <https://doi.org/10.1177/03611981221076126>
- Currie, G., & Delbosc, A. (2011). Transport Disadvantage: A Review. In G. Currie (Ed.), *New Perspectives and Methods in Transport and Social Exclusion Research* (pp. 15–25). Emerald Group Publishing Limited. <https://doi.org/10.1108/9781780522012-002>
- Cutsinger, J., & Galster, G. (2006). There is No Sprawl Syndrome: A New Typology of Metropolitan Land Use Patterns. *Urban Geography*, 27(3), 228–252. <https://doi.org/10.2747/0272-3638.27.3.228>
- Delbosc, A., & Currie, G. (2011). The spatial context of transport disadvantage, social exclusion and well-being. *Journal of Transport Geography*, 19(6), 1130–1137. <https://doi.org/10.1016/j.jtrangeo.2011.04.005>
- EPA. (2018). *Smart Location Database Technical Documentation and User Guide Version 3.0*. 55.
- Esekhagbe, E. O., & Bills, T. (2021). *Examining the Travel Behavior of Transport Disadvantaged Communities Using the 2017 National Household Travel Survey* (No. TRBAM-21-04202). Article TRBAM-21-04202. Transportation Research Board 100th Annual Meeting Transportation Research Board Transportation Research Board. <https://trid.trb.org/view/1759374>
- FHWA. (2018). *National Household Travel Survey (NHTS)—Policy | Federal Highway Administration*. <https://www.fhwa.dot.gov/policyinformation/nhts.cfm>
- Gray, D. (2004). Rural Transport and Social Exclusion: Developing a Rural Transport Typology. *Built Environment*, 30(2), 172–181. <https://doi.org/10.2148/benv.30.2.172.54310>

- Handy, S. (2020). Is accessibility an idea whose time has finally come? *Transportation Research Part D: Transport and Environment*, 83(0). <https://trid.trb.org/view/1696897>
- Handy, S. L., & Niemeier, D. (1997). Measuring Accessibility: An Exploration of Issues and Alternatives. *Environment and Planning A*, 29(7), 1175–1194. <https://doi.org/10.1068/a291175>
- Hoggart, K. (1990). Let's do away with rural. *Journal of Rural Studies*, 6(3), 245–257. [https://doi.org/10.1016/0743-0167\(90\)90079-N](https://doi.org/10.1016/0743-0167(90)90079-N)
- Kamruzzaman, Md., & Hine, J. (2012). Analysis of rural activity spaces and transport disadvantage using a multi-method approach. *Transport Policy*, 19(1), 105–120. <https://doi.org/10.1016/j.tranpol.2011.09.007>
- Kolodinsky, J. M., DeSisto, T. P., Propen, D., Putnam, M. E., Roche, E., & Sawyer, W. R. (2013). It is not how far you go, it is whether you can get there: Modeling the effects of mobility on quality of life in rural New England. *Journal of Transport Geography*, 31, 113–122. <https://doi.org/10.1016/j.jtrangeo.2013.05.011>
- Lucas, K. (2012). Transport and social exclusion: Where are we now? *Transport Policy*, 20, 105–113. <https://doi.org/10.1016/j.tranpol.2012.01.013>
- Lucas, K., & Jones, P. (2012). Social impacts and equity issues in transport: An introduction. *Journal of Transport Geography*, 21, 1–3. <https://doi.org/10.1016/j.jtrangeo.2012.01.032>
- Mattioli, G. (2014). Where Sustainable Transport and Social Exclusion Meet: Households Without Cars and Car Dependence in Great Britain. *Journal of Environmental Policy & Planning*, 16(3), 379–400. <https://doi.org/10.1080/1523908X.2013.858592>
- Mattioli, G. (2021). *Transport-related inequalities in the sustainable transition debate*. 17.
- McAndrews, C., Tabatabaie, S., & Litt, J. S. (2018). Motivations and Strategies for Bicycle Planning in Rural, Suburban, and Low-Density Communities: The Need for New Best Practices. *Journal of the American Planning Association*, 84(2), 99–111. <https://doi.org/10.1080/01944363.2018.1438849>
- Millward, H., & Spinney, J. (2011). Time use, travel behavior, and the rural–urban continuum: Results from the Halifax STAR project. *Journal of Transport Geography*, 19(1), 51–58. <https://doi.org/10.1016/j.jtrangeo.2009.12.005>
- Preston, J., & Rajé, F. (2007). Accessibility, mobility and transport-related social exclusion. *Journal of Transport Geography*, 15(3), 151–160. <https://doi.org/10.1016/j.jtrangeo.2006.05.002>
- Pucher, J., & Renne, J. L. (2005). Rural mobility and mode choice: Evidence from the 2001 National Household Travel Survey. *Transportation*, 32(2), 165–186. <https://doi.org/10.1007/s11116-004-5508-3>
- Smith, N., Hirsch, D., & Davis, A. (2012). Accessibility and capability: The minimum transport needs and costs of rural households. *Journal of Transport Geography*, 21, 93–101. <https://doi.org/10.1016/j.jtrangeo.2012.01.004>

van Wee, B., & Geurs, K. T. (2004). Accessibility evaluation of land-use and transport strategies: Review and research directions. *Journal of Transport Geography*, 12(2), 127–140.
<https://doi.org/10.1016/j.jtrangeo.2003.10.005>

Voulgaris, C. T., Taylor, B. D., Blumenberg, E., Brown, A., & Ralph, K. (2016). Synergistic neighborhood relationships with travel behavior: An analysis of travel in 30,000 US neighborhoods. *Journal of Transport and Land Use*, 10(1).
<https://doi.org/10.5198/jtlu.2016.840>

Wang, W., Espeland, S., Barajas, J. M., & Rowangould, D. (2023). Rural–nonrural divide in car access and unmet travel need in the United States. *Transportation*. 10.1007/s11116-023-10429-6

Part 2: Qualitative Evaluation of Transportation Experiences of People with Limited Access to a Vehicle Living in Vermont's Northeast Kingdom

Abstract

People living in rural communities face unique transportation challenges. Greater distances between destinations and fewer transportation options contribute to rural transportation challenges. These challenges are compounded for those with limited or no vehicle access, which we define as those with either no access to a personal vehicle or those with access some of the time. Socio-economic factors, housing dynamics, and generational poverty also influence the rural travel experience and affect vehicle ownership. This study investigates the extent to which rural residents with limited vehicle access are able to meet their needs and the effects that unmet travel needs have on their lives. Further, this research explores how mobility, or the ability to travel where one want and need to go, is connected to needs, wellbeing, and quality of life in the rural context. To address these questions, this study uses qualitative interview data with residents of the Northeast Kingdom, a largely rural region of Vermont, with a focus on residents with low to no vehicle access. The study findings indicate that in addition to owning a vehicle, having the resources to maintain and operate the vehicle determines a person's mobility in rural communities. Transit service and getting rides are also an important means of mobility for many people living in rural areas. The results highlight the importance of vehicle access in rural contexts (whether it is personal, shared, or public) and to the connections between mobility, poverty, and quality of life. This study points to the potential for improving rural mobility through thoughtful rural transit investments and support for expanded vehicle access, which may include vehicle maintenance programs and programs that build on social connections and shared ride networks.

Keywords: Transport disadvantage, rural travel, car access, unmet need, equity

Introduction

The challenge of meeting transportation needs is heightened in rural contexts, where destinations are farther apart and there are fewer transportation options that connect them. A growing body of literature has established that accessibility, or the ability to reach valued destinations, is critical to satisfying a person's fundamental needs. Conversely, difficulty accessing destinations can result in burdens such as high transportation costs, long travel times, or unmet travel needs, adversely affecting wellbeing. Accessibility varies depending on a person's identity, resources, abilities, and needs, as well as the built environment and community resources available (Currie & Delbosc, 2011; Lucas, 2012).

Prior research evaluating the effects of individual and environmental factors on travel outcomes and travel burdens highlights the importance of access to transportation options such as public transit or a personal vehicle, financial resources, and proximity to destinations (Barajas & Wang, 2023). A subset of these studies points to the heightened challenges encountered in rural and small communities, including higher rates of unmet travel needs in rural contexts (Espeland & Rowangould, 2024). However, little is known about the transportation needs and experiences of those living in rural communities with limited or no access to a vehicle, which we define as those that either do not have a personal vehicle or who only have access to a vehicle some of the time.

To better understand how those with limited or no vehicle access in rural contexts meet (or do not meet) their transportation needs, this study collected and analyzed data from 42 semi-structured interviews with people residing in the largely rural Northeast Kingdom region of Vermont, with particular attention to those with limited access to a vehicle. This qualitative investigation illustrates the travel experiences, barriers, and mobility adaptations of rural populations, with a focus on people's mobility in terms of their ability to reach destinations rather than their physical mobility. The findings shed light on important connections between accessibility, housing, social capital, poverty, and vehicle access, in a rural context.

Literature Review

Transportation Burdens and Transport Disadvantage

Commonly cited burdensome travel outcomes include long travel times, high financial costs, inability to travel, reduction of mobility or access, and unmet needs (Currie & Delbosc, 2011; Lucas & Jones, 2012; Mattioli, 2021; Smith et al., 2012). People who experience burdensome travel outcomes often experience reduced physical accessibility to services and opportunities and diminished participation in community activities (Lucas, 2012; Lucas & Jones, 2012; Xiao et al., 2018). Prior research evaluates the effects of both individual and built environment factors on travel outcomes that reflect burden. This body of work underscores the importance of access to transportation options such as public transit or a personal vehicle, financial resources, and proximity to destinations (Allen & Farber, 2020; Blumenberg & Pierce, 2012; Coren et al., 2022).

Research on “transport disadvantage” establishes the interconnections between burdensome outcomes, a person’s circumstances and their community’s land use and transportation systems (Currie & Delbosc, 2011; Lucas, 2012). Transport disadvantage captures both the accessibility of destinations posed by transportation networks and land use systems, and the individual capability of people to reach necessary goods and services (Blumenberg & Pierce, 2012). In this context, *accessibility* refers to how well a transportation system facilitates travel between a range of necessary destinations, while *capability* refers to the specific ability of an individual to travel to desired destinations (Bantis & Haworth, 2020; Preston & Rajé, 2007). Transport disadvantage can adversely impact a person’s quality of life by limiting their involvement in a variety of employment, medical, food, and social opportunities (Currie & Delbosc, 2011).

The Relationship Between Car Access and Mobility

Prior work finds that car access is strongly associated with increased mobility; access to a car both increases the distances traveled for all people and elevates access to services and opportunities (Mattioli, 2014, 2021). Conversely, those lacking a car often suffer from reduced access to opportunities and unfavorable mobility outcomes (Blumenberg et al., 2020a; Coren et al., 2022; Morris, 2020). The presence of at least one car in a household greatly increases mobility (Blumenberg et al., 2020a). Blumenberg finds that the determinants and effects of car access are best characterized as a spectrum spanning three categories: zero-car¹, car-deficit², and car-fully equipped³ (Blumenberg et al., 2020a). Current research establishes a strong positive relationship between income and car access; car access increases with household income, increasing mobility outcomes for those with limited resources, and car access can contribute to income by facilitating employment (Blumenberg et al., 2020a; Blumenberg & Pierce, 2012).

This vein of research also considers the role of choice and constraint in determining car access. Brown posits that some households may choose not to own a car (car-free) due to reasons such as environmental or financial concerns (Brown, 2017a). These households often have other transport options that satisfy their mobility needs (Brown, 2017a). Due to financial or personal constraints, other households may be unable to own a car (car-less), though they may desire to satisfy their mobility needs (Brown, 2017a). Brown draws this important distinction by establishing the role of choice and constraint in households without a car. Blumenberg’s work complements these findings by exploring the idea of forced car ownership in car-deficit households. These households undertake the high financial costs associated with car ownership in order to meet basic mobility needs, often because there are not transport options that provide as much access as a car, or no other options available at all (Blumenberg et al., 2020b).

¹ Households with no car access.

² Households with access to less than one car per driver.

³ Households with access to one or more cars per driver.

Several barriers preclude people with limited resources and abilities from having constant, reliable car access. Perhaps the most common barrier to car access is the high financial cost associated with car ownership (Blumenberg et al., 2020a; Blumenberg & Pierce, 2012; Klein & Smart, 2017). Financial stressors include the purchase, registration, insurance, fuel, and maintenance costs. These costs can impose an unfeasible burden particularly among lower-income groups (Blumenberg et al., 2020a; Klein & Smart, 2017, 2019). Other barriers include living with disability or a general inability to obtain a driver's license which severely limit mobility (Barajas, 2021).

Scholars have explored the idea of car access being fluid across time and related to a variety of factors beyond income. Maintenance and car ownership costs had been previously thought to be the main driver of intermittent car ownership, but recent work finds that life events and spatial context may play an equally important role (Klein & Smart, 2019). For example, households who experience the addition of a child may purchase a car to accommodate their new travel needs (Klein & Smart, 2019). Conversely, a household who moves from a rural area to an urban center may relinquish their household cars due to the availability of other transportation options and potential difficulties of urban car ownership (Klein & Smart, 2019).

Transportation and Land use in Rural Contexts

Urban and suburban contexts differ from rural contexts in terms of peoples' proximity to destinations and the extent of transportation infrastructure that connects destinations (Cutsinger & Galster, 2006; Hoggart, 1990; Millward & Spinney, 2011). Urban communities tend to have the greatest density and access to jobs, services, and opportunities (Millward & Spinney, 2011). Suburban communities tend to have relatively high levels of proximity to resources and multi-modal options, although to a lesser extent than urban communities (Cutsinger & Galster, 2006). Rural neighborhoods are structurally different from both urban and suburban neighborhoods, and tend to exhibit the longest distances between destinations and the fewest destinations (Cutsinger & Galster, 2006; Hoggart, 1990; Mattioli, 2014; Millward & Spinney, 2011; Voulgaris et al., 2016). Rural areas also tend to have limited non-auto travel options such as public transit and bicycle and pedestrian infrastructure (McAndrews et al., 2018). Additionally, it is challenging to use non-auto modes over longer distances as transportation options other than private vehicles (e.g., transit, walk, bike) work best in areas where origins and destinations are reasonably proximate such as urban centers. Increased transportation costs may be at least partly offset by lower housing prices. The lack of alternative transport travel modes in rural contexts presents a substantial barrier to mobility, making it difficult for those without cars living in rural areas to meet their needs (Carlson et al., 2018; Espeland & Rowangould, 2024).

At the same time, rural contexts are not homogenous (Isserman, 2005; Mattioli, 2014; Millward & Spinney, 2011). Rural communities reflect variation in destination accessibility and transportation options (Gray, 2004; Smith et al., 2012; *Transportation Economic Trends*, n.d.). "Rural" can include a range of built environments, from small towns with a relatively concentrated center to highly dispersed communities with a lower density. People living in different rural contexts can have varying levels of access to opportunities, services, and

transportation infrastructure (Millward & Spinney, 2011). Town centers can concentrate destinations and provide better bicycle, pedestrian, and transit infrastructure than more dispersed areas. These core spaces can support a portion of the needs of people living in these communities, even if they don't provide the same levels of opportunities as their urban counterparts (Cutsinger & Galster, 2006; Espeland & Rowangould, 2024; Schukei & Rowangould, n.d.). In comparison, people living in lower density and less centralized rural contexts tend to have less access and are typically more isolated than those who live in more urban areas (Cutsinger & Galster, 2006).

Mobility and Car Access in Small and Rural Communities

As expected, people living in rural contexts are more likely to rely on a vehicle (Gray, 2004; Kamruzzaman & Hine, 2012; Schukei & Rowangould, n.d.). At the same time, those living in more remote locations have higher travel costs, and those with lower income spend a larger share of their income on transportation (Smith et al., 2012). Compared with urban households, rural households travel longer distances by vehicle overall, taking fewer but longer trips (Millward & Spinney, 2011; Pucher & Renne, 2005; Schukei & Rowangould, n.d.; Voulgaris et al., 2016). Some vulnerable rural populations travel less than their urban counterparts (Delbosc & Currie, 2011; Kamruzzaman & Hine, 2012; Kolodinsky et al., 2013; Smith et al., 2012), consistent with the finding that rural travelers are more likely to have difficulty meeting their essential travel needs (Delbosc & Currie, 2011; Espeland & Rowangould, 2024).

The role that car access plays in mobility varies across community types. As in urban contexts, in rural communities, car access brings greater levels of mobility, while the lack of a car is associated with less mobility (Kamruzzaman & Hine, 2012). The relationships between household income, car access, and burdensome travel also vary in rural contexts (Gray, 2004; Mattioli, 2014). As the built environment transitions from dense urban to sparsely populated rural areas, more households have cars, and the gap between people with and without vehicles widens in terms of their travel activity and accessibility (Mattioli, 2021).

At the same time, in car-dependent communities, car access may be “forced”, or necessary to reach minimum mobility thresholds even when vehicle ownership imposes considerable financial burdens (Allen & Farber, 2020; Currie & Delbosc, 2011; Mattioli, 2014; Xiao et al., 2018). The burden of buying, operating, and maintaining a car is especially pronounced for those with limited financial resources. To avoid these costs, some people reduce how much they travel or rely on others for rides (Currie & Delbosc, 2011).

In rural contexts carpooling is a more commonly used means of travel, regardless of personal vehicle access (Wang et al., 2023), consistent with the notion that vehicles are a key to rural mobility. Research conducted in tandem with this research report, examining the transportation barriers and adaptation of rural carless households, found that rural households without car access mainly relied on family and friends to get rides or borrow a car (Barajas & Wang, 2023). The same research found costs including gas, maintenance, and purchase costs to be the main barrier to owning a vehicle and that inadequate public transit limited mobility which resulted in missed trips (Barajas & Wang, 2023). Solutions focused on non-car

transportation options that would be accessible to their lifestyle, such as employee-planned transportation, better bus service, car-sharing, and on-demand services (Barajas & Wang, 2023).

Research Gap and Objective

The challenges posed by a lack of car access are heightened in rural areas, where the distance between destinations is greater, and there are fewer transportation options connecting destinations. Little is known about how those with limited access to a car and other resources meet (or do not meet) their transportation needs in rural contexts. This paper uses in-depth interviews with people living in a rural region of Vermont to address two questions: How do people with limited or no access to a vehicle living in rural communities meet their travel needs? When their needs are not met, how does it affect their wellbeing and quality of life? Building on these findings, the discussion identifies potential means to improve rural mobility.

Methods & Data

This study focused on transportation experiences and needs in the rural Northeast Kingdom (NEK) region of Vermont. The NEK includes Orleans, Caledonia, and Essex Counties with populations of 27,000, 30,000, and 6,000 respectively. The NEK has the highest unemployment and poverty rates in Vermont. The region has limited fixed route transit service and on-demand transit services for Medicaid visits and for the elderly and disabled. Many roads in the NEK are mountainous or unpaved, which makes travel particularly challenging in winter and mud seasons.

The research team worked with Northeast Kingdom Community Action (NEKCA), an anti-poverty organization, to convene a community advisory committee to guide the research questions, identify recruitment strategies, assist with recruitment, and reflect on findings. The advisory committee included 15 community organizations and agencies working on food access, affordable housing, healthcare, justice, and transportation in the NEK.

Based on discussions with the advisory committee and a review of census data on poverty and carlessness in communities across the region, the research team selected three towns to recruit study participants. Towns were selected based on variations in rurality, ranging from a small town with moderate access (St. Johnsbury) to relatively remote with very little access (Gilman). The Town of St. Johnsbury (population 7,000) is the county seat of Caledonia County and has a moderate-sized downtown area with limited transit access, a concentration of retail and services, and multiple affordable housing sites. The Town of Barton (population 2,900) is in Orleans County. Barton has a small downtown with schools, a public library, and a handful of retail establishments. Gilman is an unincorporated community in the town of Lunenburg (population 1,200) in Essex County. Gilman has a post office, an early childhood education center, a senior center, and a town square. Recruitment primarily occurred through community food and meal sites, affordable housing, and a public library.

Qualitative Research

This study uses qualitative methods to ascertain the transportation needs of people living without cars or with limited car access in rural communities, who are often also those with limited financial resources. Qualitative research is a social exchange between different groups, organizations, institutions, and people with existing power dynamics between participant and researcher that should be considered (Hay & Cope, 2021). These power dynamics are particularly relevant when researchers are conducting a study on a historically marginalized population, where participants and researchers' socioeconomic, racial, gendered, or sexual societal positionings can impact how research is conducted (Hay & Cope, 2021). For this reason, researchers relied on the advisory committee to guide many aspects of the research, including how to interact appropriately with NEK communities when conducting interviews, compensating participants, and reporting results.

Semi-structured Interviews

This study collected qualitative data through 42 semi-structured interviews. Semi structured interviews have a predetermined set of questions that allow the interviewer to explore different topics raised by a research subjects by asking follow-up questions or questions that were not included in the protocol.

Participants were compensated with \$20 in cash before the interview began. All interviews were conducted in English and lasted approximately between 30 minutes and one hour. Interview questions were developed with guidance from the advisory committee, covering personal and household characteristics, transportation options and experiences, mobility barriers, unmet travel needs and their effects, housing and location, and future desires. Participant recruitment efforts were designed to reach participants with limited or no vehicle access by seeking to reach populations with limited financial resources. Participants were asked about their access to a vehicle and whether or not it was shared, but because of the complex nature of partial or intermittent vehicle access, participants were not screened based on the degree of vehicle access reported. Interviews were recorded, and audio files were transcribed using Trint.

Demographic characteristics of participants and study area are shown below in Table 7. Interview subjects were more likely to be low income and less likely to be employed and have access to a vehicle than the region's adult population. Participants included a mix of people living within, nearby, and farther outside of town. Nearly half (48%) of participants lived within 1 mile of a store, and 84% within 5 miles of a store. The maximum distance to a store reported by respondents was 16 miles.

Analysis

The project team conducted thematic analysis to identify themes, patterns, and relationships from the interview data (Creswell, 2013). Interview transcriptions and audio files were uploaded to the qualitative analysis software, NVIVO. The team, consisting of four researchers, developed a code book to identify text related to topics of interest within the text files. The

team generated codes structurally to match the interview protocol and to cover additional research areas of interest based on prior literature and conversations with the advisory committee.

The research team refined the code book several times, where the team applied that version on a practice subset of text data, and removed, added, or combined codes to cover all important topics (Creswell, 2013). To ensure there were no systematic coding differences the team undertook three rounds of coding comparison among researchers. The team completed coding of all NEK interviews in July 2023. The team then analyzed the coded transcripts to identify themes, which are presented below.

Table 7. Demographics of Interview Subjects and NEK Adults

Characteristic		Interviews (n=42)	NEK Adult Population
Age	18-34	19%	23%
	35-44	10%	14%
	45-59	12%	26%
	60-74	38%	27%
	75+	21%	10%
Gender	Female	52%	50%
	Male	43%	50%
	Non-Binary	5%	N/A
Income	Median HH Income	\$16,000	\$52,797
Race & Ethnicity	White alone	90%	94%
	Black alone	0%	1%
	American Indian Alaska Native alone	2%	1%
	Asian alone	0%	1%
	Native Hawaiian & other Pacific Islander alone	0%	0%
	Two or more races	7%	2%
	Hispanic any race	2%	2%
Education	Less than High School	10%	9%
	High school, GED, or some college	57%	64%
	Bachelor's or higher	33%	27%
Transportation	No vehicle	52%	7%
Other	Disability	60%	18%
	Employed	17%	58%

Results

Most participants described the central role that vehicles played in their mobility. This included personal vehicle access, sharing a vehicle, or getting rides from others. Public transit options consisted of Rural Community Transit (RCT), a fixed route transit service that operates in a

limited number of locations, as well as on-demand Medicaid and elderly and disabled transit for eligible trips. In the study sample, 60% (25/42) used at least one of these services.

Peoples' accounts of their mobility were tied to the transportation and land use environment in which they lived. Participants described difficulty getting around, due to places simply being far apart.

Quality hospital care, and in some cases grocery stores, were far away for many people. On average, participants lived 3 miles from the nearest store, with the range of distances among participants ranging from one block to 17 miles. People's mobility varied depending on if they lived in town or far outside of town.

Land use changes over time have made mobility harder for those in the NEK. Those participants who grew up in the NEK or have lived a considerable amount of their lives there expressed that stores and other services or locations were easier to access in decades past when there were more stores and more people. Several older participants voiced concerns over young people in their community becoming isolated and having limited exposure to life beyond their community. As one participant in her 80's explained:

Busses don't run like they used to ... We had Greenwood bus lines ... two or three times a day and there were passenger trains from Boston to Montreal on it. – Cora

This study describes four key themes that arose in the interviews, including recommendations for improved mobility provided by interview participants and the advisory committee. Each theme is illustrated with quotes from participants, which are described using pseudonyms for confidentiality.

Vehicle access provides mobility freedom, but it is not a simple binary

Many participants described the importance of personal vehicle access in supporting their mobility, indicating that mobility provided freedom of movement. Notably, vehicle access was not simply a matter of having or not having a vehicle, but rather existed on a spectrum as people navigate shared and intermittent vehicle use, in part due to financial challenges posed by maintenance costs. As one participant with a vehicle who also drives their son to work daily and whose license was revoked expressed:

I drive ... [it's] the only way. – Jessica

Many interviewees described vehicles as transformative, providing freedom of movement and access to important places and people. One unhoused and unemployed participant who recently lost vehicle access due to high repair costs described this change as follows:

It does give you a lot more freedom. Having your own vehicle, it changes everything ... And that's one of the biggest things I miss. There's so much more that you can do. – Chris

Having a personal vehicle, sharing a vehicle, or being able to get rides from others with cars was critical for mobility. As one participant who no longer uses his broken truck explained:

When you don't have a vehicle, you have to rely on other people. You can't just take off when you want to. – CJ

Relying on others was shared across participants, even for those who have vehicles. As one woman in her 60's who owns an older unreliable car noted:

There is no other means of transportation unless you have good friends ... [to] take you places that you need to go. – Leslie

Many participants reported having intermittent personal car access, typically shared with a family member, or getting rides from family or friends with cars. Whether people paid for rides or got free rides varied across participant accounts. In many cases, those giving rides did not ask for payment outright. One participant who once depended on rides from others but now has a vehicle explains:

I definitely help with rides if I can ... I just always have since I've had a vehicle...Most of my friends don't have cars. Yeah, and I know what it's like. So as long as I have the open schedule and availability, I don't mind. – Donna

Car ownership can be costly, so simply owning a car does not ensure mobility. Many respondents described car maintenance costs as a significant barrier to owning a car, and several indicated that they have a car but cannot drive it because they cannot afford to fix it. Several respondents living with poverty indicated that it can take a long time to afford to fix their car. This greatly affects their mobility and how they get around, as one participant describes:

I had a flat tire and it took me four days to figure out how to get a new one. So my mom had to bring me to work and then friends brought me home ... I had to buy a whole new set and I had to wait to get the money. – Jackie

Many respondents described owning older cars because they are more affordable. These older vehicles are less likely to pass vehicle safety and emissions inspections which require repairs, and more likely to have other maintenance issues too. One woman was able to finance a used vehicle during the pandemic with the assistance of COVID relief checks and has been struggling to afford repairs, paying incrementally. When asked how her mobility could be improved, she expressed:

More money to fix the vehicle. I do a buy here, pay here ... There's been a lot wrong with my vehicle since I've gotten it. Doing a buy here, pay here. And I don't even own it yet. – Connie

Vehicle maintenance and operation costs were not prohibitive for all participants. As one wealthier retiree explained regarding elevated gas prices:

I'm very lucky. It doesn't affect my travel ... I like the fact that the gas is high because it's making people think about the energy cost of gasoline ... More and more people are going to switch to electric vehicles. I know my next car will be electric. – Lindsey

Many participants desired cheaper rural transportation options. Beyond expanding personal vehicle access affordably, some participants perceived more rental cars and more on-demand services like taxis and Uber/Lyft to fill this affordability gap:

It doesn't have to be a major car rental company. Just something where somebody whose car is broken down can rent a car that will get them to work ... My neighbors were two months without a vehicle because they were waiting for one to be delivered and their other one, I think didn't pass inspection. – Jessica

To meet the challenge of improving mobility, the advisory committee discussed other mobility options, such as carshare, rideshare, and hitchhiking programs that their organizations are in the process of implementing. Discussion of formalizing a neighbor-to-neighbor network, possibly in app form, was one possibility.

Transit works for some, but does not meet the needs of many

As one advisory committee member explained, development patterns and transit service in the NEK mean that residents can be divided into two groups; those that can be served by RCT and those who live too far from fixed routes. Serving the latter is a major challenge that would likely require increased funding to expand the current RCT service.

For those living on fixed routes and who may not have strict time constraints, RCT was described as a good mobility option. One man who lives in town and uses the medical RCT service on a regular basis explained the pros and cons of RCT, with the main con being the wait time:

RCT goes ... to Montpelier ... they're accessible, they can get you to where you need to be ... But, how long? How long do I have to wait? – Corey

In comparison, living outside of town can mean that transit is in no way an option. As one retired participant who relies on a personal vehicle and lives out of town explained:

No, there's no bus ... [RCT] has some routes, but they're very, very sparse and don't happen very often. – Delores

As a solution, some suggested route improvements that would help those living beyond fixed route service:

More stops ... towards the outskirts of town would help a lot of people compared to what it is right now ... [We need] quicker bus routes [and] more frequent busses – Ally

Both those who did and did not regularly use RCT commented that the hours of operation were inconvenient, suggesting weekend and evening hours. One participant with children in daycare who did not have access to a car during the day described how the sparse RCT schedule affected her ability to have a job:

If you have ... your kids in daycare, you're probably going to barely miss that bus to get yourself to work. Then you have to wait, and then you're late for work. So you could take the earlier bus, but the daycare is not open for your children at that time. – Susie

Several people described needing to reschedule appointments and meetings or just completely change their schedule because of scheduling limitations of RCT. Mostly, this was due to RCT being late or not showing up for medical rides, so people missed medical appointments and needed to reschedule. As one young mother of two who lives in affordable housing described:

RCT ... it's not accessible ... My dentist is in Newport and I've already missed a couple [appointments]. I had three rounds of antibiotics for an infection...My throat swelled up ... I had an emergency. But I couldn't get RCT to bring me ... So I had to have my nephew bring me ... that's a very long way for someone to bring someone. – Ellie

There was an acknowledgement among some participants that despite the rurality of the region, improving transit could greatly improve their lives and the lives of those living in nearby communities. One respondent who lives out of town and has a medical condition that prevents her from driving and relies on family for mobility, shared:

If we had a bus, I [would] definitely use it. Like in Lancaster, they have a bus that takes you to where you can come back in the afternoon ... But see, we're stuck in the middle. We have nothing. – Audrey

Interrelationship between mobility/accessibility, social connections, and wellbeing

Access to friends, family, and acquaintances proved to be an important source of mobility but also community ties in a region where people can live far apart. One man in his late 70's who does not have a car explained:

I don't have a car or transportation, but I do have my friend, which is my help and transportation of where I need to go – Diego

One elderly woman who depends on rides from family shared why she enjoyed getting rides:

Because I'm with friends and family. Family's first. – Nora

Apart from having a personal vehicle in working order, the most common way that people got around was by rides from others, usually family, friends, neighbors, or people from organizations such as human services caseworkers and other community organizations. Getting (and giving) help on a regular basis from those in their community was common for some living in senior living centers. This could include making shopping trips, cooking meals together, or getting rides to medical facilities or other appointments. As one man expressed:

[Neighbor] in the building is very helpful ... she can give you rides if you need to make it to an appointment or something ... And she's just helpful with communicating what's going on in the building. – Norman

Despite social connections being a source of mobility, the foregoing of social and recreational activities with friends and family due to a lack of mobility and far distances was common. Many participants noted that missing out on these activities contributed to isolation. One respondent described the pervasive effects of the lack of mobility on seniors:

It's one thing to say, if you have a medical appointment, we'll get you to the doctor. But people ... can't be mentally healthy, socially healthy, if the only time they can have a way somewhere is if it's to see a doctor. – Amy

Many people expressed how their mobility affected their mental health and wellbeing. Not knowing how and if you will be able to reach a given destination was stressful for many participants. Not being able to get around and socialize was depressing for some. A young mother who now has a car described when she lacked mobility:

It affected my whole life ... I'm an ex-addict, so, like, being... in that state of mind...that's the trigger for me of wanting to use ... So, without transportation, it does put a lot of like different ... challenges for [me] ... I will get into depression ... I can't [walk] because I have medical issues ... [A lack of] transportation affects people differently, [it] affects me worse. – Ellie

Unmet Needs, Poverty, and Adaptation

Many of the participants had to creatively plan how to get their needs met through adaptation—by arranging rides, contacting people for help, or simply doing without. Self-reliance came up among some participants, as a way of dealing with unmet needs. As one elderly man who limits family visits expressed:

Parker: You go without

Interviewer: You go without?

Parker: [To] go visit my brother in Burlington. But there's no way to get there ... I don't [go].

When asked how often people cannot get where they want to go, one man who is afraid of driving long distances without a license and is unable to visit his son, became emotional:

I want to go somewhere and I just don't have a way to get there...I guess that's the only way I can say it. And [it] will [be] quite often ... Ten times a month – Brad

Changing behavior is one response people have to a lack of mobility. One woman who lives in poverty explains being unable to get to a grocery store or the doctor on a regular basis. For her, finding a ride poses additional stress to her everyday life, so she has just given up:

And if you can't get to the grocery [store], [you] usually spend all your money at Walgreens, which [costs] extra just to get dinner because you don't have a way there ... You just stop going [to the doctor] if you can't get there, you're not going to stress about getting there, so you just don't go. – Ellie

Increased reliance on others is another adaptation technique people use to get their needs met. One woman who no longer has a car was forced to rely on others, and is often reluctant to ask for help:

I had a vehicle when I came here. It died...when you don't have [one], you feel trapped, you feel confined. And I'm the type of person that I won't call you and say, look, I need to go get groceries ... I won't do that ... It was very hard for me to admit that I needed somebody. – Ella

Participants' mobility and accessibility struggles are connected to and exacerbated by a cycle of poverty that has been developing across rural communities, including lack of employment and increased substance abuse. One participant living in poverty shared how she wants to move due to substance abuse by her neighbors, but has been struggling to do so:

I'm looking [for apartments] in other towns, there's not many. Or the rent is outrageous, and you can't move to a different town without a job. And so how are you going to pay rent? You know, like who wants to travel that far? So it's kind of like you got to have a job lined up and an apartment to make sure you can pay for it...To move to a different town. – Lila

Elucidating the connection between poverty and transportation, one affluent woman who has a reliable car and splits her time between Vermont and a larger city noted:

[If] you could have more transportation ... it would make it make the whole economy of Vermont different. If they had decent transportation, you'd have a more viable economy up here. You wouldn't have so many poor people. – Lina

The advisory committee discussed the importance of quantifying the hidden costs of residents not getting needs met due to inadequate transportation, particularly in terms of health and time lost, and their connection to poverty. Potential costs could include the loss of independence and ensuing isolation for older Vermonters who can no longer drive, missed

medical appointments, inability to work or break the cycle of poverty, lack of access to high quality healthcare, and lengthy waiting time for shared rides or RCT.

Discussion and Conclusion

Rural populations face greater rates of unmet travel needs, particularly among those with limited or no vehicle access (Espeland & Rowangould, 2024). The findings from this study deepen the understanding of the interconnectedness of rurality, limited transit, community ties, and wellbeing across the spectrum of vehicle access. Together, these factors combine to precipitate a resident’s ability to meet (or not meet) their needs and quality of life (Figure 2).

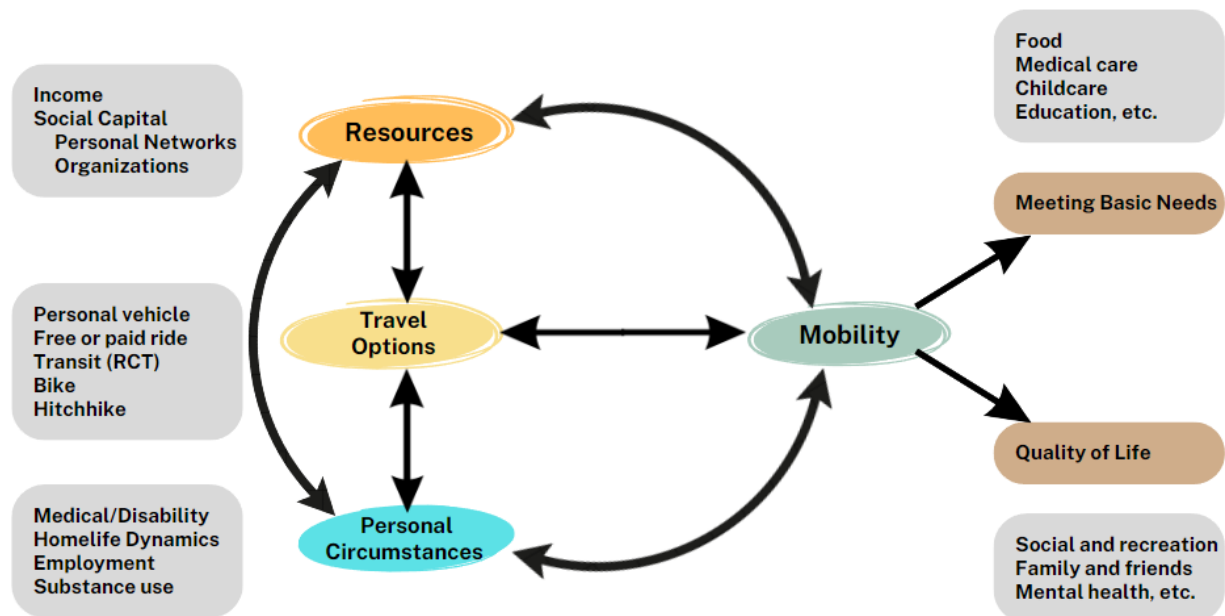


Figure 2. Rural Mobility Interconnections

Given these findings, having access to social capital, especially having strong family and friendship connections, made a big difference in peoples’ mobility. These connections allowed some people to not need to own a car or use public transit by getting rides from others. These rides also served as an invaluable backup plan for the many whose first transportation mode—a vehicle needing maintenance or public transit—were unreliable. Although this is a great asset, it also exposes the precarity of mobility—in that it strongly depends on knowing other people.

The need for vehicle access is often particularly important for mobility in rural contexts where alternatives to personal vehicle travel are often either not present or inadequate, and where people need to make longer trips (Schukei & Rowangould, n.d.) although the trips are more likely to be on uncongested highways and roads than in urban areas. It is not surprising that despite high ownership costs, people kept striving for vehicle ownership, essentially being forced to do so to ensure mobility in the rural built environment. At the same time, results showed that the costs of maintenance were reported to be extremely prohibitive for participants, which the literature has indicated (Brown, 2017b; Klein & Smart, 2017, 2019). The

advisory committee echoed these sentiments, and some members were interested in exploring funding programs that cover vehicle maintenance costs. Such programs have the potential to be transformative to some of the participants who took part in this study in terms of improving their mobility and quality of their life.

An alternative approach to providing expanded personal vehicle access is to explore innovative public transit and shared vehicle and ride programs. While providing high frequency fixed route service in rural contexts is often infeasible, transit providers in the study region have recently begun to pilot on-demand microtransit services, which may be a promising avenue for those traveling within their service areas if they can mimic the flexible access afforded by private vehicles. Carshares, rideshare, and formalized hitchhiking services, which were talked about by both participants and the advisory committee, may also be means to improve rural mobility. These findings match related research on rural mobility in California, where options like improved transit and sharing programs were suggested by participants, rather than aspirational car ownership (Barajas & Wang, 2023). Research examining the effects of an electric vehicle (EV) car share program, located at affordable housing sites in California found that the program led to a change in mode for higher income users and expanded mobility options for lower income households who had few options (Caroline Rodier, 2022). The same study found that trips using this service were primarily trips that were impossible to complete with existing transit (Caroline Rodier, 2022). The same study investigated a volunteer rideshare program targeting rural communities, finding that it expanded mobility up to 60% among low-income users (Caroline Rodier, 2022). For trips that users reported that they would have made without the service, users reported the ride would have been made by getting a ride with family or friends (Caroline Rodier, 2022).

Among participants of this study, those with unmet needs indicated that recreation and social trips were often those first eliminated by lack of mobility. Despite many people living within an hour drive of several tourist locations (ski lodges, hiking, lakes, etc.), these locations were inaccessible to rural dwellers with low mobility. Combined with missed trips to visit family and missed hospital visits, this lack of mobility substantially diminishes the overall quality of life for those affected.

This study aims to examine the transportation needs of an underserved and under-researched population when it comes to mobility research: rural people with limited or no access to vehicles. Note that these findings focus on the Northeast Kingdom of Vermont. This region's residents may be fundamentally different from rural residents in other rural communities. Even in the same region, different populations can have distinct transportation experiences and needs (LanzDuret-Hernandez et al., 2024). This study also provides a snapshot of experiences for a subset of the population in this region so it cannot point conclusively to the impacts of potential interventions suggested by participants or the advisory committee. It is also subject to the limitations of who was reached. Extremely mobility-limited populations that do not leave home or are not in contact with social service agencies were likely to be underrepresented in this study. These populations may experience unique challenges not captured herein.

Overall this research contributes to the understanding of rural lived experiences at the junction of accessibility, travel barriers, and vehicle access. Findings provide valuable insights into how policymakers can prioritize the needs of rural residents to improve rural accessibility and mobility, including key insight into the transportation needs and adaptations of car-limited rural populations who experience unique challenges. The need to ensure that rural populations with limited resources are able to meet their transportation needs and maintain quality of life will likely grow in the future as climate impacts add additional stressors and the need for community climate resilience grows.

Acknowledgements

This research was funded by the National Center for Sustainable Transportation (NCST).

Author Contributions

The authors confirm contribution to the paper as follows: study conception and design: D. Rowangould; data collection: J. LanzDuret-Hernandez, S. Espeland, D. Rowangould; analysis and interpretation of results: S. Grajdura, J. LanzDuret-Hernandez. Author; draft manuscript preparation: S. Grajdura, S. Espeland, D. Rowangould. All authors reviewed the results and approved the final version of the manuscript.

References

- Allen, J., & Farber, S. (2020). Planning transport for social inclusion: An accessibility-activity participation approach. *Transportation Research Part D: Transport and Environment*, 78, 102212. <https://doi.org/10.1016/j.trd.2019.102212>
- Bantis, T., & Haworth, J. (2020). Assessing transport related social exclusion using a capabilities approach to accessibility framework: A dynamic Bayesian network approach. *Journal of Transport Geography*, 84, 102673. <https://doi.org/10.1016/j.jtrangeo.2020.102673>
- Barajas, J. M. (2021). The effects of driver licensing laws on immigrant travel. *Transport Policy*, 105, 22–34. <https://doi.org/10.1016/j.tranpol.2021.02.010>
- Barajas, J. M., & Wang, W. (2023). *Mobility Justice in Rural California: Examining Transportation Barriers and Adaptations in Carless Households* (NCST-UCD-RR-23-01; p. 73). National Center for Sustainable Transportation.
- Blumenberg, E., Brown, A., & Schouten, A. (2020a). Car-deficit households: Determinants and implications for household travel in the U.S. *Transportation*, 47(3), 1103–1125. <https://doi.org/10.1007/s11116-018-9956-6>
- Blumenberg, E., Brown, A., & Schouten, A. (2020b). Car-deficit households: Determinants and implications for household travel in the U.S. *Transportation*, 47(3), 1103–1125. <https://doi.org/10.1007/s11116-018-9956-6>
- Blumenberg, E., & Pierce, G. (2012). Automobile Ownership and Travel by the Poor: Evidence from the 2009 National Household Travel Survey. *Transportation Research Record: Journal of the Transportation Research Board*, 2320(1), 28–36. <https://doi.org/10.3141/2320-04>
- Brown, A. E. (2017a). Car-less or car-free? Socioeconomic and mobility differences among zero-car households. *Transport Policy*, 60, 152–159. <https://doi.org/10.1016/j.tranpol.2017.09.016>
- Brown, A. E. (2017b). Car-less or car-free? Socioeconomic and mobility differences among zero-car households. *Transport Policy*, 60, 152–159. <https://doi.org/10.1016/j.tranpol.2017.09.016>
- Carlson, S. A., Whitfield, G. P., Peterson, E. L., Ussery, E. N., Watson, K. B., Berrigan, D., & Fulton, J. E. (2018). Geographic and Urban–Rural Differences in Walking for Leisure and Transportation. *American Journal of Preventive Medicine*, 55(6), 887–895. <https://doi.org/10.1016/j.amepre.2018.07.008>
- Caroline Rodier, B. H. (2022). *A Before and After Evaluation of Shared Mobility Projects in the San Joaquin Valley*. <https://doi.org/10.7922/G2CZ35GV>
- Coren, C., Lowe, K., & Barajas, J. M. (2022). Commuting Carless: A Qualitative Study of Transportation Challenges for Disadvantaged Job Seekers in Chicago, IL. *Transportation Research Record*, 2676(6), 673–684. <https://doi.org/10.1177/03611981221076126>

- Creswell, J. W. (2013). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches* (3rd ed.). SAGE Publications.
- Currie, G., & Delbosc, A. (2011). Transport Disadvantage: A Review. In G. Currie (Ed.), *New Perspectives and Methods in Transport and Social Exclusion Research* (pp. 15–25). Emerald Group Publishing Limited. <https://doi.org/10.1108/9781780522012-002>
- Cutsinger, J., & Galster, G. (2006). There is No Sprawl Syndrome: A New Typology of Metropolitan Land Use Patterns. *Urban Geography*, 27(3), 228–252. <https://doi.org/10.2747/0272-3638.27.3.228>
- Delbosc, A., & Currie, G. (2011). The spatial context of transport disadvantage, social exclusion and well-being. *Journal of Transport Geography*, 19(6), 1130–1137. <https://doi.org/10.1016/j.jtrangeo.2011.04.005>
- Espeland, S., & Rowangould, D. (2024). Rural travel burdens in the United States: Unmet need and travel costs. *Journal of Transport Geography*, 121, 104016.
- Gray, D. (2004). Rural Transport and Social Exclusion: Developing a Rural Transport Typology. *Built Environment*, 30(2), 172–181. <https://doi.org/10.2148/benv.30.2.172.54310>
- Hay, I., & Cope, M. (2021). *Qualitative research methods in human geography* (Fifth edition.). Oxford University Press.
- Hoggart, K. (1990). Let's do away with rural. *Journal of Rural Studies*, 6(3), 245–257. [https://doi.org/10.1016/0743-0167\(90\)90079-N](https://doi.org/10.1016/0743-0167(90)90079-N)
- Isserman, A. M. (2005). In the National Interest: Defining Rural and Urban Correctly in Research and Public Policy. *International Regional Science Review*, 28(4), 465–499. <https://doi.org/10.1177/0160017605279000>
- Kamruzzaman, Md., & Hine, J. (2012). Analysis of rural activity spaces and transport disadvantage using a multi-method approach. *Transport Policy*, 19(1), 105–120. <https://doi.org/10.1016/j.tranpol.2011.09.007>
- Klein, N. J., & Smart, M. J. (2017). Car today, gone tomorrow: The ephemeral car in low-income, immigrant and minority families. *Transportation*, 44(3), 495–510. <https://doi.org/10.1007/s11116-015-9664-4>
- Klein, N. J., & Smart, M. J. (2019). Life events, poverty, and car ownership in the United States: A mobility biography approach. *Journal of Transport and Land Use*, 12(1). <https://doi.org/10.5198/jtlu.2019.1482>
- Kolodinsky, J. M., DeSisto, T. P., Propen, D., Putnam, M. E., Roche, E., & Sawyer, W. R. (2013). It is not how far you go, it is whether you can get there: Modeling the effects of mobility on quality of life in rural New England. *Journal of Transport Geography*, 31, 113–122. <https://doi.org/10.1016/j.jtrangeo.2013.05.011>
- LanzDuret-Hernandez, J., Grajdura, S., & Rowangould, D. (2024). Mobility, Community, and Connection: Transportation Experiences of Rural Latinx Migrant Workers. *Journal of Transport Geography*, 118, 103947.

- Lucas, K. (2012). Transport and social exclusion: Where are we now? *Transport Policy*, 20, 105–113. <https://doi.org/10.1016/j.tranpol.2012.01.013>
- Lucas, K., & Jones, P. (2012). Social impacts and equity issues in transport: An introduction. *Journal of Transport Geography*, 21, 1–3. <https://doi.org/10.1016/j.jtrangeo.2012.01.032>
- Mattioli, G. (2014). Where Sustainable Transport and Social Exclusion Meet: Households Without Cars and Car Dependence in Great Britain. *Journal of Environmental Policy & Planning*, 16(3), 379–400. <https://doi.org/10.1080/1523908X.2013.858592>
- Mattioli, G. (2021). *Transport-related inequalities in the sustainable transition debate*. 17.
- McAndrews, C., Tabatabaie, S., & Litt, J. S. (2018). Motivations and Strategies for Bicycle Planning in Rural, Suburban, and Low-Density Communities: The Need for New Best Practices. *Journal of the American Planning Association*, 84(2), 99–111. <https://doi.org/10.1080/01944363.2018.1438849>
- Millward, H., & Spinney, J. (2011). Time use, travel behavior, and the rural–urban continuum: Results from the Halifax STAR project. *Journal of Transport Geography*, 19(1), 51–58. <https://doi.org/10.1016/j.jtrangeo.2009.12.005>
- Morris, E. A. (2020). *Does lacking a car put the brakes on activity participation? Private vehicle access and access to opportunities among low-income adults*. 23.
- Preston, J., & Rajé, F. (2007). Accessibility, mobility and transport-related social exclusion. *Journal of Transport Geography*, 15(3), 151–160. <https://doi.org/10.1016/j.jtrangeo.2006.05.002>
- Pucher, J., & Renne, J. L. (2005). Rural mobility and mode choice: Evidence from the 2001 National Household Travel Survey. *Transportation*, 32(2), 165–186. <https://doi.org/10.1007/s11116-004-5508-3>
- Schukei, H., & Rowangould, D. (n.d.). Sustainable travel behaviors in urban and rural contexts: Who and where matters, Working Paper. *Working Paper*.
- Smith, N., Hirsch, D., & Davis, A. (2012). Accessibility and capability: The minimum transport needs and costs of rural households. *Journal of Transport Geography*, 21, 93–101. <https://doi.org/10.1016/j.jtrangeo.2012.01.004>
- Transportation Economic Trends*. (n.d.). [Dataset]. Retrieved August 1, 2022, from <https://www.bts.gov/product/transportation-economic-trends>
- Voulgaris, C. T., Taylor, B. D., Blumenberg, E., Brown, A., & Ralph, K. (2016). Synergistic neighborhood relationships with travel behavior: An analysis of travel in 30,000 US neighborhoods. *Journal of Transport and Land Use*, 10(1). <https://doi.org/10.5198/jtlu.2016.840>
- Wang, W., Espeland, S., Barajas, J. M., & Rowangould, D. (2023). Rural Carlessness and Unmet Travel Need in the United States. *Working Paper*.

Xiao, R., Wang, G., & Wang, M. (2018). Transportation Disadvantage and Neighborhood Sociodemographics: A Composite Indicator Approach to Examining Social Inequalities. *Social Indicators Research*, 137(1), 29–43. <https://doi.org/10.1007/s11205-017-1616-2>

Part 3: Qualitative Evaluation of Transportation Experiences of Latinx Migrant Workers with Limited Access to a Vehicle Living in Vermont

Abstract

Transportation research on Latine migrant workers has increased in the past decade, revealing the difficulties that can arise for migrants who are often undocumented, isolated, and subject to unfair treatment at work. This study focuses on the transportation experiences and challenges of migrants from Latin America residing in the largely rural border state of Vermont. We conducted semi-structured interviews with Latine migrant workers to better understand their mobility and quality of life. We find that the legal landscape and resource access (including drivers' licenses, personal vehicles, and personal networks) are major contributors to rural migrant workers' mobility, which in turn contributes to quality of life. Difficulty accessing transportation was not strongly tied to financial resources, instead stemming from a lack of knowledge of transportation resources as well as legal and social contexts that prevent participants from feeling safe when leaving their homes. Driver privilege cards increased independence and mobility for many migrant workers interviewed, although some respondents shared that feelings of safety diminish the closer one gets to the US-Canada border. All participants without a car and license reported paying for "raites" to get from one place to another. Our findings highlight the importance of individual transportation access for migrant workers living in a rural context. Expanding access to permissive driver's licensing laws and investing in organizations and programs that strengthen community ties and improve information dissemination (including native language options) are crucial to making mobility and community resources accessible to all migrants.

Keywords: Informal travel networks, driver's privilege card, Latinx, migrant worker, rural, Vermont

This portion of this report is a preprint of a manuscript that has been revised and published:

LanzDuret-Hernandez, J., Rowangould, D. (2024) "We have the right and we need better transportation": Mobility, community, and connection of Latin American migrant workers in Vermont. *Journal of Transport Geography*. 118, 103947.

<https://doi.org/10.1016/j.jtrangeo.2024.103947>.

Introduction

The Hispanic population is the fastest growing population in rural America (1–4). This new ethnoracial composition of rural populations is largely driven by migrants (1). Despite their growing numbers, in many rural communities migrants are isolated and erased from narratives that they manage and help create, such as the picturesque pastures and rolling hills of the countryside (5). The nature of work that largely employs migrants in rural America often leads to migrants experiencing isolation and spatial segregation in ways not present in urban areas with greater mobility and higher population densities (1, 6).

Concerns about isolation stem in part from mobility challenges faced by migrants. Migrants are known to have less access to personal vehicles and rely more on carpooling to get around (7–11), and evidence suggests that migrants living in rural contexts are less mobile than their nonrural peers (12, 13). For migrant workers in the U.S., vehicle access and mobility also depend on documentation status and border enforcement (1, 7, 14, 15).

The consequences of migrants' lack of mobility are far reaching, including limited economic opportunity and a reduced ability to move to a better neighborhood (12) as well as diminished political engagement (13). Permissive licensing laws show promise for mitigating challenges related to documentation and enhancing migrants' mobility (16).

In this changing landscape Latine migrant workers living in rural communities in the U.S. face myriad mobility challenges as a result of their personal resources, their physical environment, and the cultural and legal landscape of the communities in which they live. There is growing interest in understanding the mobility challenges that migrant workers face across different contexts and in different conditions in order to inform strategies to increase their mobility and wellbeing.

The objective of this study is to deepen and broaden our understanding of transportation experiences of US migrants from Latin America by evaluating the experiences of those living in a context that differs materially from those that have been studied, providing an opportunity to understand the generalizability or novelty that may arise in different conditions. To address our research objective, we conduct in-depth semi-structured interviews with Latine migrant workers in the state of Vermont. Vermont's rural context, demographics, border proximity, and legal landscape converge to provide unique insights about mobility challenges and factors contributing to mobility and quality of life for Latine migrant workers. Our analysis is attentive to the relationships between mobility, community, and connection.

Literature Review

It is well understood that transportation systems provide vital connections to essential destinations such as jobs, healthcare, education, and social and recreational opportunities. Accessibility, or the ability to reach the places that people want and need to go to, is often described as a function of both transportation infrastructure and land use (17–19). Aside from physical infrastructure, adequate transportation access requires affordable, reliable, and safe

travel options (20). Accessibility is a critical determinant of *social inclusion*, or the ability to participate in society (21), which is in turn tied to wellbeing (22).

Accessibility varies widely across geographic areas and populations (18, 23–25). Evidence indicates that migrants are among the least socially included (21, 26). At the same time, rural communities have less accessibility than urban and suburban communities, as destinations are farther apart, and there are fewer transportation options. Consequently, rural populations are less likely to have their transportation needs met (22, 27), as are migrants living in rural contexts (12, 13).

Vehicle access is an important determinant of mobility (28, 29), particularly in rural contexts where non-auto transportation options are limited (27, 30, 31). Prior research indicates that new immigrants are less likely to have personal vehicles and more likely to carpool than U.S.-born individuals (7–11, 32–34). These choices have been tied to their neighborhoods' built environment characteristics (35) and ethnic makeup (33, 34). Immigrants' travel behaviors also change over time, with growing similarities to native born travel behaviors the longer a person remains in the U.S. (11, 35–37).

Previous research on Latin American and Hispanic immigrants indicates that sharing cars, borrowing cars, and getting rides are important sources of mobility (10, 12, 38, 39). In situations where a migrant does not have access to a car or driver's license, they often turn to informal travel networks as a preferred alternative to public transportation, particularly in rural areas (12, 13, 39). In some contexts, these options can be expensive, unsafe, unreliable, and only accessible to those who are employed and connected within the community (40). Each of these alternatives to personal vehicle use reflect dependence on others for mobility, so it is not surprising that social networks and community organizations have been identified as a means for new Latin American immigrants to gain mobility and access to essential resources (12, 14, 39, 41, 42).

A mobility justice framework sheds light on the factors that determine migrants' ability to move. Mobility justice is expansive and historically embedded, encompassing accessibility, freedom of movement, equitable infrastructure, reduction of environmental burdens, equitable allocation of resources, and the right to move or dwell in a certain location (43). A critical tenet of mobility justice is that people inhabit different bodies and identities, which impact how they move through the world and participate in society (43). The way people move through the world depends on mobility infrastructure, which may have been built to ensure the safety and accessibility for some privileged groups, while shaping space that is exclusionary and marginalizing to others (43). Mobility is therefore tied not only to where someone lives and their vehicle access but also to their intersecting identities (44). Gender, race, religion, sexuality, ability status, and socio-economic status all impact peoples' mobility and the ways in which they experience transportation systems, with public visibility linked to vulnerability for individuals of marginalized groups (5, 14, 30, 45, 46).

In the case of migrants, sophisticated virtual border infrastructure ensures immobilization, and operates to surveille, filter, and exclude migrant bodies (47, 48). In the 2010s, immigration

enforcement in the U.S. began to expand from borders to throughout the country, particularly during traffic stops (49). The U.S. Supreme Court has ruled that fourth amendment rights diminish within a “reasonable distance” of US borders and external boundaries, such that within 100 air miles of all US borders and external boundaries—an area which encompasses most major cities in the country—the US Customs and Border Protection agency can legally board any vehicle to search for undocumented immigrants; within 25 air miles, they can enter non-residential private properties for the same reason(50–53). Due to the heightened restrictions at the U.S.-Mexico border, the back-and-forth flow of migrants has decreased, leading migrants who are undocumented to stay in the U.S. permanently, often maintaining a low-profile at the fear of being deported (49, 54). For a migrant crossing a border, mobility injustices do not occur as singular events, but can be conceptualized as a process that generates and maintains the unequal space in which they move throughout their lives (43).

Evidence from transportation literature also indicate that efforts to stop the movement of migrants across international borders have impacted migrant mobility even within the U.S. Border enforcement has made driving a higher-risk activity for undocumented individuals and caused them to curtail their driving relative to documented immigrants (7, 14). Even for those who avoid driving a personal vehicle and instead use ride networks, a lack of documentation can lead to price discrimination (15). This is concerning given that diminished mobility has a negative effect on migrants’ economic opportunities, ability to move to better neighborhoods, and their political engagement (12, 13).

In an effort to address the mobility needs of undocumented residents of the US, 19 states and the District of Columbia have passed laws allow undocumented residents to obtain a driver’s license since 1993 (55). Evidence suggests that these programs provide increased mobility for undocumented migrants, improve road safety and economic opportunities, and increase the rate of giving and getting a ride in the immigrant community (16, 56).

Knowledge Gap and Research Objective

In a review of nearly 50 studies of migrant travel, Delbosc and Shafi note that migrants’ transportation experiences depend on who they are, where they are, and where they have been (11). Achieving a deeper understanding of the mobility challenges that migrants face across different contexts and in different conditions is critical to inform effective strategies to increase their mobility and wellbeing.

The majority of the insights about migrants’ travel stem either from national studies (7, 8, 16, 32, 34, 37) or from research conducted in one of three regions: California (9, 15, 38, 39), Georgia (12, 14), and New York/New Jersey (13, 35, 36). Most of these studies focus on urban contexts, and few address the intricacies of border enforcement and state licensing laws.

Additionally, much of the prior literature on migrant travel uses national survey data that was not designed to capture unique aspects of migrant travel experiences (7, 8, 16, 32, 34, 37). A subset of literature on migrant travel uses qualitative methods including interviews, focus groups, and ethnography to understand the depth and breadth of challenges faced by migrants,

the consequences of a lack of mobility, and migrants' adaptations to those challenges. These studies provide important insights about the role of informal travel networks and social networks in migrant mobility (12, 14, 15, 39) and how concerns about border enforcement and documentation hinder migrant mobility (13, 14). They also illustrate how a lack of mobility manifests as a lack of control (12), limits economic opportunity (12), and reduces political engagement (13) among migrants.

The objective of this study is to deepen and broaden our understanding of transportation experiences of US migrants from Latin America by collecting qualitative data in a context that differs materially from those that have been studied before. This will allow us to understand the extent to which prior findings hold (or not) under different conditions. Our study focuses on Latine migrant worker communities in the state of Vermont. Vermont's rural context, demographics, border proximity, and legal landscape converge to provide unique insights about mobility challenges and factors contributing to mobility and quality of life for Latine migrant workers.

Using first-person accounts of migrant workers, we gather and synthesize the experiences of this group that can be invisible to society, shedding light on their travel behaviors, needs, and daily life. We include Latine migrants working outside of the agricultural sector, and migrants who have newly arrived in Vermont and the U.S. We examine the following questions:

- What accessibility and mobility challenges do migrant workers face in the rural Vermont context?
- What factors contribute to greater mobility among migrant workers in Vermont?

Many of our findings echo those of prior studies, for example the importance of car access for migrant mobility in rural contexts (whether it is a personal vehicle, a shared ride, or an informal travel network) and the importance of community and connections in determining mobility. Other insights from this study are unique in the transportation literature, such as heightened concerns about border enforcement with proximity to the border, as well as greater insight into the transformational effect of the availability of drivers' privilege cards on migrants' mobility and day-to-day lives. Our findings also highlight the important role that community organizations play in facilitating connections and supporting policies that increase mobility.

Study context

Vermont is home to approximately 1,000 to 1,500 Latine migrant dairy workers, 90% of which are believed to be undocumented (5, 57). Many migrant workers are employed in the dairy industry, while others work in construction, hospitality, tourism, and food industries.

Migrants in Vermont that are employed in agriculture typically live in rural communities. Vermont is the most rural state in the U.S., with 65% of residents living in rural areas (58). Vermont's Latine population is a relatively small share of the state's population, making the Latine migrant worker community highly visible, particularly in many rural communities where the share of the population that is Latine is even smaller. Additionally, Vermont's newer migrant community differs from communities in places such as California and Texas, where

migrant support networks are more established, and where there is a significant presence of families who immigrated from Latin America one or more generations ago.

Prior research on Latine migrant workers in Vermont has focused largely on dairy workers, uncovering their heightened stress levels due to dangerous work and language barriers with employers, barriers to medical care, and concern over border enforcement (59–61). Vermont shares an international border with Canada with an active border enforcement presence, particularly in portions of the northern counties that fall within the 100 and 25 mile area of “reasonable distance” (50–53). Proximity to the border has been found to be a determinant of food access and isolation for migrant workers living in the state, with some migrants living near the border avoiding leaving their home, even to simply step outside (5). Local Vermonters and community-based organizations aim to reduce vulnerable worker exposure by delivering hard-to-obtain items to migrants (5). For those living further south in Vermont, cultural and linguistic barriers seem to contribute more to feelings of isolation than the threat of border enforcement (5).

Following the lead of several other states, in 2013 Vermont passed legislation allowing Driver’s Privilege Cards (DPC) (55), which offer a means for migrant workers to obtain licenses without demonstrating their legal presence or U.S. citizenship. Migrant Justice, a community-based organization that works closely with the Vermont migrant community to advance migrant farmworkers’ economic and human rights, advocated for the law, works to enforce it, and organizes a volunteer network that provides translation support and rides for migrants seeking to obtain a license or register a vehicle.

Data and Methods

We conducted in-depth first-person semi-structured interviews with 16 migrant workers living in Vermont. Semi-structured interviews allow interviewers to expand on unexpected comments brought up by the participant that may not have been included in the protocol (62), allowing researchers to ascertain the breadth of experiences held by participants, the reasoning behind their actions, and its effects. Power dynamics are particularly relevant when researchers are conducting a study on a historically marginalized population (63). To minimize the potentially extractive nature of this work, we partnered with Migrant Justice to design the interview protocol, recruit many of the participants, determine how to minimize the risk of exposure to immigration officials during the interview process, and to discuss our findings. Both Migrant Justice and research participants were compensated for their time.

Recruitment

Migrant Justice and Viva El Sabor, a culinary collective led by Latina women, provided advice and assistance recruiting participants. Eight participants (mostly farmworkers) were recruited in coordination with Migrant Justice at an assembly (2), soccer tournament (3), and through their volunteer ride service (3). The remaining eight participants were recruited through other means: two pickup soccer games where Viva El Sabor was also present (3), through a biannual mobile Mexican Consulate event (3), and by word of mouth (2). We gave potential participants

information about the study during recruitment and gave them the chance to schedule an interview on a date of their choosing.

Data collection

Interviews occurred during recruitment (e.g., during a ride home or at an event) or at a time and location of the respondents' choosing. Before interviews began, participants were given an information sheet written in Spanish to read over with the interviewer to inform them about the study and their rights before asking them if they wished to participate. Interview questions focused on mobility, unmet travel needs, transportation access and experiences (including food and health care), history in Vermont, work life environment, housing location, and connection to others in the community. Migrant Justice provided advice on the interview protocol to ensure applicability to the study population, and allow the interviewer to gain familiarity with existing efforts, networks and resources within the community of interest, consistent with recommendations from prior literature (63).

Interviews lasted between 30 minutes and an hour and were all conducted in Spanish although an English version was also offered. All questions were optional, and participants received \$20 in cash. Practices used to inform participants of their rights, obtain consent, collect interview data, and protect respondents' identities were approved by the Institutional Review Board of the University of Vermont. With successive interviews, the interview protocol was refined to incorporate new topics brought up by participants.

Demographic characteristics for the 16 interview subjects are shown in Table 8. Most participants were male, from Mexico, and lived in Addison County or Chittenden County at the time of the interview (Figure 3). Three participants lived in Franklin County (on the Canadian border). Half of the participants worked on a farm, while the other half held positions in construction, housekeeping, restaurants, ski resorts, and small catering businesses and organizations. Respondents had a range of educational backgrounds, from fourth grade to some college. Participant demographics were similar to those observed in prior research on Latine migrant workers in Vermont, with two exceptions. Our study included more non-farmworkers than prior literature (which has focused primarily on farmworkers), and it included a higher share of respondents with less than a high school education level.

Table 8. Demographic characteristics of interview subjects

Demographic Characteristics	Interview Respondents	Population Estimate⁴
Age		
20-39	88%	> 50%
40-45	13%	< 25%
Gender (% male)	81%	85-93%
Country of origin		
Mexico	75%	88-96%
Guatemala	13%	4-11%
Venezuela	6%	Nd
Not stated	6%	Nd
Self-Reported English Proficiency		
None or Poor	38%	64-94%
Limited	32%	Nd
Good	6%	4-6%
Not stated	25%	
Less than 9th grade	69%	26-49%
Farmworker	50%	42%
Monthly Household Income		
≤ \$3000	50%	31%
\$3001 - \$4000	19%	Nd
\$4001 - \$4500	12%	Nd
Not stated	19%	Nd
Lives on farm	56%	Nd
Large household (5+)	50%	Nd
County		
Addison	44%	Nd
Chittenden	31%	Nd
Franklin	19%	Nd
Washington	6%	Nd
Has valid driver's license	38%	Nd

⁴ Migrant population counts represented in U.S. Census are likely to be undercounted, so we include population estimates from prior studies conducted in Vermont (5, 59, 61, 64). "Nd" indicates categories with no data.

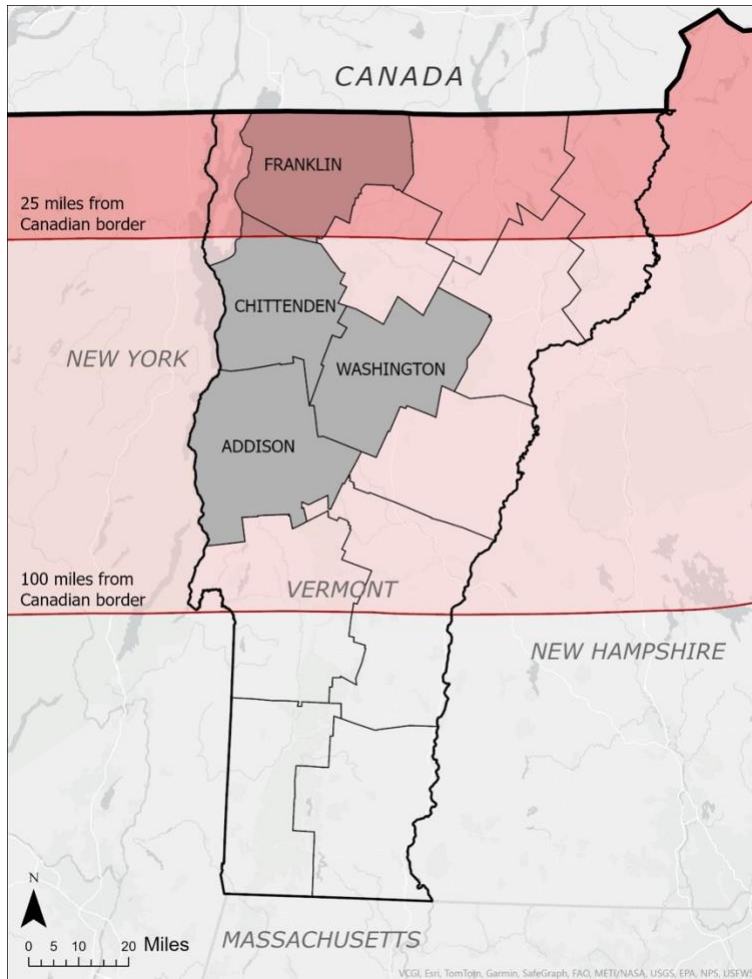


Figure 3. Home counties of interview subjects

Data analysis

Interview recordings were transcribed, translated from Spanish to English, and analyzed using thematic analysis to identify recurring themes in participants’ experiences. To thematically code the interviews, the coding guide was first developed iteratively by the research team. The final codebook was split into 83 codes grouped into fourteen categories including transportation behavior, travel preferences, car, non-auto modes, destinations, unmet needs, quality of life, travel changes and disruption, housing and location, recommendations and program sentiments, demographic-related, unrelated to travel, connection, and notable text)

Codes were structured similarly to the interview questions, with some modifications based on the content of interviews. We added new codes as we listened to more interviews, using a combination of preconfigured and emergent codes (65). Once the guide was complete, all interviews were coded by two researchers using the final guide. Codes were then merged so that each interview was double coded. Combining the applied codes, the research team reviewed the information provided by interview respondents by examining responses for each code to find higher level themes, or common ideas that emerge from several codes (65).

Results

Our thematic analysis points to substantial mobility challenges faced by migrant workers in Vermont. Limited mobility came up throughout the interviews. Over half of participants live where they work and only rarely leave the property. Many shared that they only leave their home one, two, or three times a month aside from going to work.

Participants described resource access (including personal vehicles, driver's licenses and personal networks, and information access), and the legal landscape as determinants of their mobility and expressed that their level of mobility contributes to their overall quality of life (Figure 4). They emphasized the importance of vehicles and licenses, whether it was personal vehicles or getting rides from others to reach social gatherings, grocery outlets, and other important destinations. The main travel modes used included personal vehicles, with some also citing short distance walks and the occasional use of bikes. Personal networks were also a determinant of what resources an individual knew of and had access to. The legal landscape, including documentation status and visibility, are also important determinants of mobility. Their impact on mobility depends in part on the border enforcement landscape subjects face (DPC, border proximity).

Themes of English language proficiency, employment, and documentation came up throughout, and were contributors to the transportation and community resources that participants in this study engaged with. The following section describes key themes that arose in interviews. Interview participants are represented using pseudonyms in this discussion to protect their identities. For original quotes in Spanish, see supplementary materials. Figure 4

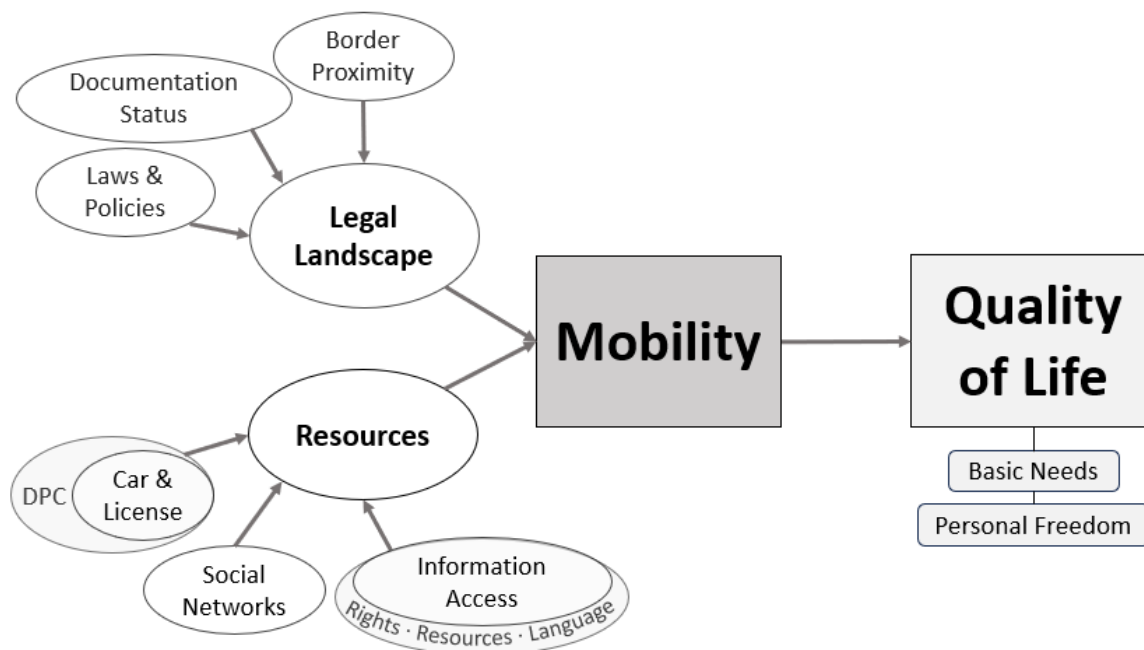


Figure 4. Contributors to Latine migrant mobility in Vermont

Resources

Personal vehicles, driver's licenses, and informal travel networks (ITN)

All participants in this study discussed getting around by car, whether it was their own or by getting a ride. All participants with vehicle access describe their mobility as improving after obtaining a license and car access.

Those with no license expressed interest in getting a license and eventually a car to gain independence and mobility. One respondent who currently relies on rides described her desire to learn to drive and the flexibility it would bring:

I'm interested in learning how to drive. Sometimes difficult situations arise and if there is a car around, you can avoid waiting for someone to come for you, so you come and go at the time you want because you brought your own transport. - Neli

Another participant describes the opportunities that come with acquiring a license such as freedom, choice, and quality of life:

[If I had a car and license] it would change a lot, I wouldn't be in my house all the time, I would come out a little more, I would go to places that I don't know. The lifestyle that I lead would be more beautiful. – Diego

Participants' work schedules and time-off were also mentioned as contributing to the ability to acquire a new skill such as driving a car or learning English, as well as how often they are able to leave the house.

Of the participants who do not have a license and car all report primarily using informal travel networks (ITN) to get around, known as "raites". Generally, "raiteros", individuals who give rides for pay, tend to be a rider's friend, coworker, or someone recommended to them who speaks Spanish. One respondent indicated that his border proximity was a determinant of how much he paid for a raite, with rates increasing near the border. Before owning a car, Gabriel would pay \$100 per raite to go to the grocery store. As someone who lives near the border, he shared that he would consider giving reasonably priced rides to others in his community especially near the border:

I'd like to be able to help, but not charge like 100 per hour... fill the gas and I'll take you wherever you want. That's one way of like helping others - Gabriel

Those who exclusively use ITN shared that taking raites in a group can often be cheaper than alternatives like Uber Lyft (when these options are available) or buying a personal vehicle. Despite ITNs being a convenient option for those with no car access, depending on others makes travel planning difficult since many raiteros hold jobs outside of providing raites:

We have to look for the person who has the time because we all work almost the same schedule already, or if some of them work at night and others work

in the morning, then they have to adapt to the best of the rest day in order to go out." - Neli

For Sofia, her ability to leave the house to attend events or appointments often depends on a raitero's availability:

Sometimes when you don't have a raite, you have to cancel the appointment because you have no way to get there. – Sofia

When asked if they would give rides, most either already did so or said they would if there was someone in need. When asked if he would charge for a ride, Luis responded similarly to other participants:

No, I don't think so. If someone sincerely asks you for a favor, then I think one should fulfill it. – Luis

Personal and community networks and access to information

A person's network can include individuals they know in their state, workplace, or home country, as well as organizations. The strength and size of someone's network can determine what resources they use or know of and how much they pay for rides. For example, participants describe depositing money to send to family abroad based on the knowledge from their personal networks, with some using locations in Vermont, while others are only aware of locations in Massachusetts.

Networks are often determined by someone's contacts prior to arriving in Vermont, their duration in the state, and the people they interact with frequently. For example, Oscar described connecting with a local contact who helped him with transportation, local information, finding a place to stay and work when he arrived in Vermont:

The first three months, he [prior contact] was my transport. Everything. He picked me up at the airport and welcomed me to his house. I met him through a friend, I didn't know him in person. He [my friend] spoke to him, and he said that he could receive me and he helped me a lot at work, in transportation and all that. – Oscar

Most participants described relationships made in Vermont as important for learning how to navigate life there as a migrant worker, including knowledge of community organizations, tips for safe locations for those without documentation, and how to survive in the winter.

Those with dependents or others sending remittances back home generally reported being less willing to pay for non-essential travel (for example, social events), while mobility, documentation status, or a lack of accessible information were more commonly brought up as barriers to non-essential travel for those who were not sending remittances.

Some who work on farms and ski resorts mentioned employers as intermittent providers of essential or emergency rides. Edgar, a farmworker in his mid-twenties describes his work commute using a car provided by his employer:

The owner of the farm has given us a car to transport us from work to the apartment. A coworker and I are the ones who drive, only with the Guatemalan license, but we also wanted to know the process of obtaining a license here. – Edgar

Apart from local contacts, many migrants who live in Vermont without their families rely heavily on internet access to stay connected with family. Those living close to the border describe occasional difficulties with internet connection barring them from connecting with family on their limited time off stating:

“Nothing [you can do about it], just wait until it [signal] comes back” – Gabriel.

Apart from personal networks, participants indicated that trustworthy community organizations are an important source of information, mobility resources, and a sense of cultural community. Examples include assistance understanding legal rights and offerings in Vermont and the U.S., information about where to access necessities, mobility help, and language & translation resources. The main community organizations brought up in the study included Migrant Justice, the Open-Door Clinic, Addison Allies, and Viva El Sabor, all of whom work to support and uplift migrant workers in the state of Vermont.

Migrant Justice provides migrants with translation services, application information about the DPC and a means of getting to and from the Department of Motor Vehicles to obtain a license or register a vehicle. A lack of knowledge about licenses and other transportation options was more commonly reported by those who had recently arrived in Vermont and were unaware of most community organizations. Examples included being unaware that they could get a Vermont driver’s license while undocumented and wanting a license but not knowing how to apply for one or who to ask for help.

For many migrants, low English proficiency and a lack of Spanish-language information is also a barrier to accessing formal transportation options in Vermont. One participant discussed finding unusable bus information since the directions were only available in English. Another participant who has lived in the relatively transit-rich City of Burlington for several years had only used ITN and was unaware of other options. He shared that he would consider using public transportation if transit information were available in Spanish.

Community organizations also provide mobility, social connection, and access to goods and services. Some participants, such as Gabriel, a farmworker in Northern Vermont, described

attending events put on by these organizations as the only time that they leave their house apart from necessary trips such as food shopping:

I leave the farm about three times a month and usually go to buy food and participate in Migrant Justice... When I go to a Migrant Justice meeting, I don't have to pay anything because they send someone for me, usually a volunteer.
– Gabriel

Several participants mentioned Addison Allies, a local organization focused on providing migrants with resources such as food and clothing, bringing up the relationships built with volunteers and the strong sense of support that they feel from this organization:

There are organizations that provide us with transportation, they have given us things for our houses, and even winter clothes. Sometimes they will give bikes to those who live far from their farm. Sometimes people who are new don't have money so they will bring them food. They do not ask for anything in return, you just have to live in Vermont. - Carlos

Documentation and the legal landscape

Interviewers did not ask research subjects about their legal status but it was brought up by some participants. All who divulged being undocumented shared that it brought up difficulties in their lives due to feelings revolving around safety in public and on the road, technicalities such as not being able to open a bank account or sign a lease on a house and being unable to visit their family living in another country.

Proximity to the Canadian border was brought up as a factor that contributes to whether a participant left their house for unnecessary travel. Elena, like others, mentioned feeling relatively safe in the central and southern part of Vermont, but shared her dislike of leaving the state or going to northern Vermont “because of migration police” (Elena).

Elena also described the shifts in opportunity, freedom, and feelings of increased security that have arisen for her as someone living in Vermont with her family since the availability of the DPC:

Now it's not difficult [to get around]. In the past, it was difficult because I didn't have a license and I was afraid to drive because they said that La Migra would get you and deport you. That was scary. But as soon as they started issuing the licenses, I got mine. So now it's like you're still in danger, but you feel more protected. – Elena

However, some undocumented migrant workers do not qualify for a DPC if they have no identification like Daniel:

Well, when I entered this country, my Mexican identification was taken away from me. So, I am in this country without any identification. Nothing. I don't have my passport either... so that is why I have not been able to get my license or passport. – Daniel

Documentation status also affected other aspects of participant's lives. In addition to being unable to obtain a DPC, Daniel, in his early twenties, described being unable to partake in any activities requiring identification such as joining his friends at a bar on the weekend. Elena discussed documentation as a barrier to visiting her home country and the challenges of having mixed documentation status in her family:

My kids are young... they want to visit [Mexico] but we tell them 'You know that we can't go visit' so that limits us...The only thing that gives me peace of mind is that if they want to return, they won't have to do it the way we came. That's what's important, they won't suffer. They know the language and have their papers. – Elena

A hostile political climate was also brought up as a barrier to mobility. Carlos describes feeling unsafe leaving his home for this reason:

I got here in 2015, and I did not use the internet, Trump was going to become president and it was scary, we did not want to go out and explore, so we only used the services the boss offered or people we knew. – Carlos

The legal landscape as well as access to transportation were described by some participants as a greater mobility barrier than financial costs. Diego describes how getting a license and car would allow him to participate in the local economy.

It would change a lot because I would go to places more often. It would help in, I don't know, in the local economy, so to speak. If I go out more, I buy more, I see more. I need more things. It would increase this area economically if I could go out more frequently, because day by day I always need something, buy something, you know? But since I don't have transportation, I have to wait until the person can take me, which would be once a week. On the other hand, if I had the possibility to move, then I would go out to buy several things. – Diego

Respondent recommendations

Our final interview questions asked respondents to provide recommendations for improving transportation options in their community. Most responses centered on increased car access, rides, ride services such as taxis, Ubers, and Lyfts, and for some, public transportation. As Luis put it, most participants preferred individual forms of transportation:

[To help others in the community get around more easily] give them each a car. – Luis

Another participant suggested that there could be an on-call person ready to provide transportation to and from his farm if someone became stranded because their *raite* was cancelled. Another respondent suggested that employers help with transportation as they often do with housing for farmworkers.

An interviewee who bikes to work suggested improved bicycle infrastructure near his home and farm:

I just want a bike lane, an area where I can circulate. – Santiago

Other recommendations centered instead on community connection and legal barriers to mobility. Several participants mentioned gaining documentation as a way to gain independence or be with their family again:

[If I was documented] It would be more relaxing. My family could maybe come [to Vermont]. – Oscar

I know three friends who don't have papers and its difficult for them to go from one place to another. And I don't like that, we have the right, and we need better transportation. – Edgar

One participant expressed a need for more events where one could express their culture:

[What is needed is] somewhere to dance Salsa, Bachata, Merengue, somewhere where there is more of a vibe for someone who is Latino. – Oscar

Discussion and Conclusions

This study provides important insights about mobility needs of Latine migrants in rural regions with newer and growing population of Latine migrant workers. We find that resource access (including driver's licenses, personal vehicles, and personal networks), and the legal landscape are major contributors to rural migrant workers' mobility, which in turn contributes to quality of life. Notably, the legal and social context that prevent migrants from feeling safe and respected outside of their homes poses a greater mobility barrier than financial costs. Driver's Privilege Cards have greatly increased vehicle use and mobility for undocumented Vermonters, but documentation status remains a barrier to mobility, and freedom of movement is curtailed closer to the international border because of concerns about border enforcement.

Informal travel networks, particularly *raites* were the most consistent form of transportation used by Latine migrant workers in Vermont other than a personal vehicle. Other informal travel networks included getting rides from community members. Consistent with past findings, migrants in Vermont without a license or documentation face unstandardized pricing which tends to be higher in more rural areas and closer to the border (15, 39).

Personal networks and interactions with community organizations are also key sources of information which are crucial for mobility. Whether these resources are accessed is often determined by the strength of someone's personal networks, their duration at their place of residence, and the language in which information is provided.

Our results are consistent with past findings pointing to vehicle dependence in rural areas in the general population (30, 66) and for migrants (39). Informal ride networks are a major source of mobility for migrants—especially those with no license—indicating that vehicle dependence expands beyond owning a personal vehicle (5, 9, 10, 38, 39, 59). Our findings

highlight mobility as crucial for migrants' ability to meet basic needs and experience personal freedom (23, 48). Although there are organizations providing information and resources to improve mobility, many migrants, particularly non-farmworkers or new Vermonters, are unaware of their existence.

Strategies to improve rural migrant mobility include expanding access to permissive driver's license laws in places where they are unavailable, ensuring that information about licenses is available in Spanish, and disseminating information to those who are new to the area and less connected through employment or to community networks. Providing support for the process of learning how to drive (including the vehicle and free time), filling out an application, and translation services needed to get a license are also an important part of expanding access to licenses.

Acknowledgements

This research was funded by the National Center for Sustainable Transportation (NCST) at the University of Vermont. The authors would like to thank the study's participants, Marita Canedo, Migrant Justice, and Viva El Sabor. We are also grateful to Peggy O'Neil Vivanco, Sierra Espeland, Holly Foster, Maisie Melican, Alvaro Nadal-Alvarez and Calvin Wuthrich for assistance collecting and analyzing data and to David Conner and Theresa Mares for insightful comments on an early version of this manuscript.

Declarations

Interest statement

The authors declare no competing interests.

Author contributions

Funding acquisition: Dana Rowangould, conceptualization of this study: Dana Rowangould and Julia LanzDuret-Hernandez, Investigation: Julia LanzDuret-Hernandez, Sarah Grajdura, formal analysis: Julia LanzDuret-Hernandez and Sarah Grajdura, manuscript preparation: Julia LanzDuret-Hernandez, Sarah Grajdura and Dana Rowangould.

Funding

This work was supported by the National Center for Sustainable Transportation (NCST) at the University of Vermont (UVM).

Availability of data and materials

Data from this study is unavailable to the public to protect participant's identities and ensure confidentiality. The study protocol is available to the public in English and Spanish by request.

References

1. Lichter, D. T. Immigration and the New Racial Diversity in Rural America*. *Rural Sociology*, Vol. 77, No. 1, 2012, pp. 3–35. <https://doi.org/10.1111/j.1549-0831.2012.00070.x>.
2. Kandel, W., and J. Cromartie. *New Patterns of Hispanic Settlement in Rural America*. Publication Rural Development Research Report No. 99. Economic Research Service, 2004.
3. Sharp, G., and B. A. Lee. New Faces in Rural Places: Patterns and Sources of Nonmetropolitan Ethnoracial Diversity since 1990. *Rural Sociology*, Vol. 82, No. 3, 2017, pp. 411–443. <https://doi.org/10.1111/ruso.12141>.
4. Lichter, D. T., and K. M. Johnson. A Demographic Lifeline? Immigration and Hispanic Population Growth in Rural America. *Population Research and Policy Review*, Vol. 39, No. 5, 2020, pp. 785–803. <https://doi.org/10.1007/s11113-020-09605-8>.
5. Mares, T. M. *Life on the Other Border: Farmworkers and Food Justice in Vermont*. University of California Press, Oakland, California, 2019.
6. Farmer, F., and Z. Moon. An Empirical Note on the Social and Geographic Correlates of Mexican Migration to the Southern United States. *Journal of Rural Social Sciences*, Vol. 26, No. 2, 2011.
7. Allen, R., and J. Wang. Immigrant Legal Status and Commute Mode Choice for Hispanics in the United States. *Journal of the American Planning Association*, Vol. 86, No. 3, 2020, pp. 284–296. <https://doi.org/10.1080/01944363.2020.1724818>.
8. Blumenberg, E., and M. Smart. Getting by with a Little Help from My Friends...and Family: Immigrants and Carpooling. *Transportation*, Vol. 37, No. 3, 2010, pp. 429–446. <https://doi.org/10.1007/s11116-010-9262-4>.
9. Blumenberg, E., and M. Smart. Brother Can You Spare a Ride? Carpooling in Immigrant Neighbourhoods. *Urban Studies*, Vol. 51, No. 9, 2014, pp. 1871–1890. <https://doi.org/10.1177/0042098013502825>.
10. Cline, M. E., C. Sparks, and K. Eschbach. Understanding Carpool Use by Hispanics in Texas. *Transportation Research Record*, Vol. 2118, No. 1, 2009, pp. 39–46. <https://doi.org/10.3141/2118-06>.
11. Delbosc, A., and R. Shafi. What Do We Know about Immigrants' Travel Behaviour? A Systematic Literature Review and Proposed Conceptual Framework. *Transport Reviews*, Vol. 43, No. 5, 2023, pp. 914–934. <https://doi.org/10.1080/01441647.2023.2179683>.
12. Bohon, S. A., K. Stamps, and J. H. Atilas. Transportation and Migrant Adjustment in Georgia. *Population Research and Policy Review*, Vol. 27, No. 3, 2008, pp. 273–291. <https://doi.org/10.1007/s11113-008-9075-8>.
13. Lauby, F. Transportation and Immigrant Political Incorporation. *Journal of Ethnic and Migration Studies*, Vol. 47, No. 19, 2021, pp. 4552–4569. <https://doi.org/10.1080/1369183X.2019.1635003>.

14. Stuesse, A., and M. Coleman. Automobility, Immobility, Altermobility: Surviving and Resisting the Intensification of Immigrant Policing. *City & Society*, Vol. 26, No. 1, 2014, pp. 51–72. <https://doi.org/10.1111/ciso.12034>.
15. Valenzuela Jr., A., L. Schweitzer B, and A. Robles. Camionetas: Informal Travel among Immigrants. *Transportation Research Part A: Policy and Practice*, Vol. 39, No. 10, 2005, pp. 895–911.
16. Barajas, J. M. The Effects of Driver Licensing Laws on Immigrant Travel. *Transport Policy*, Vol. 105, 2021, pp. 22–34. <https://doi.org/10.1016/j.tranpol.2021.02.010>.
17. Handy, S. L. Understanding the Link Between Urban Form and Nonwork Travel Behavior. *Journal of Planning Education and Research*, Vol. 15, No. 3, 1996, pp. 183–198. <https://doi.org/10.1177/0739456X9601500303>.
18. Handy, S., and D. Niemeier. Measuring Accessibility: An Exploration of Issues and Alternatives. *Environment and Planning A*, Vol. 29, No. 7, 1997, pp. 1175–1194. <https://doi.org/10.1068/a291175>.
19. Karner, A., K. Levine, L. Alcorn, M. Situ, D. Rowangould, K. Kim, and A. Kocatepe. *Accessibility Measures in Practice: A Guide for Transportation Agencies*. Transportation Research Board, Washington, D.C., 2022.
20. Schwanen, T., K. Lucas, N. Akyelken, D. Cisternas Solsona, J.-A. Carrasco, and T. Neutens. Rethinking the Links between Social Exclusion and Transport Disadvantage through the Lens of Social Capital. *Transportation Research Part A: Policy and Practice*, Vol. 74, 2015, pp. 123–135. <https://doi.org/10.1016/j.tra.2015.02.012>.
21. Lucas, K. Transport and Social Exclusion: Where Are We Now? *Transport Policy*, Vol. 20, 2012, pp. 105–113. <https://doi.org/10.1016/j.tranpol.2012.01.013>.
22. Delbosc, A., and G. Currie. The Spatial Context of Transport Disadvantage, Social Exclusion and Well-Being. *Journal of Transport Geography*, Vol. 19, No. 6, 2011, pp. 1130–1137. <https://doi.org/10.1016/j.jtrangeo.2011.04.005>.
23. Geurs, K. T., and B. van Wee. Accessibility Evaluation of Land-Use and Transport Strategies: Review and Research Directions. *Journal of Transport Geography*, Vol. 12, 2004, pp. 127–140. <http://dx.doi.org/10.1016/j.jtrangeo.2003.10.005>.
24. Levine, J., J. Grengs, and L. A. Merlin. *From Mobility to Accessibility: Transforming Urban Transportation and Land-Use Planning*. Cornell University Press, Ithaca, NY, 2019.
25. Rowangould, D., A. Karner, and J. London. Identifying Environmental Justice Communities for Transportation Analysis. *Transportation Research Part A: Policy and Practice*, Vol. 88, 2016, pp. 151–162.
26. Das, M. B. *Social Inclusion in Macro-Level Diagnostics: Reflecting on the World Bank Group's Early Systematic Country Diagnostics*. World Bank, Washington, DC, 2016.

27. Wang, W., S. Espeland, J. M. Barajas, and D. Rowangould. Rural–Nonrural Divide in Car Access and Unmet Travel Need in the United States. *Transportation*, 2023. <https://doi.org/10.1007/s11116-023-10429-6>.
28. Blumenberg, E., and G. Pierce. Automobile Ownership and Travel by the Poor: Evidence from the 2009 National Household Travel Survey. *Transportation Research Record: Journal of the Transportation Research Board*, Vol. 2320, No. 1, 2012, pp. 28–36. <https://doi.org/10.3141/2320-04>.
29. Blumenberg, E., A. Brown, and A. Schouten. Car-Deficit Households: Determinants and Implications for Household Travel in the U.S. *Transportation*, Vol. 47, No. 3, 2020, pp. 1103–1125. <https://doi.org/10.1007/s11116-018-9956-6>.
30. Barajas, J. M., and W. Wang. *Mobility Justice in Rural California: Examining Transportation Barriers and Adaptations in Carless Households*. Publication NCST-UCD-RR-23-01. National Center for Sustainable Transportation, 2023, p. 73.
32. Klein, N. J., and M. J. Smart. Car Today, Gone Tomorrow: The Ephemeral Car in Low-Income, Immigrant and Minority Families. *Transportation*, Vol. 44, No. 3, 2017, pp. 495–510. <https://doi.org/10.1007/s11116-015-9664-4>.
33. Liu, C. Y., and G. Painter. Travel Behavior among Latino Immigrants: The Role of Ethnic Concentration and Ethnic Employment. *Journal of Planning Education and Research*, Vol. 32, No. 1, 2012, pp. 62–80. <https://doi.org/10.1177/0739456X11422070>.
34. Smart, M. J. A Nationwide Look at the Immigrant Neighborhood Effect on Travel Mode Choice. *Transportation*, Vol. 42, No. 1, 2015, pp. 189–209. <https://doi.org/10.1007/s11116-014-9543-4>.
35. Chatman, D. G. Explaining the “Immigrant Effect” on Auto Use: The Influences of Neighborhoods and Preferences. *Transportation*, Vol. 41, No. 3, 2014, pp. 441–461. <https://doi.org/10.1007/s11116-013-9475-4>.
36. Chatman, D. G., and N. J. Klein. Why Do Immigrants Drive Less? Confirmations, Complications, and New Hypotheses from a Qualitative Study in New Jersey, USA. *Transport Policy*, Vol. 30, 2013, pp. 336–344. <https://doi.org/10.1016/j.tranpol.2013.10.002>.
37. Tal, G., and S. Handy. Travel Behavior of Immigrants: An Analysis of the 2001 National Household Transportation Survey. *Transport Policy*, Vol. 17, No. 2, 2010, pp. 85–93. <https://doi.org/10.1016/j.tranpol.2009.11.003>.
38. Lovejoy, K., and S. Handy. A Case for Measuring Individuals’ Access to Private-Vehicle Travel as a Matter of Degrees: Lessons from Focus Groups with Mexican Immigrants in California. *Transportation*, Vol. 35, No. 5, 2008, pp. 601–612. <https://doi.org/10.1007/s11116-008-9169-5>.

39. Lovejoy, K., and S. Handy. Social Networks as a Source of Private-Vehicle Transportation: The Practice of Getting Rides and Borrowing Vehicles among Mexican Immigrants in California. *Transportation Research Part A: Policy and Practice*, Vol. 45, No. 4, 2011, pp. 248–257. <https://doi.org/10.1016/j.tra.2011.01.007>.
40. Lucas, K. Making the Connections between Transport Disadvantage and the Social Exclusion of Low Income Populations in the Tshwane Region of South Africa. *Journal of Transport Geography*, Vol. 19, No. 6, 2011, pp. 1320–1334. <https://doi.org/10.1016/j.jtrangeo.2011.02.007>.
41. Barajas, J. M. Supplemental Infrastructure: How Community Networks and Immigrant Identity Influence Cycling. *Transportation*, Vol. 47, No. 3, 2020, pp. 1251–1274. <https://doi.org/10.1007/s11116-018-9955-7>.
42. Toomey, R. B., A. J. Umaña-Taylor, D. R. Williams, E. Harvey-Mendoza, L. B. Jahromi, and K. A. Updegraff. Impact of Arizona’s SB 1070 Immigration Law on Utilization of Health Care and Public Assistance Among Mexican-Origin Adolescent Mothers and Their Mother Figures. *American Journal of Public Health*, Vol. 104, No. S1, 2014, pp. S28–S34. <https://doi.org/10.2105/AJPH.2013.301655>.
43. Sheller, M. *Mobility Justice: The Politics of Movement in an Age of Extremes*. Verso, London, 2018.
44. Preston, J., and F. Rajé. Accessibility, Mobility and Transport-Related Social Exclusion. *Journal of Transport Geography*, Vol. 15, No. 3, 2007, pp. 151–160. <https://doi.org/10.1016/j.jtrangeo.2006.05.002>.
45. Lubitow, A., M. J. Abelson, and E. Carpenter. Transforming Mobility Justice: Gendered Harassment and Violence on Transit. *Journal of Transport Geography*, Vol. 82, No. 102601, 2020.
46. Guzmán, J. R., and M. A. Medeiros. Damned If You Drive, Damned If You Don’t: Meso-Level Policy and Im/Migrant Farmworker Tactics under a Regime of Immobility. *Human Organization*, Vol. 79, No. 2, 2020, pp. 130–139. <https://doi.org/10.17730/1938-3525.79.2.130>.
47. Vukov, T., and M. Sheller. Border Work: Surveillant Assemblages, Virtual Fences, and Tactical Counter-Media. *Social Semiotics*, Vol. 23, No. 2, 2013, pp. 225–241.
48. Sheller, M. Sustainable Mobility and Mobility Justice: Towards a Twin Transition. *Mobilities: New Perspectives on Transport and Society*, 2012, pp. 289–304.
49. Garcia, A. S. *Legal Passing: Navigating Undocumented Life and Local Immigration Law*. University of California Press, Oakland, California, 2019.
50. ACLU. Know Your Rights | 100 Mile Border Zone | ACLU. American Civil Liberties Union, , 2024.
51. Anthony, D. The U.S. Border Patrol’s Constitutional Erosion in the “100-Mile Zone.” *Penn State Law Review*, Vol. 124, No. 2, 2020.

52. U.S. Customs and Border Protection. Legal Authority for the Border Patrol. https://help.cbp.gov/s/article/Article-1084?language=en_US. Accessed Feb. 23, 2024.
53. Smith, H. *U.S. Customs and Border Protection's Powers and Limitations: A Primer*. 2021.
54. Monto, A. *The Roots of Mexican Labor Migration*. Praeger, 1994.
55. NCSL. States Offering Driver's Licenses to Immigrants. *National Conference of State Legislatures*. <https://www.ncsl.org/immigration/states-offering-drivers-licenses-to-immigrants>. Accessed Apr. 2, 2023.
56. Gonzalez, D., P. Margulies, and Tirado-Alcaraz, J. Alejandro. *A Legal and Policy Analysis of Driver's Licenses for Undocumented Rhode Islanders*. Latino Policy Institute at Roger Williams University, 2016.
57. Baker, D. Latino Dairy Workers in Vermont. *Communities and Banking*, Federal Reserve Bank of Boston, Spring, , 2013, pp. 5–7.
58. US Census Bureau. Nation's Urban and Rural Populations Shift Following 2020 Census. *Census.gov*. <https://www.census.gov/newsroom/press-releases/2022/urban-rural-populations.html>. Accessed Jul. 31, 2023.
59. Baker, D., J. Kades, J. Kolodinsky, and E. H. Belarmino. Dairy Is Different: Latino Dairy Worker Stress in Vermont. *Journal of Immigrant & Minority Health*, Vol. 23, No. 5, 2021, pp. 965–975. <https://doi.org/10.1007/s10903-021-01232-5>.
60. Panikkar, B., and M.-K. Barrett. Precarious Essential Work, Immigrant Dairy Farmworkers, and Occupational Health Experiences in Vermont. *International Journal of Environmental Research and Public Health*, Vol. 18, No. 7, 2021, p. 3675. <https://doi.org/10.3390/ijerph18073675>.
61. Wolcott-MacCausland, N., T. Mares, and D. Baker. Health by Mail: Mail Order Medication Practices of Latinx Dairy Worker Households on the Northern US Border. *Agriculture and Human Values*, Vol. 37, No. 1, 2020, pp. 225–236. <https://doi.org/10.1007/s10460-019-09962-x>.
62. Sommer, R., and B. Sommer. *A Practical Guide to Behavioral Research - Tools and Techniques*. Oxford University Press, 2001.
63. Hay, I., and M. Cope. *Qualitative Research Methods in Human Geography*. Oxford University Press, Don Mills, Ontario, Canada, 2021.
64. Baker, D., and D. Chappelle. Health Status and Needs of Latino Dairy Farmworkers in Vermont. *Journal of Agromedicine*, Vol. 17, No. 3, 2012, pp. 277–287. <https://doi.org/10.1080/1059924X.2012.686384>.
65. Creswell, J. W. *Qualitative Inquiry & Research Design: Choosing Among Five Approaches*. SAGE Publications, Thousand Oaks, CA, 2013.
66. Pucher, J., and J. L. Renne. Rural Mobility and Mode Choice: Evidence from the 2001 National Household Travel Survey. *Transportation*, Vol. 32, No. 2, 2005, pp. 165–186. <https://doi.org/10.1007/s11116-004-5508-3>.

67. Kim, S. Immigrants and Transportation: An Analysis of Immigrant Workers' Work Trips. *Cityscape*, Vol. 11, No. 3, 2009, pp. 155–169.

Data Summary

Products of Research

The quantitative part of this project uses data from the publicly available 2017 National Household Travel Survey (NHTS, available at <https://nhts.ornl.gov/>) and from the US EPA Smart Location Database (EPA SLD, available at <https://www.epa.gov/smartgrowth/smart-location-mapping>). The project uses detailed locations for the NHTS data (provided by FHWA) to match NHTS data to EPA SLD data. The NHTS detailed location data requires FHWA permission to access and cannot be made publicly available under the terms of the data sharing agreement. Detailed spatial information for the NHTS survey can be requested from FHWA.

The qualitative part of this project uses semi-structured interview data. In accordance with the study's Institutional Review Board approval this data cannot be made publicly available in order to protect the confidentiality of research subjects.

Data Format and Content

The data can be downloaded in a variety of formats from the sources noted above.

Data Access and Sharing, and Reuse and Redistribution

See above.

Appendix A: Qualitative Interview Study Details

Advisory Committee Members' Organizations (Parts 2 and 3)

Organization

Community Restorative Justice Center

Migrant Justice

Hardwick Agriculture

Northeast Kingdom Council On Aging

Center for Agricultural Economy

Northeast Kingdom Community Action (NEKCA)

Northeast Kingdom Organizing (NEKO)

Northeast Kingdom Human Services (NKHS)

Northeast Vermont Regional Hospital

Northern Counties Health Care (NCHC)

North Country Supervisory Union

Northeastern Vermont Development Association (NVDA)

Pica Pica Filipino Cuisine

Rural Community Transportation (RCT)

Rural Edge

St. Johnsbury Community Hub

United Way Lamoille

Vermont Agency of Transportation (VTrans)

Translated Quotations (Part 3)

Cars as freedom

I'm interested in learning how to drive. Sometimes difficult situations arise and if there is a car around, you can avoid waiting for someone to come for you, so you come and go at the time you want because you brought your own transport. – Neli

Si me interesa aprender a manejar. Si de repente surgen situaciones difíciles y pues a lo mejor hay un carrito por ahí y ya se quitó uno de estar esperando de que vengan por ti, así tu sales y entras a la hora que tú quieras porque ya traes tu propio transporte. – Neli

[If I had a car and license] it would change a lot, I wouldn't be in my house all the time, I would come out a little more, I would go to places that I don't know. The lifestyle that I lead would be more beautiful. – Diego

[Si tuviera carro] Cambiaria mucho, ya no estaria todo el tiempo en mi casa, ya saldria un poquito mas, me iria a lugares que no conozco, El estilo de vida que tengo seria mas bonito. – Diego

Informal travel networks (ITN)

Sometimes when you don't have a raite, you have to cancel the appointment because you have no way to get there. – Sofia

Aveses cuando no tiene un raite se tiene que cancelar la cita porque no tienes como llegar – Sofia

I'd like to be able to help, but not charge like 100 per hour... fill the gas and I'll take you wherever you want. That's one way of like helping others – Gabriel

Si me gustaria ayudar pero no cobrar asi como, 100 por hora... pon el gas y yo te llevo a donde quieras. Eso seria una forma de como ayudar a los demas. – Gabriel

No, I don't think so. If someone sincerely asks you for a favor, then I think one should fulfil it. – Luis

No, yo digo que no. Si te piden un favor de corazon, yo digo que hay que hacerlo. – Luis

Border enforcement and documentation

Now it's not difficult [to get around]. In the past, it was difficult because I didn't have a license and I was afraid to drive because they said that La Migra would get you and deport you. That was scary. But as soon as they started issuing the licenses, I got mine. So now it's like you're still in danger, but you feel more protected.
– Elena

Well, when I entered this country, my Mexican identification was taken away from me. So, I am in this country without any identification. Nothing. I don't have my passport either... so that is why I have not been able to get my license or passport. – Daniel

I got here in 2015, and I did not use the internet, Trump was going to become president and it was scary, we did not want to go out and explore, so we only used the services the boss offered or people we knew. – Carlos

Por ahora no es dificil. Pero en el pasado si era dificil porque no tenia licencia y me daba miedo manejar porque dician que la migra , que te agarraban, que te deportaban, entonces si daba miedo. Pero ya despues que empezaron a dar las licencias, saque mi licencia, entonces ahora ya es como que anda uno igual en peligro pero como que ya uno se siente como mas protegido. – Elena

Bueno, cuando yo vine a este pais, me quitaron mi identificacion Mexicana. Entonce estoy en este pais sin ninguna identificacion. Nada, mi passaporte tampoco...pore so no e podido sacar mi passaporte.
– Daniel

No, yo llegue aqui en 2015, entonces, no, no usaba yo tanto el internet porque iba a entrar el president trump y nos daba miedo salir, e investigar cosas, asi que los unicos servicios que usabamos eran de el patron, Y gente que prestaba el servicion nadamas. – Carlos

My kids are young... they want to visit [Mexico] but we tell them 'You know that we can't go visit' so that limits us...The only thing that gives me peace of mind is that if they want to return, they won't have to do it the way we came. That's what's important, they won't suffer. They know the language and have their papers. – Elena

Mis hijos estan Jovenes... quieren ir a visitar [Mexico], pero nosotros les decimos, 'tú sabes que nosotros no podemos ir de visita', entonces eso es lo que nos detiene...lo único que me tiene un poco tranquila es que, si ellos quieren regresar, ya no regresan de la manera en que nosotros venimos. Eso es lo único importante que pues no van a sufrir. Llegan, saben el idioma, y tienen sus papeles. – Elena

Interconnections between personal networks and mobility

The first three months, he was my transport. Everything. He picked me up at the airport and welcomed me to his house. I met him through a friend, I didn't know him in person. He spoke to him, and he said that he could receive me and he helped me a lot at work, in transportation and all that. – Oscar

Los primeros tres meses el fue mi transporte, todo. El fue el que me busco en el aeropuerto, y me recibió en su casa...Lo conocí por un amigo, no lo conocía en persona yo. Hablo con el y le dijo que si me recibía y me ayudo bastante en el trabajo, en el transporte, y todo eso. – Oscar

The owner of the farm has given us a car to transport us from work to the apartment. A coworker and I are the ones who drive, only with the Guatemalan license, but we also wanted to know the process of obtaining a license here. – Edgar

El dueño de la finca nos a dado un carro para transportarnos del trabajo a el departamento. Un compañero y yo somos los que manejamos solo con la licencia de Guatemala, pero queríamos saber tambien el proceso de cómo se puede obtener una licencia de acá. – Edgar

I would have a hard time. If I were to move to another place, I would have to pay rent. [Right now] its part of the job – Ricardo

Tendria dificultades. Si me mudaria yo a otro lugar tendria que pagar renta. [Ahora] es paerte de el trabajo. – Ricardo

Role of community organizations: mobility, language, and information

There are organizations that provide us with transportation, they have given us things for our houses, and even winter clothes. Sometimes they will give bikes to those who live far from their farm. Sometimes people who are new don't have money so they will bring them food. They do not ask for anything in return, you just have to live in Vermont. – Carlos

Hay organizaciones que nos ayudan en el transporte, han donándonos cosas para nuestro hogar, y hasta ropa para invierno... A veces [dan] bicicletas porque los ranchos están alejados de las casas. A veces gente que llega llegando no tiene dinero entonces les llevan comida. No te piden nada, solo que seas de Vermont. – Carlos

I leave the farm about three times a month and usually go to buy food and participate in Migrant Justice... When I go to a Migrant Justice meeting, I don't have to pay anything because they send someone for me, usually a volunteer. – Gabriel

Aproximadamente 2-3 veces al mes. En ocasiones voy a comprar la comida o estoy participando con Justicia Migrante... Cuando voy con Justicia Migrante a una reunion, no tengo que pagar nada porque ellos son los que me estan llamando y ellos mandan alguien por mi, tienen voluntarios en el programa. – Gabriel

Vermont has grown more lately; There are also more Latino people. I kind of feel that it has grown, and the transportation has not. – Armando

Ultimamente a crecido mas Vermont; Tambien hay mas gente Latina. Si como que siento que si a crecido y lo que es de el transporte como que no. – Armando

Respondent recommendations

[To help others in the community get around more easily] give them each a car. – Luis

[Para ayudar a que otros se muevan mas facilmente] Que les den carro a cada uno. – Luis

I just want a bike lane, an area where I can circulate. – Santiago

Solamente quisiera un acotamiento para las bicicletas, donde pueda circular. – Santiago

*It would be more relaxing.
My family could maybe. –
Oscar*

*[what is needed is]
Somewhere to dance Salsa,
Bachata, Merengue,
somewhere where there is
more of a vibe for someone
who is Latino. – Oscar*

*I know three friends who
don't have papers and its
difficult for them to go from
one place to another. And I
don't like that, we have the
right, and we need better
transportation. – Edgar*

*Ya estaria mas tranquilo. Mi
familia llegase a venir. –
Oscar*

*[Hace falta] Un lugar para
bailar salsa, bachata,
merengue, donde haiga mas
ambiente para uno latino. –
Oscar*

*Conozco tres amigos que no
tienen papeles y se les
complica ir de un lugar a
otro. Y a mi no me gusta eso,
tenemos el derecho y
necesitamos major
transporte. – Edgar*

NEK Interview Protocol (Part 2)

Thank you for your interest in this research study. The study is focused on the transportation needs and experiences of people living in Vermont so my research team and I are interviewing Vermont to learn more about your experiences with transportation. The goal of this research study is to understand the transportation-related challenges farmworkers and their families face and to identify potential strategies to improve transportation in rural Vermont communities. Your experience is very important to us to help us understand transportation needs of farmworkers and their families living in Vermont.

My name is **XX** and I am a researcher with the University of Vermont. And this is **XX**, who will be helping me conduct this interview.

Before we start, I'd like to tell you a little more about the study and your rights as a participant so that you can make an informed decision about whether to participate.

Review consent document verbally

- ENSURE that they:
 - live in Vermont and have lived here for at least one month
 - Are 18 or older.
 - If not, they cannot participate.

Would you like to participate in the study? [If yes, provide them with a copy and proceed]

Thank you for agreeing to participate. Before we begin, I'd like to give you \$20 to thank you for your time. I'd also like to ask you if there's a first name or nickname you'd like me to use while we talk. This is optional.

Begin recording if they agreed to do so

Thank you [**first name/nickname, if provided**]. I have now begun the recording. Can you tell me again for the recording, whether you agree to participate in this study?

I'd also like to ask if you have any questions for me?

Before we get into the interview, I'd like to learn where you live in so that I have some context.

- What town do you live in? How long have you lived there?

Now I'm going to ask you some open-ended questions to hear more about your transportation experiences in the place where you live now.

Transportation behavior and options:

I'm interested in hearing about where you go and how you get there.

- In the past month or week how often have you left your home to go somewhere?

- Can you tell me about a place where you go that is important to you?
 - Can you tell me about how you get there?
 - Is this how you'd like to get around?
 - Why or why not?
- Can you tell me about other ways that you get around?
- Do you have any challenges to getting around?
- Do you have a driver's license that's currently valid in Vermont?
 - [If yes] When did you get it?
 - [If recent] Did it change your ability to get around?
 - [If no] Is there a reason you don't have a license?
 - [If lost it] When did you lose it?
 - Did that change your ability to get around?
- How often do you have access to a vehicle?
 - [If sometimes] What limits your access?
 - [If yes vehicle access]
 - Do you give rides to others in your community?
 - Have you always had access to a vehicle?
 - [if changed recently] What changed, how did it affect you?
 - [If no vehicle access]
 - Why not?
 - Have you had access to a vehicle in the past?
 - [If yes] What changed, how did it affect you?
- Do you know if there is a public transit option or transportation service in your community?
 - [If yes] Is this something you use?
 - Why or why not?
 - [If no] Would you like for there to be public transportation or a transportation service?
- I'm also interested in whether you have access to the internet on a computer or phone, as this can be one way to reach places that people need to go—such as working remotely, visiting a doctor, shopping, food delivery, or connecting with family or friends. Do you currently have access to the internet on a phone or computer?
 - [If yes]
 - How do you access the internet?
 - Do you use the internet to access people or services that you would otherwise travel to?
 - Do you use the internet to find information on transportation options?
 - Are there any challenges to accessing the internet?
 - [If no] Why not?

Unmet travel needs:

I'm interested in hearing about whether you're usually able to get where you want to go.

- Are you ever in a situation where you can't get somewhere that you want to go?
 - [If yes] How often does that happen?
 - [If yes] Can you tell me more about a time when this happened and how it affected you?
 - Have you ever had difficulty getting to a doctor's appointment?
 - Do you ever have difficulty reaching a place to get food?
 - Are there any types of food that you want but can't usually get?
 - Do you ever have difficulty meeting up with friends and family?
 - Do you have friends or family that live very close by, for example in the same building or nearby buildings, or within a short walk?
- What services, resources or people have been helpful for getting around?

Disruption and resilience/adaptation:

Now I'd like to ask about how you have or haven't change your travel in response to changes in your community.

- Have you changed how you travel because of the recent changes in gas prices?
- Did you change how you traveled during the pandemic?

Housing:

I'm interested in learning more about where you live.

- How long have you lived in your current home?
- What do you like about the area where you live?
- Have you ever thought about moving somewhere else?
 - [If yes] Why?
 - Are there any barriers to moving?
- How far is it from where you live to the nearest store?

Changes/Recommendations:

I'm interested in hearing your ideas about how to improve your travel and housing options as someone with first-hand knowledge of your community and your needs.

- If you could change anything about your transportation options, what would it be?
 - If that change happened, how would it affect your day-to-day life?
- If you could change anything about the area where you live, what would it be?

- If someone wanted to improve transportation options in your community, what would you have them do to help you get around more easily?
 - What about to help others in your community get around more easily?

Closing:

- [Interviewer 2] Are there any other questions we should ask?
- Is there anything else about your transportation needs or experiences that you'd like to share?

I'm going to wrap up by asking you a few more questions about you and your household. This will help us to better understand your experiences. As I mentioned earlier, we won't be sharing your personal information. And if you prefer not to answer any of these questions we can skip them.

- How many people live in your household?
 - How many of those are children under the age of 18?
 - How many are adults over the age of 60?
- Are you currently working? In school?
- How old are you?
- What is your gender?
- About how many times have you visited the doctor in the past year?
- Do you have a medical condition or a disability that makes it hard to get around?
- Do you identify as Hispanic or Latino/a/x?
- What race do you identify as?
- What is your highest level of education (*finished or in progress)?
- About how much is your family's annual income?

*****Thank you for participating in this study!*****

Data collection location: _____

If you have any questions please feel free to get in touch with the research team.

Migrant Worker Interview Protocol in English (Part 3)

Thank you for your interest in this research study. The study is focused on the transportation needs and experiences of people living in Vermont so my research team and I are interviewing Vermont to learn more about your experiences with transportation. The goal of this research study is to understand the transportation-related challenges farmworkers and their families face and to identify potential strategies to improve transportation in rural Vermont communities. Your experience is very important to us to help us understand transportation needs of farmworkers and their families living in Vermont.

My name is **XX** and I am a researcher with the University of Vermont. And this is **XX**, who will be helping me conduct this interview.

Before we start, I'd like to tell you a little more about the study and your rights as a participant so that you can make an informed decision about whether to participate.

Review consent document verbally

- ENSURE that they:
 - live in Vermont and have lived here for at least one month
 - Are 18 or older.
 - If not, they cannot participate.

Would you like to participate in the study? [If yes, provide them with a copy and proceed]

Thank you for agreeing to participate. Before we begin, I'd like to give you \$20 to thank you for your time. I'd also like to ask you if there's a first name or nickname you'd like me to use while we talk. This is optional.

Begin recording if they agreed to do so

Thank you [**first name/nickname, if provided**]. I have now begun the recording. Can you tell me again for the recording, whether you agree to participate in this study?

I'd also like to ask if you have any questions for me?

Before we get into the interview, I'd like to learn where you live in so that I have some context.

- What town or city do you live in? How long have you lived there?
- Do you work or study?

Now I'm going to ask you some open-ended questions to hear more about your transportation experiences in the place where you live now.

Transportation behavior and options:

I'm interested in hearing about where you go and how you get there.

- In the past week, about how often have you left your home to go somewhere?

- Can you tell me about a place where you go that is important to you?
 - Can you tell me about how you get there?
 - Is this how you'd like to get around?
 - Why or why not?
- Can you tell me about other ways that you get around?
- Do you have any challenges to getting around?
- Do you have a driver's license that's currently valid in Vermont?
 - [If yes] When did you get it?
 - [If recent] Did it change your ability to get around?
 - [If no] Is there a reason you don't have a license?
 - [If lost it] When did you lose it?
 - Did that change your ability to get around?
- How often do you have access to a vehicle?
 - [If sometimes] What limits your access?
 - [If yes vehicle access]
 - Do you give rides to others in your community?
 - Have you always had access to a vehicle?
 - [if changed recently] What changed, how did it affect you?
 - [If no vehicle access]
 - Why not?
 - Have you had access to a vehicle in the past?
 - [If yes] What changed, how did it affect you?
- Do you know if there is a public transit option or transportation service in your community?
 - [If yes] Is this something you use?
 - Why or why not?
 - [If no] Would you like for there to be public transportation or a transportation service?
- Have you heard of "raites"? Do you use them?
 - [If yes] How many times a week do you use them?
 - About how much do you usually pay for one raite?
 - [If they have a car] Do you offer raite services to others in your community?
- I'm also interested in whether you have access to the internet on a computer or phone, as this can be one way to reach places that people need to go—such as working

remotely, visiting a doctor, shopping, food delivery, or connecting with family or friends. Do you currently have access to the internet on a phone or computer?

- [If yes]
 - How do you access the internet?
 - Do you use the internet to access people or services that you would otherwise travel to?
 - Do you use the internet to find information on transportation options?
 - Are there any challenges to accessing the internet?
- [If no] Why not?

Unmet travel needs:

I'm interested in hearing about whether you're usually able to get where you want to go.

- Are you ever in a situation where you can't get somewhere that you want to go?
 - [If yes] How often does that happen?
 - [If yes] Can you tell me more about a time when this happened and how it affected you?
 - Have you ever had difficulty getting to a doctor's appointment?
 - Do you ever have difficulty reaching a place to get food?
 - Are there any types of food that you want but can't usually get?
 - Do you ever have difficulty meeting up with friends and family?
 - Do you have friends or family that live very close by, for example in the same building or nearby buildings, or within a short walk?
- What services, resources or people have been helpful for getting around?

Disruption and resilience/adaptation:

Now I'd like to ask about how you have or haven't change your travel in response to changes in your community.

- Did you change how you traveled during the pandemic?
- Have you changed how you travel because of the recent changes in gas prices?

Housing:

I'm interested in learning more about where you live.

- How long have you lived in your current home?
- (if Farmworker) Do you live on the farm that you currently work at?
 - [If no, and if previously answered]: How do you usually get to your job?
 - [If previously answered]: Does your employer offer a transportation service for getting to places outside of the farm? Does anyone else offer these services?
 - [If yes]: Can you tell me how this service works?
 - Does it work well or not?

- What do you like about the area where you live?
- Have you ever thought about moving somewhere else?
 - [If yes] Why?
 - Are there any barriers to moving?
- How far is it from where you live to the nearest store?

Changes/Recommendations:

I'm interested in hearing your ideas about how to improve your travel and housing options as someone with first-hand knowledge of your community and your needs.

- If you could change anything about your transportation options, what would it be?
 - If that change happened, how would it affect your day-to-day life?
- If you could change anything about the area where you live, what would it be?
- If someone wanted to improve transportation options in your community, what would you have them do to help you get around more easily?
 - What about to help others in your community get around more easily?

Closing:

- [Interviewer 2] Are there any other questions we should ask?
- Is there anything else about your transportation needs or experiences that you'd like to share?

I'm going to wrap up by asking you a few more questions about you and your household. This will help us to better understand your experiences. As I mentioned earlier, we won't be sharing your personal information. And if you prefer not to answer any of these questions we can skip them.

- How many people live in your household?
 - How many of those are children under the age of 18?
 - How many are adults over the age of 60?
- Are you currently working? In school?
 - [If farmworker]: What type of farm are you working at?
 - [If not previously answered]: Do you live on the farm you work at?
 - How many workers are on the farm apart from yourself?
 - [If not working]: Does anyone in your family work on a farm? What type of farm?
- How old are you?
- What is your gender?
- About how many times have you visited the doctor in the past year?

- Do you have a medical condition or a disability that makes it hard to get around?
- Do you identify as Hispanic or Latino/a/x?
- What is your country of origin?
- What is your highest level of education (*finished or in progress)?
- About how much is your family's annual income?

*****Thank you for participating in this study!*****

Data collection location: _____

If you have any questions please feel free to get in touch with the research team.

Migrant Worker Interview Protocol in Spanish (Part 3) / Protocolo de entrevista para Trabajadores Agrícolas

Gracias por su interés en este estudio. El estudio se centra en las necesidades de transporte y las experiencias de las personas que viven en Vermont. Por eso mi equipo de investigación y yo estamos entrevistando a los trabajadores agrícolas de Vermont y sus familias para aprender más sobre sus experiencias con el transporte. El objetivo de este estudio de investigación es entender los desafíos relacionados con el transporte que enfrentan los trabajadores agrícolas y sus familias e identificar posibles estrategias para mejorar el transporte en las comunidades rurales de Vermont. Su experiencia es muy importante para nosotros para entender mejor las necesidades de transporte de los trabajadores agrícolas y sus familias que viven en Vermont.

Mi nombre es **XX** y soy un/a investigador/a de la Universidad de Vermont. Y este/a es **XX**, quien me ayudará a realizar esta entrevista.

****Revisar el documento de consentimiento verbalmente****

- ASEGÚRESE de que ellos:
 - Viven en Vermont y han vivido aquí durante al menos un mes
 - Tienen 18 años o más.
 - Si no, no pueden participar.

¿Le gustaría participar en el estudio? [En caso que si, dele una copia y proceda]

Gracias por aceptar participar. Antes de comenzar, me gustaría darle \$20 para agradecerle su tiempo. También me gustaría preguntarle si hay un nombre o apodo que le gustaría que use durante la entrevista. Esto es opcional.

Empezar a grabar si están de acuerdo en hacerlo*

Gracias [**nombre/apodo, si se ofrece**]. Ahora he comenzado la grabación. ¿Puede decirme nuevamente para la grabación, si acepta participar en este estudio?

También me gustaría preguntarle si usted tiene alguna pregunta para mí.

Antes de empezar la entrevista, tengo algunas breves preguntas que me ayudarán a saber un poco más sobre usted.

- ¿En qué ciudad o pueblo vive? ¿Cuánto tiempo ha vivido ahí?
- ¿Trabaja? ¿Estudia?

Ahora le preguntaré sobre sus experiencias con transporte en el lugar en donde vive ahora.

Transporte: ¿Cómo Funciona y Qué Opciones Hay?:

Me interesa saber a dónde va y cómo llega ahí.

- En una semana, ¿con qué frecuencia sale de su casa para ir a algún lado?

- ¿Puede contarme de un lugar al que vaya que sea importante para usted?
 - ¿Puede decirme cómo llega usted ahí?
 - ¿Se siente cómodo/a con esa opción?
 - ¿Por qué o por qué no?
- ¿Puede contarme de otras formas en las que va y viene de diferentes lugares?
- ¿Es difícil ir de un lugar a otro?
- ¿Tiene una licencia de conducir que es actualmente válida en Vermont?
 - [En caso que si] ¿Cuándo la saco?
 - [Si es reciente] ¿Le ayudó a ir a lugares diferentes?
 - [Si no] ¿Hay alguna razón por la que no tiene una licencia?
 - [Si la perdió] ¿Cuándo la perdió?
 - ¿Cambió eso su habilidad para movilizarse?
- ¿Con qué frecuencia tiene acceso a un vehículo?
 - [Si a veces] ¿Qué limita su acceso?
 - [En caso que si tiene acceso a un vehículo]
 - ¿Da transporte a otros en su comunidad?
 - ¿Siempre ha tenido acceso a un vehículo?
 - [si cambió recientemente] ¿Qué cambió, cómo le/la afectó?
 - [Si no tiene acceso a vehículos]
 - ¿Por qué no?
 - ¿Ha tenido acceso a un vehículo en el pasado?
 - [En caso que sí] ¿Qué cambió, cómo le/la afectó?
- ¿Sabe si hay una opción de transporte público o servicio de transporte en su comunidad?
 - [En caso que si] ¿Esto es algo que usa?
 - ¿Por qué o por qué no?
 - [Si no] ¿Le gustaría que hubiera transporte público o algún servicio de transporte?
- ¿Usted a escuchado de los rites? ¿Los usa?
 - [Si si] ¿Cuantas veces usa un rite a la semana?
 - ¿Mas o menos cuanto paga por rite?
 - [Si tiene carro] ¿Usted ofrece servicios de reitero para otros en su comunidad?

También me interesa saber si tiene acceso al Internet. en una computadora o teléfono.

- ¿Actualmente tiene acceso al Internet?
 - [En caso que si]
 - ¿Cómo se conecta al Internet?
 - ¿Utiliza el Internet para conectarse con personas o servicios a los que podría ir en persona? Por ejemplo, trabajar de forma remota, visitar a un

médico, ir de compras, pedir comida o conectarse con familiares o amigos.

- ¿Utiliza el Internet para encontrar información sobre opciones de transporte?
- ¿Cuando intenta conectarse al internet, se encuentra con dificultades?
- [Si no] ¿Por qué no?

Falta de medios de transporte:

Me interesa saber si normalmente puede llegar a donde quiere ir.

- ¿Alguna vez se ha encontrado en una situación en la que no puede llegar a algún lugar al que quiere ir?
 - [En caso que sí] ¿Con qué frecuencia sucede eso?
 - ¿Puede contarme más sobre un momento en el que esto sucedió y cómo le/la afectó?
 - ¿Alguna vez ha tenido dificultades para llegar a una cita con el médico?
 - ¿Alguna vez ha tenido dificultades para llegar a un lugar en donde se obtiene comida?
 - ¿Hay algún tipo de comida que le gustaría encontrar pero que normalmente no puede conseguir?
 - ¿Alguna vez ha tenido dificultades cuando ha querido reunirse con amigos y familiares?
 - ¿Tiene amigos o familiares que viven muy cerca, por ejemplo, en la misma casa o en casas cercanas, o a poca distancia caminando?
- ¿Qué servicios, recursos o personas han sido útiles para transportarse?

Cambios y adaptaciones:

Ahora me gustaría preguntarle si ha cambiado o no su manera de transportarse bajo cambios.

- ¿Durante la pandemia cambió su medio de transporte?
- ¿Su medio de transporte cambió por el cambio en precio de gasolina?

Vivienda:

Me interesa saber más sobre el lugar en donde vive.

- ¿Cuánto tiempo ha vivido en su casa actual?
- ¿Vive en el rancho en el que trabaja o en otro lado?
 - [Sí no, y si ya contestó]: ¿Cómo llega a su trabajo?
 - [Si, ya contesto]: ¿Su patrón le ofrece un servicio de transporte para llegar a lugares fuera del rancho? ¿Alguien más le ofrece estos servicios?
 - [Si si]: ¿Me puede contar como funciona ese servicio?
 - ¿Sirve bien o no?

- ¿Qué le gusta de la zona en donde vive?
- ¿Alguna vez ha pensado en mudarse a otro lugar?
 - [En caso que sí] ¿Por qué?
 - ¿Existe alguna limitación para mudarse?
- ¿Qué distancia hay entre donde vive ahorita a la tienda más cercana?

Cambios/Recomendaciones:

Estoy interesado/a en escuchar sus ideas sobre cómo mejorar sus opciones de transporte y vivienda como alguien que conoce a su comunidad y a sus propias necesidades.

- Si pudiera cambiar algo acerca de sus opciones de transporte, ¿qué sería?
 - Si ese cambio sucediera, ¿cómo cambiaría su vida diaria?
- Si pudiera cambiar algo de la zona en donde vive, ¿qué sería?
- ¿Usted qué cree que se necesita para mejorar el transporte en su comunidad?
 - ¿Y para ayudar a que otros en su comunidad se transporten más fácilmente?

Conclusiones:

- [Entrevistador 2] ¿Hay alguna otra pregunta que debemos hacer?
- ¿Hay algo más sobre sus necesidades de transporte o experiencias que le gustaría compartir?

Voy a terminar preguntándole sobre usted y su hogar. Esto nos ayudará a comprender mejor sus experiencias. Como mencioné anteriormente, no compartiremos su información personal. Y si prefiere no responder a ninguna de estas preguntas podemos saltarlas.

- ¿Cuántas personas viven en su hogar?
 - ¿Cuántos de ellos son niños menores de 18 años?
 - ¿Cuántos son adultos mayores de 60 años?
- ¿Trabaja? ¿Estudia?
 - [Si está trabajando]: ¿En qué tipo de rancho trabaja?
 - ¿Usted vive ahí?
 - ¿Cuántos trabajadores hay en su rancho aparte de usted?
 - [Si no está trabajando]: ¿Ahí alguien de su familia que trabaja en un rancho? ¿Qué tipo de rancho?
- ¿Cuántos años tiene?
- ¿Cómo se identifica? ¿Hombre, mujer, u otro?
- ¿Aproximadamente cuántas veces visitó al médico en el último año?
- ¿Tiene una condición médica o una discapacidad que le causa dificultad para moverse?

- ¿Se identifica como hispano o latino/a/e?
- ¿Cuál es su país de origen?
- ¿Cuál es su nivel más alto de educación (*terminado o en progreso)?
- ¿Qué tan bien habla usted inglés?
- ¿Aproximadamente cuánto es el ingreso anual de su familia?

*****¡Gracias por participar en este estudio!*****

Lugar de recolección de datos: _____

Si tiene alguna pregunta, no dude en ponerse en contacto con el equipo de investigación.

Full Code Book NEK Interviews (Part 2)

Code	Definition	Example
Transportation behavior		
Travel frequency	How often they leave their home	Interviewee indicates that they usually go out every day, or once every month
Important place	A place they go that is important to them	Interviewee indicates that going to a family members house is an important trip
How they usually get around	Describing how they travel.	Interviewee describes how they usually get around by car and occasionally getting rides.
Informal travel networks	Non-traditional ways of getting around	Interviewee describes how they use shared rides through the Migrant Justice network
Other travel behavior	Other notes about how they travel not captured in other codes.	
Travel preferences		
Govt trust	Mentions trust in government in relation to travel - pos or neg sentiment	Describes a mistrust of government as a reason for avoiding the DMV (only travel / mobility / internet related)
Govt bureaucracy	Mentions government bureaucracy in relation to travel - pos or neg sentiment	Describes challenges getting a license back after it was revoked because of paperwork (only travel / mobility / internet related)
Costs	Mentions financial considerations (high or low cost)	Describes the high cost of vehicle ownership
Travel time and convenience	Descriptions of how long travel takes or how convenient it is	Describes how much faster it is to drive which is why they prefer it
Travel organization time	Description of planning for rides or transport	Describes the time it takes to organize rides, flexibility, etc.
Flexibility	Descriptions of how they build in flexibility in travel or cannot be flexible, Cancelled rides, etc.	Describes leaving early knowing that getting rides will take a while or dealing with cancelled rides
Cargo or passengers	Describes need or ability to transport stuff or other people (kids, parent, etc.)	Describes challenges bringing belongings on the bus
Law enforcement	Descriptions of travel preferences relating to law enforcement	I don't walk at night for fear of being stopped by police
Personal safety	Descriptions of feelings of personal safety (from crime, collisions, law enforcement, harassment, gender-based harassment)	Describes feeling unsafe on transit because of other passengers or law enforcement
Comfort	Descriptions of comfort or discomfort when traveling	Describes feeling more comfortable getting a ride with a friend instead of a stranger on RCT
Comfort in bad weather		
Other preferences	Descriptions of other preferences	

Code	Definition	Example
Car		
Driver's license	Description of whether they do or do not have a license (and reasons)	Interviewee describes losing their license and steps they went through to get it back
Car access	Descriptions of when they DO have access to a car to drive, may overlap with others below	Interviewee describes owning a car, borrowing or sharing a car or getting rides
Intermittent car access	Situations where access to a car comes and goes	Interviewee describing how they may only have access to a car due to maintenance or other people using it
No access (general)	Situations where they don't have access to a car in general or at a specific time it was needed	Interviewee describes a time(s) when they do not have access to a car, e.g., needed to go to medical appointment and could not
Car sharing	Situations where they drive someone else's car or co-own a car with someone else	Interviewee describing how they share the cost of a car with a family member or borrow a car from a neighbor
Cost of rides	Describes the cost of getting rides	Interviewee describing how costly it is to get a ride to store
Give or get rides	Situations where they give or get rides from friends, family, strangers, etc.	Interviewee discussing how they pay a coworker to drive them home
Car and license knowledge	Describes knowledge on how to get a car, license, insurance	Interviewee discussing not knowing how to get a license
Car reliability	Describes car breaking down or unreliable	Interviewee discussing how their car is unreliable to travel far distances
Car opinion	Sentiments about driving / getting rides (positive or negative)	Interviewee discusses their car as freedom, or hates having a car, etc.
Other car access situation	Other car access situations not captured above, i.e., skill level, comfort with weather/ road conditions, navigation, GPS, maps	Interviewee discusses previous experiences such as how they got to Vermont, limitations to how far they can drive because of age, etc.
Non-Auto Modes		
Transit vehicle	Medicaid or elderly and disabled rides, fixed route bus, etc.	Interviewee discussing what they've heard about a time when they took the bus, why they don't take the bus
RCT	Discussing RCT	mixed feelings about RCT: liked it, didn't know about it, did not like it, did not like the individual rides, thoughts of it being used for poverty, etc
Train	Discusses train (use, or sentiment about trains)	Interviewee discusses the history of trains in the region, a train route they've used or want, etc.
Bike	Discusses bike options or use of bike	Interviewee discussing biking to work or why they don't bike anymore
Walk	Discussions walk options or walking behavior	Interviewee discussing how they walk to their neighbor's house to get a ride, why they are unable to walk
Virtual or online	Discussions about online access, use, sentiments (phone, computer, or through a friend)	Interviewee describes how they used to have trouble accessing the internet but now use it at the library for online shopping
Lack of mode or route knowledge	Discussion of lack of knowledge for routes that exist	Interviewee describes not being aware of other route options

Code	Definition	Example
Other mode	Discussion of another mode (?)	Interviewee describes a flight, ferry, ski, snowmobile (sled), or other mode not captured here
Destinations		
Self to work or school	Self: transport to work or school	Discussing how they get to work every morning
Self to medical	Self: Transport to/from physical or mental health-related destination (doctor or pharmacy)	Discussing how they reach a hospital to receive medical treatment
Self to food	Self: travel to/from food or destination	Discussing difficulties reaching grocery stores without a car
Self to other shopping	Self: travel to/from non-food shopping or destination	Discussing difficulties reaching a clothing store without a car
Self to social and recreation	Self: Visits with family and friends, social events and hobbies, recreation	Discusses how important it is that they get to a book club at the library or the senior center
Self to caretake	Self: travel to give or receive care or delivery goods	Discussing how to reach a loved one to provide care and bring groceries
Self: Other	Self to another destination (not listed above)	Discussing how they reach some place not listed here
Delivery	Description of getting food or other items delivered	Discussing getting food brought to them
Transport family or friend	Transport family or friend to any destination	Discussing how they get their child to school or a parent to a store
Unmet Needs		
General unmet travel need	Sentiments/discussion about unmet travel needs, whether they have them or not	Discussing how they would make more trips if they had a way to do so
Car unmet need	Car-specific sentiment/discussion of unmet travel needs, whether they have them or not	Discussing how they would be able to go to the gym and hospital if they had a car
Knowledge-based unmet need	Lack of knowledge on routes or networks/ language barrier to access.	Discussing not being able to access information about what is available to them
Public unmet need	Public transit-specific sentiment/discussion of unmet travel needs, whether they have them or not	Discussing a specific route they wish had bus access
Quality of Life		
Health/medical	Aspects of life relating to health and wellbeing, including mental health	Interviewee discussing how they struggle to arrive at their doctor's appointments
Economic resilience	Ability to improve economic situation or to withstand and recover from unforeseen costs	Interviewee discussing how big unexpected costs made them unable to afford their car any longer, cycle of poverty
Aging	How aging has affected their quality of life	Interviewee discussing how aging has made them less mobile and has lowered their quality of life
Future Desires	Things or ideas that interviewee would like to see implemented	Interviewee discussing how they would like to see people in their neighborhood have better access to jobs

Code	Definition	Example
Disability	A condition that limits a person's activities	Interviewee discussing how using a wheelchair limits how they can travel
Mobility sentiment	Interviewee describes benefits of getting around or adverse effects of not getting around, Injuries	Mentions that going to town is what keeps them going, or that when they can't get to work they get anxiety
Employer or work environment	Interviewee mentions issues relating to their employer	How employers facilitate transportation of workers on their farm

Travel changes and disruption	-	-
Gas	Gas price fluctuation	Interviewee discussing how they drive less with higher gas prices
Winter	Winter weather (snow, ice, power outages, etc.)	Interviewee discussing how they could not reach where they needed to go in blizzard
COVID	COVID-19 pandemic travel changes	Interviewee discussing not traveling to work during travel restrictions
Reliability	How reliable are the existing transportation systems they use	Interviewee discussing bus schedule being unreliable
Other disruptions	Other disruptions not listed	Interviewee discussing flooding during a bad storm
Changes due to personal circumstances	Travel changes related to changes in interviewers circumstances, family, job, etc.	Interviewee describing how their life changed after their partner suddenly passed

Housing and location	-	-
Town or City	Geographic location where the person lives	The person lives in Saint Johnsbury, VT
Duration at current home	How long interviewee has lived at their home	The person has lived there 4 years
Type of housing	The type of housing the person lives in	Mobile home, apartment, house, etc.
Likes and dislikes	Stuff they like and dislike about where they live or their home	They like the quiet
Desire to move	Expressing a desire to change location	They wish they could move closer to their kids
Barriers to moving	What prevents them from moving	They don't have enough money to move
Distance to nearest store	How far away is the nearest store	The nearest grocery store is 2 hours away
Vermont-specific experiences	Travel sentiments unique to Vermont	"In Vermont.."
Experiences Outside Vermont	Experiences living outside Vermont	"When I lived in ... "

Code	Definition	Example
<u>Recommendations and program sentiments</u>	These codes refer to specific programs or initiatives that interviewees mention. Transit is coded above so this is other programs	
Support mobility: Not used	Programs/initiatives/organizations that supports mobility but interviewee hasn't used	Interviewee discussing a program a friend has used but they have not tried, e.g., meals on wheels
Support mobility: Used	Programs/initiatives/organizations supporting mobility that they have personally used	Interviewee discussing how Migrant Justice has helped giving them rides to the DMV
Potential life changes	Describes how a change they hypothesize or suggest could affect or change their life	Interviewee describes if they had program X, their life would change by Y
Other, not mobility-focused	Other programs/initiatives/organizations	Interviewee discussing using Meals on wheels, etc.
Recommendations	Suggestions that interviewees make to improve their travel experience	Interviewee mentions a need for a bus line or for a program targeting youth mobility to reach jobs
<u>Demographic-Related</u>		
Medical condition	Interviewee discussing medical condition	
Migrant worker	Interviewee is a migrant worker	
English proficiency	Interviewee description of their proficiency	
Duration in VT	How long they have lived in Vermont	Interviewee discussing for how long they have been in Vermont or where in Vermont they have lived
Language challenges	Barriers or challenges posed by language	How it's hard to communicate with bus operators/ ask their employer for transportation help.
Documentation	Issues relating to citizenship and/or undocumented status	Issues where documentation comes up -- there is also a code for law enforcement above, so if they just mention law enforcement a mention of just police would go there, unless they mention specifically issues with documentation and police (both codes then applied)
<u>Unrelated to travel</u>		
Govt bureaucracy	Systems and levels of decision-makers within government	Interviewee discussing dissatisfaction with bureaucracy causing initiatives a long time to be implemented
Institutional trust	Belief in the truth and reliability of the government	Interviewee discussing an event that caused them to lose trust in local government
Law enforcement	Civil force that maintains law and order	Interviewee discussing feeling they distrust the court system
Other	Other sentiments off topic	Interviewee discussing conspiracy theory

Code	Definition	Example
Connection	-	-
Sense of community	Feelings of fellowship and belonging arising from shared ideas, shared culture, gathering place, etc.	Interviewee discussing the feelings they have for where they live
Family and Friends	People in interviewee's family or friends group	Interviewee discussing connections to their friends
Getting help	Accessing assistance in a time of need	Interviewee discussing who they reach out to in an emergency or when they need help
Giving help	Offering assistance	Interviewee discussing how/when they offer their help to those in need
Isolation: unwanted	Feeling alone or cut off from others	Interviewee discussing how not having access to transportation makes them feel alone and disconnected
Isolation: wanted		Interviewee describing how they want to live off the grid and away from civilization
Notable text	<u>Notable text that needs to be saved (apply in addition to other category codes)</u>	
Unique sentiment	Unique perspective that interviewee shares	"I feel like...[something prophetic or well-said]"
Common idea well-said	Clear distillation of a common idea, expressed in a notable way	"Having poor access to transport in a rural area feels like [something well-said]"
Other thing to revisit	Something you're not sure where else it fits, but it seems important	Poignant quote
Nontransportation	This is a discussion that is not directly about transportation or other topics of the study.	The interviewee describes their opinions about college loans

Full Code Book Migrant Worker Interviews (Part 3)

Code	Definition	Example
Transportation behavior		
Travel frequency	How often they leave their home	Interviewee indicates that they usually go out every day, or once every month
Important place	A place they go that is important to them	Interviewee indicates that going to a family members house is an important trip
How they usually get around	Describing how they travel.	Interviewee describes how they usually get around by car and occasionally getting rides.
Travel preferences		
Government	Mentions government sentiments in relation to travel - pos or neg sentiment	Describes challenges getting a license back after it was revoked because of paperwork (only travel / mobility / internet related)
Costs	Mentions financial considerations (high or low cost)	Describes the high cost of vehicle ownership
Travel time and convenience	Descriptions of how long travel takes or how convenient it is	Describes how much faster it is to drive which is why they prefer it
Travel planning	Description of planning for rides or transport, & flexibility in travel, cancelled rides, etc.	Describes the time it takes to organize rides, flexibility, etc.
Cargo or passengers	Describes need or ability to transport stuff or other people (kids, parent, etc.)	Describes challenges bringing belongings on the bus
Law enforcement	Descriptions of travel preferences relating to law enforcement	I don't walk at night for fear of being stopped by police
Personal safety	Descriptions of feelings of personal safety(from crime, collisions, law enforcement, harassment, gender-based harassment)	Describes feeling unsafe on transit because of other passengers or law enforcement
Other preferences	Descriptions of other preferences	
Modes		
Car or License	Discussing use or sentiment relating to car or license.	Interviewee describes owning a car, borrowing or sharing a car or getting rides
RCT or Transit	Discussing using RCT or transit use/ feelings about it (medicaid or elderly and disabled rides, fixed route bus, etc.)	Interviewee discussing what they've heard about a time when they took the bus, why they don't take the bus
Taxi Uber or Lyft	Discussion about using a taxi or TNC service like Uber or Lyft	Interviewee discussing how expensive getting a taxi is
Train	Discusses train (use, or sentiment about trains)	Interviewee discusses the history of trains in the region, a train route they've used or want, etc.
Bike	Discusses bike options or use of bike	Interviewee discussing biking to work or why they don't bike anymore
Walk	Discussions walk options or walking behavior	Interviewee discussing how they walk to their neighbor's house to get a ride, why they are unable to walk

Code	Definition	Example
Get free ride	Getting a free ride to someplace (from someone else)	Discussing how their friend gives them a ride to work (would mark Get Ride and Work)
Pay for ride	Paying someone for a ride that is not a taxi, uber, etc. (Non-traditional ways of getting around)	Interviewee describes how they got a "raite" for \$40 from a community member who charges for rides.
Give ride	Giving a ride to someone else (ie family, friends, neighbor)	Discussing how they give their neighbor a ride to the doctor (would mark Give Ride and Medical)
Other mode	Discussion of another mode (?)	Interviewee describes a flight, ferry, ski, snowmobile (sled), or other mode not captured here

<u>Destinations</u>	**Can be about something coming to someone or virtual access**	
Work	Transport to work	Discussing how they get to work every morning
Education or school	Transport to school or an other form of education	Discussing how an english teacher meets with them virtually once a week.
Medical	Transport to/from physical or mental health-related destination (doctor or pharmacy)	Discussing how they reach a hospital to receive medical treatment
Food	Travel to/from food or destination	Discussing difficulties reaching grocery stores without a car
Shopping other	Travel to/from non-food shopping or destination	Discussing difficulties reaching a clothing store without a car
Social and Recreation	Visits with family and friends, social events and hobbies, recreation	Discusses how important it is that they get to a book club at the library or the senior center
Caretaking	Go somewhere to help someone	Discussing how to reach a loved one to provide care and bring groceries
Delivery	Description of getting food or other items delivered	Discussing getting food brought to them
Long distance travel	Traveling over 100 miles, flying somewhere, or taking a long distance bus	Discussing traveling to New York City or Connecticut
Other Destination	Another destination (not listed above)	Discussing how they reach some place not listed here

<u>Unmet Needs</u>		
Personal unmet need	Sentiments/discussion about personal unmet needs	Discussing how they would be able to go to the gym and hospital if they had a car
Community unmet need	Sentiments/discussion about community unmet needs	Discussing how there is no food pantry near them

Code	Definition	Example
Travel changes and disruption	-	-
Gas prices	Gas price fluctuation	Interviewee discussing how they drive less with higher gas prices
Pandemic	COVID-19 pandemic travel changes	Interviewee discussing not traveling to work during travel restrictions
Personal or Family Changes	Travel changes related to changes in interviewee's circumstances, family, job, etc.	Interviewee describing how their life changed after their partner suddenly passed
Other disruptions	Other disruptions not listed	Interviewee discussing flooding during a bad storm
Housing and location	-	-
Duration at current home	How long interviewee has lived at their home	The person has lived there 4 years
Household size	Interviewee says how many people or who are in their household	Interviewee lives with friends
Distance to nearest store	How far away is the nearest store	The nearest grocery store is 2 hours away
Type of housing	The type of housing the person lives in	Mobile home, apartment, house, etc.
Affordable housing	Is the interviewee in Rural Edge affordable housing or another type of affordable housing?	Interviewee discussing living in Rural Edge
Homelife Dynamics	Interviewee talking about events going on at home	Interviewee talks about husband preferring she didn't use the family car or Discussion of
Likes and dislikes	Stuff they like and dislike about where they live or their home	They like the quiet
Move/ Moving	Expressing a desire to change location & what prevents them from doing so	They wish they could move closer to their kids but don't have enough money to move
Rural character	Aspects of life relating to country life, or non-city life	Interviewee describing they prefer living away from people and appreciate the peace and quiet away from cities
Vermont-specific experiences	Travel sentiments unique to Vermont	"In Vermont.."
Experiences Outside Vermont	Experiences living outside Vermont	"When I lived in ... "
Demographic-Related	-	-
Duration in VT	How long they have lived in Vermont	Interviewee discussing for how long they have been in Vermont or where in Vermont they have lived
Language	Discusses language capabilities when communicating with others	Interviewee discussing how they can understand enough english to perform their job, but cannot speak enough to communicate with their boss.
Documentation	Issues relating to citizenship and/or undocumented status	Issues where documentation comes up -- there is also a code for law enforcement above, so if they just mention law enforcement a mention of just police would go there, unless they mention specifically issues with documentation and police (both codes then applied)

Code	Definition	Example
Connection		
Sense of community	Feelings of fellowship and belonging arising from shared ideas, shared culture, gathering place, etc.	Interviewee discussing the feelings they have for where they live
Insider/Outsider	Feelings of division within community that could refer to COVID refugees, gentrifiers, etc.	Interviewee discussing how they dislike the new condos in their community being bought as vacation homes
Family and Friends	People in interviewee's family or friends group	Interviewee discussing connections to their friends
Getting help	Accessing assistance in a time of need	Interviewee discussing who they reach out to in an emergency or when they need help
Giving help	Offering assistance	Interviewee discussing how/when they offer their help to those in need
Cultural Differences	Discusses experiences and sentiments with cultural changes.	Interviewee discussing how there are no places to go and dance where Latin music is played
Isolation	Wanted or unwanted experiences being alone or cut off from others	Interviewee discussing how not having access to transportation makes them feel alone and disconnected
Notable text		
	Notable text that needs to be saved (apply in addition to other category codes)	
Unique sentiment	Unique perspective that interviewee shares	"I feel like...[something prophetic or well-said]"
Common idea well-said	Clear distillation of a common idea, expressed in a notable way	"Having poor access to transport in a rural area feels like [something well-said]"
Other thing to revisit	Something you're not sure where else it fits, but it seems important	Poignant quote
Recommendations		
	Suggestions that interviewees make to improve their travel experience	These codes refer to specific programs or initiatives that interviewees mention. Transit is coded above so this is other programs
Internet		
	Person discusses any experience relating to the internet	Interviewee does not have internet access at home but goes to the public library to access it
Misc.		
Health/medical	Aspects of life relating to health and wellbeing, including mental health	Interviewee discussing how they are no longer able to paint because of their arthritis.
Aging	How aging has affected their quality of life	Interviewee discussing how aging has made them less mobile and has lowered their quality of life
Disability	A condition that limits a person's activities	Interviewee discussing how using a wheelchair limits how they can travel
Economic resilience	Ability to improve economic situation or to withstand and recover from unforeseen costs	Interviewee discussing how big unexpected costs made them unable to afford their car any longer, cycle of poverty

Code	Definition	Example
Future Desires	Things or ideas that interviewee would like to see implemented	Interviewee discussing how they would like to see people in their neighborhood have better access to jobs
Employer or work environment	Interviewee mentions issues relating to their employer	How employers facilitate transportation of workers on their farm
Enjoyment of life	Interviewee describing what gives them enjoyment or joy	Interviewee discussing the joy they get from driving
Weather	Describes experiences or sentiments relating to weather	Describes not feeling safe driving during snowstorms
Migrant Justice role	Discusses experiences or sentiments relating to Migrant Justice	Interviewee discussing how they got a ride to the DMV from Migrant Justice
Helpful resources/organizations	Discusses experiences or sentiments relating to organizations that do not have a specific code.	Discusses use of NEKA services
Nontransportation	This is a discussion that is not directly about transportation or other topics of the study.	The interviewee describes their opinions about college loans