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Seasonality, Mobility, and Livability

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Seasonality, Mobility, and Livability UVM Transportation Research Center

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Disclaimer

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1. Introduction

Signature project 4a, "Seasonality, Mobility, and Livability" investigated the effects of weather, season, built environment, community amenities, attitudes, and demographics on mobility and quality of life (QOL). A four season panel survey examined these variables through an in depth survey and a 24-hour travel log. After the first phase (season) the potential to co-investigate health effects within the context of mobility and qol was realized. Therefore, in the second phase of the study a health module was added that allowed for investigation of food choice, exercise, and weight status.

This report is organized by first introducing the principal research question then following with secondary and tertiary research questions. The report follows this structure through the introduction, methodology, results, and conclusion. Chapter 4, dissemination, will discuss how the work has and will be distributed. When commonality exists in introducing broad concepts and methodology it will be discussed at the beginning of the respective chapter. Specific details of that research area will be discussed within the sub-chapters.

Unserved travel demand has been shown to decrease quality of life. Faced with a combination of severe weather, dramatic seasons, low population density and aging infrastructure, northern rural communities are particularly challenging environments in which to provide transportation options and ensure that people can get to where they want and need to go. The climate and seasonality of rural northern communities makes the provision of public transit, whether local, regional, or inter-regional, particularly challenging and often cost-prohibitive. Important amenities and services, i.e. grocery stores, employment, and places you can walk to, are also considered less available and less accessible in rural areas (Dillman 1977; Hart 2002; Goldsberry 2009), given lower population sizes and densities (Hart 2005; Hubsmith 2007). Rural populations, in general, also have more poor and elderly residents (Hart, Larson et al. 2005). Using a 2009 database of residents of Vermont, Maine, and New Hampshire, this study examines the issues which cause unserved travel demand and how these issues impact the QOL of residents of northern New England.

The first stage of the study was a qualitative investigation using focus group discussions. The purpose of the focus groups was to explore the opinions, behaviors, and ideas of various identified segments of the population to inform the four-season panel survey development.

The literature shows that concepts from rural transportation research, travel behavior, mode choice, as well as the concepts of social and health capital, impact community planning, maintenance of vibrant rural communities, and the obesity crisis

Overall, there is a need for more research that connects travel behavior to the built environment and season in northern communities. This project team is particularly motivated by the important role of transportation on the social and health capital aspects of livability in our communities. The existing work is most often focused on urban and suburban areas and the impact of climate and season is rarely considered. This research will contribute both methodology and data to strive to fill these gaps while focusing on northern communities in the United States.

Research Objectives

1. Describe the impact of season on the level of both revealed and unserved travel demand using activity-based analysis for rural northern communities. Describe the variation of this seasonal impact on travel demand based on measures of rural character and the built environment and

2. Evaluate unserved travel demand as a measure of livability and quality of life in rural northern climates.

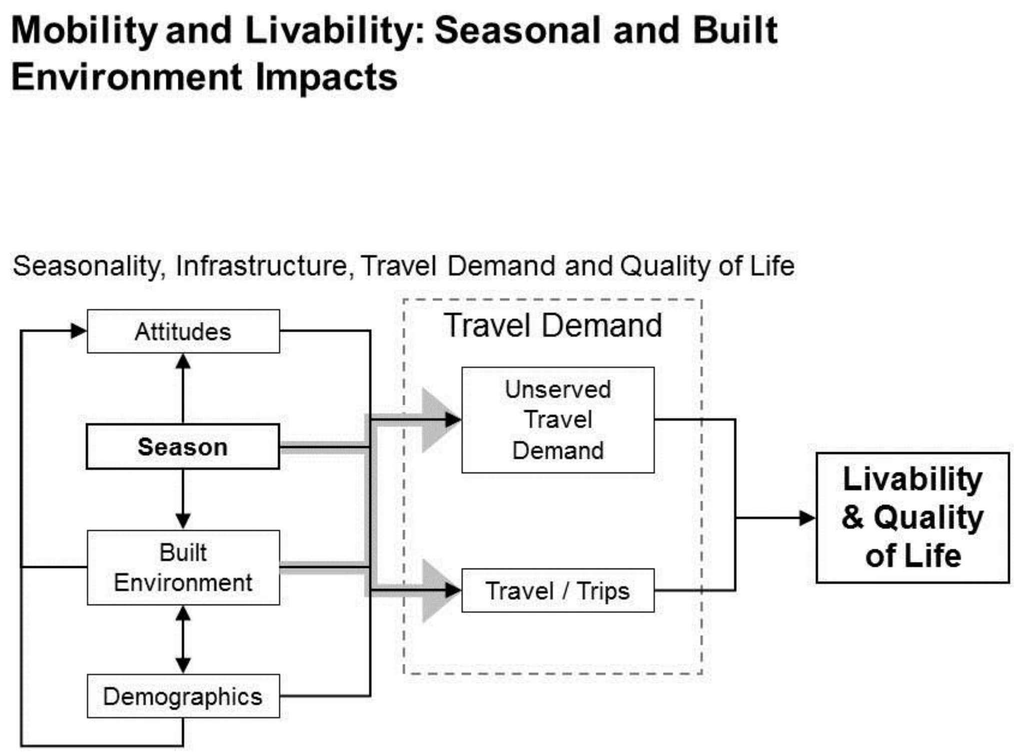

Figure 1-1. Mobility and Livability: Seasonal and Built Environment Impacts Model

2. Research Methodology

2.1 Qualitative Research for Survey Design

Qualitative studies were used in Phase I to develop and refine survey measurement instruments during the first three months, January, 2008 - March, 2008. The project teams worked with NETI and other partners to coordinate survey development efforts during this period.

Qualitative studies are often used to help formulate hypotheses and identify appropriate question formulations. The richness of the data obtained through structured discussion with groups or individuals is valuable in designing more focused structured measurement instruments and in pursuing deeper interpretation of results obtained from surveys; however, the effort required to obtain, process, analyze, and interpret qualitative data generally limits this type of research to small samples. The character of these data also rules out formal testing for differences.

Topics discussed in the focus groups included: isolation, seasonality, health implications, livability, choices in the use of transportation infrastructure, how activities are organized, planned, and executed, and whether or not travel patterns would differ if the transportation infrastructure were to change. Verbatim transcripts were produced from these focus groups.

A draft survey instrument was developed with information and concepts gathered from the literature review, developmental focus groups, and consultation with NETI. Survey development was accomplished in multiple phases of drafting and consultation among the research group members. Once a satisfactory initial draft of the survey instrument was developed, the survey instrument was pre-tested on 35 respondents, both experts in the field of transportation and individuals who will be part of the target population for the survey research. These pre-test respondents reviewed the survey instrument and provided feedback on content, clarity, wording and format.

2.2 Quantitative Methodology

This survey was informed by findings from focus groups conducted in the Fall of 2008 and guided by the Transportation Research Center and Center for Rural Studies at the University of Vermont. This survey was approved by the University of Vermont's Institutional Review Board (IRB). In order to engage the variety of specified populations, the team used purposeful, non-probability sampling methods. This research was funded by the U.S. Department of Transportation (USDOT).

2.2.1 Sample and Profile of Respondents

A total of 1417 respondents responded to the survey. Of this sample, 70.1% lived in a rural area, 45.5% of respondents were male, 47.7% had at least a bachelor's degree, the average age was 53.3 years old, and the average household income was $76,850.

Table 2-1. Demographic comparison of rural and non-rural residents

	Rural N=980	Non-Rural N=437
Age	50.5	51.9
Gender	49% Male	45% Male
Income	58% $50,000+	59% $50,000+
Children in household	35% at least one child	31% at least one child
Education	47% BA or greater	52% BA or greater

2.2.2 Procedure

The initial sample for the survey was taken from a sample frame of 15,000 residents of Vermont, Maine, and New Hampshire provided by the New England Transportation Institute (NETI). The number of surveys completed in the spring was 1,417 (sample) out of 4,625 mail and voice contacts corresponding to a 30.64% response rate. Of those contacted, 2,708 people refused to take the survey or terminated it after only a few questions and 500 people who said they had completed, or would complete, the survey online did not. Respondents had to be over the age of eighteen and willing to participate in all four phases of the survey to be interviewed.

The survey was completed using computer-aided telephone interviewing (CATI) and online polling. Letters were mailed out on Friday, May 22, 2009 to potential respondents. These letters contained a short description of the survey, and alerted potential respondents to the availability and web address of the online survey (Dillman, Smythe et al. 2009). All computer-aided telephone interviews and online surveys were conducted between Tuesday, May 26, 2009 and Wednesday, June 10, 2009, Monday through Friday from 4:00 p.m. until 9 p.m.

Over the summer, fall, and winter, respondents totaled 1006, 802, and 732 respectively. The final panel, who responded during all four seasons, totaled 654 respondents. Throughout our four surveys, the weather patterns that the region experienced were normal.

2.2.3 Indirect Obesity Determination

Obesity is defined here as a body mass index (BMI), i.e. weight in kilograms divided by height in meters that is greater than thirty. During the development of the survey, weights that corresponded to an individual that was overweight and obese were assigned to each height ranging from 4’10” to 6’4”. BMIs for all other heights were individually calculated after the survey was administered.

In order to indirectly determine whether a respondent was obese or not, respondents were first asked approximately, how tall are you (in feet and inches). Answers to this question were recorded and based on this response. Our computer aided telephone interview asked the respondent a series of up to two questions regarding their weight. The first weight-based question asked whether the respondent weighed less than a specific weight which corresponded to the pounds at which an individual of the respondent’s height would be classified as overweight. If the respondent answered yes (1), that they were less than this weight, they were coded as not overweight. If the respondent answered no (2), that they were not less than this weight, they were asked a second weight-based question which corresponded to the pounds at which an individual of the respondent’s height would be classified as obese. Subsequently, the sum of these weight-based questions were totaled for each respondent and coded such that a value of 1, i.e. an answer of yes to the first weight-based question, classified the respondent as not overweight. A value of 3, i.e. the respondent weighed more than the first weight question (an answer of 2-no) but less than the second (an answer of 1-yes), classified the respondent as overweight. A value of 4, i.e. the respondent answered no, that they weigh more than both weights offered (an answer of 2-no for both questions), classified the respondent as obese.

2.3 Analytical Methodology

All analyses were conducted with the Statistical Program for Social Sciences (SPSS), version 18.0 and LIMDEP Econometrics Software.

Respondents rated the importance of eighteen community amenities on a scale from zero (0) to ten (10), with zero being not at all important and ten being very important and 5 being a point in the middle. To measure the natural and built environment, respondents rated the perceived availability of eighteen community amenities on a scale from zero (0) to ten (10), with zero being not at all offered and ten being very well offered and 5 being a point in the middle. A five point Likert Scale ranging from Strongly Agree to Strongly Disagree was used to measure the attitudes of the respondents on various transportation-related issues.

Respondents were asked to identify themselves as rural, suburban, or urban. Self-reported and perceived rurality has been shown to map well to other measures of rurality (Doty, et al., 2006; Howat, Veitch, & Cairns, 2006; Jacob & Luloff, 1995). Compared to classifications from the U.S. Census Bureau (US Census, 2002), 84.0 percent of the respondents in this study correctly self-classified as rural. Rural areas include towns with less than 2,500 residents, towns with low population and/or density and communities that are neither metropolitan nor dependent on a metropolitan area (Dillman & Tremblay, 1977; Hart, Larson, & Lishner, 2005; Hubsmith, 2007; Williams, et al., 1975).

The number of trips a respondent made in a given day was measured through a travel log collected within the survey. Within this travel log, respondents answered such questions as, “where did you start your day,” “what time did you first leave,” and “what was the purpose of your trip.” Once the respondent had answered all the questions regarding a given trip they were asked “Then, did you go home or somewhere else?” If they answered yes (1) then the interviewer would continue to gather data regarding these subsequent trips until the respondent stated that they had ended their day at that location (2). The respondents who took 0 trips were coded as a 0. All respondents who made more than 1 trip were measured by totaling one plus the number of times a respondent went somewhere else, coded as (1), after leaving their starting point for the day yesterday. A single leg was added to account for the respondent’s initial trip away from their starting point.

Age was measured as a continuous variable. Binary codes were used for other demographic variables (1=female, high income, children in household, at least college education).

2.3.1 Uni- and bi-variate analysis

A frequency analysis was conducted for both overall unserved travel demand and for each of the reasons cited as causing unserved travel demand. To fully utilize the panel nature of this data set, a random effects model was estimated using regression techniques. In this model there were four periods for each of the 654 respondents (nLogit 4.0 2007) used to estimate QOL.

In order to determine the issues behind respondents’ unserved travel demand, respondents were asked about any necessary trips last week that they were unable to make. If the respondent replied affirmatively, then we followed-up with ‘why couldn't you go?’

A frequency analyses was conducted, for each of the four seasons, to determine the types of transportation issues respondents had encountered. Chi-square tests and independent sample t-tests were then conducted to assess the relationship between the demographics and the issues causing unserved travel demand. Demographics coded nominally included: gender (male=1), education (at least a bachelor's degree=1), rurality (rural=1), bicycles (at least one per household=1), motor vehicles (at least one per household=1), access to public transportation (yes=1), driver's license (yes=1), and employment (employed=1). Household composition was divided into four variables: single adults no kids (SANK), single adults with kids (SAWK), multiple adults no kids (MANK), and multiple adults with kids (MAWK). Of these four SANK, SAWK, and MAWK were included in the regression analyses. Age and years in New England were coded continuously. The dependent variable, QOL was coded on a scale from zero (0) to ten (10), with zero (0) being completely dissatisfied and ten (10) being completely satisfied and 5 being the point in the middle.

Lastly, independent sample t-tests were conducted to determine whether there were significant differences in QOL amongst the respondents facing specific issues causing unserved travel demand and everyone else.

2.3.2 Thematic analysis of open ended questions

Reasons for why a respondent was unable to get where they needed to go were thematically coded according to eight categories, transportation, weather, time, health, affordability, accessibility, social issues, and other. The transportation category included not having access to a car or a driver's license; the weather category included snow, rain, coldness, darkness, and seasonality; the time category included work and time constraints, unemployment, conflicting plans, and commitments to family and friends; the health category included the flu, family illness, injuries, disabilities, handicaps and other health related issues; the affordability category included gas prices and money considerations; the accessibility category included distance considerations, destinations being too far away, and lack of amenities in the area; the social category included isolation, and peer attitudes; the other category included all other reasons and those who did not provide a reason. If respondents provided more than one reason for their inability to get where they needed to go, then the reasons were coded under more than one category, i.e. work and time, or transportation and health. For each of the eight categories, responses were coded into a binary variable with one (1) representing that the respondent was unable to get to their destination due to this issue and zero (0) representing everyone else.

2.3.3 Multi-variate analysis

Within LIMDEP, a series of three models were estimated using structural equation modeling (SEM) techniques. The model can be seen in its totality in Figure 3-1.

Responses were recoded into a binary variable with one (1) representing strongly agree or agree and zero (0) representing everyone else. Similarly, other categorical variables were recoded into binary variables including typical weather (worse than typical=1) and weather affected travel decision (yes=1). Categorical demographics were also recoded as binary variables: gender (male=1), education (at least a bachelor's degree=1), rurality (rural=1), bicycles (at least one per household=1), motor vehicles (at least one per household=1), access to public transportation (yes=1), driver's license (yes=1), and employment (employed=1). We divided household composition into four variables: single adults no kids (SANK), single adults with kids (SAWK), multiple adults no kids (MANK), and multiple adults with kids (MAWK). Of these four we included SANK, SAWK, and MAWK in the regression analyses to compare to the MANK reference group.

Additional exogenous variables included in the regression analyses to satisfy rank and order conditions included four nominal variables, whether a respondent lived in Maine (1) or

Vermont/New Hampshire (0), whether a respondent lived in New Hampshire (1) or Maine/Vermont (0), whether a respondent considered today a typical day (1) or not (0), and a single continuous variable, how many years a respondent had lived in northern New England.

Other variables that served as intermediary dependent variables included the nominal variables of whether a respondent had any form of unmet demand, i.e. places they wanted or needed to go but didn't (yes=1), whether a respondent had taken at least one trip (yes=1) as determined by the survey travel log, and the continuous variables, the total number of trips taken by a respondent, and the respondent's self-reported QOL.

The first model was a binary logistic model with unserved travel demand as the dependent variable. This model was estimated to predict the probability that a respondent had any form of unserved demand, with unserved demand defined as a respondent having anywhere they wanted or needed to go but didn't in the last week (yes=1). Independent variables in the model included the perceived availability of eighteen community amenities, nine attitudinal statements regarding travel, thirteen demographics, and two measures of the weather.

The second model was a two-step, truncated regression model with total number of trips as the dependent variable. This model was suggested by preliminary analysis which indicated that the probability of a respondent making at least 1 trip and the total number of trips a respondent made in a day both depend on the same independent variables used in the previous binary logistic model but in opposite directions (LIMDEP Version 8.0, 2007). The initial step, a probit model, served as the indicator of whether the probability of making at least 1 trip was positive or not. The second step was a truncated regression model that indicated the nonlimit observations, or predicted total number of trips made and truncated at greater than zero; here, we included as the dependent variable of total number of trips logged. Independent variables in the first step of the truncated probit were the same as in the previous binary logistic model. Independent variables in the second step of the truncated regression model included two exogenous variables to identify the model: whether the respondent was a resident of Maine or New Hampshire.

The final model used linear OLS regression techniques with QOL as the dependent variable. QOL was coded on a scale from zero (0) to ten (10), with zero (0) being completely dissatisfied and ten (10) being completely satisfied and 5 being the point in the middle. Included in this regression were the previously included independent variables: community amenities, attitudinal statements regarding travel, demographics, and measures of the weather. To ensure the system of equations was indentified and satisfied rank and order conditions, the final linear regression analysis of QOL included two exogenous variables that were excluded from the previous equations. The number of previously excluded independent variables (2) was also as large as the number of right hand side endogenous (dependent) variables in the same equation (Wooldridge 2003). Additional exogenous variables of Maine residence, New Hampshire residence, whether today was a typical day, and the number of years the respondent had lived in northern New England were included in the final model. Lastly, the predicted number of trips a respondent made and predicted probability that a respondent had any form of unserved demand were independent variables in this model.

To test for multicollinearity, an analysis of the variance inflation factors (VIF), was conducted. No collinearity was detected within our model's data; all of the initial variables were included in the final model.

2.3.4 Novel Approach to BMI Classification: Auto Classification of Self-Reported Height and Weight

The percentages of respondents who were not overweight, overweight, and obese as classified by our "less than weight" self-reported height measures can be seen in Table 1. Using our auto-classification method, 24.8% of respondents were coded as obese; these findings correspond well to the BMI trends exhibited in Chou, Grossman, & Saffer's (2002) review of the four National Health and Nutrition Examination Surveys (NHES I through NHANES III) from 1959 to 1994 in which the percentage of obese respondents has been steadily increasing from 12.73% in the first survey to 21.62% in NHANES III. These results also correspond well with the Behavioral Risk Factor Surveillance System (BRFSS) survey, a national health survey administered by the Centers for Disease Control and Prevention (CDC). All of our classifications are within 1.1 percentage points of the classifications gathered in the BRFSS survey.

Table 2-2. Overweight and Obesity Survey Comparison

TIYL (2009)		BRFSS (2009)	
Classification	Percentage	Classification	Percentage
Not Overweight	37.10%	Not Overweight	37.02%
Overweight	38.10%	Overweight	37.11%
Obese	24.80%	Obese	25.87%

Note. TIYL N=1349, BRFSS N=19945

(National Center for Chronic Disease Prevention & Health Promotion: Behavioral Risk Factor Surveillance System 2009)

On a state-wide level, our findings are also supported by the BRFSS survey. Below, we present our percentages for obese and overweight & obese respondent classifications compared with the 2009 BRFSS telephone survey data for Vermont, Maine, and New Hampshire. Our obesity classifications are within the range of the BRFSS's 95% confidence interval (CI) for Maine and Vermont. Our overweight classifications, however, are within the range of the BRFSS's 95% CI for only Maine.

Table 2-3. Overweight and Obesity Survey Comparison by State

	Auto-Classification (2009)			BRFSS (2009)		
	N	Obese	Overweight	N	Obese	Overweight
Maine	350	26.9	37.1	7776	26.4 (25.1-27.7)	37.8 (36.3-39.3)
New Hampshire	281	28.5	38.8	5725	26.3 (24.6-28.0)	36.5 (34.6-38.4)
Vermont	718	22.3	38.3	6444	23.4 (22.0-24.8)	34.8 (33.4-36.3)

Note. 95% Confidence Interval for BRFSS Obese and Overweight columns.

(National Center for Chronic Disease Prevention & Health Promotion : Behavioral Risk Factor Surveillance System 2009)

2.3.5 Geospatial data analysis

In the first phase of the TIYL panel, all 1417 respondents were asked to identify themselves as rural, suburban or urban. Only respondents in the final four season panel were included in the geospatial data analysis.

Rural houses may sit farther back from the road than urban houses and therefore geocoded addresses for urban and rural respondents would differ. The geocoded point is located on the road in front of the house. In urban and suburban developments the house sits close to the road but rural areas the house may be setback. In vehicular focused studies the difference between geocoded point and the house is negligible, but a study incorporating biking and pedestrian activities could be heavily influenced if long setbacks from the road were ignored.

Using the physical addresses of the panel respondents and satellite imagery the distance from the geocoded address to the nearest building edge was measured to determine if distance from the street to the house was different between the two groups. Rural houses averaged 163 feet (n=139) from the geocoded point to the nearest building edge while urban houses averaged 57 feet (n=100). Urban standard deviation was 32.8 feet while rural standard deviation was 171 feet. Maximum distance in the sample for rural houses was 1461 feet while urban houses maximum distance was 189 feet. Minimum distances were similar 8 feet for urban and 9 feet for rural.

Addresses were geocoded using ArcMAP 10 with the US streets geocode service locator. A 98% match rate was achieved. 2009 TIGER/Line® Shapefiles available from the U.S. Census Bureau demarking urban areas were used to determine a household's rurality. The Shapefiles often use midline of streets as a boundary which would include houses on one side of the street and exclude homes on the opposite side. A 0.05 mile buffer was applied to the selection to include addresses that fell on the sides of streets not included in the Shapefiles boundaries.

Urban areas include all urban areas and urban clusters. This may be broadly defined as any area with 50,000 or more inhabitants with a minimum density of 1,000 people per square mile, places with between 2,500 and 50,000 inhabitants and a minimum density of 500 people per square mile and less densely settled enclaves that connect such areas (U.S. Census Bureau, 2009).

Distance was measured in ArcMAP 10 using the measure feature. Distance was determined at a map scale of 1:1000, from the geocoded point to the closest available building. For consistency there was no attempt to follow roads, driveways, or paths. 100 addresses were randomly selected from the urban respondents and because of the high variability of rural respondents a somewhat larger sample of 139 was selected from the rural group. Imagery resolution was noticeably higher on average for the urban group than the rural selection.

Satellite imagery was sourced from the built in Imagery provided by ESRI in the ArcMAP software.

3. Results

The primary objective of Signature Project 4a was to measure the effects of seasonality and mobility (unmet travel demand and number of trips) on Quality of Life (QOL).

3.1 Results of Primary Objective

The structural equation model to measure the effects of seasonality and mobility on QOL was developed using preliminary models to determine the probability of a respondent having unmet travel demand and to predict the number of trips a respondent will make. These two new variables are then included in the final OLS model. Table A-1 (see Appendix) presents the results of the binary logistic model to measure the effects of community amenities, attitudes, demographics, and seasonal weather upon whether or not a respondent had unserved travel demand.

Variables that significantly decreased the probability that a respondent had unserved travel demand included the perceived availability of grocery stores, a feeling of safety, and the availability of at least one motor vehicle. The strongest effect of these variables was the availability of at least one motor vehicle which resulted in a 25.3% decrease in the probability of having unserved travel demand. A perceived availability for grocery stores, and a feeling of safety equal to 10 resulted in an 11% and 19% decrease in the probability of having unserved travel demand, respectively, as shown in the marginal effects column of Table A-1. Variables that significantly increased the probability that a respondent had any form of unserved travel demand included being male (4.3% increase), worse than typical weather (5.9% increase), if weather affected your travel (11.4% increase), and knowing people who had unserved travel demand (6.4% increase).

The second model is shown in Table A-2. This truncated regression model predicts the number of trips a respondent made in a given day. The perceived availability of grocery stores (0.85 more trips per 10 unit increase in availability) and places you can walk to (0.39 more trips per 10 unit increase in availability) both increased the number of trips a respondent made in a given day, as did having at least a bachelor's degree (0.27 more trips), living in a multiple adult household with children (0.51 more trips as compared to households with multiple adults and no children), and feeling safe making a trip after dark (0.36 more trips). Respondents who agreed that they traveled less when gas prices were high made 0.24 more trips than their counterparts (it should be noted that at the time of data collection, gas prices were lower than in the recent past). The perceived availability of restaurants (0.49 fewer trips per 10 unit increase in availability) decreased the number of trips a respondent made in a given day.

The final model is a linear OLS regression with the dependent variable QOL shown in Table A-3 (see Appendix). The model had an Adjusted R Square value of .37. The presence of any form of unserved travel demand, had the greatest impact on QOL with a 1 unit decrease (-.954) out of 11 possible units. Neither the number of trips made nor any of the weather variables had any significant effect on QOL (controlling for unserved travel demand).

QOL was significantly increased by the perceived availability of adequate housing (0.61 units per 10 unit increase in availability), access to neighbors you consider friends (1.09 units per

10 unit increase in availability), and a feeling of safety (1.52 units per 10 unit increase in availability), as well as enjoying your daily travel (0.275 unit increase), having a typical day (0.214 unit increase), and living more years in northern New England (0.002 unit increase). The perceived availability of affordable housing significantly decreased QOL by 0.5 units per 10 unit increase.

Figure 3-1 below presents structural equation model (SEM) of the entire analysis. The perceived availability of safety was the only variable which affected both unserved travel demand (negatively) and QOL (positively). Figure 3-1 provides a graphic representation of the variables of the SEM that were significant predictors of their respective dependent variable, as well as the Beta coefficient value (impact) of each of the significant variables. It also displays the significant variables coded for the relevant segment of the hypothesized model depicted in Figure 1-1.

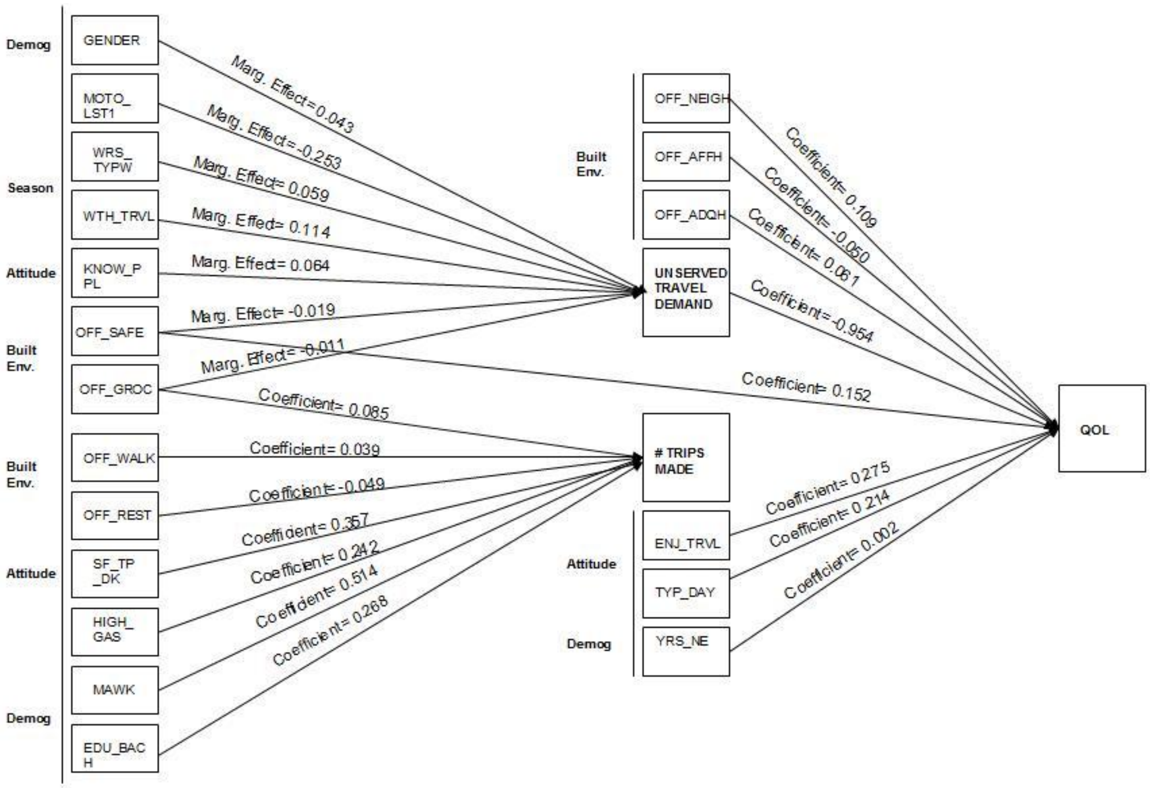

FIGURE 3-1. Structural Equation Model of Significant Variables Impact on QOL.

3.2 Other Results

Other areas of investigation in the project were to better understand the reasons for unmet travel demand and, specifically, the effect of weather and seasonality on unmet travel demand. The research team also investigated the effect of community amenities on QOL, and the effect of the community type (rural vs. urban) on QOL, as well as considering the interaction effect of the importance of community amenities and the amenities' availability in the community. Selected results from these investigations are presented below.

Table3-4 presents the results, across seasons, of respondents who had *places they needed to go but couldn't in the past week*. Unserved travel demand (not being able to get places you need to go) was rare in all four seasons, including winter. Winter demonstrated the greatest percentage of respondents who had unserved travel demand, followed by spring. Over all seasons, transportation issues were the most common reason for unserved travel demand. The issue that most affected respondents, in a single season, was weather in winter.

Table 3-4. Incidence of unserved travel demand (places you needed to go last week but couldn't), by season

	Spring N=648	Summer N=647	Fall N=646	Winter N=650
Unserved travel demand	5.1%	3.6%	3.4%	6.8%
Reasons for unmet demand				
Transportation	2.0%	0.8%	0.5%	2.6%
Time	1.5%	1.2%	1.5%	0.5%
Accessibility	1.1%	0.9%	0.9%	1.0%
Weather	0%	0.2%	0%	3.2%
Health	0.8%	0.9%	0.6%	0.8%
Affordability	0.3%	0.2%	0%	0.3%
Social	0.2%	0.3%	0%	0.3%
Other	0.2%	0%	0%	0%

Figure 3-2 presents a 100% stacked bar graph illustrating the role of each issue in causing unserved travel demand in each season. As shown in Figure 3-2, weather was challenging to mobility only in winter, while accessibility and health challenges were equally likely to occur in all seasons.

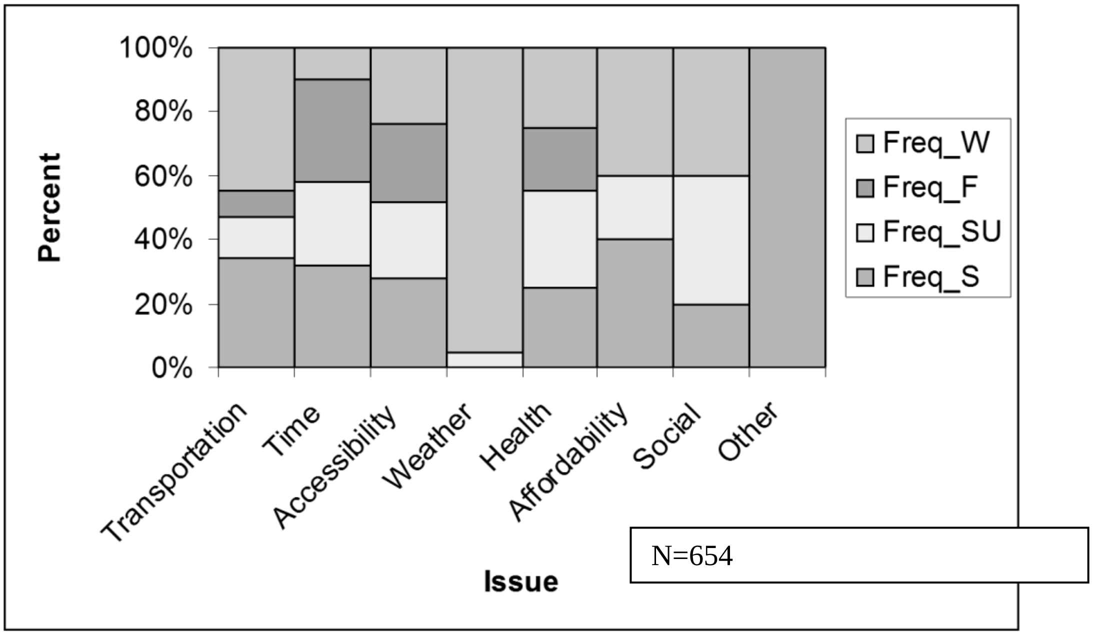

Figure 3-2. 100% Stacked Bar Graph – Unserved Issues Across Panel

Table A-5 (See Appendix) presents the results of a random effects model estimated using regression techniques. The random effects model allows for time-varying variables such as the causes of unserved demand over the four seasons of the panel. Controlling for both time-varying (season) and invariant demographic characteristics, this model shows that causes of unserved travel demand have a significant impact on QOL. Affordability issues, which include price of gas and other financial considerations, had the largest impact, reducing QOL by nearly 2 full units. Access, weather and health issues also had a negative impact on QOL. Both age and the winter season were shown to have a small, but significant, positive impact on QOL.

These results suggest that, in northern rural climates, winter weather appears to be an exacerbating factor. While winter weather-related unserved travel demand was not specifically correlated with these vulnerable populations, the winter weather appears to have made getting where residents of these populations needed to go, that much more difficult, to the point where already existing vulnerabilities, i.e. rurality, low-income, and unemployment, that were not evident in the other seasons, now became a factor in contributing to transportation-related unserved travel demand.

Table A-6 (See Appendix) shows the mean and standard deviation for each of the community amenities tested, as well as QOL, for rural and non-rural residents. While the level that many of these community amenities are offered at differs between rural and non-rural residents, the overall QOL does not differ significantly; nor are there differences in the demographic characteristics of the residents. T-test for equality of means revealed the significant differences between both the importance and availability of rural versus non-rural community amenities, as well as the non-significant difference in QOL.

These t-test results show that despite having a comparable QOL, rural and non-rural residents value the importance of amenities differently. One hypothesis is that amenity availability and importance affects QOL differently for rural and urban residents. An Ordinary Least Squares (OLS) regression was used to estimate whether rurality is simply shifted the intercept for QOL or if it changed the slope and the intercept. To test this hypothesis, an f-test of restrictions was performed on the linear model to test the null hypothesis that they are a single population and the results (F = 4.10***) rejected the null hypothesis. That is, to understand the relationship between community amenities and QOL, rural residents need to be treated as a separate population and not just a variable to control for in the regression model.

To estimate the effect of amenities on QOL, OLS regression was used. Table A-7 (See Appendix) shows the results of an OLS model that controls for perceived amenity importance as well as demographic variables. When importance is controlled for in the model, fewer amenities affect QOL and the impact of those amenities that are significant is smaller when importance is controlled for. The two amenities (affordable housing and education & training) with a negative relationship between availability and QOL are not significant when importance is controlled for. The availability of grocery stores (.045), adequate housing (.059), employment opportunities (.088), safety (.112), natural surroundings (.133) and places you can walk to (.074) predict QOL for rural residents of Northern New England. As in the first model, being older (.008) and male (-.238) increases QOL, though the effect of age on QOL is less when controlling for importance. Residents who believe that natural surroundings are important increases QOL by .145 units. In addition, availability of natural surroundings and a feeling of safety have impact QOL by .133 and .112, respectively.

Results of a multivariate model which uses the panel survey data to predict meal patterns and obesity are provided in Tables 3-8 and 3-9, respectively. This recent analysis attempts to determine the relationship between transportation variables, such as access to public transportation, number of vehicles in the household and unmet travel demand to predict meal patterns. The predicted meal pattern cluster values are then included in the second stage model which predicts likelihood of healthy weight or overweight compared to obese.

Table 3-8. Results from the first multivariate logistic regression of meal pattern clusters

	Eat at home and away cluster			*Mostly eat away from home* cluster		
Independent Variable	B†	Marginal Effects Averaged Over Individuals	P-value	B†	Marginal Effects Averaged Over Individuals	P-value
Constant	1.21	.1685	.281	1.737	.1202	.332
Under 5	-.061	.0375	.858	-1.151	-.1117	.058*
Youth	-.259	-.0237	.308	-.656	-.0540	.088*
Teen	.148	.0346	.581	-.11	-.0174	.769
# employed in HH	.067	.0047	.528	.205	.0174	.158
Years in NNE	.001	.0002	.368	.002	.0001	.535
Age	-.016	-.0021	.06*	-.026	-.0018	.041**
VT	-.151	-.0318	.441	.032	.0097	.91
Income < 15,000	-1.04	-.1255	.058*	-1.941	-.1477	.083*
Income 15,000 – 34,999	-.859	-.1050	.022**	-1.575	-.1192	.009***
Income 35,000 – 74,999	-.354	-.0416	.236	-.689	-.0531	.085*
Income 75,000 – 149,999	.119	.0344	.683	-.241	-.0290	.535
Race	.166	.0795	.793	-1.065	-.1129	.118
Gender	-.123	-.0253	.514	.015	.0068	.955
Drivers license	-.783	-.1031	.16	-1.261	-.0913	.109
Taxi	-1.158	-.1912	.125	-.970	-.0462	.405
Public transportation access	.51	.0912	.015**	.265	.0042	.375
Public transportation use	.292	.0631	.571	-.098	-.0224	.908
Bike use	.701	.1431	.08*	-.047	-.0349	.946
# of vehicles	.042	.0097	.655	-.032	-.0049	.807
Unmet travel demand	-.384	-.0197	.316	-1.331	-.1156	.093*
Availability of grocery stores	.015	.0024	.647	.013	.0007	.771
Access to grocery stores	-.025	-.0661	.959	1.415	.1415	.218
Nearest food source	-.062	-.0103	.343	-.048	-.0021	.609
Choose a healthy diet	-.629	-.0758	.001***	-1.174	-.0894	.000***

Note. N=664. X^2 =111.72, p=.000***.
†Logistic regression coefficient. *P<.1, **P < .05, *** P < .01.
All results are reported comparing to *Mostly Eat at Home* cluster.

Table 3-9. Results from the second stage of the multivariate logistic regression

	Not Overweight cluster			*Overweight* cluster		
Independent Variable	B†	Marginal Effects Averaged Over Individuals	P-value	B†	Marginal Effects Averaged Over Individuals	P-value
Constant	-3.638	-.6271	.005***	-.738	.3165	.466
Eat at home & away cluster	-.049	-.0279	.85	.129	.0358	.6
Eat away cluster	-.123	-.0298	.739	.04	.0255	.904
Under 5	.638	.0976	.142	.222	-.0345	.6
Youth	.506	.0409	.13	.451	.0350	.159
Teen	.624	.0422	.076*	.617	.0570	.064*
# employed in HH	.083	.0298	.474	-.099	-.0336	.409
Years in NNE	-.016	-.0025	.004***	-.005	.0009	.209
Age	.01	.0008	.342	.009	.0006	.383
VT	.472	.0588	.042**	.265	-.0026	.222
Income < 15,000	-.588	.0447	.361	-1.217	-.1979	.043**
Income 15,000 – 34,999	-.949	-.0767	.034**	-.846	-.0657	.046**
Income 35,000 – 74,999	-.353	-.0496	.361	-.157	.0115	.671
Income 75,000 – 149,999	-.403	-.0423	.295	-.286	-.0112	.439
Race	1.251	.3105	.161	-.459	-.2706	.44
Gender	-.008	.0477	.973	-.37	-.0829	.085*
Availability of grocery stores	.072	.0048	.055*	.071	.0066	.043**
Access to grocery stores	.35	.0714	.527	-.012	-.0493	.98
Nearest food source	.075	-.0012	.321	.122	.0176	.086*
Choose a healthy diet	1.463	.1741	.000***	.884	.0059	.000***
Enjoy physical activity	.468	.0610	.083*	.243	-.0071	.312
Exercise	1.07	.1069	.000***	.8	.0391	.000***

Note. N=664. X^2 =159.4, p=.000***.
†Logistic regression coefficient. *P<.1, **P < .05, *** P < .01.
All results are reported comparing to *Obese* respondents.

4. Implementation/Tech Transfer

The results of this Signature Project 4a have been used to inform several proposals for future research.

- Perceptions filter contextual effects on mobility and energy balance
- Estimating contextual and mediating effects of the environment on energy balance
- Estimating the effect of mobility and food choice on obesity
- Rural Elderly Access to Healthcare

The results of the primary objective were presented at the Transportation Research Board 2012 Annual Meeting.

Interim Results have been presented as posters at TRB Conferences in 2009 and 2010.

Two M.S. Theses were based on analysis of the data gathered in this project.

- Association of the built food environment and consumer food choice on meal patterns and implications on obesity in rural northern new england: a two-stage multivariate logistic regression analysis – Faye Conte, 2012
- Amenity Deserts in Northern Climates: Meeting Needs Amongst Rural Communities – David Propen, 2010

5. Conclusions

- Based on qualitative and quantitative results, seasonality and weather do not constitute barriers to mobility or impede QOL independently, but rather exacerbate other barriers such as lack of personal vehicle.

- Rural residents have different systems of values than non-rural residents of Northern New England. The relationship between their natural and built environment and their QOL is different.

- Having access to a motor vehicle has the strongest effect on probability of unserved travel demand. Availability of grocery stores and feeling of safety in community both significantly decreased likelihood of unserved travel demand.

- Availability of grocery stores and places to walk to in the community increase the number of trips made.

    - Note that more grocery store availability increases the number of trips, but decreases the probability of unserved travel demand.

- Unserved travel demand has a strong impact on QOL, showing a one unit decrease, out of all possible units, in QOL when there is unserved demand. Feeling safe in one's community resulted in the biggest increase in QOL.

- Unserved travel demand is rare in all seasons, though more likely in winter. Reasons for unserved travel demand included transportation issues, time, accessibility, weather, health, and affordability.

    - Across all seasons, unserved travel demand due to affordability had the biggest negative impact, reducing QOL by nearly two units (out of a possible 11).

- Better availability of grocery stores decreases probability of being in obese cluster, compared to overweight or healthy clusters.

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Appendix

TABLE A-1. Binary Logistic Model to predict Probability of Unmet Travel Demand

Variable	Coefficient	Marginal Effects	b/St.Er.	P(|Z|>z)	
Constant	0.615	0.091	0.777	0.437	
Grocery Store	-0.072	-0.011	-1.837	0.066	*
Restaurant	-0.004	-0.001	-0.104	0.917	
Clothing Store	-0.004	-0.001	-0.086	0.931	
Affordable Housing	0.052	0.008	1.082	0.279	
Adequate Housing	0.000	0.000	-0.006	0.995	
Healthcare Provider	-0.015	-0.002	-0.441	0.659	
Family	-0.003	0.000	-0.104	0.917	
Friends	-0.080	-0.012	-1.587	0.113	
Neighbors	0.008	0.001	0.182	0.856	
Education & Training	0.025	0.004	0.699	0.485	
Employment	-0.071	-0.010	-1.557	0.120	
Recreation	-0.010	-0.001	-0.226	0.821	
Feeling of Safety	-0.127	-0.019	-2.550	0.011	*
Arts & Entertainment	-0.002	0.000	-0.041	0.967	
Place of Worship	0.034	0.005	0.867	0.386	
Childcare	0.065	0.010	1.598	0.110	
Natural Surroundings	0.088	0.013	1.476	0.140	
Place you can walk to	0.006	0.001	0.186	0.853	

Gender	0.291	0.043	1.699	0.089	*
Age	-0.008	-0.001	-0.947	0.344	
Income $50,000+	0.148	0.022	0.724	0.469	
BA or more education	0.041	0.006	0.211	0.833	
Rural	-0.206	-0.031	-0.950	0.342	
At least 1 motor vehicle	-1.262	-0.253	-2.404	0.016	*
At least 1 bicycle	0.012	0.002	0.053	0.958	
Access to public transportation	0.096	0.014	0.483	0.629	
Valid driver's license	-0.259	-0.041	-0.631	0.528	
Employed	0.178	0.026	0.804	0.422	
Multiple adult with children	0.157	0.024	0.684	0.494	
Single adult, no children	0.205	0.032	0.780	0.436	
Single adult, with children	0.331	0.054	0.752	0.452	
Weather typical	0.376	0.059	1.838	0.066	*
Weather affected my travel	0.653	0.114	2.100	0.036	*
Afraid to drive in bad weather in the spring	0.193	0.030	0.674	0.500	
Travel less when gas prices high	0.164	0.024	0.901	0.368	
Able to get places you need to go	-0.467	-0.078	-1.469	0.142	

Feel safe walking after dark	0.110	0.016	0.491	0.624	
Enjoy daily travel	-0.286	-0.044	-1.471	0.141	
Believe should walk/bike more	0.318	0.044	1.473	0.141	
Think about climate change when travel	0.116	0.017	0.646	0.519	
Feel safe making a trip after dark	-0.063	-0.009	-0.232	0.816	
Know people with trouble getting needed places	0.428	0.064	2.398	0.017	*

Note. Model correctly predicted 98.47% of actual 0s (respondents without unmet demand).

n=984

TABLE A-2. Truncated Probit Model to predict # of Trips Made

Variable	Coefficient	Standard Error	b/St.Er.	P(|Z|>z)	
Constant	1.145	0.573	1.997	0.046	*
Grocery Store	0.085	0.024	3.486	0.001	***
Restaurant	-0.049	0.027	-1.849	0.064	*
Clothing Store	0.014	0.025	0.558	0.577	
Affordable Housing	0.000	0.030	0.004	0.997	
Adequate Housing	0.005	0.032	0.167	0.867	
Healthcare Provider	0.003	0.022	0.156	0.876	
Family	0.011	0.018	0.622	0.534	
Friends	0.027	0.032	0.849	0.396	
Neighbors	-0.019	0.026	-0.752	0.452	
Education & Training	0.005	0.022	0.233	0.816	
Employment	-0.027	0.028	-0.964	0.335	
Recreation	-0.042	0.027	-1.558	0.119	
Feeling of Safety	0.018	0.034	0.524	0.600	
Arts & Entertainment	-0.035	0.026	-1.352	0.177	
Place of Worship	-0.018	0.024	-0.735	0.462	
Childcare	0.014	0.024	0.567	0.571	
Natural Surroundings	0.059	0.038	1.540	0.124	
Place you can walk to	0.039	0.019	2.068	0.039	*
Gender	-0.077	0.105	-0.732	0.464	
Age	0.007	0.005	1.418	0.156	

Income $50,000+	-0.148	0.124	-1.199	0.230	
BA or more education	0.268	0.118	2.266	0.023	*
Rural	-0.148	0.130	-1.139	0.255	
At least 1 motor vehicle	0.619	0.416	1.487	0.137	
At least 1 bicycle	0.038	0.134	0.284	0.776	
Access to public transportation	-0.175	0.119	-1.474	0.140	
Valid driver's license	-0.427	0.296	-1.440	0.150	
Employed	0.096	0.133	0.722	0.470	
Multiple adult with children	0.514	0.140	3.684	0.000	***
Single adult, no children	0.010	0.164	0.059	0.953	
Single adult, with children	0.131	0.282	0.464	0.643	
Weather typical	-0.092	0.134	-0.682	0.495	
Weather affected my travel	-0.119	0.236	-0.505	0.614	
Afraid to drive in bad weather in the spring	0.034	0.189	0.180	0.857	
Travel less when gas prices high	0.242	0.111	2.176	0.030	*
Able to get places you need to go	-0.288	0.219	-1.316	0.188	
Feel safe walking after dark	-0.085	0.139	-0.613	0.540	
Enjoy daily travel	0.051	0.123	0.410	0.682	
Believe should walk/bike more	0.142	0.128	1.113	0.266	
Think about climate	0.028	0.109	0.259	0.796	

change when travel					
Feel safe making a trip after dark	0.357	0.175	2.042	0.041	*
Know people with trouble getting needed places	-0.109	0.110	-0.990	0.322	
Sigma	1.421	0.042	34.134	0.000	

n=891 (observations after truncation)

TABLE A-3. Linear Model: QOL Regression

Variable	Coefficient	Standard Error	b/St.Er.	P(|Z|>z)	
Constant	2.439	3.369	0.724	0.469	
Grocery Store	0.042	0.165	0.256	0.798	
Restaurant	0.000	0.098	0.003	0.997	
Clothing Store	0.001	0.033	0.032	0.974	
Affordable Housing	-0.050	0.025	-1.989	0.047	*
Adequate Housing	0.061	0.028	2.163	0.031	*
Healthcare Provider	-0.015	0.019	-0.795	0.427	
Family	-0.024	0.026	-0.926	0.354	
Friends	0.012	0.057	0.207	0.836	
Neighbors	0.109	0.044	2.495	0.013	*
Education & Training	-0.023	0.021	-1.125	0.261	
Employment	0.089	0.056	1.589	0.112	
Recreation	0.007	0.084	0.083	0.934	
Feeling of Safety	0.152	0.043	3.509	0.001	***
Arts & Entertainment	0.020	0.070	0.282	0.778	
Place of Worship	0.040	0.039	1.018	0.309	
Childcare	-0.022	0.033	-0.663	0.507	
Natural Surroundings	0.153	0.116	1.317	0.188	
Place you can walk to	0.035	0.076	0.465	0.642	
Gender	-0.092	0.171	-0.534	0.593	
Age	0.014	0.014	0.960	0.337	

Income $50,000+	0.000	0.301	-0.001	0.999	
BA or more education	0.210	0.516	0.407	0.684	
Rural	0.304	0.310	0.978	0.328	
At least 1 motor vehicle	-0.450	1.169	-0.385	0.700	
At least 1 bicycle	-0.080	0.135	-0.592	0.554	
Access to public transportation	0.016	0.353	0.046	0.964	
Valid driver's license	-0.105	0.846	-0.124	0.902	
Employed	0.007	0.213	0.032	0.975	
Multiple adult with children	-0.070	1.003	-0.070	0.944	
Single adult, no children	-0.208	0.134	-1.553	0.120	
Single adult, with children	0.010	0.341	0.029	0.977	
Weather typical	-0.011	0.205	-0.055	0.956	
Weather affected my travel	-0.034	0.291	-0.117	0.907	
Afraid to drive in bad weather in the spring	0.030	0.168	0.177	0.859	
Travel less when gas prices high	-0.063	0.474	-0.133	0.894	
Able to get places you need to go	-0.032	0.591	-0.055	0.957	
Feel safe walking after dark	0.093	0.202	0.459	0.646	
Enjoy daily travel	0.275	0.144	1.905	0.057	*
Believe should	-0.286	0.288	-0.991	0.322	

walk/bike more					
Think about climate change when travel	-0.117	0.109	-1.068	0.285	
Feel safe making a trip after dark	-0.153	0.688	-0.222	0.824	
Know people with trouble getting needed places	-0.266	0.232	-1.149	0.251	
Maine resident	0.005	0.109	0.048	0.962	
New Hampshire resident	-0.090	0.117	-0.776	0.438	
Typical day	0.214	0.099	2.168	0.030	*
Years living in Northern New England	0.002	0.001	1.981	0.048	*
Predicted # of trips	0.308	2.204	0.140	0.889	
Predicted unserved travel demand	-0.954	0.316	-3.019	0.003	**

Note. Adjusted R Square=.3679

n=984

Table A-5. Random Effects QOL Model, estimated using regression techniques

Variable	Coefficient	Standard Error	b/St. Er.	P[|Z|>z	
Constant	7.455	0.389	19.152	0.000	***
Gender	-0.082	0.094	-0.870	0.384	
Age	0.009	0.004	2.081	0.037	*
High Income	-0.026	0.107	-0.248	0.804	
BA or more	0.128	0.098	1.303	0.193	
Rural	0.158	0.106	1.487	0.137	
1 or more motor vehicles in household	-0.117	0.188	-0.622	0.534	
1 or more bicycles in household	0.066	0.085	0.771	0.441	
Access to public transportation	0.033	0.055	0.604	0.546	
Possess valid driver's license	-0.026	0.245	-0.105	0.916	
Employed	0.069	0.112	0.610	0.542	
Multiple adults, kids	0.107	0.124	0.863	0.388	
Single adult, no kids	0.007	0.139	0.052	0.959	
Single adult, kids	-0.158	0.269	-0.587	0.557	
Transportation Issue	-0.036	0.205	-0.175	0.861	

Access Issue	-0.642	0.245	-2.615	0.009	**
Weather issue	-0.529	0.248	-2.131	0.033	*
Affordability issue	-1.993	0.489	-4.078	0.000	***
Health issue	-0.474	0.261	-1.818	0.069	*
Social issue	0.190	0.490	0.388	0.698	
Other issue	0.729	1.083	0.674	0.501	
Time issue	-0.115	0.210	-0.548	0.584	
Spring	-0.040	0.054	-0.737	0.461	
Fall	0.021	0.054	0.380	0.704	
Winter	0.118	0.055	2.163	0.031	*

Note. Adjusted R-squared = 0.345E-01

Note. N= 646

Table A-6. Rural and non-rural comparison of QOL and ratings of amenity availability and importance

Variable	Rural N=980 Mean (Std Dev)	Non-Rural N=437 Mean (Std Dev)	Rural N=980 Mean (Std Dev)	Non-Rural N=437 Mean (Std Dev)
Quality of Life	7.87 (1.63)	7.75 (1.76)		
	Importance		Availability	
Grocery Store	7.78 (2.20)***	8.30 (2.00)	5.64 (3.35)***	7.75 (2.49)
Restaurant	5.59 (2.42)***	6.44 (2.38)	5.01 (3.11)***	7.12 (2.55)
Clothing Store	4.71 (2.44)***	5.24 (2.49)	2.93 (2.93)***	5.31 (3.05)
Affordable Housing	7.22 (2.84)***	7.74 (2.49)	4.59 (2.47)***	5.46 (2.39)
Adequate Housing	7.47 (2.49)*	7.88 (2.33)	5.53 (2.48)***	6.22 (2.18)
Healthcare Provider	7.92 (2.29)**	8.28 (2.12)	5.41 (3.41)***	7.26 (2.51)
Family	7.01 (2.92)	7.22 (2.79)	5.49 (3.64)**	6.01 (3.38)
Friends	7.80 (2.05)*	8.04 (2.09)	7.10 (2.57)***	7.41 (2.37)

Neighbors	7.24 (2.29)	7.22 (2.46)	6.94 (2.72)	6.93 (2.84)
Education & Training	7.54 (2.37)	7.55 (2.52)	5.28 (3.10)***	6.45 (2.85)
Employment	7.83 (2.63)	7.98 (2.54)	3.89 (2.54)***	5.25 (2.56)
Recreation	7.37 (2.05)*	7.60 (1.86)	6.63 (2.68)***	6.95 (2.25)
Safety	8.89 (1.71)	8.89 (1.55)	8.15 (1.97)	7.98 (2.14)
Arts & Entertainment	6.09 (2.30)***	6.57 (2.14)	4.31 (2.85)***	5.92 (2.61)
Place of Worship	5.30 (3.38)***	5.99 (3.33)	6.73 (2.85)***	7.59 (2.42)
Childcare	5.05 (3.51)	5.20 (3.67)	5.15 (2.82)***	5.93 (2.56)
Natural Surroundings	8.53 (1.62)***	7.92 (1.93)	8.88 (1.63)***	7.85 (1.98)
Places you can walk to	6.61 (2.69)***	7.31 (2.55)	5.50 (3.33)***	6.76 (2.83)

Table A-7. QOL Regression: Perception of Availability controlling for importance

	Rural			
Variable	B	t	B	t
Constant	3.334***	6.705		
	Importance		Availability	
Grocery Store	.007	.251	.045*	1.900
Restaurant	.017	.604	-.003	-.098
Clothing Store	-.019	-.670	.002	.096
Affordable Housing	-.090**	-2.953	-.027	-.908
Adequate Housing	.013	.371	.059**	1.975
Healthcare Provider	-.018	-.606	-.006	-.295
Family	.010	.426	-.017	-.937
Friends	-.045	-1.176	.033	1.077

Neighbors	.069**	2.036	.044	1.467
Education & Training	.003	.103	-.035	-1.578
Employment	-.062**	-2.325	.088***	3.222
Recreation	-.019	-.581	.012	.461
Safety	.080**	2.291	.112***	3.385
Arts & Entertainment	-.041	-1.352	.042	1.575
Place of Worship	.002	.092	.017	.736
Childcare	-.001	-.038	-.006	-.245
Natural Surroundings	.145***	3.923	.133***	3.323
Places you can walk to	-.042*	-1.759	.074***	3.620
Demographics				
Age	.008*	1.642		
Gender (Female = 1)	-.238**	-2.287		

Income ($50,000 or more = 1)	-.015	-.137
Children in household	.074	.577
Education (At least BA = 1)	-.040	-.333
Adjusted R^2	.321	

*p<.1

**p<.05

***p<.01