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A Decade of Research in Transportation and Land Use

NITC Research Roadmap: Lit Review

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What follows is an **excerpt** from the full report “**NITC Research Roadmap: Transportation and Land Use**,” which serves as internal guidance to where our focus on research and workforce development should be applied next in this area. It is one in a series of six reports looking at:

Transportation and Land Use

Multimodal Data and Modeling

Walking and Bicycling

New Mobility and Technology

Transportation Equity

Transportation Resiliency

These excerpts provide a lookback of the last decade of projects funded by the National Institute for Transportation and Communities, a U.S. DOT University Transportation Center. Through these literature reviews we hope you'll gain new transportation insights that our researchers and partners have shared.

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NITC Research Roadmap: Transportation and Land Use *Lit Review*

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National Institute for Transportation and Communities

The National Institute for Transportation and Communities (NITC) is one of seven U.S. Department of Transportation national university transportation centers. NITC is a program of the Transportation Research and Education Center (TREC) at Portland State University. This PSU-led research partnership also includes the Oregon Institute of Technology, University of Arizona, University of Oregon, University of Texas at Arlington and University of Utah. We pursue our theme — improving mobility of people and goods to build strong communities — through research, education and technology transfer. **Learn more at** <https://nitc.trec.pdx.edu/>

Recommended Citation

Currans, Kristina. NITC Research Roadmap: Transportation and Land Use. NITC-RR-1545. Portland, OR: Transportation Research and Education Center (TREC), 2022.

Table of Contents

Table of Contents	1
Acknowledgements	2
Overview	3
Methodology	3
What do we know about transportation and land use research?	5
Travel Behavior, Land Use Patterns, and External Impacts	5
Transportation, Jobs/Housing, and Property Value	7
Attitudes, Preferences, Choices, and Decision-Making	8
Housing and Transportation Affordability	10
Vulnerable Communities	12
Integrated T&LU Planning and Evaluating Trade-Offs	13
Conclusions	15
References	16

Acknowledgements

This project was funded by the National Institute for Transportation and Communities (NITC; grant number 1545), a U.S. DOT University Transportation Center.

Within this research roadmap, several professional interviews were conducted to help inform this roadmap. The team would like to acknowledge the following professionals for their time and thoughts.

- Keith Bartholomew, Professor, University of Utah
- Shima Hamidi, Associate Professor, John Hopkins University
- Jason Jurjevich, Associate Professor of Geography, University of Arizona
- Gerrit Knaap, Professor, University of Maryland National Center for Smart Growth
- Jenny Schuetz, Senior Fellow, Brookings Institute
- Janille Smith-Colin, Assistant Professor of Civil and Environmental Engineering, Southern Methodist University
- Shawn Teigen, Research Director, Utah Foundation

Additionally, the following professions provided both qualitative interviews as well as a review of our draft roadmap. We are thankful for their input and time.

- Stefanie Brodie, Research Practice Lead, Toole Design
- Myriam Igoufe, Chief Research and Innovation Officer, Dallas Housing Authority
- Shyam Kannan, Associate Vice President, Mid Atlantic Transit Lead, HDR
- Lindsey Romaniello, Planner II, Community and Planning Services, Missoula County
- Alex Steinberger, Partner, Cascadia Partners

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Overview

Decades worth of research indicate the interconnected ties between travel behavior and land use. In academic research, travel itself is often treated as a demand derived from the activities for which it serves. In practice, coordinating and linking transportation and land use decision making proves to be challenging. Furthermore, with increasing urgency to address concerns of social, environmental, and economic equity of access, in this document we survey the state-of-knowledge with respect to contributions of research from the **National Institute for Transportation and Communities (NITC)** and provide a roadmap for research aiming to address gaps and needs for practice.

This roadmap aims to capture a wide variety of disciplines working to understand the transportation and land use relationship for different purposes and at different temporal and/or spatial scales, including, but not limited to urban planners, engineers, lawyers, geographers, economists, social workers, computer scientists, policy analysts, and political decision makers. The intent of this roadmap is not to provide a comprehensive literature review or overview, but rather identify recent trends in work and highlight relevant needs for academia and practice to address in the near term.

In this document, we refer to the relationship between Transportation and Land Use (T&LU) broadly. Transportation, for example, captures everything from infrastructure (supply) to travel behavior (observed or latent demand). Land use on the other hand includes everything from the activities travelers wish to achieve to the land use patterns (such as density or diversity of use mixes), to designated land use and zoning in place in local communities. In this roadmap, we often refer to the term “accessibility”. Accessibility in this context describes the access of people, households, firms, and neighborhoods to opportunities, which may include jobs, homes, businesses (from retail to offices), or transportation opportunities (e.g., transit stations, bike share locations).

It is important to note that the topic of “transportation and land use” is especially broad. While we have attempted to synthesize high-level themes in research and practice, this complex and interdisciplinary area of work is particularly unwieldy. The outline of this roadmap is as follows. First, we examine broad categories of NITC contributions to the interdisciplinary field of transportation and land use research. We then describe and identify areas where there are gaps in knowledge that may inhibit research itself, or practice’s ability to implement knowledge. We then outline short-term research needs (e.g., within 5 years). Lastly, we specify opportunities and needs for workforce development that encourages translation of state-of-the-art research and knowledge into the communities for which we serve.

Methodology

To prepare this roadmap, we took a two-pronged approach: professional interviews and a literature review. First, we identified a variety of researchers across academia and in think-tank businesses that cover a range of disciplines, communities and regions, and career tenures. We

began individual interviews with the immediate research team and then expanded our network of contributors. We requested an interview to discuss the state-of-knowledge, gaps in research, and workforce development needs. We then expanded our interviewee list to incorporate five additional practitioners representing a range of industries and regions. These interviewees were paid community participants and were also involved in the review of this manuscript. Second, we conducted a review of NITC literature, starting with projects that aligned with themes culled from the interview process and then expanding to other related Transportation and Land Use themes covered by NITC. Research and workforce need themes were largely identified through the interview process and subsequent roadmap team discussions but were augmented with findings and discussions identified throughout relevant NITC project reports.

What do we know about transportation and land use research?

In this section of the Research Roadmap, we leave the major gaps in research to the following section (“Gaps in Knowledge”). In this section, we instead aim to explore the thematic areas of NITC-led research that have expanded our knowledge of the transportation and land use relationship, in academic contexts and in practice. This section focuses first on the underlying T&LU relationship and corresponding indirect impacts, the importance of preference and choices, and policy support and regional coordination.

Travel Behavior, Land Use Patterns, and External Impacts

One of the most well supported areas of research in the T&LU realm reinforces that there is in fact a relationship, and there are many potential indirect outcomes that communities experience depending on their built environments. The built environment indicators are often called the “D’s” (Cervero & Kockelman, 1997)—starting with Density, Diversity (such as land use mix), and Design (including connectivity indicators transportation infrastructure routes) and later extending to Destination accessibility and Distance to transit and so on. And while research in this area may not be expansive in larger scales—such as multiregional studies—there are numerous meta-analyses that have aimed to synthesize the relationships between travel outcomes—primarily personal, motorized vehicle use—and the built environment “Ds” (Ewing & Cervero, 2001, 2010; Stevens, 2017).

Many examples of NITC research have helped unpack the influences of the built environment on travel behavior in different ways. In Clifton et al (2012), a study of more than 70 retail and service locations observed higher rates of multimodal travelers than previously expected by industry standards, indicating standard industry estimation—such as those provided by the Institute of Transportation Engineering Trip Generation Handbook—vastly overestimates vehicle demand. The following study by Clifton et al (2017) qualitatively detailed local influences in multimodal travel demand on influencing mode share at these retail and service locations. For example, the permeability between the development site and surrounding neighborhood was a qualitative indicator of walking or biking accessibility. Nationally focused analyses on travel to and from multifamily housing reiterate similar perspectives (K. Clifton & Currans, 2019).

Transit-oriented development (TOD) and transit-adjacent development (TAD) are planning strategies that leverage denser and more accessible built environments to encourage both transit use and active travel, thus reducing vehicle dependence and increasing physical activity. Several NITC studies have improved our understanding about TODs in terms of improving access, increasing multimodal travel, and decreasing transportation costs associated with vehicle ownership and use, including McNeil and Dill (2020). Scheer et al (2017) compared TOD to those classified as transit-adjacent areas—those within proximity to transit but with less activity and intersection density. They found that households either moving to a TOD from a

TAD, or those in locations transitioning into a TOD, would save enough in terms of vehicle ownership and maintenance costs, on average, that the increases in transit-related expenses would create net financial savings on transportation. The authors found that TOD neighborhoods encourage residents to walk and take transit more while driving less than TAD (39% less vehicle miles traveled per household and 35% fewer auto trips, comparatively).

While TODs often represent nodal centers oriented around high-quality transit locations, it would stand that the role of the built environment in terms of land use contributes to how different multimodal arterials might operate in urban areas as well. Larice and Scheer (2016) contributed a typology of designs for urban arterials and described an “urban arterial issue”, which describes a uniform definition of arterials that do not adequately capture the varying complexity for which these facilities serve. The activities (and therefore, land uses) surrounding the facilities may better describe the functionality of the facilities to the surrounding communities as opposed to their function in terms of volume and/or throughput. Challenges to urban arterials, as the authors note, may occur when maintenance and operations for many urban arterials fall into the hands of stakeholders at a state- or county-level, which may have goals that misalign with the desires of the local communities through which the arterials pass. Additionally, engineering and level-of-service requirements for these kinds of facilities often dictate conflicting demands for capacity and flow, as do the commuting populations who use facilities as routes to work, not always as varying places to achieve activities.

Activity centers outside of transit-nodes or corridors operate in different ways. Ewing et al (2020) conducted a literature review, review of comprehensive plans, and analysis of household travel surveys to provide planning guidance around polycentric center development. The work identifies land use patterns (densities, intersection connectivity, access to transit and jobs) that support stronger multimodal outcomes for different types of regional centers. Wei et al (2021) found that, although automobile travel may dominate outside of centers, a case study in Utah suggests that compact development, open space, and walkability encouraged the kinds of multimodal trip chaining occurring in urban areas. In some contexts, there is evidence to suggest that people’s willingness to pay to limit the negative externalities of these environments (such as traffic noise, pollution) may be greater than the positive benefits of increasing accessibility (Tian et al., 2017), but these kinds of studies are currently limited (but growing). Regardless, it is unclear whether or how regional planning and policy efforts—full of a complex network of multicriteria information and decision-making processes (Margerum et al., 2012)—are fully enabled to adequately capture the benefits of planning for activities centers. Margerum et al (2017) studied the relationship between regional planning and policies that have encouraged the adoption of center-based planning, and the results were somewhat mixed. In some areas, transportation incentives seemed to influence the development of centers, while in others market forces and transit investments seemed to be more important. The study of how governance and policies influence the built environment, and in the end, behavior, remains an important area of research.

Even as the transportation landscape rapidly changes, especially since the COVID-19 pandemic, these kinds of studies reinforced the idea that T&LU researchers and practitioners do

have a firm understanding that the built environment influences travel choices. For example, vehicle use and dependency tends to increase as residential and job densities decrease and urban form patterns become more sprawling and further separated. The longer distances between destinations correspond with increased reliance on automobile travel and longer trip lengths, which increases greenhouse gas emissions and lowers rates of cycling and walking, thus decreasing physical activity. Sprawl—a term often used to describe the (often subsidized) low-density growth of land development on the fringes of urban areas—is also not financially sustainable at larger scales. The implications for coordinated transportation and land use planning extend to numerous other outcomes for communities, including but not limited to health, environmental quality, equity, affordability, safety, and economic prosperity.

Transportation, Jobs/Housing, and Property Value

Economic vitality is often a primary goal that agencies and practitioners consider when evaluating transportation and/or land use plans, one notable and substantial area of work contributed by NITC researchers has explored the economic relationship between multimodal transportation infrastructure and development. From theoretical works of Alonso (1964), Mills (1969), and Muth (1969), economists and researchers have long understood the ties between land rents and values and regional accessibility or locations. In more recent decades, UTC researcher Arthur Nelson has led the way in exploring the notable contribution of transit investments—particularly fixed-guideway transit (FGT)—on land values as well as firm and household location changes. Over several projects, the author examined more than 30 metropolitan areas and FGT systems to identify substantial influences between the transit infrastructure and development response in the U.S. The notable theme of this work is that quality transit investments see both higher rates of adjacent development within walking distance to the station and often corresponding increases in land value.

Furthermore, Nelson et al (2015a) found that the development of light-rail (LRT) and streetcar (SCT) systems between 2000 and 2010 saw some of the highest growth rates of housing development within an 1/8th mile of the station and up to 3/4 mile—indicating housing development and household preferences were strongest in adjacent parcels to the systems. Development of bus-rapid transit (BRT), saw higher rates of housing development from 3/4-to-1-mile buffers around stations, indicating development was greatest at a relatively walkable (and non-adjacent) distance. Another study from Nelson et al (2015b) found that across 23 LRT and SCT systems, jobs increased in many sectors up to a mile away from the stations between 2008 and, most notably in jobs located in offices, education, and the health care sectors. Further work by Nelson et al (2021) expanded the analysis to include consideration for different place types—categories that describe the characteristics of the built environment, like mixed-use or intersection density. This study found that BRT, CRT, SCT and LRT stations attracted growth in all development sectors overall though with considerable variation between systems and importantly with considerable variation by place-type favoring more mixed-use, accessible places than lesser ones.

In a related analysis published in (2019), Nelson and Hibberd found significant corresponding increases in land values in proximity to a variety of land use types (office, multifamily, retail) and fixed-guideway systems (LRT, BRT, SCT, and commuter rail transit or CRT), controlling for regional location, demographics, and structural differences in parcel characteristics. Although many findings indicate increases in demand for transit-oriented development, larger increases in land values can often indicate competitive supply. This might suggest that the development that does occur near transit stations is still not enough to supply the needs of the regions, on average at least.

It is challenging to summarize succinctly all the findings that Nelson et al have generated in the suite of NITC monoliths and corresponding papers—e.g., (2015a; 2015b; 2019; 2021). However, one consistent theme of Nelson’s work is that there is a vast latent demand for high-quality, transit-oriented development in metropolitan areas in the U.S. Some of the larger observations of growth around fixed-guideway transit appeared in the period after the 2008 recession, after many regions expanded their network in response to federal transit funding programs. In 2013, Nelson anticipated that nearly a quarter of U.S. households might select to live within a nearby distance to fixed-guideway transit, only if those areas were developed with adequate housing supply (2013).

In (2018), NITC researchers Liu and Shi conducted a series of similar analyses with respect to bicycle infrastructure and accessibility in the Portland, Oregon metro area. They considered the relationship between different measures of bike accessibility—including proximity to facilities, directness of proximity, access to destinations, and bikeability from a safety and comfort perspective—economic measures like business vitality (e.g., consumer spending) and property values. The authors found significant and positive correlations between distance-based and low-stress network-based bike accessibility measures for office, retail, services, and park employment. Higher bike accessibility ratings were also associated with higher residential—especially multifamily—property values. The authors then demonstrate how their analysis can be applied to consider the social equity impacts of the 2035 Metro City Greenways plan on different historically marginalized communities in the area, including: the proportion of people of color; households with incomes less than 200% of the federal poverty line; person who identify as unable to speak English; and older or younger persons (65 and older or 17 and younger, respectively).

Attitudes, Preferences, Choices, and Decision-Making

Attitudes and preferences for characteristics of travel, households, and neighborhoods play a powerful, but less understood, role in understanding travel and activity choices. Although we understand that human behavior and personal values influences one’s housing choices and travel behavior decisions such as activity (or trip) generation, commute mode choices, or even sometimes route choices, our work reveals that we know *how* attitudes and preferences matter in decision making, but we do not yet know enough about *why*. Throughout the professional interviews conducted during this project, one theme is clear: we know that individual and household preferences matter a lot in terms of travel, activities, and location choices, but we do

not yet know enough to operationalize this understanding to better provide transportation infrastructure and services or land use patterns that anticipate these preferences in a widespread manner. This area of research becomes increasingly important as local agencies are looking to understand how different strategies and programs might increase access to destinations, lower transportation costs, and improve other outcomes such as quality of life or satisfaction.

In response, NITC has contributed several studies that explore market response to programs and strategies targeting improved access to services. For example, McNeil et al (2021) evaluated whether a pilot transportation demand management (TDM) program, “Transportation Wallet for Residents of Affordable Housing” in Portland, Oregon, improved use of services and access to destinations by providing a suite of discounted transportation services. The authors found that more than half of the participants increased their access to try different transportation modes, including primarily transit and ride-hailing. Just under a third of participants signed up for shared electric scooter and bike services, although a large proportion did not continue to use these services. While the program had difficulties in implementation, it indicated high degrees of transit use for a variety of activities and amenities—work/school, medical appointments, shopping errands, and social and/or recreational travel.

TDM programs that encourage active travel may have additional indirect benefits in addition to mode shifting for traffic management or improving access to services. In Yang et al (2018), active travel during commutes correlated with both lower job and life stress—including notably fewer reported conflicts between work and family—and lower corresponding volumes of cortisol, a primary stress hormone affecting physical and emotional wellbeing, in the system of study participants. While Yang et al (2018) notes that both households and businesses might benefit from encouraging active commuting travel, this area of work is still in its infancy. More work is needed to understand how additional factors centered around work commitments—such as engagement activities and/or interactions with others—might influence stress. Additional base research in this area could illuminate the reasons why active commuting influences variations in both stress and behavior. In an on-going extension of this line of work, Yang et al (2018) are currently examining whether and how the costs of riding transit influence ridership in a program for low-income riders, including an examination of alternative mode use and the ways in which changes in mobility influence well-being and destination accessibility.

While the work of McNeil above evaluates TDM programs, it may be increasingly fruitful to encourage evaluating transportation options before residential (or workplace) location choices are made. In one foundational study, Clifton et al (2015) evaluated residential location preferences within neighborhoods with distinctly different land use patterns and mobility options, associating preferences with household attitudes towards home, transportation, and neighborhood characteristics. In this choice experiment, the authors found the following residential characteristics to be most strongly associated with the respondent’s neighborhood preferences: living near established, older homes; living in a detached single-family home; living at the “center of it all”; having a private yard, walking to bus and/or rail stops; and walking to nearby places. However, there is a dissonance between residential preferences and location

choices, primarily in that residents often say they prefer more dense, urban neighborhoods than they actually do. This indicates a latent demand for more multimodal and accessible neighborhoods and punctuates the need to incorporate residential preferences in travel demand models to better predict residential location choices (and preferences). Building from this study, additional work was completed examining preferences across smaller MPOs in Oregon (Lewis & Parker, 2018).

Looking further, to understand how transportation information might *influence* decision making, Tremoulet and Dann (2016) evaluated the ability for a residential-location choice toolkit helping Housing Choice Voucher (HCV) participants find housing with improved transportation environments. This toolkit includes messaging that *nudged* housing seekers to consider differences in walkability, estimate the costs of transportation for regular travel, and provides other information about how transportation can play a role in reducing household costs alongside the housing voucher. However, the authors found that the toolkit made little difference in improving the transportation accessibility of HCV participants, although the housing market in the study area (Portland, Oregon) was considerably more constrained at the time. They note that this kind of toolkit may assist in areas where there is greater flexibility in terms of residential location choices.

Housing and Transportation Affordability

A natural extension of work that explores economic outcomes of transportation investments is affordable access to housing and transportation services. Increases in land value are often a result of increased competition for limited supply, and rising rents and property values places substantial gentrifying pressure on vulnerable households that may either inhibit their ability to achieve basic needs or displace them by forcing them to move to a less expensive, albeit often less accessible, area. This means that while several transportation infrastructure strategies may aim to improve multimodal access to opportunities, some investments might be counterproductive, adding pressures to the very communities they aim to help.

NITC research has provided guidance in foreseeing these issues and strategies for accommodating them. As Ewing and Hamidi (2015) have indicated, the U.S. Department of Housing and Urban Development's (HUD) have historically provided a rental assistant program that provides subsidies unconstrained by place, which may not have considered the lack of affordable transportation in more sprawling, suburban areas. The authors recommend that HUD direct subsidies to better locations, which include more compact, walkable, and transit-oriented neighborhoods. This concept of "housing + transportation affordability" was termed "location efficiency" or "location affordability", which led to the creation of the HUD Location Affordability Index (LAI). The LAI is intended to provide a sense for the housing and transportation affordability relative to market incomes and needs by finding average location-based measures of affordability, assuming housing at or less than 30% of total income is affordable for housing costs and 15% for transportation costs. The index provides a national-level approach to measuring and comparing trends in affordability, and it is used in conversations amongst policymakers, researchers, and practitioners when framing the two-pronged approach to

housing and accessibility costs and burdens. However, relying on LAI as a universal metric of affordability may misrepresent (or hide) very low-income individuals that are extremely burdened by transportation costs near 15% of their income. As Igoufe (2018) explains, because the metric is an aggregate measure of costs, there may be a number of households that are overburdened by transportation costs even within a block group listed as “affordable”.

National-scale performance metrics are incredibly valuable, but not without their limitations. In Ganning and Tighe (2017), for example, the authors explore (LAI) in “shrinking” or weaker market cities. In this study, Ganning and Tighe (2017) analyze archived data and conduct a survey to examine location affordability for households in 12 census tracts in Cleveland, Ohio. They found both housing and transportation costs were overestimated for these Cleveland locations, although most households studied still incurred unaffordable expenses. By centering the study around shrinking cities, the authors were able to consider the implications of housing and transportation costs together in areas that were representing those redeveloping, stable, and declining neighborhoods. Ganning and Tighe note that transit authorities are facing especially difficult decisions in terms of service and coverage, not only because of declining population, development, and ridership, but failure of regional planning to control sprawling land use patterns that spread destinations out, further thinning resources across the region. Igoufe (2018) notes that even the 15% benchmark for “transportation affordability” in the LAI index—a threshold derived from average transportation expenses compared with pre-tax income—may be unaffordable for many, not just very low-income individuals. Metrics that consider residual income, not just ratio costs to income, may improve our ability to capture the nuances of household expenditures and affordability.

This speaks to the value of *locally* driven data and analysis that can better pin-point neighborhoods and households specific needs. In Bates and Golub (2017), the NITC researchers examine existing conditions and trends in housing supply, conditions, and affordability along a proposed BRT line in Portland, Oregon to assess environmental and social justice outcomes for vulnerable populations along the line. Despite improving access to jobs and destinations (and therefore location efficiency or affordability), existing trends in housing suggest that particularly more vulnerable neighborhoods, such as “persistently low-income” neighborhoods, already face increasing pressures in terms of housing affordability and supply.

Another localized example of demographic analysis is provided in Sandoval’s two NITC reports (2015, 2016). In these analyses, the author provided two sets of case studies comparing TOD in low-income, Latino neighborhoods in California. Notably, Sandoval’s findings from both studies indicate the importance of recognizing and building on existing social, cultural, political, and economic capital within the neighborhood, and guiding public processes to have authentic participation from the community when developing implementation plans. A similar theme prevails: while multimodal investments have invaluable contributions for improving location efficiency and affordability, successful implementation requires localized analysis and meaningful public participation to achieve results that benefit all members of the community.

Policy evaluation and toolkits lend support for practitioners hoping to integrate policies that provide equitable access to community stakeholders and groups. In a presentation by Brown et al (2021), the authors highlight initial findings from a policy scan of equity requirements in local micro-mobility programs as part of an ongoing NITC study (Brown & Howell, 2021). One important component identified in equity-based program evaluation is how agencies address the geographic distribution of micro-mobility requirements as they relate to access to jobs, food, and healthcare. These goals can be measured through collecting information about traveler trip purpose, aggregated origin/destination flows, or disaggregated origin-destination flows by demographic strata (e.g., race, ethnicity, income, age). Beyond providing equitable access and micro mobility, research within transportation and land use needs to focus on the “time value” of transportation. Places that improve their access to goods and services might have poor capacity or frequency, but people conceptualize travel and make their travel decisions based on minutes.

Vulnerable Communities

A small but growing subsection of NITC research has focused on vulnerable subsections of the population and the nuanced ways in which different people experience environments differently. In this section, we highlight a few examples (outside of those discussed in the previous section) that will improve our understanding of how access to amenities and opportunities varies in different populations, and what practitioners can do about it.

For example, Crutchfield et al (2020) conducted qualitative interviews and quantitative surveys to compare the transportation and access characteristics of (non-)environmental-justice (EJ) populations in suburban “boom towns” (areas of sprawl observing rapid economic growth). The qualitative findings reported on-going challenges for EJ populations accessing opportunities and basic needs (housing, employment, healthcare, education), while the quantitative findings indicated that most residents rely on a personally owned vehicle, and thought public transit and ride share were inconvenient in these suburban areas. Unsurprisingly, EJ populations without a personal vehicle reported extreme challenges accessing transit.

There are several on-going studies in Utah, Arizona, and Texas that look deeper at accessibility needs within specific communities. Mitschke et al (2022) will be studying the role of transportation and community cohesion in housing location choices of refugee and immigrant communities in Dallas County, Texas. Similarly, Myadar et al (2021) will also conduct mixed-methods work evaluating transportation mobility and quality of life for refugee communities in Tucson, Arizona. Wang et al (2021) plan to integrate socioeconomic vulnerabilities of people, households, and businesses in resiliency assessments of emergency management infrastructure planning using readily available and archived census data. In Dallas, Texas, Nordberg et al (2021) are evaluating access to services that reduces recidivism for former inmates and offenders, and in Salt Lake City, Canham et al (2021) are evaluating the impacts of decentralized homeless shelter and provider services (from one center to four) on improving access of the unhoused to services offered.

Integrated T&LU Planning and Evaluating Trade-Offs

Most of the evidence in this field points to how powerful transportation infrastructure investments can be when coupled with land use strategies and planning. Concurrent and synchronized T&LU planning shifts people's behavior and interactions with the environment, and as a result, coordinated planning in this realm provides more powerful results when considering the implications on location efficiency as well as greenhouse gas emissions (climate response), climate adaptation, equitable access, and other outcomes.

Transportation infrastructure planning and land use regulation and governance tends to be tied to different political jurisdictions, complicating the ability for local and regional practitioners to think about travel and land use in an integrated and complementary manner. Further, many agencies and communities are facing increasing pressure to understand, assess and trade-off across a broader range of outcomes. NITC researchers have explored a variety of housing and transportation efficiencies, competition between economic vitality and affordability, as well as themes that explore the implications of land use patterns on transportation greenhouse gas emissions, and public health outcomes including physical activity, disease, and exposures. Most studies have focused on large metropolitan areas (e.g., New York, San Francisco, Portland, Boston), often overlooking mid-sized and smaller regions and a broader suite of place types—from suburban, to exurban, to small town communities and regions. When communities and regions are not readily able to consider the implications across political boundaries, efforts around mitigating gentrification, displacement, health exposures, and economic vitality may shift implications to neighboring jurisdictions. Effective interventions require organizational strategies that enable agencies to work together and partner. Research in this area is small but growing.

Among places overlooked by transportation and land use research, rural towns, and places with high natural amenity value, widely considered gateway communities, are currently experiencing “big city problems” like rapid increases in population growth and tourism, low wages, lack of affordable housing, and income inequality. Rumore et al (2019) created a unified definition of western towns with high natural amenity value that are experiencing these problems, naming them Gateway and Natural Amenity Region Communities (GNAR), which was the first step in being able to effectively study these places to a degree that reflects their regional importance. Migration to GNAR communities and rural gentrification causes regional spillover in smaller towns that often rely on planners with limited capacity. (Rumore & Stoker, 2021) is continuing to assess challenges in GNAR communities, paying special attention to ways in which COVID-19 pandemic rapidly exaggerated existing challenges.

For the practicing transportation and/or land use professional, the goal of creating opportunities for a thriving and livable community becomes convoluted in weighing trade-offs, regardless of the scale of political boundaries. In many cases, there are decades' worth of studies and understanding about the implications of a variety of outcomes that communities care about and how to mitigate or improve. There are fewer examples and tools that showcase how generally academic concepts might translate to practice.

In one NITC study, Lewis and Parker (2018) used a survey to unpack perceptions of what makes a community “livable” and found demographics played a role in perceptions. “Livability” is often a term referenced in local goal setting practices, and it is largely meant to encompass a broad range of social, environmental, and economic outcomes that make a place feasible, enjoyable, and worth living in. In Lewis and Parker (2018), the authors found, unsurprisingly, that households weight different neighborhood and transportation characteristics differently. For example, Millennial households saw their neighborhoods as more livable than Boomers, and Boomers more than Generation X. Similarly, households appeared to make trade-offs between prioritizing accessibility of their residential location choice (a positive indicator of livability) or affordability (a negative indicator). Households also listed trade-offs that they made when deciding where to live and how to get around. Overall, the study found residents trade off characteristics that correspond both positively and negatively with “livability”, including proximity to parks and grocery stores (positive) and retail (negative); a variety of multimodal options for travel (positive) and driving to work (negative); street infrastructure and mix retail/service and residential services (positive) and proximity to mixed-use, density, and perceived density (negative). From a regional decision-making perspective, this can make evaluating trade-offs at a regional or even project-level challenging.

Conclusions

In this report, we have outlined existing NITC literature on interdisciplinary transportation and land use research, and we identified major gaps in knowledge and prioritized short-term research goals and workforce development needs. The primary theme throughout this Research Roadmap process has been around identifying, understanding, and communicating trade-offs on a wide range of goals and outcomes corresponding with a variety of transportation and land use decision making. Research and workforce development needs are greatest where they improve (a) access to a variety of measurable outcomes at different scales that are also sensitive to the implications for different populations, and (b) evaluation and communication tools that can help facilitate different discussions on trade-offs as they correspond with both transportation and land use decisions that affect the following including, but not limited to: addressing inequitable implications or historically systemic inequities; multimodal access to services and destinations; multimodal infrastructure; land use development (both incremental and broader zoning and built environment patterns).

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