LOCATION AFFORDABILITY:
PRACTICES, CHALLENGES, AND PATTERNS IN OREGON METROPOLITAN PLANNING ORGANIZATIONS

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Master of Community and Regional Planning
Professional Project
June 2020

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ABSTRACT

A growing body of research suggests that using measures of location affordability rather than traditional housing-based measures improves our understanding of the cost-related challenges households face. Prompted by this advancement and new federal requirements for performance-based planning and programming, several of the nation's largest metropolitan planning organizations (MPOs) have begun incorporating location affordability into their long-range transportation plans (LRTPs) to better guide policy and evaluate outcomes. My research explores the role that location affordability can serve in the long-range planning practices of Oregon MPOs and offers policy recommendations. It focuses on the state of Oregon's ten MPOs, who serve populations ranging from 57,000 to 1.5 million, and their long-range transportation plans (LRTPs). To conduct this research, I used a mixed-method approach, relying primarily on a content analysis of LRTPs and spatial analysis of housing-transportation costs as a percent of household income in MPOs. This study demonstrates the extent of the location affordability challenge facing various household types, analyzes its spatial patterns to explore neighborhood disparities, and evaluates how Oregon MPOs have incorporated location affordability and associated concepts into LRTPs. Results suggest that location affordability is largely absent from Oregon MPO LRTPs, and that future plan updates should include guidance statements and performance measures focused on improving location affordability for moderate-income and median-income households and be targeted at specific neighborhoods within the region.

ACKNOWLEDGEMENTS

I would like to express my deepest appreciation to my committee chair, Rebecca Lewis, Ph.D., and second reader, Yizhao Yang, Ph.D., for their steadfast guidance and support throughout the development of this project. Without their keen insights and contributions, it would not have been possible.

I wish to acknowledge encouragement, patience, and assistance of my family, who helped me see the forest through the trees.

I would also like to extend my gratitude to my colleagues in the University of Oregon's Master of Community and Regional Planning program. Especially helpful were Jenna Chilingerian, Emerson Hoagland, Zackary Luckin, and Catherine Rohan, who reviewed materials throughout.

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CHAPTER 1 | INTRODUCTION

Across the United States, a large and growing share of households struggle to find housing they can afford. The U.S. Department of Housing and Urban Development (HUD) considers housing affordable if housing-related expenditures, like mortgage payments, rents, or utilities, do not exceed 30 percent of household income. If housing costs surpass 30 percent or 50 percent of income, policymakers consider households to be housing cost burdened or severely housing cost burdened, respectively (U.S. Department of Housing and Urban Development, 2020). In 2017, the national percentage of households experiencing housing cost burden reached 31.5 percent, while the share of severely housing cost-burdened households was 15.2 percent (Veal & Jonathan, 2018). The state of Oregon likewise finds itself in a crisis where nearly one in three households, and one-half of renters, faced housing cost burden in 2018 (Oregon Center for Public Policy, 2018).

KEY TERMS

Housing Affordability

Housing Affordability: The ability of households to obtain and pay for housing without experiencing undue financial hardship.

Housing Cost Burden: The percent of household income spent on housing-related expenditures exceeds 30 percent.

Severe Housing Cost Burden: The percent of household income spent on housing-related expenditures exceeds 50 percent.

Location Affordability

Location Affordability: The ability of households to obtain and pay for housing and transportation without experiencing undue financial hardship.

Housing-Transportation (H+T) Cost Burden: The percent of household income spent on housing-transportation costs exceeds 45 percent.

Severe H+T Cost Burden: The percent of household income spent on housing-transportation costs exceeds 65 percent.

Sources: Acolin & Green, 2016; U.S. Department of Housing and Urban Development, 2020.

This phenomenon has sparked innovation in local, state, and federal urban planning and public policy organizations towards tackling the challenge of affordability (Devajyoti, 2015). Traditionally, measures of affordability focused on the share of household income spent on housing-related expenditures. However, academics and practitioners have begun to acknowledge that analyzing housing costs alone provides an incomplete picture (Acolin & Green, 2016). For a complete view, transportation-related expenditures, such as vehicle payments, fuel, or fares, must be accounted for as well (Devajyoti, 2015).

Measures that combine the share of household income spent on housing and transportation (H+T) costs are known as measures of location affordability (Hartell, 2018). Location affordability broadly refers to the ability of households to obtain and pay for housing and transportation without experiencing undue financial hardship. Under this new paradigm, H+T costs become a burdensome share of household income at 45 percent, which is based on the traditional 30-percent threshold for housing costs, plus 15 percent for transportation costs (Acolin & Green, 2016). For the purposes of this report, I was interested in calculating severe H+T cost burden as well, but no precedent existed. To assess it, I considered a household severely H+T cost burdened if the share of income spent on H+T costs exceeded 65 percent, which is based on the 50-percent threshold for housing costs, plus 15 percent for transportation costs.

Until recently, the main barrier to adopting location affordability into planning practice was data availability. No national survey, including the U.S. Census, collects standardized household transportation expense data (US Department of Housing and

Urban Development, 2019). As a solution, scholars developed two models to estimate H+T costs as a percent of household income – the Housing and Transportation (H+T) Affordability Index and the Location Affordability Index (LAI) (Center for Neighborhood Technologies, 2019; US Department of Housing and Urban Development, 2019). Academics have since extensively used both indices to study cities' location affordability and its determinants (e.g., Acolin & Green, 2016; Mattingly & Morrissey, 2014; Isalou & Litman, 2014; Vidyattama, Tanton, & Nepal, 2013). However, to date its incorporation into general planning practice is sparse and its practical role in addressing the affordability crisis remains unclear.

In the U.S., several scholars have suggested that federally mandated policy boards called metropolitan planning organizations (MPOs) offer a natural avenue for incorporating location affordability into practice because they are responsible for conducting regional transportation planning. By guiding federal investment, MPO's help shape their region's transportation systems and, consequently, affect aspects related to affordability across local and state government boundaries. For instance, housing location choice is influenced primarily by housing and transportation costs (Devajyoti, 2015). Thus, a region's transportation system impacts housing choice because households must consider a location's transportation options and costs (i.e., affordability) when choosing where to reside. Federal regulations acknowledge these important relations by requiring that MPO's administrative boundary reflect regional economies and forecasted population growth (Federal Transit Administration, 2019). As a result, MPO planning areas better match regional jobsheds, or how far people will travel to work, and provide a more appropriate means to address location affordability challenges than state or local governments.

Several key federal regulations further provide the basis for how location affordability can be incorporated into MPO planning practice and why now is an appropriate time. First, MPOs are federally required to produce and maintain long-range transportation plans (LRTPs) that coordinate their area's transportation planning activities. The LRTP planning process presents an opportunity for an MPO and its partners to evaluate the affordability implications of its strategies and investments. Second, following the passage of Moving Ahead for Progress in the 21st Century Act (MAP-21) and, subsequently, the 2015 Fixing America's Surface Transportation (FAST) Act, MPOs are now required to include performance management methods focused on safety, infrastructure condition, and travel reliability in their LRTP (Hartell, 2018). The introduction of these new requirements has spurred interest in including location affordability performance measures, or "a variable…selected to represent a[n]…issue of interest and applied in a goal-setting context", into LRTPs (Hartell, 2018, p. 32). In fact, several MPOs have already done just that, but practices vary from plan to plan and its implications are unclear.

Purpose and Research Contribution

The existing literature related to location affordability is small and growing, but critical gaps remain in understanding how it can guide and inform regional planning analysis and policy in the United States. Fortunately, its conceptual foundations are well-studied and offer a wide breadth of knowledge to help frame its origins and potential uses. Housing affordability and cost burden, for example, have been studied

for decades and are institutionalized into standard planning practice. In spite of this, the synthesis of these concepts into location affordability is a recent occurrence.

The literature discussing location affordability primarily focuses on the testing and application of the location-affordability indices, like the LAI and H+T Affordability Index. Insights from these studies have helped inform and guide current planning practice and policy. For example, they established the quantitative case for using measures of location affordability rather than housing affordability. Research by several authors, notably Acolin & Green (2016), found that H+T-cost-based measures provide a more comprehensive assessment of cost-related challenges facing households than traditional measures based on housing costs. Secondly, such studies also demonstrated the need to situate analysis of location affordability at the region with neighborhood-level observations. Haas et al. (2013), for instance, showed the importance of examining regional household transportation cost burden at the neighborhood level to reveal local disparities, while Mattingly & Morrissey (2014) showed that when measures of location affordability are used at the neighborhood scale they help better showcase the affordability of compact cities at the metropolitan scale.

Despite this, research shows that location affordability remains largely absent from U.S. regional transportation planning practice. In a study of 21 large MPOs, who had populations greater than 2.5 million in 2010, Hartell (2018) found that just six LRTPs (28%) included location affordability in its goals, strategies, or objectives. The smallest of which was the East-West Gateway Council of Governments (St. Louis, Missouri), who had a population of 2.57 million (2010) (U.S. Federal Highway Administration/Federal Transit Administration, 2020). Furthermore, several of these plans focused on measuring and improving regional location affordability, ignoring neighborhood-level patterns of affordability, which studies show provides a more comprehensive analysis. Thanks to Hartell's (2018) research, the prevalence of location affordability in these large MPO's plans, which about two-thirds of the U.S. population reside within, is well documented. Despite having similarly complex jobsheds, transportation facilities, and affordability challenges, the remaining one-third is not well documented. Little research exists that studies the practice of applying the location-affordability framework in smaller metropolitan areas, like those found in the state of Oregon.

My research fills this gap by offering insights into the role that location affordability can serve in the transportation planning practices of Oregon MPOs. The purpose of this report is to provide observations into the state of location affordability and LRTP practices in Oregon MPOs and offer policy recommendations. It focuses on Oregon's ten MPOs, which serve populations ranging from 57,000 to 1.5 million and were not included in previous studies, and their LRTPs. The study demonstrates the extent of the location affordability challenge facing various household types, analyzes its spatial patterns to explore neighborhood disparities, and evaluates how Oregon MPOs have incorporated location affordability and associated concepts into LRTPs. Each component seeks to move location affordability beyond academic discussion and towards establishing a standard planning practice.

CHAPTER 2 | LITERATURE REVIEW

In many ways, the concept of location affordability is a synthesis and a critique of several well-developed bodies of planning literature. Therefore, to explain its intellectual origins it is worthwhile to examine the literature of foundational subjects that have contributed to its evolution. I begin by identifying traditional meanings and measures of housing affordability. I then discuss the theories underlying household housing location choice with emphasis on the impacts of housing and transportation costs. Afterwards, I follow with an overview of the second-order consequences of affordability and how planners use the "jobs-housing balance" concept to address them. To conclude, I identify location affordability, its indices, and its applications in U.S. planning to situate my research within this contemporary context.

Housing Affordability

Since conception, housing affordability's prevalence in social, economic, and legal nomenclatures has led to everchanging uses, definitions, and measurement methodologies. In fact, several scholars have conducted intellectual and historical studies, tracing its origins to social science's search for "scientific laws" of social and economic life (Hulchanski, 1995; Schwartz & Wilson, 2007). While others have since studied its contemporary uses, finding that it is often used to benchmark neighborhood affordability or to measure whether a household was housing cost burdened (Acolin & Green, 2016; Hulchanski, 1995). Hence, housing affordability lacks a formal definition. In lieu, scholars tend to agree that housing affordability generally "refers to the ability of households in obtaining and paying for appropriate housing without experiencing undue financial hardship" (Saberi, Wu, Amoh-Gyimah, Smith, & Arunachalam, 2017, p. 135).

A sizeable body of literature exists on how to measure housing affordability. Scholars point to two primary methods – the ratio approach and the residual approach. Measures using the more common ratio approach are based on the share of household income spent on housing-related expenditures (Acolin & Green, 2016). Studies using the ratio approach generally agree upon setting 30 percent and 50 percent of household income spent on housing as key thresholds to evaluate whether a household is housing cost burdened or severely housing cost burdened, respectively (Acolin & Green, 2016). Yet, other authors have critiqued this approach for not assessing household's capacity to pay and changes in housing quality. They alternatively proposed using the residual approach, which is based on the concept of housing-induced poverty, to account for such aspects (Thalmann, 2003; Kutty, 2010). Regardless of which approach is used, which housing-related expenditures are included in housing costs depends on whether a household owns or rents. Housing costs for owners generally include "mortgage payments, utilities, maintenance expenditures, and taxes" (Acolin & Green, 2016, p. 43), while "gross rents, which directly or indirectly include utilities" are generally included for renters (Acolin & Green, 2016, p. 43).

Housing Location Choice

For decades, academics from various disciplines have examined the role that location plays in shaping affordability and informing household housing choice. This scholarly work is perhaps best summarized by the urban economists Alonso (1964) and Muth (1969) who famously established that "a worker's household location is the result of a trade-off between housing and commuting costs" (Devajyoti, p. 26). Under this theory, household housing location choice is driven by a desire to balance housing- and transportation-related expenditures. Location inherently plays a key role in shaping these costs. For example, houses located at the urban periphery may appear more affordable because of lower housing costs but may suffer from less accessibility to services and employment and, as a result, have higher transportation costs. On the other end, houses located near the central business district may have higher housing-related expenditures, like rental and mortgage fees, but may be more accessible and, thus, have lower transportation costs. Therefore, both housing- and transportation-related expenditures depend on housing location (Saberi, Wu, Amoh-Gyimah, Smith, & Arunachalam, 2017). Yet, as discussed earlier, traditional measures of affordability focus on housing costs alone.

The consequences of neglecting other costs that affect housing choice is perhaps best illustrated by the growing share of household income spent on transportation (Mattingly & Morrissey, 2014). In 1920, the average American household spent three percent of its income on transportation costs. By 2010, that share had grown to 16 percent (Devajyoti, 2015). This substantial shift in household expenditures has caused growing concern both in academia and at federal agencies such as the U.S. Department of Transportation (DOT) and HUD. The fear is that by overlooking location and transportation costs, traditional housing-based measures of affordability exclude key factors theoretically relevant to household housing choice and mislead government planning and policy.

In practice, however, housing choice is far more complex. Over the past few decades, observations from studies on household housing choice behavior have not strongly supported Alonso and Muth's theory of cost-based trade-offs. As a result, the concept of an excess commute or a "wasteful commute" was conceived. Researchers, such as Hamilton (1982), Giuliano (1995), and Salomon and Mokhtarian (1998), have contributed explanations for why this phenomenon exists, despite urban economist's assumption that people will minimize their transportation costs. These and other studies point to the conclusion that the cost of commuting is not simply a matter of cost optimization, rather subjective notions like attitude and lifestyle choice are significant as well (Devajyoti, 2015).

This foundational research on household housing location choice is important to location affordability for three reasons. First, it reveals that traditional housing affordability measures are inconsistent with housing location choice and urban economic theory. Second, it identifies the distortion that inaccurate affordability measures may cause in policy decisions and household housing choice. Third, it establishes that even if location affordability is more comprehensive than housing affordability, other personal preferences matter as well. Location affordability is, therefore, only one of several dimensions guiding household location choice – but a critical one at that.

Jobs-Housing Mismatches

The consequences of not addressing affordability have sweeping implications for regional economics, travel behavior, and quality of life. In regions where the supply of affordable housing is constrained, studies found that household's experience lower quality housing and neighborhoods, longer commutes, more congestion, and reductions in job creation and economic activity (Gabriel & Painter, 2017). They showed that as people trade longer commutes to consume more housing, the resulting increased jobs-housing mismatch, or a mismatch between where jobs are located and where job seekers live, exacerbates affordability issues (Urban Institute, 2019).

Several scholars have examined this phenomenon by using the concept of a "jobs-housing balance". A jobs-housing balance is based on the theory that job and housing location choice are closely linked, therefore, policy should encourage achieving an even balance of housing and jobs. Achieving a jobs-housing balance has been offered as a solution for traffic congestion and air pollution concerns as well (Guiliano, 1991). In a study examining the Los Angeles metropolitan region, Giuliano (1991) found that job-housing balance is not a transportation issue, but part of the urban development process where people trade longer commutes to consume more housing. While there were isolated job-housing mismatches at the community level, little evidence suggested that the mismatch significantly affected commuting patterns. Later, Stroker and Ewing (2014) further explored this topic and found that across the U.S. areas with an even job-worker balance have higher internal capture of work-related trips.

The complex interplay between the spillover effects of poor affordability have significant implications for agency's strategies and performance. If jobs-housing mismatches are not addressed, any reductions in housing costs will continually be offset by the resulting rising transportation costs. This suggests that housing, land use, and economic development activities must be coordinated alongside regional transportation planning to break the cycle of ever-expanding commute sheds.

Location Affordability and its Indices

For most U.S. households, housing and transportation costs are their two largest expenditures (Devajyoti, 2015). Yet, the professional and academic scholarship about affordability typically begins and ends with a discussion of housing costs alone – though, this is changing. Researchers increasingly suggest using measures of location affordability rather than housing affordability to address the transportation-related shortcomings of traditional measures (Acolin & Green, 2016). Location affordability broadly refers to the ability of households to obtain and pay for housing and transportation without experiencing undue financial hardship. Similar to housing affordability, it can be measured using the ratio approach, but instead the percent of household income spent on housing-transportation (H+T) costs is measured. Location affordability also can be used to assess whether housing or a neighborhood is affordable or cost burdened. Research tends to identify the point that a location's H+T costs become a burdensome share of household income at 45 percent, which is based on the traditional 30 percent threshold for housing costs, plus 15 percent for transportation costs (Acolin & Green, 2016).

By including transportation costs, the concept of location affordability importantly introduces the consequences of housing location choice and job-housing mismatches.

For example, affordable locations are now characterized by high accessibility to services and employment, which results in lower transportation costs because of reduced trips and/or modal shifts to walking, biking, and transit (Jahan & Hamidi, 2019). Location affordability fills the conceptual gaps of housing affordability. By defining affordability using both housing and transportation costs, household, employer, and government agency decisions will more comprehensively reflect the complex relationships between the land use, transportation, housing, and economic development characteristics of neighborhoods and regions.

At first, a major obstacle of introducing location affordability into planning practice was the absence of a standardized national database for transportation costs. In 2006, researchers at the Center for Neighborhood Technology (CNT) helped solve this problem by studying the relationship between transportation costs and the built environment and developing the Housing + Transportation (H+T) Affordability Index. The H+T Affordability Index provides estimates of H+T costs as a percent of income for a typical household in a neighborhood (Haas, Morse, Becker, Young, & Esling, 2013). Later in 2013, academia officially permeated planning practice when HUD "adopted a measure of affordability that combines housing and transport" (Acolin & Green, 2016, p. 43). In addition, HUD launched the Location Affordability Index (LAI) portal to help other agencies quantify H+T costs as a percent of income in their communities. Version 3.0 of the LAI models housing and transportation cost estimates for eight household profiles – varying by income, size, and number of commuters – at the census-tract level based on household and geographic characteristics (US Department of Housing and Urban Development, 2019).

With no definitive national data source to calculate transportation expenditures, both indices rely primarily upon a mixture of data from the U.S. Census and National Transit Database to model and generate cost estimates (US Department of Housing and Urban Development, 2019; Center for Neighborhood Technologies, 2019). Several researchers have studied the LAI and H+T Affordability Index to test their cost estimate's validity (Haas et al, 2016; Ganning and Tighe, 2017). Notably, Ganning and Tighe (2017) tested the validity of the LAI and found that it overestimates housing costs, more so for renters in metropolitan areas. This finding suggested that data must be carefully calibrated to and tested for each setting to ensure validity.

Researchers have increasingly used location-affordability indices to study domestic and, predominately, international cities' affordability and its determinants. Insights from these studies have significant implications for planning practice. For example, in 2013, Haas et al. (2013) studied the H+T Affordability Index and established the need for neighborhood-level analysis of location affordability because "comparisons at large geographies mask the value of urban form and the pockets of location efficiency that may exist in a larger geography" (Haas, Morse, Becker, Young, & Esling, 2013, p. 22). Mattingly & Morrissey (2014) similarly examined this spatial relationship by studying the housing and commuting expenditures of New Zealand at the neighborhood scale, finding that it "more accurately conveyed the locational value of centrally located housing and, if used at the metropolitan scale, better

showed the affordability of compact cities (see Figure 1 to the right) (Mattingly & Morrissey, 2014, p. 82). Later, Acolin and Green (2016) critically proved the comprehensiveness of location affordability by testing the applicability of the H+T Affordability Index by using a customized variant to measure housing affordability in Sao Paulo, Brazil metropolitan region, and found that during a seven year period the number of households spending greater than 45 percent of their income on housing and transportation combined had increased rapidly.

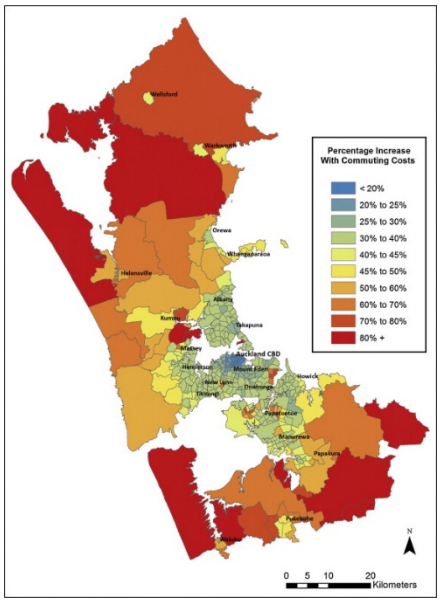


Figure 1: Percentage increase in the proportion of income spent when commuting costs are included in the housing affordability indictor in Auckland, New Zealand
Source: Mattingly & Morrissey, 2014

Location Affordability in U.S. Planning Practice

Literature on the applications of location affordability into U.S. planning practice is fast growing. Over the past few years, planning and public policy scholars have begun to explore its uses in unconventional contexts. Reina et al., for instance, found that location affordability can be incorporated in the siting of subsidized housing in a manner that avoids disparate impacts. While, Hartell (2019) studied the relationship between transportation costs, urban form, and mortgage default and foreclosures to showcase the need to incorporate the concept of location affordability into economic resilience policy and practice.

Critically, Hartell (2018) also demonstrated how large regional transportation planning agencies, known as metropolitan planning organizations (MPOs), who have populations greater than 2.5 million, have utilized it in their long-range transportation planning activities. She found that of 21 large MPOs studied, only six (28%) included location affordability in its long-range transportation plans' goals, strategies, or objectives, despite 13 of the 21 plans mentioning it in passing. Similarly, only five MPOs include a performance measure for location affordability in their current long-range transportation plan. Moreover, plans that included performance measures for location affordability unanimously defined and measured it using household housing-transportation (H+T) costs a percent of income. The spatial scale used varied between plans, ranging from regional, or MPO-wide, measures to measures focused on specific urban centers. While many referenced the Center for Neighborhood Technologies H+T Affordability Index, she did not find that this indicated the establishment of a standard practice. Hartell then used a theoretical framework to discuss how performance measures for location affordability may be designed to support planning practice. Yet, no studies have since further examined the challenges and practices of incorporating location affordability in smaller MPOs. This represents a significant gap in the literature as issues of affordability are not exclusive to large MPOs.

CHAPTER 3 | U.S. TRANSPORTATION PLANNING

Transportation plays a key role in shaping our cities, regions, and states. How, and for whom, our transportation systems are designed has broad implications. Despite finite space and resources, transportation agencies must develop a transportation system that balances the travel needs of many different users. To address this challenge, agencies use a collaborative process called transportation planning, which examines the community's past, present, and projected travel needs and evaluates alternative improvements for the transportation system (Institute of Transportation Engineers, 2020). Through this planning process, the community's vision for its system's future is generated and is then used to guide public agency's transportation plans, policies, and investments.

In the United States, transportation planning is largely conducted by state and local agencies with assistance from consulting firms and universities (Weiner, 2013). This dynamic exists because state and local agencies typically own and operate highway and transit facilities. Historically, the federal government's role has been "to set national policy, provide financial aid, supply technical assistance and training, and conduct research" (Weiner, p. 2). While it is typically absent in the operation of transportation systems, it still plays a critical role and exerts strong influence over how state and local agency's conduct planning activities. The federal government's ability, and willingness, to attach requirements to financial aid is one of its most influential tools to shape lower-level transportation planning activities.

The Federal-Aid Highway Act of 1962 (FAHW) established the role of and need for transportation planning in the United States. The purpose of the legislation was to manage federal investments into the Interstate Highway System. At the time, the federal government paid 90 percent of the cost of the development of the Interstate Highway System, requiring only a 10 percent state or local match. After passage, "any federal-aid highway project in an urbanized area of 50,000 or more in population" required approval based on a "continuing, comprehensive urban transportation planning process carried out cooperatively by states and local governments" (Weiner, p. 39). This Act is perhaps the most influential federal legislation in U.S. transportation planning history because it was the first legislation that mandated transportation planning as a condition of receiving federal capital assistance funds and established the "Three-Cs" of transportation planning – continuing, comprehensive, and cooperative. In addition, by basing the requirement on "urbanized areas" it situated transportation planning at the region rather than city level. Further, it required that planning be conducted cooperatively between states and localities.

While the FAHW of 1962 provided the impetus for all 224 existing urbanized areas to undertake urban transportation planning by 1965, it was not until the issuance of the joint highway/transit planning regulations by the Urban Mass Transportation Administration (UMTA) (known today as the Federal Transit Administration [FTA]) and the Federal Highway Administration (FHWA) in 1975 that the requirement for formal regional transportation planning agencies called Metropolitan Planning Organizations (MPOs) was created (Weiner, 2013). These joint regulations

established the institutional framework from which today's state and local transportation planning is based upon.

Metropolitan Planning Organizations

A Metropolitan Planning Organization (MPO) is a federally mandated policy board created and designated to carry out regional transportation planning. Urbanized Areas (UZAs) with a population over 50,000, which are determined by the U.S. Census, are required to be represented by an MPO. The process for designating an MPO and its planning boundary (i.e., the Metropolitan Planning Area [MPA]) involves an agreement between the state's governor and local governments that together represent at least 75 percent of the affected population (Federal Transit Administration, 2019). In addition, the geography of regional economic development and population growth forecasts are considered when establishing MPA boundaries (23 CFR § 450.312 - Metropolitan Planning Area boundaries). The transportation investments that MPOs guide play a key role in facilitating regional growth and development. As one of the few required regional agencies in the U.S., they are uniquely positioned to coordinate growth in a way that acknowledges regional, not local, characteristics and concerns.

The U.S. Department of Transportation's (DOT) Federal Transit Administration (FTA) and Federal Highway Administration (FWHA) jointly administer MPO-related planning programming and regulations (Federal Transit Administration, 2017). MPOs are required to prepare two main planning documents – a Transportation Improvement Plan (TIP) and a Metropolitan Transportation Plan (MTP) – as a condition of receiving federal planning funds. These plans must be developed cooperatively with the state, public transit agencies, and other local partners.

The short-range document, a TIP, is a "list of upcoming transportation projects…covering a period of at least four years" to be carried out within a metropolitan planning area (Federal Transit Administration, 2019). An MTP, which is also commonly referred to as a long-range transportation plan (LRTP), outlines how an MPO will "accomplish the objectives outlined by the MPO, the state, and the public transportation providers with respect to the development of the metropolitan area's transportation network" during an approximately a 20-year planning horizon (Federal Transit Administration, 2019). The LRTP must also "identify how [it] will manage and operate a multi-modal transportation system (including transit, highway, bicycle, pedestrian, and accessible transportation) to meet the region's economic, transportation, development, and sustainability goals…while remaining fiscally constrained" (Federal Transit Administration, 2019).

MPO plans must be coordinated with state short- and long-range transportation plans. In accordance with 49 U.S.C. 5304(g) and 49 USC 5304(f), each state is required to prepare a short-range statewide transportation improvement program (STIP) that is a "staged, multi-year, statewide intermodal program of transportation project…" and a long-range statewide transportation plan (SLRTP) "that provides for the development and implementation of the multimodal transportation system…" (Federal Transit Administration, 2019). This requirement for inter-jurisdictional coordination can be

traced back to the FAHW of 1962's cooperative-planning requirement. Figure 2 provides an overview of the interaction between state and MPO planning processes.

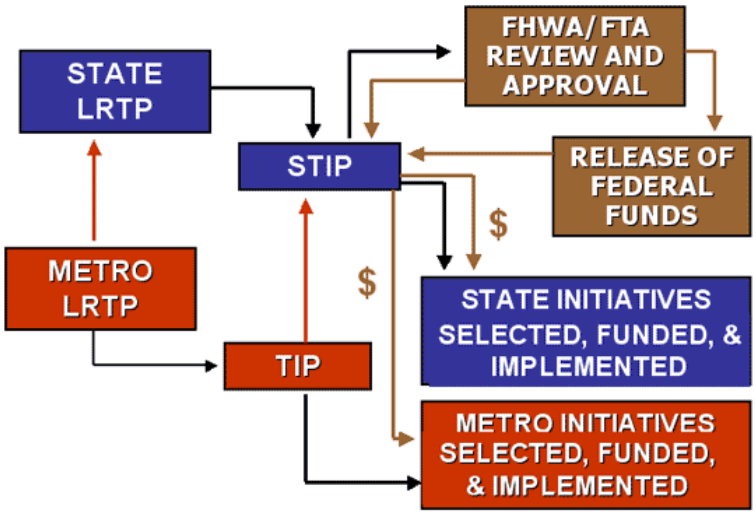


Figure 2: MPO and State Federal Transportation Planning Processes

Source: Federal Highway Administration, the Federal Transit Administration, and the Volpe National Transportation Systems Center, 2020

While federal law is clear on what planning activities must occur, it does not mention how MPOs should be organized and administrated. As a result, the organizational structure of MPOs varies substantially, with some functioning as independent agencies and others hosted by other agencies. In a 2009 national survey, Bond & Kramer (2011) found that of 133 responding MPOs, 69 percent were hosted by another agency. Regional councils (26%) were the largest host, but municipalities (20%) and counties (20%) were not far behind. Frequent reasons cited for choosing to be hosted include lower overall costs, staff synergies, and agency name recognition. However, respondents also noted disadvantages such as lack of capital float, difficulty meeting federal match requirements, and managerial independence (Bond & Kramer, 2011).

Performance-based Planning and Programming

Over the past decade, a revolution has occurred in state and regional transportation agencies. Led by changes in federal transportation policy, state Departments of Transportation (DOTs) and MPOs have begun to shift towards a performance-based framework to conduct planning and programmatic activities. Performance-based planning and programming (PBPP) approaches differ from traditional processes in that performance data is defined, monitored, and then evaluated to inform decision-making processes (Federal Transit Administration, 2018). The indicators that are used throughout PBPP are referred to as performance measures. A performance measure is "a variable, or combination of variables, selected to represent a characteristic or issue of interest and applied in a goal-setting context" (Hartell, Is Performance Measurement Improving Planning Practice? The Case of Location Affordability in Long-Range Transportation Plans, 2018, p. 32). Performance measures allow guidance statements (e.g., goals) to be converted into measurable objectives that support agencies' and the public's ability to assess the efficacy of strategies.

At the heart of the push towards the use of PBPP and performance measures is the desire for accountability. By setting clearly defined and measurable targets, agencies can be held accountable by their many stakeholders. For MPOs, this means that its policy board, local governments, state DOT, state and federal legislatures, and public can quickly gauge the success or failures of its plans, policies, and decisions. For this reason, MPOs may be hesitant to adopt performance measures. The environment in which MPOs function is incredibly complex, with social, economic, and ecological factors continuously influencing the outcomes of their short- and long-term plans and actions. Consequently, MPOs may avoid setting performance measures for elements which they have limited control or influence over. Moreover, not all outcomes, like qualitative aspects, are quantifiable and easily incorporated into a performance measure.

As a result of this disincentive for MPOs, the accountability relationship and use of performance measures is formalized and regulated by the federal government. In exchange for incorporating performance measures, targets, and reporting on their progress towards federal objectives, MPOs receive federal funding for projects. Two key federal legislative acts drive this change and establish the practice for how MPOs employ PBPP: 1) Moving Ahead for Progress in the 21st Century Act of 2012 (MAP-21) and 2) Fixing America's Surface Transportation (FAST) Act of 2015.

Like the Federal-Aid Highway Act of 1962, MAP-21 transformed how federal transportation grants were administered by "establishing new requirements for performance management and performance-based planning and programming…" (Federal Transit Administration, 2018). The purpose of the legislation was to increase the accountability and transparency of federal transportation programs and to improve project decision-making. Specifically, MAP-21 directed the U.S. DOT to establish a set of performance measures that, once established, would be required for state DOTs and public transportation providers. There are four actions the agencies must satisfy:

- "establish performance targets that reflect the measures,
- report on progress towards achieving those targets,
- develop performance-based plans for safety and asset management, and
- implement a performance-based approach to planning and programming" (Federal Transit Administration, 2018).

In 2015, the passage of the FAST Act furthered the transition towards performance-based planning that MAP-21 established with minor changes. On May 27, 2016, the FHWA and FTA published the final rule on Statewide and Nonmetropolitan Transportation Planning and Metropolitan Transportation Planning, which implemented the changes set by MAP-21 and the FAST Act for state DOTs and MPOs. The changes included:

- "requiring a performance-based approach to planning…,
- adding a structural change to the membership of large metropolitan planning organizations (MPOs) to include transit provider representation,
- adding a framework for voluntary scenario planning, and
- implementing new authority for integrating the planning and environmental review processes as well as programmatic mitigation plans" (Federal Transit Administration, 2018).

Performance measures related to safety, infrastructure condition, and travel reliability are now required to be included in MPO's LRTPs. Notably, these measures focus on outcomes directly related to transportation systems, which MPOs exert considerable influence over. To date, the federal government has avoided requiring performance measures for the second-order implications of MPO's plans. This hesitation is likely because MPO's would be held accountable for outcomes they have limited influence or control over.

Performance measures for location affordability fall into this category. While it is clear that MPO's guidance impacts transportation costs because the investments they guide shape a region's travel options, it is more difficult to establish its relation to other outcomes that affect location affordability, like housing costs or development patterns. Despite the complexity and increased accountability, the potential benefits of individual MPOs voluntarily including location affordability in its plan's performance measures are considerable. MPOs that better understand the state of their region's affordability challenge can ensure their actions improve conditions rather than exacerbate them. Moreover, the measures and their evaluation process can foster greater cooperation with community organizations and other agencies who oversee other contributing aspects, such as economic development and land use planning. Ultimately, due to its broad implications, incorporation may be an effective analytical and communication tool for MPOs to improve inter-jurisdictional and inter-disciplinary coordination.

While new federal mandates often receive push-back from the affected agencies, MPOs have been surprisingly receptive to the transition towards performance-based planning. In 2017, a national survey of 104 MPOs conducted by the advocacy organization, Transportation for America, found that 75 percent of MPOs used performance measures to some degree in their last short- or long-range planning document. Contrary to common perception, those not using them represent both large and small MPOs, which suggests that a lack of resources or expertise is a not major barrier to use. Of those who have used performance measures, most used them to evaluate current conditions (65 of 78) rather than to choose projects. Further, most performance measures used focused only on the limited range of measures required by MAP-21. Encouragingly, two-thirds (69 of 104) of MPOs surveyed indicated extreme interest in going beyond the federally required measures in a recent survey. "Data" was cited as the most significant barrier to MPOs expanding their use of performance measures (Transportation For America, 2020). These findings suggest that there is an appetite for incorporating additional performance measures into planning documents, but a perceived dearth of data, not organizational capacity, is preventing their incorporation.

Oregon Statewide Transportation Planning

Oregon is one of several states that use statewide growth management policies to regulate growth and development. In 1973, the landmark legislation, Senate Bill 100, enacted a statewide land-use planning program based on 19 Statewide Planning Goals. The goals outline the state's policies for land use-related planning activities, which include topics such as citizen involvement, housing, transportation, and natural resources. These statewide goals must be incorporated into local and state plans.

Goal 12 of Oregon's Statewide Planning Program is its transportation goal. Goal 12 aims to create a transportation system that takes into account a wide variety of modes of transportation that supports access to jobs, goods, or services (Oregon Department of Land Conservation and Development, 2020). To provide guidance and support the implementation of Goal 12, Oregon's Transportation Planning Rule (TPR), Oregon Administrative Rule 660-012-000, was enacted. The TPR requires that state-created regional transportation planning agencies must create and adopt a transportation system plan (TSP) that is in compliance with the TPR and the Oregon Transportation Plan (King, 2012). The elements of the state-required transportation plans resemble the federally required LRTPs in that they also must outline projects, policies, and programs to meet the current and future needs of the region's transportation system. The TSPs, however, are not subject to federal regulations, like MAP-21 or the FAST Act, and are not required for MPOs to receive federal transportation funds and resources. Therefore, this report does not discuss TSPs and focuses on MPO LRTPs.

Incorporating Location Affordability into Transportation Planning Practice

The roles and responsibilities of MPOs continue to shift as our understanding of how regions function deepens. Growing evidence suggests that traditional planning approaches and metrics silo concepts and ignore key factors impacting affordability. For example, research shows that the factors impacting location affordability, like jobs, housing, land use, and transportation, are too critical to relegate to local governments and state DOTs. It is at the region where these relations must be addressed to effectively influence outcomes.

At the same time, thanks to the passage of MAP-21 and the FAST Act, MPOs are now revisiting how and why their planning processes function the way they do. Through this reexamination, several large MPOs have begun exploring how their plans and its performance measures can best address the incredible affordability challenge their residents face. To achieve this, several have turned to national databases, like the LAI and H+T Affordability Index, to quantify and evaluate how their plans may affect their region's affordability. However, the practices of these few are varied, and no standard exists. In the coming years, as MPOs of all sizes begin incorporating location affordability into the concepts and measures of their plans, a new planning practice will emerge. The implications of this new practice will be broad and long lasting; thus, it is important to analyze the state of the practice and the extent of the challenges it will face.

CHAPTER 4 METHODOLOGY

For this project, I used a mixed-method research approach to account for the complex interactions between regional planning documents and real-world outcomes. To address my qualitative research questions, I performed a content analysis of Oregon MPOs' LRTPs. To answer quantitative research questions, I conducted statistical and spatial analyses of location affordability measures at the regional and census tract level for Oregon's ten MPOs. This study relies heavily upon the H+T Affordability Index (2017) and LAI (2019) datasets, which provide estimates for housing-transportation (H+T) costs as a percent of household income. Throughout this report, location affordability is broadly referring to whether the share of income a household spends on a housing and transportation costs are burdensome or not.

Research Questions and Hypotheses

This study builds upon previous research by moving beyond international cities and large MPOs and examines the practices and challenges of location affordability in smaller MPOs. The report focuses on ten MPOs located in the state of Oregon. My research will provide insights into the following key questions:

1) **What is the state of the practice of incorporating location affordability in Oregon MPOs' LRTPs?**
    a) How are location affordability-related concerns framed in plans' guidance statements and performance measures?
    b) Are location affordability-related guidance statements connected to location affordability-related performance measures?

2) **To what extent is location affordability a challenge in Oregon MPOs?**
    a) Does including transportation costs improve our understanding of affordability?
    b) Does household type affect the likelihood that households faced (severe) H+T cost burden in a neighborhood?

3) **What are the spatial patterns of location affordability within Oregon MPOs?**
    a) How is the percent of household income spent on H+T costs spatially distributed between neighborhoods?
        - How do the spatial patterns vary by household type?
    b) What are the characteristics of neighborhoods with relatively better and worse location affordability?

In this research, the direct concerns of location affordability are anticipated to be absent from MPO LRTPs, with some related concerns – particularly transportation affordability – briefly mentioned in guidance statements but not performance measures. Portland METRO, Oregon's largest MPO, is anticipated to have the most completely incorporated location affordability into its plan because of its larger budget and more advanced technological capabilities. Household type is expected to have a significant effect on the location affordability of neighborhoods. As household type incomes rise, the H+T costs as a percent of income and the percent of H+T cost burdened census tracts are expected to decrease. In addition, H+T costs as a percent of income are anticipated to not be randomly distributed in MPOs. Percentages are expected to be clustering at varying extents in most MPOs, regardless of household

type. It is presumed that uneven distribution of transportation infrastructure, jobs, and housing units will be driving this clustering.

Study Areas

This research will analyze and compare ten MPOs in the state of Oregon (OR). All MPOs whose metropolitan planning area is located within Oregon were non-randomly selected for review. A key objective in the selection process was geographic coverage and state population representativeness. Collectively, the selected MPOs serve over 70 percent of the state's population. Two of the MPOs' metropolitan planning area boundaries share a border with the state of Washington (WA) but were included for comprehensiveness. The ten MPOs selected were: Albany Area, OR; Bend, OR; Central Lane, OR; Corvallis Area, OR; Longview-Kelso-Rainier, OR-WA; Middle Rogue, OR; Portland METRO, OR; Rogue Valley, OR; Salem-Kaizer Area Transportation Study, OR; Walla Walla Valley, OR-WA (see Figure 3). Each MPO will be analyzed at the MPO and census-tract level. Table 1 lists background information on selected MPOs.

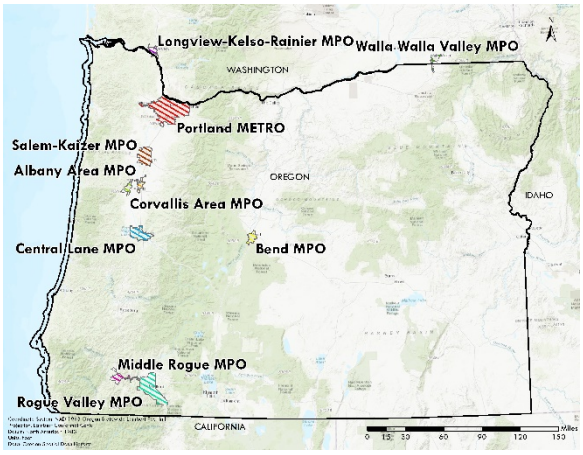


Figure 3: Study Area Metropolitan Planning Organizations

Table 1: General Information on Selected MPOs

Metropolitan Planning Organization	State(s)	Major City	Area (Sq. Miles)	2010 Population	Designation Year
Albany Area (AAMPO)	OR	Albany	34	57,721	2013
Bend	OR	Bend	46	84,249	2002
Central Lane (LCOG)	OR	Eugene	124	249,601	1973
Corvallis Area (CAMPO)	OR	Corvallis	38	64,951	2003
Longview-Kelso-Rainier	OR-WA	Kelso, WA	50	65,796	1982
Middle Rogue (MRMPO)	OR	Grants Pass	65	56,501	2013
Portland Area Comprehensive Transportation System (METRO)	OR	Portland	487	1,499,844	1979
Rogue Valley (RVMPO)	OR	Central Point	262	167,859	1982
Salem-Kaizer Area (SKATS)	OR	Salem	135	241,598	1987
Walla Walla Valley	OR-WA	Walla Walla	36	56,239	2013

Source: U.S. Department of Transportation Metropolitan Planning Organization (MPO) Database

As noted above, most of the selected MPO regions are not populous. In fact, most (60%) had populations less than 100,000. The Middle Rogue MPO was the least populated with slightly above 56,000 residents. Portland METRO represents an outlier in this study. Portland METRO is the largest MPO in the state of Oregon, serving three-counties and nearly 1.5 million residents – 26 times larger than Middle Rogue's population. Although, compared to the large MPOs nation-wide, Portland METRO is relatively small, with one million less residents than the smallest MPO included in Hartell's 2018 study. Portland METRO was also included because the precedent it sets will likely influence how the state's other MPOs proceed. Therefore, it is important to document its status, despite being remarkably different from the rest of the study areas.

Qualitative Approach

The first element of my research seeks to understand the state of the practice of incorporating location affordability into LRTPs in Oregon. Table 2 summarizes the qualitative research questions and the methods used.

Tabe 2: Summary of Qualitative Research Questions and Methods

Research Questions	Methods
1) What is the state of the practice of incorporating location affordability in Oregon MPOs' LRTPs?	Content Analysis
a) How are location affordability-related concerns framed in plans' guidance statements and performance measures?	Coding by concern
b) Are location affordability-related guidance statements connected to location affordability-related performance measures?	Tracking concern's location within plan

For each MPO, the most recent long-range transportation plan (LRTP) was collected and reviewed (see Table 3). Plans were analyzed to identify language related to location affordability, then coded to describe the continuity and framing of that language.

Table 3: Information about MPO LRTPs

Metropolitan Planning Organization	Plan Year	Planning Horizon
Albany Area	2018	2040
Bend	2019	2040
Central Lane	2017	2040
Corvallis Area	2017	2040
Longview-Kelso-Rainier	2018	2045
Middle Rogue	2018	2040
Portland METRO	2018	2040
Rogue Valley	2017	2042
Salem-Kaizer	2019	2043
Walla Walla Valley	2018	2040

Source: MPO LRTPs

To track continuity throughout the plan, two areas of the LRTPs were of interest in this analysis: 1) guidance statements and 2) performance measures. Guidance statements are "high-level overarching transportation policy language used to guide plan development" (Singleton & Clifton, 2017, p. 80). The following section-title terms were used to identify guidance statements: "goal", "strategy", "objective", "policy", and "recommendation". Performance measures are "specific metrics used to assess plan performance" (Singleton & Clifton, 2017, p. 80). The following terms were used to identify performance measures: "performance", "measure", "metric".

The plans were reviewed to identify guidance statements and performance measures related to location affordability. Then, statements and measures were coded to describe the framing of their primary concern. Types of concerns coded for include affordability, costs, and planning coordination. See Table 4 for full definitions.

Table 4: Plan Review Codes by Concern

Concern	Criteria
Affordability	
Location Affordability	Location affordability, location efficiency, housing-transportation (H+T) cost burden, or discuss housing-transportation costs as a percent of income
Housing Affordability	Housing affordability, housing cost burden, severe housing cost burden, or measures of affordability related to household's share of income spent on housing-related expenditures
Transportation Affordability	Transportation affordability, transportation cost burden, severe transportation cost burden, or measures of affordability related to household's share of income spent on transportation-related expenditures
Costs	
Housing Costs	Housing-related expenditures or costs for individuals or households
Transportation Costs	Transportation/travel-related expenditures or costs for individuals or households
Planning Coordination	
Jobs, Housing, and Transportation	A combination of jobs, employment, housing, transportation, or travel and contextually connect the need to coordinate their planning
Land Use and Transportation	A combination of land use, development, or transportation and contextually connect the need to coordinate their planning

Quantitative Approach

To answer my second and third research questions, I used quantitative research methods. Table 5 summarizes the methods and data used.

Tabe 5: Summary of Quantiative Research Questions and Methods

Research Questions	Methods	Variables	Household Types	Geography	Data Sources
2) To what extent is location affordability a challenge in Oregon MPOs?					
a) Does including transportation costs improve our understanding of affordability?	Statistical Analysis	Average Housing Costs as a Percent of Income Average H+T Costs as a Percent of Income	Typical Household	MPO	H+T Affordability Index (2017)
b) Does household type affect the likelihood that households faced (severe) H+T cost burden in a neighborhood?	Statistical Analysis	H+T Costs as a Percent of Income	Moderate-income, Median-income, Dual-professional	Census Tract	LAI (2019)
3) What are the spatial patterns of location affordability within Oregon MPOs?					
a) How is the percent of household income spent on H+T costs spatially distributed between neighborhoods?	Visual Observation, Global Moran's I Index, Local Indicators of Spatial Analysis (LISA)	H+T Costs as a Percent of Income	Moderate-income, Median-income, Dual-professional	Census Tract	LAI (2019)
b) What are the characteristics of neighborhoods with relatively better and worse location affordability?					

In my second research question, I sought to provide insights into what extent location affordability is an issue in Oregon MPOs. Of particular interest was whether location affordability measures improved our understanding of the challenge households faced compared to housing affordability measures, and how the severity of the location affordability challenge varied by household characteristics. Several descriptive statistics were calculated to characterize the challenge. First, I analyzed MPO average housing costs and housing-transportation (H+T) costs as a percent of household income. Second, I examined the percentage of census tracts where various household types experienced (severe) H+T cost burden within MPOs and the entire study area. For this phase of my research, I collected and used H+T Affordability Index (2017) and LAI version 3.0 (2019) data for the study areas at the census-tract and MPO-level.

Data from the H+T Affordability Index was used to describe average MPO housing costs and H+T costs as a percent of household income. The Index provides housing costs, transportation costs, and H+T costs as a percent of income for a hypothetical "moderate" household, who earns 80 percent of the Area Median Income (AMI) and for a "typical" household, who earns 100 percent of the AMI. In this study, housing costs and H+T costs as a percent of income for a typical household from the H+T Affordability Index were used.

The H+T Affordability Index focuses on quantifying the influence that the built environment has on transportation costs. Its housing cost estimates are calculated by using the "median selected monthly owner costs for owners with a mortgage and median gross rent, both from the 2015 ACS…." (Center for Neighborhood Technology, 2017, p. 5). Transportation cost estimates are based on three aspects of transportation behavior – auto ownership, auto use, and transit use. These aspects are modeled based on neighborhood and household characteristics. Figure 4 shows the methodologies used to compute total transportation costs.

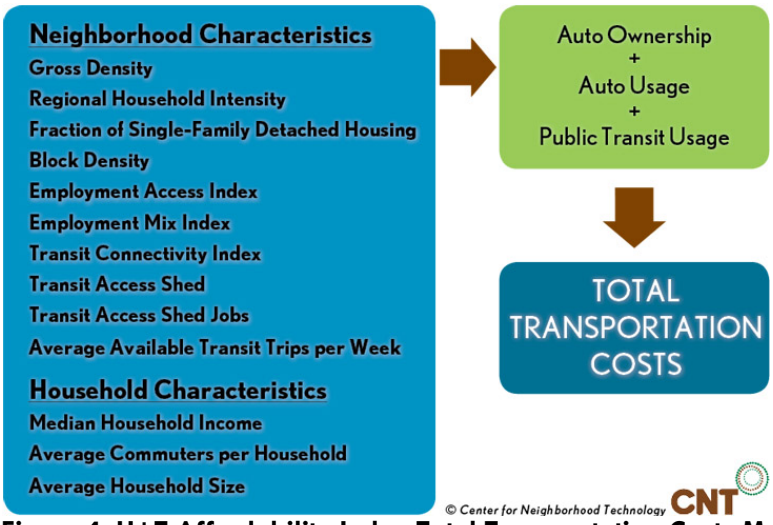


Figure 4: H+T Affordability Index Total Transportation Costs Methodology
Source: Center for Neighborhood Technology

Data from Version 3.0 of HUD's LAI was then used to analyze the percentage of census tracts where various households were (severely) H+T cost burdened. Since metropolitan planning area boundaries do not match census tract boundaries, census tracts whose centroid was within the boundary were included in the analysis for each MPO. This selection method was chosen to minimize the likelihood that a large, rural census tract would be included in the sample.

Census tracts where a household spent 45 percent or more or 65 percent or more of income on H+T costs were considered cost burdened and severely cost burdened, respectively. No precedent exists for using "severe H+T cost burden" in previous studies, but the measure was created by simply extending of definition of severe housing cost burden, with 50 percent for housing costs, plus 15 percent for transportation costs.

The LAI provides outputs for eight household types to account for different household characteristics. The households vary by income, size, and number of commuters. To examine the effect of household type on cost burden, I analyzed (severe) H+T cost burden for the following three household types: 1) moderate-income household, 2) median-income household, and 3) dual-professional household. Table 6, on the next page, describes the household types.

Table 6: Location Affordability Index Household Profiles

Household Profile	Income	Size	Number of Commuters
Moderate-Income Household	80% of MHHI	3	1
Median-Income Household	MHHI	4	2
Dual-Professional Household	150% of MHHI	4	2

Note: MHHI = Median household income for a given area (CBSA or County).
Source: U.S. Department of Housing and Urban Development, 2019

The most recent LAI was published in March 2019. The Index relies on data from the National Transit Database and several U.S. Census products, specifically the 2012-2016 American Community Survey, 2014 Longitudinal Employer-Household Dynamics (LEHD) Longitudinal Employment-Household Dynamics Origin-Destination Employment Statistics (LODES), and Topologically Integrated Graphically Encoding and Referencing (TIGER) line files. In addition, to model automobile use, it uses odometer readings from the Chicago and St. Louis metro areas for 2013 through 2015 that were obtained from the Illinois Environmental Protection Agency to calculate vehicle miles traveled (VMT) or the total number of miles households that drive their autos.

The Index uses a simultaneous (or structural) equation modeling (SEM) to capture the interrelationship of major characteristics of the built and social environment. Below, Figure 5 displays the geographic and household characteristics used to model housing costs and transportation costs. Generally, monthly housing costs included for homeowners were "mortgage payment, utilities, fuel, and condominium and mobile home fees" (U.S. Department of Housing and Urban Development, 2019, p. 7); while monthly housing costs included for renters were "contract rent and utilities if paid for by the renter" (U.S. Department of Housing and Urban Development, 2019, p. 7). Monthly transportation costs were generally based on auto ownership, auto use, and transit use.

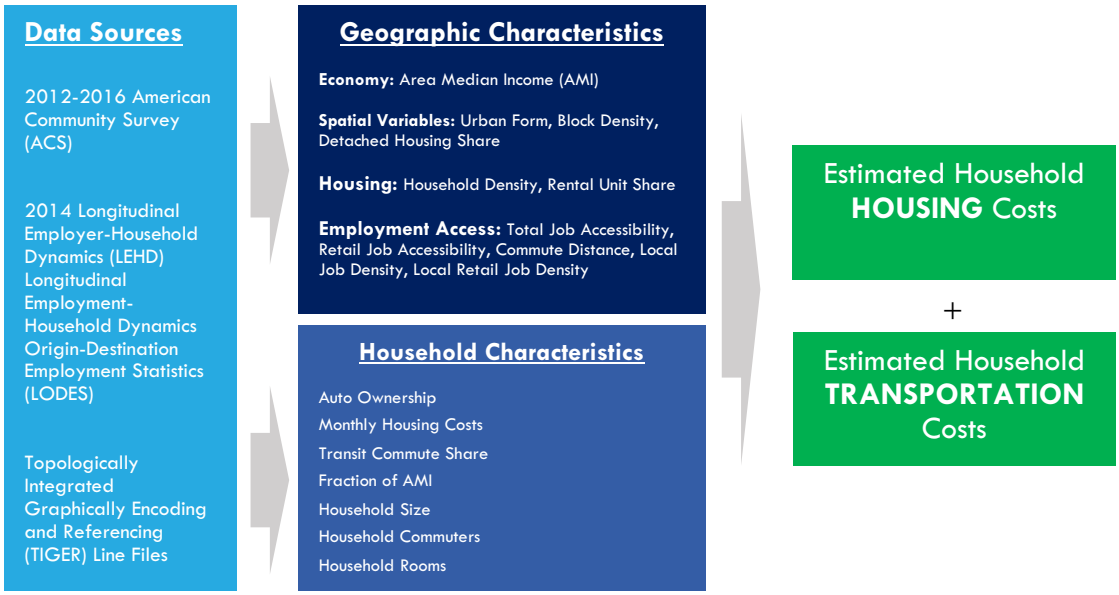


Figure 5: LAI Household Housing and Transportation Cost Estimate Methodology
Source: Haas, Newmark, & Morrison, 2016

Next, my third research question aimed to provide insights into spatial patterns of location affordability. To do so, I used a series of area pattern analysis approaches on MPOs using census-tract level observations. The percent of household income spent on H+T costs was used as a measure of location affordability to answer these questions.

As Oregon MPOs craft strategies and performance measures for their plans, it is important to know if patterns are present within their regions. The geographic distribution of H+T costs as a percent of income was of interest because Hartell (2018) showed that several MPOs who incorporated location affordability set MPO-wide guidance statements and performance measures. Yet, studies suggest strictly regional analyses overlook critical local patterns of location affordability, as Mattingly & Morrissey (2014) showed. Measures of location affordability's relation to neighborhood characteristics, like transportation systems, jobs, or housing, may contribute to neighborhood-level disparities or similarities between H+T costs as a percent of income.

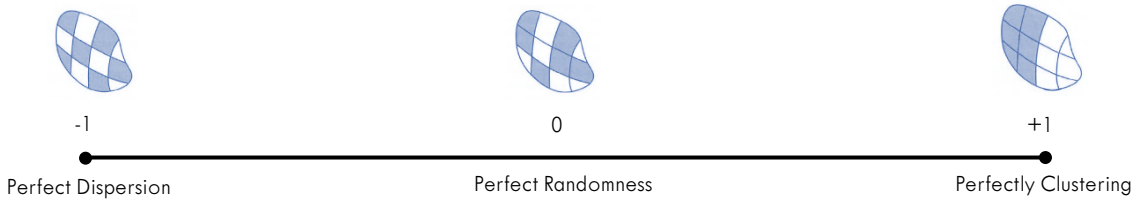
Current MPO planning practice may be ignoring a key determinant of H+T costs. If this analysis finds that the share of income spent on H+T costs are distributed randomly, it suggests that location within MPOs is not a significant factor in Oregon – contrary to what previous studies found elsewhere – and that MPO-wide measures provide an accurate assessment. However, if particular neighborhoods perform relatively better or worse, it suggests that the location within the region further impacts the level of affordability. Identifying neighborhoods with relatively better or worse location affordability can also help inform our understanding of where they tend to locate regionally. Either way, it is worth testing if findings from other studies hold true in Oregon to guide future practices.

Spatial patterns were generally analyzed using the concept of spatial autocorrelation, which is loosely based on that principle that "nearby things are more similar than distant things" (i.e., Tobler's First Law of Geography). Spatial autocorrelation helps describe the degree to which observations or values at spatial locations are correlated, or similar, to each other (Luan, 2020). Two spatial statistics were used: global and local Moran's *I* Index. For these methods, a spatial weight matrix was created based on a first-order Queen contiguity, which uses polygon vertices to define whether census tracts are neighbors. Again, since metropolitan planning area boundaries do not match census tract boundaries, census tracts whose centroid was within the boundary were included in the analysis for each MPO.

As a preliminary step, choropleth maps displaying H+T costs as a percent of income for moderate-income households were mapped for each MPO with census-tract observations. Visual inspection of patterns allows for a brief assessment of whether more robust analysis is warranted.

Then, the global Moran's *I* index was used to test for overall spatial autocorrelation of H+T costs as a percent of household income within MPOs. Moran's *I* allows researchers to quantitatively test whether a pattern is random, dispersed, or clustered in a spatially distributed set of elements. Index values can range from -1 to +1. Moran's *I* index values greater than one indicate that the H+T costs as a percent of income are spatially positively related or clustering. The closer the index value approaches positive one, the stronger the clustering. If the Moran's *I* index value is lower than zero, it suggests that H+T costs as a percent of income are spatially negatively related or dispersed. The closer the index value approaches negative one, the stronger the dispersion. A Moran's *I* index value of zero indicates that H+T costs as a percent of income are spatially randomly distributed (Lui, et al., 2019). Below, Figure 6 illustrates the global Moran's *I* index's scale and its interpretations.

Figure 6: Global Moran's *I* Index Value Scale, Visualization, and Interpretation



Source: McGrew & Monroe, 2014

Finally, the local Moran's *I* index was used to test for local spatial autocorrelation of H+T costs as a percent of household income at the census tract level. Several local indicators of spatial autocorrelation (LISA) were calculated to characterize the results.

Counts for two types of spatial clusters, which are areas where similar percentages of income are spent on H+T costs, were documented. The first, hotspots, are census tracts where an equally high share of household income is spent on H+T costs compared to neighboring tracts (High-High). Hotspots signify areas with relatively worse location affordability. The second type of clusters, coldspots, are census tracts where an equally low share of household income is spent on H+T costs compared to neighboring tracts (Low-Low). Coldspots signify areas with relatively better location affordability.

Spatial outliers were also identified. High-Low outliers are census tracts with worse location affordability that are neighbored by census tracts with better location affordability. Low-High outliers are census tracts with better location affordability that are neighbored by census tracts with worse location affordability. High and low percentages of income spent on H+T costs are relative to the sample mean. On the next page, Table 7 summarizes the meanings of key LISA terms.

Table 7: Key Terms of Local Indicators of Spatial Autocorrelation (LISA)

Terms	Meanings
Spatial Clusters	Areas where similar percentages of income are spent on H+T costs
Hotspots (High-High)	A cluster of census tracts with relatively worse location affordability
Coldspots (Low-Low)	A cluster of census tracts with relatively better location affordability
Spatial Outliers	Areas where different percentages of income are spent on H+T costs
Low-High	A census tract with good location affordability is neighbored by census tracts with poor location affordability
High-Low	A census tract with poor location affordability is neighbored by census tracts with good location affordability

The statistics described in this section will provide insights into the extent and characteristics of the affordability challenge Oregon MPOs are facing. When compared with the findings of my content analysis, I will be able to describe which MPOs are facing the greatest challenge and which are the most prepared, and vice versa. The descriptive nature of this research means that causal relationships cannot be established. A finding that an MPO has high H+T costs as a percent of income and lacks relevant guidance statements and performance measures does not suggest one is causing the other. Rather, this analysis is intended to establish a baseline of information to inform and guide future research that explores such relationships. This research represents a necessary first step in understanding the state of planning practice and severity of the challenge in MPOs in Oregon.

CHAPTER 5 REVIEW OF LONG-RANGE TRANSPORTATION PLANS

This chapter provides an overview of the extent to which Oregon MPOs incorporate location affordability-related considerations into LRTP guidance statements and performance measures. Complete coding sheets for this analysis are located in Appendix A.

Guidance Statements

The following table and figures describe the current practices of Oregon MPOs incorporating location affordability-related considerations into LRTP guidance statements. As previously discussed, guidance statements are used to set guidance for the aims and practices of the MPO during its LRTP planning horizon. Plan sections that include "goal", "strategy", "objective", "policy", or "recommendation" were searched to identify statements.

Table 8, located on the next page, summarizes findings for the plans reviewed. It shows that most MPO LRTPs' guidance statements were only concerned with planning coordination. Ten out of ten plans included planning coordination-related statements, with eight including both jobs, housing, and transportation and land use and transportation planning coordination concerns. Affordability was the second most frequently mentioned concern, with five plans including it. Transportation affordability appeared in five plans and was the most mentioned affordability-related concern in guidance statements. Cost concerns were not frequently mentioned in plan's guidance statements. Only two plans included cost concerns by mentioning transportation costs.

Overall, Middle Rogue MPO's plan had the most comprehensive guidance statements, including two out of three affordability concerns, one out of two cost concerns, and two out of two planning coordination concerns. Portland METRO was a close second, including the same number of affordability and planning coordination concerns, minus transportation costs. Rogue Valley MPO included the fewest location affordability-related concerns in its plan's guidance statements. Land use and transportation planning coordination was the only concern found in its plan. Central Lane MPO had the second fewest concerns mentioned in its plan's guidance statements. It only included concerns related to transportation affordability and land use and transportation planning coordination. Four MPOs' plans (Bend, Longview-Kelso-Rainier, Rogue Valley, Salem-Kaizer, and Walla Walla Valley) did not mention affordability or cost concerns, focusing only on planning coordination.

Table 8: Guidance Statement Concerns by MPO Long-range Transportation Plan

MPO	Affordability			Costs		Planning Coordination	
	Location	Housing	Transportation	Housing	Transportation	Jobs, Housing, and Transportation	Land Use and Transportation
Albany Area			✓		✓	✓	✓
Bend						✓	✓
Central Lane			✓				✓
Corvallis Area			✓			✓	✓
Longview-Kelso-Rainier						✓	✓
Middle Rogue	✓		✓		✓	✓	✓
Portland METRO	✓		✓			✓	✓
Rogue Valley							✓
Salem-Kaizer						✓	✓
Walla Walla Valley						✓	✓

Affordability Concerns

Oregon MPOs were likely to include guidance statements related to transportation affordability and frame it as an equity issue. Overall, one-half of LRTPs considered affordability to some degree in their guidance statements. Of the plans that considered it, four (80%) chose to focus on transportation affordability (see Figure 7). Plans mentioning this concern generally aimed to provide affordable transportation options and systems, like public transit. Further, three of these four plans discussed transportation affordability through an equity lens. For instance, Central Lane MPO's LRTP includes an objective broadly focused on ensuring an equitable transportation system that allows people to travel to employment, education, and services affordably. Portland METRO went a step further and targeted its objective at specific communities, aiming to "eliminate disparities related to access, safety, affordability and health outcomes experienced by people of color and other historically marginalized communities" (Portland METRO, 2018, pp. 2-20).

Location affordability was unlikely to be included in guidance statements. Only two MPOs' plans (Portland METRO and Middle Rogue MPO) mentioned location affordability. In those statements, the concepts of location-efficient places and housing-transportation costs as a percent of income were included. Middle Rogue MPO's plan discussed its strategy to promote "location-efficient incentives to help increase the opportunities for individuals and families to purchase homes and businesses within areas well-served by transit" (Middle Rogue Metropolitan Planning Organization, pp. 3, Ch. 7) While affordability or cost burden were not mentioned, this strategy's use of "location efficiency" acknowledges the important role the location of homes, businesses, and transportation plays in determining affordability. Portland METRO's statements were more comprehensive, providing both an objective for location-efficient and location-affordable places. Their plan, for example, mentioned the objectives of supporting "affordable location-efficient housing choice[s]" and "reducing the share of income households in the region spend on housing and transportation" (Portland METRO, pp. 2-12, 2-13).

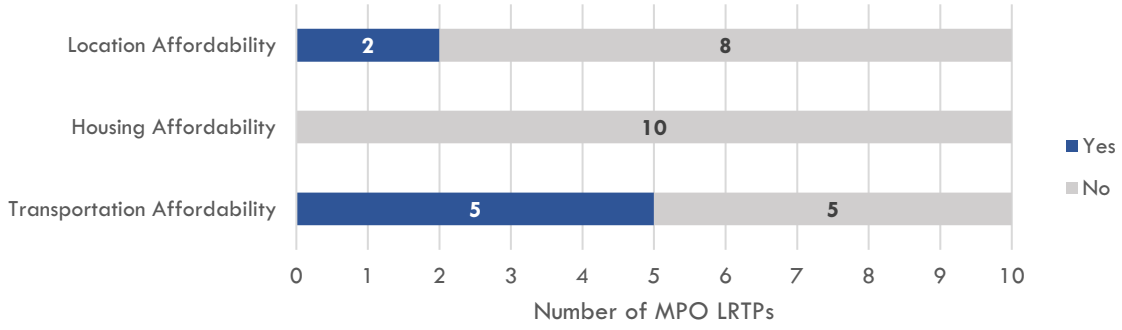


Figure 7: Summary of Affordability Guidance Statements by Concern

Cost Concerns

Overall, costs were unlikely to be included in plan's guidance statements. Most (80%) of MPOs did not mention cost concerns to any extent in their guidance statements, with only 20 percent of MPOs considering it (see Figure 8). The MPOs that considered costs in their plans exclusively focused on transportation costs. For example, the Albany Area MPO had an objective to "reduce user travel costs" (Albany Area Metropolitan Planning Organization, 2018, p. 13). No plan included housing costs in its guidance statements.

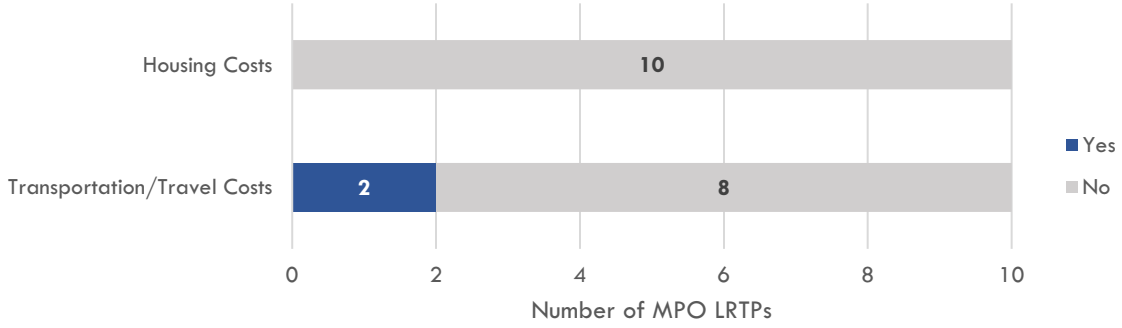


Figure 8: Summary of Cost Guidance Statements by Concern

Planning Coordination Concerns

Planning coordination was very likely to be included in LRTPs' guidance statements. The plans of all ten MPOs considered planning coordination to some degree (see Figure 9). The most popular concern was land use and transportation planning coordination, with 100 percent of the plans mentioning it. These guidance statements, in general, focused on collaboration, consistency, and the integration of land use and transportation planning policies, plans, and systems. The relationship between land use development patterns and transportation systems was an underlying theme of these statements. The Albany Area MPO's plan, for instance, has the goal to "coordinate transportation and land use decision-making to foster collaboration and to encourage development patterns which increase transportation options, encourage physical activity, and decrease reliance on the automobile" (Albany Area Metropolitan Planning Organization, p. 19). Jobs, housing, and transportation planning coordination was the second most frequently mentioned, appearing in 70

percent of MPOs' plans. These plans' statements focused on the need to coordinate housing and employment, and their impact on the transportation system. These guidance statements emphasized guiding development to ensure employment is accessible by several transportation options and are often framed as equity or economic development issues.

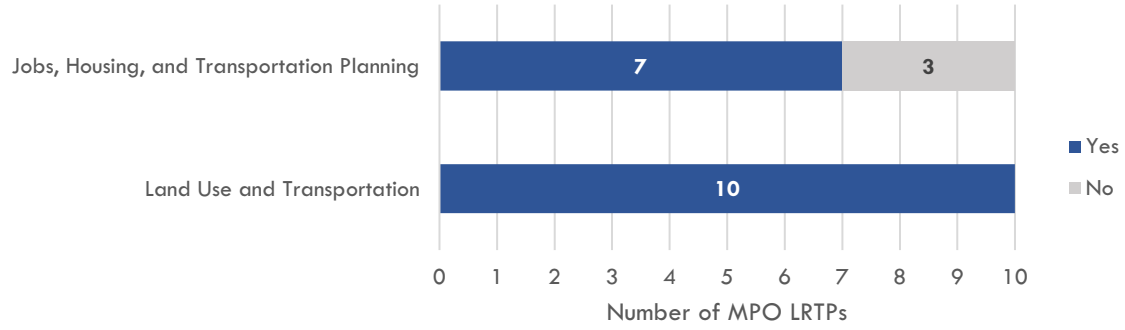


Figure 9: Summary of Planning Coordination Guidance Statements by Concern

Performance Measures

The table and figures in this section describe the current practices of Oregon MPOs incorporating location affordability-related considerations into LRTP performance measures. As previously mentioned, performance measures are specific metrics used to assess plan performance. The following terms were used to identify performance measures: "performance", "measure", and "metric".

Table 9 documents the findings for the plans reviewed. It shows that the vast majority of MPOs' plans do not include any location affordability-related performance measures. Planning coordination concerns were the most frequently mentioned concern in plans' measures, with four MPOs including it. Jobs, housing, and transportation planning coordination was the most popular concern – it was found in four plans. Only one MPO, Portland METRO, included an affordability-related performance measure and its measure was concerned with location affordability. Cost concerns were absent from all plans' performance measures.

Overall, no MPO's plan was distinctively comprehensive in terms of performance measures. Three MPOs (Middle Rogue, Portland METRO, and Rogue Valley) included two location affordability-related concerns in their measures, and the Bend MPO included one related concern. Six plans did not mention any concerns at all. This suggests that the practice of incorporating location affordability-related concerns into performance measures is not well developed in Oregon.

Table 9: Performance Measure Concerns by MPO Long-range Transportation Plan

MPO	Affordability			Costs		Planning Coordination	
	Location	Housing	Transportation	Housing	Transportation	Jobs, Housing, and Transportation	Land Use and Transportation
Albany Area							
Bend Area						✓	
Central Lane							
Corvallis Area							
Longview-Kelso-Rainier							
Middle Rogue						✓	✓
Portland METRO	✓					✓	
Rogue Valley						✓	✓
Salem-Kaizer							
Walla Walla Valley							

Affordability Concerns

Very few MPOs included affordability to any extent in their LRTPs' performance measures. Only one MPO, Portland METRO, included a performance measure concerned with affordability, and it focused on location affordability (See Figure 10). Its performance measure was based on the question of "how much do households spend on housing and transportation in our region?" (Portland METRO, pp. 7-4). Although while the performance measure was in the plan, it was not formally used in plan or project evaluation. Unfortunately, the tool that will allow METRO to evaluate this measure was still under development at plan adoption. METRO stated that it was

developing a Housing and Transportation expenditure tool in-house that will "look at out-of-pocket expenditure for housing and transportation and looks at the effects of future transportation investments and the housing and transportation expenditures that result" (Portland METRO, pp. 8-84). Since the tool was still underdevelopment, it was not applied to its most recent LRTP (2018) and is not anticipated to be applied until its next plan update. Despite the absence of this tool, Portland METRO did state that it has the target of reducing the H+T cost burden of lower-income households by 25 percent to 2015 levels by 2040. In addition, the plan notes that observed data shows that the region was performing poorly MPO-wide and for historically marginalized communities. No plans included performance measures for housing or transportation affordability.

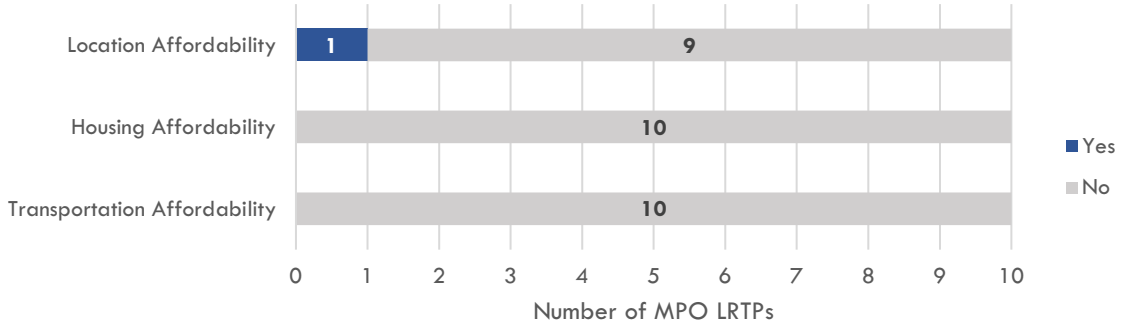


Figure 10: Summary of Affordability Performance Measures by Concern

Cost Concerns

Costs were not considered to any degree in Oregon MPO plans' performance measures (see Figure 10). No MPO considered housing or transportation costs.

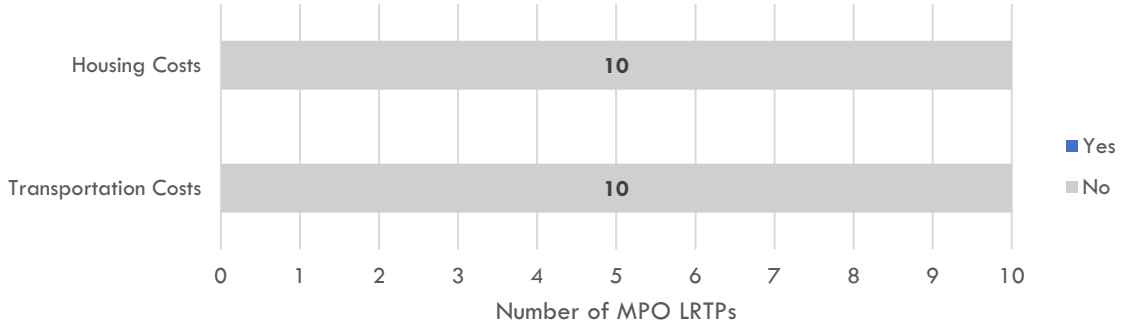


Figure 10: Summary of Cost Performance Measures by Concern

Planning Coordination Concerns

Oregon MPOs were somewhat likely to consider planning coordination to some extent in their plans' performance measures. 30 percent of plans included planning coordination performance measures (see Figure 11). The concern for the coordination of jobs, housing, and transportation planning (30%) was included slightly more than land use and transportation planning (20%). For example, the Bend Area MPO had a performance measure for "Employment Accessibility" which measures the "number of jobs that the majority of Bend residents can reach, within a reasonable

timeframe… for each mode" (Bend Metropolitan Planning Organization, pp. 18-270). While, the Rogue Valley MPO considered land use and transportation planning by measuring both the changes in mixed-use and downtown development and the population living within one-quarter mile of transit service.

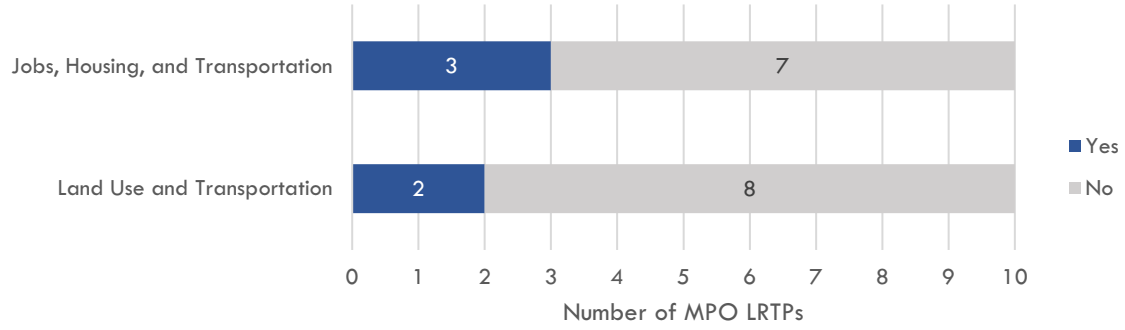


Figure 11: Summary of Planning Coordination Performance Measures by Concern

Summary

The practice of directly incorporating location affordability is not well established in Oregon MPOs, but several related concepts were widespread. In general, affordability- or cost-related considerations were absent, yet planning coordination was prevalent in the plans reviewed. Moreover, the practice of including related concerns was not consistent throughout individual plans. Plan's guidance statements were found to be more inclusive than performance measures. Ten out of ten plans included a relevant concern in its guidance statements, while only four plans included them in its performance measures. Overall, planning coordination was the primary concern incorporated, appearing in ten out of ten plan's statements and in four plan's measures. Location affordability was only specifically mentioned in two MPO's plans – Middle Rogue MPO and Portland METRO. As regions begin to update their LRTP, these two plans represent the best local examples of how MPOs can address the affordability crisis and can serve as a baseline to help others evolve their planning practice.

CHAPTER 6 | CHALLENGES OF LOCATION AFFORDABILITY

This chapter characterizes the challenges of location affordability of Oregon metropolitan planning organizations (MPOs). Chapter 5 established few MPOs included location affordability into its LRTP. This chapter builds upon that finding by exploring the degree to which location affordability statements and measures would help MPOs describe and analyze their affordability crisis. Specifically, it aims at answering: 1) whether including transportation costs in measures of affordability improves our understanding of affordability, and 2) whether household type influences the likelihood that households were (severe) H+T cost burdened in a neighborhood. To do so, various measures of location affordability are analyzed for several different household types.

Housing Costs and Housing-Transportation (H+T) Costs as a Percent of Income

This section describes the average percentage of income spent on housing costs and H+T costs for typical households, who earn 100 percent of the area median income (AMI). Appendix B includes additional analysis based on moderate household's income. Both use MPO-wide data from the H+T Affordability Index (2017).

Figure 12 demonstrates that if only the average share of household income spent on housing costs is considered, most (60%) MPOs' housing was affordable, and those that were housing cost burdened, were only slightly above the 30-percent threshold. Yet, if average H+T costs as a share of income were measured instead, no MPO was affordable, with nearly all substantially exceeding the 45-percent H+T cost burden threshold. Middle Rogue MPO had the highest average share of household income spent on housing costs (36%) and H+T costs (65%), while Portland METRO had the lowest average percent of household income spent on housing costs (26%) and H+T costs (45%).

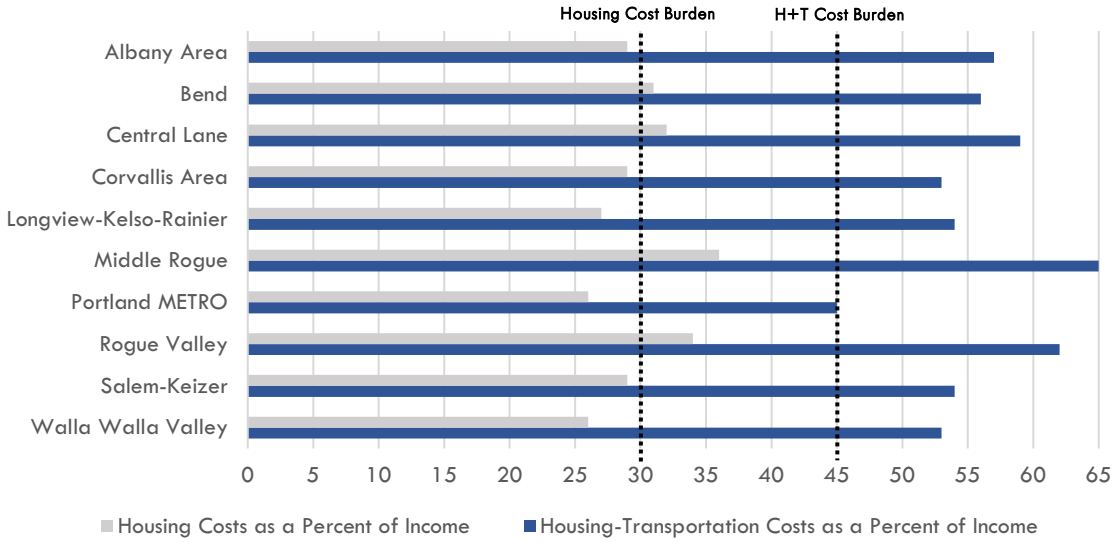


Figure 12: Average Percent of Income Spent on Housing Costs and Housing-Transportation Costs for a Typical Household, by MPO, 2017

Source: H+T Affordability Index (2017)

Percentage of Census Tracts where Households Faced (Severe) Housing-Transportation (H+T) Cost Burden

The following table compares the percentage of census tracts where various household types face H+T cost burden or severe H+T cost burden by MPO. Census tract-level data for moderate-income, median-income, and dual-professional households from the LAI (2019) was used. The purpose of this inquiry was to examine whether household type affected the likelihood that a household would be (severely) H+T cost burdened in a neighborhood.

Findings presented in Table 10 show that household type does generally impact the likelihood that a household would be H+T cost burdened in a census tract. Overall, moderate-income and median-income households were H+T cost burdened in nearly all study-area census tracts, while dual-professional households were only H+T cost burdened in several MPO's tracts. Across the three household types, households only experience severe H+T cost burden if they reside in less than five percent of census tracts in the entire study area. Based on census-tract level observations, Middle Rogue MPO was the least location-affordable MPO, with all three household types experiencing H+T cost burden in 100 percent of its census tracts; while Portland METRO was the most location-affordable MPO, although the vast majority of its census tracts were still unaffordable for moderate-income (98%) and median-income (94%) households. In Portland METRO, dual-professional households were not H+T cost burdened in every census tract. These findings suggest that moderate-income and medium-income households have few location-affordable places to live within Oregon MPOs, while most places are location-affordable for dual-professional households.

Table 10: Percentage of Cenus Tracts where Households were (Severely) Housing-Transportation Cost-Burdened by Household Type, by MPO, 2016, N=493

MPO	Household Type						Total Census Tracts (n)
	Moderate-Income		Median-Income		Dual-Professional		
	Cost Burdened (%)	Severely Cost Burdened (%)	Cost Burdened (%)	Severely Cost Burdened (%)	Cost Burdened (%)	Severely Cost Burdened (%)	
Albany Area	100	0	100	0	25	0	8
Bend	100	0	100	0	0	0	8
Central Lane	97	5	98	0	31	0	59
Corvallis Area	100	0	100	0	0	0	12
Longview-Kelso-Rainier	100	7	100	0	43	0	14
Middle Rogue	100	100	100	0	100	0	6
Portland METRO	98	0	94	0	0	0	303
Rogue Valley	100	0	100	0	30	0	33
Salem-Kaizer	100	100	100	0	7	0	41
Walla Walla Valley	100	10	100	10	22	0	9
Entire Study Area (N)	98	4	96	0.2	10	0	493

Source: Location Affordability Index 3.0 (2019)

Moderate-income Households

Overall, census tracts within Oregon MPOs were extremely location-unaffordable for moderate-income households. Moderate-income households were H+T cost

burdened in 98 percent of census tracts within the entire study area. In every MPO, except Portland METRO (98%) and Central Lane MPO (97%), moderate-income households faced H+T cost burden when residing in 100 percent of census tracts. The percentage of census tracts where households were severely H+T cost burdened was substantially lower, overall. Moderate-income households were only severely H+T cost burdened when living within four percent of study-area census tracts. Two MPOs were particularly unaffordable for this household type. Moderate-income households faced severe H+T cost burden in every census tract within the Middle Rogue and Salem-Kaizer MPOs.

Median-income Households

Census tracts within the study area were just as location-unaffordable for median-income households. In total, median-income households were H+T cost burdened when living within 96 percent of census tracts in Oregon MPOs. Like moderate-income households, medium-income households experienced H+T cost burden in 100 percent of census tracts in most MPOs, except in Portland METRO (94%) and Central Lane MPO (98%). Overall, in less than one percent of study-area census tracts, medium-income households were severely H+T cost burdened. Medium-income households only experienced severe H+T cost burden when living in 10 percent of Walla Walla MPO's census tracts.

Dual-professional Households

Conversely, dual-professional households can reside in nearly all census tracts within the study and not experience H+T cost burden or severe H+T cost burden. Yet, several census tracts in seven out of ten MPOs were still unaffordable for dual-professional households. Middle Rogue MPO (100%), again, had the highest percent of H+T cost-burdened census tracts, while Portland METRO (0%) had the lowest percentage. Dual-professional households were not severely H+T cost burdened in any census tract within the entire study area.

Summary

The findings of this chapter demonstrate that location affordability is a major problem facing every MPO in Oregon, but the challenge is not the same for all households. The comparison between measures showcased that when transportation costs are included, it improved our understanding of a typical household's cost-related challenges. This is exemplified by the finding that whether the average share of income spent on costs was considered burdensome in an MPO depended on which measure was used. If a measure of location affordability was used, households faced cost burden in all ten MPOs; yet if a measure of housing affordability was used, housing was considered affordable in 60 percent of MPOs. Further, disparities existed between different household types. In general, only dual-professional households had the opportunity to reside in a neighborhood without facing H+T cost burden. Within MPOs, moderate-income and median-income households cannot simply move further away from their place of work to reduce cost burden, as traditional housing-based measures might imply, when transportation costs were included.

These harsh conditions beg further examination into the spatial patterns of the challenge. While overall unaffordable, according to measures of location affordability, internal disparities at the neighborhood level may offer guidance on

how to address it through policy. As MPOs begin to craft guidance statements and performance measures, it important to understand the spatial patterns of this challenge. By understanding the spatial characteristics, strategies can be tailored to the unique local circumstances that each MPO faces.

CHAPTER 7 SPATIAL PATTERNS OF LOCATION AFFORDABILITY

This chapter characterizes the spatial distribution and patterns of location affordability in Oregon MPOs. The share of household income spent on H+T costs from the LAI (2019) is used to measure location affordability. As a preliminary step, this measure was mapped and visually observed. Then, spatial statistics, including the global and local Moran's *I* index values, for it were analyzed. Values were computed and compared for three household types.

Spatial patterns were of interest because research shows that when measures of location affordability are observed at the neighborhood scale, the affordability of compact cities is more apparent. An examination into strictly regional (i.e., MPO-wide) measures may hide the positive affordability outcomes of cities or neighborhoods that employ policies aimed at encouraging mixed-use development, high quality public transit, and walkable environments, and, consequently, provide a misleading representation of the challenge. This is particularly pertinent to Oregon because the content analysis conducted for Chapter 5 found that the two MPOs with LRTPs that included guidance statements and performance measures for location affordability focused on regional conditions, similar to the pratices of large MPOs, neglecting important local area's conditions. Therefore, it is worth examining the spatial patterns of location affordability measures in Oregon MPOs to advise policy.

Descriptive Maps of H+T Costs as a Percent of Income

The following figures shows H+T costs as a percent of a moderate-income household's income in census tracts for Portland METRO, Salem-Kaizer, Rogue Valley, and Central Lane MPOs. This measure was mapped for each MPO as a first step to see if patterns were present visually and whether further examination with more robust methods was necessary. See Appendix C for the maps of each MPO.

Figures 12 and 13, as well the others, demonstrate that H+T costs were typically a relatively lower share of household income in centrally located areas and near transit routes. For example, within Portland METRO, census tracts located within the city of Portland tended to have lower H+T costs of as a percent of income than the region. This is not surprising because research shows that location-affordable places are characterized by high accessibility to services and employment, which is consistent with the fact that Portland is the state's economic center and has a comprehensive transit network (Jahan & Hamidi, 2019). This pattern holds true even in less populous, more rural MPOs, like Rogue Valley MPO. In this MPO, the cities of Medford and Central Point had the lowest share of income spent on H+T costs. Conversely, these maps also show that the areas where H+T costs consumed a relatively high percent of income lacked transit access and were on the outskirts of the region, which are generally characterized by a mix of suburban and rural development patterns.

However, through visual observation is it difficult to compare how strong or weak these patterns are between MPOs and how they vary by household type. To describe these characteristics, more rigorous methods of analysis are needed.

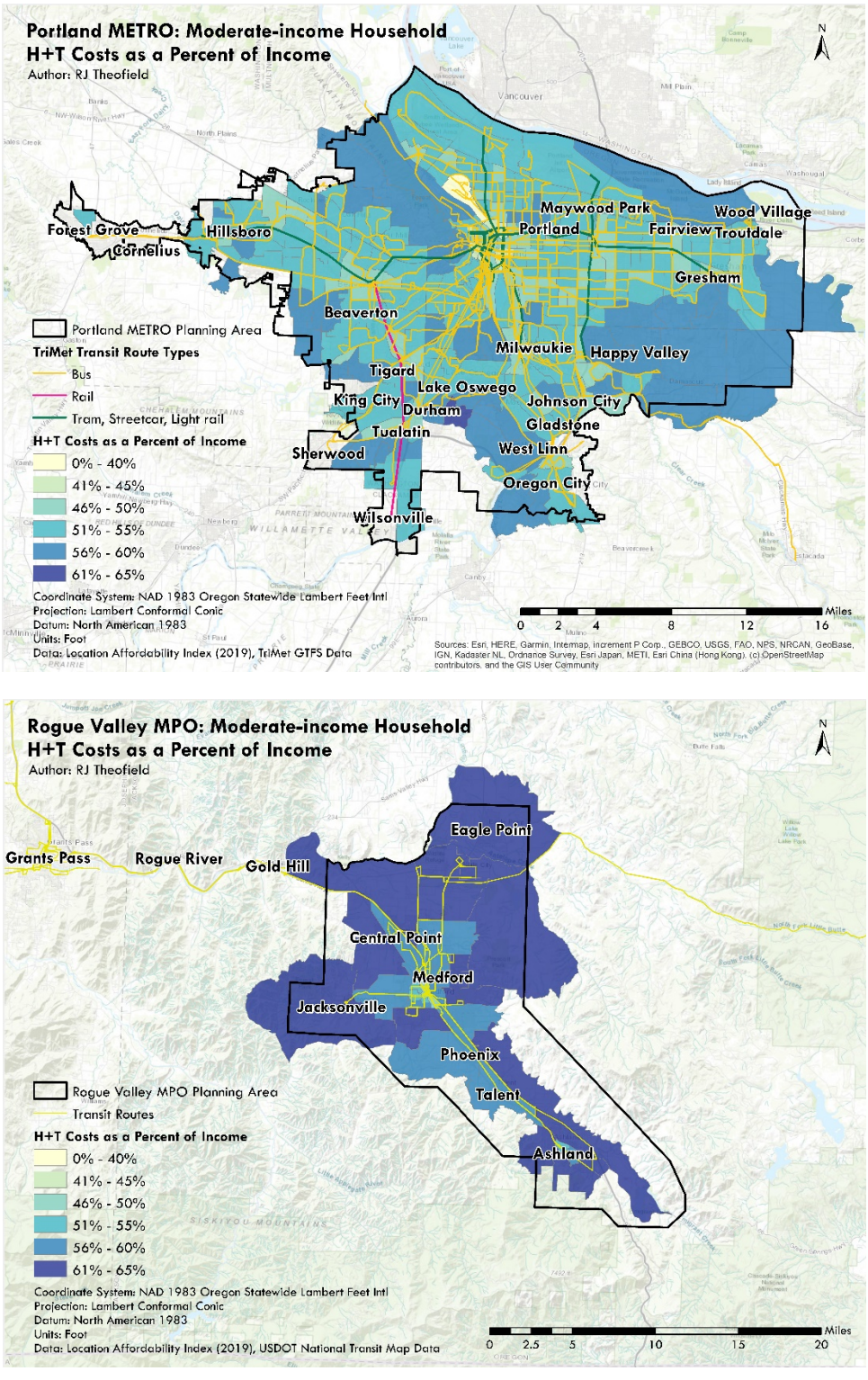


Figure 12: H+T Costs as a Percent of Moderate-income Household Income, Portland METRO and Rogue Valley MPO

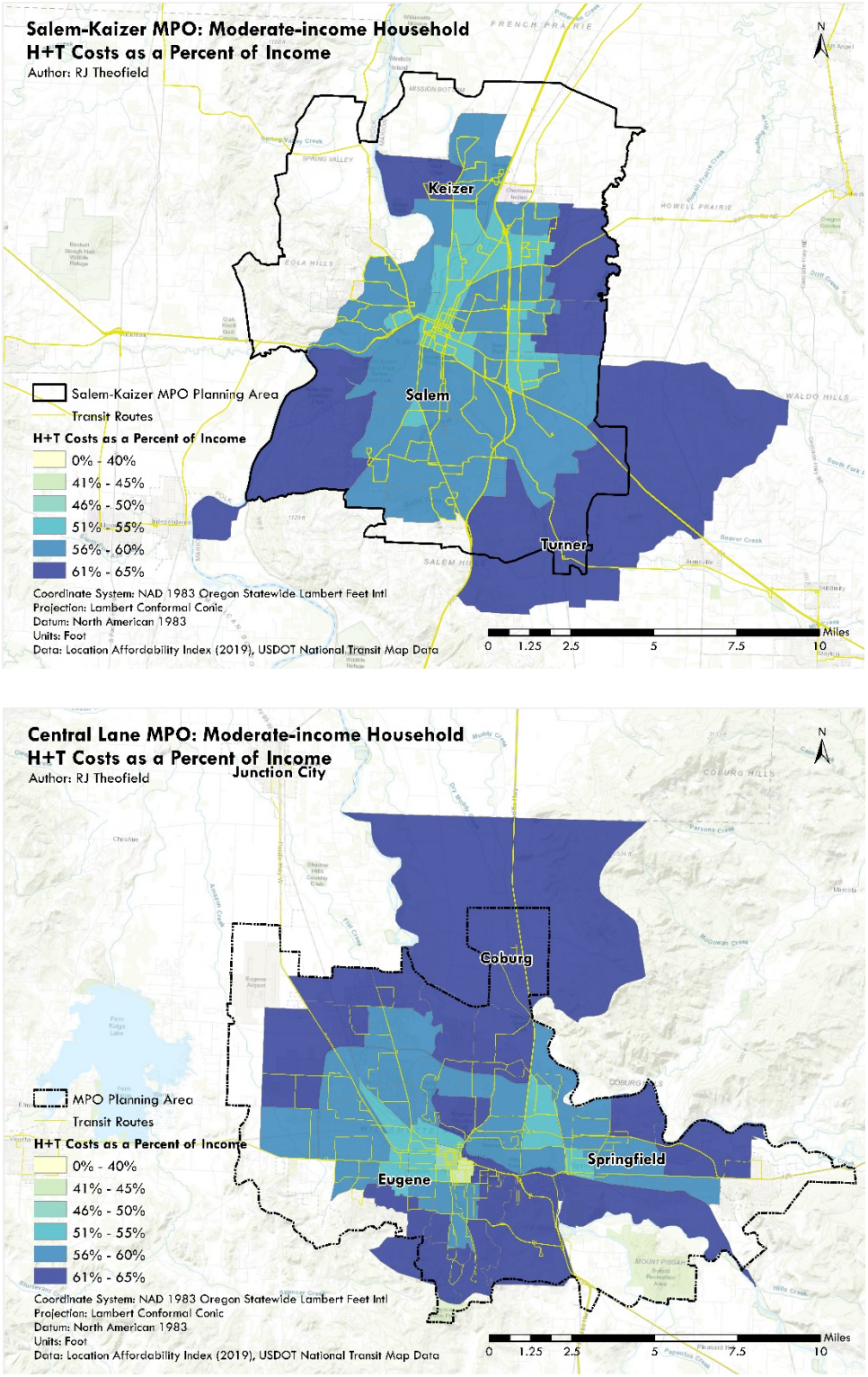


Figure 13: H+T Costs as a Percent of Moderate-income Household Income, Salem-Kaizer MPO and Central Lane MPO

Global Spatial Autocorrelation of H+T Costs as a Percent of Income

The following tables and figures provide insights into the overall spatial autocorrelation of the share of income spent on H+T costs in MPOs at the census-tract level. Visual observations from the previous section suggested that percentages were not uniformly distributed within MPOs. This section quantitatively examines these percentages to determine the type of spatial patterns present in each MPO. Values were documented for three LAI household types: 1) moderate-income, 2) medium-income, and 3) dual-professional. Table 11 compares the global Moran's *I* Index values of the share of income spent on H+T cost by household type.

Results indicate that the percent of income spent on H+T costs were either dispersed, randomly distributed, or clustering in Oregon MPOs for all household types. However, Moran's *I* values that indicated random distribution (i.e., close to 0) or dispersion (i.e., approaching -1) were not statically significant. Global Moran's *I* values were only significant in seven MPOs at a 90-percent condifence interval.

Table 11: Global Moran's *I* Index Values of H+T Costs as a Percent of Income by MPO by Household Type, 2016, N=493

MPO	Household Type			Total Census Tracts (n)
	Moderate-income	Median-income	Dual-Professional	
Albany Area	-0.274	-0.265	-0.249	8
Bend	0.000	-0.008	0.008	8
Central Lane	**0.381*** **	**0.399*** **	**0.415*** **	59
Corvallis Area	0.121	0.136	**0.152***	12
Longview-Kelso-Rainier	**0.145***	**0.152***	**0.132***	14
Middle Rogue	-0.317	-0.320	-0.345	6
Portland METRO	**0.234*** **	**0.232*** **	**0.220*** **	303
Rogue Valley	**0.290*** **	**0.314*** **	**0.299*** **	33
Salem-Kaizer	**0.160*** **	**0.207*** **	**0.166*** **	41
Walla Walla Valley	**0.154****	**0.144****	**0.132****	9

* Significance level of p=<0.10
** Significance level of p=<0.05
*** Significance level of p=<0.01
Source: Location Affordability Index 3.0 (2019)

Figure 14, on the next page, shows that in all MPOs with statistically significant values, the share of income spent on H+T costs indicated spatial clustering was present across household types. The clustering is not particularly strong, rather it is moderate at best throughout the state. This finding supports previous research into this issue, particularly Mattingly & Morrissey (2014). There were areas within most Oregon MPOs that had relatively better or worse location affordability, suggesting that neighborhood or city location within MPOs does matter and is a relevant factor for policy and household housing choice regardless of household type.

Interestingly, MPOs who exhibited significant global clustering were also some of the most populous in the regions in the state. It may be that as region's grow, their economic and transportation systems expand unevenly and produce spatial disparities between neighborhoods. Overall, Central Lane MPO had the strongest clustering, Rogue Valley has the second strongest clustering, and Portland METRO had the third

strongest clustering for all household types. Longview-Kelso-Rainier MPO and Walla Walla Valley MPO generally had the weakest clustering.

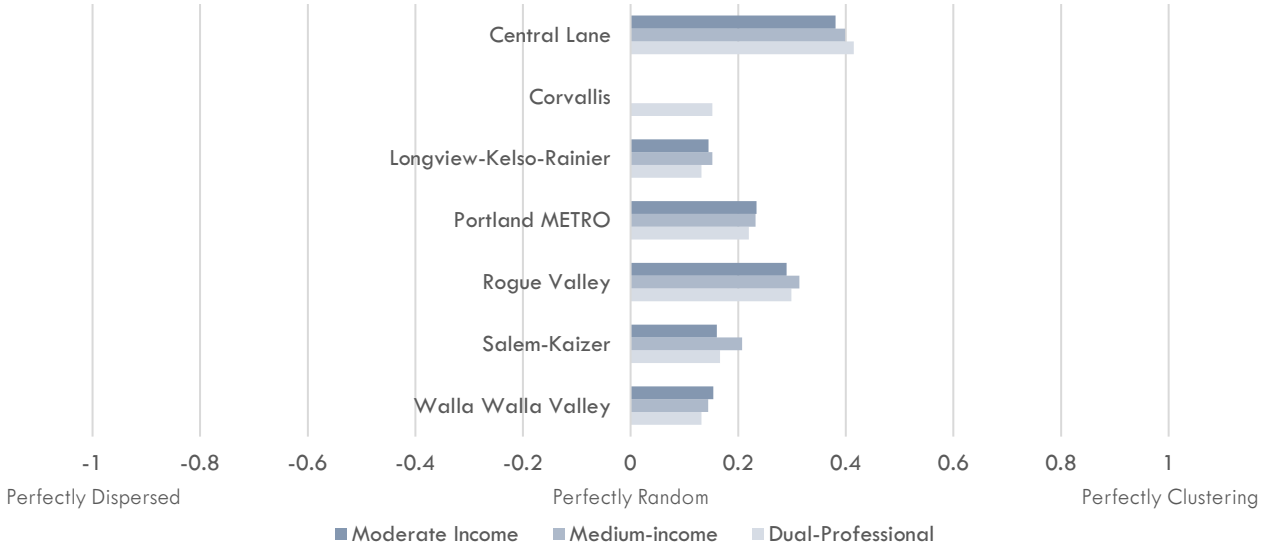


Figure 14: Global Moran's *I* Index Values for the Percent of Income Spent on H+T Costs by MPO by Household Type, p=<0.10, 2016

Note: Corvallis Area MPO Moran's I values were excluded for moderate- and median-income households because they were not statistically significant at 90-percent confidence interval.
Source: Location Affordability Index 3.0 (2019)

Moderate-income Households

For moderate-income households, MPOs' global Moran's *I* Index values ranged from 0.145 (Longview-Kelso-Rainier) to 0.381 (Central Lane) at a confidence interval of 90 percent, meaning H+T costs as a percent of income were clustering the weakest in Longview-Kelso-Rainier MPO and the strongest in Central Lane MPO. Rogue Valley MPO (0.290) and Portland METRO MPO (0.234) had the second and third strongest clustering rates, respectively. These findings suggest that the percent of income spent on H+T costs were spatially clustering in MPOs for moderate-income households. Census tracts were more likely to have neighbors with similar H+T costs as a percent of income than different – percentages are not evenly distributed across regions. Housing location within MPOs will affect the share of income a moderate-income household's income spend on H+T costs.

Median-income Households

For median-income households, MPOs' global Moran's *I* index values ranged from 0.144 (Walla Walla Valley) to 0.399 (Central Lane) at a confidence interval of 90 percent. This means that the share of income spent on H+T costs were clustering the weakest in Walla Walla Valley MPO and the strongest in Central Lane MPO. Rogue Valley MPO (0.314) and Portland METRO MPO (0.232) had the second and third strongest clustering for medium-income households, respectively. These findings suggest that the share of income spent on H+T costs were spatially clustering in MPOs for median-income households, suggesting that location within the region affected affordability.

Dual-professional Households

For dual-professional households, MPOs' global Moran's *I* index values ranged from 0.132 (Longview-Kelso-Rainier and Walla Walla Valley) to 0.415 (Central Lane) at a confidence interval of 90 percent. This means that the share of income spent on H+T costs were clustering the weakest in the Longview-Kelso-Rainier and Walla Walla Valley MPOs and the strongest in Central Lane MPO, again. Rogue Valley MPO (0.299) and Portland METRO MPO (0.220) had the second and third strongest clustering rates for dual-professional households, respectively. The Corvallis Area MPO had its only significant value for any household type at this type, with a value of 0.152. These findings suggest that, like moderate- and medina-income households, the percent of income spent on H+T costs were spatially clustering in MPOs for dual-professional households. Despite generally experiencing cost burden in the fewest census tract, the census tract a dual-professional households resides within an MPO still affects its affordability.

Local Indicators of Spatial Autocorrelation (LISA) for H+T Costs as a Percent of Income

Local indicators of spatial autocorrelation (LISA) for H+T costs as a percent of income were then mapped for each MPO by household type. Appendix C contains maps for all MPOs. A significance level of when the p-value is less than or equal to 0.05 was used. Through this method, census tracts within MPOs that exhibit significant clustering of H+T costs as a percent of income can be identified. Two types of spatial clusters, which are areas where similar percentages of income are spent on H+T costs, were documented. The first type, hotspots, signify areas of relatively worse location affordability. The second type, coldspots, signify areas of relatively better location affordability. High and low percentages of income spent on H+T costs are relative to the sample mean.

Indicators were documented for the same three LAI household types as the previous section. This aims to provide insights into whether household type affects the nature and extent of clustering at the local level. If spatial clusters of one type are more or less prevalent for a household type, it has implications for whether the neighborhood they locate determines affordability, respectively.

The following figures and tables in this section demonstrate that census tracts located near the urban centers of regions typically had relatively better location affordability and those at the urban periphery had worse location affordability. They also show that hotspots and coldspots were generally likely to be present, which means that neither end of the affordability spectrum were more or less common. Lastly, they show that household type appears to have a minor impact on the total number of spatial clusters present at the census-tract level. Total spatial clusters were slightly greater for moderate-income and median-income households than dual-professional households. Moderate-income (87 clusters) and median-income (90 clusters) households had nine and 12 more clusters than dual-professional (78 clusters) households, respectively. This finding suggests that as household income rises above the area median income, the prevalence of spatial clusters decreases somewhat – reducing the consequences of housing choice on affordability.

These phenomena are not favorable to moderate-income and median-income households. It suggests that housing location within a region more significantly affects how burdensome the share of income spent on H+T costs was for them. It builds upon the findings from Chapter 6, which showed moderate-income and median-income households faced H+T cost burden regardless of the neighborhood in nearly all MPOs. Not only were H+T costs a burdensome share of their income no matter where they resided, but their choice was more consequential than dual-professional households. These households are forced to choose between exclusively bad options, yet their choice still partially determines the severity of their affordability challenge.

It is not all bad news, though. If these households use measures of location affordability to guide their housing location choice, it becomes clear that all households can typically minimize their share of income spent on H+T costs by choosing housing near urban centers. For MPOs, it means that they can ensure efforts do not worsen local conditions and target strategies at specific areas to alleviate how burdensome H+T costs are.

Moderate-income Households

Table 12 shows that nine out of ten MPOs had statistically significant spatial clusters for moderate-income households. In total, there were 43 hotspots, 46 coldspots, and 389 not significant census tracts across all study areas. This suggests that local clustering is equally likely to occur in areas with relatively worse or better location affordability. On the other hand, six MPOs had significant spatial outliers. High-Low outliers were seven times more prevalent than Low-High outliers, suggesting that areas where H+T costs consume a high share of income are much more likely to be neighbors with low shares of income than vice versa. Though, no local clusters were identified in the vast majority (77%) of census tracts for this household type.

Throughout Oregon, location within MPOs played a modest role in defining the share of income spent on H+T costs for moderate-income households. Earlier in this report, I showed that moderate-income households were H+T cost burdened in nearly all census tracts. Yet, this finding suggests that spatial disparities, likely driven by variations in neighborhood characteristics, still existed at the local level. While, most census tracts did not generally exhibit clustering, several neighborhoods in nearly all MPOs performed relatively better or worse. These neighborhoods represent areas where households can minimize or maximize their share of income spent on H+T costs. Ultimately, despite experiencing widespread H+T cost burden, local housing location choice is still a factor in determining the severity of the affordability challenge for moderate-income households.

Table 12: Moderate-income Household H+T Costs as a Percent of Income Burden Rate LISA by MPO, p=<0.05, 2016, N=493

MPO	Spatial Clusters		Spatial Outliers		Not Significant
	Hotspots	Coldspots	Low-High	High-Low	
Albany Area	0	2	0	2	4
Bend	0	1	0	0	7
Central Lane	4	5	1	1	48
Corvallis Area	0	1	0	0	11
Longview-Kelso-Rainier	2	0	0	0	12
Middle Rogue	0	0	0	1	5
Portland METRO	33	26	2	7	235
Rogue Valley	3	6	0	0	24
Salem-Kaizer	1	2	0	2	36
Walla Walla Valley	0	1	0	1	7
Entire Study Area (N)	43	44	3	14	389

Source: Location Affordability Index 3.0 (2019)

Overall, Portland METRO had the most local clusters of both hotspots and coldspots – likely because it had by far the most census tracts (303). Though, Longview-Kelso-Rainier MPO had the highest percent of tracts that were hotspots at 14 percent, but only had a total of two hotspots. Portland METRO (33) had the most hotspots and second highest percentage of tracts (11%). Rogue Valley MPO had the third most hotspots (3) and third highest percentage of tracts (9%). Central Lane MPO had the second most hotspots (4) and fourth highest percentage of tracts (7%). These four MPOs had local clustering of high H+T costs as a percent of income at the census-tract level. Albany Area MPO had the highest percent of tracts that were coldspots at 25 percent, yet only had two coldspots total. Rogue Valley MPO had the second most coldspots at six and the second highest percentage of tracts with 18 percent of tracts.

Bend and Walla Walla Valley MPOs tied for the third highest percent of coldspots tracts at 12 percent. Portland METRO also had the highest total coldspots with 26, but that was only the fourth highest percentage of tracts at about eight percent.

Figure 15, below, visualizes the spatial clusters and outliers in Portland METRO. Similar to the descriptive map, areas with better location affordability, or coldspots, are located in and around the city of Portland (shown in blue), while areas with worse location affordability, or hotspots, are located at the periphery of the region (shown in red), like by the cities of Sherwood, West Linn, or Happy Valley. Downtown Portland is the densest place in terms of jobs and housing both in the MPO and state and best fits the stereotypical description of an affordable location. This map also shows that the regional transit investments by Portland METRO and the region's transit agency, TriMet, have likely resulted in improved location affordability in several neighborhoods near the downtown, in particular. Places where many transit options converge and are extremely comprehensive are generally coldspots. This map differs from the choropleth map because it suggests that, while the presence of transit routes in a census tract was visually associated with reduced H+T costs percentages, other neighborhood characteristics help produce a more significant cluster of values.

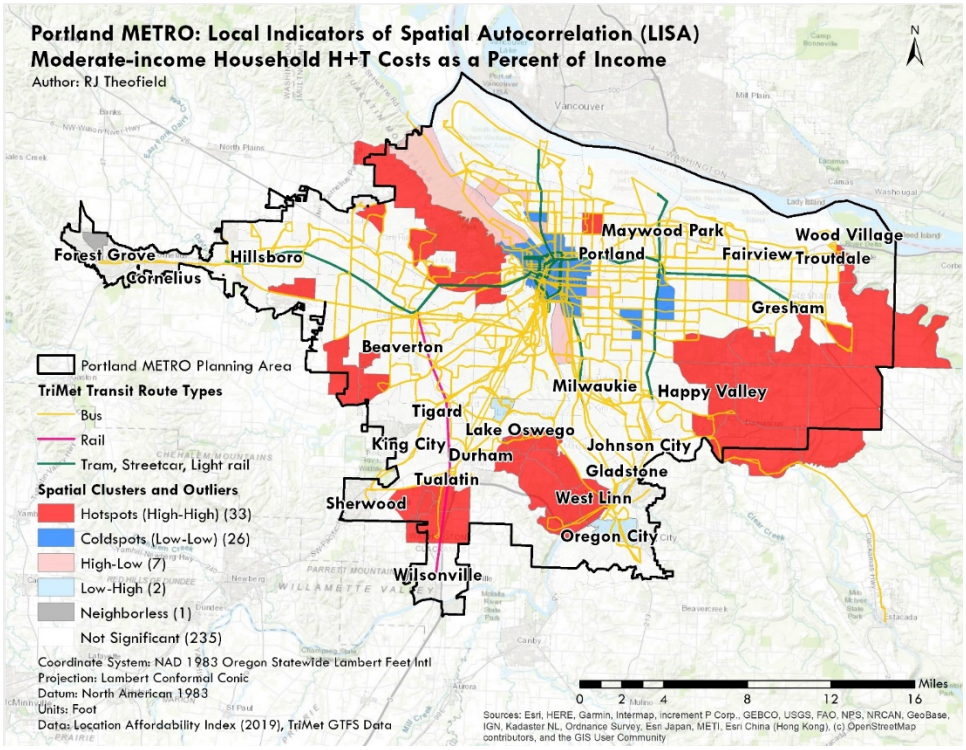


Figure 15: LISA for Moderate-income Household H+T Costs as a Percent of Income, Portland METRO, p=<0.05, 2016, n=303

Median-income Households

As shown in Table 13, eight out of ten MPOs had statistically significant spatial clusters for medium-income households. For all study areas, there were 44 hotspots, 46 coldspots, and 386 not significant census tracts. This suggests that, similar to moderate-income households, census tracts with better or worse location affordability were equally likely to cluster together. Five out of ten MPOs had significant spatial outliers. Again, High-Low outliers were much more likely to be present than Low-High outliers.

Tracts where high shares of income were spent on H+T costs are more likely to be neighbors with low percentages than the inverse. Although, most (78%) census tract did not have significant local clustering.

Overall, it shows that while median-income households faced H+T cost burden in all census tracts region-wide, local disparities exist in how burdensome the share of income spent on H+T costs was. Where housing is located within a region, and its neighborhood's characteristics, are relevant factors in determining location affordability. The majority of census tracts did not cluster, but several neighborhoods in all MPOs performed relatively better or worse. These neighborhoods represent areas where median-income households can minimize or maximize their share of income spent on H+T costs. While widely H+T cost burdened, local housing location choice is still a factor in determining the severity of the affordability challenge for median-income households.

Table 13: Median-income Household H+T Costs as a Percent of Income LISA by MPO, p=<0.05, 2016, N=493

MPO	Spatial Clusters		Spatial Outliers		Not Significant
	Hotspots	Coldspots	Low-High	High-Low	
Albany Area	0	2	0	1	5
Bend	0	0	0	0	8
Central Lane	4	6	1	1	47
Corvallis Area	0	1	0	0	11
Longview-Kelso-Rainier	2	0	0	0	12
Middle Rogue	0	0	0	0	6
Portland METRO	34	28	2	9	230
Rogue Valley	3	5	0	0	25
Salem-Kaizer	1	3	0	2	35
Walla Walla Valley	0	1	0	1	7
Entire Study Area (N)	44	46	3	14	386

Source: Location Affordability Index 3.0 (2019)

Portland METRO showcased the strongest local clustering with the most hotspots (34) and highest percentage of tracts (11%) for this household types. Central Lane MPO had the second most hotspots (4) and third highest percentage of tracts (7%). Rogue Valley MPO (3) had the third most hotspots (3) and second highest percentage of tracts (9%). In these MPOs, areas with poor location affordability tended to cluster together. Conversely, Albany Area MPO had the highest percentage of tracts that were coldspots at 25 percent. Rogue Valley MPO had the third most coldspots (5) and the second highest percentage of tracts with coldspots at 15 percent. Central Lane MPO had the second most cold spots (6) and third highest percentage of tracts (10%). Portland METRO had the second most coldspots (28) and fourth highest percentage of tracts (9%) highest percentage of tracts. In these MPOs, areas with good location affordability clustered.

Figure 16, on the next page, visualizes the spatial clusters and outliers in Portland METRO for a median-income household. This map is nearly identical to the one for moderate-income households. The same story holds true, areas with better location affordability, or coldspots, are located in and around the city of Portland (shown in blue), while areas with worse location affordability are located at the periphery of the region (shown in red). There were several more clusters for this household type,

but they simply expanded the areas with clusters for moderate-income households. Places near its economic center with transit options are coldspots, whereas more rural area at the edge of the MPO were hotspots.

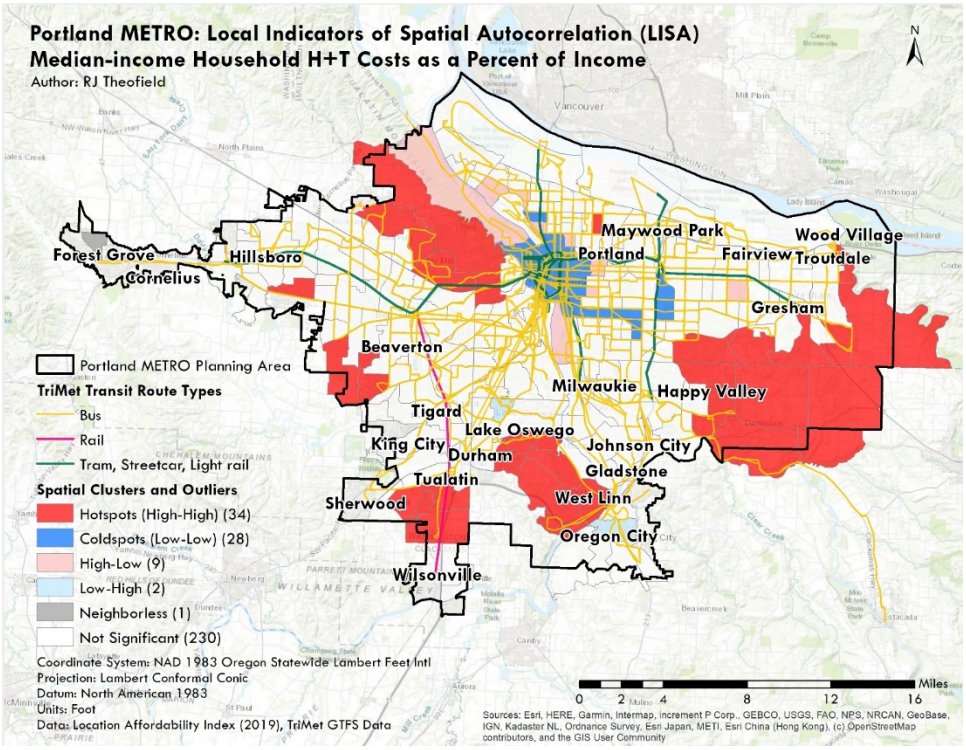


Figure 16: LISA for Median-income Household H+T Costs as a Percent of Income, Portland METRO, p=<0.05, 2016, n=303

Dual-professional Households

Table 14 shows that six out of ten MPOs had statistically significant hotspots or coldspots for dual-professional households. In the entire study area, there were 37 hotspots, 41 coldspots, and 396 not significant census tracts. This suggests that, like moderate-income and medium-income households, census tracts where high or low shares of income were spent on H+T costs were as likely to be nearby one another. In total, six out of ten MPOs had significant spatial outliers. High-Low outliers (14) were nearly three times more prevalent than Low-High (5) outliers.

Location within MPOs was a factor in determining how burdensome the share of income spent on H+T costs were, but less so than was found in moderate-income and median-income households. This phenomenon is partially explained by the finding in Chapter 6 that dual-professional households were less likely to experience H+T cost burden in census tracts throughout the study area. Quite simply, where this household type choses to live within an MPO is less significant because there were less areas at either extreme.

Table 14: Dual-professional Household H+T Cost Burden Rate LISA by MPO, p=<0.05, 2016, N=494

MPO	Spatial Clusters		Spatial Outliers		Not Significant
	Hotspots	Coldspots	Low-High	High-Low	
Albany Area	0	2	0	2	4
Bend	0	0	0	0	8
Central Lane	3	6	0	1	49
Corvallis Area	0	1	0	0	11
Longview-Kelso-Rainier	2	0	0	0	12
Middle Rogue	0	0	0	1	5
Portland METRO	28	25	5	6	239
Rogue Valley	3	4	0	0	26
Salem-Kaizer	1	2	0	3	35
Walla Walla Valley	0	1	0	1	7
Entire Study Area (N)	37	41	5	14	396

Source: Location Affordability Index 3.0 (2019)

Portland METRO had the most hotspots (28), or eight percent of tracts, for dual-professional households, but it did not have the highest percent. Rather, Longview-Kelso-Rainier MPO, where 14 percent of census tracts were hotspots, had the highest percentage, despite only having two hotspots. Rogue Valley MPO had the second most hotspots (3) and second highest percentage of tracts at nine percent. Again, Portland METRO had the most coldspots (25), or eight percent of tracts, but it was not the highest percent of tracts. Albany Area MPO had the highest percent of tracts that were coldspots, with 25 percent. The Rogue Valley MPO had the second highest percentage of tracts at 12 percent. Central Lane MPO had the third highest percentage at 10 percent.

Figure 17 visualizes the spatial clusters and outliers in Portland METRO for a dual-professional household. Similar to moderate-income and median-income households, areas with better location affordability, or coldspots, are located in and around the city of Portland (shown in blue), while areas with worse location affordability are located at the periphery of the region (shown in red). There were a few less spatial clusters for this household type, shrinking the areas in other household types. The same pattern holds, though, places near economic center with transit options are coldspots, whereas more rural area at the edge of the MPO were hotspots.

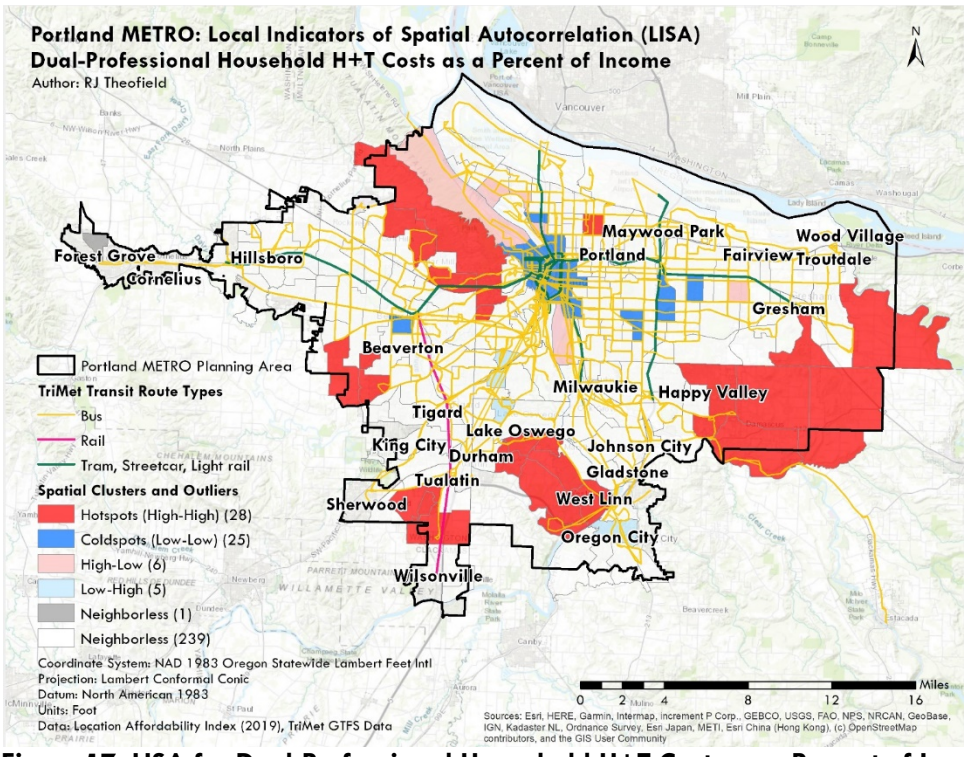


Figure 17: LISA for Dual-Professional Household H+T Costs as a Percent of Income, Portland METRO, p=<0.05, 2016, n=303

Summary

The findings from this chapter showcase that spatial clusters in H+T costs as a percent of household income were present within most MPOs and that local patterns vary slightly by household type. Spatial patterns in Oregon MPOs suggest, similar to the literature, that areas located near urban centers with high accessibility to jobs and services, perform better on measures of location affordability; while areas at the urban periphery that lacked transit service and economic activity generally performed worse. Since the analysis demonstrated that spatial clustering was present at the neighborhood level, regional measures of location affordability would mask neighborhood disparities with Oregon MPOs, and plans should be adjusted accordingly. In addition, this chapter showed that spatial clusters were more prevalent for moderate-income and median-income households than dual-professional households, further exacerbating the consequences of housing location choice.

To recap, this chapter establishes that Oregon MPO plan's strategies must be customized to account for local conditions and pay attention to the impacts on moderate-income and median-income households. While location affordability is a problem for MPOs overall, some neighborhoods and households face greater challenges than others.

CHAPTER 8 | KEY TAKEAWAYS

This section outlines key takeaways for the challenges, spatial patterns, and practices of location affordability in Oregon metropolitan planning organizations (MPOs).

State of the Practice of Incorporating Location Affordability into Long-range Transportation Plans (LRTPs)

Findings in this report suggest that the practice of incorporating location affordability into Oregon MPO LRTP is at best disjointed. Including concepts or concerns related to location affordability, such as planning coordination and transportation affordability, into LRTP guidance statements is a somewhat common practice in Oregon. Though, even these related guidance statements were often not accompanied by a performance measure. Many plans lacked any relevant performance measures. Importantly, location affordability-specific statements and measures were largely absent from plans, similar to national practices. Unlike what was expected, Portland METRO did not have the most complete plan, instead it had the second most. The following key findings support this:

- **Most plans did not include location affordability in its guidance statements or performance measures.** Only two plans specifically incorporated location affordability into their guidance statements, and one included it in its performance measures. Portland METRO and Middle Rogue MPO both included location affordability-specific guidance statements, but only Portland METRO included a performance measure.
- **Planning coordination was the most often included concern in LRTPs' guidance statements and performance measures.** All ten plans included planning coordination concerns in their guidance statements, but only three included it in their performance measures. So, while it was the most prevalent, most plans did not comprehensively include it.
- **Guidance statements and performance measures were somewhat connected throughout plans.** While ten plans included at least one relevant guidance statement, only four included performance measures. Most plans lacked follow-through from statement to measure. The four plans with performance measures, however, did connect each guidance statement with their performance measures. This suggests that MPOs who have incorporated related performance measures are connecting them with guidance statements, but it is not a common practice state-wide.

Challenges of Location Affordability

Findings suggest that using measures of location affordability, rather than housing affordability, improved our understanding of the cost-related challenges in Oregon MPOs, and that the challenge is greater for moderate-income and median-income households. Overall, Portland METRO represents the most affordable MPO at the regional and neighborhood level, with the lowest average housing costs and H+T costs as a percent of income and lowest percent of census tracts where households were (severely) H+T cost burdened. Middle Rogue MPO was the least affordable MPO at the regional and neighborhood level, with the highest average housing costs and H+T costs as a percent of income and highest percent of census tracts where households were (severely) H+T cost burdened.

In addition, findings demonstrate that household type does impact the likelihood that a household faced H+T cost burden in a census tract, but the variation is more significant when comparing households earning the AMI or less to households earning 150 percent of AMI. The following key findings support this:

- **Location affordability was a greater challenge than housing affordability for a typical household.** Based on housing affordability measures, most (60%) of MPOs were affordable for median-income households, on average. But, when the location affordability measure, average H+T costs as a percent of income, were used, no MPO was affordable.

- **Moderate-income and median-income households were very likely to be H+T cost burdened, but not severely H+T cost burdened in most census tracts.** Moderate- or median-income households were H+T cost burdened in nearly all census tracts in the entire study area. The most location-affordable MPOs for this household type were Portland METRO and Central Lane, where these households were not H+T cost burdened in only between two percent and six percent of census tracts.

- **Dual-professional households very unlikely to be H+T cost burdened or severely H+T cost burdened in most census tracts.** Dual-professional households were cost burdened in less than 10 percent of census tracts and severely cost burdened in zero percent of the entire study area. Further, dual-professional households were cost burdened in less than 50 percent of census tracts in nine out of ten MPOs.

Spatial Patterns of Location Affordability

Findings suggest that regional measures of location affordability mask local disparities in affordability in Oregon MPOs. Regardless of the MPO's size, regions were not flat, rather there are peaks and valleys in the share of income households spend on H+T costs at the census-tract level. Areas near the urban core where generally more affordable, while areas at the urban periphery were less affordable.

This pattern was observed both visually and quantitatively. The H+T costs as a percent of income were globally clustering at varying extents across all three household types in MPOs. The strength of global clustering varied between MPOs, with Central Lane MPO exhibiting the strongest clustering and Longview-Kelso-Rainier MPO showing the weakest clustering, in general. Quantitative analysis at the local level suggests that spatial clusters were present in most MPOs, meaning certain areas had relatively better or worse location affordability than the sample mean. Clusters at either extreme were equally likely to be present. Household type appeared to slightly affect the prevalence of local clusters, more so for some households more than others. Not only does where housing is located within an MPO matter, but it matters more for moderate-income and median-income households than dual-professional households. The following findings support this:

- **The percent of income spent on H+T costs were spatially clustering at the neighborhood level within most MPOs across household types.** Of the seven MPOs with significant global Moan's *I* index values, all had values approaching positive one, indicating that clustering was present.

- **Spatial clusters of relatively better or worse location affordability were less prevalent for dual-professional households than moderate- or median-income households.** Moderate-income (87 clusters) and median-income (90 clusters) households had nine and 12 more spatial clusters than dual-professional (78 clusters) households, respectively. This suggests that as household income rises above the AMI, the number of clusters decreases or the significance of location

In summary, location affordability is a serious challenge, regardless of household type, and Oregon MPOs' current state of planning practice does not adequately address it. Spatial patterns of location affordability measures suggest that disparities exist between neighborhoods within MPOs, and the disparities are greater for median-income and moderate-income households and must be accounted for in planning efforts. The regional scope of MPO's planning areas means that development and transportation system patterns vary throughout it. This geographic distribution may be expected in Oregon because of its statewide land use planning program's use of growth management strategies. The clusters of better affordability often located near urbanized land, which is required to be within an urban growth boundary in the state of Oregon. While this regulatory aspect in Oregon certainly influences the disparity in affordability between urban and rural communities within MPOs, this phenomenon is not unique to Oregon. This pattern can be observed throughout the U.S. and in international cities, and instead is perhaps better explained by general social and economic behavior, like economies of agglomeration. Despite a unique state planning program, it is unlikely that Oregon MPOs represent an exception from the location affordability research on these larger or more foreign regions. If Oregon and its MPOs are to begin addressing the full breadth of its affordability crisis, a change in practice is needed.

CHAPTER 9 CONCLUSION

Throughout the United States, households face not just a housing crisis, but an affordability crisis. In 2018, about one-third of U.S. and Oregon households spent over 30 percent of their income on housing costs alone (Oregon Center for Public Policy, 2018). This issue is further compounded by the growing share of household income spent on transportation, which reached 16 percent nationwide in 2016 (Devajyoti, 2015). How government agencies respond to this crisis will undoubtedly be shaped by how they measure and analyze it. Traditional measures of affordability focused solely on housing costs as a share of household income; however, recent studies suggest these measures provide an incomplete picture of the cost-related challenges households face. Scholars now recommend that the share of household income spent on both housing and transportation costs be accounted for, instead.

In response, regional transportation agencies called metropolitan planning organizations (MPOs) have begun transitioning towards location-based measures of affordability to evaluate projects and plans. Measures that consider both housing and transportation costs as a percent of household income are known to measure location affordability. Since the systems that effect location affordability operate regionally, MPOs can serve a unique role in addressing this challenge. By guiding federal transportation investments across municipal boundaries, they offer an effective pathway to coordinate regional efforts to improve location affordability. Yet, the practice of achieving this is not well developed nor is it well documented. In a nationwide review of MPO long-range transportation plans (LRTPs), Hartnell (2018) found that the few MPOs who incorporated it are some of the largest in the nation, all with populations greater than 2.5 million. Until this report, little was known of the challenges and practices in smaller MPOs, who often lack similar levels of organization capacity yet face equally daunting challenges. This research helps fill this gap by studying location affordability in Oregon's ten MPOs.

Recommendations

This research reveals a blind spot in regional transportation planning practice. Despite providing a more complete view of the affordability crisis than traditional housing-based measures, few MPOs in Oregon directly incorporated location affordability statements or measures into their LRTPs. As a result, it is likely that most are unaware of the problem and how their activities may affect it, which has wide-ranging implications, but more so for households who earn the AMI or less in particular. Statewide, moderate-income and median-income households were H+T cost burdened in nearly every MPO both on average and at the census-tract level. While it would be erroneous to solely blame MPOs for this reality, their general disengagement suggests that a major regional effect of their activities is unaccounted for during planning efforts.

As the federal government continues to move towards performance-based planning and programming, Oregon MPOs should be proactive and voluntarily incorporate location affordability into their LRTP's guidance statements and performance measures to properly evaluate its impacts. Adopting it voluntarily may mitigate MPO's concerns of an unfair accountability situation, where they are penalized for poor performance

despite limited authority. Moreover, incorporation into MPO's long-range plan and planning process can serve as a tool for greater cooperation with partners who oversee aspects related to location affordability.

How MPOs decide to integrate location affordability into LRTPs will influence its effectiveness. Therefore, I recommend that performance should be measured at two points of the planning process: 1) plan development and 2) plan evaluation. Integrating a scenario-planning framework into plan development that utilizes location affordability performance measures will help MPOs be proactive and anticipate investment results. Second, by having MPOs analyze their region's location affordability indicators during plan evaluation, they can identify trends and evaluate real-world strategy outcomes on an ongoing basis.

The voluntary scenario-planning framework introduced by the FAST Act of 2015 offers a natural avenue to integrate location affordability into the plan development process. Scenario planning augments traditional transportation planning processes by adding an analysis of the impact investment packages may have on a region's future (Eno Center for Transportation, 2018). Including location affordability performance measures in a scenario-planning process would help MPOs better understand the implications their decisions have on the share of household income spent on H+T costs, ensuring actions align with regional affordability goals. The modeled results can then be compared to real-world outcomes to further refine plan guidance statements.

A critical component of modeling the impacts of transportation investments on location affordability will be accounting for the plans of partner jurisdictions and agencies. The limited scope of MPOs' influence places it at the mercy of local land use planning decisions and state economic development strategies, for example. However, unlike other regional organizations, like councils of governments (COGs), MPOs are required to be involved in federal transportation investment decision-making processes. This leverage makes them an influential actor in shaping regional development patterns and travel behavior relative to other regional cooperatives, which are often voluntary. MPOs can utilize this federal mandate to act as a regional organizer and coordinate the many aspects that contribute to location affordability.

Furthermore, scenario planning will require a more robust analytical and public involvement processes during plan development than traditional approaches. Yet, nationwide the median MPO only has a staff of six, including administrative and executive staff, while about one-quarter of MPOs employed less than three people in 2017 (Eno Center for Transportation, 2018). In lieu of an increase in federal aid, the lack of organizational capacity in MPOs represents an opportunity for greater inter-agency collaboration. MPOs may be well served to partner with cities, counties, or transit agencies, for instance, to share the financial and staffing needs of conducting scenario planning centered around location affordability. The scenario modeling and evaluation can then also be incorporated into other jurisdiction's plans, further strengthening each other's efforts. Ultimately, if integrated into the planning process and plans itself, the comprehensive nature of location affordability provides a mechanism to coordinate regional priorities that respect local goals. In addition to the cost savings produced by this strategy, it will also foster improved planning coordination and address Oregon's affordability crisis in a holistic manner.

How Oregon MPOs and their partners target their location affordability guidance statements and performance measures will affect decision-making and outcome evaluation. The research in this report demonstrated that MPOs must account for variation in household type and local spatial patterns. Moderate-income and median-income households experienced worse location affordability than dual-professional households across all Oregon MPOs at multiple levels; thus, LRTPs should focus statements and measures at improving their situation. Further, neither of the two plans reviewed in this study that incorporated location affordability considered its spatial patterns. Both used regional approaches, which ignore the local geographic disparities that were found to be present in the percent of income spent on H+T costs within Oregon MPOs. The uneven spatial distribution of neighborhood characteristics, such as jobs, housing, and transportation network options and coverage, within MPOs likely means that costs inherently vary. This pattern was exhibited by the presence of spatial clusters (i.e., hotspots and coldspots) of H+T costs as a percent of income within most metropolitan planning areas. To account for this, LRTP performance measures should be targeted to specific regions that display relatively worse or better location affordability to be more effective. This strategy further emphasizes the need for inter-jurisdictional coordination because many of these local characteristics will be out of the purview of MPOs.

Luckily for Oregon's smaller MPOs, who typically lack the technical capacity to collect and process data, the Department of Housing and Urban Development's Location Affordability Index (LAI) (2019) provides an accessible dataset that can readily be used to establish such performance measures. The LAI contains H+T costs as a percent of income at the census-tract level at various household types at or below the AMI. In fact, the LAI has eight household type variants that represent households earning at or below the AMI – five more than were covered in this study. As such, the challenge of data availability, which was identified as the greatest barrier to incorporating more performance measures by MPOs in a 2017 national survey, will not exist. MPOs can tailor their strategies to the household type which best fits their situation and policy aims.

Limitations and Implications for Future Research

While this report clearly demonstrates need to incorporate location affordability into MPO planning practice, additional research is needed to fully understand and plan for the challenge of location affordability. Primarily, while previous research shows the general characteristics of affordable locations and this research helped identify neighborhoods which had better or worse location affordability, further research into the neighborhood characteristics that drive this phenomenon is necessary. Foundational research on both housing and location affordability helps identify several characteristics, such as jobs, housing, transit, that may be impacting the share of income spent on H+T costs, but little research quantitatively examines the causal relationships. If these relationships can be established, MPOs can better target strategies to encourage positive measure performance. This may be a necessary last piece to clarify before the relationship between MPOs and performance measures is clearly established. Not only would MPOs be able to set guidance statements and performance measures, but their analysis could guide which strategies to pursue to improve location affordability.

Second, the relationship between neighborhood characteristics and the complex models used to generate H+T cost estimates may unintentionally result in bias. As in any model, theories underly its assumptions and internal mechanisms. It may be the case that when models are used to measure location affordability, they are inherently biased to indicate certain areas as affordable. Further tests on the validity of such indices are necessary to understand if this is the case. If so, collecting transportation cost data via a household survey may be a more accurate measurement method. Though, the financial cost of a survey may prove infeasible in many MPOs and be a barrier to adoption if existing estimates are proven invalid.

Lastly, the political or technical difficulties of undertaking an initiative to reimagine how affordability is discussed and measured in an MPO and its partners was not explored. In theory, location affordability provides a logical platform to establish a regional collaborative, but the realities of implementation may prove much more difficult. Any effort for inter-jurisdictional coordination would require a comprehensive community engagement strategy to help balance the varied interests within each region. Moreover, MPO staff may not have the capacity or expertise to conduct the research and efforts necessary for proper incorporation into LRTPs. Research on the barriers to inclusion is necessary to understand the potential resources MPOs may need prior to embarking on reforming how its affordability crisis is addressed.

REFERENCES

Acolin, A., & Green, R. K. (2016). Measuring housing affordability in São Paulo metropolitan region: Incorporating location. *Cities*, 41-49.

Albany Area Metropolitan Planning Organization. (2018). *Regional Transportation Plan (2018-2040)*. Albany: Albany Area MPO.

Alonso, W. (1964). *Location and Land Use*. Cambridge, Mass.: Harvard University Press.

Bend Metropolitan Planning Organization. (2019). *2040 Bend Metropolitan Transportation Plan*. Bend: Bend MPO.

Bond, A., & Kramer, J. (2011). Administrative Structure and Hosting of Metropolitan Planning Organizations. *Journal of the Transportation Research Board*, 69-75.

Carreras, J. (2010). Applying the Housing + Transportation Affordability Index in Your Metro Area. *Tools of the Trade: 12th National Conference for Transportation Planning for Small and Medium-Sized Communities*. Williamsburg, Virginia: Transportation Research Board.

Center for Neighborhood Technology. (2017, August). *H+T Affordability Index Methodology*. Retrieved from H+T Affordability Index: https://htaindex.cnt.org/about/HTMethods_2016.pdf

Center for Neighborhoood Technologies. (2019, October 18). *About the Index*. Retrieved from https://htaindex.cnt.org/about/#history

Devajyoti, D. (2015). Relationship between Households' Housing and Transportation Expenditures: Examination from Lifestyle Perspective. *Transportation Research Board*, 26-35.

Federal Highway Administration, the Federal Transit Administration, and the Volpe National Transportation Systems Center. (2020). *Metropolitan Transportation Planning: Executive Seminar*. Retrieved from U.S. Department of Transportation: https://www.planning.dot.gov/Documents/MetroPlanning/metroTrans.htm

Federal Transit Administration. (2017, February 22). *Metropolitan, Statewide & Non-Metropolitan Planning*. Retrieved from Federal Transit Administration: https://www.transit.dot.gov/regulations-and-guidance/transportation-planning/metropolitan-statewide-non-metropolitan-planning

Federal Transit Administration. (2018, January 2). *Final Rule on Statewide and Nonmetropolitan Transportation Planning and Metropolitan Transportation Planning*. Retrieved from Federal Transit Administration: https://www.transit.dot.gov/regulations-and-guidance/transportation-planning/final-rule-statewide-and-nonmetropolitan

Federal Transit Administration. (2018, May 9). *Performance-Based Planning and Programming*. Retrieved from Federal Transit Administration: https://www.transit.dot.gov/performance-based-planning

Federal Transit Administration. (2019, March 11). *Long-Range Statewide Transportation Plan*. Retrieved from Federal Transit Administration: https://www.transit.dot.gov/regulations-and-guidance/transportation-planning/long-range-statewide-transportation-plan

Federal Transit Administration. (2019, March 11). *Metropolitan Planning Organization*. Retrieved from Federal Transit Administration: https://www.transit.dot.gov/regulations-and-guidance/transportation-planning/metropolitan-planning-organization-mpo

Federal Transit Administration. (2019, March 11). *Metropolitan Transportation Plan (MTP)*. Retrieved from Federal Transit Authority: https://www.transit.dot.gov/regulations-and-guidance/transportation-planning/metropolitan-transportation-plan-mtp

Federal Transit Administration. (2019, March 11). *Unified Planning Work Program (UPWP)*. Retrieved from Federal Transit Administration: https://www.transit.dot.gov/regulations-and-guidance/transportation-planning/unified-planning-work-program-upwp

Gabriel, S., & Painter, G. (2017, April 6). *Conference on Housing Affordability*. Retrieved from American Enterprise Institute: https://www.aei.org/wp-content/uploads/2017/04/CHA-Panel-1.pdf

Ganning, J. P. (2017). It's Good but Is It Right? An Under-the-Hood View of the Location Affordability Index. *Housing Policy Debate*, 708-824.

Guiliano, G. (1991). *Is Jobs-Housing Balance a Transportation Issue?* UC Berkeley: University of California Transportation Center.

Guiliano, G. (1995). The Weakening Transportation-Land Use Connection. *Access*, 3-11.

Haas, P. M., Newmark, G. L., & Morrison, T. R. (2016). Untangling Housing Cost and Transportation. *Housing Policy Debate*, 568-582.

Haas, P., Morse, S., Becker, S., Young, L., & Esling, P. (2013). The influence of spatial and household charactersitics on household transportation costs. *Research in Transportation Business & Management*, 14-26.

Hamilton, B. W. (1995). Wasteful Commuting. *The Journal of Policital Economy*, 1035-1053.

Hartell, A. M. (2018). Is Performance Measurement Improving Planning Practice? The Case of Location Affordability in Long-Range Transportation Plans. *Transportation Research Record*, 31-44.

Hartell, A. M. (2018). Location Affordability and Regional Economic Resilience: Evidence from the U.S. Foreclosure Crisis. *Transportation Research Board*, 37-45.

Hulchanski, D. J. (1995). The concept of housing affordability: Six contemporary uses of the housing expenditure-to-income ratio. *Housing Studies*, 471-491.

Institute of Transportation Engineers. (2020). *Transportation Planning*. Retrieved from ITE: https://www.ite.org/technical-resources/topics/transportation-planning/

Isalou, A. A., & Litman, T. (2014). Testing the housing and transportation affordability index in a developing world context: A sustainability comparison of central and suburban districts in Qom, Iran. *Transport Policy*, 33-39.

Jahan, J., & Hamidi, S. (2019). A National Study on Transportation Affordability of HUD Housing Assistance Programs. *Sustainability*, 123.

King, L. (2012). *Oregon's Transportation Planning Rule*. Eugene: University of Oregon.

Kutty, N. K. (2010). A new measure of housing affordability: Estimates and analytical results. *Housing Policy Debate*, 113-142.

Luan, H. H. (2020). *Area Pattern Analysis*. Eugene: University of Oregon.

Lui, H., Nie, J., Cai, B., Cao, L., Wu, P., Pang, L., & Wang, X. (2019). CO2 emissions patterns of 26 cities in the Yangtze River Delta in 2015: Evidence and implications. *Environmental Pollution*, 1678-1686.

Mattingly, K., & Morrissey, J. (2014). Housing and transport expenditure: Socio-spatial indicators of affordability in Auckland. *Cities*, 69-83.

McGrew, L., & Monroe, C. B. (2014). *An Introduction to Statistical Problem Solving in Geography (Third Edition)*. Illinois: Waveland Press, Inc.

Middle Rogue Metropolitan Planning Organization. (2018). *2015-2040 Regional Transportation Plan*. Grants Pass: Middle Rogue MPO.

Monk, S., Pearce, B. J., & Whitehead, C. M. (1996). Land-Use Planning, Land Supplym and House Prices. *Environment and Planning A: Economy and Space*, 495-511.

Montgomery, D. (2019, April 4). *The Neighborhoods Where Housing Costs Devour Budgets*. Retrieved from CityLab: https://www.citylab.com/equity/2019/04/affordable-housing-map-monthly-rent-home-mortgage-budget/586330/

Muth, R. (1969). *Cities and Housing*. Chicago, Ill.: Chicago University Press.

Oregon Center for Public Policy. (2018, March 15). *One in Three Oregon Families Struggle to Afford Housing*. Retrieved from Oregon Center for Public Policy: https://www.ocpp.org/2018/03/15/20180315-cost-burdened-housing/

Oregon Department of Land Conservation and Development. (2020, March 27). *Goal 12: Transportation*. Retrieved from Oregon Planning: https://www.oregon.gov/lcd/OP/Pages/Goal-12.aspx

Oregon MPO Consortium. (2020). *About OMPOC*. Retrieved from Oregon MPO Consortium: https://www.ompoc.org/test/

O'Toole, R. (2019, March 30). *Affordable in name only: Oregon's Housing Problem*. Retrieved from The Hill: https://thehill.com/opinion/finance/436487-affordable-in-name-only-oregons-housing-problem

Portland METRO. (2018). *Regional Transportation Plan*. Portland: Portland METRO.

Portland METRO. (2018). *Regional Transportation Plan*. Portland: Portland METRO.

Portland METRO. (2020). *What is METRO?* Retrieved from Portland METRO: https://www.oregonmetro.gov/regional-leadership/what-metro

Reina, V. J., Wegmann, J., & Guerra, E. (2019). Are Location Affordability and Fair Housing on a Collision Course? Race, Transportation Costs, and the Siting of Subsidized Housing. *Cityscape*, 125-142.

Saberi, M., Wu, H., Amoh-Gyimah, R., Smith, J., & Arunachalam, D. (2017). Measuring housing and transportation affordability: A case study of Melbourne, Australia. *Journal of Transport Geography*, 134-146.

Schwartz, M., & Wilson, E. (2007). *Who Can Afford To Live in a Home?* US Census Bureau.

Singleton, P. A., & Clifton, K. J. (2017). Considering health in US metropolitan long-range transportation plans: A review of guidance statements and performance measures. *Transport Policy*, 79-89.

Stoker, P., & Ewing, R. (2014). Job-Worker Balance and Income Match in the United States. *Housing Policy Debate*, 485-497.

Thakuriah, P., & Yihua, L. (2006). Transportation Expenditures and Ability to Pay: Evidence from Consumer Expenditure Survey. *Transportation Research Board*, 257-265.

Thalmann, P. (2003). 'House poor or simply poor'? *Housing Economics*, 291-317.

Transportation For America. (2020). *MPO Survey on Performance Measures*. Retrieved from Transportation For America: https://t4america.org/maps-tools/mpo-survey/

U.S. Department of Housing and Urban Development. (2019, Nov. 10). *Location Affordability Index*. Retrieved from HUD Exchange: https://www.hudexchange.info/resources/documents/Location-Affordability-Index-Version-3-Data-and-Methodology.pdf

U.S. Department of Housing and Urban Development. (2020, March 17). *Affordable Housing*. Retrieved from HUD: https://www.hud.gov/program_offices/comm_planning/affordablehousing/

U.S. Department of Transportation. (n.d.). *Fact Sheet: Metropolitan & Statewide and Nonmatropolitan Transportation Planning 49 U.S.C. Chapter 53, Section 5303, 5304, 5305*. Retrieved from Federal Transit Administration: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/5303-5304-5305_Program_Metropolitan_and_Statewide_Planning_Fact_Sheet_FINAL.pdf

U.S. Federal Highway Administration/Federal Transit Administration. (2020, April). *Metropolitan Planning Organization (MPO) Database*. Retrieved from Transportation Planning Capacity Building: https://www.planning.dot.gov/mpo/

Urban Institute. (2019, February 21). *Too Far from Jobs: Spatial Mismatch and Hourly Workers*. Retrieved from Urban Institute: https://www.urban.org/features/too-far-jobs-spatial-mismatch-and-hourly-workers

US Department of Housing and Urban Development. (2019, October 19). *About the Location Affordability Index*. Retrieved from HUD Exchange: 2019

Veal, S., & Jonathan, S. (2018, December 7). *Nearly a Third of American Households were Cost-burdened Last Year*. Retrieved from Joint Center for Housing Studies of Harvard University: https://www.jchs.harvard.edu/blog/more-than-a-third-of-american-households-were-cost-burdened-last-year/

Vidyattama, Y., Tanton, R., & Nepal, B. (2013). The Effect of Transport Costs on Housing-related Financial Stress in Australia. *Urban Studies*, 1779-1795.

Weiner, E. (2013). *Urban Transportation Planning in the United States: History, Policy, and Practice*. New York: Springer.

APPENDIX A | CODING SHEETS

This appendix includes tables that document the findings of the content analysis by MPO.

Table 15: Albany Area MPO Code Sheet, Plan Adopted 2018

Concern	Guidance Statements	Page(s)	Performance Measures	Page(s)	Notes
Affordability					
Location Affordability	No		No		
Housing Affordability	No		No		
Transportation Affordability	Yes	23, 24	No		
Costs					
Housing Costs	No		No		
Transportation Costs	Yes	13	No		
Planning Coordination					
Jobs, Housing, and Transportation	Yes	19	No		
Land Use and Transportation	Yes	19, 71	No		

Table 16: Bend MPO Code Sheet, Plan Adopted 2018

Concern	Guidance Statements	Page(s)	Performance Measures	Page(s)	Notes
Affordability					
Location Affordability	No		No		
Housing Affordability	No		No		
Transportation Affordability	No		No		
Costs					
Housing Costs	No		No		
Transportation / Travel Costs	No		No		
Planning Coordination					
Jobs, Housing, and Transportation	Yes	54	Yes	270	
Land Use and Transportation	Yes	52, 53	No		

Table 17: Central Lane MPO Code Sheet, Plan Adopted 2017

Concern	Guidance Statements	Page(s)	Performance Measures	Page(s)	Notes
Affordability					
Location Affordability	No		No		
Housing Affordability	No		No		
Transportation Affordability	Yes	Chapter 2, pg. 6	No		
Costs					
Housing Costs	No		No		
Transportation / Travel Costs	No		No		
Planning Coordination					
Jobs, Housing, and Transportation	No		No		
Land Use and Transportation	Yes	Chapter 2, pg. 6 and 10	No		

Table 18: Corvallis Area MPO Code Sheet, Plan Adopted 2017

Concern	Guidance Statements	Page(s)	Performance Measures	Page(s)	Notes
Affordability					
Location Affordability	No		No		
Housing Affordability	No		No		
Transportation Affordability	Yes	13, 93, 94	No		
Costs					
Housing Costs	No		No		
Transportation / Travel Costs	No		No		
Planning Coordination					
Jobs, Housing, and Transportation	Yes	3	No		
Land Use and Transportation	Yes	4, 95	No		

Table 19: Longview-Kelso-Rainier MPO Code Sheet, Plan Adopted 2018

Concern	Guidance Statements	Page(s)	Performance Measures	Page(s)	Notes
Affordability					
Location Affordability	No		No		
Housing Affordability	No		No		
Transportation Affordability	No		No		
Costs					
Housing Costs	No		No		
Transportation / Travel Costs	No		No		
Planning Coordination					
Jobs, Housing, and Transportation	Yes	1	No		
Land Use and Transportation	Yes	31, 35	No		

Table 20: Middle Rogue MPO Code Sheet, Plan Adopted 2018

Concern	Guidance Statements	Page(s)	Performance Measures	Page(s)	Notes
Affordability					
Location Affordability	Yes	Ch. 3, pg. 7	No		
Housing Affordability	No		No		
Transportation Affordability	No		No		
Costs					
Housing Costs	No		No		
Transportation / Travel Costs	Yes	Ch. 7, pg. 4	No		
Planning Coordination					
Jobs, Housing, and Transportation	Yes	Ch. 2, pg. 3	Yes	Ch. 2, pg. 3	
Land Use and Transportation	Yes	Ch. 2, pg. 5 and 8	Yes	Ch. 2, pg. 14	

Table 21: Portland METRO Code Sheet, Plan Adopted 2018

Concern	Guidance Statements	Page(s)	Performance Measures	Page(s)	Notes
Affordability					
Location Affordability	Yes	Ch. 2, pg. 12 and 13	Yes	Ch. 7, pg. 7	Metro Research Center developed a prototype of a Housing and Transportation Expenditure tool. The prototype will undergo further development, testing and refinement in anticipation of application during the next MTIP process and RTP update.
Housing Affordability	No		No		
Transportation Affordability	Yes	Ch. 2, pg. 12, 14, and 20	No		
Costs					
Housing Costs	No		No		
Transportation / Travel Costs	No		No		
Planning Coordination					
Jobs, Housing, and Transportation	Yes	Ch. 2, pg. 13 and 14	Yes	Ch. 7, pg. 35	
Land Use and Transportation	Yes	Ch. 2, pg. 12	No		

Table 22: Rogue Valley MPO Code Sheet, Plan Adopted 2017

Concern	Guidance Statements	Page(s)	Performance Measures	Page(s)	Notes
Affordability					
Location Affordability	No		No		
Housing Affordability	No		No		
Transportation Affordability	No		No		
Costs					
Housing Costs	No		No		
Transportation / Travel Costs	No		No		
Planning Coordination					
Jobs, Housing, and Transportation	No		Yes	Ch. 2, pg. 9	
Land Use and Transportation	Yes	Ch. 2, pg. 5, 7, and 8	Yes	Ch. 2, pg. 5 and 7	

Table 23: Salem-Kaizer MPO Code Sheet, Plan Adopted 2019

Concern	Guidance Statements	Page(s)	Performance Measures	Page(s)	Notes
Affordability					
Location Affordability	No		No		
Housing Affordability	No		No		
Transportation Affordability	No		No		
Costs					
Housing Costs	No		No		
Transportation / Travel Costs	No		No		
Planning Coordination					
Jobs, Housing, and Transportation	Yes	Ch. 3, pg. 5	No		
Land Use and Transportation	Yes	Ch. 2, pg. 1	No		

Table 24: Walla Walla Valley MPO Code Sheet, Plan Adopted 2018

Concern	Guidance Statements	Page(s)	Performance Measures	Page(s)	Notes
Affordability					
Location Affordability	No		No		
Housing Affordability	No		No		
Transportation Affordability	No		No		
Costs					
Housing Costs	No		No		
Transportation / Travel Costs	No		No		
Planning Coordination					
Jobs, Housing, and Transportation	Yes	13	No		
Land Use and Transportation	Yes	14, 29	No		

APPENDIX B | LOCATION AFFORDABILITY MEASURES

This appendix provides additional information on measures of location in Oregon MPOs.

Housing Costs and Housing-Transportation Costs as a Percent of Income

Moderate Households

The following figure compares average housing costs and H+T costs as a percent of a moderate household's income by MPO. It shows that moderate-income households faced both housing and H+T cost burden, on average, in every Oregon MPO. While the shares of income spent on housing costs and H+T costs both varied by MPO, no percentages were low enough to be considered affordable under either threshold. The Middle Rogue MPO had the highest average housing costs (45%) and H+T costs (78%) as a percent of household income, which suggests that it was the least affordable; while Portland METRO had the lowest housing costs (33%) and H+T costs (53%) as a percent of household income, suggesting that it was the most affordable.

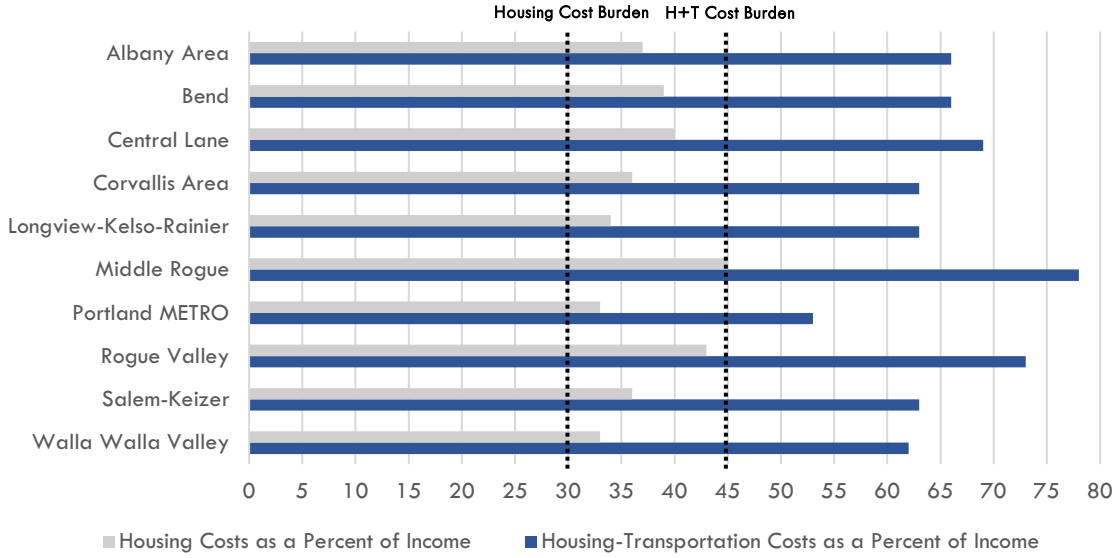


Figure 18: Average Percent of Income Spent on Housing Costs and Housing-Transportation Costs for a Moderate-income Household by MPO, 2017
Source: H+T Affordability Index (2017)

<u>Housing Costs as a Percent of Income</u>

Figure 18, above, indicates that moderate households had an average housing cost burden rate greater than 30 percent (i.e., cost burdened) in all MPOs. Middle Rogue MPO had the highest housing cost burden rate at 45 percent, while Portland METRO and Walla Walla Valley MPO had the lowest rates at 33 percent. Across all study areas, the median average MPO housing cost burden rate was 36.5. Overall, average housing cost burden rates did vary by MPO, but moderate households were cost burdened, regardless of location. These findings suggest that the moderate household in an Oregon MPO is housing cost burdened.

Housing-Transportation Costs as a Percent of Income

In all Oregon MPOs, moderate households had an average H+T cost burden rate greater than 45 percent (i.e., cost burdened). Middle Rogue MPO had the highest average cost burden rate at 78 percent. Portland METRO had the lowest average cost burden rate at 53 percent. The median average H+T cost burden rate across all study areas was 64.5 percent. While cost burden rates varied by MPO, moderate households were H+T cost burdened, regardless of location. These findings suggest that the moderate household in an Oregon MPO is H+T cost burdened.

Percentage of Census Tracts where Households Faced (Severe) Housing-Transportation (H+T) Cost Burden

The following figures show the percentage of census tracts where various households face H+T cost burden and severe H+T cost burden.

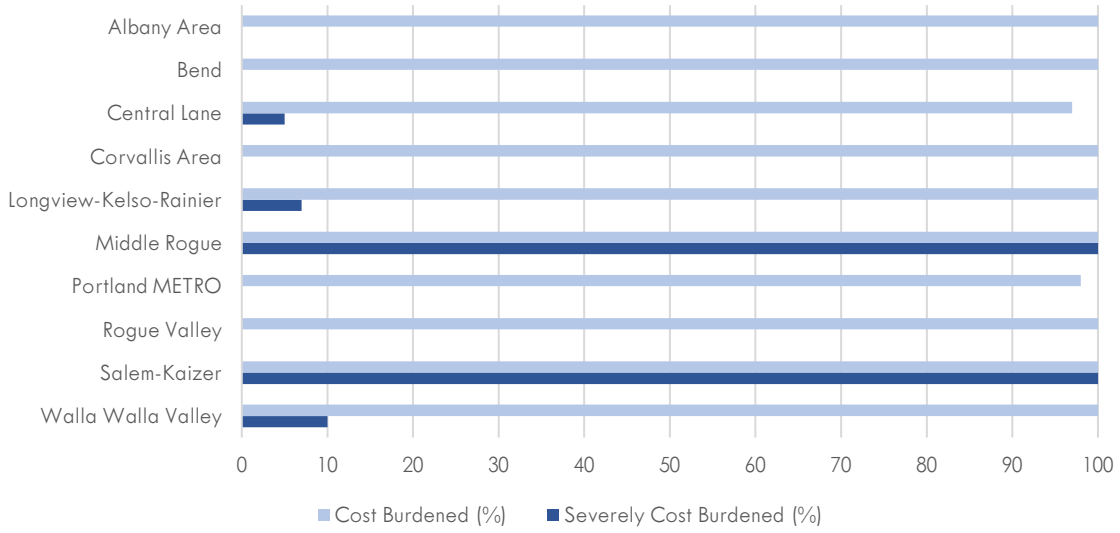


Figure 19: Moderate-income Household, Percentage of Housing-Transportation Cost-Burdened Census Tracts, by MPO, 2016, N=493

Source: Location Affordability Index 3.0

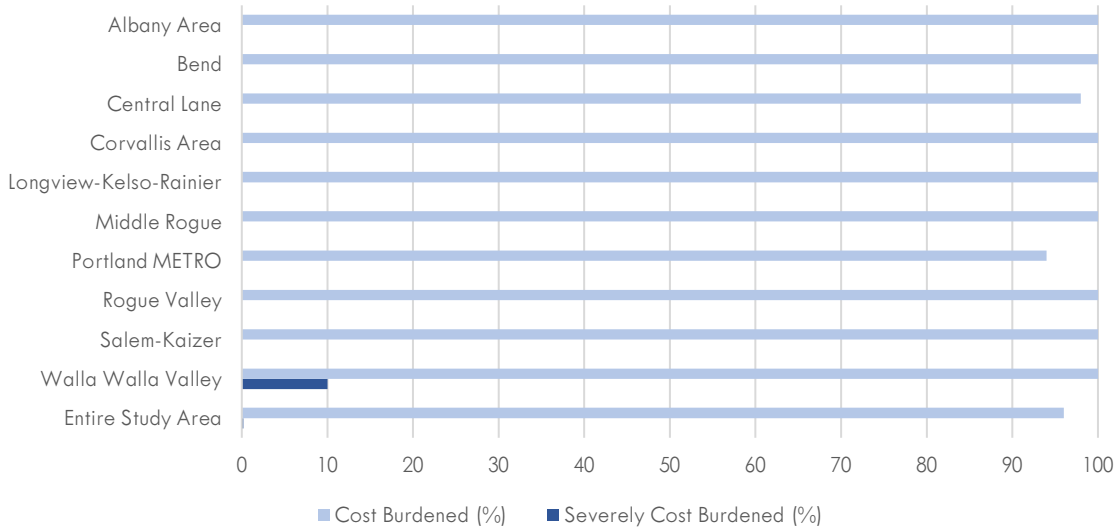


Figure 20: Median-income Household, Percentage of Housing-Transportation Cost-Burdened Census Tracts, by MPO, 2016, N=493
Source: Location Affordability Index 3.0

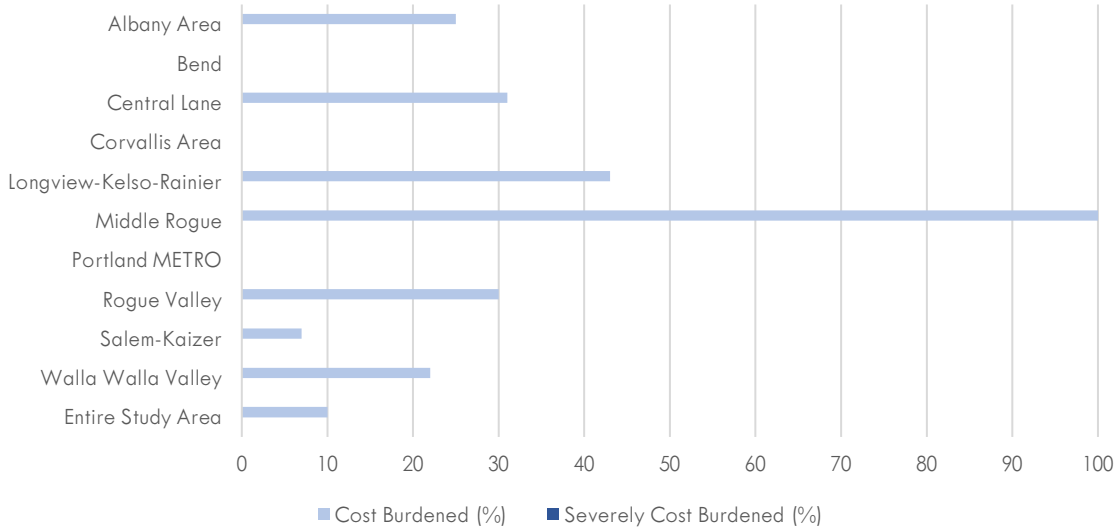
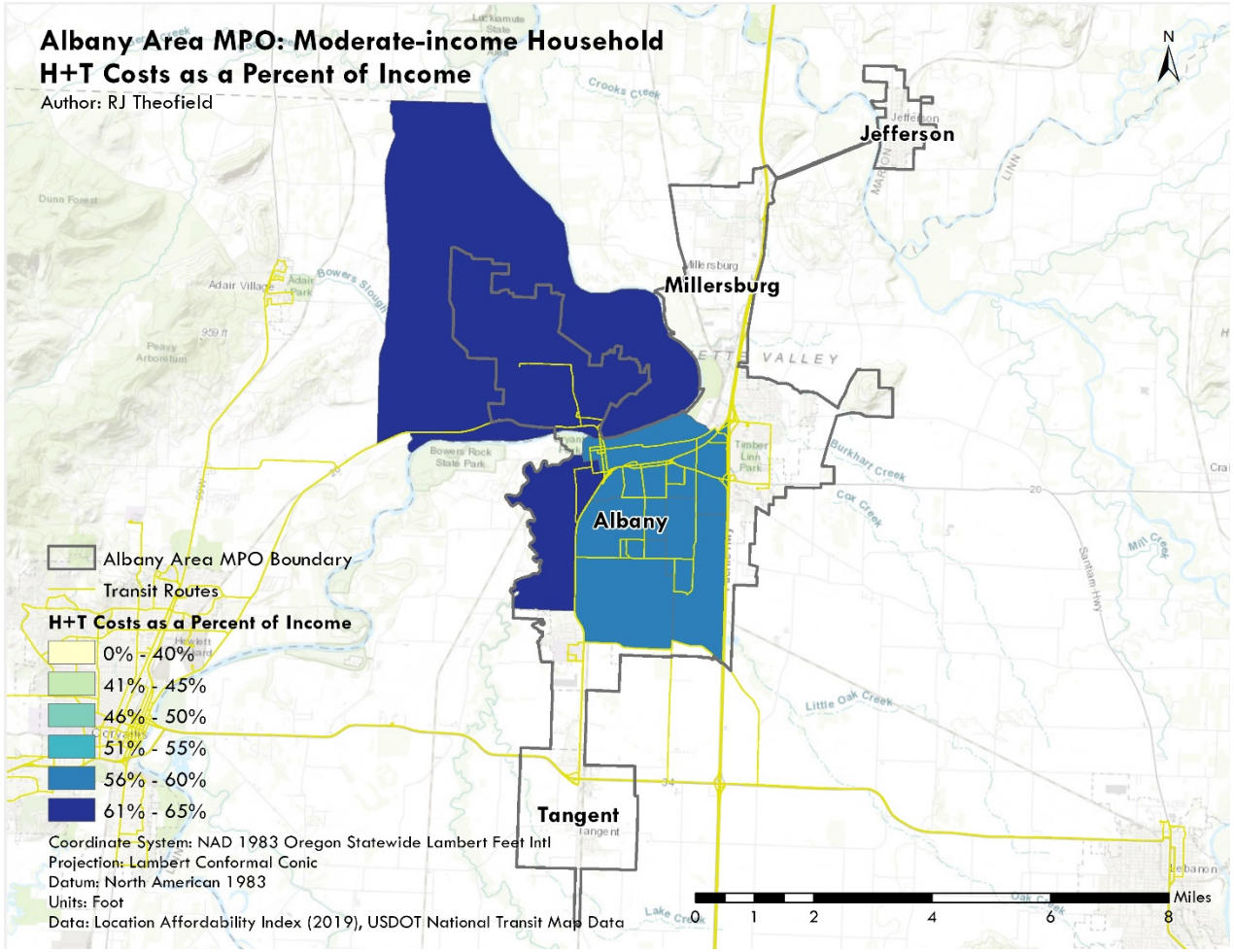


Figure 21: Dual-professional Household, Percentage of Housing-Transportation Cost-Burdened Census Tracts, by MPO, 2016, N=493
Source: Location Affordability Index 3.0

APPENDIX C | SPATIAL PATTERNS OF LOCATION AFFORDABILITY

Descriptive Maps

Figure 22: Albany Area MPO, Moderate-income Households, H+T Costs as a Percent of Household Income



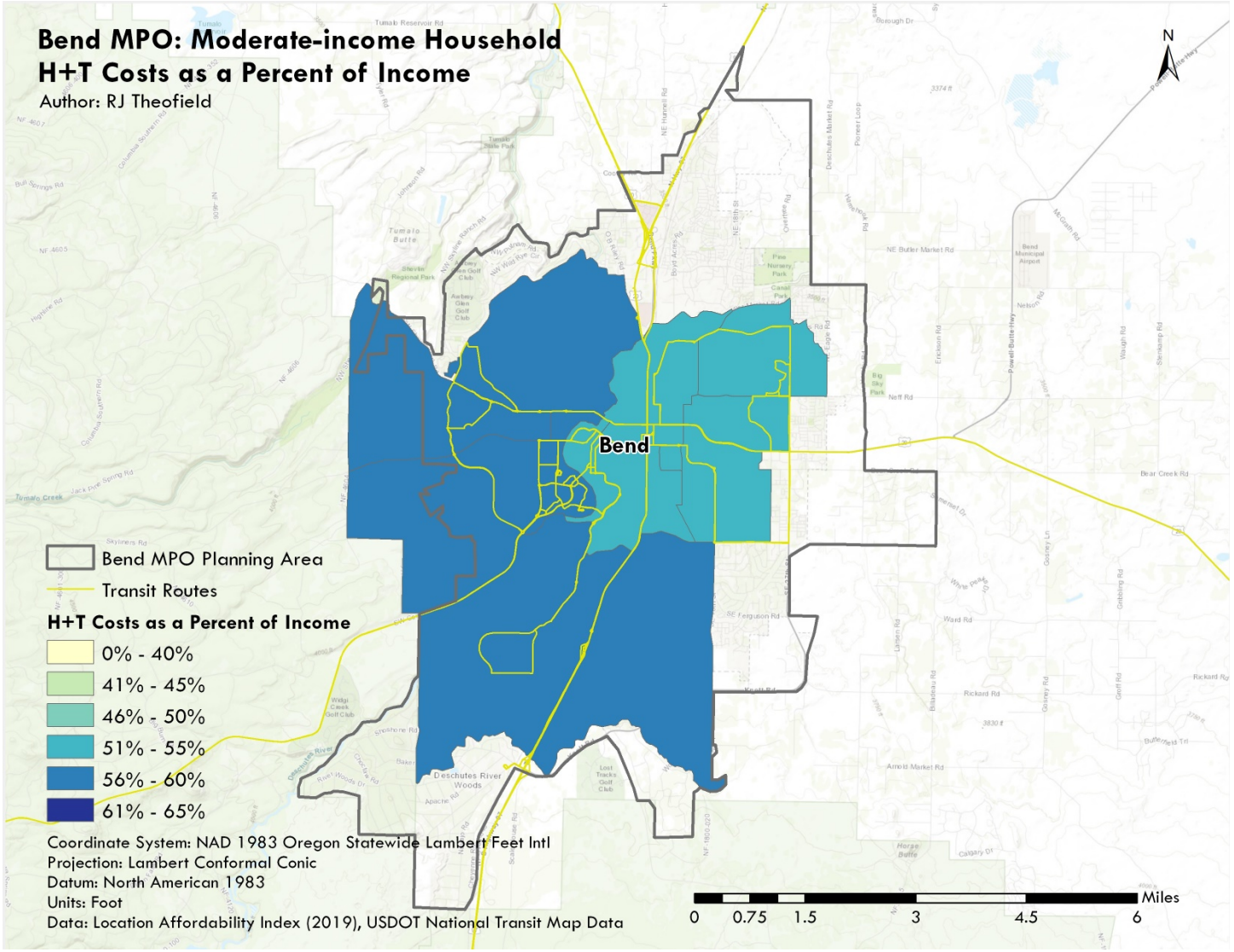


Figure 23: Bend MPO, Moderate-income Households, H+T Costs as a Percent of Household Income

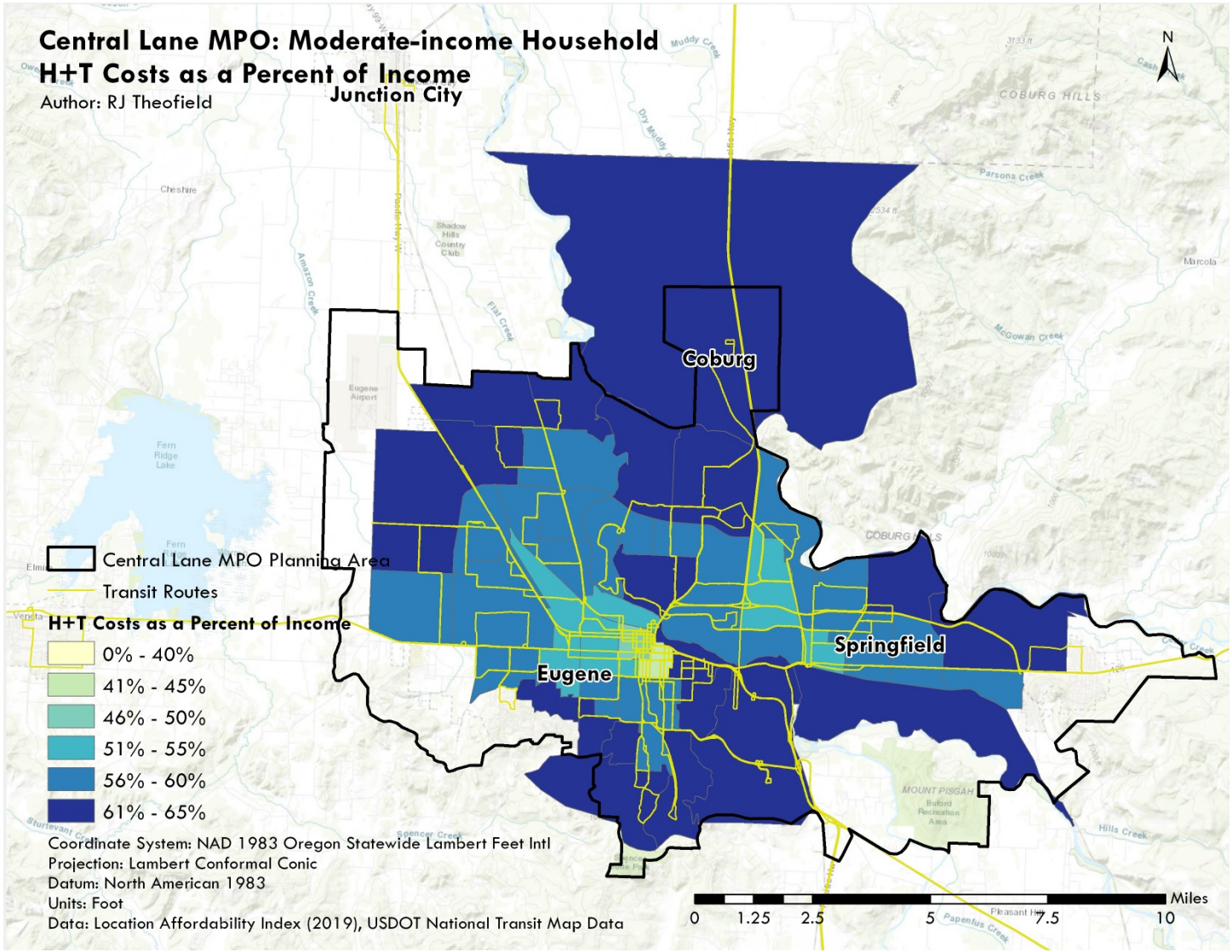


Figure 24: Central Lane MPO, Moderate-income Households H+T Costs as a Percent of Household Income

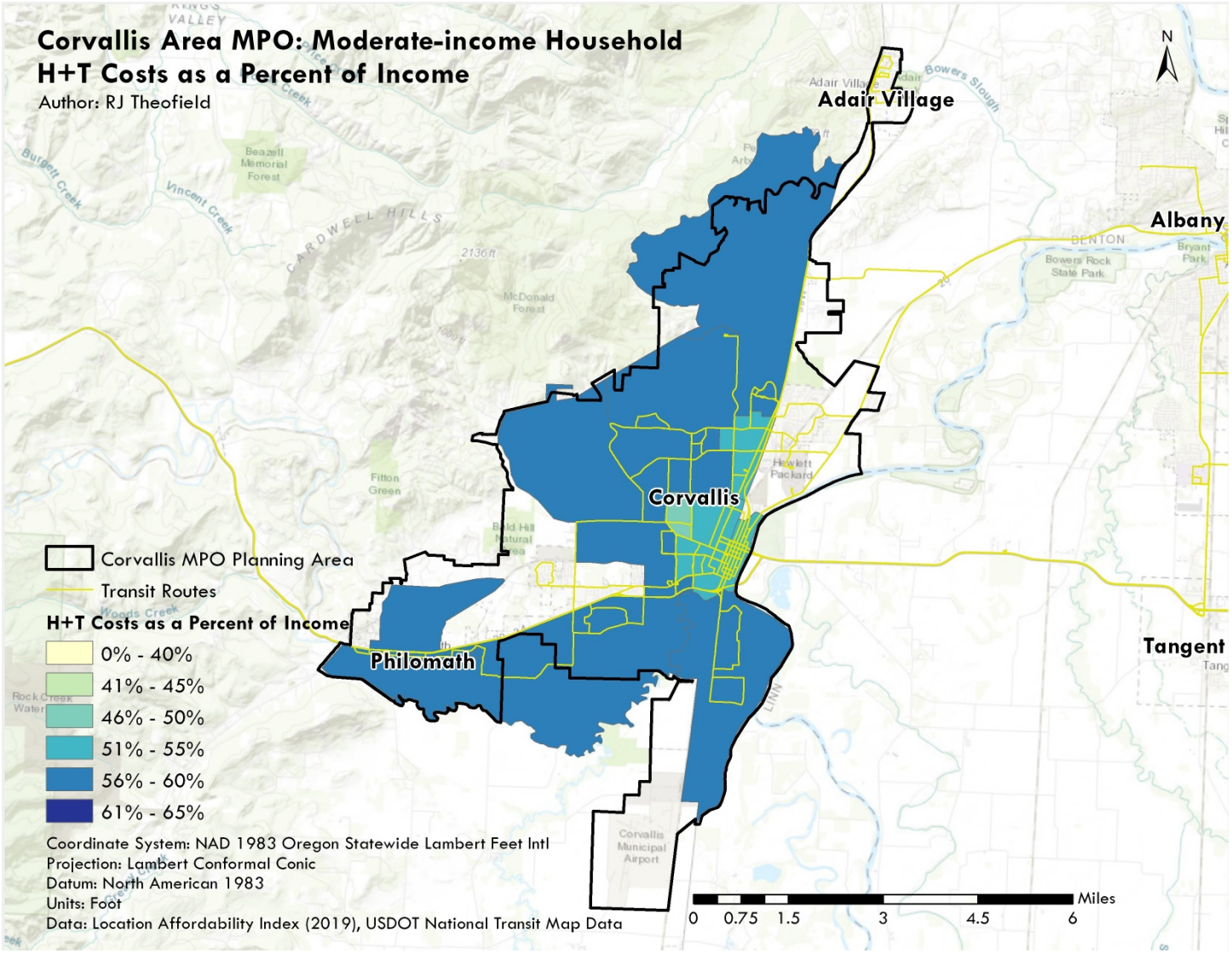


Figure 24: Corvallis Area MPO, Moderate-income Household, H+T Costs as a Percent of Household Income

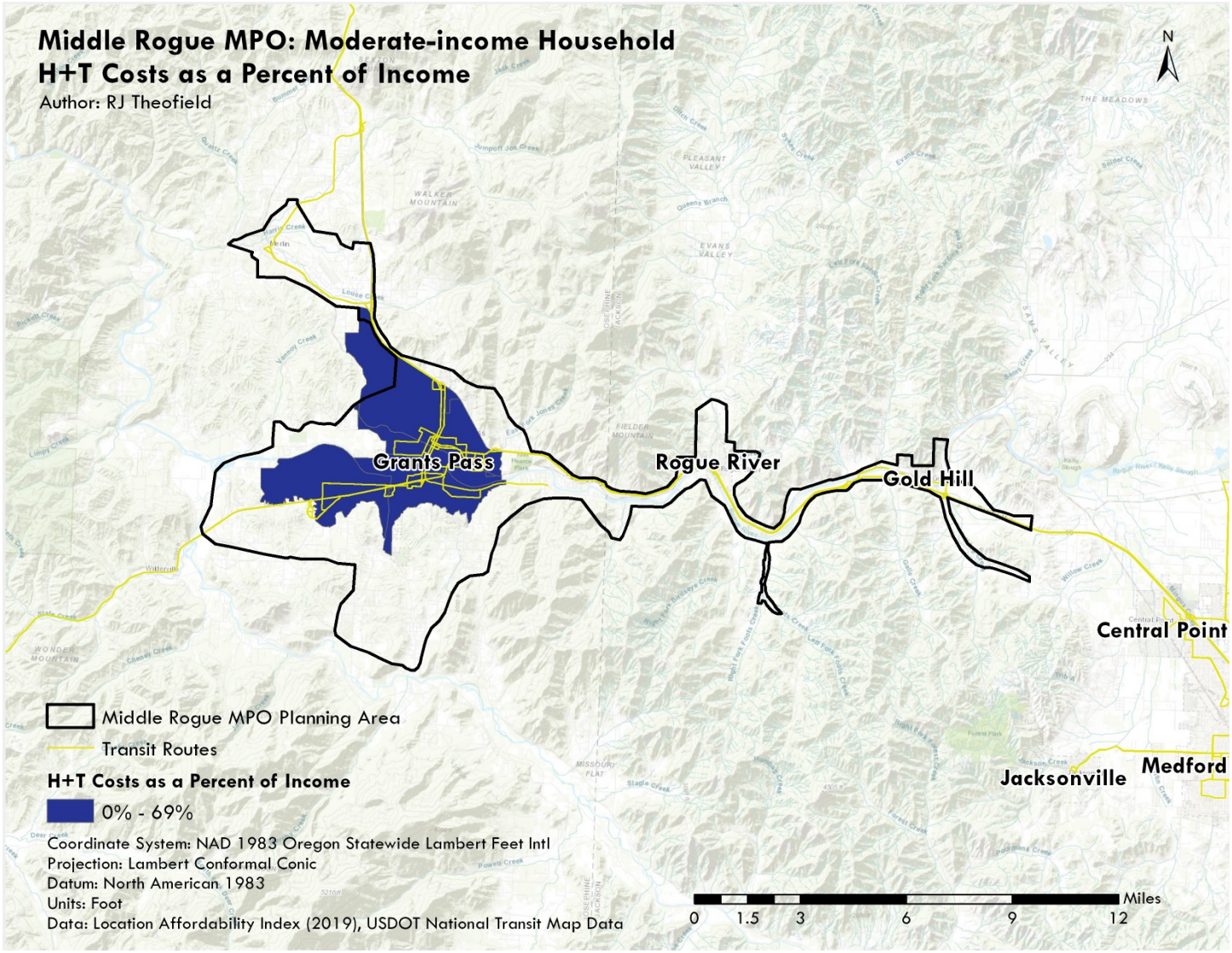


Figure 25: Middle Rogue MPO, Moderate-income Household, H+T Costs as a Percent of Household Income

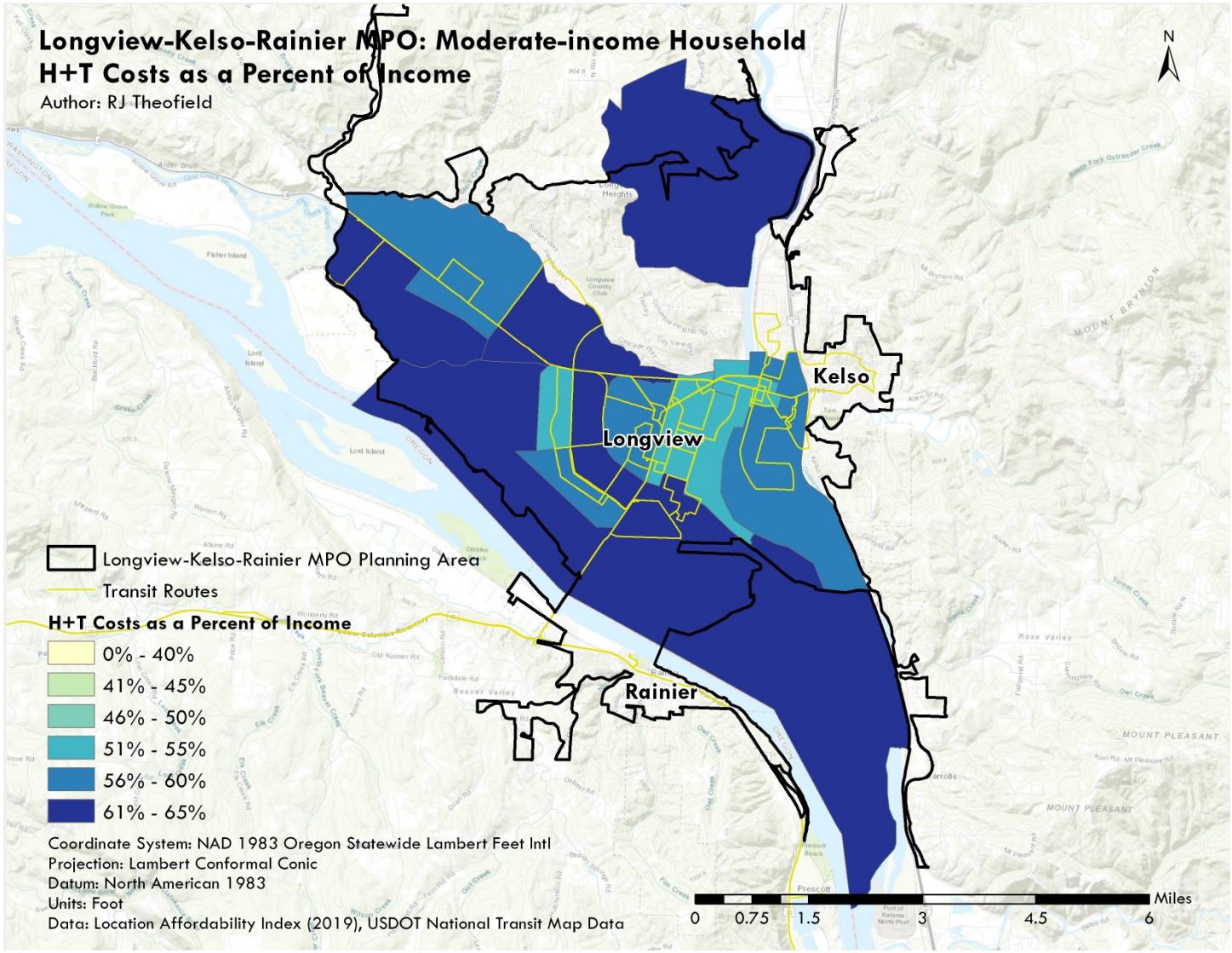


Figure 26: Longview-Kelso-Rainier MPO, Moderate-income Household, H+T Costs as a Percent of Household Income

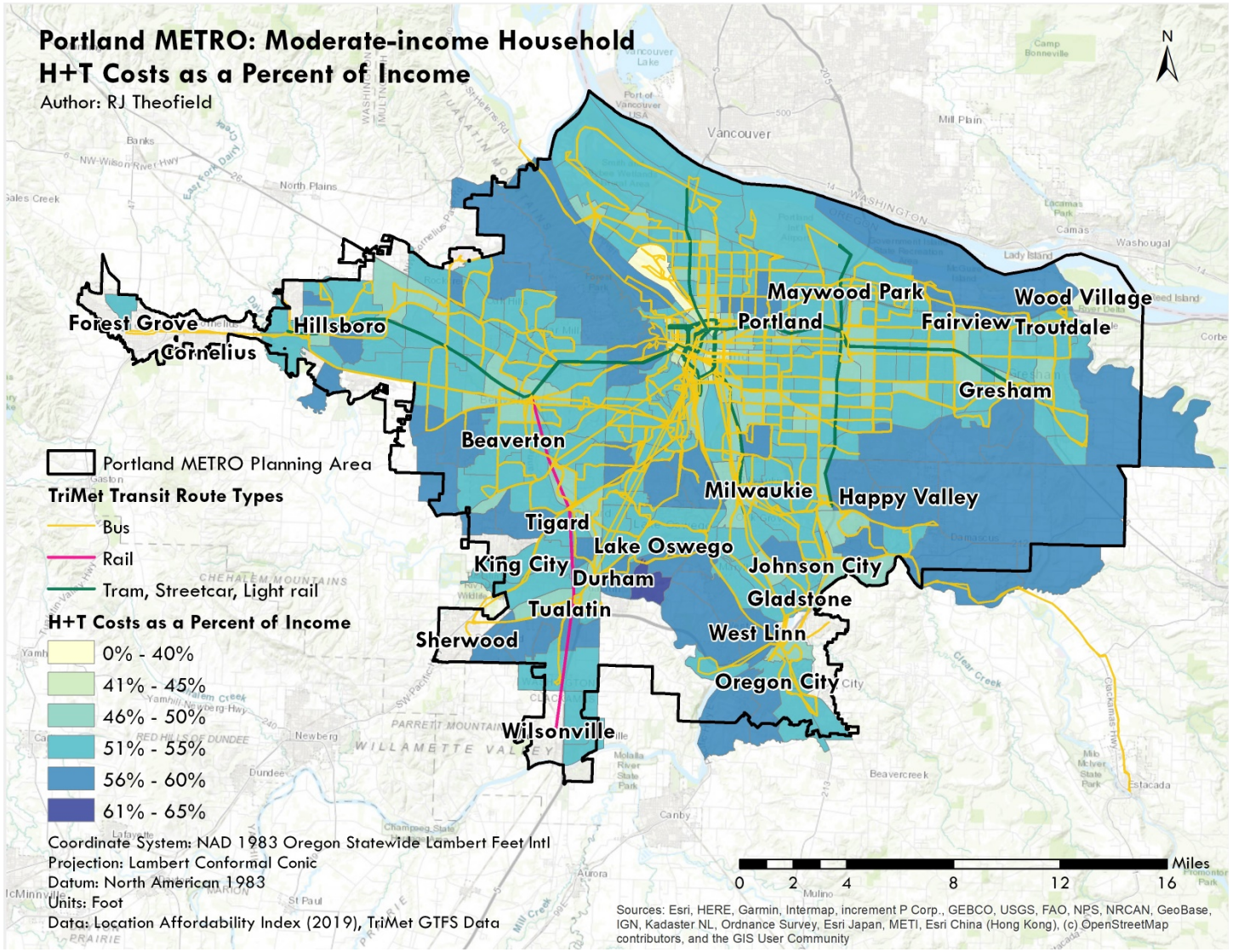


Figure 27: Portland METRO, Moderate-income Household, H+T Costs as a Percent of Household Income

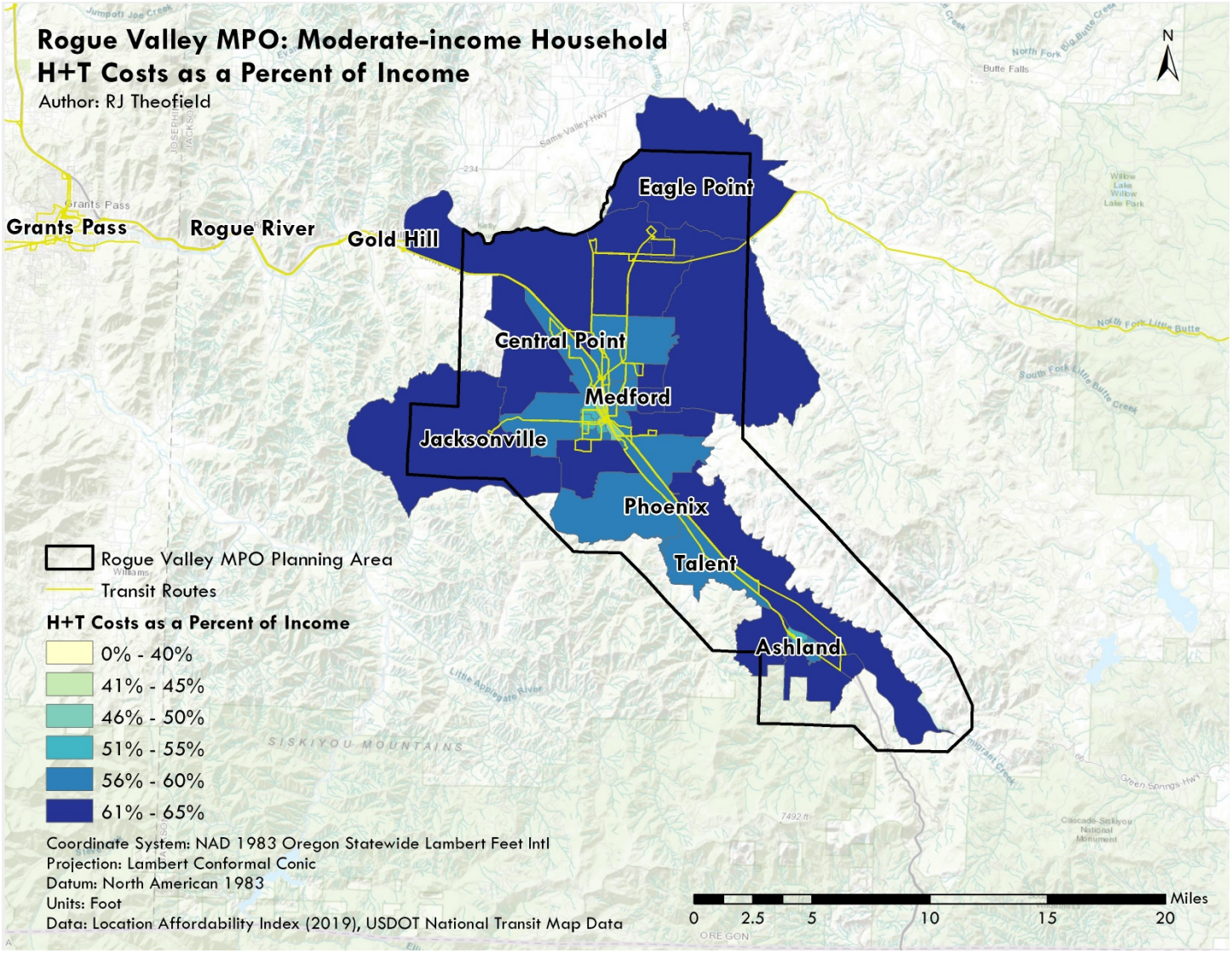


Figure 28: Rogue Valley MPO, Moderate-income Household, H+T Costs as a Percent of Household Income

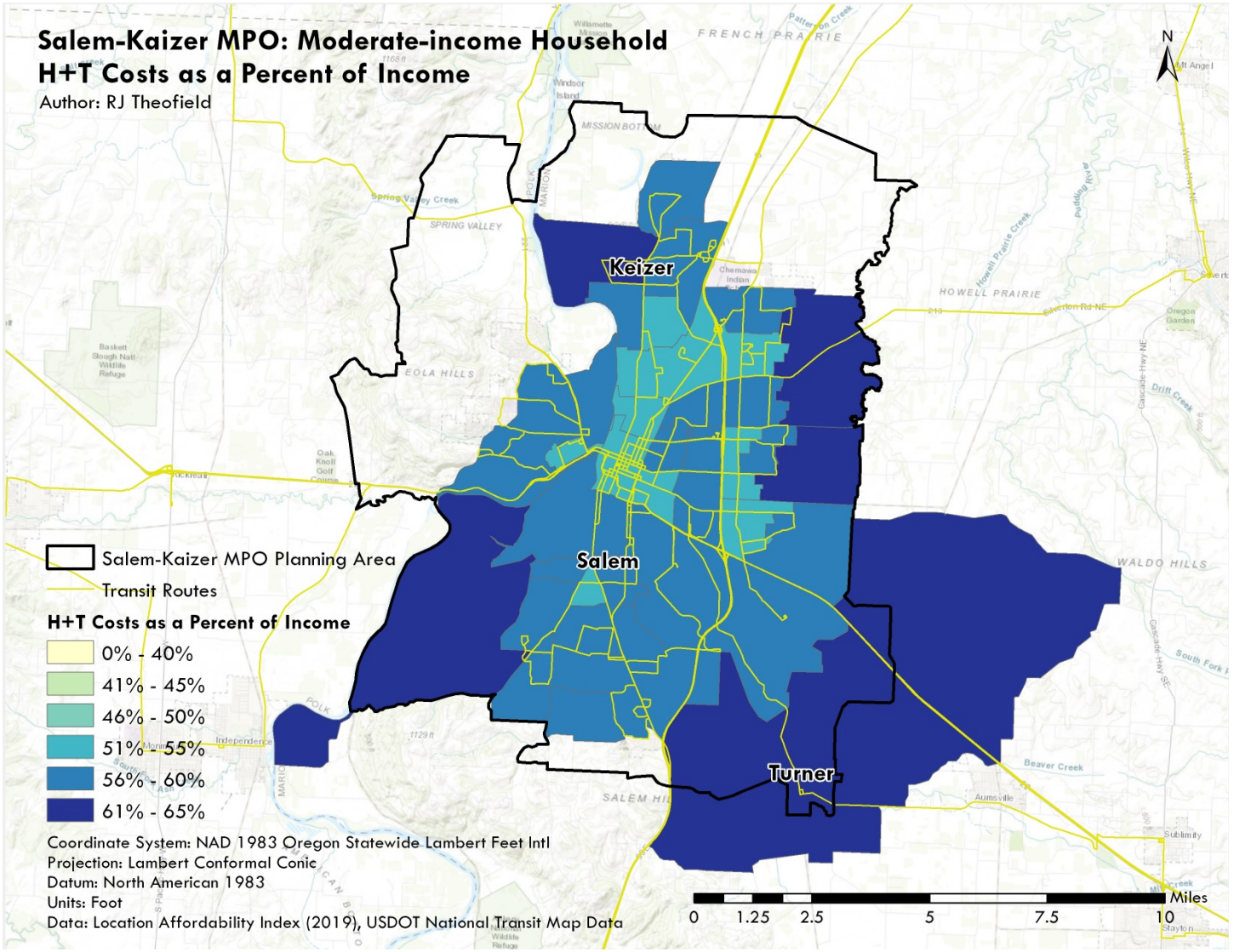


Figure 29: Salem-Kaizer MPO, Moderate-income Household, H+T Costs as a Percent of Household Income

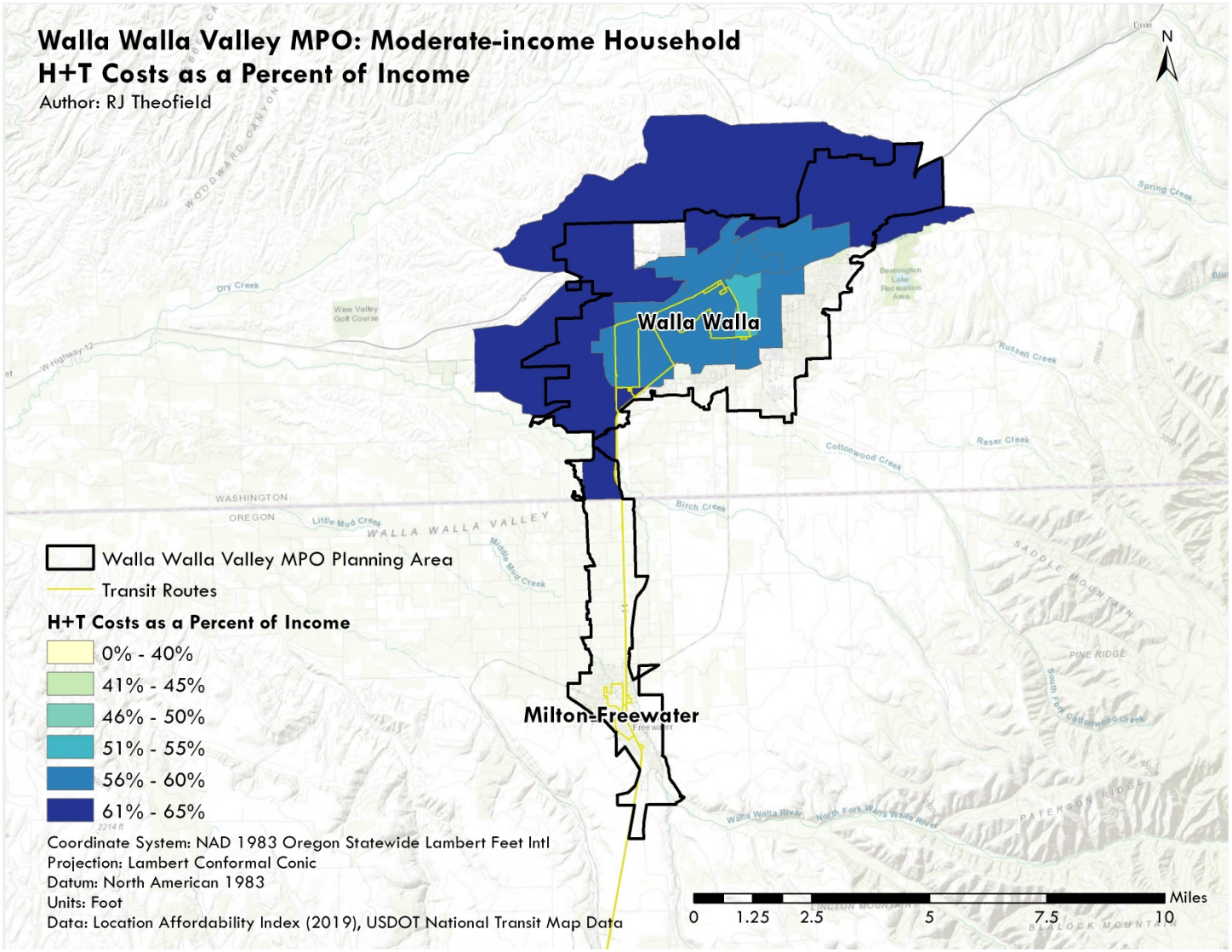


Figure 30: Walla Walla Valley, Moderate-income Household, H+T Costs as a Percent of Household Income

Local Indicators of Spatial Autocorrelation (LISA) Maps

The following figures show LISA results of H+T costs as a percent of household income for each MPO.

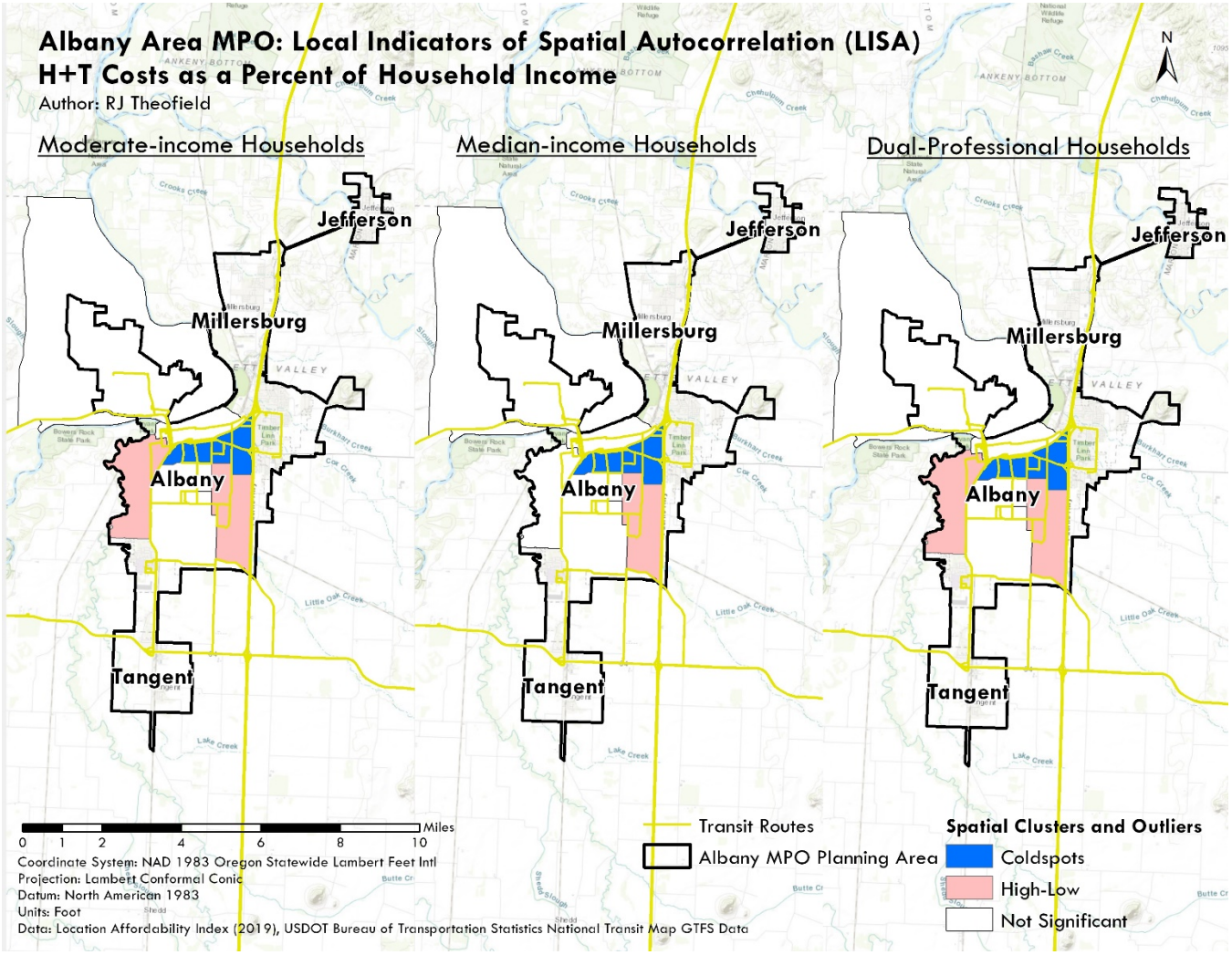


Figure 31: Albany Area LISA for H+T Costs as a Percent of Household Income

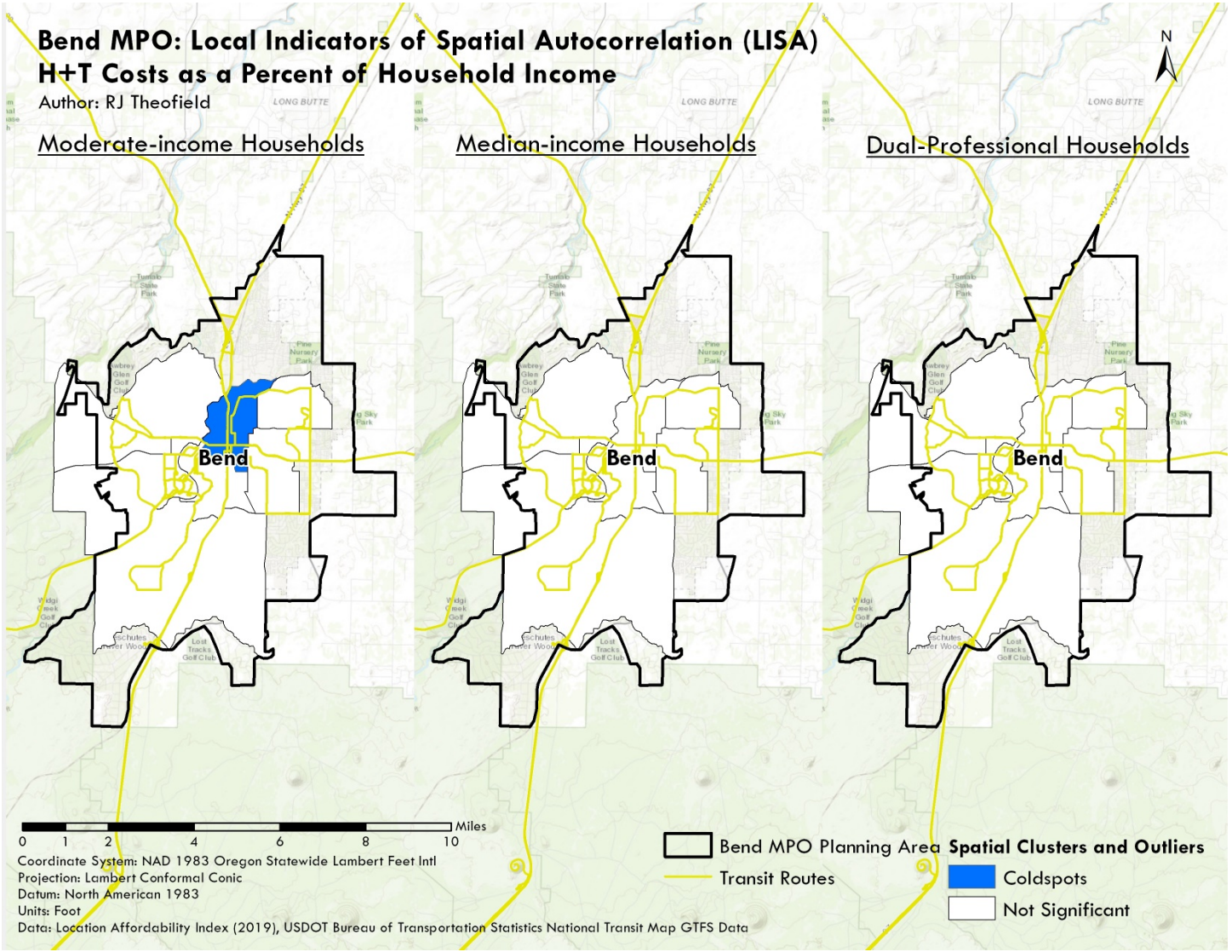


Figure 32: Bend MPO LISA for H+T Costs as a Percent of Household Income

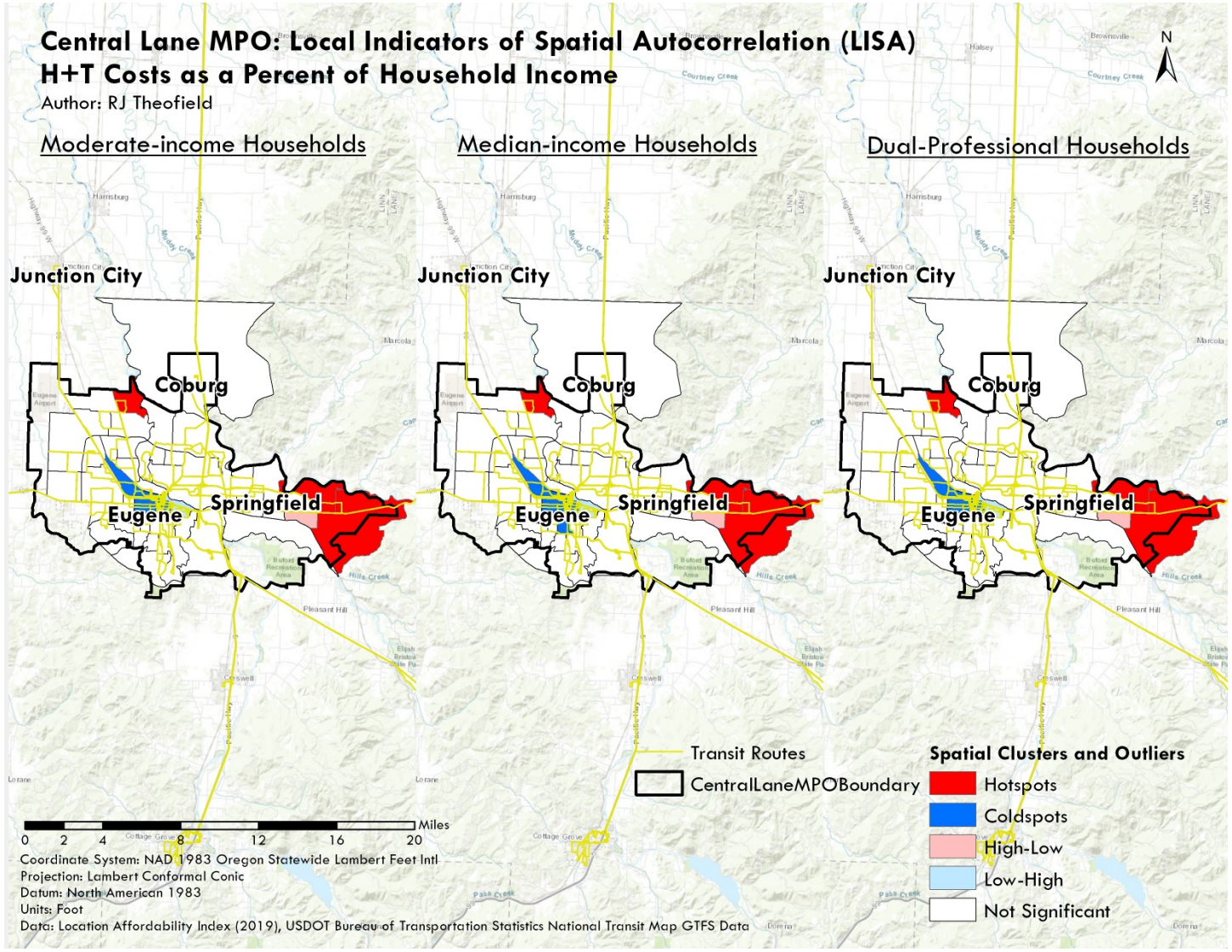


Figure 33: Central Lane MPO LISA for H+T Costs as a Percent of Income

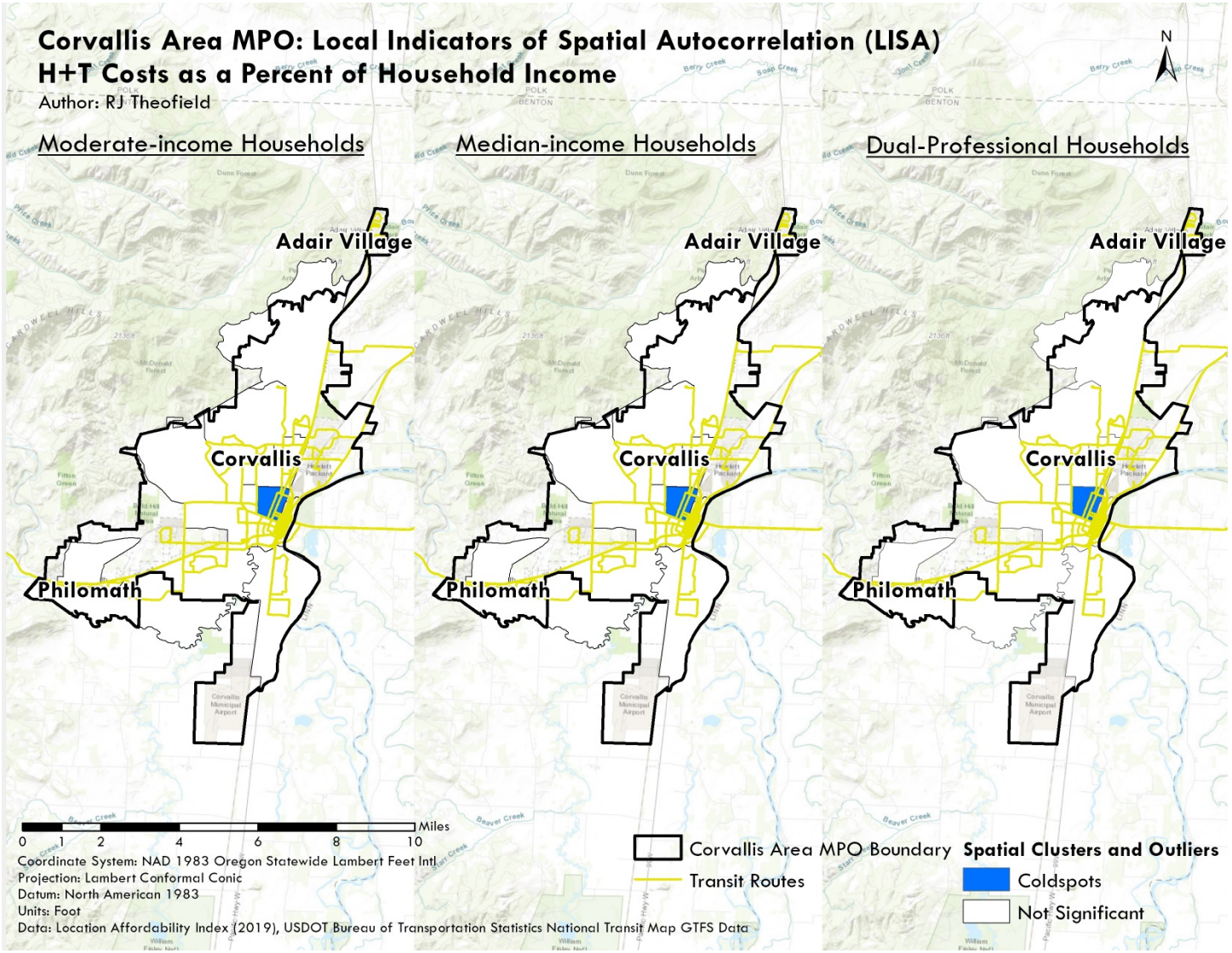


Figure 33: Corvallis Area MPO LISA for H+T Costs as a Percent of Income

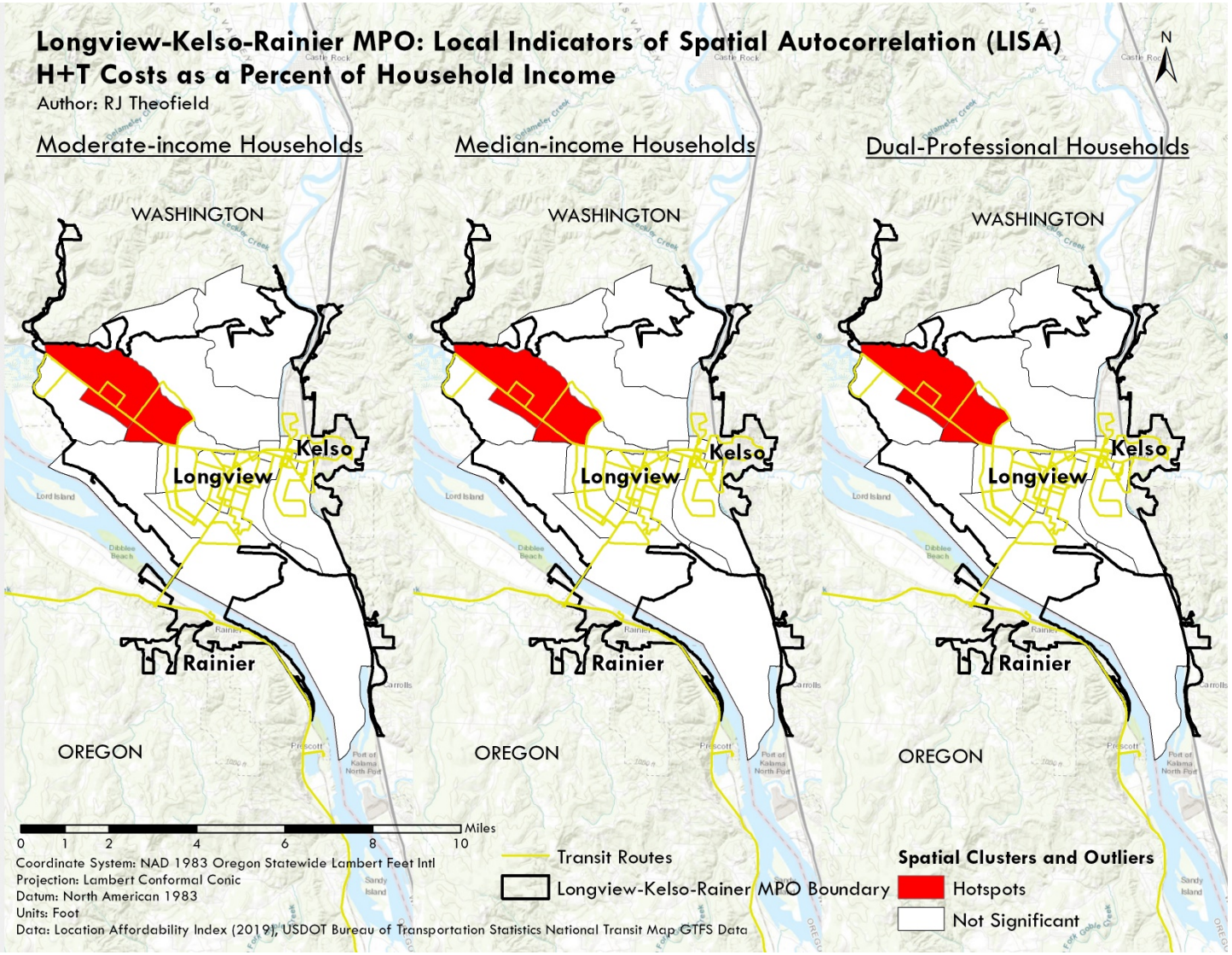


Figure 34: Longview-Kelso-Rainier MPO LISA for H+T Costs as a Percent of Household Income

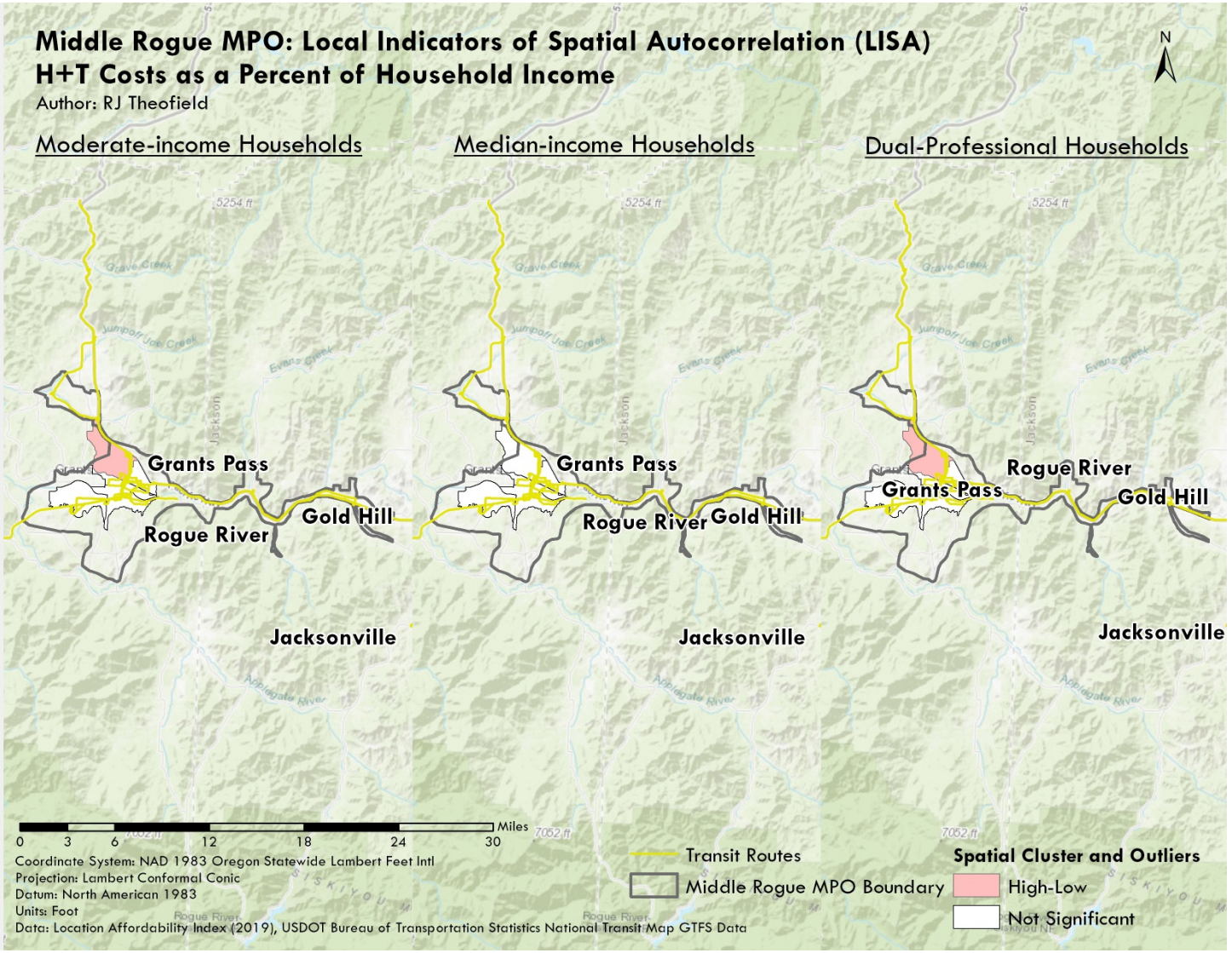


Figure 35: Middle Rogue MPO LISA for H+T Costs as a Percent of Income

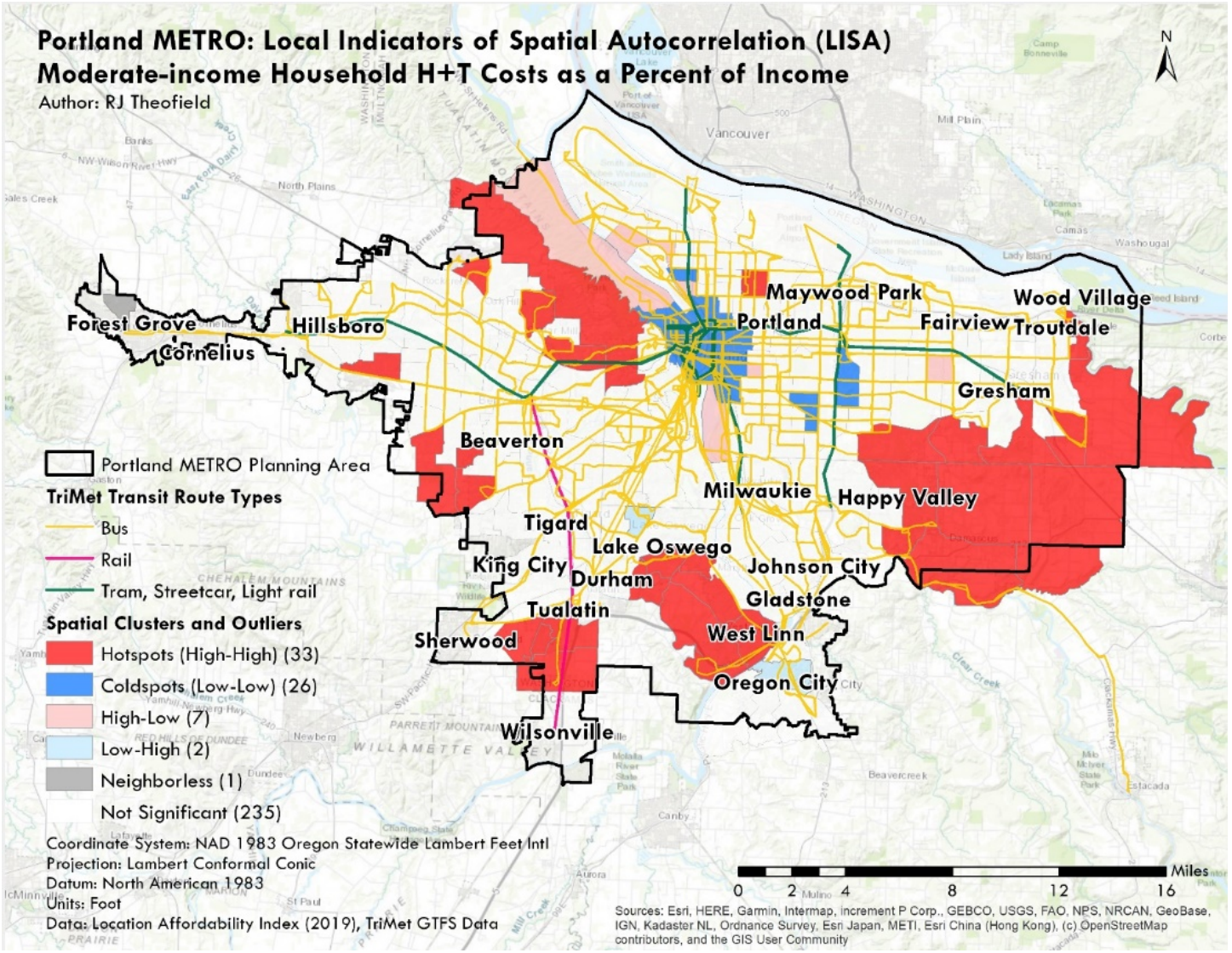


Figure 36: LISA for Moderate-income Household H+T Costs as a Percent of Income, Portland METRO, p=<0.05, 2016, n=303

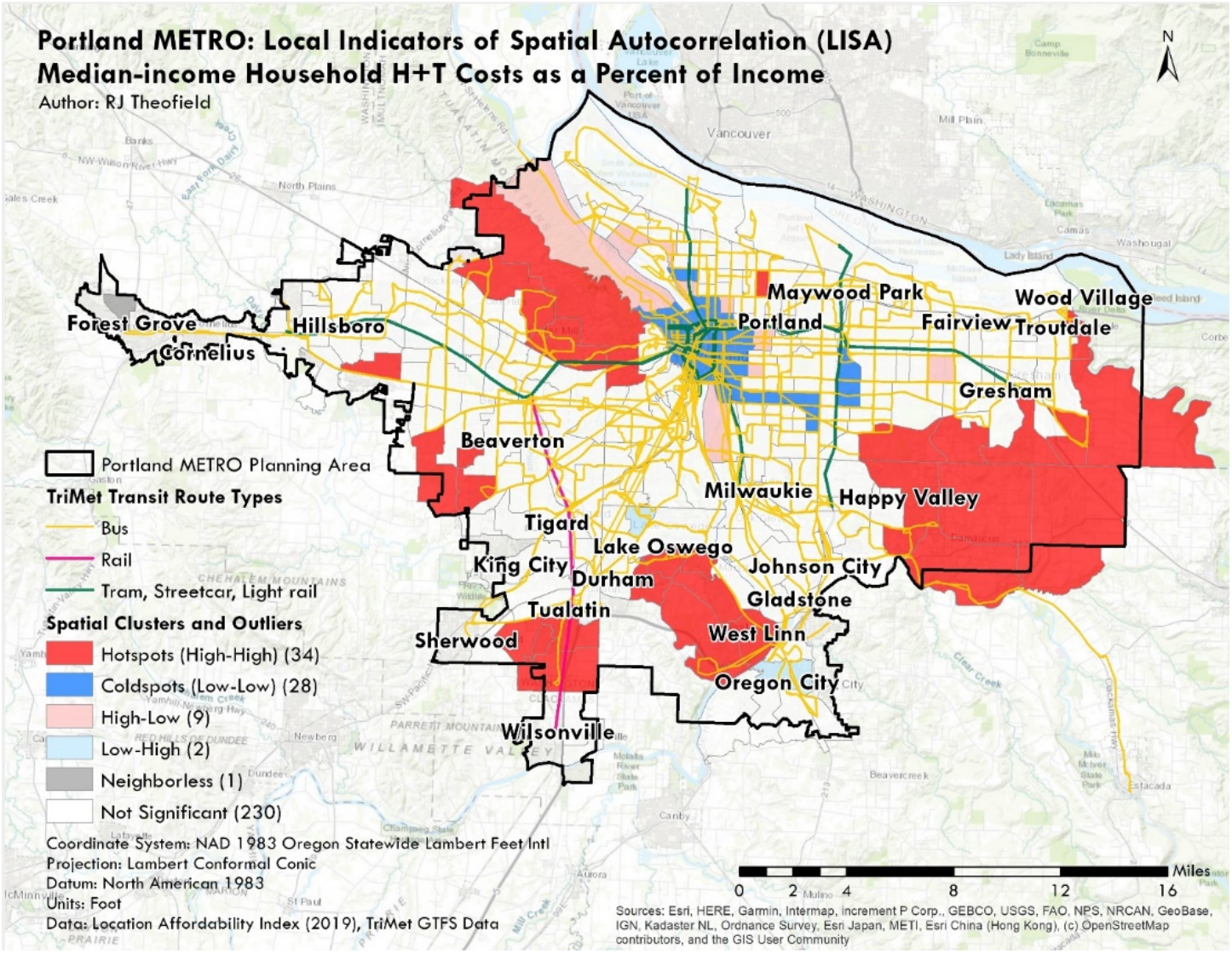


Figure 37: LISA for Median-income Household H+T Costs as a Percent of Income, Portland METRO, p=<0.05, 2016, n=303

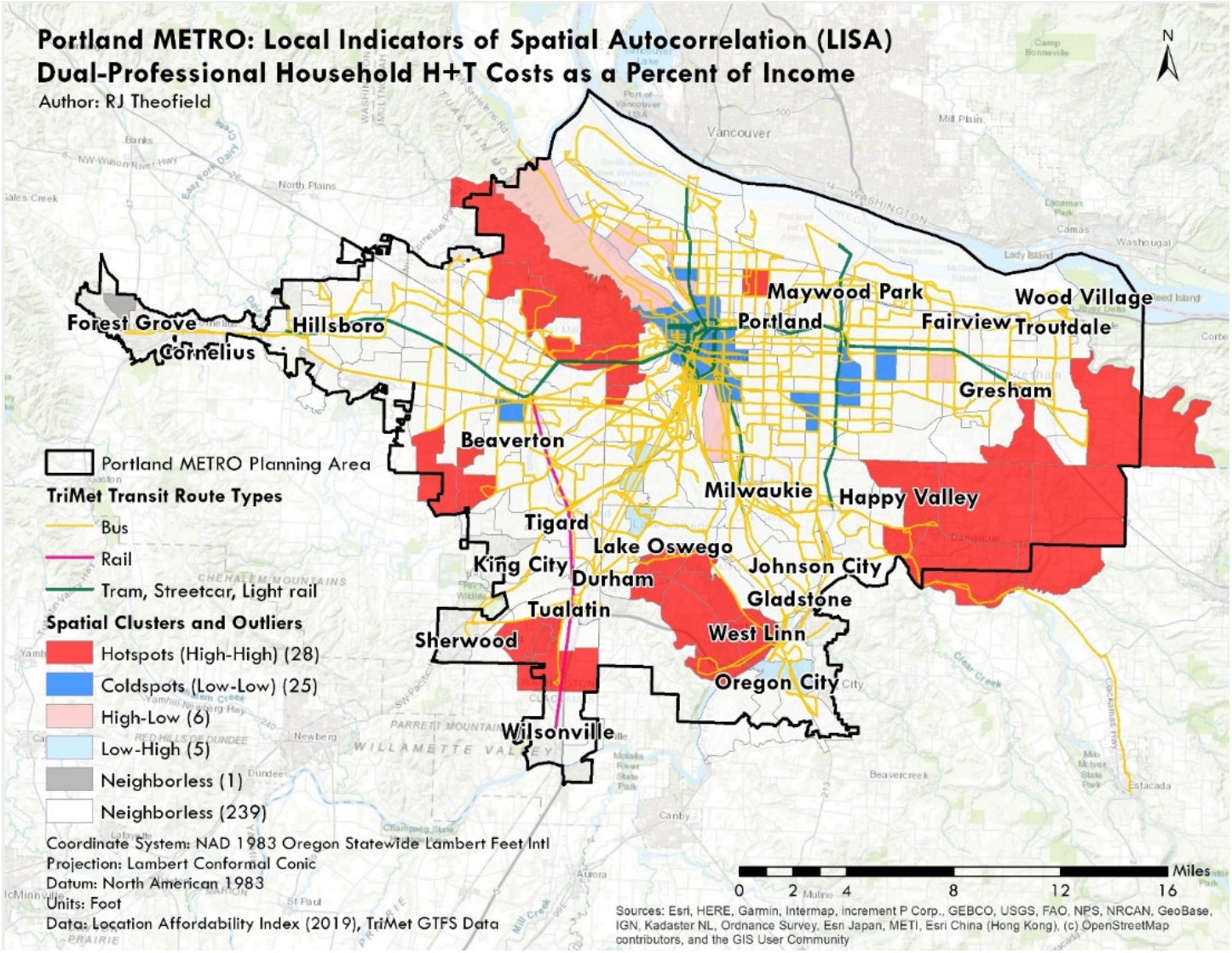


Figure 38: LISA for Dual-Professional Household H+T Costs as a Percent of Income, Portland METRO, p=<0.05, 2016, n=303

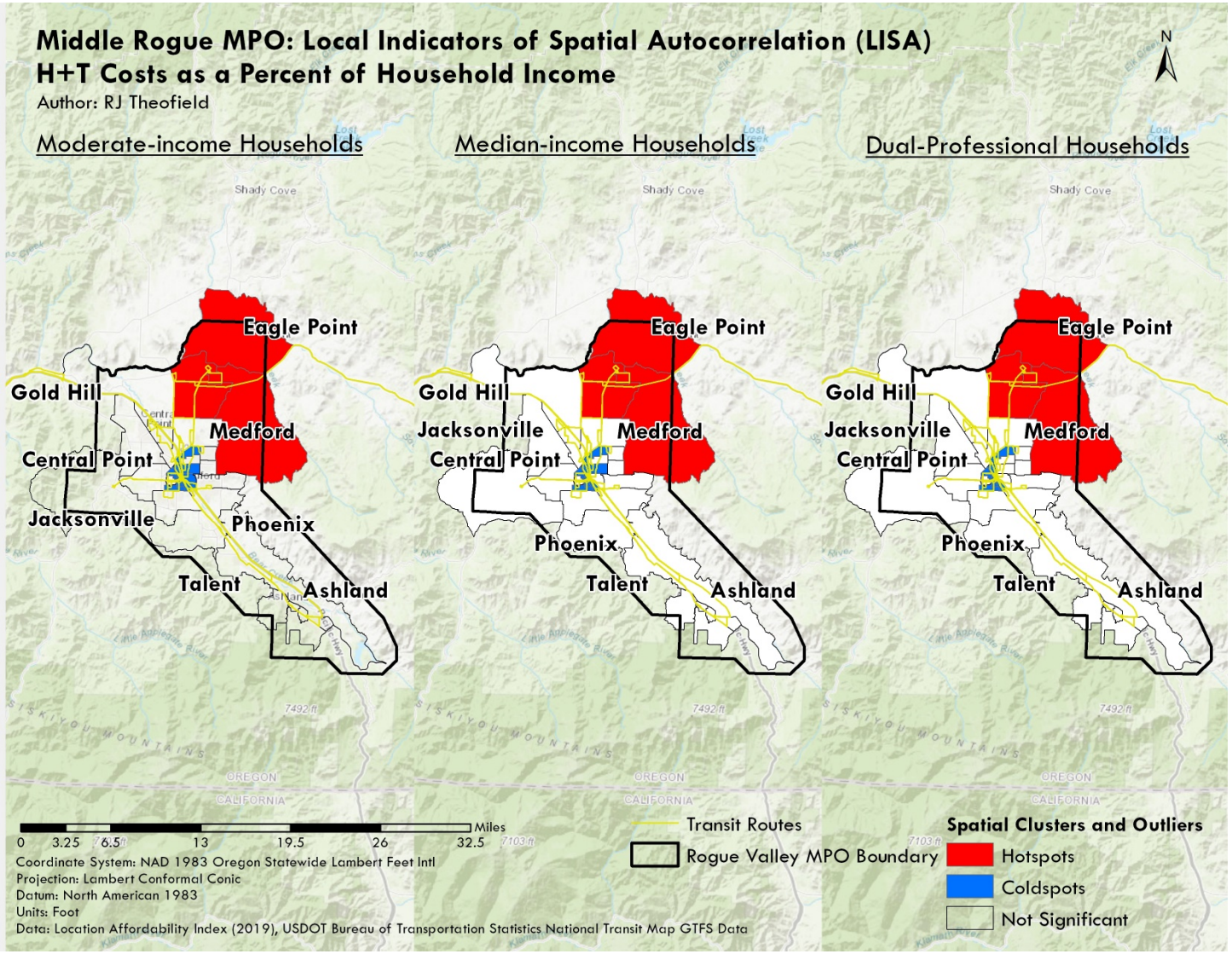


Figure 39: Rogue Valley MPO LISA for H+T Costs as a Percent of Household Income

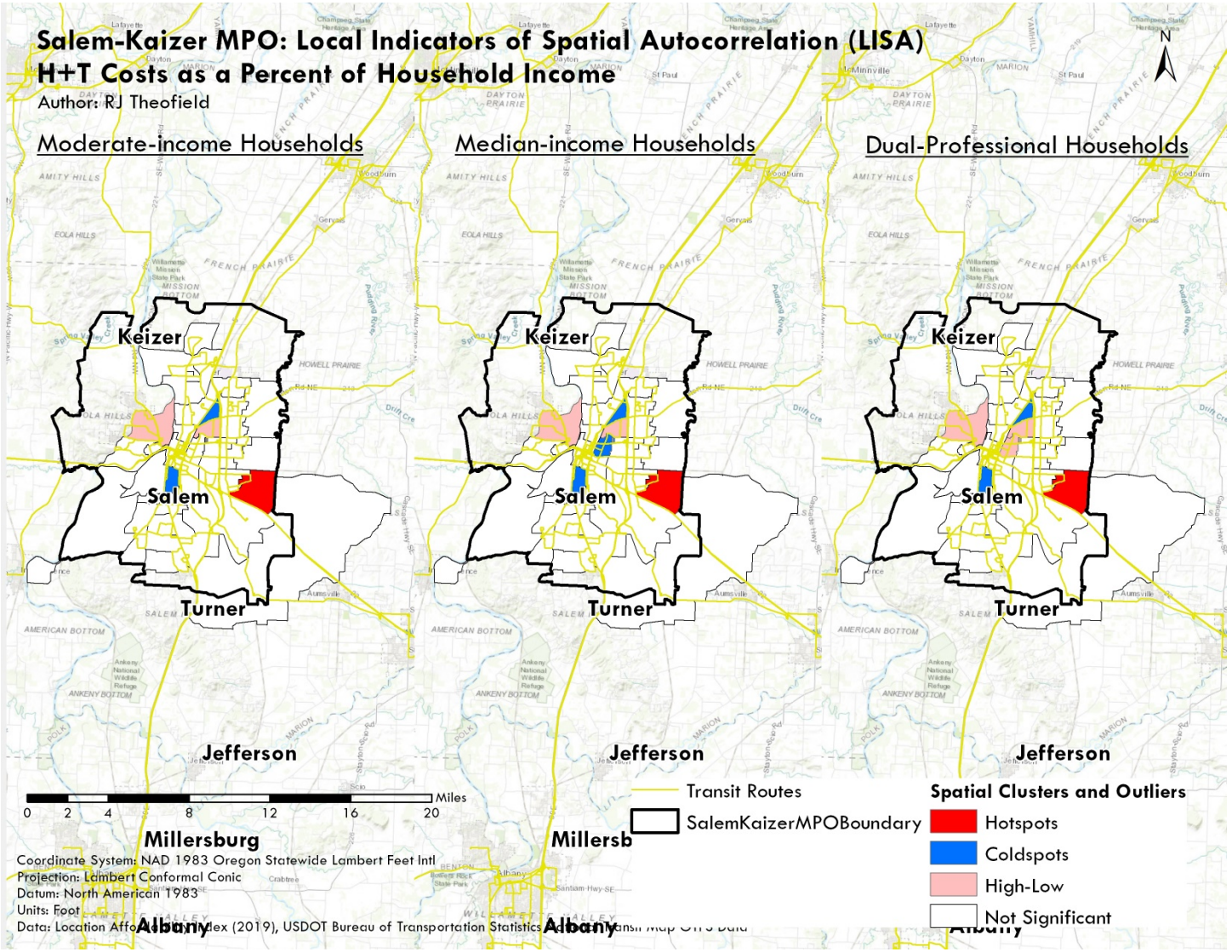


Figure 40: Salem-Kaizer MPO LISA for H+T Costs as a Percent of Household Income

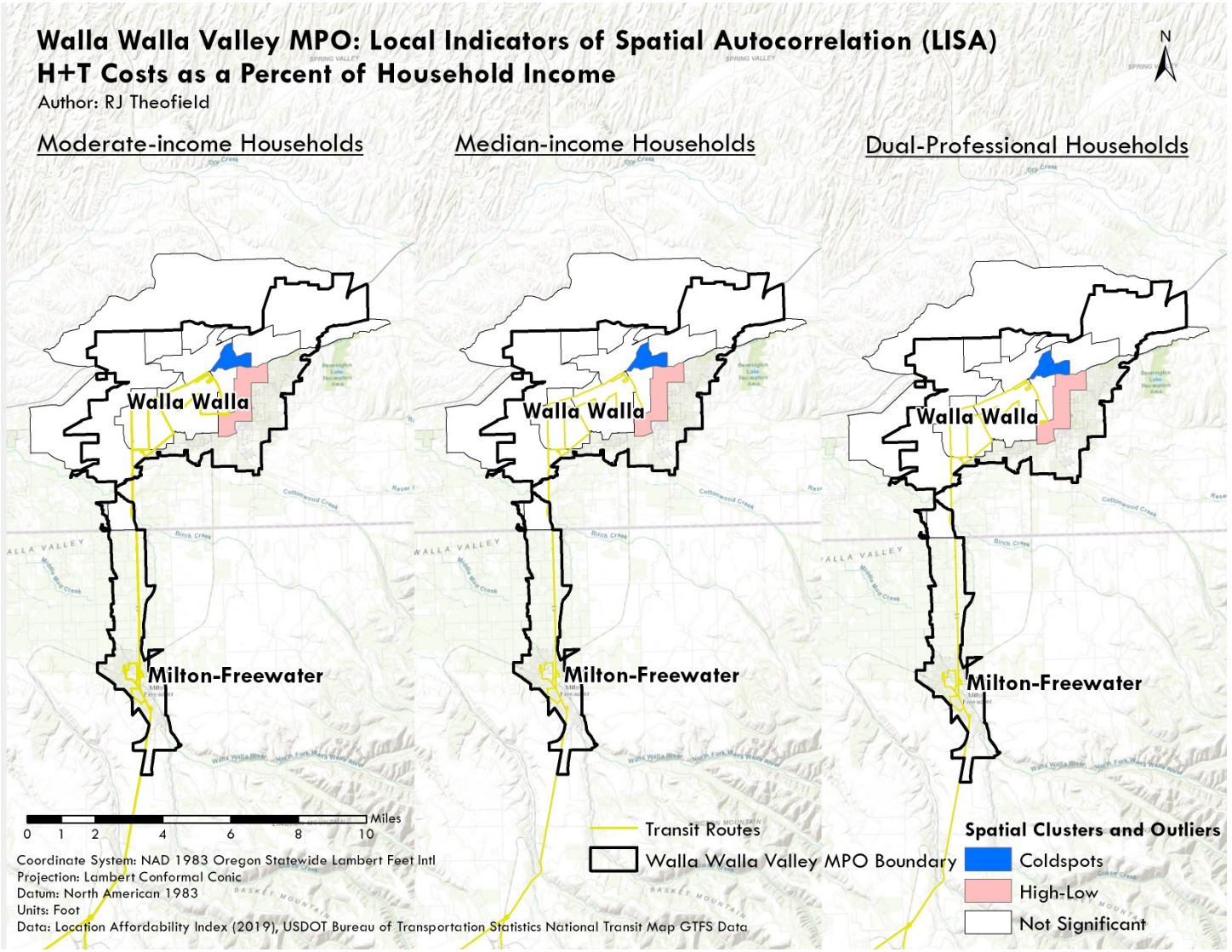


Figure 41: Walla Walla Valley LISA for H+T Costs as a Percent of Household Income