Transportation Equity in King County: Final Report

PUBM 5450: GIS For Public Administrators

Ashlee Day, Justin Crippen, Isaac Yescas, Prateek Kakkar

Summary

This study seeks to understand what relationship exists between the dispersion of people with disabilities and transit access, income level, and housing affordability in King County. We theorize that people with disabilities are likely to be reliant on public transportation as their primary mode of travel; which may present challenges for transportation systems that largely serve to connect suburban consumers with central business districts. By applying a combination of social and spatial analysis to a series of GIS maps produced to show these variables in King County, we find that our hypothesis is accurate. The maps produced show King County Metro primarily linking suburban parts of King County with downtown Seattle, an absence of transit in more affordable neighborhoods, and concentrations of people with disabilities near public transit routes.

Introduction

Local and National advocacy organizations such as Disability Rights WA and the American Association of People with Disabilities have both called for greater attention to public transportation as means of creating greater access and opportunity for people with disabilities. In his book chapter, “Urban Transportation and Social Equity: Transportation Planning Paradigms that Impede Policy Reform” Jonathan Levine (2013), argues that access to transit and the opportunities it provides is unequally distributed across cities and that this is a barrier to transportation planning that is most beneficial to people who need it (p. 141, p.144). In order to advocate to policymakers and transportation planners the need for changes to our transportation system that will better serve the needs of people with disabilities there needs to be data showing how the location of public transportation impacts people with disabilities, especially in regard to their choices for housing.

The research question(s) we intend to explore is: What areas of King County are people with disabilities likely to be concentrated in, and how is this influenced by factors such as income level, housing affordability, transit access? How do people with disabilities navigate the trade-off between housing costs and access to transportation? We hypothesize that affordable housing is likely to be congregated away from urban centers with sought-after resources, which ultimately negatively impacts disabled people who are more likely to rely on public transportation as a primary method of mobility. With this information, we hope to clearly identify areas of underinvestment in accessible public transit and affordable housing to provide a valuable resource for disability justice advocates and community leaders who want to increase accessibility.

Background

People with disabilities are often forced to make difficult decisions about where they are able to live, work, and spend their time based on access to public services that are out of their control. For many people with disabilities, mobility presents a significant barrier that requires careful planning. Historically, transportation policy in the United States has disproportionately prioritized investment in transportation systems that favor personal vehicle ownership. Data from the Bureau of Labor Statistics (2018) shows that people with disabilities are more likely to rely on public transportation than people without disabilities and they are also less likely in general to be able to rely on travel by personal vehicle as well (Braumbaugh, p.6). Therefore, access to reliable and accessible public transit is a fundamental part of ensuring that all people, especially those with disabilities, have equal access to opportunity.

By comparing where people with disabilities reside with the location of accessible public transportation options, we can better understand what gaps exist with regard to mobility. When we add in data comparing the location of affordable housing with census income data, we gain additional insight to equity disparities experienced by people with disabilities.

The report “Access to Opportunity through Equitable Transportation” by Stacy et. al. (2020) seeks to identify barriers to equitable transportation access by analyzing four metropolitan regions in the United States. In this case-study, the authors define transportation equity as “transportation decisions made with deep and meaningful community input that leads to transportation networks and land use structures that support health and well-being, environmental sustainability, and equitable access to

resources and opportunities" (Stacy et. al., 2020, p. 3). This definition is useful as we consider what the end goal of an analysis such as ours seeks to achieve. Stacy et. al. underscore the correlation between vulnerable communities and a lack of accessible transit, noting that historical legacies of public investment into highway systems between urban centers and suburban communities has largely failed to meet the needs of lower-income, urban communities of color. Not only are these communities burdened by a lack of access to resources and opportunity; transportation inequity has been shown to negatively impact the health and overall well-being of underserved communities as well (p. 18). Notably absent from this report was an in-depth analysis of the ways in which these barriers impact people with disabilities, something we hope to address in our research.

The article, "The Unaffordable City: Housing and Transit in North American Cities" by Anna Kramer (2018) is an analysis of seventeen metropolitan areas in the United States and Canada. The author sought to see the relationship between housing cost, frequent transit networks also known as transitscapes and income levels (p. 2). In her article, Kramer references the idea of "the suburbanization of poverty" which according to Elizabeth Kneebone of the Brookings Institution, (2017), is a reflection that poverty in the suburbs has increased at double the rate of the places that are traditionally associated with higher concentrations of poverty: inner cities or rural areas (n.p.). The author's results showed some key points about transit and housing: areas that had frequent transit networks had "on average, lower median household incomes and greater proportions of poor and near poor households., as well as mre households without cars and with few people who drive to work" and the housing "on average was

older, smaller, denser…with more rental housing" in comparison to areas that were less transit dense" The conclusion of the research, was that many times lower income households are faced with the choice between affordable housing and affordable transportation (p.8). Kramer's research did not include Seattle/King County in their research area but there is an opportunity through further analysis to show how this region aligns with or contradicts this research. By correlating income, housing affordability and transit, with the added variable of disability we will be able to see what choices disabled individuals in particular are able to make about where to live.

This information is useful for many local and national advocacy groups focused on disability justice. Including Disability Rights Washington and the National Disability Rights Network. This could also be useful for housing affordability advocates and urban planners as they think about the future of King County, especially when we think about the fact that the population continues to grow and there will need to be intentional choices made about the placement of housing and transit moving forward.

Local and national organizations can use this information to be more equitable when expanding public transit in major cities and population hubs, ensuring more areas receive higher Opportunity Index Scores. The Opportunity Index, maintained by the Puget Sound Regional Council ranks neighborhoods based on five elements that affect opportunity: education, economic health, housing access and quality, mobility and transportation access, and environment (Puget Sound Regional Council, n.d.). Based on the map published with King County's current Opportunity Index ratings, disabled person's are primarily limited to southern Seattle if they want access to both housing

and transportation; other areas in the county come with significant trade offs (Puget Sound Regional Council, n.d.).

Research Design

This research question will be answered by combining a framework of social and spatial equity to understand the relationship between disability and access to public services. The social equity lens will be used to examine this problem by targeting vulnerable populations using specific socio-demographic categories. In this case-study, we will be examining data around the percentage of population living with disabilities, as well as data on income distribution by census tracts. We intend to then apply a spatial equity lens to examine where resources are and are not distributed with the intent to to identify geographic areas that lack certain services. In this case, we will be looking at public transportation service routes and affordable housing to better identify a correlation between a lack of these services and areas where people with disabilities live.

The variables we are looking at fall into the following categories:

- Independent: Number of residents with disabilities per census tract and median income per census tract obtained from the Census Bureau
- Dependent: Median price of housing by census tract obtained from the Census Bureau and GIS data on public transit routes

King County is a diverse metropolitan region made up of many municipalities, therefore stratifying the data by census tracts will allow us to quickly analyze compounding data in a meaningful way. If we opted to look at these variables from a

wider unit of analysis, such as at the county level, important trends and disparities in specific communities would be overlooked.

Results

All maps produced (see appendix) overlay one of the selected variables with King County Metro transit routes to analyze the relationship between the variable and transit access. Common themes across all maps produced illustrate dense public transit access through the interstate-5 corridor, shown as the connected network of transit stretching from Federal Way north through Shoreline. Large parts of the greater Bellevue area, including Kirkland, Redmond, and Renton also show dense public transit access. Eastern King County, both to the north and south, show little to no public transit service, suggesting that King County Metro prioritizes service that connects central business districts with suburban, residential communities. This transit model may not provide optimal service for individuals with travel needs that do not revolve around commuting in or out of urban downtown areas, like downtown Seattle.

Figures 1 & 2: Disability Percentage and King County Metro Access

Figures one and two combine U.S. Census data from the American Community Survey with King County Metro transit routes to illustrate the relationship between where people with disabilities reside in King County and what their level of access to public transit is. The population density of disabled individuals per census tract in King County ranges from less than 3% up to 10%. The maps show concentrations of disabled populations in census tracts serviced by public transit. The Seattle-Bellevue metro-area shows the greatest density of disable people, suggesting that these communities are indeed more reliant on public services like transit, which appear to be

more readily accessible than in rural King County. The census tracts in eastern King County show a relatively small disabled population, further suggesting that people living with a disability are choosing to live in areas that are better connected.

Figures 3 & 4: Median Home Price by Census Tract & King County Metro Access

Figure 3 combines median home value by census tract with King County metro access. This map shows that the highest valued homes in King County are centralized in a small section of the county. That is the central part of the City of Seattle, North Seattle, as well as in Mercer Island and Bellevue. The areas surrounding the central part of Lake Washington (shown in the darkest purple on Figure 3) are highly concentrated areas of wealth with homes valued above 750,000 dollars. The lowest income areas are heavily concentrated in southern King County starting from White Center Down to Federal Way. These hopes are valued at under 350,000, which is less than half of the homes in Seattle and on the Eastside. Transit becomes sparse as you move further away from the city center and however it is also interesting to note that although Shoreline and Tukwila are about the same distance from the city center, the density of the transit directed north is much higher than the density of transit headed south even though the home values are much higher in Shoreline than Tukwila.

Figures 5 & 6: Median Income by Census Tract & King County Metro Access

Figure 5 is a wide view of all of King County showing the routes of King County Metro. From the big picture view it is clear that the main function of the King County Metro system is to facilitate transit to and from the city of Seattle, which is evidenced by the high concentration of routes running through the downtown area and few routes that

run between individual cities that are outside of the city. Figure 6 shows close-ups of three parts of King County: the City of Seattle, eastern King County including: Bellevue, Redmond, Kirkland, Mercer Island, and Issaquah, and lastly southern King County which includes SeaTac, Des Moines, Auburn, Kent, and Covington. Although there are transit lines throughout King County, more affordable areas like Auburn, Des Moines and SeaTac are limited by the routes available to them meaning that if people with disabilities are looking for affordable housing in southern King County they would need to live directly on the transit line to have any hope of accessing transit. Another Area of Note is Mercer Island, this is one of the highest income areas in King County and there is transit running the length of the island connecting it to both Bellevue and Downtown Seattle. Similar things can be said about the cities in the Eastern part of King County in general, the density of transit running through Redmond and Kirkland is much higher than the transit running in SeaTac and Auburn even as those areas are more affordable.

Figure 7: Curb Ramp Geo-Location & King County Public Transit

The last map (shown in Figure 7) shows the placement of curb ramps within the City of Seattle and a few select areas in unincorporated King County including: Lakeland North & South as well as Union-Novelty Hill. What this map shows is that the use of curb ramps is robust. Unfortunately, there was no data available to display the full scale of King County but this sampling does give a picture of the high concentration of ramps in the county. This makes sense as in the article, “The Curb-Cut Effect” (2017), Angela Blackwell discusses how since their first iteration in 1972, curb cuts or ramps have been a major force for creating equity and access not just for people who are mobility assisted with wheelchairs but also for runners, people with strollers, and all

pedestrians. King County/City of Seattle have invested in curb ramps which although intended for people with disabilities increase mobility for all there is also a need to invest in public transit in the same way.

Conclusions

The initial hypothesis presented in this research was that the areas of King County with affordable housing would not be the same as the areas with high transit access. What the research shows is that King County transit routes are heavily located away from affordable housing, primarily congregated near businesses in Seattle and other major King County cities. Eastern and Northern King County are almost entirely devoid of access to transit, even in areas such as Sammamish and Woodinville with a higher disability percentage and income level. Higher income level only increases access to transit if living near a major shopping center or business hub. Findings are congruent with research performed by other studies in other major metropolitan areas which showed there are tradeoffs that have to be made by people who depend on transit between having transit access and having an affordable place to live, money saved on housing by moving further out ends up being spent on purchasing and maintaining a personal vehicle in many cases (Kramer, 2018).

This study is limited to King County and does not take into account the wider Seattle/Tacoma/Bellevue metropolitan area which would also include Snohomish and Pierce Counties, which are served by Sound Transit and The Regional Transit Authority. This research however is beneficial specifically to King County Metro to show where

there is potential for increased public transportation infrastructure. Another limitation to our study was the data from the American Community Survey used to measure disability, the percentage of disabled individuals is measured by grouping together all people who identify with any disability. Different disabilities will have different access needs, for example those who are hard of hearing will need different things than those who require mobility devices such as wheelchairs. This study does not take into account the nuances of those different experiences and follow up qualitative research could be done to gain more insight into the specificities of different experiences with disability. Other areas for research and exploration include: surveying conditions of roads and sidewalks, mapping buildings with elevators. Ramps, or other accessible features, mapping crosswalks with accessibility features such as audio signals or texture for those who are visually impaired. Seattle/King County has varying topography, our study did not include that as a layer on our maps and that could also impact the experience of how transit is accessed, all transit stops are not equally accessible. More data on curb ramps throughout the county is needed as well as the condition of those ramps, our data was only able to show data for the city of Seattle and some areas of unincorporated King County. Finally, this study focuses on the full county and uses census tracts as the area of analysis. It could be beneficial to see things at a much smaller scale such as zooming into one specific neighborhood or even down to a specific census block.

Based on the results of this research there are a few recommendations that will improve the experiences of people with disabilities in King County. One, King County should emphasize the expansion of more routes, and offer greater frequency of trips for

the routes serving southern King County. These areas based on the research are where low income people are concentrated and also are where there are significant pockets of individuals with disabilities. There is already significant transit infrastructure in the city of Seattle. However, although there is infrastructure there needs to be proactive policy incentivizing and encouraging housing affordability. Owning a home vs renting means that a person with disabilities would be able to add features such as ramps, lowered counters, and other assistive devices to their home, they could have a greater sense of community and also not be constricted to the whims of the price of rent which fluctuates and is controlled by landlords. It is an excellent first step to ensure there are programs for affordable rental units available but that needs to be paired with finding ways to ensure people with disabilities are not just forever renters but also can become homeowners. Finally, as mentioned earlier in this paper, creating access for people with disabilities does not just benefit people with disabilities; those impacts Angela Blackwell (2017) points out that investing in transit attracts jobs, increases access to higher education and boosts economic output (n.p.). King County should look at its budget and figure out how to divert funds towards transit and people with disabilities to create a more equitable and accessible county. This research visualizes the current disparities present in the county and the way they impact the lives of those who are most marginalized. King County must prioritize centering those at the margins moving forward and building transportation equity for people with disabilities across King County, not just those fortunate enough to be able to afford to live in the city center or the more wealthy outlying areas.

Bibliography

Blackwell, A. G. (2017). The Curb-Cut Effect (SSIR). *Stanford Social Innovation Review*, *15*(1). Retrieved March 13, 2022, from https://ssir.org/articles/entry/the_curb_cut_effect

Brumbaugh, S. (2018, September). *Travel patterns of american adults with disabilities*. Bureau of Transportation Statistics. https://www.bts.gov/sites/bts.dot.gov/files/2022-01/travel-patterns-american-adults-disabilities-updated-01-03-22.pdf

Kneebone, E. (2017, February 15). *The changing geography of US poverty*. Brookings Institute. Retrieved February 1, 1992, from https://www.brookings.edu/testimonies/the-changing-geography-of-us-poverty/

Kramer, A. (2018). The unaffordable city: Housing and transit in North American cities. *Cities*, *83*, 1–10. https://www.sciencedirect.com/science/article/pii/S0264275117310855

Levine, J. (2013). Urban Transportation and Social Equity: Transportation Planning Paradigms That Impede Policy Reform. In N. Carmon & S. S. Fainstein (Eds.), *Policy, Planning, and People: Promoting Justice in Urban Development* (pp. 141–160). University of Pennsylvania Press. http://ebookcentral.proquest.com/lib/seattleu/detail.action?docID=3442079

Puget Sound Regional Council. (n.d.) *Opportunity mapping.* Retrieved February 1, 2022. https://www.psrc.org/opportunity-mapping

Stacy, C., Su, Y., Noble, E., Stern, A., Blagg, K., Rainer, M., & Ezike, R. (2020, October). *Access to opportunity through equitable transportation: Lessons from four metropolitan Regions*. Urban Institute. https://www.urban.org/research/publication/access-opportunity-through-equitable-transportation/view/full_report

US Census Bureau. (2021, November 21). *How disability data are collected from the american community survey*. Census.Gov. Retrieved February 1, 2022, from https://www.census.gov/topics/health/disability/guidance/data-collection-acs.htm

Appendix:

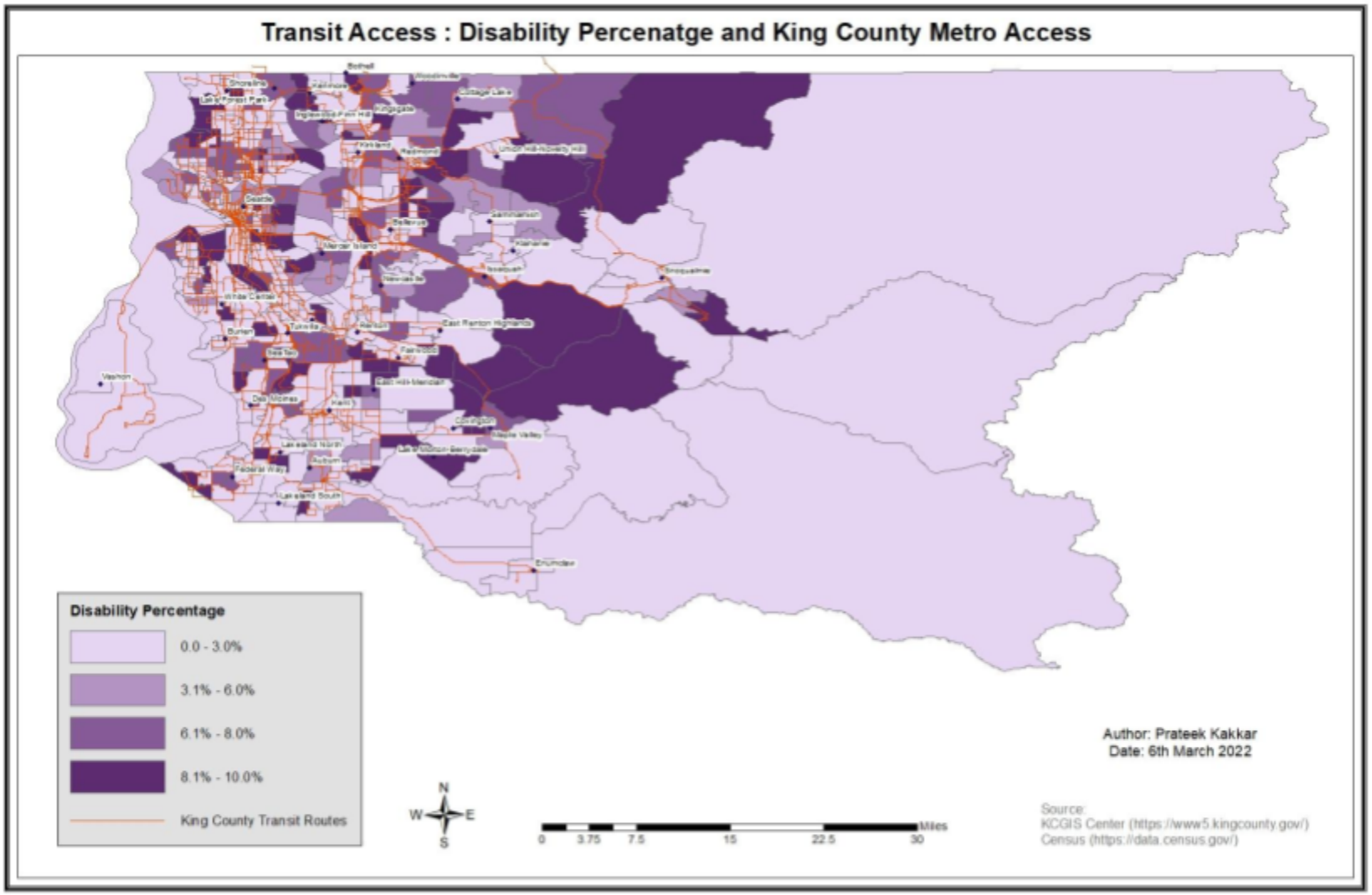

Figure 1: Disability Percentage by Census Tract & King County Metro Access- County-Wide
(darker areas indicate higher concentration of disabled persons)

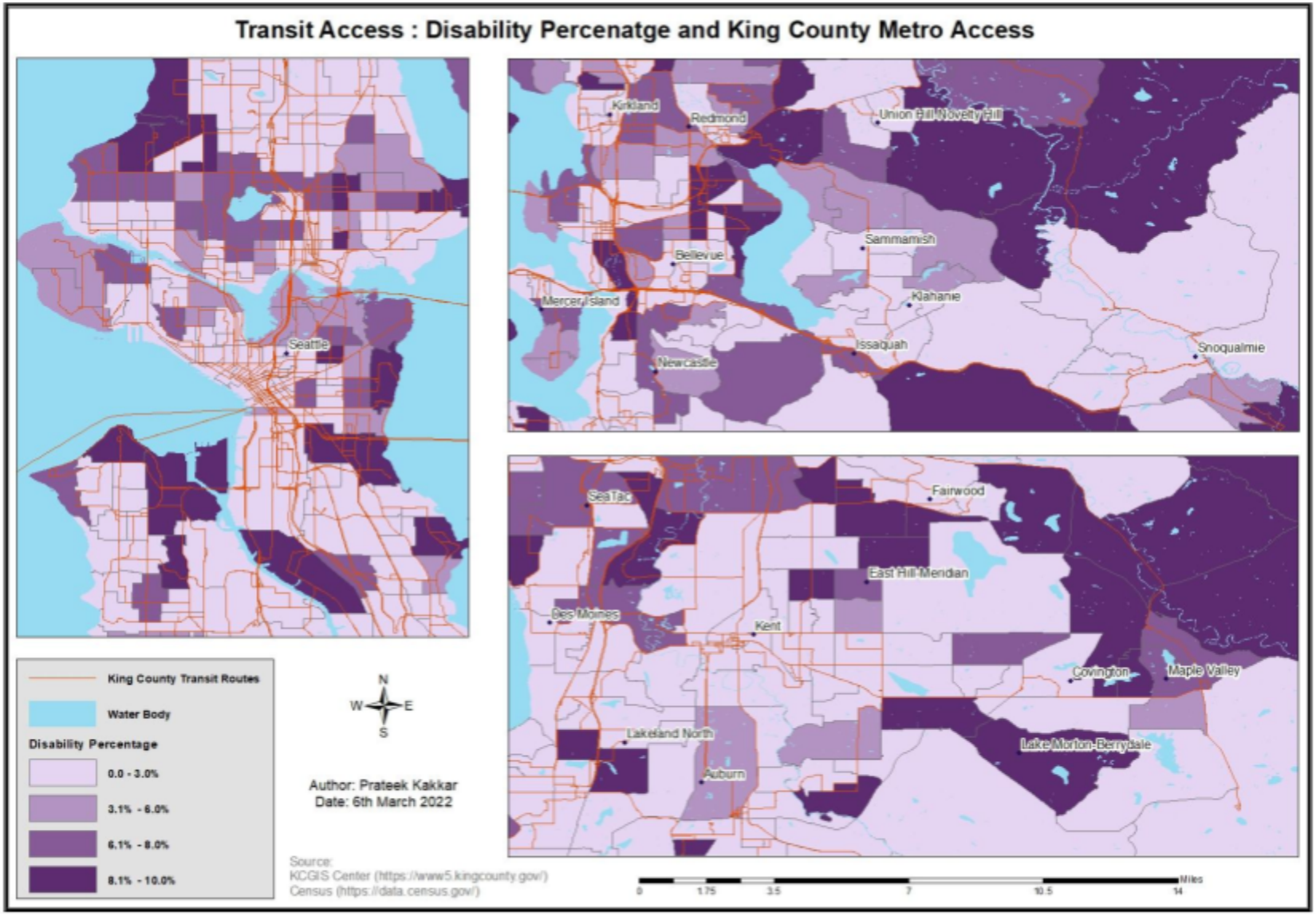

Figure 2: Disability Percentage by Census Tract & King County Metro Access-Major Cities
(darker areas indicate higher concentration of disabled persons)

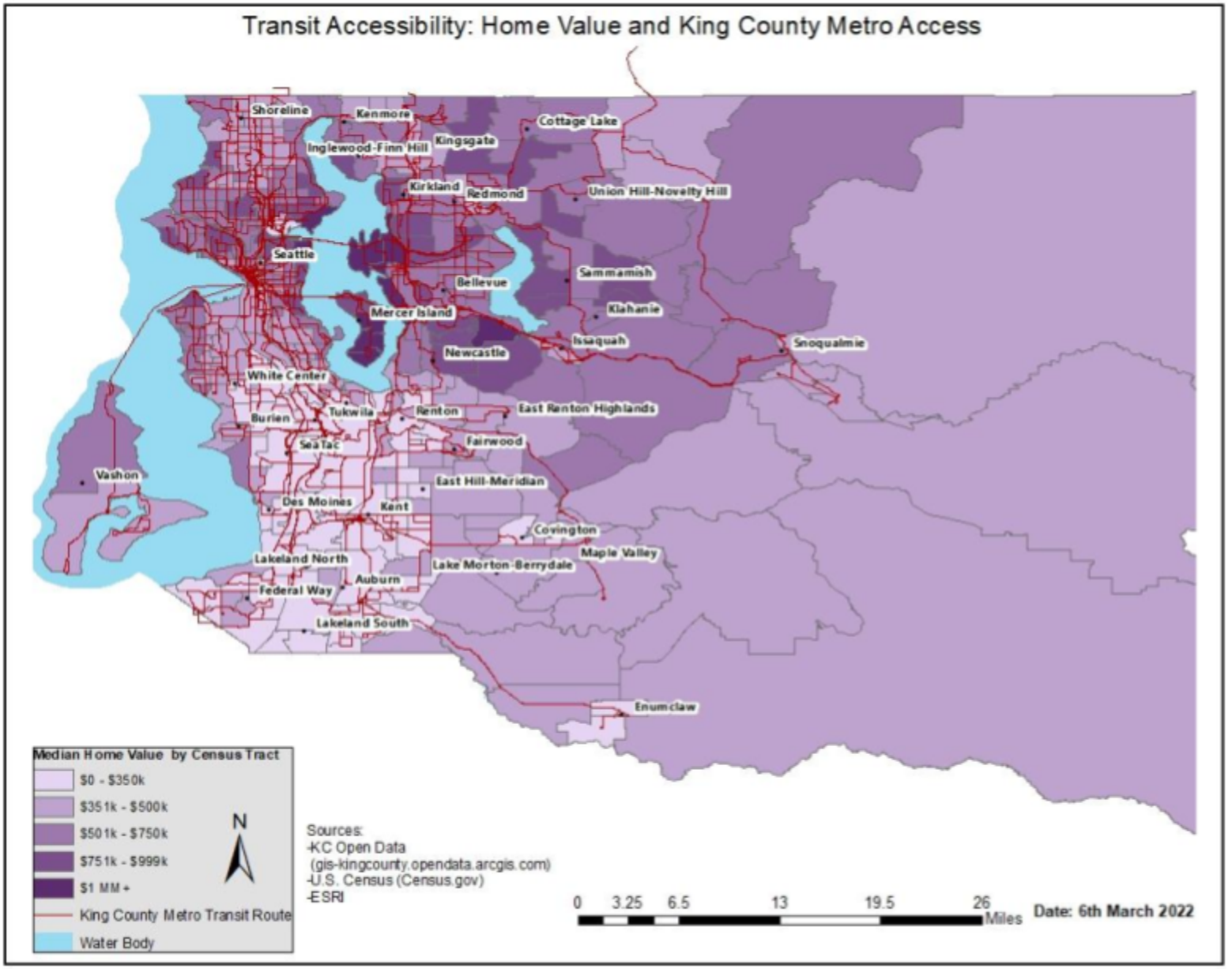

Figure 3: Home Value by Census Tract & King County Metro Access- County-Wide (darker areas indicate higher median home price)

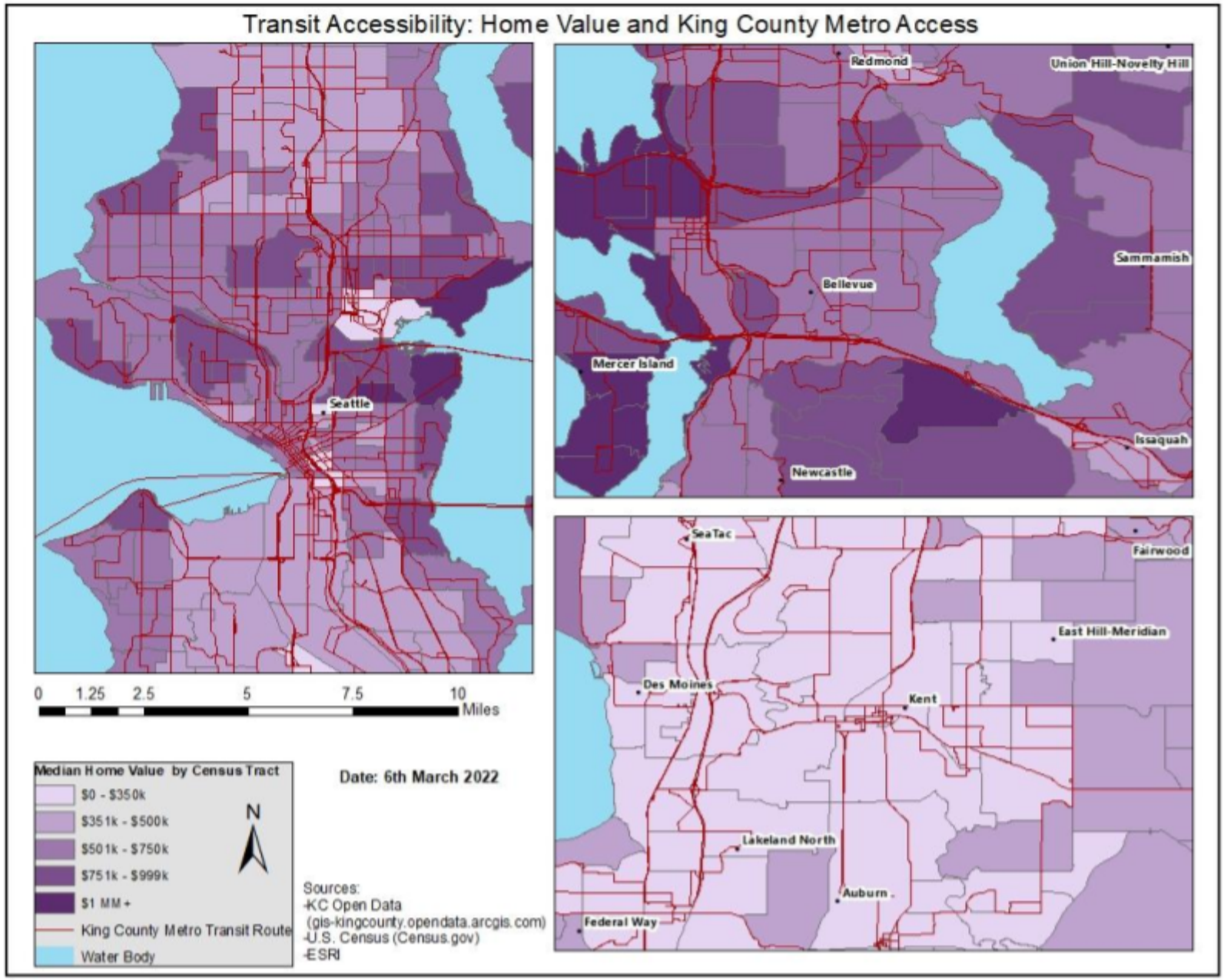

Figure 4: Median Home Value by Census Tract & King County Metro Access-Major Cities
(darker areas indicate higher home value)

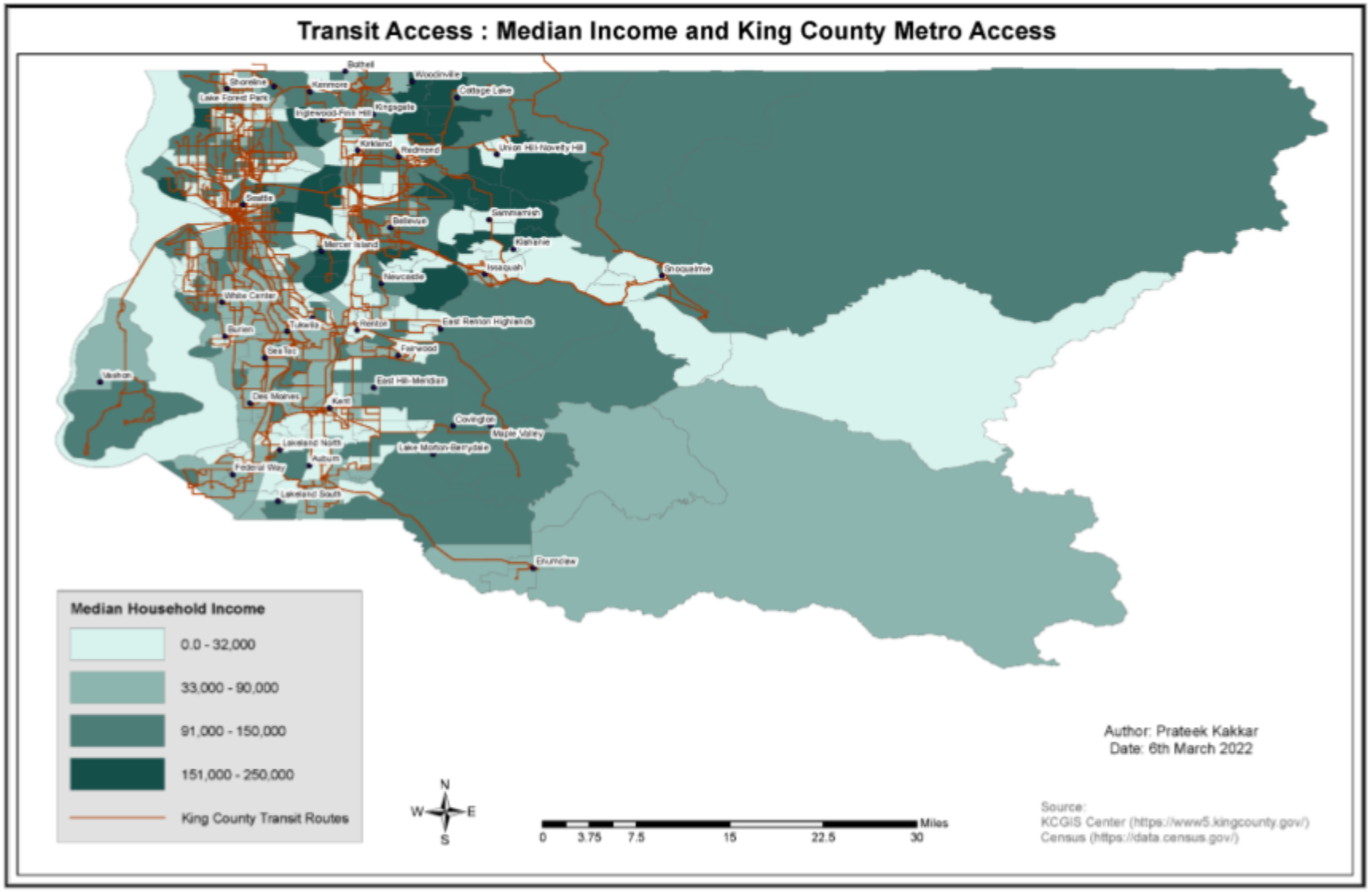

Figure 5:
Median Income by Census Tract & King County Metro Access- County-Wide(darker areas indicate higher median income)

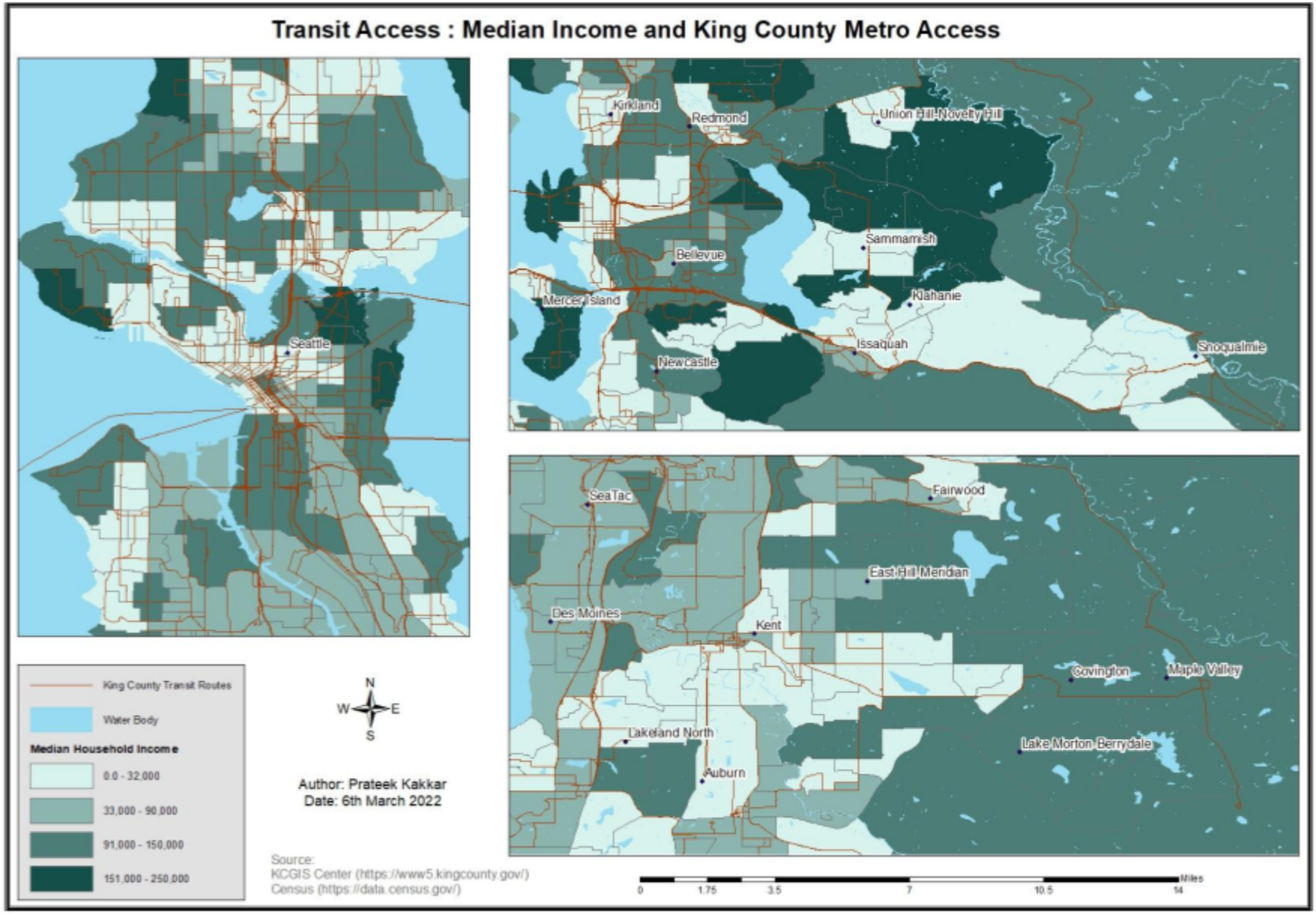

Figure 6: Median Income by Census Tract & King County Metro Access- Major Cities (darker areas indicate higher median income)

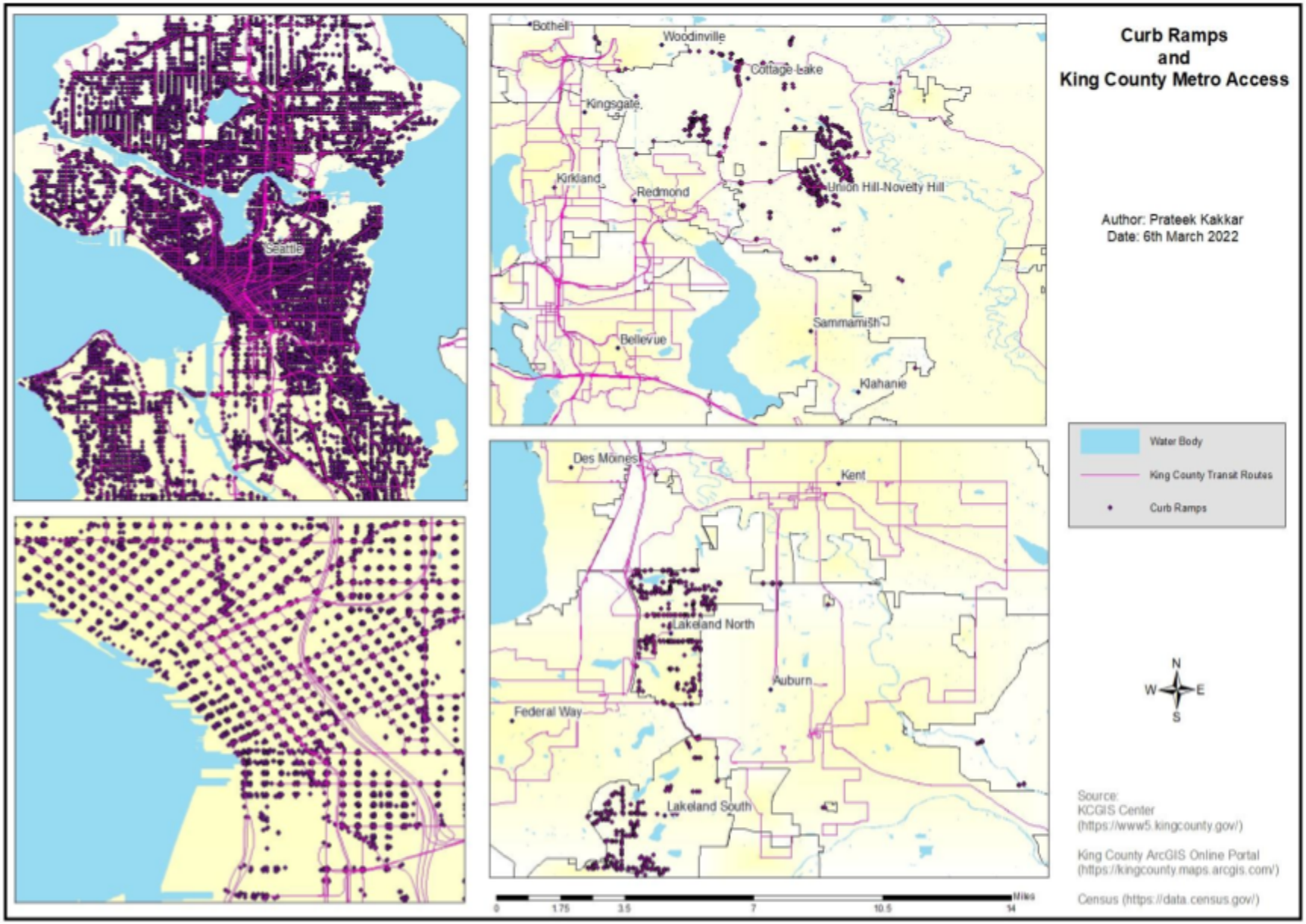

Figure 7: Curb Ramp Geo-Location & King County Metro Access