Spatial Assessments of Seattle Housing Authority's Senior Housing and their Proximity to Parks, Public Transit Stations, and Medical Facilities

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Abstract

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The built environment has the capacity to enhance or diminish quality of life. This capacity provides the reason and motivation to provide an environment that is able to facilitate the needs of individuals. To accomplish this aim, it is important to consider the diversity of needs of different age groups. This thesis focuses on the proximity of Seattle Housing Authority's Senior Housing communities to certain built environment amenities that have been found to improve senior well-being and outcomes. These amenities include proximity to parks, public transportation, and medical facilities for those seniors living within the 23 low-income housing owned by the Seattle Housing Authority (SHA). This analysis uncovered variance in the distribution of the amenities. The analysis found that: i) 82% are within a .25 mile radius of a park; ii) 100% of the SHAs have public transportation stations within .25 miles; iii) 65% of the SHAs are within .25 miles of a pharmacy; iv) 13% of SHAs are in .25 mile proximity to a hospital and; v) 39% of the SHAs are within a .25 mile proximity to an urgent care. However, 30% of the SHAs do not have any medical facility within .5 miles. To provide additional insight into the degree of accessibility of medical facilities an analysis into each of the SHA's travel distance to the medical facilities found that: i) 91% of the SHAs are within five miles of a hospital; ii) 82% of the SHAs are within a mile of a pharmacy; iii) 65% of the SHAs are within a mile of an urgent care. Lastly, the SHAs were ranked based on their relative measured degree of accessibility to the assessed amenities, which identified: seven SHAs with high accessibility to such amenities; seven SHAs with moderate accessibility; nine SHAs with low accessibility. It was found that the areas with the highest level of accessibility to amenities were located in the Downtown, Ballard, and U-District neighborhoods, while the ones with the lowest were located the furthest north, south, and in the Magnolia neighborhoods.

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Chapter 1: Introduction

The world's population is constantly changing, requiring the built environment to adapt to meet the unique needs of its population. Two global demographic shifts that will greatly impact the composition of urban populations are population aging and urbanization. The United Nations identifies these shifts as two of the most significant trends.[1] First, older individuals (aged 65 and above) are the world's fastest-growing age group, and by 2050, it is expected that this age group will outnumber adolescents and youth (ages 15 to 24).[2] Second, by 2050, it is expected that 70% of the world's population will be living in cities; this is a 15% increase compared to 2018.[3] Acknowledging that the global population is aging and urbanizing, requires adjustment of the built environment to accommodate such evolution.

Seniors are a group that faces unique challenges largely stemming from changes in their physical state and societal treatment. The World Health Organization's (WHO) effort to create age-friendly built environments, known as the Global- Age-Friendly Cities (AFC) movement, has identified three domains, related to the built environment, that most impact older adults.[4] These domains include housing, transportation, and outdoor space**s.**[5] In addition, access to medical care has been found to improve the health outcomes of older populations, along with improvement in transportation access.[6]

[1] "Shifting Demographics."
[2] "Shifting Demographics."
[3] "Shifting Demographics."
[4] "National Programmes for Age-Friendly Cities and Communities."
[5] "National Programmes for Age-Friendly Cities and Communities."
[6] National Academies of Sciences et al., "Factors That Affect Health-Care Utilization."

Guided by these domains, this thesis seeks to provide an understanding of the current environment of older adults living in subsidized senior housing in Seattle, Washington.

Specifically, the research question that this thesis seeks to address is: ***how accessible are parks, public transportation stations, and medical facilities for those living within Seattle Housing Authority's (SHA) senior housing?*** The pursuit of this question uncovered that 83% of the SHAs are within within .25 miles of a park, 100% are within close proximity to public transportation stations, and the level of accessibility to medical facilities is mixed. By understanding the current built environment's ability to enhance or diminish the quality of life of older adults, guided action can be taken to provide for a more informed environment, one that addresses the needs of older adults.

Chapter 2: Literature Review

2.1: Population Trends

The United Nations has identified the growth of the global population, aging, and urbanization to be among the most significant changes in the global population.[7] According to the United Nations, those aged 65 years and older are considered to be the fastest-growing age group globally.[8] Figure 1 illustrates the proportion of various age groups that comprise the worldwide population. Notably, those aged 65 and older are expected to comprise an increasing proportion of the total population.

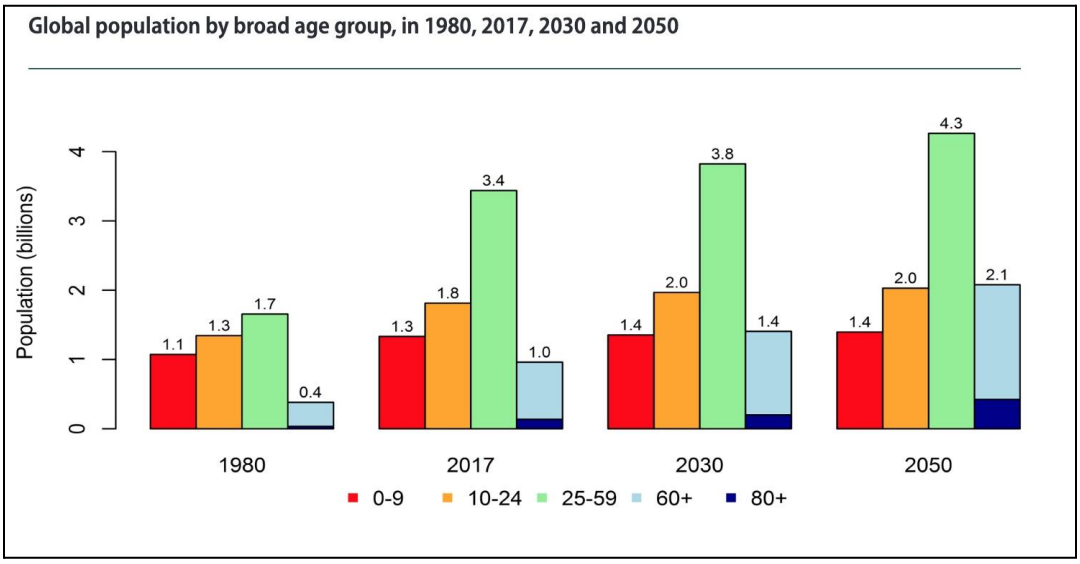


Figure 1: Global Population Trends Regarding Age [9]

Similar to the worldwide trends, Seattle's population of those aged 65 and older is projected to grow. As of 2000, 10% of Seattle's population was aged 65 and older, by 2040 it is expected that this population will comprise 17% of the population.[10] Within

[7] "World Urbanization Prospects - Population Division - United Nations."
[8] "World Urbanization Prospects - Population Division - United Nations."
[9] "National Programmes for Age-Friendly Cities and Communities."
[10] "Vision 204."

King County, Seattle maintains the highest population and is expected to absorb a significant proportion of future growth.[11] Figure 2 shows the projected population change by age group over time in Seattle. This figure shows that the age groups 75 and older increase exponentially by 2037.[12]

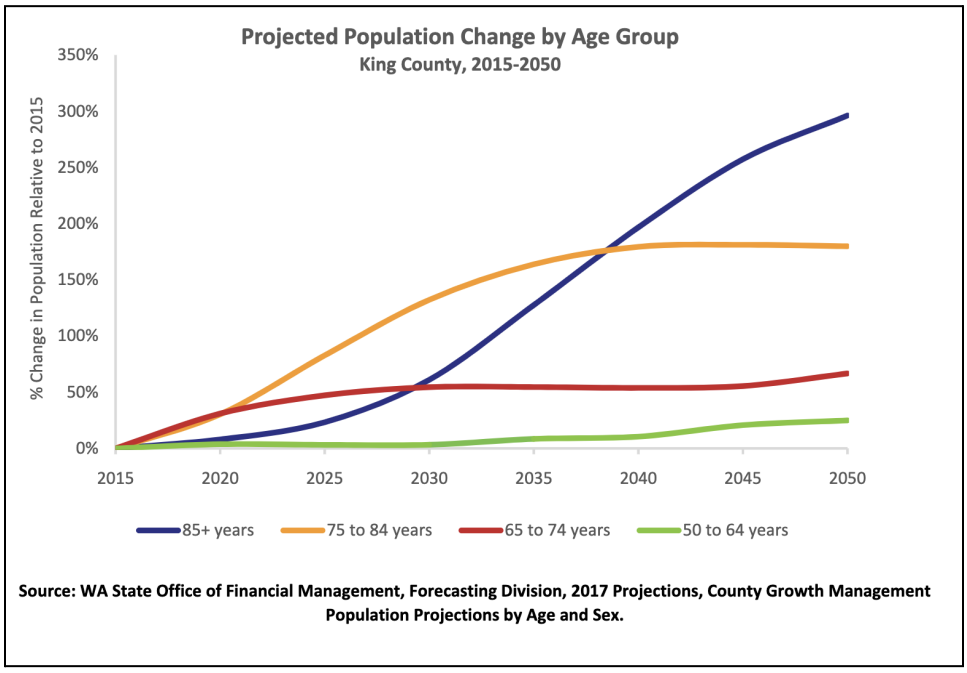


Figure 2: King County Population Trends Regarding Age [13]

In addition to the aging population, urbanization is the other key trend. The proportion of the global population living in rural areas is expected to continue to decline, while the proportion of those living in urban areas is expected to grow. The United Nations' Department of Economic and Social Affairs 2018 report, found that those living within urban areas will increase to encompass 68% of the total population by 2050.[14] As of 2018, the total population of those living within cities included 55% of

[11] "Vision 204.""Update 2022-2023 for Seattle and King County, Washington."
[12] "Update 2022-2023 for Seattle and King County, Washington."
[13] "Update 2022-2023 for Seattle and King County, Washington."
[14] "World Urbanization Prospects - Population Division - United Nations."

the global population.[15] Figure 3 breaks down the urbanization rate by geographic region, showing that every examined region will experience increases in their urban populations.

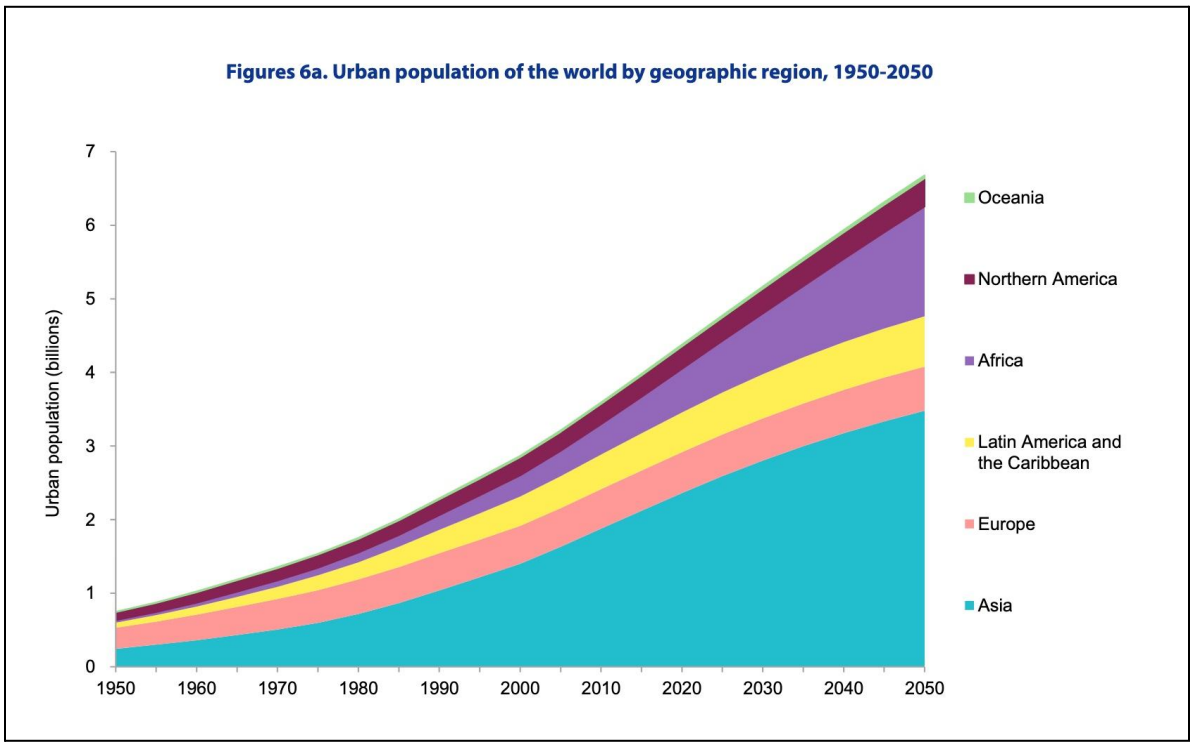


Figure 3: Global Urbanization Rate [16]

Following similar trends, Seattle is expected to continue to experience increased urbanization. King County is expected to experience a 32% population increase between the years 2000-2040.[17] Specifically, Seattle's population is expected to increase by 120,000 by 2035.[18] These demographic trends have inspired efforts to provide an improved built environment that enhances the lives of older residents in urban environments.

[15] "World Urbanization Prospects."
[16] "World Urbanization Prospects."
[17] "Vision 204."
[18] "Population & Demographics."

2.2: Efforts to Enhance the Built Environment for older adults

To address the needs of an aging and urbanizing population, the U.N. has adopted strategies that provide consideration and resources to enhance the lives of elders living in urban environments. In December 2020 the U.N. General Assembly deemed the years 2021-2030 to be the Decade of Healthy Aging.[19] The WHO, which is part of the UN, found that cultural perceptions and treatment, the provision of robust health care, and the ability of the community to facilitate the abilities of older adults to be foundational elements of communities that enhance the lives of older adults. In an attempt to translate these elements into the built environment, the WHO identified "eight domains" within the built environment that highly impact older people. These eight domains include: "**outdoor spaces, transportation and mobility, housing, social participation, social inclusion and non-discrimination, civic engagement and employment, communication and information and community support and health services**".[20] The motivation behind the UN's efforts to enhance the quality of life for elders is derived from their belief that everyone has the right to the highest attainable level of health.[21]

Along with WHO's domains in which urban places can focus efforts to enhance the quality of life for elders, the WHO seeks to partner with regions and cities to help guide these partnered areas to incorporate relevant elements within their environments.[22] The WHO calls this network of assisted regions to become more age-friendly to be the Global Network for Age-friendly Cities and Communities

[19] "WHO's Work on the U.N. Decade of Healthy Ageing (2021-2030)."
[20] "About the Global Network for Age-Friendly Cities and Communities."
[21] "Human Rights."
[22] "About the Global Network for Age-Friendly Cities and Communities."

(GNAGCC). Notably, in 2016, Seattle became part of this network by pledging to work with the World Health Organization to become more age-friendly. [23] [24] These efforts help identify that financial health, housing, and social isolation are significant issues facing older adults.

2.3: Specific Issues Facing Older Adults

A prominent issue facing many seniors is related to their financial health. Currently, the share of seniors below the poverty line, defined as the minimum level of income deemed adequate to meet the needs of the average adult, is at its lowest point in U.S. history, however, compared to other developed countries, the U.S. has a relatively high percentage of elders that are impoverished.[25] Further, in 2022, the National Council on Aging found that "over 15 million older adults aged 65+ are economically insecure, with incomes below 200% of the federal poverty level.[26] In order to supplement reduced levels of income, seniors often rely on savings to supplement spending.[27] However, research indicates that significant portions of the U.S. population lack adequate savings important in supporting one's ability to retire comfortably. Table 1, shows a graph provided by the Federal Reserve that analyzes the health of various retirement savings of different age groups.[28]

[23] "About the Global Network for Age-Friendly Cities and Communities."
[24] "Area Plan Update 2022-2023 for Seattle and King County, Washington."
[25] "Interactive Charts by the OECD."
[26] "Get the Facts on Economic Security for Seniors."
[27] "Economic Well-Being of U.S. Households."
[28] "Economic Well-Being of U.S. Households."

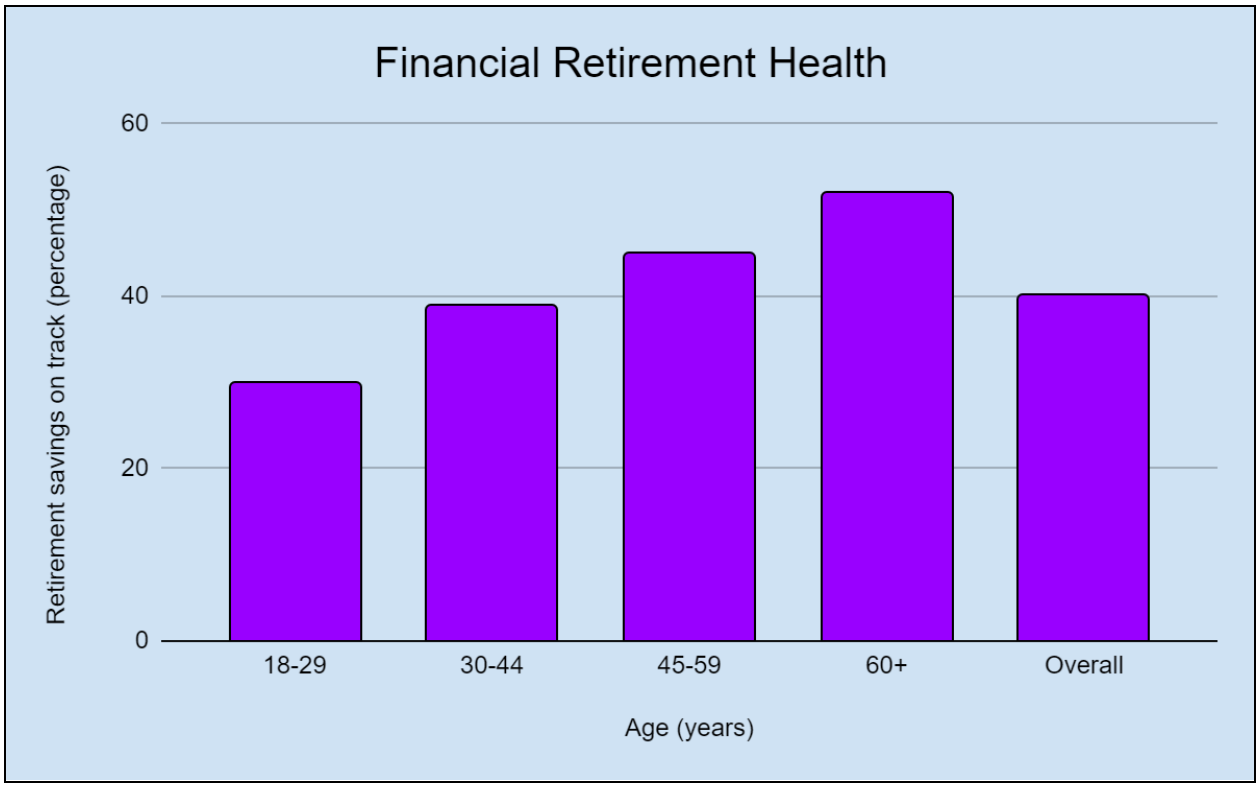


Table 1: U.S. Retirement Savings [29]

Table 1 highlights that many do not have the proper levels of savings to retire healthy. Notably, this table shows that 60% of the U.S. population is not on track to have sufficient retirement savings. A report conducted by the National Institute on Retirement Security found that poor rates of retirement preparation will continue and worsen.[30]

A notable impact of reduced financial health among older adults concerns housing. A study conducted by Seattle's Center for Housing Policy explains that there will be an "increased number of older, low-income households that will experience increased housing cost burdens and/or will confront unaffordable housing".[31] While there are various programs aimed at providing housing for seniors, many of these

[29] "Economic Well-Being of U.S. Households."
[30] Bower et al., "The Impact of the Built Environment on Loneliness."
[31] Aging and Disability Services et al., "Quiet Crisis."

programs are unable to fully meet current demand. According to the Joint Center for Housing Studies at Harvard University, only 36% of elders who qualified for federal housing assistance received it.[32] Seattle shares similar trends. Seattle's Housing Authority (SHA), which provides subsidized housing to elders, is in such demand that the waitlist to access this housing takes years.[33] In addition to the financial strain many seniors face, diminished ability greatly impacts this age group.

Mental and physical function often reduce one's ability to interact with their environment. The Area Agency on Aging for Seattle and King County explains that functional limitations occur because of a disability, which has impacted their physical, cognitive, or psychological ability to independently perform functions fundamental to daily living.[34] Seniors are a group with an increased likelihood of having a disability. The U.S. Census found that nearly 40% of people 65 and older had at least one disability inhibiting their movement.[35] The King County Aging and Disability Services area plan includes an examination of seniors with disabilities. Figure 4 breaks down prominent functional limitations and shows their prominence compared among different age groups.

[32] Molinsky, "Housing for America's Older Adults."
[33] "SHA Housing."
[34] "Area Plan Update 2022-2023 for Seattle and King County, Washington."
[35] "Mobility Is Most Common Disability Among Older Americans, Census Bureau Reports."

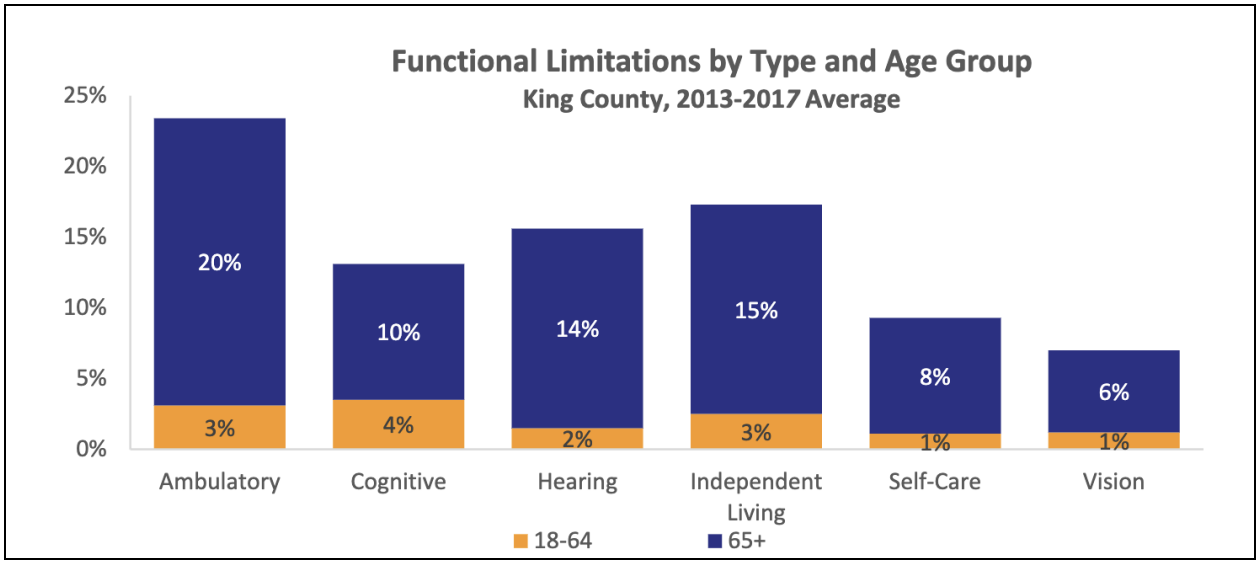


Figure 4: Functional Limitation Rates Within King County [36]

Figure 4 clearly shows that those aged 65 and older experience much higher rates of functional limitations. Those living with disabilities are impacted in a diversity of ways, including that one's ability to interact with their environment decreases.[37] However, there are techniques that seek to address this. One is to reduce the burden of travel for those with disabilities through increasing accessibility by reducing the distance needed to travel to destinations.[38] Further, reduced mobility exacerbates social isolation. It has been found that decreases in functional ability are linked to decreased social interaction which increases the adverse impact of loneliness.[39] Studies have shown that loneliness increases the risk of high blood pressure, heart disease, obesity, a weakened immune system, anxiety, depression, cognitive decline, Alzheimer's disease, and death.[40] Furthermore, a study conducted by the National Institute of Health (NIH), seeking to determine the prevalence of loneliness, found that approximately one-quarter of

[36] "Update 2022-2023 for Seattle and King County, Washington."
[37] Rosso, Auchincloss, and Michael, "The Urban Built Environment and Mobility in Older Adults."
[38] Rosso et al., "Mobility, Disability, and Social Engagement in Older Adults."
[39] Malcolm, Frost, and Cowie, "."
[40] Malcolm, Frost, and Cowie.

Americans aged 65 and older are considered to be socially isolated.[41]

However, like the other examined issues, there are techniques related to urban planning that are thought to alleviate the burden imparted by the built environment onto those with disabilities.

While loneliness is an individual experience, the built environment impacts these feelings.[42] For instance, one's experience with the built environment is impacted by a city's design, which can nurture or discourage social interaction and thus influence loneliness.[43] While there are many elements that could be considered, this analysis will focus on two relevant components: access to natural space, public transportation, and medical facilities. Easy access to natural spaces, public transportation, and medical facilities are three fundamental aspects that impact well-being.[44] Natural spaces are places that invite social interaction, thus reducing loneliness.[45] Environments with natural spaces help create spaces that promote social interaction which has been found to reduce the rates of loneliness.[46] Along with the connection to greenspace, public transportation use is linked to increased levels of social interaction and lower rates of loneliness, particularly among older adults.[47] Public transportation is able to increase mobility for a population that is composed of people with a heightened need for public transportation due to their rates of disability.[48] Further, this study examining the impact of the built environment on loneliness found that "good access to destinations and

[41] Malcolm, Frost, and Cowie.
[42] Bower et al., "The Impact of the Built Environment on Loneliness."
[43] Kelly, "Social Cities."
[44] Bower et al., "The Impact of the Built Environment on Loneliness."
[45] Lam and Wang, "Built Environment and Loneliness Among Older Adults in South East Queensland, Australia."
[46] Hammoud et al., "Lonely in a Crowd."
[47] Matsuda et al., "Association Between Public Transportation Use and Loneliness Among Urban Elderly People Who Stop Driving."
[48] Bower et al., "The Impact of the Built Environment on Loneliness."

transport options also protects against loneliness" and continued to note that public transit use offers a particular ability to reduce feelings of loneliness.[49] Lastly, an analysis of the accessibility, in terms of travel, of prominent medical facilities will be included. It has been found that access to medical facilities has a relationship with health outcomes, where increased accessibility is linked to favorable health outcomes. [50]. While many factors must be considered when providing an environment that meets the demands of elderly populations, this analysis will focus on understanding the presence of amenities that have been found to be related to issues facing older adults.

[49] Bower et al.
[50] Medicine et al., *Access to HealthCare in America*.

Chapter 3: Methodology

The thesis uses a quantitative approach to assess the accessibility of amenities that are of particular importance to seniors. To gauge the level of accessibility, data concerning senior Seattle Housing Authority (SHA) properties, parks, public transportation stations, medical facilities, and route information was used. The analysis uses Esri's ArcGIS Pro to provide spatial imagery and Google Sheets to create charts.

3.1: Data Collection

Examination Boundary

The study area for this analysis uses Seattle's city boundary from 2021, labeled as the "Incorporated Areas of King County" on the website King County Open Data.

Seattle Housing Authority (SHA)

Data pertaining to the Seattle Housing Authority (SHA) units was collected from the authority's website. The data is from 2023 and was filtered to include their 23 senior housing properties. As this data is not available in a format compatible with ArcGIS Pro, it was transferred to Google Sheets, which allows for the data to be saved in a format usable by ArcGIS Pro. To provide the location of these properties, their addresses were converted to include longitude coordinates (using gps-coordinates.org).]

Parks

Data was taken from Seattle's Geodatabase to analyze parks. This data is labeled "Seattle Parks" having been last updated in 2023.

Public Transportation Stations

Data related to the location of public transportation was also collected and prepared. Various datasets related to buses and light rail stations, the two most significant forms of public transportation infrastructure in Seattle, were gathered. Specifically, for above-ground rail stations, data created in 2022 and labeled "Streetcar Stations," was used from Seattle's GeoDatabase. To complete the network of light rail stations, 2021 data related to the below-ground light rail stations was taken from Sound Transit's website, which was untitled. In addition, bus stations were included. The data that provided the location of bus stations are labeled "Transit Stops in King County Metro," created in 2017 and updated in 2018, and came from the King County GIS Open Data website.

Medical Facilities

The analysis of medical facilities examined the locations of Seattle hospitals, pharmacies, and urgent care. The shapefile, updated in 2023, labeled "hospitals" from Seattle GeoData was used to depict their location. Further, data, updated in 2023, was collected from CountryOffice.org, which provides the information related to the location of all pharmacies in Seattle. Lastly, the locations of urgent care facilities were identified. Data concerning the location of all urgent cares in Seattle was taken from the website Urgent Care Locations.org (2022 data).

Routes

Furthermore, the analysis of medical facilities included a study to determine the most efficient routes, in terms of distance, from the Seattle Housing Authority (SHA) properties to the medical facilities by vehicle. The data network was sourced from the University of Washington's U-Drive, which houses a variety of datasets. Specifically, the network dataset "2022 Business Analyst Data," which maintains data related to travel routes in Seattle, was downloaded and imported into ArcGIS Pro for analysis. The dataset provides relevant information regarding travel times, distance, and ease of travel enabling the calculation of the distance of the route.

3.2: Data Analysis

The analysis sought to uncover the presence of parks, public transportation stations, and medical facilities. The area surrounding .25 and .5 miles around the SHAs was created, which represents the area that is largely considered to be in close proximity.[51] Further, the location of parks, public transportation stations, and medical facilities were mapped. This allowed for the comparison between the location of the study area and the location of amenities to be determined. In addition, the study into the degree of accessibility of medical facilities included an examination of the most efficient routes between the medical facilities and SHAs. Nevertheless, following the spatial analysis, data was collected and shared to Google Sheets, facilitating the creation of charts.

[51] Lin and Cui, “Transport and Mobility Needs for an Ageing Society from a Policy Perspective.”

Chapter 5: Results

5.1: Presence of Parks

The analysis of the presence of parks examined the area encompassing .25 and .5 miles from the SHA properties. Figure 5 provides the spatial analysis of the proximity of parks to SHA properties within the two areas. This analysis shows that the existence of parks are largely evenly distributed throughout the SHA properties, however, there are notable spatial patterns. Notably, the SHA properties in Magnolia & Queen Anne, Northeast Seattle, and West Seattle & Delridge contain a relatively large number of parks within .25 miles. On the other hand, seven SHA properties lack access to any parks within .25 miles. In addition to the spatial analysis provided by these maps, information regarding the number of parks within the buffer for each of the SHA properties was determined, as shown in Figure 6, which found seven properties with no park, 11 properties with one park, four properties with two parks, and one property with four parks within the .25 mile radius. To complete the analysis concerning the presence of parks within close proximity, an analysis concentrating on the .5 mile area.

The analysis of the presence of parks within the .5 mile area surrounding the SHAs was included. The analysis of this radius demonstrates that the presence of parks within the area is largely evenly distributed, meaning that there is no significant concentration of neighborhoods containing a disproportionate number of parks. In addition to the spatial analysis, a study into the particular number of parks within each of the SHA properties was conducted, as shown in Figure 6. Specifically, the analysis found that there are four properties with no parks, three properties with one park, seven

properties with two parks, three properties with three parks, and two properties with five parks within the .5 mile area of the SHAs.

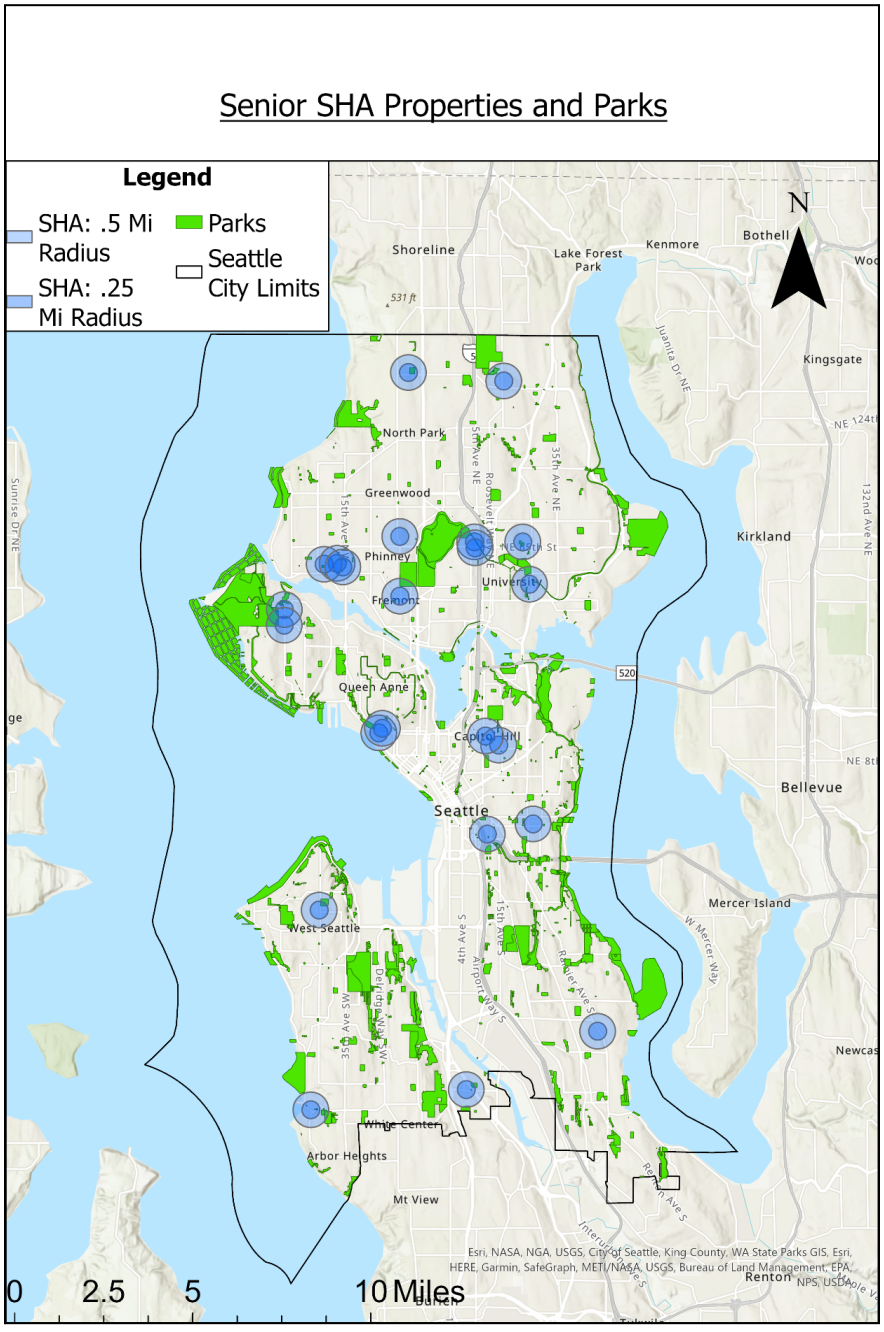


Figure 5: SHA Properties & Parks

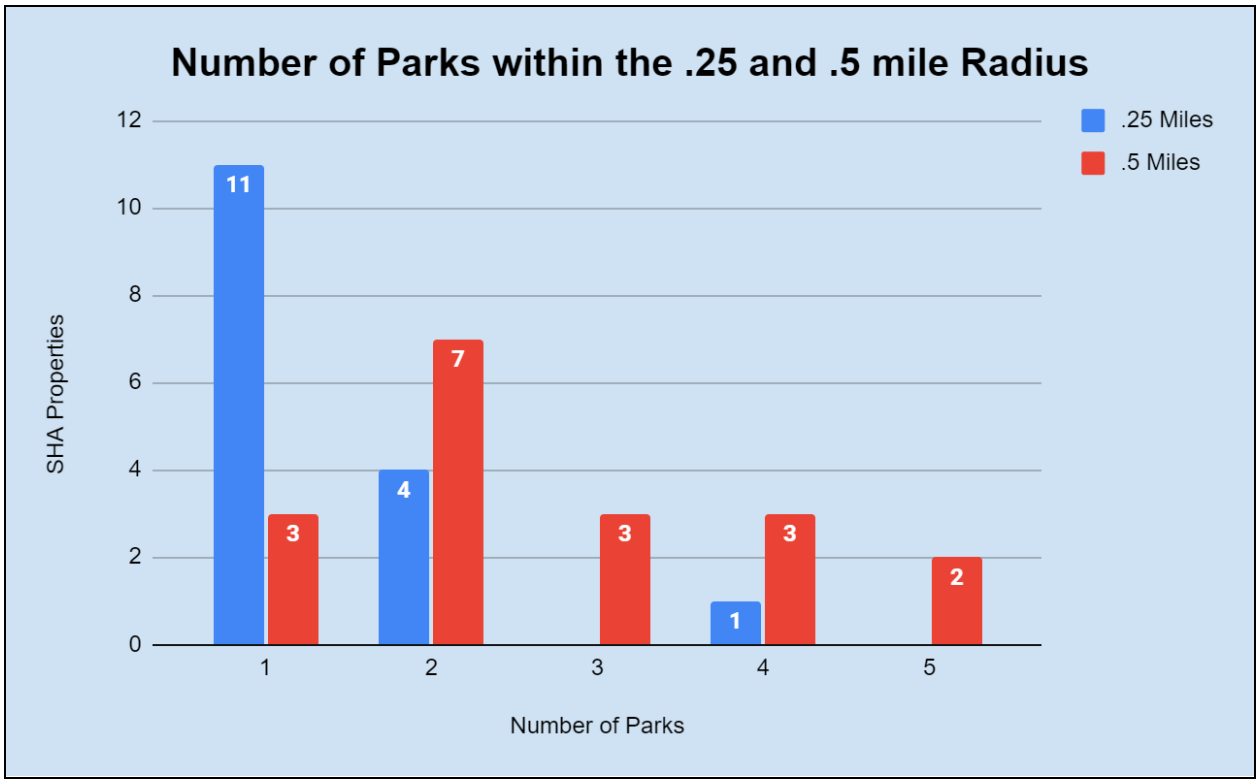


Figure 6: Number of Parks Within Close Proximity

5.2: Presence of Public Transportation Stations

The analysis of the presence of Public Transportation Stations was determined for the area comprising .25 and .5 miles around the SHA properties. Figure 7 shows the presence of public transportation stations near the SHA properties. Regarding the .25 analysis, the vast majority of the SHA properties have a number of public transportation stations. The two properties with no public transportation stations are located in the Northwest Seattle neighborhood. In addition to the spatial analysis, Figure 8 finds that there are two SHAs with no public transportation stations, five SHAs with 1–5 stations, 14 SHAs with 6–10 stations, and two SHAs with 11–15 stations. In addition, the examination area includes the .5 mile radius.

Figure 8 shows that all of the SHA properties have a number of stations within 0.5 miles and that there are no large discrepancies in the distribution of stations across the neighborhoods. Specifically, Figure 8 finds that there is 1 SHA with 6-10 stations, 5 SHAs with 11-15 stations, 5 SHAs with 5 stations, 1 SHA with 21-25 stations, 6 SHAs with 26-30 stations, 4 SHAs with 31-35 stations, and 1 SHA with 36-40 stations.

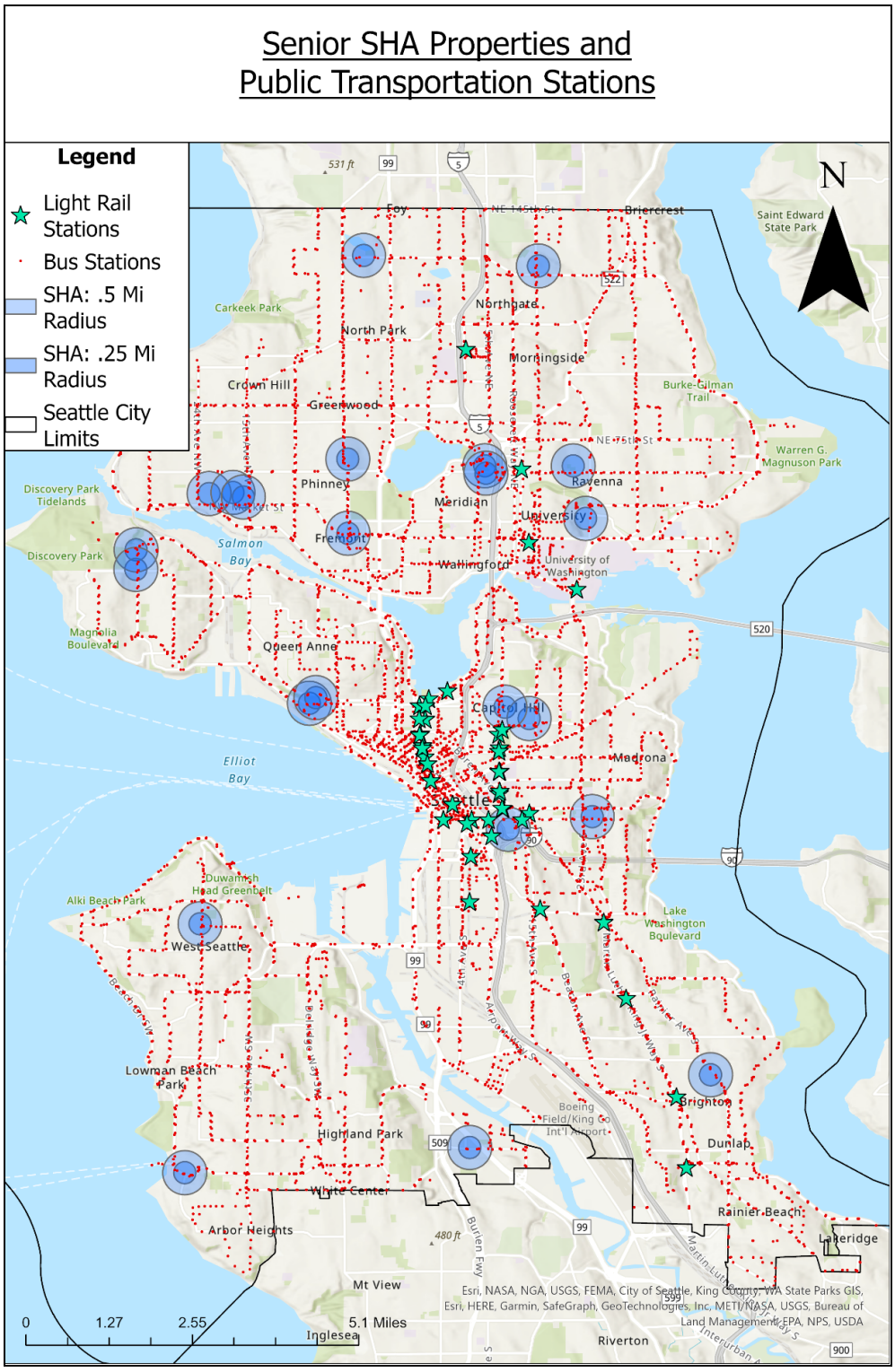


Figure 7: SHA Properties & Public Transportation Stations

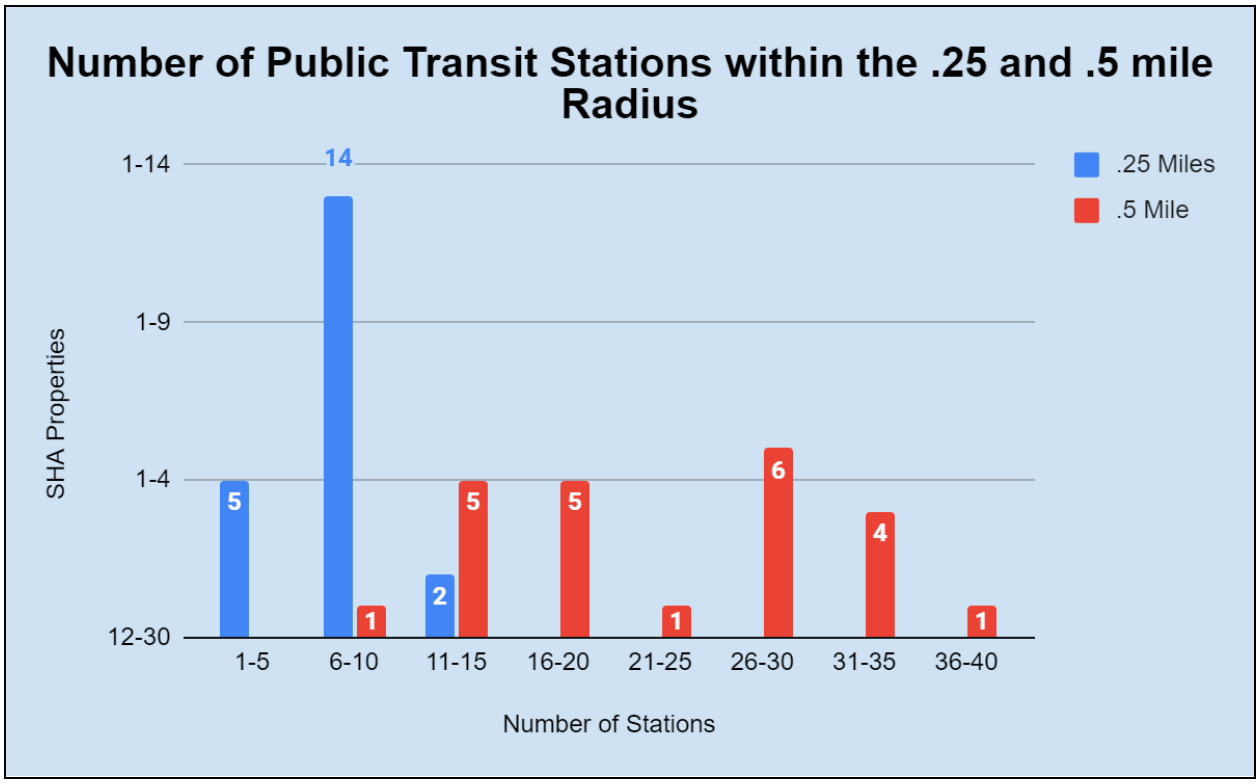


Figure 8: Number of Parks Within Close Proximity

5.3: Presence of Medical Facilities

The analysis examines the .25 and .5 mile area of the SHA properties to determine the presence of medical facilities (hospitals, pharmacies, and urgent cares), which can be seen below in Figure 11. To start, the .25 mile area was analyzed (see Figure 9). The examination includes a spatial understanding of the presence of medical facilities for all of the SHAs, illuminating spatial patterns. Notably, the spatial analysis shows that one property, located in Central Seattle, has a hospital within .25 miles. Further, Central Seattle and Northwest Seattle neighborhoods have a relatively high concentration of Pharmacies. Lastly, urgent cares are largely concentrated within

Central Seattle and Northwest Seattle. Specifically, The analysis finds that within the .25 mile area, there are:

- 22 SHAs do not have a hospital.
- 15 SHAs do not have an urgent care.
- Eight SHAs containing one-three urgent cares.
- 16 SHAs have no pharmacies.
- Three SHAs have two-five pharmacies.

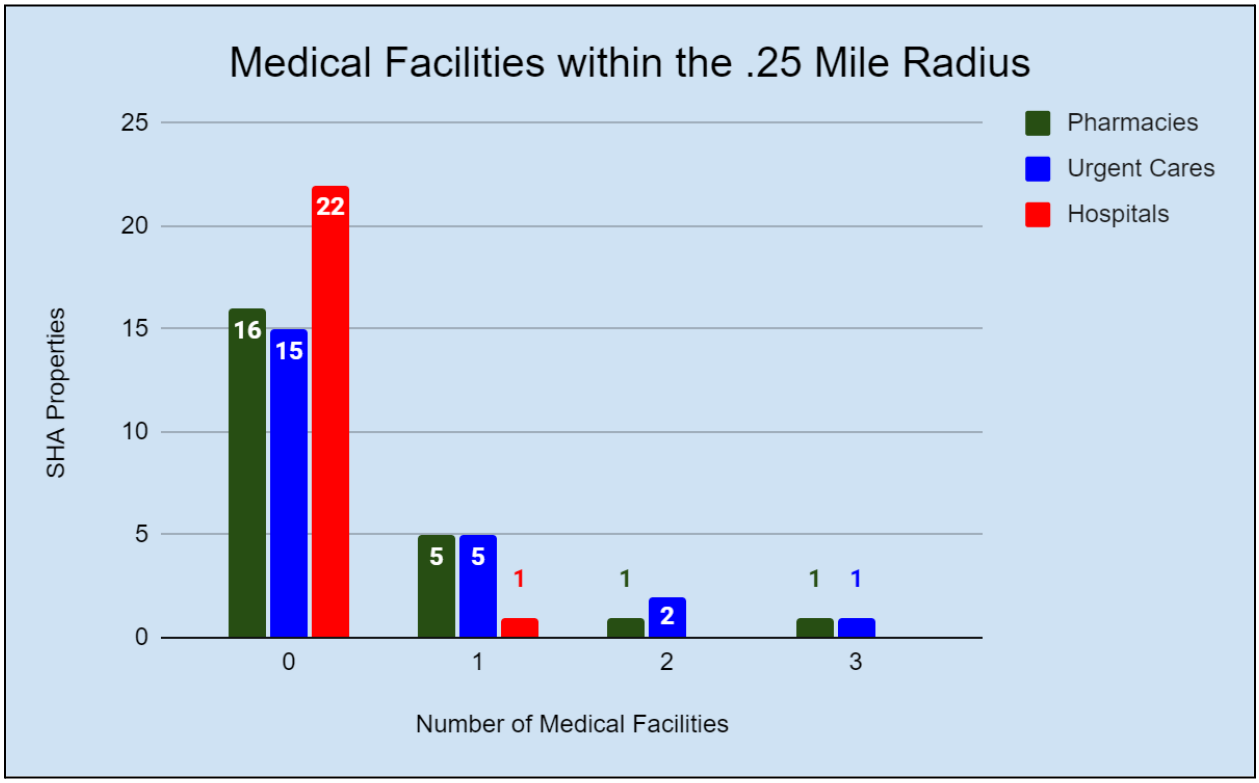


Figure 9: Medical Facilities within .25 Miles

The analysis also considers the presence of medical facilities within a .5 mile radius around the SHA properties (see Figure 10). This analysis includes a spatial analysis of the distribution of medical facilities and finds that: the vast majority of SHAs do not have a hospital within a .5 mile distance, and that Central Seattle and Northwest

Seattle neighborhoods have the highest concentration of urgent cares and pharmacies. Specifically, the analysis found that within the .5 mile area:

- 20 SHAs do not have a hospital.
- Three SHAs have two hospitals.
- 14 SHAs have no urgent cares.
- Three SHAs have one urgent care.
- Six SHAs have access to two-six urgent care facilities
- Eight SHAs have no pharmacies.
- Six SHAs have one pharmacy.
- Nine SHAs have two up to six pharmacies.

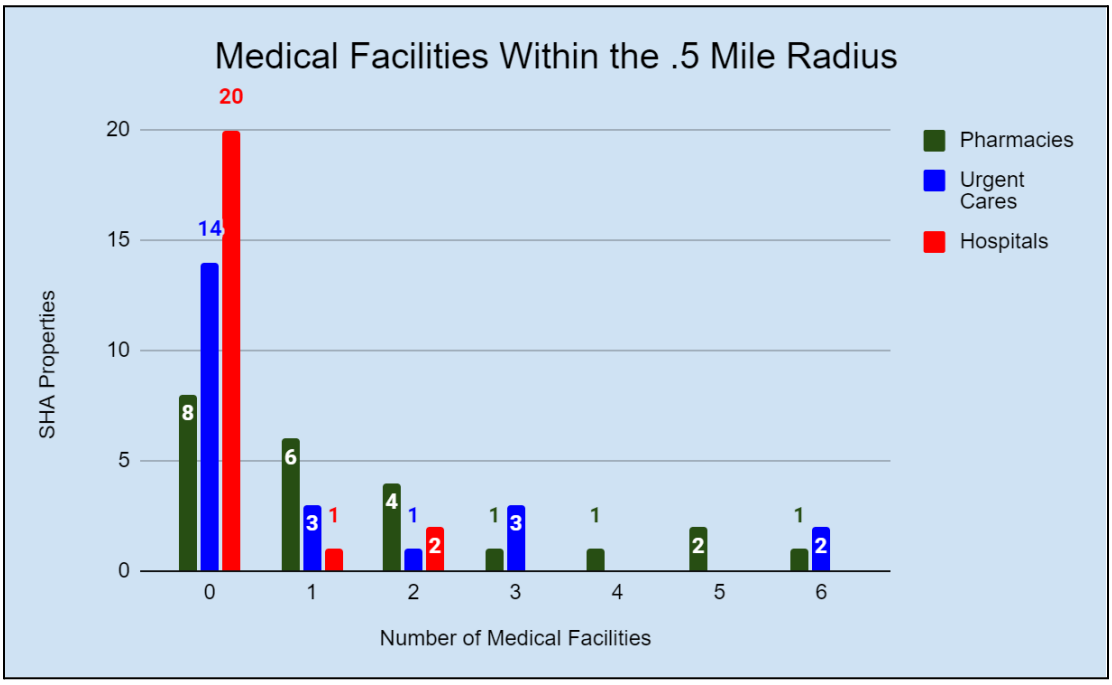


Figure 10: Medical Facilities within .5 Miles

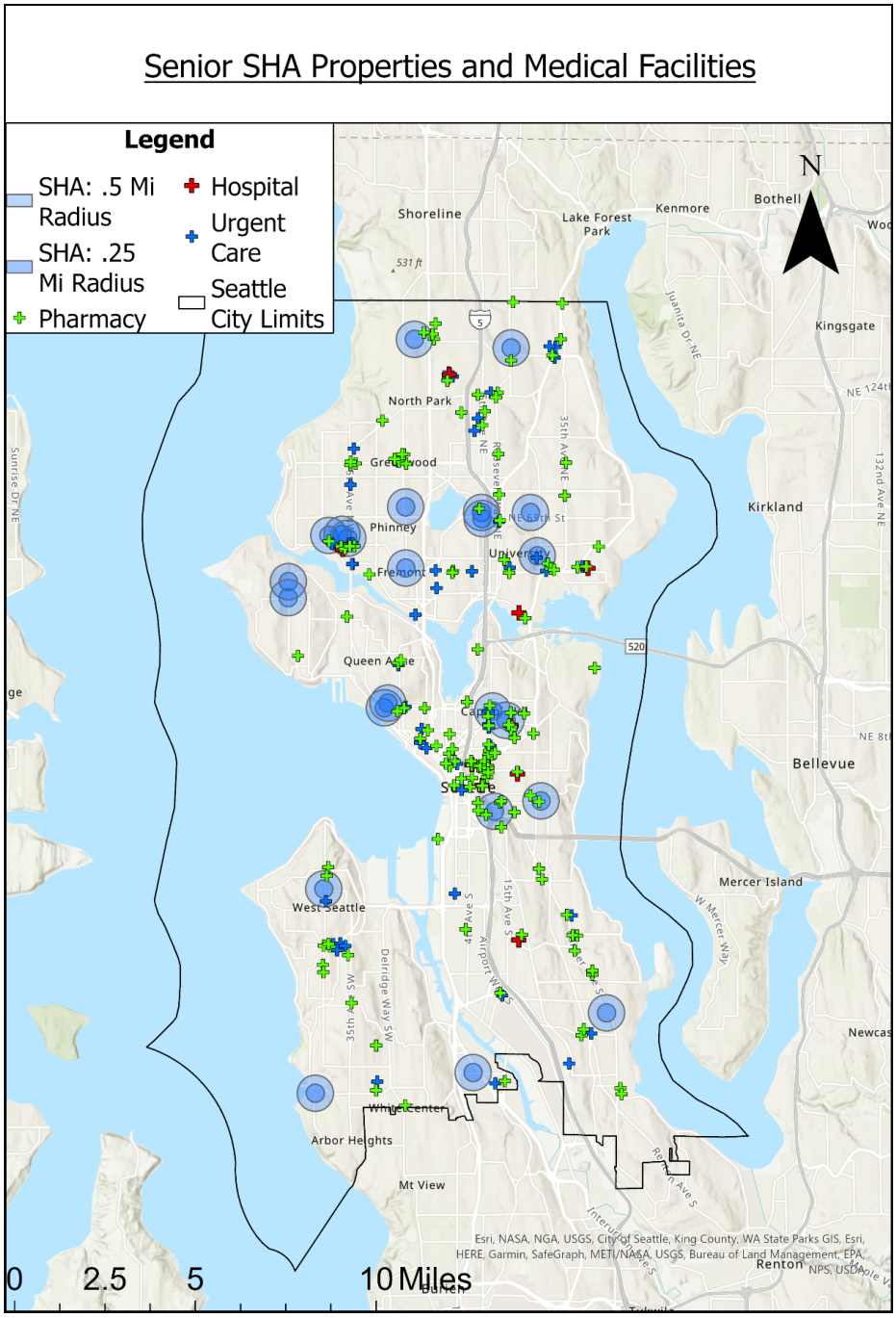


Figure 11: SHA Properties & Medical Facilities

5.4: Most Efficient Routes to Medical Facilities

Hospitals

This analysis considers the most efficient routes between the SHAs and Hospitals. Figure 12 compares the difference in distance between routes, finding:

- 43.4% have routes with relatively low travel distances (less than 2miles) (SHAs: Primeau Place, Nelson Manor, Schwabacher House, Sunrise Manor, Reunion House, Leschi House, Gideon Mathews Garden, Blakely Manor, Fremont Place, and Bitter Lake).
- 47.8% have routes with relatively moderate travel distances (2-4miles) (SHAs: Phinney Terrace, Ravenna School Apartments, Pinehurst Court, Fort Lawton Place, Willis House, Columbia Place, Olmsted Manor, Pleasant Valley Plaza, Carroll Terrace, Michaelson Manor, South Park Mare).
- 8.7% have routes with relatively long travel distances (more than 4.5 miles) (SHAs: Island View and Wildwood Glen).

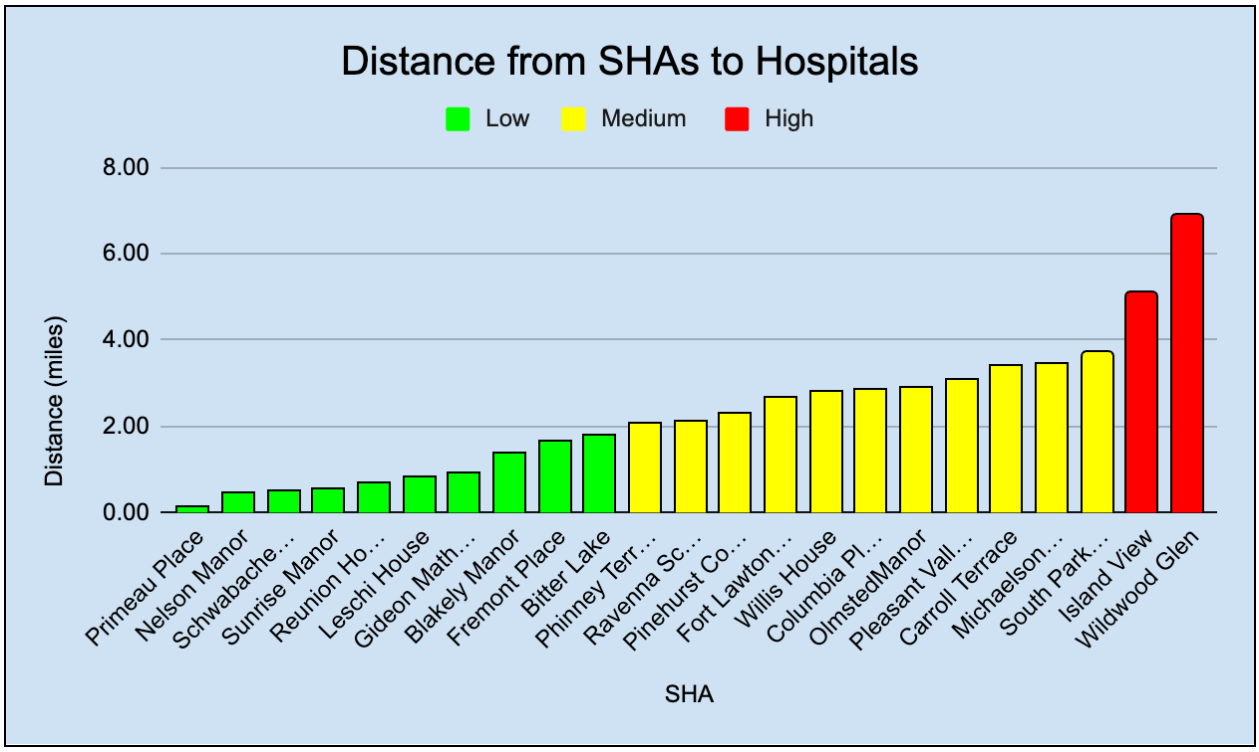


Figure 12: Distance from SHAs to Hospitals

Pharmacies

This analysis considers the most efficient routes between the SHAs and pharmacies. Figure 14 compares the difference in the distance across the routes, finding:

- 60.8% have routes with relatively low travel distances (less than 0.7 miles) (SHAs: Leschi House, Island View, Carroll Terrace, Fremont Place, Willis House, Phinney Terrace, Wildwood Glen, Nelson Manor, South Park Manor Schwabacher House, Primeau Place, Gideon Mathews, Columbia Place, and Pinehurst Court.

- 30.4% have routes with relatively moderate travel distances (0.8-1.2) (SHAs: Ravenna School Apartments, Michaelson Manor, Sunrise Manor, Pleasant Valley Plaza, Bitter Lake, and Olmsted Manor, Blakely Manor.
- 8.7% have routes with relatively long travel distances (more than 1.8miles) (SHAs: Reunion House and Fort Lawton Place).

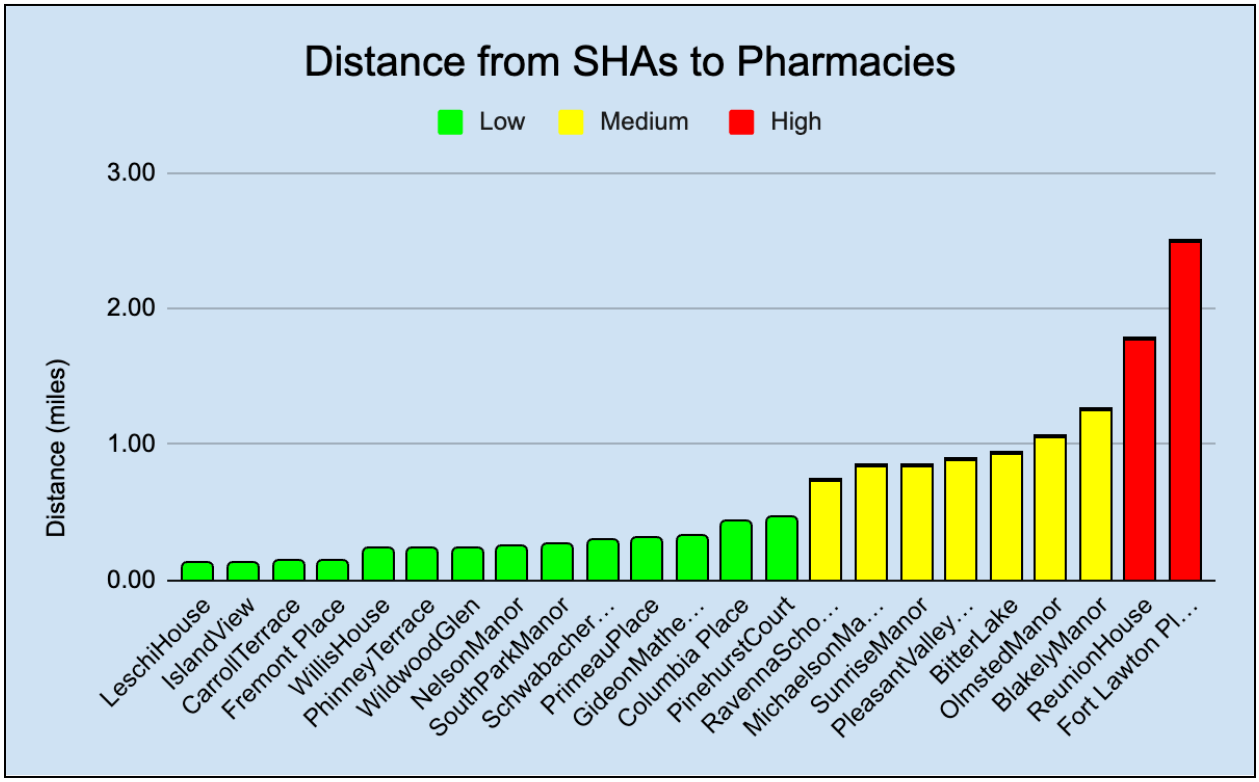


Figure 13: Quickest Routes from SHAs to Pharmacies

Urgent Cares

The analysis also examines the most efficient routes between the SHAs and urgent cares. The analysis, shown in Figure 15, compares the difference in distance between the routes, finding:

- 56.5% have routes with relatively low travel distances (less than 0.8 miles) (SHAs: Reunion House, Primeau Place, Sunrise Manor, Nelson Manor, Blakely

Manor, Island View, Willis House, Michaelson Manor, Schwabacher House, Olmsted Manor, Carroll Terrace, Fremont Place, and Leschi House).

- 30.4% have routes with relatively moderate travel distances (0.8-1.6) (SHAs: Ravenna School apartments, Columbia Place, Phinney Terrace, South Park Manor, Pinehurst Court, Gideon Mathews Gardens, and Wildwood Glen.
- 13% have routes with relatively long travel distances (more than 2miles) (SHAs: Fort Lawton Place, Pleasant Valley Plaza, and Bitter Lake.

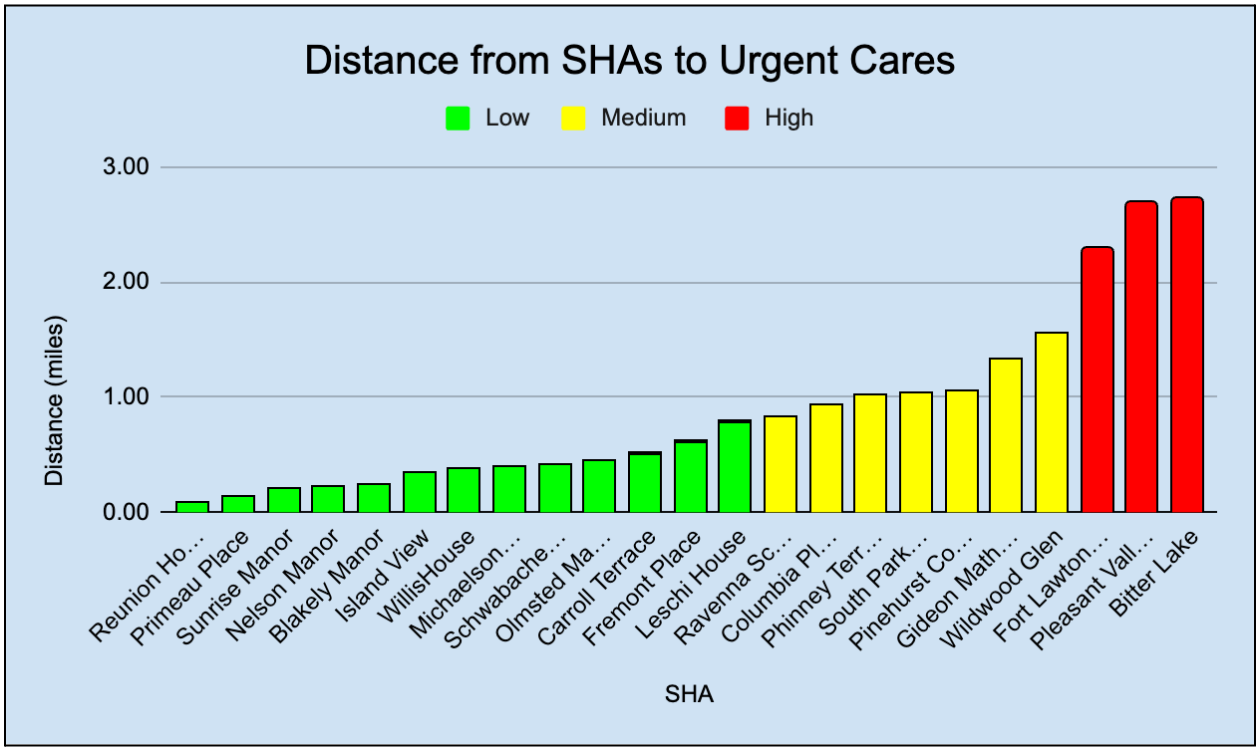


Figure 14: Distance from SHAs to Urgent Cares

Chapter 6: Findings

The thesis identified that the level of accessibility to these amenities varies among the SHA properties. Using data created during the analysis, Table 2 compares each of the SHAs' level of accessibility related to each of the amenities. Specifically, the SHAs that are determined to be the least accessible are highlighted in red and allocated zero points; moderately accessible SHAs are highlighted in yellow and allocated one point; and highly accessible SHAs are highlighted in green and allocated two points. Then, the SHAs' allocated points are summed and used to create the column labeled "Total," which compares the SHAs' overall level of accessibility to all of the amenities. The findings in Table 2 are communicated spatially in the map depicted in Figure 15. Overall, Table 2 and Figure 15 find that Blakely Manor, Leschi House, Nelson Manor, Primeau Place, Reunion House, Schwabacher House, and Sunrise Manor are located in the Downtown, Ballard, and U-District neighborhoods and maintain the highest level of accessibility. On the other hand, the SHAs with the lowest level of accessibility to these amenities are Bitter Lake, Columbia Place, Fort Lawton Place, Phinney Terrace, Pinehurst Court, Pleasant Valley Plaza, Ravenna School Apartments, South Park Manor, and Wildwood Glen, which are located in Magnolia Hill and in the far north and south of Seattle.

SHA	Hospitals	Distance to Hospitals	Pharmacies	Distance to Pharmacies	Urgent Cares	Distance to Urgent Cares	Parks	Public Transportation Stations	Total
Bitter Lake	0	2	1	1	0	0	0	1	5
Blakely Manor	0	2	1	1	2	2	2	1	11
Carroll Terrace	0	1	1	2	0	2	2	2	10
Columbia Place	0	1	0	2	0	1	0	1	5
Fort Lawton Place	0	1	0	0	0	0	2	1	4
Fremont Place	0	2	0	2	0	2	1	1	8
Gideon Mathews Gardens	0	2	1	2	0	1	1	2	9
Island View	0	0	1	2	1	2	0	1	7
Leschi House	0	2	2	2	0	2	2	2	12
Michaelson Manor	0	1	1	1	1	2	2	2	10
Nelson Manor	0	2	1	2	2	2	1	1	11
Olmsted Manor	0	1	1	1	0	2	1	2	8
Phinney Terrace	0	1	0	2	0	1	1	1	6
Pinehurst Court	0	1	1	2	0	1	0	1	6
Pleasant Valley Plaza	0	1	0	1	0	0	1	1	4
Primeau Place	2	2	2	2	2	2	2	2	16
Ravenna School Apartments	0	1	0	1	0	1	1	1	5
Reunion House	0	2	2	0	1	2	2	2	11
Schwabacher House	2	2	2	2	2	2	1	1	14
South Park Manor	0	1	0	2	0	1	1	1	6
Sunrise Manor	2	2	2	1	2	2	1	2	14
Wildwood Glen	0	0	1	2	0	1	1	1	6
Willis House	0	1	0	2	1	2	1	2	9

Table 2: Integrated Table Used to Rank SHA Senior Housing

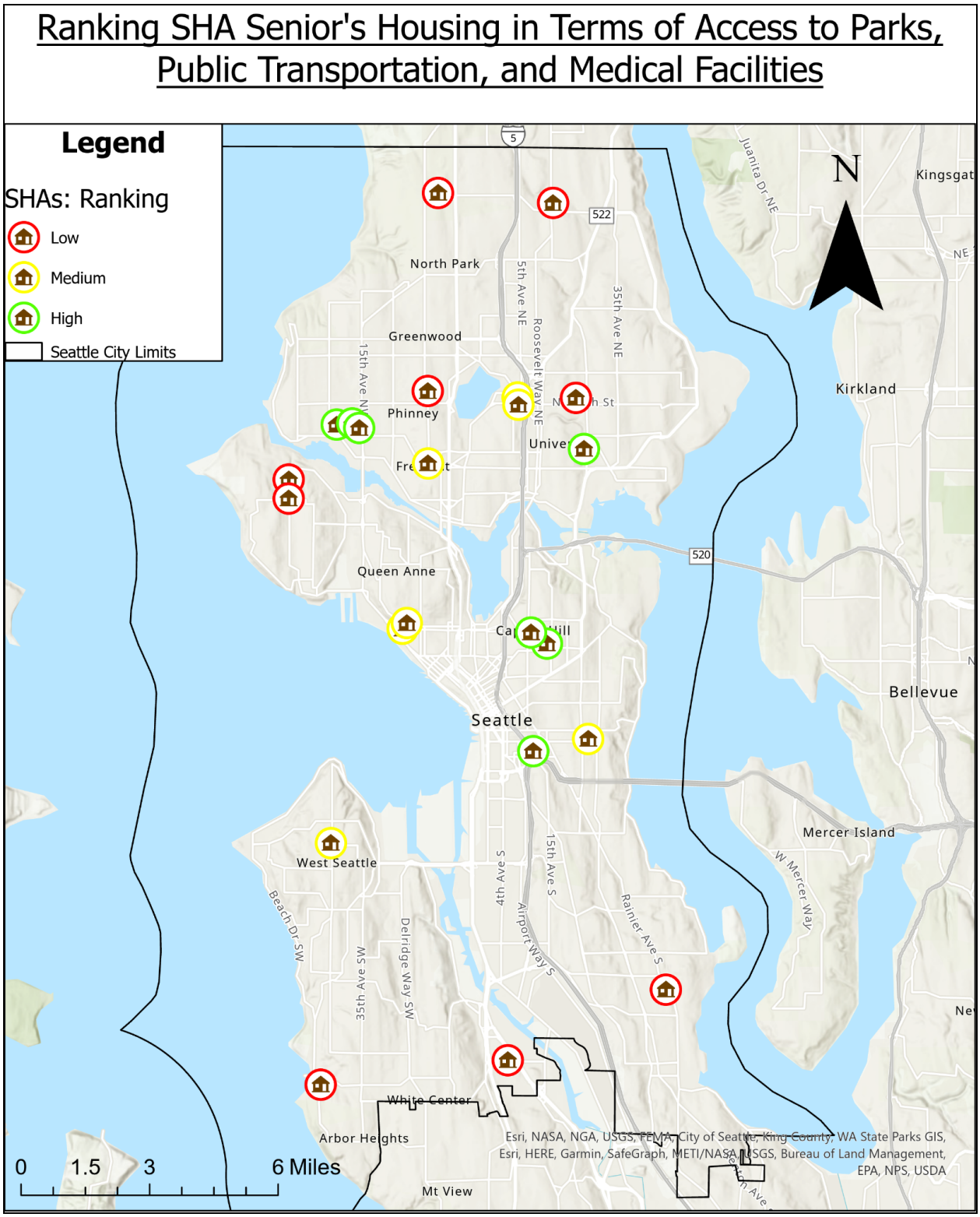


Figure 15: Ranking the SHAs

Chapter 7: Limitations

Scope

There are numerous built environment amenities that could be considered when analyzing senior wellbeing. To gain a more accurate understanding of the built environment's impact on seniors, further analysis that identifies other relevant amenities and seeks to determine their level of accessibility is needed.

While the presence of facilities is beneficial, this analysis does not consider the quality of the amenities. For instance, the analysis assumes that all hospitals are of equal quality. To truly comprehend the impact of these amenities on the examined population, consideration of quality is needed.

The analysis of parks conducted in this study solely focused on the number of parks within a certain radius, without considering the total park area within that radius. Analyzing the total park area in close proximity to the SHA units would provide insights into the degree of accessibility of parks to SHA properties.

Another limitation of the analysis was the exclusion of varying modes of transportation during the creation of the network analysis. The network analysis only considered car routes. Conducting additional network analysis that incorporates routes related to different modes of transportation would further enhance the analysis.

Chapter 8: Conclusion

This analysis provides insight into SHA senior housing's ability to provide an environment that enhances the lives of its inhabitants. The literature review highlights the pronounced need of providing accessible parks, public transportation stations, and medical facilities for older adults. For this reason, this thesis measured the degree of accessibility of these amenities and found that: i) 82% are within a .25 mile radius of a park; ii) 100% of the SHAs have public transportation stations within .25 miles; iii) 65% of the SHAs are within .25 miles of a pharmacy; iv) 13% of SHAs are in .25 mile proximity to a hospital and; v) 39% of the SHAs are within a .25 mile proximity to an urgent care. However, 30% of the SHAs do not have any medical facility within .5 miles. To provide additional insight into the degree of accessibility of medical facilities an analysis into each of the SHA's travel distance to the medical facilities found that: i) 91% of the SHAs are within five miles of a hospital; ii) 82% of the SHAs are within a mile of a pharmacy; iii) 65% of the SHAs are within a mile of an urgent care. These analyzes allowed for the cumulative judgements of an SHAs degree of accessibility. Overall, the analysis determined that seven SHAs have high accessibility, located in the Downtown, Ballard, and U-District neighborhoods; seven SHAs have moderate accessibility; and nine SHAs have low accessibility, located in the Magnolia neighborhood and those neighborhoods located furthest north and south of downtown. This analysis offers valuable insight that highlights the variation of accessibility across these SHA properties. Specifically, the SHAs that have been found to have poor access to the amenities have a heightened risk of increased rates of loneliness, limited mobility, and diminished health outcomes. For this reason, future efforts that aim to enhance the lives

of those living in senior SHA housing by providing relevant amenities to places that lack them are warranted. The increasing proportion of older adults comprising urban populations increases the need to provide environments that are more considerate of the needs of older adults.

Chapter 9: Bibliography

“About the Global Network for Age-Friendly Cities and Communities.” 2023. Wo. 2023. https://extranet.who.int/agefriendlyworld/who-network/.

Age-Friendly Cities and Communities: A Global Perspective. 2018. 1st ed. Bristol University Press. https://doi.org/10.2307/j.ctt1zrvhc4.

“Age-Related Population Data.” n.d. Aging & Disability Services for Seattle & King County. Accessed May 3, 2023. https://www.agingkingcounty.org/data-reports/age-related-population-data/.

Aging and Disability Services, City of Seattle Office of Housing, Seattle Housing Authority, King County Housing Authority, City of Seattle Human Services Department, and King County Housing & Community Development. 2009. “Quiet Crisis: Age Wave Maxes Out Affordable Housing, King County 2008-2025.” Aging and Disability Services. https://www.agingkingcounty.org/data-reports/area-plan/.

“Area Plan.” 2023. City of Seattle: Aging and Disability Services.

Boivie, Ilana, and Nari Rhee. n.d. “The Continuing Retirement Savings Crisis.” National Institute on Retirement Security (blog). Accessed April 29, 2023. https://www.nirsonline.org/reports/the-continuing-retirement-savings-crisis/.

Bower, Marlee, Jennifer Kent, Roger Patulny, Olivia Green, Laura McGrath, Lily Teesson, Tara Jamalishahni, Hannah Sandison, and Emily Rugel. 2023a. “The Impact of the Built Environment on Loneliness: A Systematic Review and Narrative Synthesis.” Health & Place 79 (January): 102962. https://doi.org/10.1016/j.healthplace.2022.102962.

———. 2023b. “The Impact of the Built Environment on Loneliness: A Systematic Review and Narrative Synthesis.” Health & Place 79 (January): 102962. https://doi.org/10.1016/j.healthplace.2022.102962.

Brumbaugh, Stephen. 2022. “Travel Patterns of American Adults with Disabilities | Bureau of Transportation Statistics.” Bureau of Transportation Statistics. January 3, 2022. https://www.bts.gov/travel-patterns-with-disabilities.

“Creating Age-Friendly Cities and Communities.” n.d. World Health Organization. Accessed May 3, 2023. https://www.who.int/activities/creating-age-friendly-cities-and-communities.

DePillis, Lydia, and Mike Belleme. 2022. “An Uptick in Elder Poverty: A Blip, or a Sign of Things to Come?” The New York Times, October 17, 2022, sec. Business. https://www.nytimes.com/2022/10/17/business/economy/elder-poverty-seniors.html.

DiPasquale, Denise, and William Wheaton. 1995. Urban Economics and Real Estate Markets.

Domènech-Abella, Joan, Lise Switsers, Jordi Mundó, Eva Dierckx, Sarah Dury, and Liesbeth De Donder. 2021. “The Association between Perceived Social and Physical Environment and Mental Health among Older Adults: Mediating Effects of Loneliness.” Aging & Mental Health 25 (5): 962–68. https://doi.org/10.1080/13607863.2020.1727853.

“Fact Sheet: Aging in the United States.” n.d. PRB. Accessed May 3, 2023. https://www.prb.org/resources/fact-sheet-aging-in-the-united-states/.

“Financial Security of Elderly Americans at Risk: Proposed Changes to Social Security and Medicare Could Make a Majority of Seniors ‘Economically Vulnerable.’” n.d. Economic Policy Institute. Accessed April 28, 2023. https://www.epi.org/publication/economic-security-elderly-americans-risk/.

“Get the Facts on Economic Security for Seniors.” 2022. National Council on Aging. July 15, 2022. https://ncoa.org/article/get-the-facts-on-economic-security-for-seniors.

Hammoud, Ryan, Stefania Tognin, Ioannis Bakolis, Daniela Ivanova, Naomi Fitzpatrick, Lucie Burgess, Michael Smythe, Johanna Gibbons, Neil Davidson, and Andrea Mechelli. 2021. “Lonely in a Crowd.” Scientific Reports 11 (1): 24134. https://doi.org/10.1038/s41598-021-03398-2.

https://www.facebook.com/NIHAging. 2019. “Social Isolation, Loneliness in Older People Pose Health Risks.” National Institute on Aging. April 23, 2019. https://www.nia.nih.gov/news/social-isolation-loneliness-older-people-pose-health-risks.

Jones, Jeffrey. 2022. “More in U.S. Retiring, or Planning to Retire, Later.” Gallup. July 22, 2022. https://news.gallup.com/poll/394943/retiring-planning-retire-later.aspx.

Kelly, Jane-Frances. 2012. “Social Cities.” Grattan Institute. https://grattan.edu.au/report/social-cities/.

Knoll, Melissa. 2013. “Social Security Lifts More People Above the Poverty Line Than Any Other Program | Center on Budget and Policy Priorities.” Government. Social Security: Office of Behavioral Economics and Disability Policy. October 25, 2013. https://www.cbpp.org/research/social-security/social-security-lifts-more-people-above-the-poverty-line-than-any-other.

Lam, Jack, and Siqin Wang. 2022. “Built Environment and Loneliness Among Older Adults in South East Queensland, Australia.” Journal of Applied Gerontology: The Official Journal of the Southern Gerontological Society 41 (11): 2382–91. https://doi.org/10.1177/07334648221114345.

Lee, Sung-Jin, Daejin Kim, Kathleen R. Parrott, Valerie L. Giddings, and Sheryl Renee Robinson. 2019. “Financial and Health Challenges of Low-Income Elderly Homeowners Aging in Place.” Journal of Family and Consumer Sciences 111 (2): 31–42. https://doi.org/10.14307/JFCS111.2.31.

Malcolm, Martin, Helen Frost, and Julie Cowie. 2019. “Loneliness and Social Isolation Causal Association with Health-Related Lifestyle Risk in Older Adults: A Systematic Review and Meta-Analysis Protocol.” Systematic Reviews 8 (1): 48. https://doi.org/10.1186/s13643-019-0968-x.

Martinez, Ramon, Patricia Morsch, Patricia Soliz, Carolina Hommes, Pedro Ordunez, and Enrique Vega. 2021. “Life Expectancy, Healthy Life Expectancy, and Burden of Disease in Older People in the Americas, 1990–2019: A Population-Based Study.” Revista Panamericana de Salud Pública 45 (September): e114. https://doi.org/10.26633/RPSP.2021.114.

Matsuda, Naoka, Shunsuke Murata, Kohtaroh Torizawa, Tsunenori Isa, Aoi Ebina, Yuki Kondo, Yamato Tsuboi, et al. 2019a. “Association Between Public Transportation Use and Loneliness Among Urban Elderly People Who Stop Driving.” Gerontology and Geriatric Medicine 5 (July): 2333721419851293. https://doi.org/10.1177/2333721419851293.

———. 2019b. “Association Between Public Transportation Use and Loneliness Among Urban Elderly People Who Stop Driving.” Gerontology and Geriatric Medicine 5 (July): 2333721419851293. https://doi.org/10.1177/2333721419851293.

Medicine, Institute of, Committee on Monitoring Access to Personal Health Care Services, Michael Millman, and National Academy of Sciences. 1993. Access to Health Care in America. Washington, D.C: National Academies Press.

“Mobility Is Most Common Disability Among Older Americans.” 2014. United States Census Bureau. December 2, 2014. https://www.census.gov/newsroom/archives/2014-pr/cb14-218.html.

Molinsky, Jennifer. 2022. “Housing for America’s Older Adults: Four Problems We Must Address | Joint Center for Housing Studies.” ..Edu. Joint Center for Housing Studiies. August 18, 2022. https://www.jchs.harvard.edu/blog/housing-americas-older-adults-four-problems-we-must-address.

National Academies of Sciences, Engineering, Health and Medicine Division, Board on Health Care Services, and Committee on Health Care Utilization and Adults with Disabilities. 2018. “Factors That Affect Health-Care Utilization.” In Health-Care Utilization as a Proxy in Disability Determination. National Academies Press (US). https://www.ncbi.nlm.nih.gov/books/NBK500097/.

“National Programmes for Age-Friendly Cities and Communities: A Guide.” 2023. United Nations. 2023. https://www.who.int/publications-detail-redirect/9789240068698.

“Poverty Rate.” 2023. ..Org. Organization for Economic Cooperation and Development Data. April 19, 2023. https://data.oecd.org/chart/6Qc4.

Rosso, Andrea L., Amy H. Auchincloss, and Yvonne L. Michael. 2011. “The Urban Built Environment and Mobility in Older Adults.” Journal of Aging Research 2011 (June): e816106. https://doi.org/10.4061/2011/816106.

Rosso, Andrea L., Jennifer A. Taylor, Loni Philip Tabb, and Yvonne L. Michael. 2013. “Mobility, Disability, and Social Engagement in Older Adults.” Journal of Aging and Health 25 (4): 617–37. https://doi.org/10.1177/0898264313482489.

scimino. 2020. “How Can Cities Adapt to the Needs of Their Aging Populations?” USC News. September 1, 2020. https://news.usc.edu/166817/aging-in-cities-transportation-home-design-education-usc-experts/.

“Seattle 2035 Comprehensive Plan.” 2022. City of Seattle. 2022. https://www.seattle.gov/opcd/ongoing-initiatives/seattle-2035-comprehensive-plan#projectdocuments.

“SHA Housing.” 2023a. Seattle Housing Authority. 2023. https://www.seattlehousing.org/housing/all/list.

“———.” 2023b. Seattle Housing Authority. 2023. https://www.seattlehousing.org/housing/all/list.

Social Isolation and Loneliness in Older Adults. 2020. Washington (DC): National Academies Press (US). http://www.ncbi.nlm.nih.gov/books/NBK557974/.

Syed, Samina T., Ben S. Gerber, and Lisa K. Sharp. 2013. “Traveling towards Disease: Transportation Barriers to Health Care Access.” Journal of Community Health 38 (5): 976–93. https://doi.org/10.1007/s10900-013-9681-1.

“The Role of Behavioral Economics and Behavioral Decision Making in Americans’ Retirement Savings Decisions.” n.d. Social Security Administration Research, Statistics, and Policy Analysis. Accessed April 29, 2023. https://www.ssa.gov/policy/docs/ssb/v70n4/v70n4p1.html.

Umberson, Debra, and Jennifer Karas Montez. 2010. “Social Relationships and Health: A Flashpoint for Health Policy.” Journal of Health and Social Behavior 51 (Suppl): S54–66. https://doi.org/10.1177/0022146510383501.

“Urban Development.” 2023. Text/HTML. World Bank. April 3, 2023. https://www.worldbank.org/en/topic/urbandevelopment/overview.

“Urbanization and Health.” 2010. Bulletin of the World Health Organization 88 (4): 245–46. https://doi.org/10.2471/BLT.10.010410.

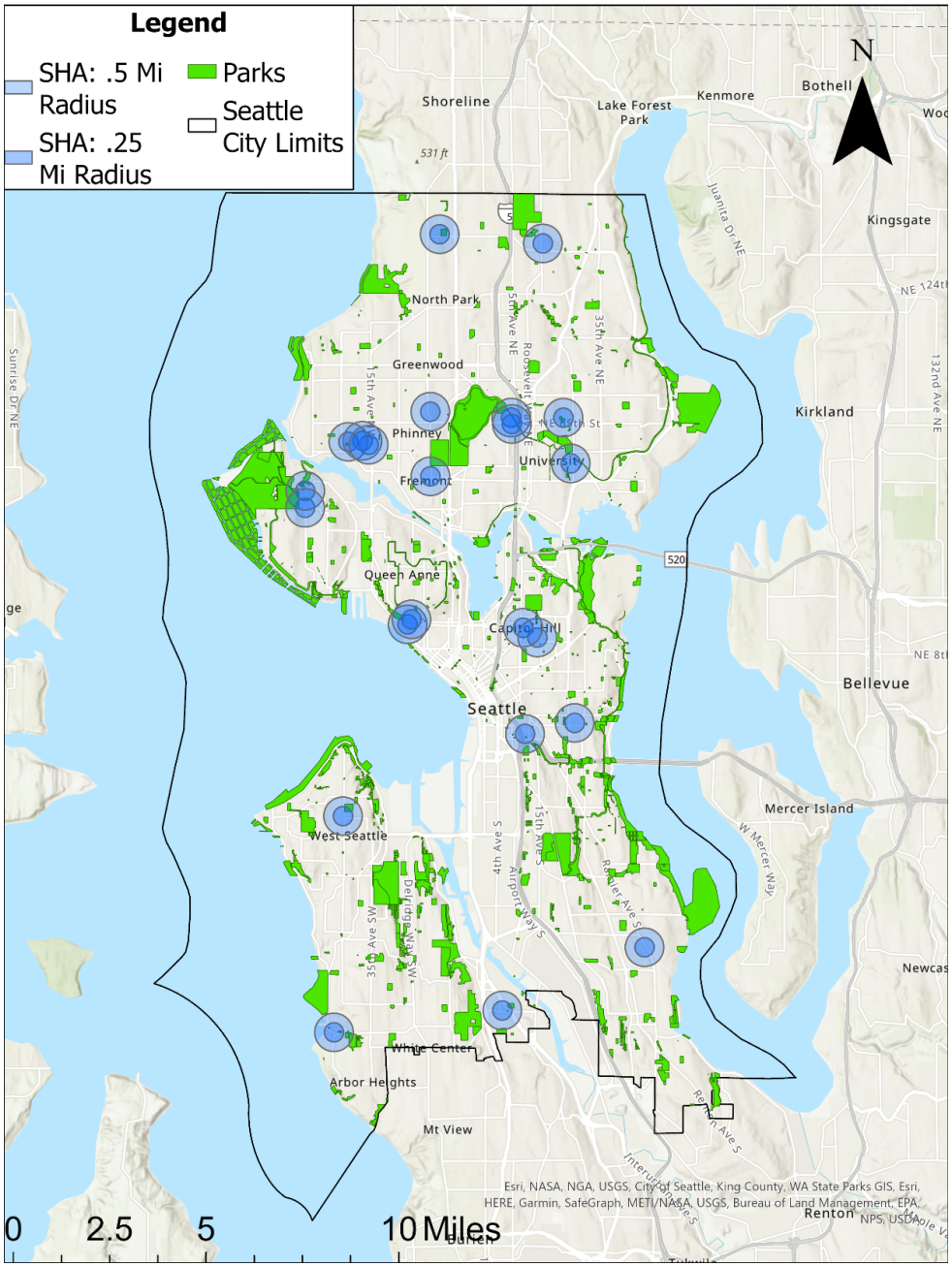
“WHO’s Work on the UN Decade of Healthy Ageing (2021-2030).” 2023. World Health Organization. 2023. https://www.who.int/initiatives/decade-of-healthy-ageing.

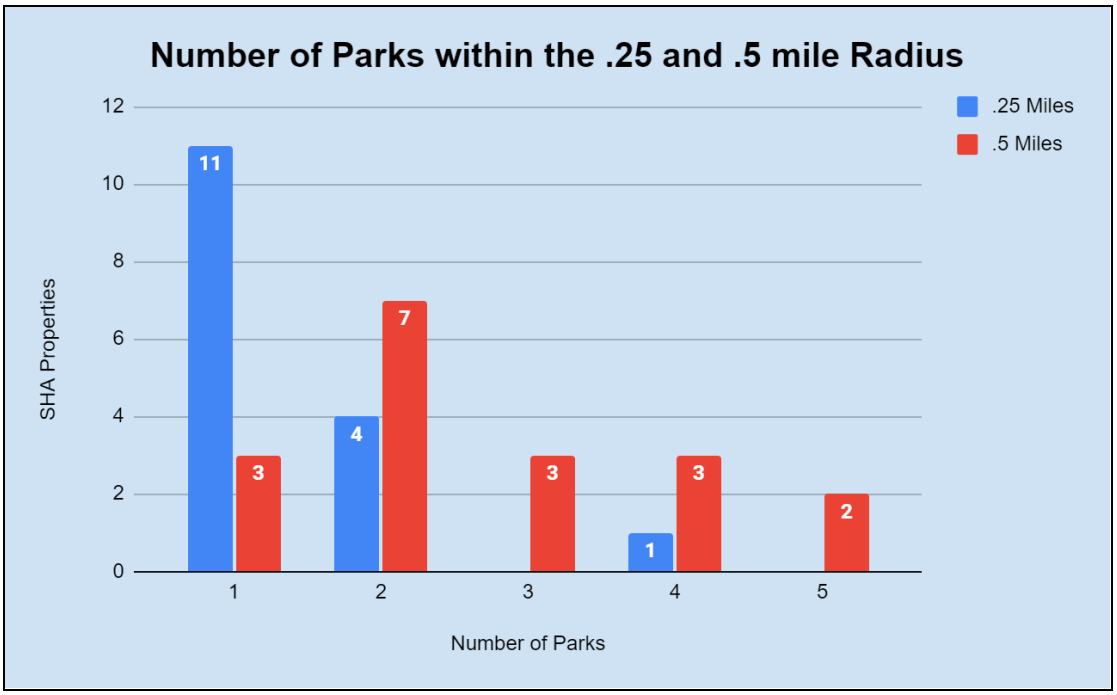
“World Urbanization Prospects.” 2018. Welcome to the United Nations. 2018. https://population.un.org/Wup/Publications/.

Chapter 10: Appendix

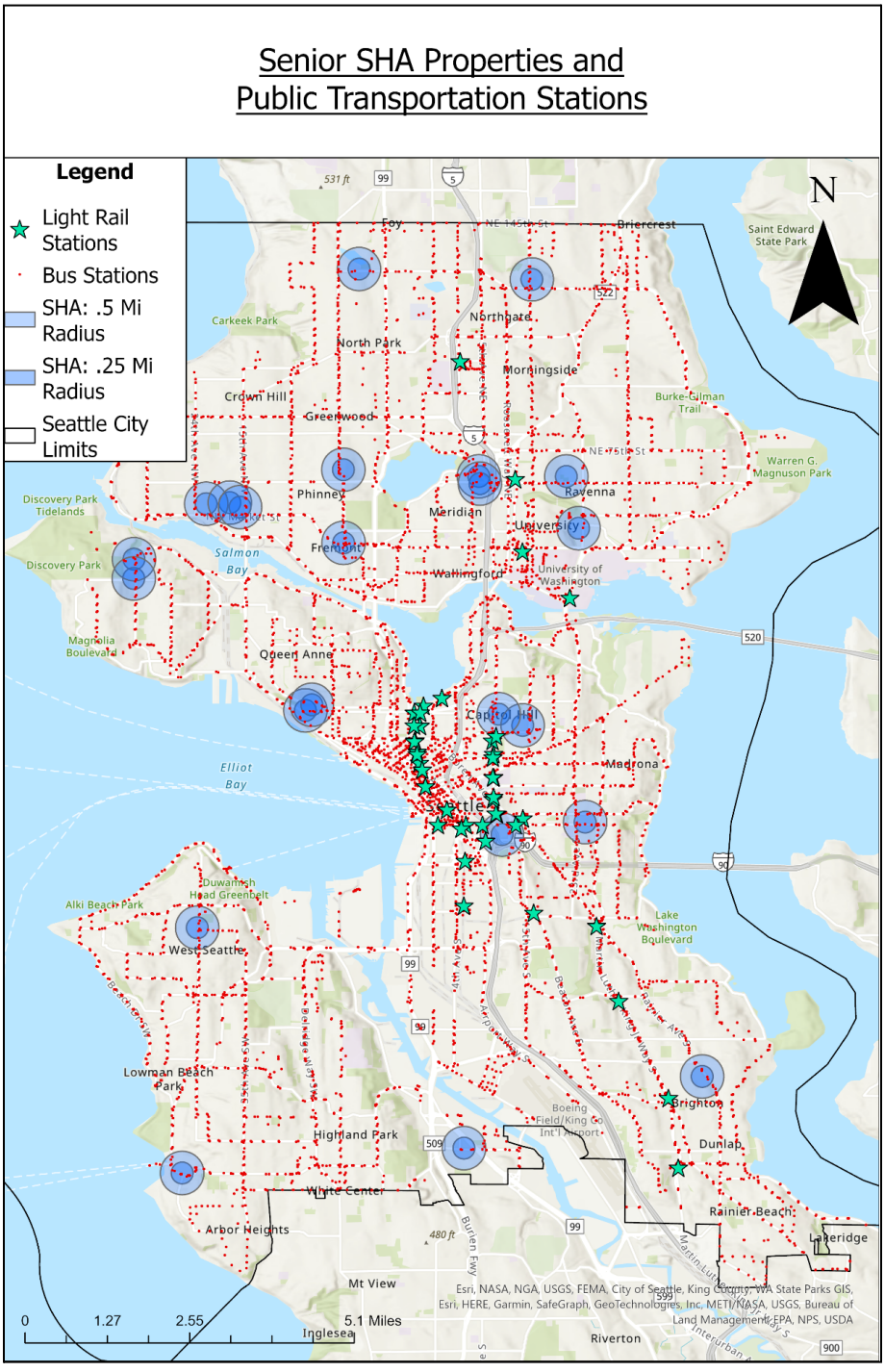
Appendix A: Proximity to Parks

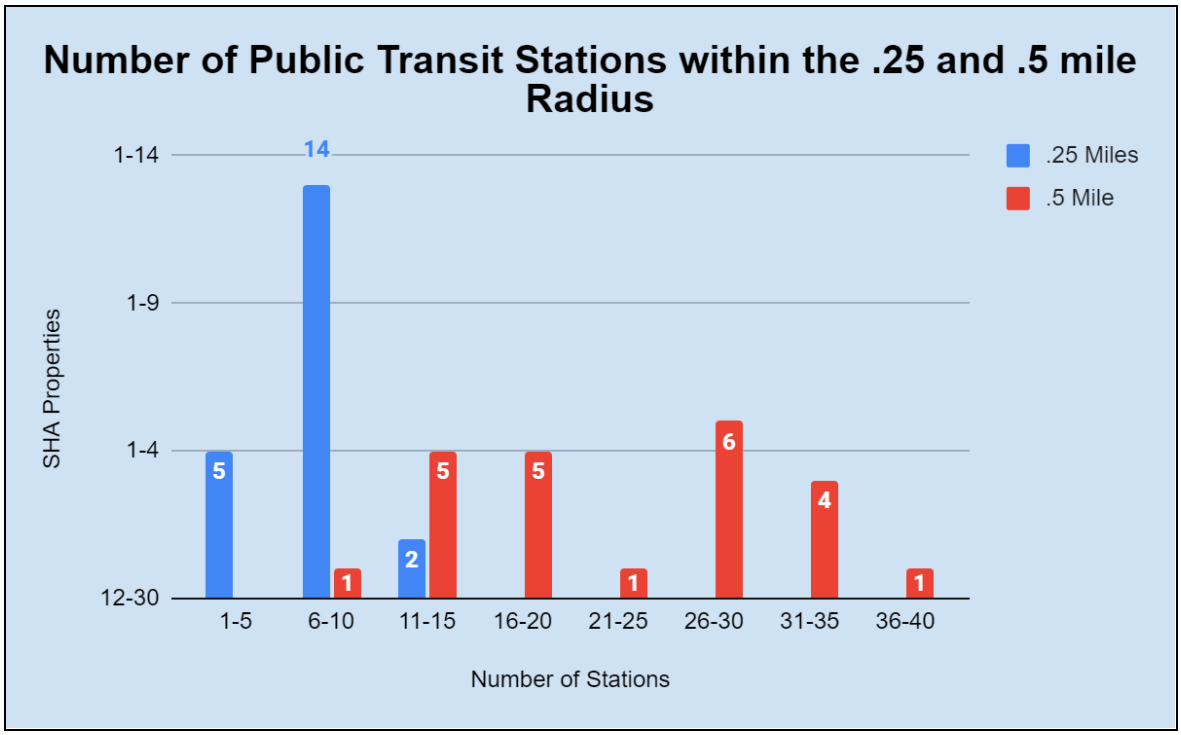
Senior SHA Properties and Parks



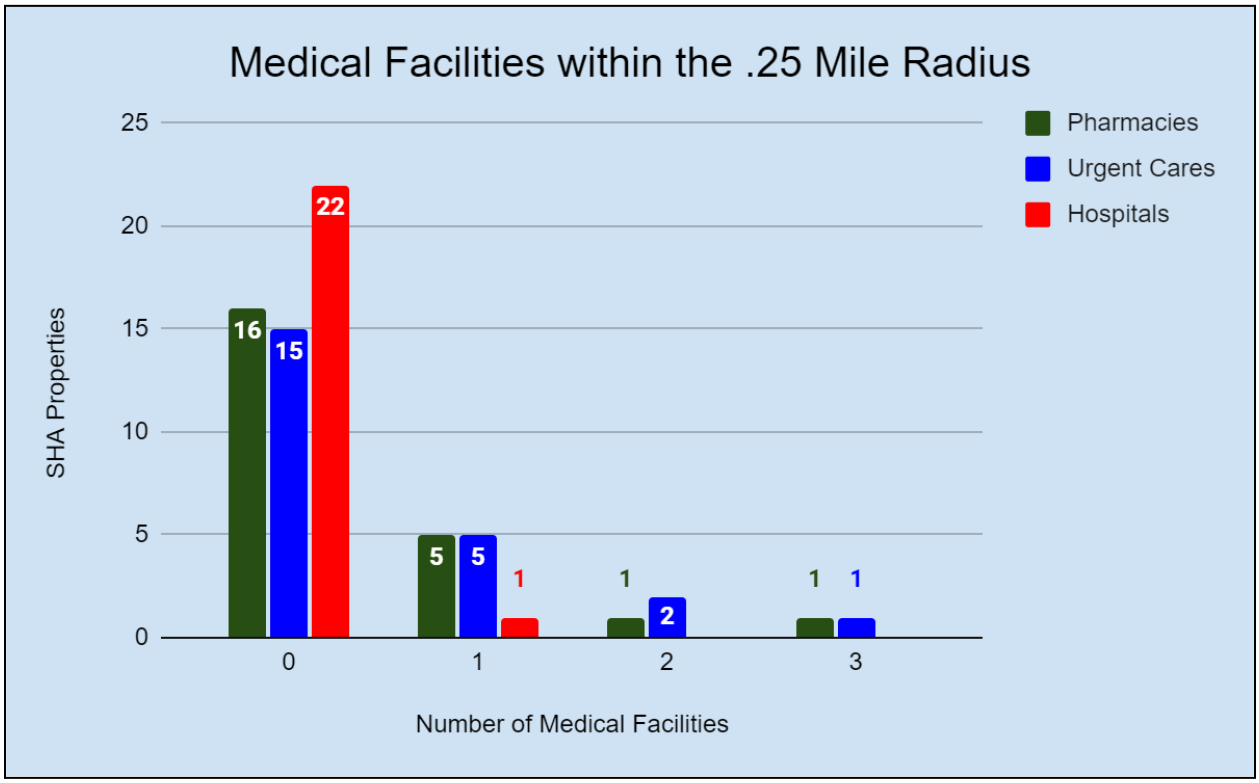

Number of Parks within the .25 and .5 mile Radius
.25 Miles
.5 Miles
SHA Properties
12
10
8
6
4
2
0
11
3
4
7
3
1
3
2
1
2
3
4
5
Number of Parks

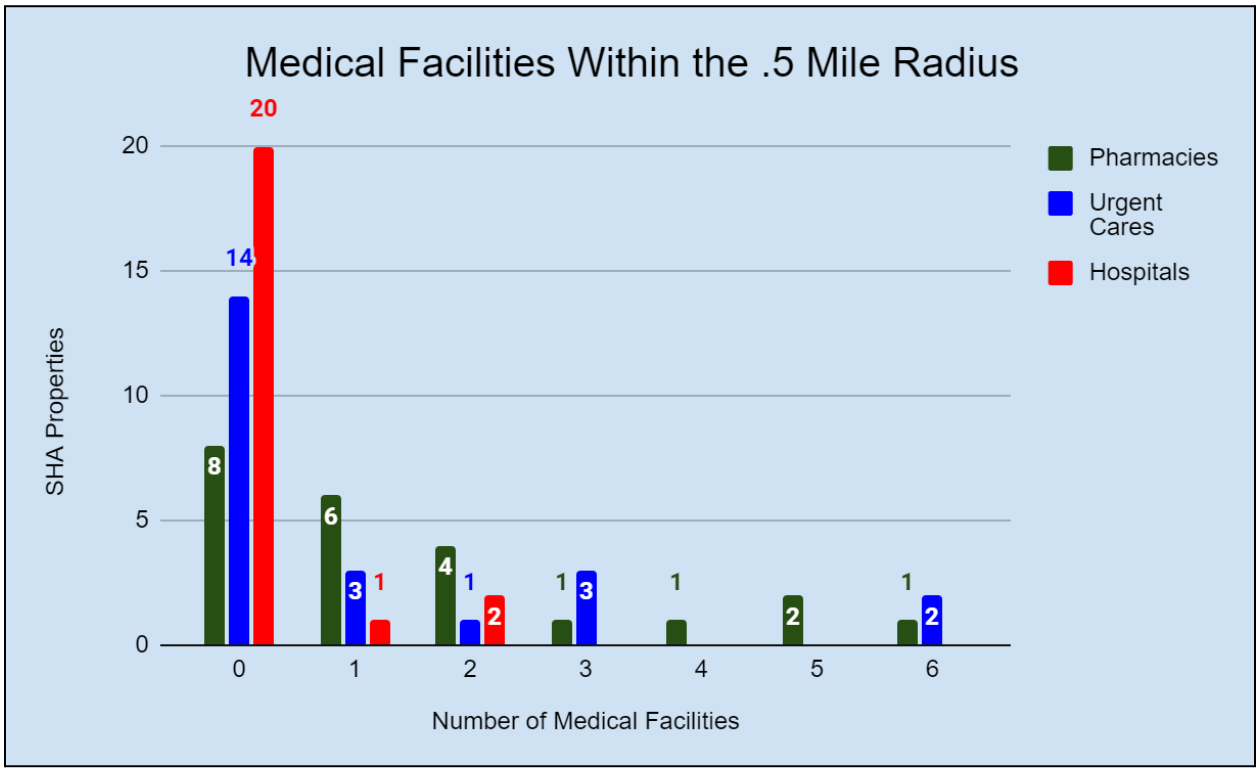
Appendix B: Proximity to Public Transportation Stations



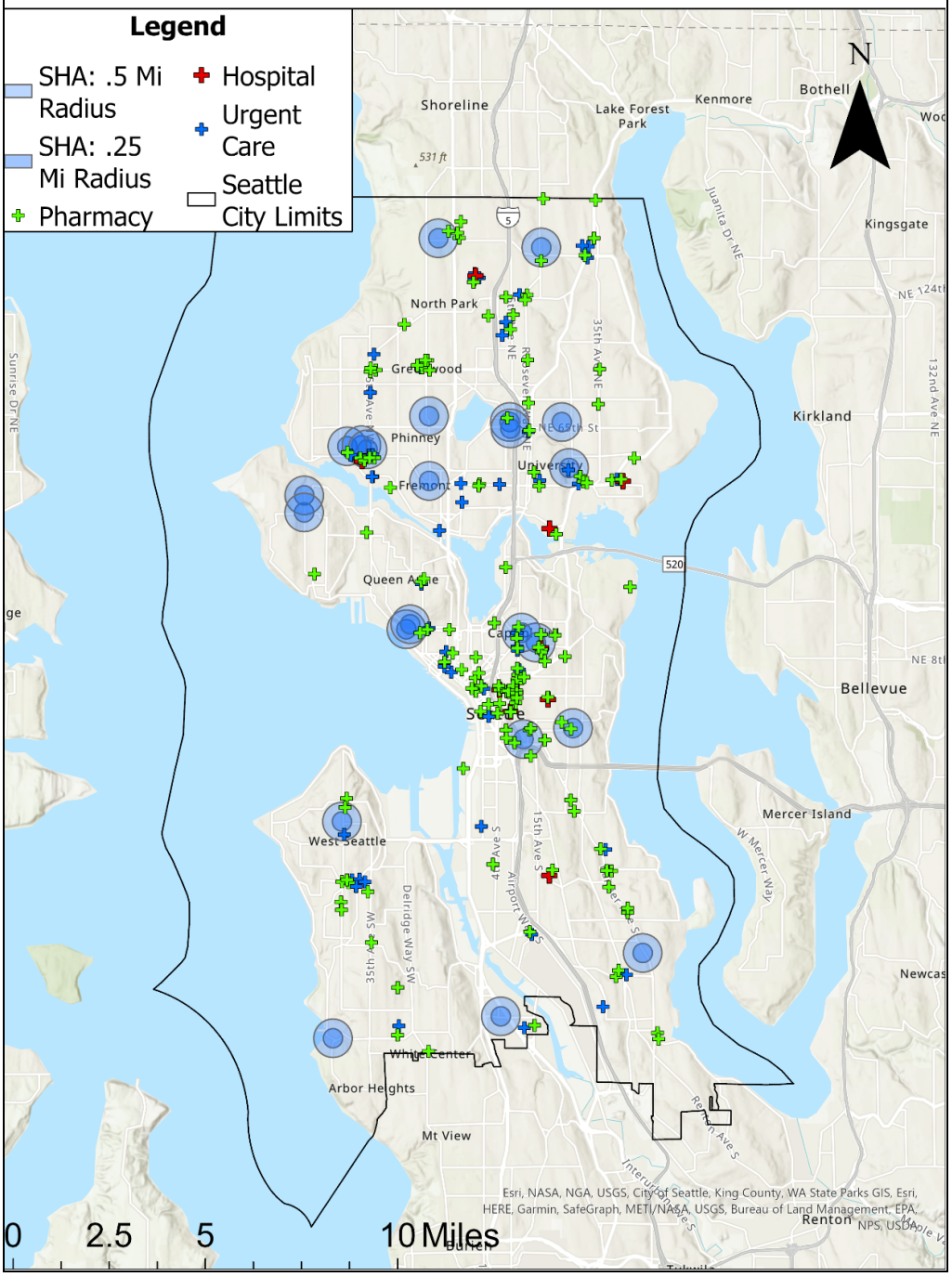

Number of Public Transit Stations within the .25 and .5 mile Radius
1-14
1-9
1-4
12-30
SHA Properties
14
5
1
2
5
5
1
6
4
1
1-5
6-10
11-15
16-20
21-25
26-30
31-35
36-40
Number of Stations
.25 Miles
.5 Mile

Appendix C: Senior SHA Properties Compared to Medical Facilities

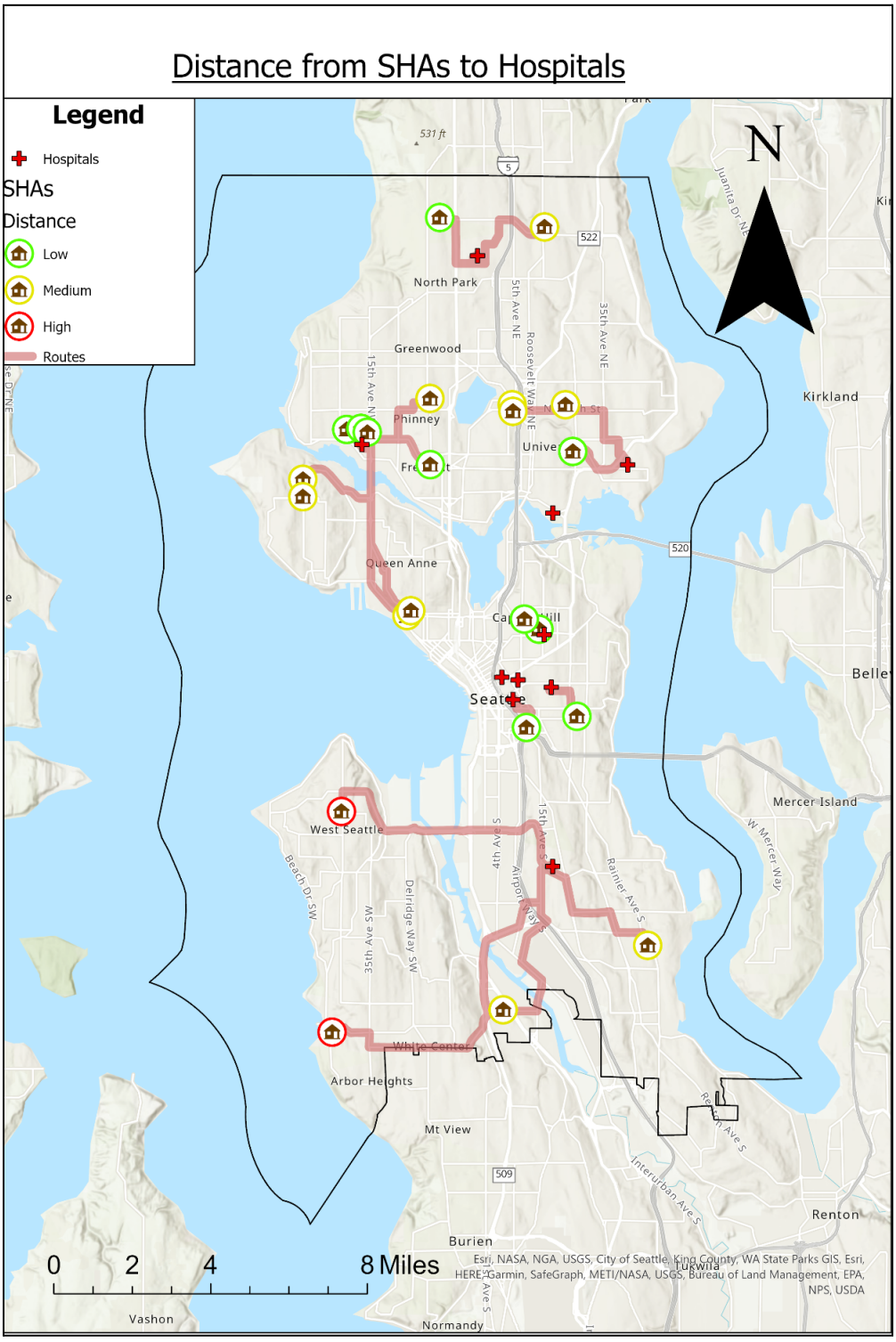


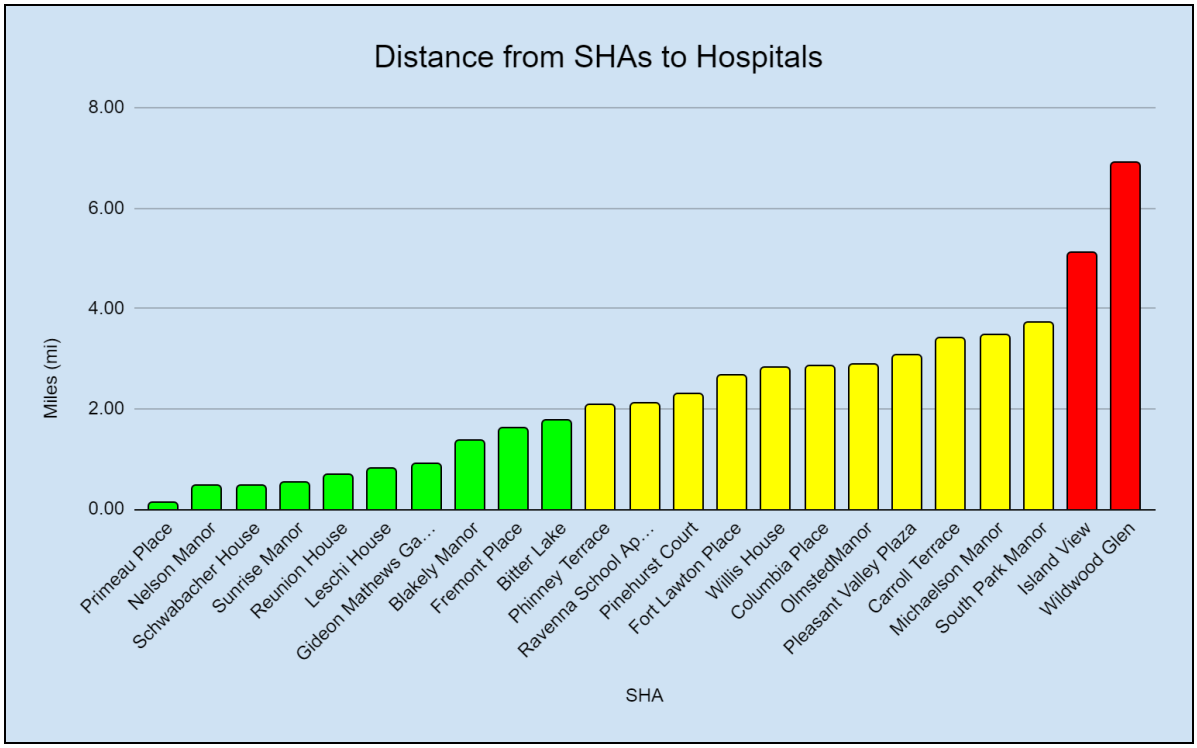


Senior SHA Properties and Medical Facilities

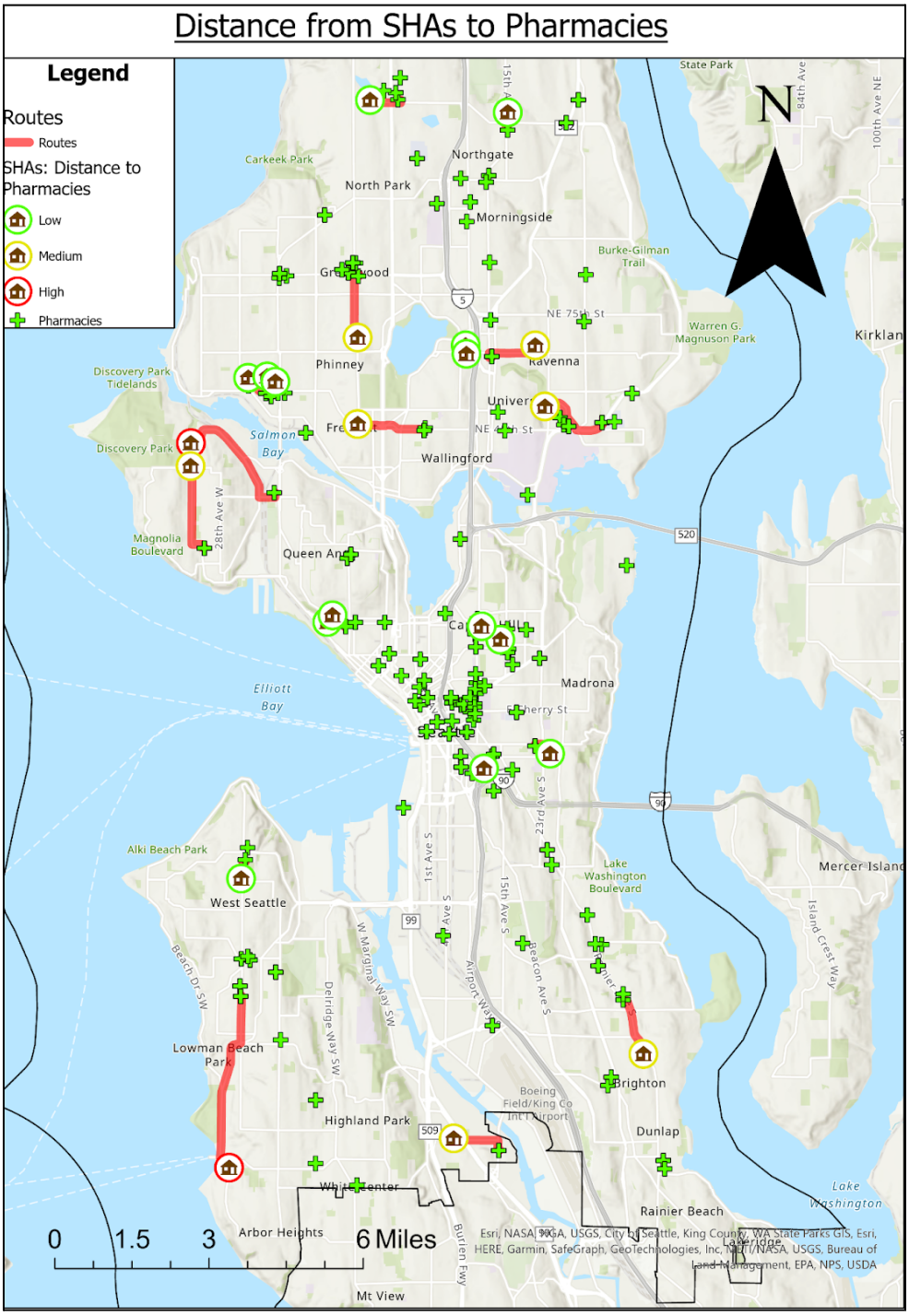


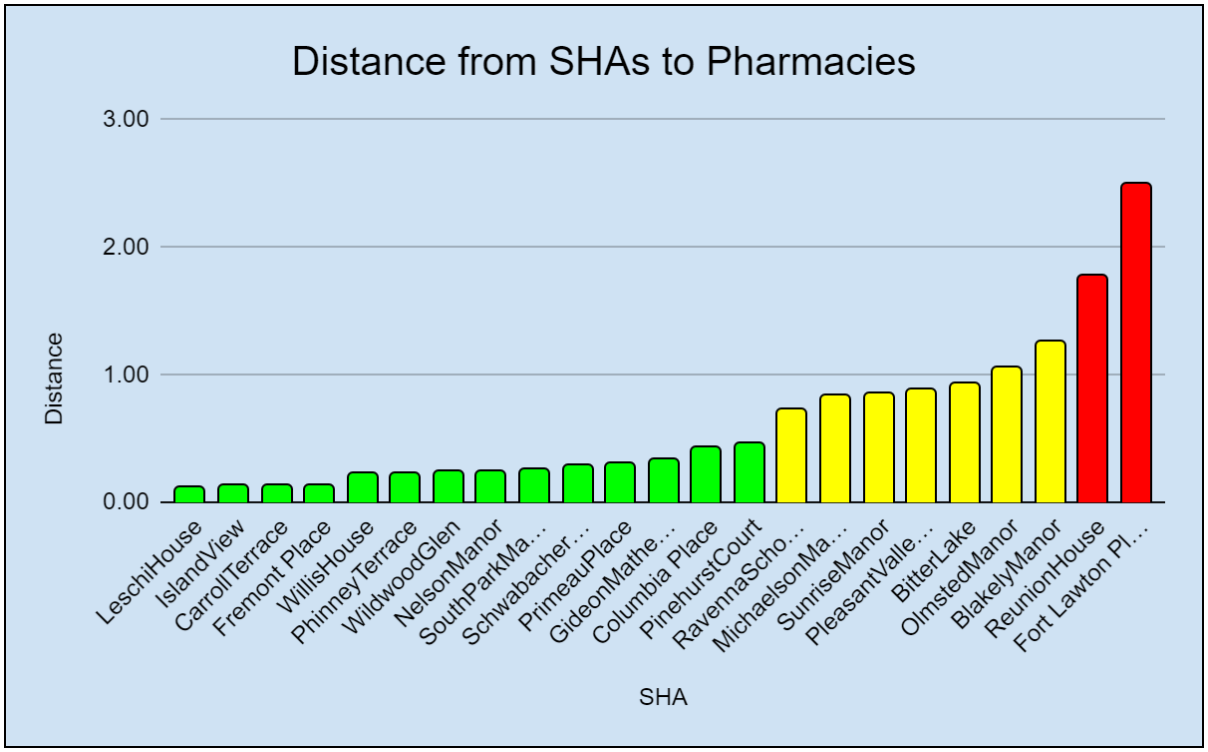
Appendix D: Most Efficient Routes to Hospitals



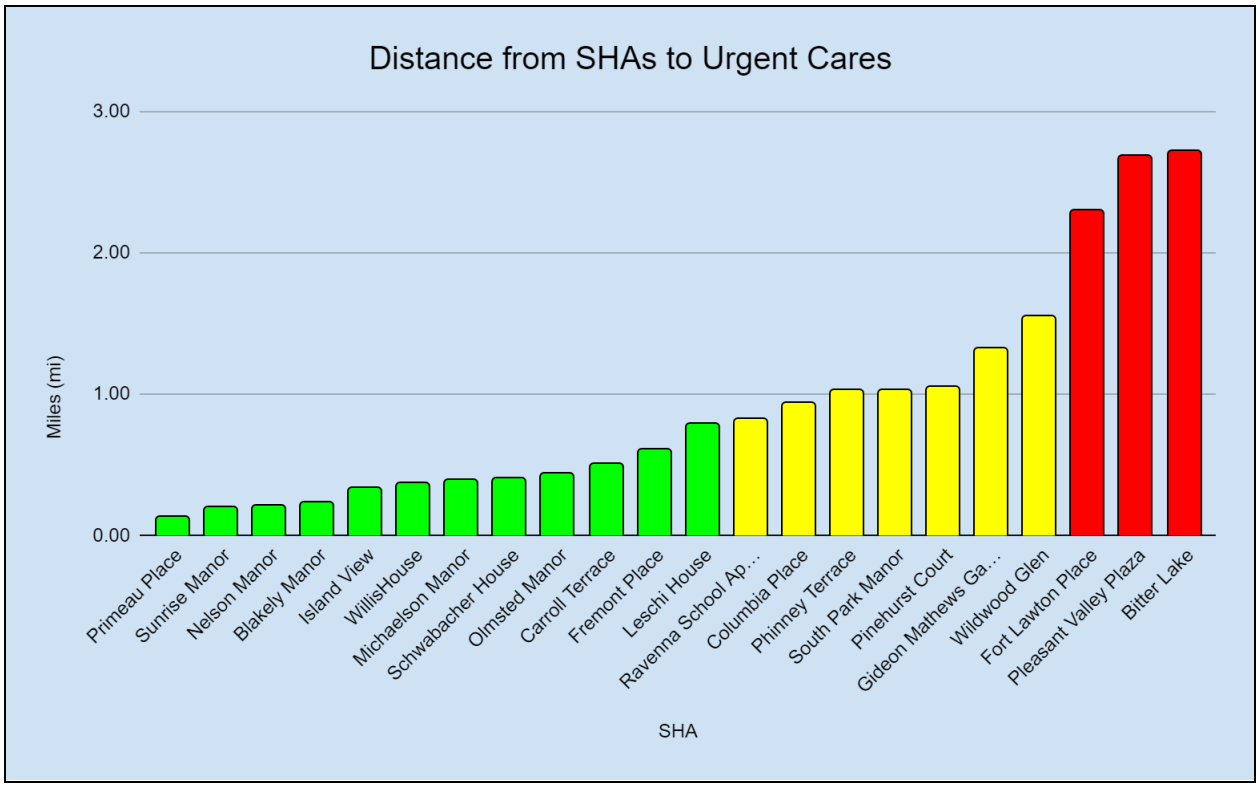

Distance from SHAs to Hospitals
8.00
6.00
4.00
2.00
0.00
Miles (mi)
Primeau Place
Nelson Manor
Schwabacher House
Sunrise Manor
Reunion House
Leschi House
Gideon Mathews Ga…
Blakely Manor
Fremont Place
Bitter Lake
Phinney Terrace
Ravenna School Ap…
Pinehurst Court
Fort Lawton Place
Willis House
Columbia Place
OlmstedManor
Pleasant Valley Plaza
Carroll Terrace
Michaelson Manor
South Park Manor
Island View
Wildwood Glen
SHA

Appendix E: Most Efficient Routes to Pharmacies

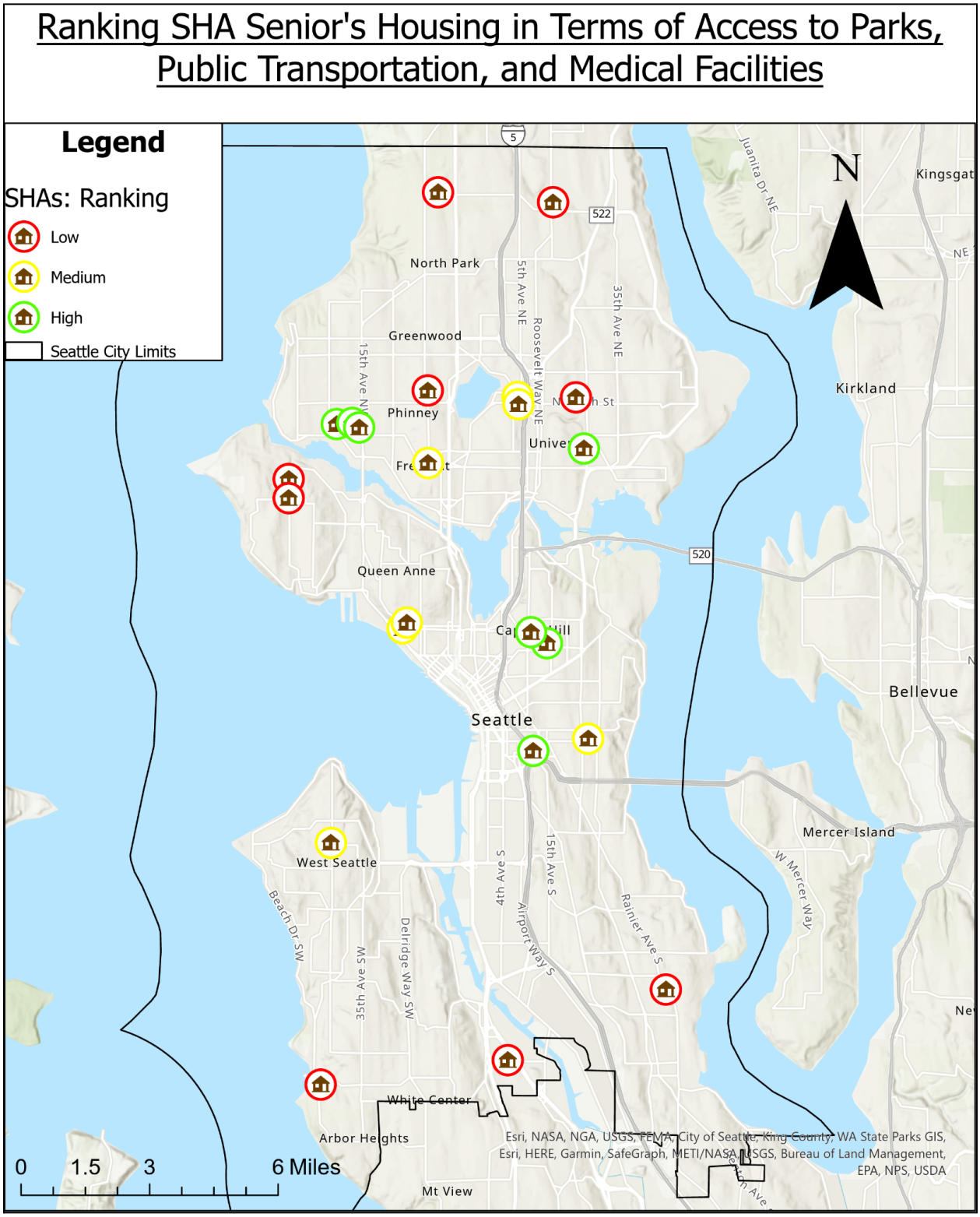



Distance from SHAs to Pharmacies
3.00
2.00
1.00
0.00
Distance
LeschiHouse
IslandView
CarrollTerrace
Fremont Place
WillisHouse
PhinneyTerrace
WildwoodGlen
NelsonManor
SouthParkMa…
SchwabacherL…
PrimeauPlace
GideonMathe…
Columbia Place
PinehurstCourt
RavennaScho…
MichaelsonMa…
SunriseManor
PleasantValle…
BitterLake
OlmstedManor
BlakelyManor
ReunionHouse
Fort Lawton Pl…
SHA

Appendix F: Most Efficient Routes to Urgent Cares


Distance from SHAs to Urgent Cares
3.00
2.00
1.00
0.00
Miles (mi)
Primeau Place
Sunrise Manor
Nelson Manor
Blakely Manor
Island View
WillisHouse
Michaelson Manor
Schwabacher House
Olmsted Manor
Carroll Terrace
Fremont Place
Leschi House
Ravenna School Ap…
Columbia Place
Phinney Terrace
South Park Manor
Pinehurst Court
Gideon Mathews Ga…
Wildwood Glen
Fort Lawton Place
Pleasant Valley Plaza
Bitter Lake
SHA

Appendix G: Final Ranking



SHA	Hospitals	Distance to Hospitals	Pharmacies	Distance to Pharmacies	Urgent Cares	Distance to Urgent Cares	Parks	Public Transportation Stations	Total
Bitter Lake	0	2	1	1	0	0	0	1	5
Blakely Manor	0	2	1	1	2	2	2	1	11
Carroll Terrace	0	1	1	2	0	2	2	2	10
Columbia Place	0	1	0	2	0	1	0	1	5
Fort Lawton Place	0	1	0	0	0	0	2	1	4
Fremont Place	0	2	0	2	0	2	1	1	8
Gideon Mathews Gardens	0	2	1	2	0	1	1	2	9
Island View	0	0	1	2	1	2	0	1	7
Leschi House	0	2	2	2	0	2	2	2	12
Michaelson Manor	0	1	1	1	1	2	2	2	10
Nelson Manor	0	2	1	2	2	2	1	1	11
Olmsted Manor	0	1	1	1	0	2	1	2	8
Phinney Terrace	0	1	0	2	0	1	1	1	6
Pinehurst Court	0	1	1	2	0	1	0	1	6
Pleasant Valley Plaza	0	1	0	1	0	0	1	1	4
Primeau Place	2	2	2	2	2	2	2	2	16
Ravenna School Apartments	0	1	0	1	0	1	1	1	5
Reunion House	0	2	2	0	1	2	2	2	11
Schwabacher House	2	2	2	2	2	2	1	1	14
South Park Manor	0	1	0	2	0	1	1	1	6
Sunrise Manor	2	2	2	1	2	2	1	2	14
Wildwood Glen	0	0	1	2	0	1	1	1	6
Willis House	0	1	0	2	1	2	1	2	9