ALLEGHENY COUNTY AGE FRIENDLY COMMUNITY INDEX

December 2022

A Supplemental Report to:

State of Aging, Disability, and Family Caregiving in Allegheny County
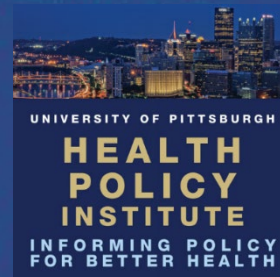
Prepared By:

Ellen Kinnee, MA
Scott R. Beach, PhD
University Center for Social and Urban Research

Meredith Hughes, JD, MPH
Everette James, JD, MBA
Health Policy Institute

University of Pittsburgh

Age Friendly Community Index for Allegheny County, PA

Acknowledgement

Background

The World Health Organization (WHO) recognizes that "Health and well-being are determined not only by our genes and personal characteristics but also by the physical and social environments in which we live our lives." Neighborhood environments play a significant role in determining physical and mental outcomes across a person's life course and into older age, particularly how well an individual can adjust to loss of function and other forms of adversity in later years.

In the past decade Age-Friendly Communities (AFC) have been defined as places where older adults are supported with necessary infrastructure and services including affordable housing, safe neighborhoods, transportation options, opportunity for community participation and accessibility to health services (Jeste 2016, Meeks 2022). The WHO Age-friendly Cities is a framework developed in the Global Age-friendly Cities Guide (WHO 2007) which introduced eight interconnected domains to help identify and address barriers to the well-being and participation of older people in the community. Expansion of this concept to the Age-Friendly Community construct has condensed the original framework into more precise categories within five domains (Kim et al. 2022).

Geographic Information Systems (GIS) and spatial data are frequently used to characterize the neighborhood environment and have been associated with social vulnerability and health effects in senior citizens. These include accessibility to food and medical care, aspects of the physical environment related to mobility and availability of community services (Yamashita 2012, Hames 2017, Beach 2019). Spatial data measures related to Age-Friendly Communities can be used to produce a quantitative assessment of age-friendliness by drawing on indicators that are specifically relevant to the values, preferences, and needs of older adults.

This Age Friendly Community Index supplements the 2022 State of Aging, Disability, and Family Caregiving in Allegheny County report. Allegheny County is part of the WHO Global Network for Age-Friendly Cities and Communities through the Southwestern Pennsylvania Partnership for Aging and Age-Friendly Greater Pittsburgh (SWPPA). Age-Friendly Greater Pittsburgh has been a collaborating partner on the project.
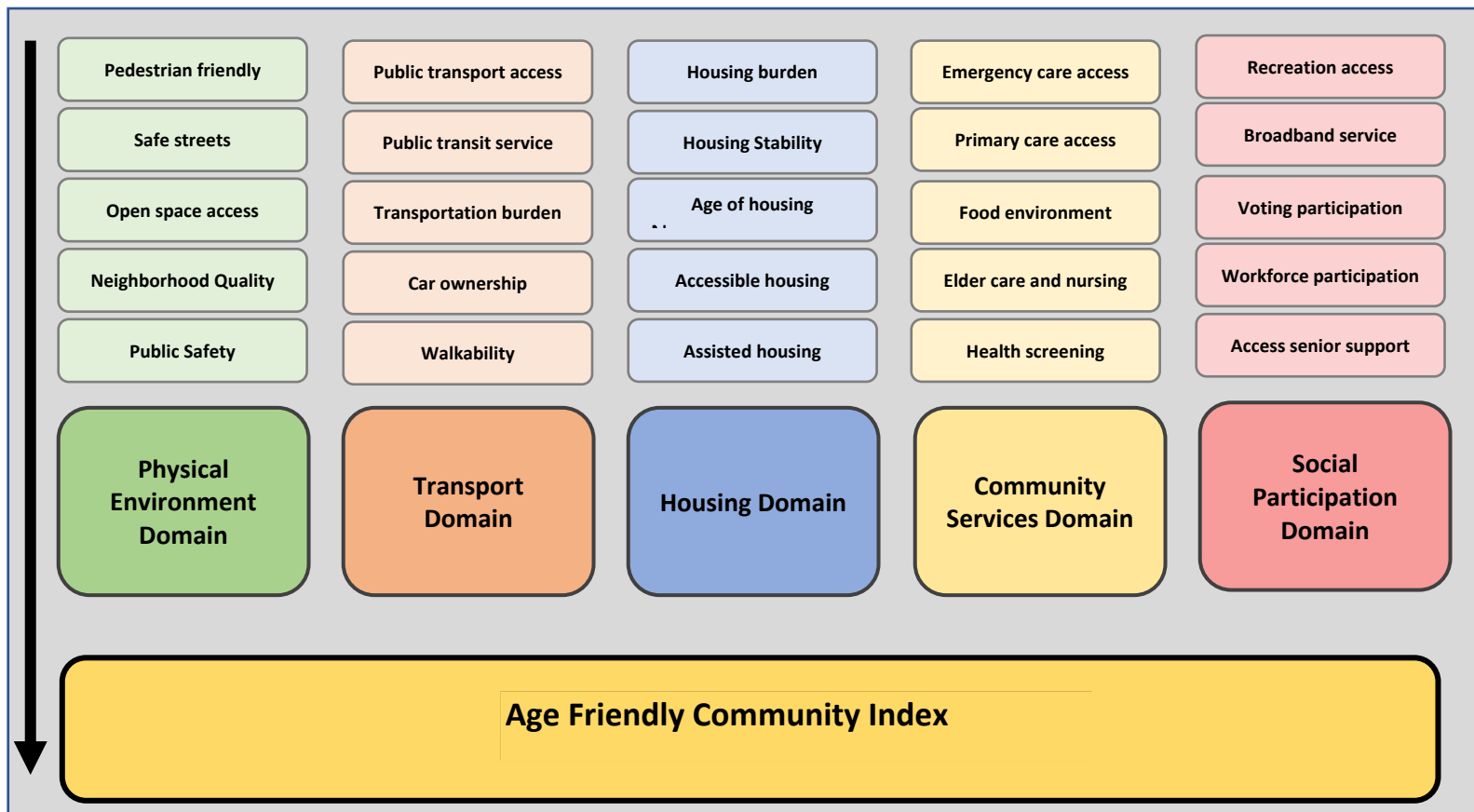
Methodology

Age-Friendly Community Framework

As part of the current project, UCSUR has developed a database of spatial Age-Friendly Community indicator variables and an ***Age-Friendly Community Index* for every Census Tract in Allegheny County.** Census Tracts are small statistical subdivisions of a county defined by the U.S. Census and average about 4,000 inhabitants. These areas are commonly used as a surrogate for the neighborhood environment in studies of health and environmental exposure. While they provide a relatively precise level of geographic detail, we realize that most people do not know what Census Tract they reside in. Because each Census Tract can be associated with a specific neighborhood or municipality, all maps and tables include both Census Tract and the associated neighborhood/municipality.

The data are organized using a framework of five Domains including 1) Physical Environment; 2) Transport; 3) Housing; 4) Social Engagement; and 5) Community Services. Each Domain is first characterized using a percentile ranking of spatial indicator variables as shown in *Figure 1*. Individual indicator rankings are summed to get Domain rankings which are then merged to generate an overall Age-Friendly Community Index. Index and Domain calculations are outlined in the section below. The resulting set of tiered measures are designed to allow direct comparison of census tracts for each individual AFC indicator, Domain, and Age-Friendly Community Index across the county. This enables the user to assess not just over all age-friendliness but also the relative contribution of each indicator and Domain to the AFC Index, identifying areas of strength and weakness regardless of AFC status. We hope that users of the data, including policy makers, service providers, community members and other stakeholders will utilize these rankings to focus on policy, services, and other interventions designed to improve not only the age-friendliness of their communities, but the quality of life of all residents.

Figure 1: *Age-Friendly Community Index Framework*

Physical Environment Domain	Transport Domain	Housing Domain	Community Services Domain	Social Participation Domain
Pedestrian friendly	Public transport access	Housing burden	Emergency care access	Recreation access
Safe streets	Public transit service	Housing Stability	Primary care access	Broadband service
Open space access	Transportation burden	Age of housing	Food environment	Voting participation
Neighborhood Quality	Car ownership	Accessible housing	Elder care and nursing	Workforce participation
Public Safety	Walkability	Assisted housing	Health screening	Access senior support

Age Friendly Community Index

Age-Friendly Community Indicators

Spatial data variables are used within each Domain to represent individual aspects of age-friendly communities and characterize the local lived environment, here represented by Census tracts. Potential variables were first identified using the spatial indicators framework developed by Davern et al. (2020) as a guide. The Davern framework proposes a set of foundational set of objective spatial AFC indicators which can be applied in any location and are directly relevant to policy intervention. We evaluated potential indicators based on the following criteria:

- Indicator should effectively measure the element of age-friendliness it represents
- Combined indicators for each Domain should provide a good representation of the overall dimension
- Indicator data is available for the entire county at the census tract level. The 402 (392 populated) census tracts in Allegheny County are used to the represent the neighborhood environment.
- Data is collected at the finest geographic scale and determined to be:
  - Complete: available for every tract
  - Accurate: spatial patterns matching local knowledge
  - Temporally current: contemporaneous with the 2021 State of Aging survey

Using these criteria, multiple sources of spatial data were identified to support indicator development. We drew on national-level data from the U.S. Environmental Protection Agency (EPA), the Department of Housing and Urban Development (HUD) and the US Census Bureau (Census) among others, as well as local data sources available through the Western Pennsylvania Regional Data Center (WPRDC). A list of age-friendly community indicators and related metrics is shown *Table 1*. Links to data source websites are given at the end of the AFC section.

Table 1: Age-friendly community indicator variables

Domain	Indicator*	Metric**
Physical Environment	Pedestrian intersection density	Pedestrian accessibility
	Total pedestrian crashes per street mile	Street safety
	Park acres per square mile	Access to public open space
	Percent vacant private residences	Neighborhood quality
	Average homicide rate	Public safety
Transport	Average transit ridership (all) per square mile	Public transit usage
	Aggregate frequency public transit service (all) per square mile	Transit accessibility
	Transit costs (all) as a percent of income	Transportation burden
	Percent 0,1 and 2+ auto households	Automobile ownership
	National Walkability Index	Streets walkable to work and recreation destinations
Housing	Housing costs (all) as a percent of income	Housing burden
	Median year householder moved into unit (renter/owner)	Housing stability
	Percent of housing below median housing age in Allegheny County	Availability of newer housing
	Percent one story houses	Availability of accessible housing
	Number of assisted living facilities within a 30-minute drive	Housing alternatives

Community Services	Emergency care facilities within a 15-minute drive	Proximity of emergency care
	Primary care physicians' offices within a 30-minute drive	Healthcare availability
	Grocery stores within a 15-minute drive	Food environment
	Residential aged care within a 15-minute drive	Elderly support
	Senior Dependency Ratio	Ratio of working population supporting senior (retired) population
Social Participation	Senior Centers, libraries, and recreation facilities within a 15-minute drive	Access to senior support and recreation
	Households with internet access	Broadband connectivity
	Percent of registered voters who voted in the 2020 election	Community involvement
	Percent over age 65 actively employed	Workforce participation
	Religious organizations within a 15-minute drive	Access to social and religious communities

*Website links for data sources provided at the end of the AFC section
**Note: Some source variables are inverted to generate a value representing a "positive" aspect of the Age-Friendly Community

Calculation of the Age-Friendly Community Index

The methods used to calculate the UCSUR Age-Friendly Community Index are adapted from the Centers For Disease Control (CDC) Social Vulnerability Index 2018 (CDC SVI 2018). This method uses summed percentile rankings of spatial indicator variables in each census tract to calculate Domain percentile rank. Domain percentile ranks are then summed to get the Age-Friendly Community Index.

Percentile Ranking of Age-Friendly Indicators and Domains

Percentile rank is calculated by sorting variables from low to high and then assigning a percentile value. The percentile is the percentage of ranked items that appear either at or below that variable. Higher percentile ranks indicate higher age-friendliness and vice versa. For example, if a census tract has a walking ability score of 80, that means 80% of census tracts have a lower walkability.

- We generated a percentile rank for each census tract among all the census tracts in Allegheny County for:

  1) The twenty-five individual indicator variables
  2) The five Age-Friendly Community Domains
  3) The Age-Friendly Community Index

The PERCENTRANK function in Excel was used to calculate the rank of indicator values as a percentage of the total dataset. Every indicator value is ranked as a percentile from 0 to 100. This percentile ranking shows how a census tract compares to other tracts in Allegheny County for that indicator. Note that the PERCENTRANK function returns a percentile rank of zero for the smallest value in the dataset and a percentile rank of one for the largest value in the dataset. Census tracts with an indicator score of zero are assigned a percentile rank of zero for that indicator when zero is a legitimate value, for example Transit Use per Square Mile is zero where there is no public transit.

The indicator percentile rankings are summed with the others from the same Domain and used to calculate a Domain Score. For example, the Housing Domain Score for each tract is computed by summing the percentile rankings for Housing Affordability, Housing Stability, Older Housing, Housing Accessibility and Assisted Housing indicators. A Domain Rank is calculated by taking the percentile rank of the Domain Score.

Age-Friendly Community Index

Domain Ranks are summed to get the total Age-Friendly Community Score for each census tract

Percentile rankings are calculated from the Age-Friendly Community Scores to get the overall percentile ranking which we call the Age-Friendly Community Index.

Note: Census tracts with no population (n = 10) are not given an AFC Index.

Results

Maps

Maps of the Age-Friendly Community Index and Domain Rankings are used to visualize results. The Age-Friendly Community Index and upper/lower 10th percentile rankings are shown in *Figures 2 and 3* (below). The five individual Domain rankings and percentiles are included in additional maps in *Figures 4 and 5*.

How to read and interpret the Age-Friendly Community maps

All values are mapped as percentile rank. Percentile rank refers to the percentage of scores that are equal to or less than a given score. It is a measure of how a tract compares to other census tracts for that indicator, Domain, or the Age-Friendly Community Index. For example, if an indicator has a percentile of 60, this means that this census tract ranks 235 out the 392 populated census tracts. This is interpreted as meaning that this census tract is higher than 60% of all the other census tracts in Allegheny County for that indicator. Percentile ranks are used here simply as a statistical measure of where each census tract stands compared to other tracts within the county.

The indicators used to calculate the AFC index come from diverse sources and have varying underlying distributions. Percentile rank calculations provide a useful way to describe data without making any assumptions about those distributions. It is worth noting that a percentile does not describe the magnitude of difference between tracts, for example a tract ranked in the 75th percentile is not three times higher than a tract ranked in the 25th percentile.

When a tract has no indicator value (for example, the census tract has no public transit stops), it is excluded from the percentile calculation and assigned a score of zero for that indicator. Thus, the percentile ranking can be thought of as a comparison of tracts where the age-friendly community characteristic is present.

Interpretation of spatial patterns

Age-Friendly Community Index
The Age-Friendly Community Index is computed from the percentile ranks of the AFC Domains. Domain contributions are weighted equally with each of the five domains contributing 20% toward the final index. Similarly, every Domain is characterized by five spatial indicators, each contributing 20% to the Domain total.

The AFC Index shows a pattern of high age-friendliness in the downtown Pittsburgh urban core and the "close-in" surrounding suburbs. This reflects the overall availability of public transportation, medical care, and opportunities for social participation in these areas. Some outer suburbs and semi-rural areas have better options for newer housing and score higher in public safety, but this is not enough to offset the comparative lack of transportation options and access to services needed for senior citizens.

Age-Friendly Community Domains
Spatial patterns of individual Domain rankings reflect the combined influence of their respective spatial indicator metrics (shown in *Table 1*).

- **Physical Environment** – The Physical Environment Domain is geographically mixed with high and low rankings across urban, suburban, and rural tracts. This reflects the variety of the indicator measures including access to parks and housing vacancy rates which are distributed unevenly across the county. Pedestrian intersections are concentrated in the urban core while street and public safety are higher in areas with less dense population.

- **Transport** – Higher transport percentiles are heavily concentrated in the downtown area with lower percentiles along the outer edges. This pattern is driven by the lack of public transportation, higher costs of car ownership and lower walkability in less densely populated areas.

- **Housing** – The patterns in the Housing Domain heavily favor suburban and rural locations. Access to assisted living is higher in the urban core, but newer construction and one-story homes are concentrated outside of the city. Housing takes up less percentage of income and the people tend to live in one location for a longer period lending stability to the community.

- **Community Services** – This Domain has the strongest spatial pattern with higher percentiles concentrated tightly around the city and lower rankings around the county fringe. Community service metrics focus on access to health care, availability of food and specialized elder care. The density of health services and food options in and near the city are key factors in this pattern. The Senior Dependency Ratio, a measure of age structure and resource allocation, has a more balanced geographic mix of high/low percentiles but since it is also high around the city it serves to reinforce the already strong spatial pattern.

  Note: All access measures based on drive-time, such as the availability of emergency care or senior support services, are calculated based on the drive time area around each tract centroid. They can include facilities that are located outside of Allegheny County. This ensures that these measures are not biased against tracts on the edge of the county where resources in other counties may be closer.

- **Social Participation** – Social participation requires the availability of social resources and recreational opportunities including senior centers, libraries, exercise facilities and places of worship. These are all more concentrated in urban and suburban tracts. Lower rates of internet access and voter participation southeast of the city contribute to low percentile rankings for this Domain.
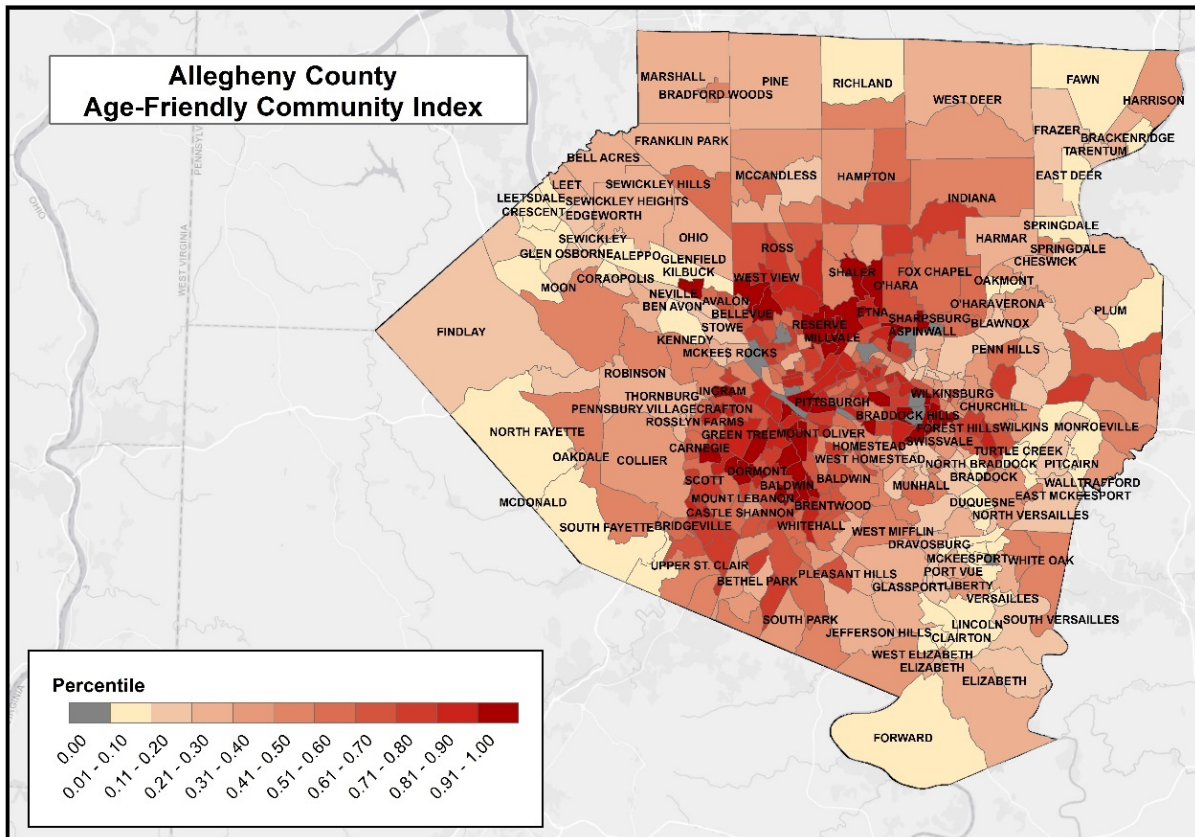
Figure 2: Allegheny County Age-Friendly Community Index

Figure 3: Allegheny County Age-Friendly Community Index – Upper and lower percentile rankings
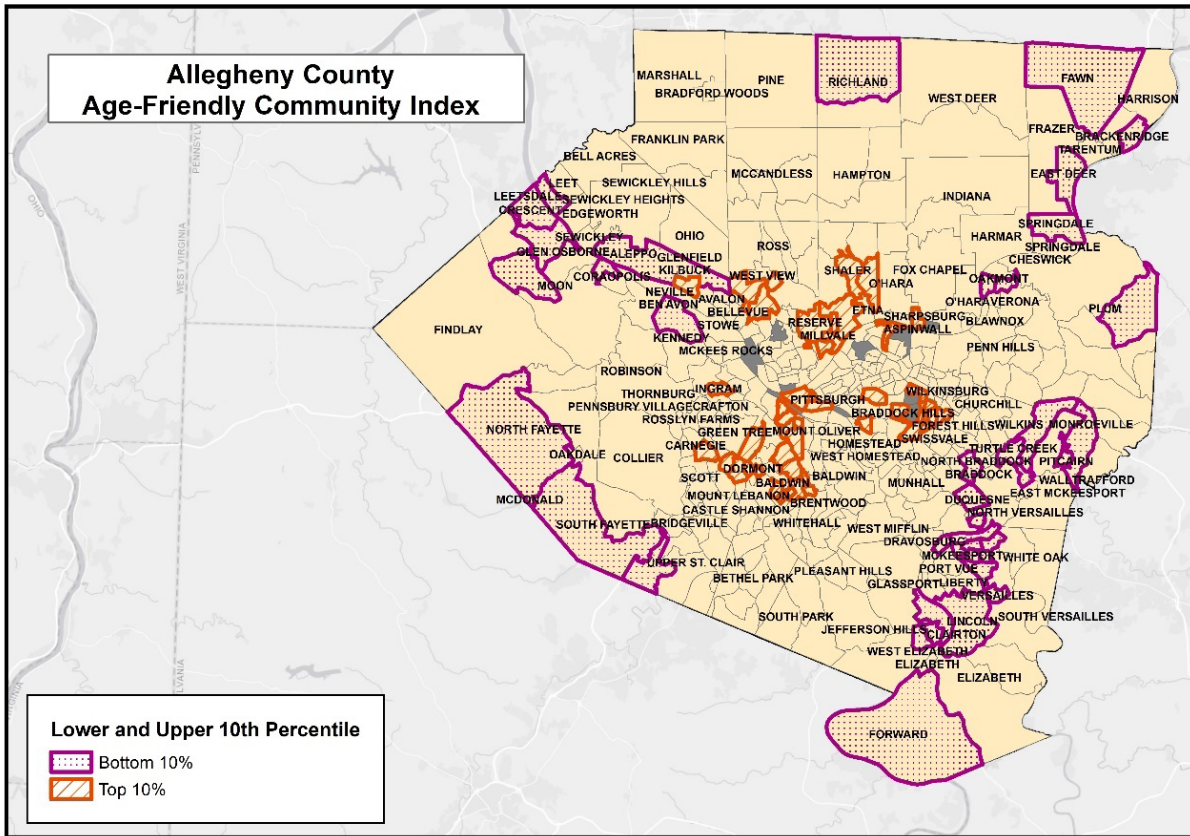
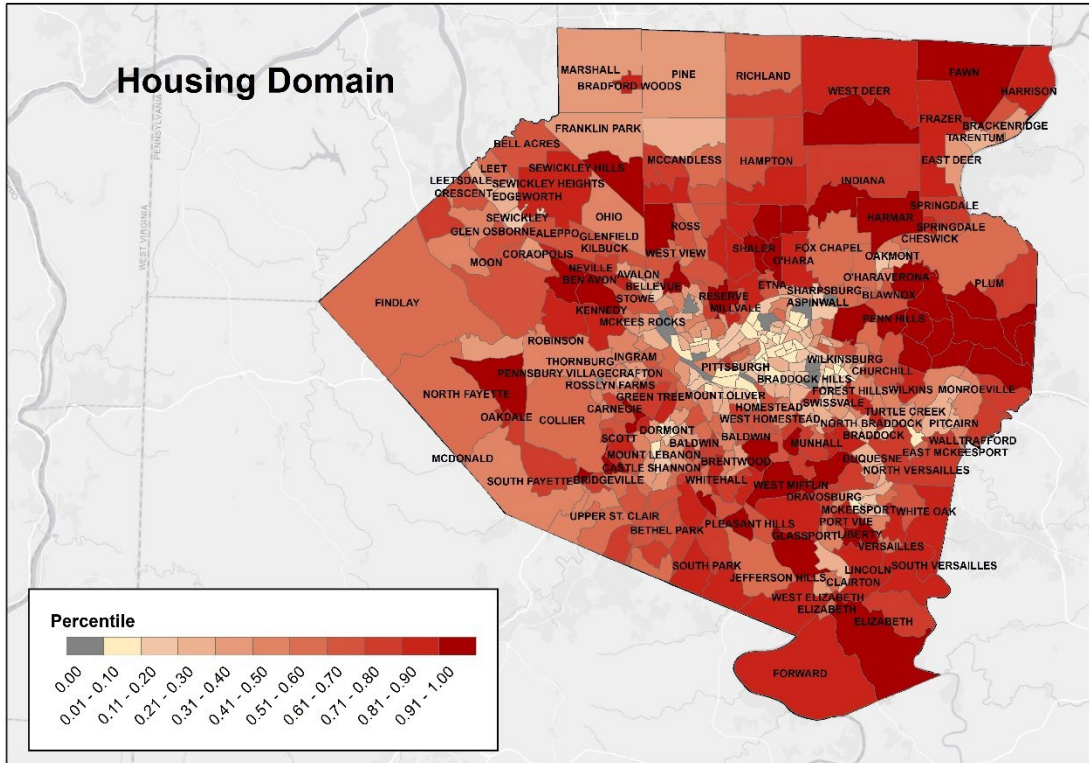***Figure 4:*** *Age-Friendly Community Domain Rankings and Upper and Lower 10th percentiles*

a) **Physical Environment**

b) Transport

Transport Domain

Transport Domain
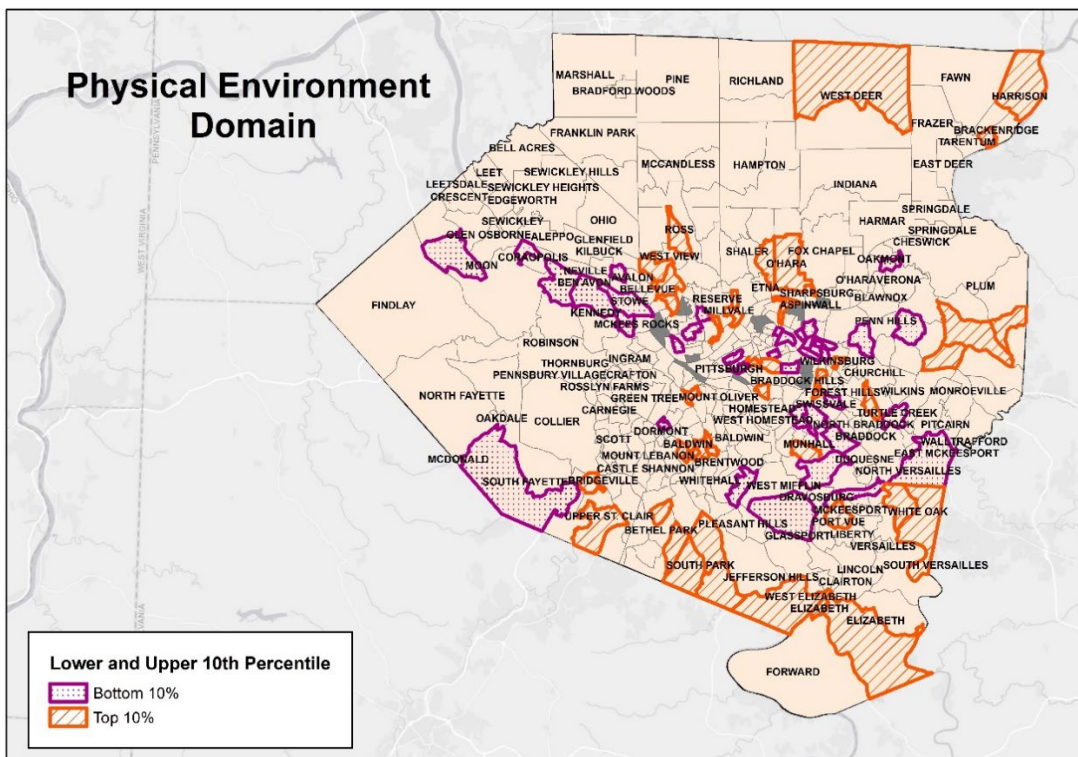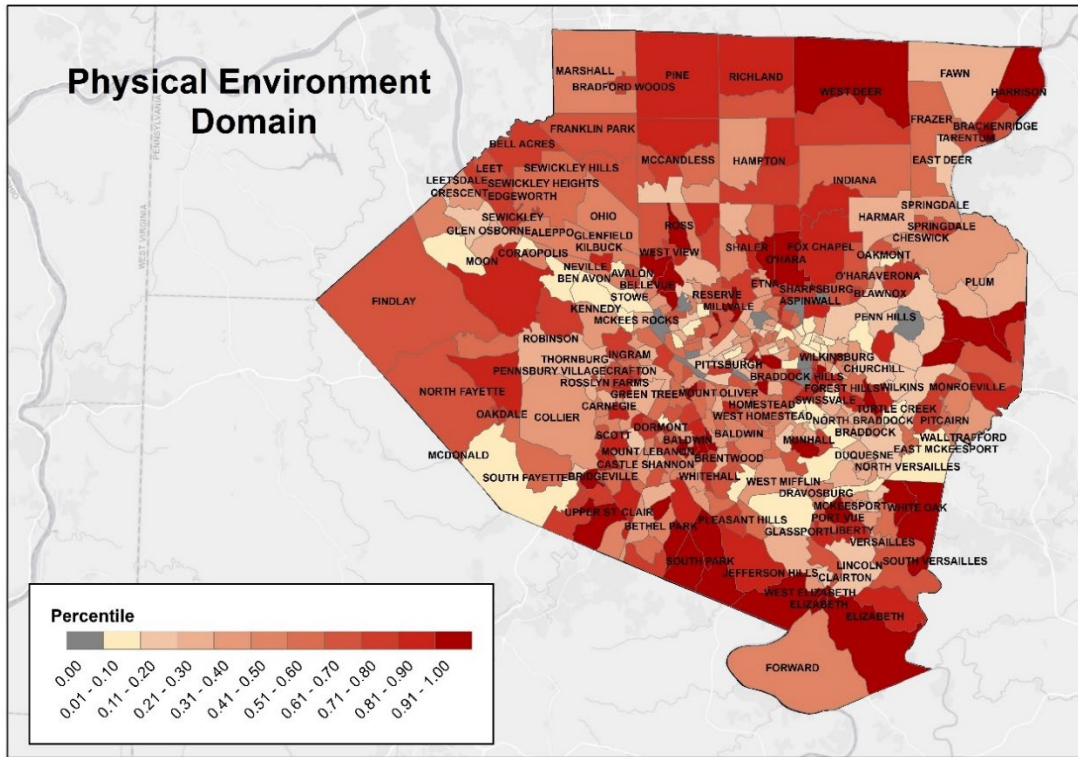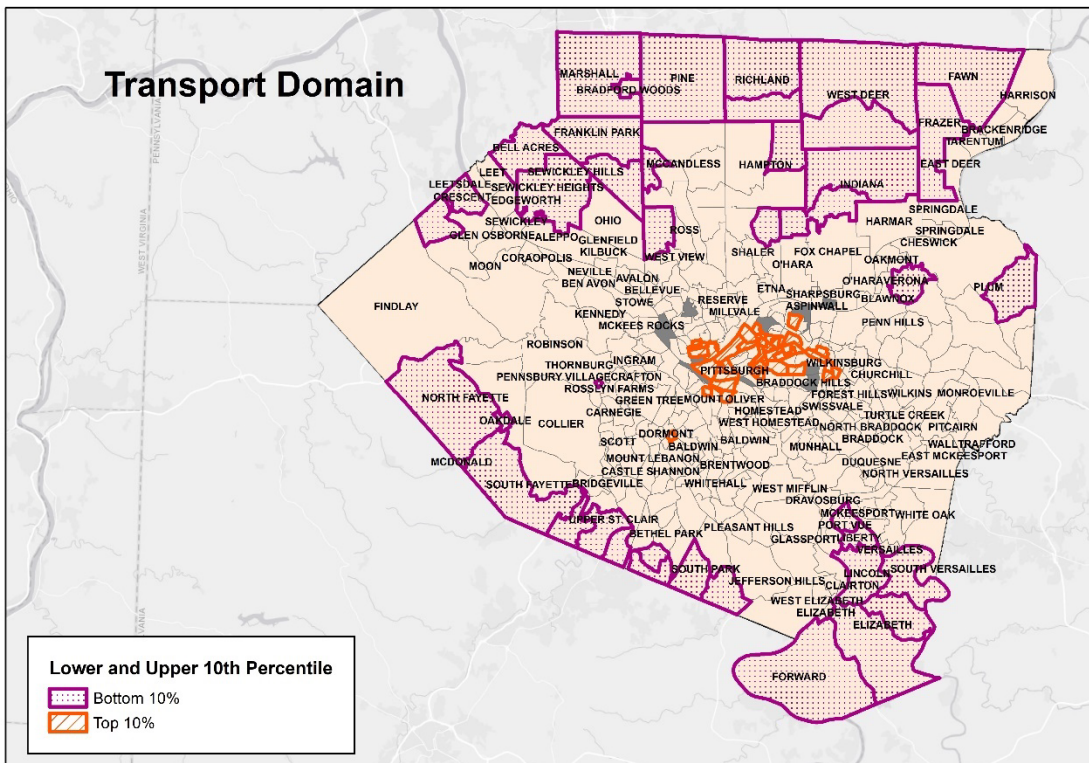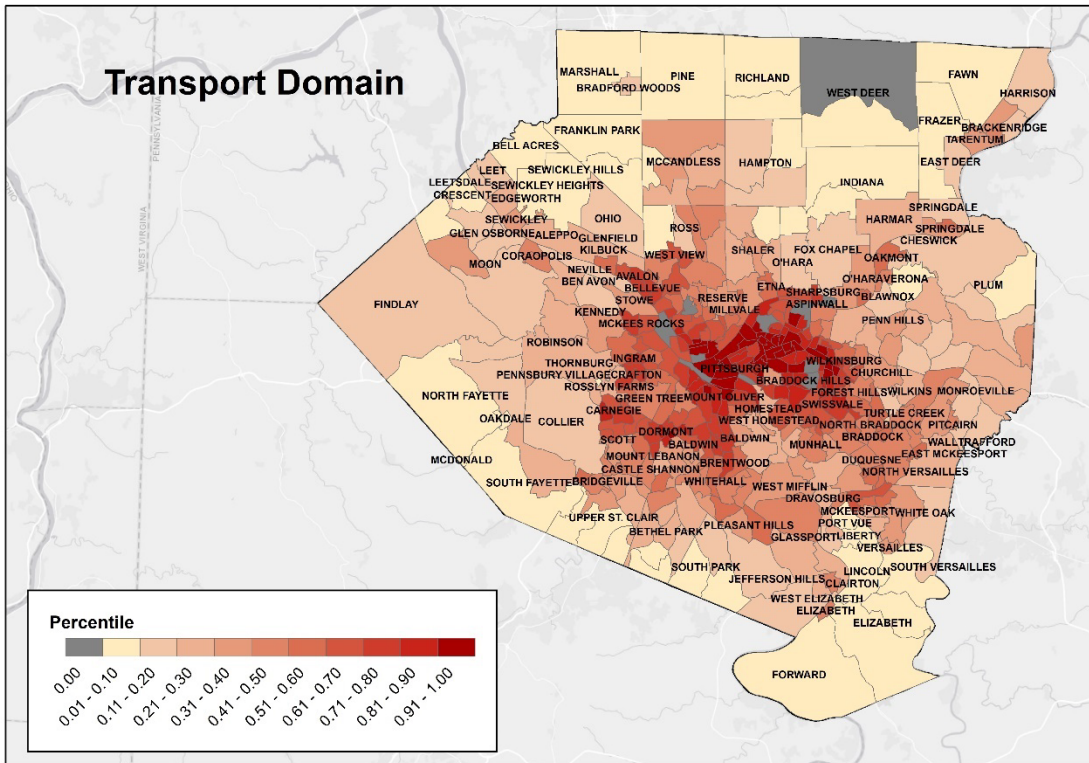
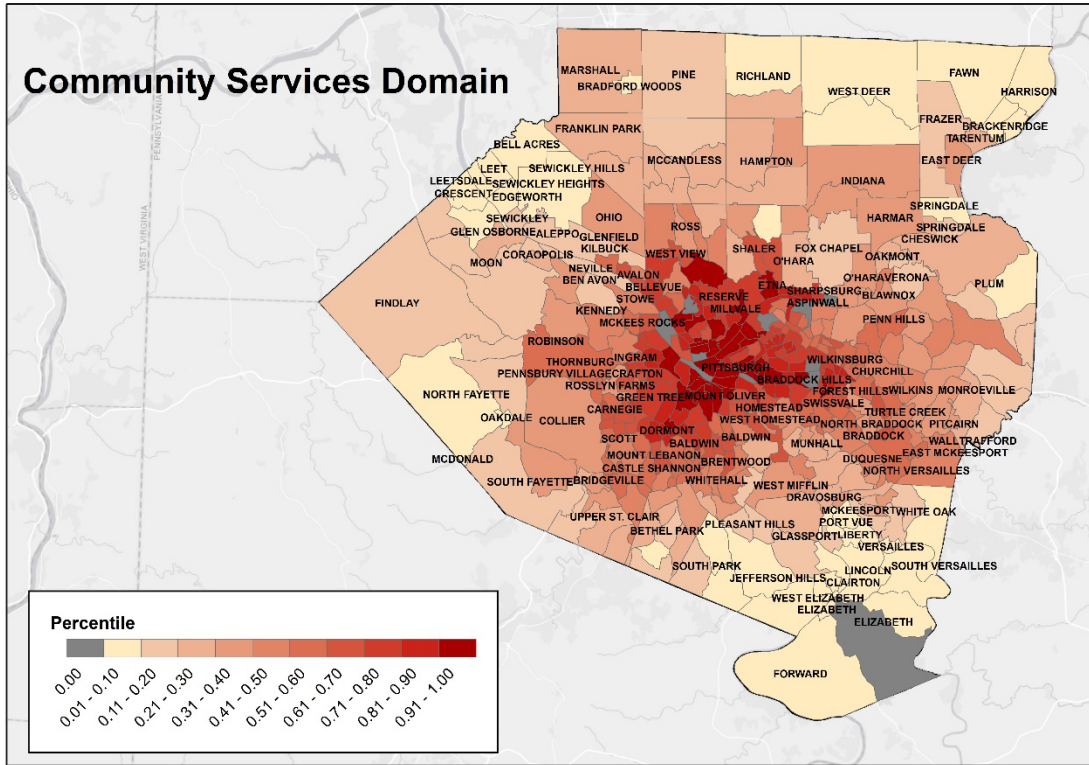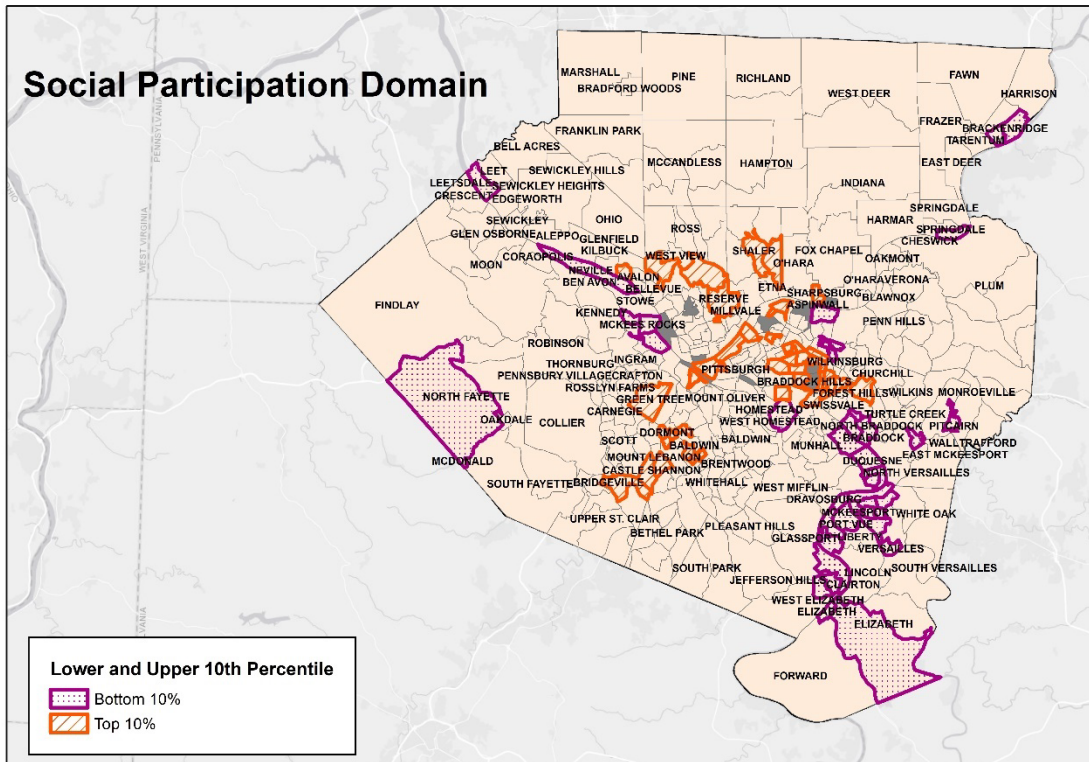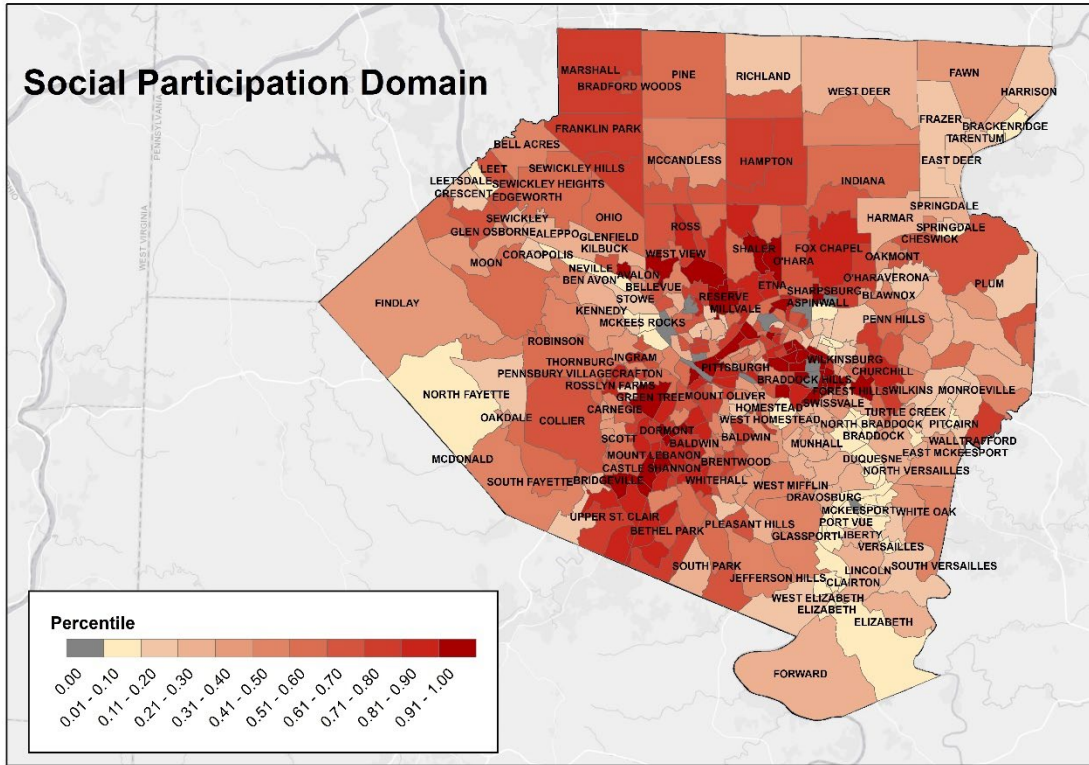## c)   Housing
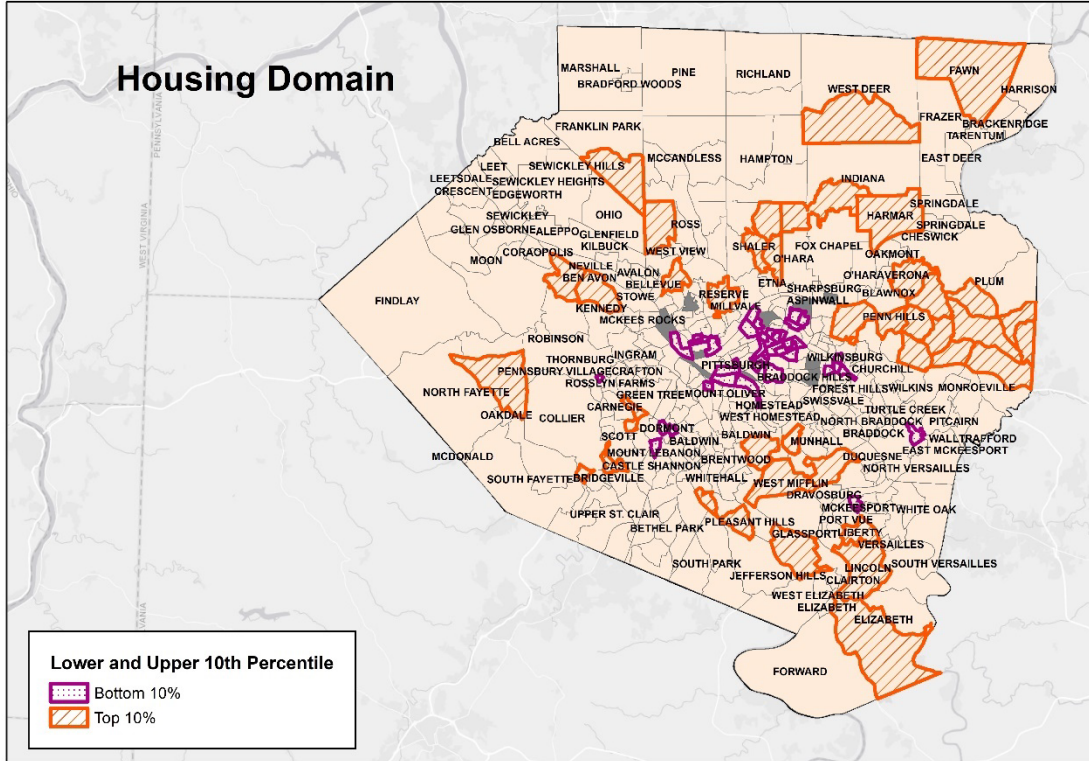
d) Community Services
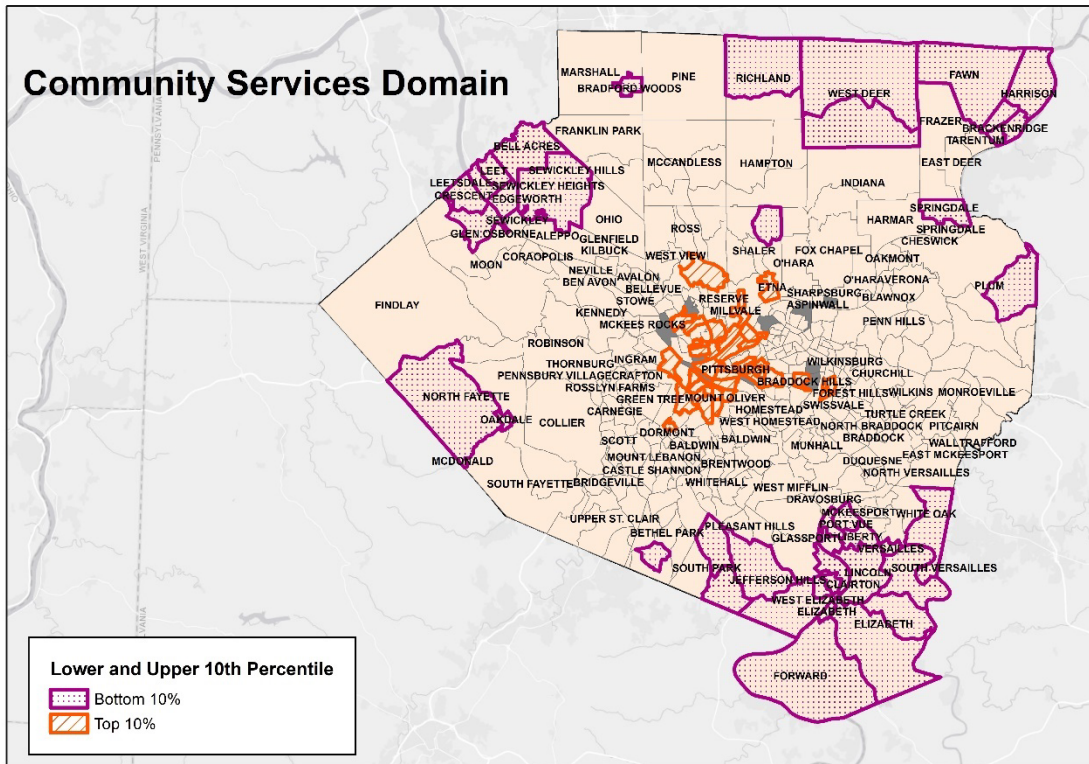
e) Social Participation

Age-Friendly Community Index Web site

The Allegheny County Age-Friendly Community maps display the physical and social neighborhood environment experience as they relate to the aging population. These maps enable senior adults and policymakers to identify the impact of infrastructure and community services on the older population and identify areas disproportionately impacted by the lack of age-friendly resources. This is a cumulative impacts approach that combines data into an established framework of spatial indicators, Domains, and a final summary measure of age-friendliness. A website is available for interactive exploration of all indicator variables, Domains, and the Age-Friendly Community Index at https://afci.ucsur.pitt.edu.

Age-Friendly Community and State of Aging survey participants

Geocoding is the process of assigning x and y coordinates (latitude and longitude) to address data. Geocoded points of residential addresses are commonly used to assign geographic location which allows for characterization of residential neighborhood environment. State of Aging, Disability, and Family Caregiving survey respondents were asked to provide the name of their street and the nearest cross-street (i.e., intersection), avoiding asking for an exact address, while allowing placement of the participant near their residential address. Of the original 1,299 Allegheny-county residing participants surveyed, 1,285 (98.9%) provided street and cross-street information. A total of 1,269 of the available 1,285 (98.8%; 97.7% of the total) in Allegheny County with correct cross streets were successfully geocoded. In sum, only 1.1% of the sample refused to provide street and cross-street data; and an additional 1.2 % provided inaccurate data that could not be geocoded.

Geocoded point locations were linked to the completed surveys to map survey responses and then spatially joined with each of the AFC spatial indicators, Domain totals and the Age-Friendly Community Index to classify each participant location. The State of Aging survey respondents categorized by the AFC Index percentiles of their census tract are mapped in *Figure 5*. Maps of selected sets of survey participants including a) those who report living alone; b) Family caregivers; and c) those living with disability are shown in *Figure 6* while *Table 3* provides comparisons of AFC percentiles between these groups and shows the distribution of the entire age 55 and older population in Allegheny County across AFC Index deciles.

- Note first the older adult total population tends to be clustered in lower Age-Friendly Index communities. Nearly 55% live in Census Tracts with AFC index percentile ranks below .50, while only 16% live in tracts with AFC index percentile ranks above .80.
- The State of Aging survey respondents are more likely to live in higher AFC tracts, with 53% in areas with AFC percentile ranks of .51 or higher.
- Those reporting disability in the survey are even more likely to live in high AFC areas with 56% in Census Tracts with AFC percentile ranks above .51.
- However, the disabled are also most likely to live in low AFC areas, with 21% in tracts with AFC index scores of .20 or lower.
- Those who report living alone also tend to live in higher AFC index communities, with 54% in tracts with AFC scores above .50.

Table 3: *Percent SOA participants by percentile class (low AFC to high AFC)*

Percentile Class	% Population over age 55 (n = 440,376)	% SOA Survey participants (n = 1,269)	% SOA Caregivers (n = 357)	% SOA Living alone (n = 517)	%SOA Living with Disability (n = 309)
0	0.2	0.3	0	0.4	1.3
0.01 - 0.10	9.5	5.7	6.5	5.6	6.8
0.11 - 0.20	10.1	10.5	10.7	8.3	12.9
0.21 - 0.30	12.1	7.6	7.3	7.5	5.2
0.31 - 0.40	11.9	13.3	12.9	14.9	10.4
0.41 - 0.50	11.4	9.5	11.2	9.1	7.1
0.51 - 0.60	10.4	11.7	12.6	13.7	11.7
0.61 - 0.70	9.9	11.0	13.2	11.2	11.7
0.71 - 0.80	8.8	10.6	10.1	11.0	9.7
0.81 - 0.90	7.8	10.0	8.4	9.5	13.6
0.91 - 1.00	8.0	9.7	7.3	8.7	9.7

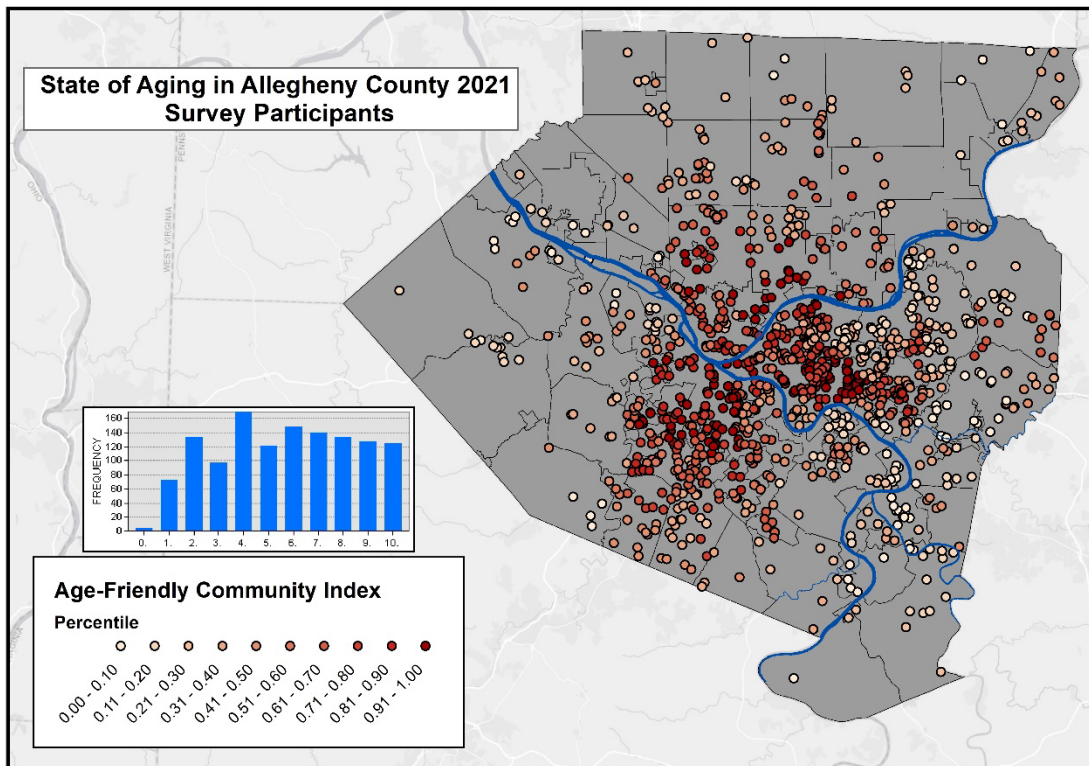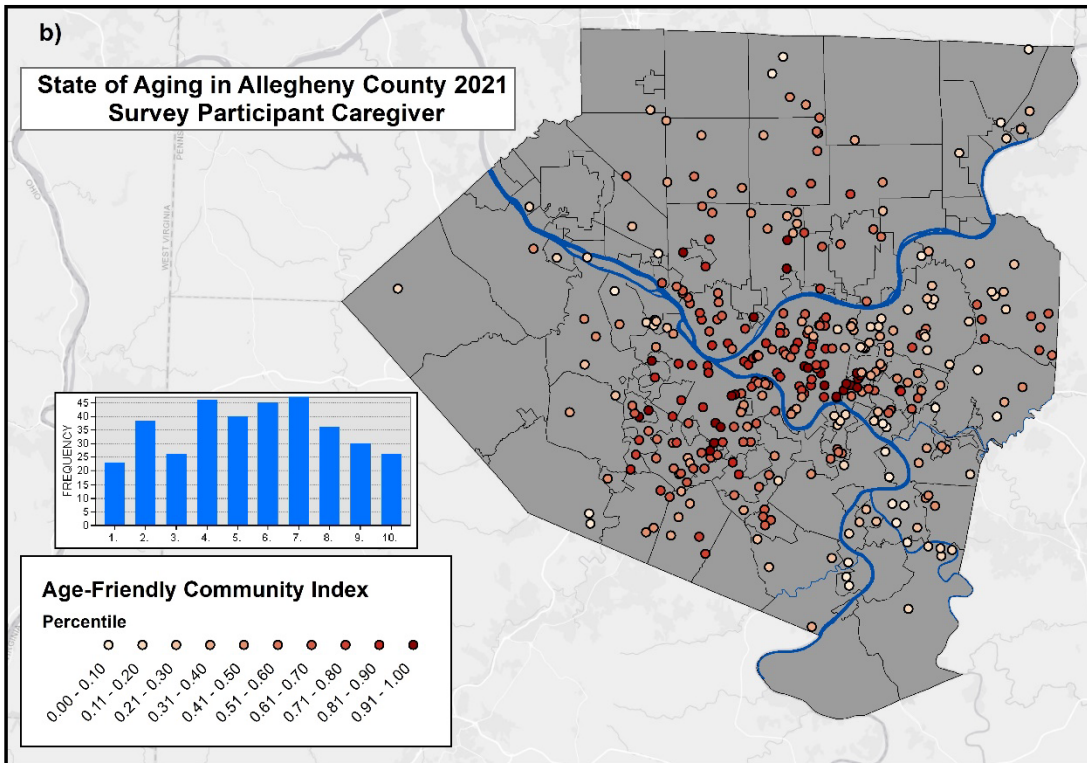**Figure 5:** *State of Aging Participants by Age-Friendly Community Index*
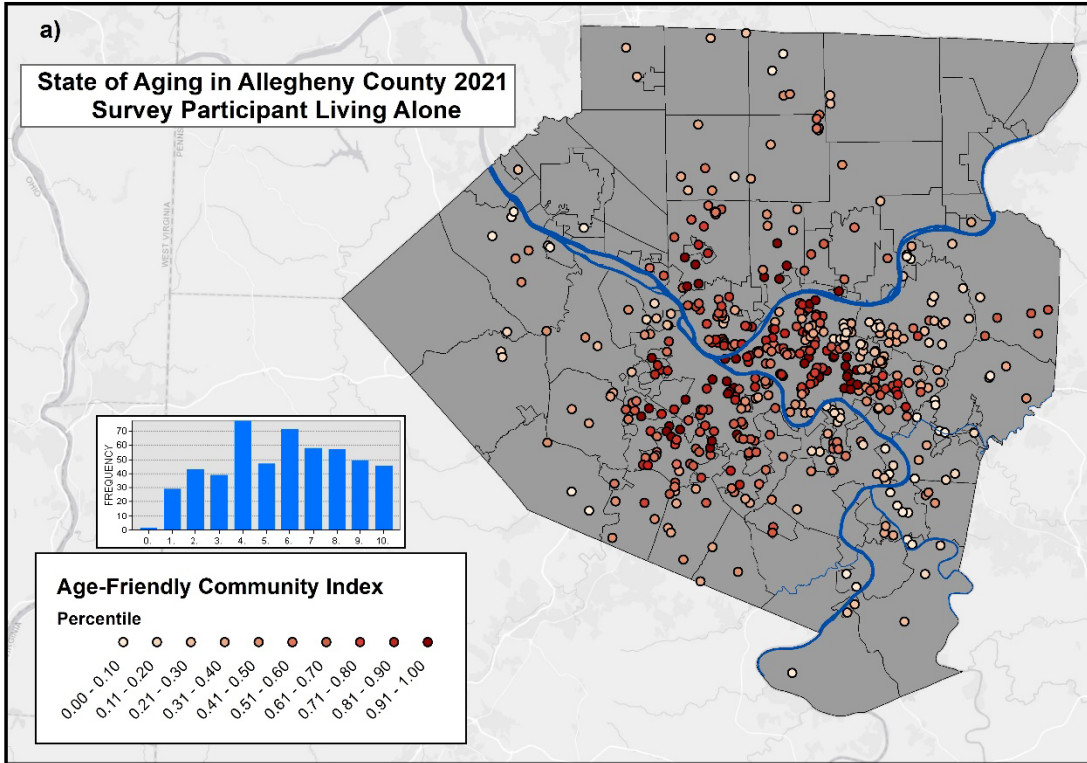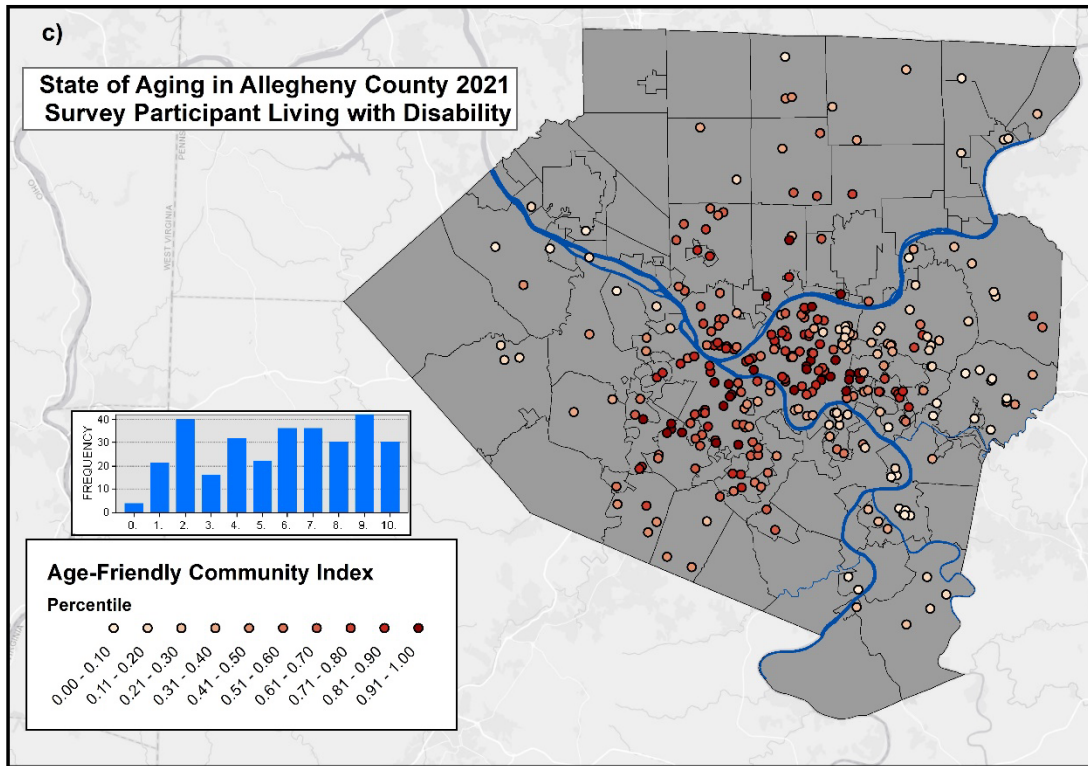
Figure 6: State of Aging Participants by AFC Index that are a) Living alone; b) Family caregivers; and c) Living with disability

Age-Friendly Community Index and population demographics

It should be noted that, while selected to reflect the needs of senior citizens, the spatial indicators used to generate the Age-Friendly Community Index do not explicitly include population characteristics such as age, race, income, and other demographic variables. The intent of the AFC Index is to represent the physical and social environment of the people living in each neighborhood. However, it is important for planners and policymakers and other stakeholders wanting to support age-friendliness to understand community demographic profiles, particularly age distributions, and how they relate to the AFC Index. *Figure 7* uses a bivariate choropleth map of two variables – the Age-Friendly Community Index and percent population over age 65 – to visually compare their quantitative relationship. The bivariate color scheme graphically illustrates the combined spatial distributions, emphasizing where highest and lowest values coincide and highlighting the interrelation between relative age-friendliness and current elderly population.

Figure 7: *Age-Friendly Community Index and Population over age 65.*

Note: The bivariate color scheme is the product of the two variables - each with three discrete classes – which creates a square grid of nine unique colors. On this map, tracts shaded dark green have both a high AFC Index and a higher percentage population over age 65. Those shaded white have low values for both. Tracts shaded medium green have a high AFC Index but a low over age 65 population. Dark blue tracts have a low AFC Index and a high percent population over age 65, making them the areas of highest concern.
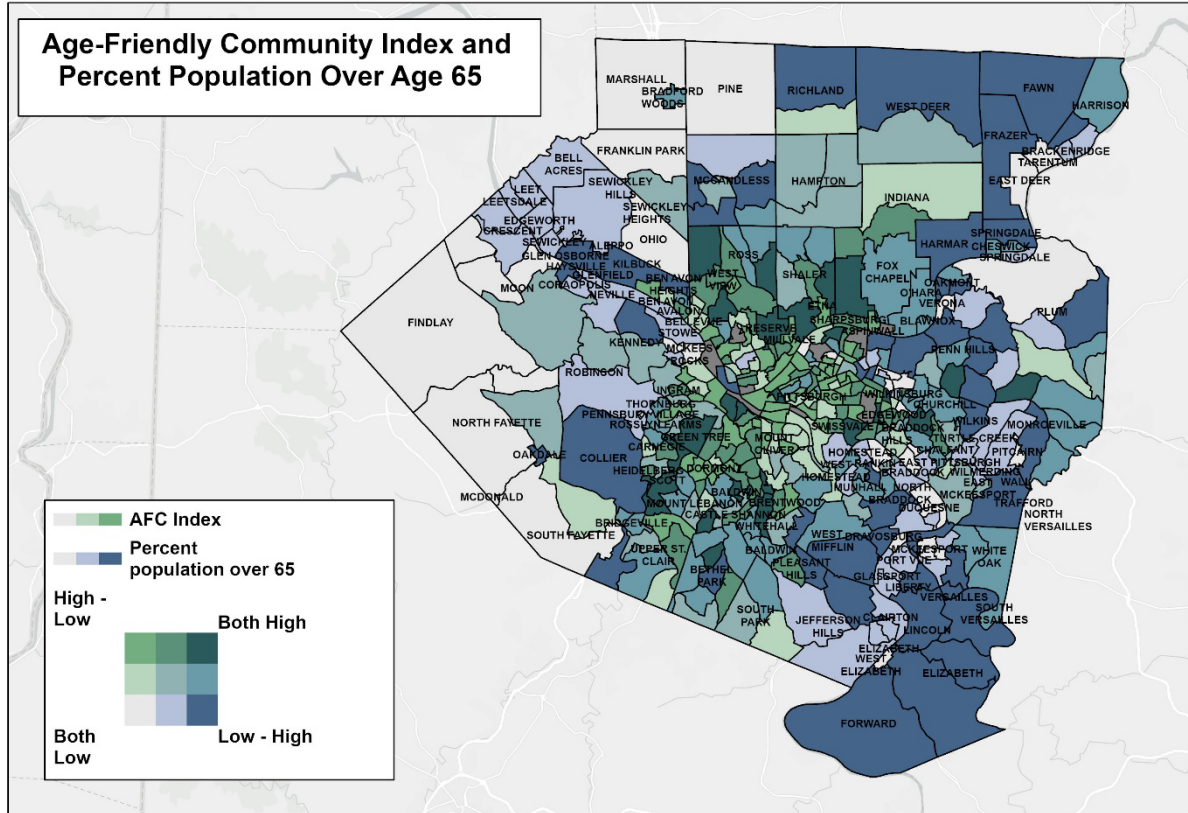
Outlook and Policy Implications

This analysis provides an overview of the availability and concentration of services and infrastructure available in Allegheny County to support older adults. By mapping the age friendliness of a community against the age of the population across neighborhoods, this report provides an important resource for future planning and targeting interventions to address unmet needs. Specifically, the mapping above indicates the geographic areas in which aging populations are high and age friendless is low, highlighting areas where policies and investments to address healthy aging could have the greatest impact on seniors. As illustrated above, the factors supporting age friendliness are not available evenly across all geographic areas of the county. Often, areas with high rates of community services and transportation availability are less likely to have an age friendly housing infrastructure. The mapping also indicates where age friendliness and senior populations are both high, creating a potential resource for assessing and replicating approaches or investments that have been successful in creating an age friendly environment for seniors.

Appendix

References

Beach S, Kinnee E, Schulz R: **Caregiving and place: combining Geographic Information System (GIS) and survey methods to examine neighborhood context and caregiver outcomes**, *Innovations in Aging*, 2019; Vol 3, No. 3, 1-15 8.

CDC SVI 2018 Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. CDC/ATSDR **Social Vulnerability Index 2018** Database https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html. Accessed March 2022.

Davern M, Winterton R, Brasher K, Woolcock G. **How Can the Lived Environment Support Healthy Ageing? A Spatial Indicators Framework for the Assessment of Age-Friendly Communities**. *International Journal Environmental Research and Public Health.* 2020 Oct 21;17(20):7685. doi: 10.3390/ijerph17207685. PMID: 33096773; PMCID: PMC7588877.

Hames E, Stoler J, Emrich CT, Tewary S, Pandya N. **A GIS Approach to Identifying Socially and Medically Vulnerable Older Adult Populations in South Florida.** *Gerontologist*. 2017 Nov 10;57(6):1133-1141. doi: 10.1093/geront/gnw106. PMID: 27496012.

Jeste DV, Blazer DG 2nd, Buckwalter KC, Cassidy KK, Fishman L, Gwyther LP, Levin SM, Phillipson C, Rao RR, Schmeding E, Vega WA, Avanzino JA, Glorioso DK, Feather J. **Age-Friendly Communities Initiative: Public Health Approach to Promoting Successful Aging.** *American Journal Geriatric Psychiatry*. 2016 Dec;24(12):1158-1170. doi: 10.1016/j.jagp.2016.07.021. Epub 2016 Jul 28. PMID: 27742528.

Kim K, Buckley T, Burnette D, Kim S, Cho S. **Measurement Indicators of Age-Friendly Communities: Findings From the AARP Age-Friendly Community Survey**. *Gerontologist*. 2022 Jan 14;62(1):e17-e27. doi: 10.1093/geront/gnab055. PMID: 33909074; PMCID: PMC8759505.

Meeks S, **Age-Friendly Communities: Introduction to the Special Issue**, *The Gerontologist*, Volume 62, Issue 1, February 2022, Pages 1–5, https://doi.org/10.1093/geront/gnab163.

Southwestern Pennsylvania Partnership for Aging SWPPA https://www.swppa.org/agefriendly/.

World Health Organization. (2007). **Global age-friendly cities: a guide**. World Health Organization. https://apps.who.int/iris/handle/10665/43755.

Yamashita, Takashi, and Suzanne R. Kunkel. **Geographic access to healthy and unhealthy foods for the older population in a US metropolitan area**. *Journal of Applied Gerontology* 31.3 (2012): 287-313.

Data Sources

Allegheny County Analytics https://analytics.alleghenycounty.us/2022/07/21/homicides-allegheny-county-city-pittsburgh-2010-2015/

Allegheny County GIS Open Data https://openac-alcogis.opendata.arcgis.com/

Pennsylvania Department of Transportation https://crashinfo.penndot.gov/PCIT/welcome.html

Pennsylvania Spatial Data Access https://www.pasda.psu.edu/

Pittsburgh Regional Transit https://data.wprdc.org/dataset/prt-of-allegheny-county-transit-stops

Trust for Public Land, ParkServe® Dataset https://www.tpl.org/parkserve/downloads

US Census Bureau, American Community Survey (ACS) 5YR 2015-2019 tables
https://data.census.gov/cedsci/

US Dept. Commerce, National Telecommunications and Information Administration (NTIA), Indicators of Broadband Need https://broadbandusa.ntia.gov/sites/default/files/2021-06/Indicators%20of%20Broadband%20Need%20-%20User%20Guide%20062421.pdf

US Environmental Protection Agency (EPA) Smart Location Database, Version 3
https://www.epa.gov/smartgrowth/smart-location-mapping#SLD

US Environmental Protection Agency (EPA) National Walkability Index
https://www.epa.gov/smartgrowth/national-walkability-index-user-guide-and-methodology

US Dept. of Housing and Urban Development (HUD) Location Affordability Index, Version 3
https://www.hudexchange.info/programs/location-affordability-index/documentation/#data-and-methodology