Preserving Home and Independence:

The Geography of Pennsylvania’s Real Estate Tax System for Aging in Place

Jongwoong Kim, Ph.D., AICP

Department of Geography and Planning | Center for GIS and Spatial Analysis

West Chester University of Pennsylvania

Acknowledgement

This work was supported by the 2023 PHFA Kathy A. Possinger Housing Policy Fellowship.

Correspondence: Jongwoong Kim (Author), jkim@wcupa.edu
Summary

This paper focuses on the real estate tax burden and its influence on aging in place, specifically in the context of Pennsylvania’s geography. The study employs geospatial perspectives to explore locations within the state which may pose challenges for aging in place due to real estate tax burdens. The project utilizes a GIS (Geographic Information Systems) database, mapping, and visualization techniques to offer insights into the real estate tax burden’s impact on potential aging in place in different locations within the state. By analyzing various real estate tax-related indicators and constructing an index with these and other relevant economic and demographic variables, the study assesses the financial challenges of aging in place, identifying counties and census tracts that are more or less favorable in terms of real estate tax burdens in the state of Pennsylvania. The project outcome includes the development of an Online GIS Dashboard and a Web Map intended for public access, aiming to provide valuable public policy implications and aid individuals in making informed decisions regarding aging in place within the state.

Keywords: real estate tax, aging in place, housing affordability, GIS, spatial analysis
The Geography of Pennsylvania’s Real Estate Tax System for Aging in Place

The demographic shift toward an aging population is a reality, evident in the statistics revealing that by 2020, one in every six individuals in the United States had reached 65 years of age or older (Caplan, 2023). Pennsylvania mirrored this trend with approximately one in every five individuals being 65 years or older in 2022, marking a figure approximately 20% higher than the national average (U.S. Census Bureau, 2022).

The concept of “Aging in Place” denotes the preference and ability of individuals to continue residing in their homes as they age, rather than relocating elsewhere later in life (National Institute on Aging, 2023). Research indicates that this inclination remains the favored choice for a substantial majority of older Americans, exceeding 75% according to a recent survey conducted by AARP in 2021 (Binette, 2021). However, scholars in housing and gerontology, exemplified by figures like Stephen Golant (2015), and federal bodies like the National Institute of Health (NIH), advocate for the notion of “aging in the RIGHT place.” This underscores that while Aging in Place is desirable for many, it may not be suitable for individuals facing health or physical/mental limitations, who might find better support in facilities such as assisted living or nursing homes.

Conversely, some individuals find themselves “stuck-in-place,” unable to relocate due to financial constraints or housing instability, often experiencing eviction resulting from factors like gentrification, mortgage default, or inability to pay real estate taxes. The ability to age in place effectively, thus, necessitates not only good health and mental acuity but also financial preparedness. Crucially, this readiness involves the ability to afford various expenses, notably housing-related costs such as real estate taxes, which tend to increase alongside housing values over time. This economic reality poses challenges, particularly as retirement savings may eventually diminish.

Given these multifaceted considerations, the evaluation of the real estate tax burden emerges as a key factor that can either facilitate or impede successful aging in place for individuals, underscoring
the significance of assessing its impact comprehensively. This paper, in this regard, explores the impact of real estate tax burdens on aging in place in Pennsylvania, using GIS (Geographic Information Systems) techniques to analyze real estate tax-related indicators and to create an index that combines and examines these indicators in the context of relevant economic and demographic factors. The study identifies counties and census tracts in Pennsylvania with varying levels of desirability for aging in place based on real estate tax burdens. The project also resulted in an Online GIS Dashboard and a Web Map, aiming to provide policy insights and aiding informed decisions on aging in place in Pennsylvania.

1. Real Estate Tax Calculation in Pennsylvania

The real estate tax payment is calculated using the “assessed” market home value determined by the county assessor or treasurer’s office in Pennsylvania. (The market home value is multiplied by the Common Level Ratio [CLR], calculated by the State Tax Equalization Board for each county, to approximate its assessed home value.) The resulting assessed home value is then multiplied by the real estate tax rate (i.e., mill rate), composed of county, municipal (sub-county), and school district mills, determined by their respective administrative budgets. The product, then, represents the real estate tax payment.

Despite some variations in definition, the “effective real estate tax rate” in this study is defined as the ratio of the real estate tax payment to the market home value. These tax rates differ between sub-county level municipalities (e.g., cities, boroughs, and townships), creating geographic variations in the real estate tax rate within the same county. These rates hinge on the revenue needed to support local governments and school districts’ operations. It is also important to note that the housing (market) value is influenced by market conditions and home/unit conditions, while the rate is contingent on the operation and budget of local governments and school districts, along with the aggregated value of the entire housing stock in that municipality.
2. The Real Estate Tax Burden

The assessment of real estate tax burden can take various forms, including the real estate tax rate and payment amount. These figures can fluctuate periodically (e.g., annually) due to changing housing values and real estate tax rates, influenced by shifts in local government budgets and assessed tax bases. However, when evaluating the “true” tax burden, it is crucial to consider geographic variations in tax rate, payment, and home value in relation to factors such as income level. For instance, a higher real estate tax payment may not necessarily pose a greater burden for those with higher incomes or lower living costs, and vice versa. Similarly, a higher tax rate may not always equate to a larger burden if home values are lower. Therefore, more accurate measurements may involve assessing the ratio between tax and income, or utilizing an index that consolidates various factors into a single indicator. These methods facilitate comparisons of real estate tax burdens across different areas, providing insights into the relative fairness and affordability of real estate taxes. This, in turn, allows for more informed discussions and potential policy insights related to real estate taxation.

3. Related Indicators and the Index

As the “burden” or affordability is relative and varies based on location and individual circumstances, this study not only individually assessed pertinent variables (e.g., real estate tax rate and payment) but also employed the development of an index with a series of relevant factors/variables. Below are the variables incorporated to construct the index that considers pertinent, context-specific factors, providing a measure of the relative real estate tax burden of an older adult couple concerning aging in place:
Indicators and the Relevant Factors of the Real Estate Tax Burden

Real Estate Tax Variables
1. Real Estate Tax Amount ($)
2. Real Estate Tax Rate [Effective] (%)

Economic and Demographic Variables
1. Home Value ($)
2. Household with a Mortgage (%)
3. Household Income ($)
4. Household Income Age 65+ ($)
5. Real estate Tax-Income Ratio (%)
6. Household Income below Poverty Level (%)
7. Household with No Retirement Income (%)
8. Cost of Living for Two Adults ($)
9. Population Age 65+ (%)
10. Population Age 15+ Widowed (%)
11. Non-White [Both Hispanic & Non-Hispanic] (%)

Sources: U.S. Census (2021 ACS 5-yr), Economic Policy Institute (2022), and local government websites (2023)

With some of these indicators and factors (below), this study identified counties that might be considered as “challenging to age in place” in terms of the real estate tax burden on older adults, if they:

ARE above the 65th percentile in the state for
1. Median Real estate Tax Paid ($) OR
2. Median Effective Real Estate Tax Rate (%)

AND ARE above the 90th percentile in the state for
1. Median Home Value ($) OR
2. Real estate Tax-Income Ratio (%) OR
3. Annual Cost of Living for Two Adults ($) OR
4. Percentage of Population Age 65+ (%) OR
5. ARE below the 10th percentile for Median Household Income ($)
With a different group of indicators and factors, census tracts were identified as “challenging to age in place” in terms of the real estate tax burden on older adults, if they:

ARE in a county that is above the 65th percentile in the state for
1. Median Real estate Tax Paid ($); OR
2. Median Effective Real Estate Tax Rate (%)

AND ARE above the 90th percentile in the state for
1. Median Home Value ($); OR
2. Percentage of Households with a Mortgage (%); OR
3. Percentage of Households Income below Poverty Level (%); OR
4. Percentage of Households with No Retirement Income (%); OR
5. Percentage of Population Age 65+ (%); OR
6. Percentage of Population Age 15+ Widowed (%); OR
7. Percentage of Population Non-White [Both Hispanic & Non-Hispanic] (%); OR
8. ARE below the 10th percentile for Median Household Income ($) OR Median Household Age 65+ Income ($)

4. Examination of the Municipal-Level Maps

The first examination, a municipal-level map with sub-county boundaries (Figure 1), displays “nominal” tax rates (i.e., total mills) across the state. Similar values are grouped together, mainly within county boundaries. The highest rates are concentrated in the east (e.g., Lackawanna and Bucks Counties), followed by counties such as Pike, Wyoming, Northumberland, Franklin, Clearfield, Westmoreland, Butler, Beaver, and Mercer.
Figure 1.

*Real Estate Tax Rate (%) by Municipality in Pennsylvania*

Notably, large cities like Philadelphia and Pittsburgh, along with other urban and rural counties, have some of the lowest rates, fairly evenly distributed. However, as low nominal rates do not necessarily equate to affordability, other factors should be considered. Overall, variations are more pronounced at the county level, with less distinction within each county.

Examining the effective tax rate - market home value divided by tax payment - (Figure 2) reveals less pronounced variations between counties, although some significant clusters of the highest rates persist in the Southeast and East Pennsylvania regions. (It needs to be noted that, unlike nominal tax rates, the “effective” tax rate information is not readily available to the public.)
Figure 2.

**Effective Real Estate Tax Rate (%) by Municipality in Pennsylvania**

Examining real estate tax payments by municipality (Figure 3), the clustering around major metropolitan areas becomes more noticeable (i.e., likely yielding a higher, positive Moran’s I spatial autocorrelation index value; a concept used in spatial statistics and geography to describe the degree to which the values of a variable are correlated in space - whether nearby locations are more similar in terms of a particular attribute than locations that are farther apart). Particularly, prominent cities like Philadelphia and Pittsburgh exhibit some of the lowest median real estate tax payments in their inner-city areas, creating a stark contrast with the surrounding suburban areas.

*Note. See Appendix 2 for a higher resolution map.*
Figure 3.

Median Real Estate Tax Payment ($) by Municipality in Pennsylvania

Note. See Appendix 3 for a higher resolution map.

When considering income levels and utilizing the tax-income ratio (Figure 4), the spatial concentration patterns show a slight outward spread while still demonstrating strength in the eastern region and around the Pittsburgh area. Notably, a clear urban-rural division is evident, consistent with the typical pattern observed in the state of Pennsylvania - as Pennsylvania is recognized for its significant urbanization in the Southeast, East, and West regions. Overall, the real estate tax burden appears to be heavier in urban areas.
Figure 4.

Median Real Estate Tax-Income Ratio by Municipality in Pennsylvania

Note. See Appendix 4 for a higher resolution map.

5. Examination of the County-Level Maps

Looking at the county-level, examining the median effective tax rate - market home value divided by tax payment - by county (Figure 5) reveals spatial clusters, influenced by the anticipated smoothing-out effect from using median values. Particularly, these clusters do not consistently encircle the largest cities, except for Delaware County near Philadelphia and Armstrong County near Pittsburgh. Strong concentrations are observed on the East and West sides, with rural counties consistently having the lowest rates at the bottom-center (the “yellow color” counties). Interestingly, the most expensive-to-live suburban/metro counties surrounding Philadelphia - the far Southeast counties such as Bucks, Chester, and Montgomery - do not exhibit the highest rates.
Examining the median real estate tax payment by county (Figure 6) reveals that Philadelphia metropolitan counties lead the rankings, alongside others like Centre County and the eastern area counties. This highlights a more pronounced clustering around large metros (again, expected to yield a higher, positive Moran’s I spatial autocorrelation index value). Noticeably, due to the smoothing-out effect (i.e., analyzed at the county level), highly populous counties like Philadelphia and Allegheny do not exhibit as much contrast compared to the largest cities such as Philadelphia and Pittsburgh (Figure 3 where these inner-city areas show markedly lower levels of median real estate tax payments and create stark contrasts with their suburban surroundings).
Figure 6.

Median Real Estate Tax Payment ($) by County in Pennsylvania

Note. See Appendix 6 for a higher resolution map.

More precisely, when we consider income levels and utilize the real estate tax-income ratio as the measure (Figure 7), the identification of counties with the highest and lowest burdens experiences a slight weakening in spatial concentration patterns. However, some counties stand out as more burdensome, notably Centre County (encompassing State College) and Lackawanna County (including Scranton City, known for having one of the state’s highest real estate tax rates). Once again, we can observe and confirm the typical urban-rural division in Pennsylvania. While this observation is somewhat oversimplified and generalized due to the use of county averages or medians, the pattern is discernible. In this case, the East-West difference is more prominent, with higher burdens in the East and lower burdens in the West based on this measurement.
Figure 7.

Median Real Estate Tax-Income Ratio by County in Pennsylvania

Note. See Appendix 7 for a higher resolution map.

6. Examination of the Index Maps

Finally, the “Challenging to Age in Place” index identified 15 counties (22% of the total 67 counties) and 862 census tracts (25% of the total 3,387 census tracts) as presenting financial challenges to age in place (Figure 8 and Figure 9, respectively). Although these two maps, each with a different unit of analysis, exhibit somewhat similar geographic patterns, it is essential to recognize that there are local variations at the more detailed census tract-level (Figure 9).
Figure 8. Counties That Are Identified as “Challenging to Age in Place” in Pennsylvania

Note. See Appendix 8 for a higher resolution map.
Initially, we can pinpoint areas that pose challenges at both the county and municipal levels (by overlapping these two maps), namely - specific census tracts in Allegheny, Cameron, Pike, Northampton, Lehigh, and in the Southeastern Pennsylvania region including Bucks, Montgomery, Chester, and Delaware. However, while certain counties are generally deemed challenging, upon closer examination at more local, census tract-level, specific communities within them may not pose significant challenges. For instance, this is evident in Centre County and Cambria County, with Armstrong, Clarion, and Adams Counties showing minimal challenges. Conversely, several counties are not typically viewed as challenging. Nonetheless, upon detailed examination at the local/census tract-level, they reveal challenging areas (e.g., Indiana, Berks, Schuylkill, Carbon, Monroe, Luzerne, and Lackawanna Counties).
7. Discussions and Implications

In addition to the study’s key findings, the online tools (Online GIS Dashboard and Web Map) enable a thorough exploration by clicking on specific locations, providing access to indicators and their percentiles. This allows for a deeper understanding of the community or census tract characteristics, assisting individual Pennsylvanians in making informed decisions for later life, such as aging in place and the estimated real estate tax burden in that area. However, it is crucial to acknowledge that this project is not without limitations. First, the project’s index (rank) system relies on intra-state comparisons and is relative. Real estate tax rates and home values change frequently, and the project offers a snapshot from the year 2022. Second, the analysis focuses on the community (census tract)-level; individual-level circumstances and choices will ultimately dictate the decision and ability to age in place. Although beyond the study’s scope, additional research could pursue broader inquiries such as exploring socioeconomic and demographic commonalities (through, such as, cross-tabulation and other descriptive analyses) of those “challenging” counties (or census tracts) and assessing their unique circumstances and opportunities qualitatively to obtain policy, development, or planning insights.

Considering some public policy implications, the current PA Real Estate Tax/Rent Rebate Program for Seniors applies universal criteria statewide, including age (65+, widow 50+, or disabilities 18+) and income (currently $45,000, changing from $35,000, as of December 2023). Given the “relative” nature of the tax burden, targeted assistance programs (e.g., local tax cap/freeze initiatives) could benefit those narrowly missing the universal criteria. Obviously, supporting local governments in maintaining fiscal health and efficient budget operation can reduce reliance on real estate tax revenue. Undoubtedly, real estate taxes often constitute a significant portion of an older adult’s expenses. Those considering aging in place in Pennsylvania, with an annual household income around $45,000, in counties with a lower CLR and a growing housing market, and in municipalities with higher budget
demands and school districts requiring elevated tax rates, should carefully evaluate the financial feasibility of aging in place.
Acknowledgements

I would like to thank Mr. Zakary Reilly, Research Assistant, for his efforts in data collection. His invaluable assistance significantly contributed to the initiation of this project. Gratitude is also extended to Drs. Dottie Ives Dewey and Gary Coutu for their steadfast support. Their insights and expertise enhanced the quality of this project.

I would like to recognize Ms. Amy Sechrist, Senior Policy Officer at PHFA, for her unwavering support and encouragement, which played a crucial role in the successful completion of this project. This research became possible through the 2023 PHFA Kathy A. Possinger Housing Policy Fellowship, and once again, I express my thanks for their financial support.
References


Appendices

Appendix 1.

*Real Estate Tax Rate (%) by Municipality in Pennsylvania*
Appendix 2.

*Effective Real Estate Tax Rate (%) by Municipality in Pennsylvania*
Appendix 3.

*Median Real Estate Tax Payment ($) by Municipality in Pennsylvania*
Appendix 4.

Median Real Estate Tax-Income Ratio by Municipality in Pennsylvania
Appendix 5.

*Median Effective Real Estate Tax Rate (%) by County in Pennsylvania*
Appendix 6.

Median Real Estate Tax Payment ($) by County in Pennsylvania
Appendix 7.

Median Real Estate Tax-Income Ratio by County in Pennsylvania
Appendix 8.

Counties That Are Identified as “Challenging to Age in Place” in Pennsylvania
Appendix 9.

*Census Tracts That Are Identified as “Challenging to Age in Place” in Pennsylvania*