Assessment and Analysis of Housing Quality and Policies in Rural Pennsylvania

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Abstract

Sub-quality housing can have negative effects on both the safety and health of residents and on the overall social welfare and economic vitality of the community. Rural areas in Pennsylvania tend to suffer more from issues related to sub-quality housing; however, there is currently no statewide data on housing quality. One of the main goals of this project was to create, validate, and map an index to measure housing quality in rural Pennsylvania to observe spatial patterns and identify socioeconomic factors that are related to housing quality. Second, the research team analyzed the 2019 Home Mortgage Disclosure Act (HMDA) to identify factors that could affect applicants' chances of getting a home improvement loan. Third, this project reviewed five state-level home repair/improvement loans in terms of their requirements and eligibility criteria. This overview allowed the team to identify strengths and weaknesses of the programs, which can then be used by policymakers in consideration of housing improvement loan policies. Fourth, the research team compiled a dataset of property maintenance codes adopted by rural municipalities in Pennsylvania. These data provide first-hand information on approaches rural municipalities currently take to maintain the safety and health of local housing stocks. Lastly, the researchers conducted an online survey to collect information from local municipal administrators and/or code officers regarding the effectiveness of property maintenance codes and challenges faced by local authorities. The final project goal was to provide information in support of improving and maintaining housing quality in rural Pennsylvania.

Keywords: housing quality index; sub-quality housing; rural Pennsylvania; property maintenance codes; housing finance programs

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Executive Summary

The purpose of this study was to assess housing quality and related policies and programs in rural Pennsylvania. The research goals and objectives focused on four areas: gaining a quantitative understanding of housing quality for rural Pennsylvania communities; understanding barriers faced by rural residents in securing loans to address home improvement; understanding municipal policy and implementation regarding housing maintenance codes; and developing policy considerations that address the key issues regarding housing quality in rural Pennsylvania. For the purpose of this study, which was conducted in 2021-2022, the researchers used the Center for Rural Pennsylvania's 2010 definition of rural municipalities: a municipality is rural when the population density within the municipality is less than the statewide average density of 284 persons per square mile, or the total population is less than 2,500 unless more than 50 percent of the population lives in an urbanized area as defined by the U.S. Census Bureau.

The researchers used two existing datasets (2015-2019 American Community Survey and 2019 Home Mortgage Disclosure Act data), field visits to 13 rural Census tracts, a review and assessment of home improvement loan programs, web-based research on property maintenance codes, and an online survey to assess sub-quality housing and related finance and policy issues in rural Pennsylvania.

Housing Quality Index

By using the 2015-2019 American Community Survey, the research team identified nine indicators of housing quality and created a housing quality index based on the following variables: *no heating fuel*, *house built before 1939*, *wood as heating fuel*, *coal/coke as heating fuel*, *no complete kitchen*, *no complete plumbing*, *no internet*, *overcrowded*, and *no telephone service*. The index value ranged from 3 to 47, where lower values suggest better housing quality. The index showed that, on average, the quality of rural housing is lower than urban housing. Specifically, rural residences were more likely to burn coal/coke as heating fuel, affecting a healthy living environment. Fewer rural Pennsylvania homes had phone or high-speed internet services. Finally, rural housing units were more likely to have incomplete plumbing and kitchens than their urban counterparts. It is interesting to note that urban residents were more likely to live in older housing units that were built before 1980, which could expose them to potential danger of lead paint.

Furthermore, the researchers investigated the relationship between the housing quality index and demographic and socioeconomic characteristics. The findings indicated that median household income, education levels, median home values, percent owner-occupied homes, median taxes paid, marital status, and race all had significant relationships with housing quality. Household income and educational level had the strongest association with housing quality: as the two measurements increase, housing quality increases (housing quality index decreases).

Home Improvement Loan Factors

The research team examined factors impacting applicants' chances of obtaining home improvement loans in rural Pennsylvania. An analysis of 2019 Home Mortgage Disclosure Act (HMDA) data showed the top three reasons for rural applications to be denied are poor credit history, debt-to-income ratio, and lack of collateral. It is important to note that an increase in debt-to-income ratios reduced one's chances of getting loan approval by about 55 percent. Urban applicants were 24 percent more likely to get loan approval than rural applicants. Joint (married or cohabitating) applicants' chances of getting loan approval were 65 percent higher than single applicants.

Geographically, the research team identified clusters of the highest denial rates in northeastern Pennsylvania (Pike, Monroe, and Carbon counties), outside of Erie (parts of Warren and Crawford counties), parts of Potter and Clinton counties in north central Pennsylvania, and parts of Somerset and Bedford counties in the south.

Age was one major predictor of one's likelihood of securing a home improvement loan. Increase in age increased one's chance of getting loan approval by 12 percent. Young people under age 25 or between ages 25 and 34 were less likely, in general, to get approved for home improvement loans, regardless of location. For the category of debt-to-income ratio, those who were in the 65 to 75 age category were affected the most compared to younger applicants. Credit history affected the middle age groups the most, and collateral was the top denial reason for younger applicants.

This research showed that minorities were less likely to secure home improvement loans compared to white applicants. For instance, the chance for Black applicants to get loan approval was 33 percent lower than for white applicants. If applicants were of two or more minority groups, their chance of getting an approval was 64 percent lower than whites. Among those who live in rural Pennsylvania, poor credit history was the top reason for denial for American Indian, Black, Hawaiian, white/minority joint applicants, and minority joint applicants. For Asian and minority joint applicants, the major challenge was high debt-to-income ratio.

Assessment of Pennsylvania Housing Finance Agency (PHFA) Home Improvement Loan Effectiveness

The research team first reviewed the PHFA website to assess the purposes, eligibility, and limitations of the five home improvement loan programs operated by the Agency: The ACCESS Home Modification Program, HomeStyle® Renovation Program, Purchase & Improvement Loan, Homeowners Energy Efficiency Loan Program (HEELP), and Pennsylvania Infrastructure Investment Authority (Pennvest) Homeowner Septic Program. All five programs greatly benefit applicants in meeting their home improvement financial needs by providing low interest loans. However, some of their requirements can be restrictive. For instance, the Purchase & Improvement Program has a requirement of no more than 30 percent debt-to-income ratio, which is beyond the reach of the majority of rural applicants.

In the past, the PHFA has served hundreds of applicants per year. The COVID-19 pandemic and increases in the price of construction materials have negatively affected the number of applications they received. The HEELP program has a loan approval rate of 30 percent. The Pennvest program has a much higher approval rate of 78 percent, and the figure can be 100 percent if the applicants meet the requirements. PHFA stated that the debt-to income ratio limit can go up to 47 percent for Pennvest and 52 percent for HEELP if the applicants can provide evidence of additional household income and other financial allowances. In addition, the debt-to income ratio can actually be as high as 50 percent to be eligible for the ACCESS program, the Purchase & Improvement loan, and the HomeStyle® Renovation program. This figure is higher than what stated on the PHFA website, which opens the door to more applicants.

At the time of the research, PHFA reported that there were no assistance efforts targeted to rural Pennsylvania, as similar outreach is conducted statewide. Educational outreach for HEELP includes mailings and discussions with "legislators, community action agencies, weatherization providers, municipal authorities and municipalities," and a network of counseling agencies with free homebuyer education is available to those with an interest in securing PHFA financing.

A Database of Municipal Property Maintenance Codes for Municipalities that Have Adopted the Uniform Construction Code (UCC)

The research team identified 1,201 rural municipalities in Pennsylvania that opted in to the UCC, and the team created a database of their property maintenance code adoption status. Of the 1,201 municipalities, 112 adopted the International Property Maintenance Code (IPMC); 10 adopted BOCA (Building Officials and Code Administrators International, Inc.) National Property Maintenance code; 53 enacted and adopted local ordinances; and 1,026 have not adopted property maintenance codes. In other words, 1,417 rural municipalities out of the 1,592 total rural municipalities in the Commonwealth (89 percent) have not adopted property maintenance codes.

Among the 112 municipalities that have adopted the codes, the extent of penalty varies, depending on their interpretation of the guidelines. In general, the penalty often involves monetary fines and/or imprisonment if violators fail to pay the fine. Of all those who adopted IPMC, only one borough did not specify the penalty.

Another issue raised while compiling the dataset was who is responsible for code enforcement. The research results show that out of the 175 municipalities that adopted either IPMC or local ordinances, 41 percent have appointed code enforcement officers; 79, or 45 percent, contracted with third party companies; and the remaining was "unknown," as the research team could not locate the information. It is interesting to note that municipalities in Armstrong County joined others to form a group, then contracted with a company to perform third party inspections. Two other counties, Bradford and Cambia, created intergovernmental agreements and enforce the codes at the county level.

Survey of Municipal Code Enforcement Officers

The survey indicated that about 58 percent of rural respondents and 27 percent of urban respondents do not have property maintenance codes. Rural municipalities, on average, had a lower number of code violations (21) than urban municipalities (177) in the previous 12 months.

The survey also collected information on the violation types. The top four types of violations were: 1. Excessive weed growth or presence of noxious weeds; 2. Presence and accumulation of objectionable materials and substances; 3. Display of inoperative vehicles; and 4. Grading and drainage problems. Interesting enough, urban municipalities had a significantly higher number of violations in all four types than rural municipalities.

Survey results suggested that staffing is a big challenge for small municipalities to enforce the codes. In addition, property maintenance code violations were often treated with low priority at the district magistrate. Another obstacle was the difficulty in locating the owners of the problem property. The general low value of rural housing makes it even more challenging to take corrective actions.

Policy Considerations

Policy considerations developed through this project include a focus on the following:

- Address the social, economic, and demographic barriers to housing quality in rural Pennsylvania;
- Use visualization technology to identify rural areas that have the most critical need in terms of housing;
- Review state-level home improvement loan assistance programs and their eligibility criteria to help residents access funding; and
- Consider programs/support for municipalities to adopt and enforce property maintenance codes.

Conclusions

Rural Pennsylvania residents are more likely to live in sub-quality housing, which could negatively affect their health, safety, and access to other resources. This research identified multiple factors that contribute to this problem, ranging from resident-level socioeconomic and financial characteristics to community-level economic well-being to municipal-level ordinance enforcement efforts. The research team recommends that policymakers take these factors into consideration to enact more efficient policies to provide a healthy living environment for Pennsylvania residents.

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Introduction

Sub-quality housing can negatively affect both the safety and health of residents and the overall social welfare and economic vitality of communities. The physical condition of a home, as well as the social and physical environment surrounding the home, all contribute to housing quality, which is assessed by examining: structure and materials, quality of indoor systems (e.g. plumbing and kitchen), health-threatening elements (e.g. pest infestation; presence of lead and/or mold), site and neighborhood, and space and security (U.S. Department of Housing and Urban Development, 1999). The American Housing Survey (AHS), a national-level housing dataset, currently collects this information; however, due to data confidentiality, AHS does not allow users to differentiate rural or urban locations. As a result, there is currently no statewide data on housing quality in rural Pennsylvania (Reina et al., 2020). Preliminary analysis of the 2015-2019 American Community Survey (ACS) 5-year data shows that rural Pennsylvanians are much more likely than their urban counterparts to live in older and sub-quality housing. Hence, creating a measurement for housing quality and building a database for housing stock quality are two prime concerns for rural Pennsylvania.

There are two laws specifically related to housing quality in Pennsylvania: the Housing Finance Agency Law of Dec.3, 1959 (P.L. 1688, No 621), which created the Pennsylvania Housing Finance Agency (PHFA), and the Pennsylvania Construction Code Act of Nov.10, 1999 (P.L. 491, No. 45), which established the Uniform Construction Code (UCC). These laws complement each other by empowering individuals and municipalities to build, maintain, and improve the quality of housing stock in the Commonwealth.

Before 1999, Pennsylvania municipalities either adopted their own ordinances or had no construction code at all. The latter was more pronounced in rural Pennsylvania. Such inconsistencies in construction requirements across municipalities could expose occupants to “risk from substandard construction” (PA Construction Code Act, 1999). The Pennsylvania Construction Code Act (Act 45) intended to establish uniformity in housing construction code across Pennsylvania. Serving as a broad guideline, Act 45 gave municipalities great flexibility in adopting and amending the construction code enforcement; Act 45 gave Pennsylvania’s 2,560 municipalities the option to “opt-in” or “opt-out,” where opt-in municipalities elected to enforce UCC. As of 2020, 95 percent of Pennsylvania municipalities chose to opt-in; the opt-out municipalities chose not to be responsible for UCC enforcement. Municipalities that opted out hand over all the UCC enforcement authority to the Pennsylvania Department of Labor and Industry when it comes to non-residential building/structure inspections. Residential property owners in those municipalities have to hire a third-party agency to conduct the code inspection for them.

According to Kasal and Turns (2010), one main issue of Act 45 is inconsistent enforcement responsibility. Due to variation in funding and resources, some municipalities have the capacity to hire their own code enforcement officers, while others share enforcement officers through intergovernmental agreement. Rural municipalities are much

more likely to out-source enforcement responsibility to a third-party agency than their urban counterparts (Kasal and Turns, 2010). This patchwork style of code enforcement effort contributes to inconsistent housing quality across the opt-in municipalities.

The 2015 amendment to Act 45 (Section 141A04) allowed municipalities to adopt their own property maintenance code. A preliminary review of sample property maintenance codes by the research team revealed inconsistencies in codes across municipalities: some adopted the International Property Maintenance Code 1998 edition, some adopted a more recent edition of the same code (2009), and some created their own codes. Often, residents are confused or unaware of property maintenance codes in their municipality (Housing Alliance of Pennsylvania, 2016). The Housing Alliance of Pennsylvania (2016) suggests that it is important to have clear standards for occupants and/or property owners so that municipalities can maintain quality housing stock. The same problem related to inconsistent code enforcement efforts applies here. As those property maintenance codes are outside the scope of the UCC, the state has no authority in challenging decisions made by a local codes officer; residents can only file petitions to their local UCC appeal board. This process can be a concern if the municipality is under-staffed, or the responsibility is sourced out to a third-party agency. With few studies focused on rural housing quality to date, a statewide survey to collect information on code enforcement efforts would help in understanding how effective local ordinances are in maintaining the quality of local housing stock, especially in rural municipalities.

In addition to understanding property codes, residents' access to the financial resources necessary to manage property is equally or more important for maintaining quality housing. This is especially true for rural Pennsylvanians, whose average per capita income is much lower than the state average ($42,463 vs. $56,225, respectively) (U.S. Department of Agriculture Economic Research Service, 2018). Mallach (2018) suggests poverty and depopulation are two main reasons that lead to rural residents abandoning their properties, as they cannot afford to maintain them. These units deteriorate over time and become a blight to the neighborhood.

PHFA oversees the Homeowners Emergency Mortgage Assistance Program (HEMAP). Since 1983, this program has prevented 46,000 Pennsylvanians from losing their homes to foreclosure. PHFA provides five loan programs for home improvements: ACCESS Home Modification Loan can make homes accessible for individuals with disabilities; HomeStyle® Renovation Program provides low interest loans for owners to repair their homes; the Purchase & Improvement Loan Program allows those who qualify for the Keystone Home loan to combine their purchase and repair costs into one single loan; the Homeowners Energy Efficiency Loan Program (HEELP) allows borrowers to make specific energy efficiency repairs; and the Pennvest Homeowner Septic Program provides assistance to qualified homeowners to repair their septic system. Loan applicants must go through the underwriting process to verify their ability to repay. Based on an analysis of the 2017 Home Mortgage Disclosure Act data, Reina et al. (2020) concluded that race, income level, and lack of collateral are the main reasons that individuals can be denied on

a home purchase loan application. Little is known about how these factors affect individuals' qualifications to obtain home improvement loans. It is critical to gain a good understanding about financial challenges faced by rural property owners, and factors that could prevent them from obtaining loans to perform necessary repairs to their properties. Research outcomes will provide policy implications to better address problems impeding social and economic vitality in rural Pennsylvania.

For this research, which was conducted in 2021-2022, the goals and objectives focused on four areas: gaining a quantitative understanding of housing quality for rural Pennsylvania communities (Goal 1); understanding the opportunities and barriers faced by rural residents in accessing funds to address home improvement (Goals 2 and 3); understanding municipal policy and policy implementation regarding housing maintenance codes (Goals 4 and 5); and developing policy recommendations that address the key issues regarding housing quality in rural Pennsylvania (Goal 6). For the purpose of this study, the researchers used the Center for Rural Pennsylvania's 2010 definition of rural municipalities: a municipality is rural when the population density within the municipality is less than the statewide average density of 284 persons per square mile, or the total population is less than 2,500 unless more than 50 percent of the population lives in an urbanized area as defined by the U.S. Census Bureau.

The specific research objectives were:

- Objective #1: Measure and map housing quality in rural Pennsylvania with a quantitative index based on identified factors that affect housing quality.
- Objective #2: Develop a demographic and socioeconomic database that describes factors that affect rural Pennsylvanians' eligibility to obtain a home improvement loan.
- Objective #3: Assess the effectiveness of PHFA home improvement loans on addressing housing quality issues in rural Pennsylvania.
- Objective #4: Develop a database of municipal property maintenance codes for municipalities that have adopted the UCC.
- Objective #5: Gain an "on the ground" understanding of practices and challenges related to enforcing property maintenance codes through a survey of local code enforcement officers.
- Objective #6: Develop policy recommendations for maintaining and improving housing stock quality in Pennsylvania.

Methodology

Objective #1: Measure and map housing quality in rural Pennsylvania neighborhoods with a quantitative index based on identified factors that affect housing quality

- Task #1a: Use variables that are directly associated with housing quality - such as age and value of the building, coal as heating fuel, number of people per room, incomplete plumbing system, and incomplete kitchen - to create and

validate a quantitative index to measure housing quality in rural Pennsylvania neighborhoods.

HUD uses a comprehensive 13-factor list to assess housing quality; however, HUD's survey does not allow researchers to identify the rural/urban status of housing units. Alternatively, the 2015-2019 American Community Survey (ACS) data are the only publicly available data that provide several proxy variables that can be used to indicate poor housing quality. With these data, the researchers used "occupied housing unit" as an analysis unit. By definition, "a housing unit is occupied if a person or group of persons is living in it at the time of the interview or if the occupants are only temporarily absent, as for example, on vacation" (U.S. Census Bureau, 2021).

Based on the literature review, the research team identified nine major indicators available in ACS data of housing quality: no heating fuel, houses built before 1939, wood as heating fuel, coal/coke as heating fuel, no complete kitchen, no complete plumbing, no internet, overcrowded (more than one person per room), and no telephone service. As these are variables at the census tract level, which are irregularly sized in terms of area and population, the research team used percentages rather than estimates to assess the severity of those issues in each tract.

When it comes to assigning scores to each indicator, the researchers deemed that no heating fuel, no complete kitchen, and no complete plumbing should receive higher scores as they are more severe problems. The remaining indicators received lower scores. For example, for the indicator of no heating fuel, the researchers first calculated the median value (0.6) and quantile distribution of this variable, and then assigned scores to each value range, as shown in Table 1.

Table 1: Quantile categories and corresponding scores for the indicator of no heating fuel.

Value Range	Score
0	0
0-0.5	2
0.6-1.1	4
1.2-1.6	6
1.7-3.2	8
3.3-7.3	10

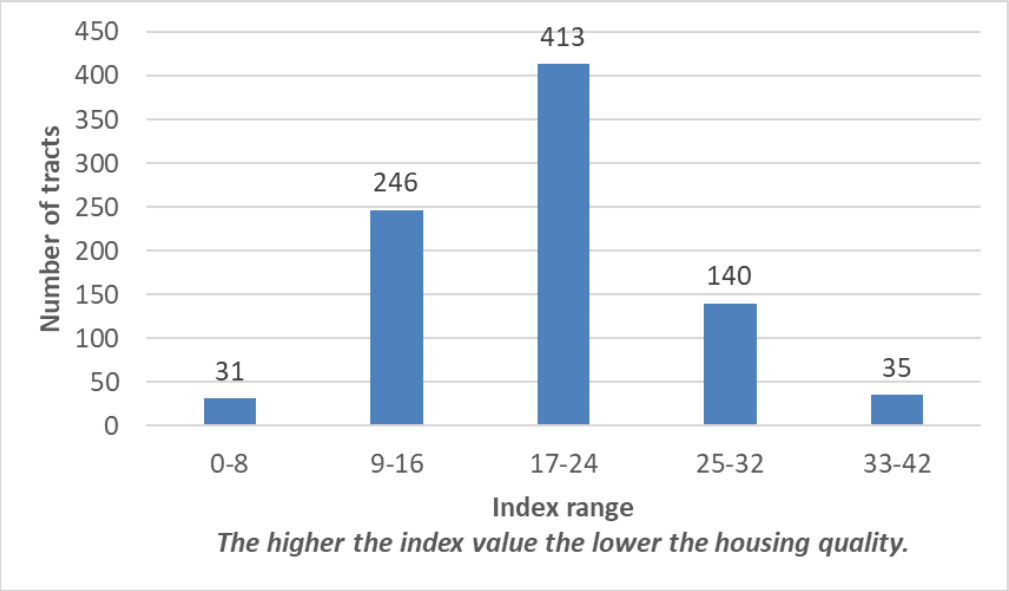
The researchers then added scores of the nine indicators to create the final index for housing quality. The resulting index values ranged from 0 - 42, where higher values correspond to poorer housing quality and lower values correspond to higher quality housing.

To validate the index, field assessments evaluated home exterior conditions in communities across a representative sample of municipalities. Field assessments were

based on easily observable external criteria, such as the status of the roof, siding, windows, doors, vehicles, and yard. These criteria are common components of field-based housing and neighborhood quality assessments, such as PQI (Eggers and Moumen, 2013) and Residential Environment Assessment Tool (REAT) (Rodgers et al., 2018). An exterior assessment can be completed rapidly and effectively; as there is a relationship between exterior problems (such as a sloping outside wall) and interior problems (such as water damage) (National Center for Healthy Housing, 2015), this field assessment can be used to infer housing quality.

To identify tracts to target for field data collection, the researchers began by selecting census tracts located in rural counties (N=865). Then, a histogram of index values was generated across five classes (*Figure 1*). Class breaks are roughly equal and are based on the range (0-42) and the target number of classes (5). When selecting the target number of classes, it is desirable to select a number of classes that faithfully represents the distribution of the index values, and also allows for an intuitive interpretation of the data. Five classes met both of these criteria, where index values ranging from 0-8 represent tracts with the very highest housing quality, tracts with indices ranging from 17-24 represent "average" housing quality, and tracts falling in the highest range (33-42) represent the lowest housing quality. Index values are all integer (whole) numbers.

Figure 1: Histogram of index values across 5 classes.



Next, the proportion of tracts in each class was calculated. The researchers initially intended to sample 20 census tracts, a sample size that would be realistic to achieve and that would still be large enough to represent the variability in the data. The initial number of samples in each class was allocated based on the proportion of tracts in each class. This initial allocation resulted in only one tract in the highest index value range (tracts with the poorest housing quality) being selected, so the research team increased the

number of sample tracts in the two categories with the highest index values and decreased the number of sample tracts in the middle and lower index value classes. The resulting sample scheme is shown in *Table 2.* Tracts were then selected to optimize both geographic variability and driving time. The researchers also ensured that tracts were located in rural municipalities to avoid urban boroughs or municipalities that are located in rural counties. It should be noted that, due to driving distances, field data collection took longer than anticipated and the researchers were only able to collect samples in 13 tracts, although the researchers prioritized sampling in the tracts with higher index values/lower housing quality since this was the primary focus.

Table 2: Proposed number of sample tracts in each index value bin range.

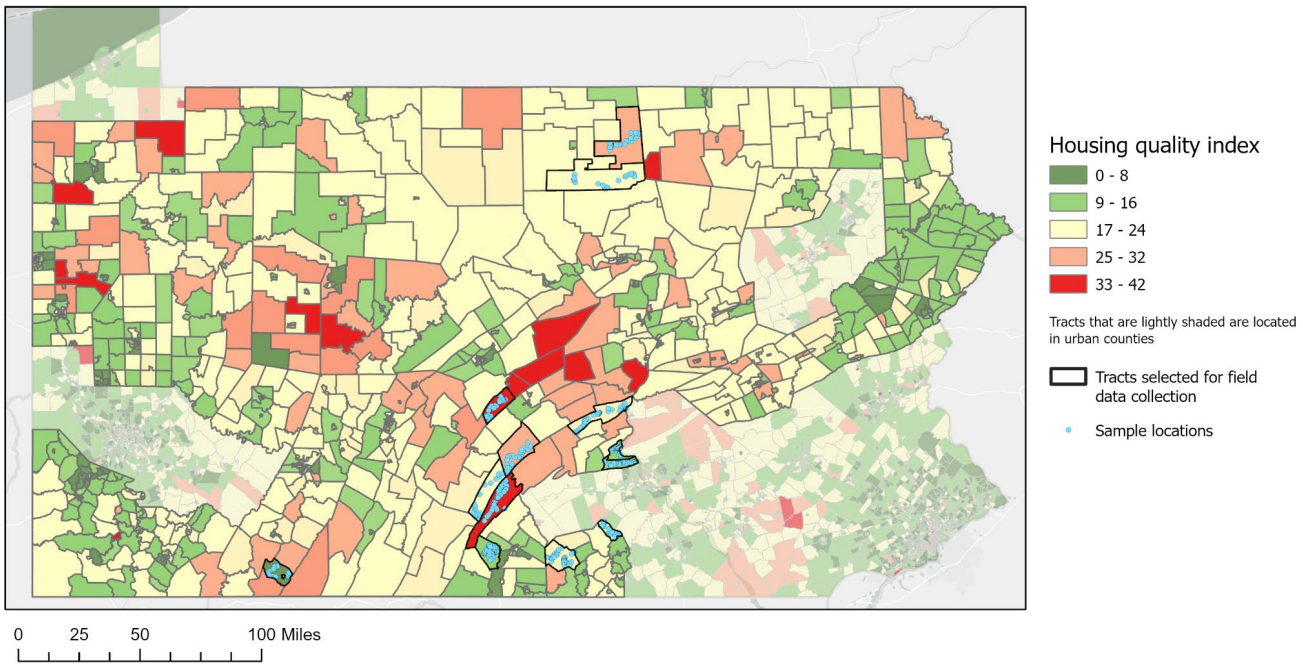
Range	Rural Tract Count (N = 865)	Proportion of tracts in each range	Proposed number of samples	Achieved number of samples
0 - 8.4	31	0.036	1	0
8.6 - 16.8	246	0.284	4	2
16.8 - 25.2	413	0.477	6	4
25.2 - 33.6	140	0.162	6	5
33.6 - 42	35	0.040	3	2

The total number of housing units within each selected tract ranged from 1,107 to 3,056. After considering travel time and costs, the researchers decided to select 1.5 percent of the total housing units as a target number for observations. This sampling rate was considered to be both achievable and sufficient to capture the variability of housing within each tract. With the calculated 17-51 units to be sampled in each tract, the total planned sampling number was 461 housing units.

In the field, the objective was to obtain the target number of housing units while covering the entire geography of the tract. The researchers typically collected data in teams, a driver and a navigator/data collector, and prior to each field day the teams would plan a route that would traverse the entire tract, often identifying east/west and/or north/south transects depending on the road network and geography of each sample tract. The rule of thumb was to sample every 10th house, but it was not unusual to have to adjust this rule. For example, in small rural villages where there was a high density of housing units, the researchers decreased sampling density to avoid clustering the samples in one area. In addition, there were times when it was not safe to collect data for a specific housing unit due to its location, for example on a blind corner, hill, or a busy road with no shoulder. In those cases, data for the next possible housing unit were collected.

After the data collection was completed across 13 tracts, the research team removed any housing units that inadvertently fell outside of the selected tracks along with incomplete entries. The end result was 382 valid housing unit visits. *Figure 2* is a map of the 865 Census tracts located in Center for Rural Pennsylvania defined rural counties, with the Census-based index values shown in shades of green (high housing quality) to red (low housing quality). Tracts where field data were collected are outlined in dark black lines and sample points are indicated in blue.

Figure 2: Housing Quality Index for 865 rural Census tracts, with sample locations.



The researchers developed a 27-item property inspection sheet to conduct the field assessment, based on extensive literature review and past field work experience. This sheet covers the following five categories: grounds, structure, windows and doors, building exterior, and roof. Each category contains four to seven specific items (*Table 3*). For instance, under the category of "Structure," the researchers used items such as "elevated deck with missing/damaged railing" to capture possible structural problems. This inspection sheet was integrated with ArcGIS Survey123, a survey tool that allows researchers to easily enter and store inputs while in the field, either online or offline (*Appendix A*). Researchers and assistants were also able to take pictures and store them in the survey tool as reference for later use.

The researchers then calculated an index for each property assessed using a weighting scheme (from 1-5), depending on the severity of the issue. For example, if "boarded windows" were observed, then this item would receive 5 points, while the presence of "broken or cracked windows" would receive 2 points (*Table 2*). If a characteristic was not

present (i.e., the home did not have skylights) or if the data collector was not able to assess a characteristic, it was recorded as "unable to assess."

The values were then summed for each property and an index score was calculated by dividing the summed value by the maximum possible value (not including "unable to assess" variables) and multiplied by 100. The mean and median value for indices for all properties within a sample census tract were then calculated. This field-based index for each census tract was then used to validate the Census-based index through a simple regression analysis.

Table 3: Variables collected for surveyed properties, and weighting applied if present.

Variable	Weight applied
Grounds	
● Standing water	2
● Tree overhanging roof or detached structures	2
● Dilapidated fence or detached structures	1
● Garbage and/or abandoned vehicles, appliances, etc.	1
● Damaged or no exterior lighting	1
● Property borders railroad tracks or airfield	1
● Industrial properties in close proximity	1
Structure	
● Porch or deck appears structurally compromised	5
● Elevated deck with missing/damaged railing	5
● Bowing/sagging exterior wall(s)	5
● Foundation crumbling or shifting	5
● Chimney damaged, leaning, or separating from structure	2
Windows and doors	
● Front door is not intact or does not appear sound/secure	2
● Broken or cracked windows	2
● Boarded windows	5
● Windows covered with insulating materials	2
Building exterior	
● Loose, missing, rotten, or damaged siding	2
● Masonry has major cracks or deterioration	2
● Wall(s) have significant vine growth	1
● Peeling or deteriorated paint	1
● Curled, broken, or missing shingles	2
Roof	
● Moss growth present	1
● Rust or rot present	1
● Tarps or other temporary materials present	5
● Broken skylight	2
● Gutters show signs of rust, sagging, detachment, or vegetation growth	1
● Gutters missing	2

- Task #1b: Visualize the spatial distribution of sub-quality housing in rural Pennsylvania by mapping the index value.

Geographic Information Systems (GIS) mapping software was used to visualize the spatial pattern of housing quality for census tracts across rural Pennsylvania. In addition, a hot spot analysis on the index value was performed in ArcGIS Pro 2.9, by calculating the Getis-Ord Gi* statistic (Getis and Ord, 1992, Mitchell, 2005) for each tract. This analysis calculates a z-score (the Gi* statistic) and p-value for each census tract. As a z-score, the Gi* statistic indicates how far a particular data point is from the mean. Z-scores are standardized to range from -3 to +3, where a z-score of 0 means that the value for a specific data point is equal to the mean and values close to -3 or +3 are farthest from the mean. A map Gi* reveals both where features with either high or low values (relative to the mean) cluster spatially and the p-value indicates whether that clustering is statistically significant. This hot spot analysis reveals where there is clustering of high index values/low housing quality, where communities may be facing similar housing challenges.

- Task #1c: Statistically relate the sub-quality housing stock index to socioeconomic and demographic characteristics.

To better understand why some communities are more likely to have a higher percentage of sub-quality housing, it is important to study the relationship between the community-level socioeconomic characteristics and sub-quality housing. Previous research suggested that socioeconomic and demographic characteristics such as marital status, income, employment status, minority status, education, and housing expenditure have significant impacts on housing quality (Friedman and Rosenbaum 2004; Housing Assistance Council, 2015; Latimer and Woldoff, 2010; Lichter et al, 2016). For example, median housing value is expected to have a negative relationship with the housing quality index; as housing value increases, the index decreases, so housing quality is higher. Hence, the researchers selected the following tract-level variables from the 2015-2019 ACS data: median home value, median household income, median taxes paid, selected monthly owner costs greater than 30 percent of household income for housing units with and without a mortgage (to represent cost-burdened households), percent owner-occupied housing units, percent owner-occupied white non-Hispanic, unemployment rate, percent of population 25 and older with at least a high school education, and married or cohabiting couples. Pearson correlation coefficients were calculated for pairwise comparisons between the housing quality index and each of these census variables. Correlations were run for all tracts across Pennsylvania and for tracts located in rural counties.

At the time this research was conducted, the 2015-2019 ACS data were the most recent available data that allowed the researchers to study housing quality indicators at the Census tract level. One main advantage of this multi-year data set is “increased statistical reliability of the data for less populated areas and small population subgroups” (U.S. Census Bureau, 2019). Rural housing stock tends to change rather slowly. Hence

even though the research team conducted the field analysis two years later the 5-year ACS estimates were collected, the data gap is negligible.

Objective #2: Develop a demographic and socioeconomic database that describes factors that affect rural Pennsylvanians' eligibility to obtain a home improvement loan

The ability to secure a home improvement loan is critical for most homeowners to maintain and improve the quality of their housing. The Consumer Financial Protection Bureau (CFPB) Home Mortgage Disclosure Act (HMDA) data are the largest and most comprehensive data on the U.S. mortgage market. This dataset includes variables such as income level, race and sex of homeowners, types of mortgages, loan application status, amount of loan, interest rate, and applicants' eligibility information. The most recently released 2019 HMDA data are unique and not directly comparable to previous years' collections, as HMDA revised its survey questionnaire and provides more detailed information on race, gender, age, and debt-to-income ratio information of mortgage applicants (Federal Financial Institutions Examination Council, 2021). The 2019 dataset contains 597,504 cases for Pennsylvania collected at the Census tract level. The researchers aggregated tract level data based on their rural/urban status, allowing an estimation of how rural locations may affect one's ability to access loan programs, and hence their housing health and safety. In addition, the researchers analyzed how factors like race/ethnicity, age, income, income-to-debt ratio, and credit score could affect one's chance of securing a home improvement loan in rural Pennsylvania. The results contribute to a database of socioeconomic and demographic information pertaining to rural Pennsylvanians' eligibility for home improvement loans.

Objective #3: Assess the effectiveness of PHFA home improvement loans on addressing housing quality issues in rural Pennsylvania

The research team initially proposed to interview state office staff on how home improvement loans offered by the Pennsylvania Housing Finance Agency (PHFA) have worked in rural Pennsylvania. Unfortunately, the researchers were unable to secure either an in-person or virtual meetings with either the executive director or policy director of the agency; however, the research team did receive a letter of acknowledgement and support from PHFA, along with a written response to questions. Additionally, the research team reviewed information on the five improvement and repair loan programs provided on the PHFA website.

Objective #4: Develop a database of municipal property maintenance codes for municipalities that have adopted the UCC

- Task #4a: Develop a database of municipal property maintenance codes and categorize them based on the dominant approaches used by municipalities.

The research team first identified rural municipalities that had opted-in to the UCC code from the website titled "Municipal Elections and Contact Information," which is

maintained by the Department of Labor and Industry. The team then searched online to identify rural municipalities that have adopted property maintenance codes and collected the text of these codes. This information was gathered from county or municipal websites and from e360codes, an online research tool developed by General Code that allows local governments to find, access, and share codes and ordinances. A scoring rubric was developed to allow researchers to categorize collected codes based on their dominant approaches. The researchers also took note of rural municipalities that did not yet have a property maintenance code in place.

- Task #4b: Summarize commonalities and differences in municipal property maintenance codes.

With information collected from objective #4a, the research team identified commonalities and differences in municipal property maintenance codes, assessing the value of standardization to inform policy implications.

Objective #5: Gain an "on the ground" understanding of practices and challenges related to enforcing property maintenance codes through a survey of local code enforcement officers

The research team developed an online survey to collect both quantitative and qualitative information from code enforcement officers in rural and urban municipalities. First, the research team developed a survey instrument with 14 questions (*Appendix C*). These questions focused on the frequency and types of code violation, challenges local officers have experienced, and other insights they could provide to improve the system. To minimize the length of the online survey (and thus maximize responses), the survey used conditional logic to limit the number of questions shown to respondents. The survey instrument was reviewed and approved by the Shippensburg University Committee on Research with Human Subjects. Secondly, the researchers obtained municipal secretary contact information from *eLibrary*, which is maintained by the Pennsylvania Department of Community and Economic Development and the County Commissioners Association of Pennsylvania. The research team reviewed a survey on the UCC adoption status in rural Pennsylvania conducted by Kasal and Turns (2010) and determined that municipal secretaries may be more likely to answer survey requests or know the best contact to respond to the survey. The Center for Land Use and Sustainability (CLUS) has experience with survey research and maintains a website with survey functionality. The survey was hosted directly on the CLUS website at https://centerforlanduse.org/.

Objective #6: Develop policy recommendations for maintaining and improving housing stock quality in Pennsylvania

This research yielded three key datasets for rural Pennsylvania:

1. Quantitative index of housing quality for Census tracts.
2. Demographic and socioeconomic database that describes the factors that affect rural Pennsylvanians' eligibility to obtain a home improvement loan.

3. A database of municipalities that have adopted property maintenance codes or local codes that aim at maintaining a safe and healthy housing stock in their areas.

With these datasets and the analytical insights, policymakers will be able to gain a better understanding of the extent of rural housing quality issues in the Commonwealth. Findings will present an overview of the effectiveness of existing housing programs and policy recommendations to address some of the most pressing issues related to housing quality in rural Pennsylvania.

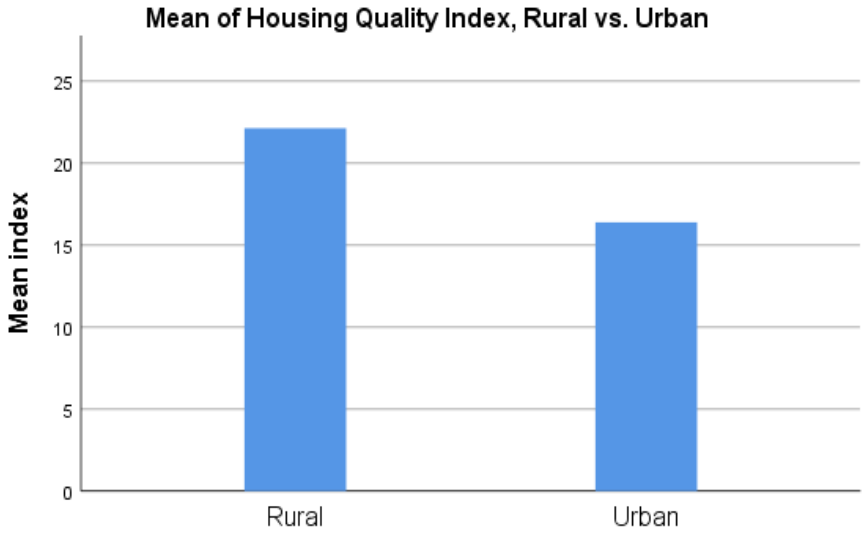
Results and Findings

Outcome #1: A quantitative index and map of housing quality in rural Pennsylvania

Objective #1a: Use variables that are directly associated with housing quality - such as age and value of the building, coal as heating fuel, number of people per room, incomplete plumbing system, and incomplete kitchen - to create and validate a quantitative index to measure housing quality in rural Pennsylvania neighborhoods.

The housing index value ranged from 3 (highest housing quality) to 47 (lowest housing quality). Most census tracts in Pennsylvania received a value of 19. The researchers compared the index value between rural and urban tracts. On average, the index value in rural areas was 5.73 points higher than it is in urban areas, and the difference was statistically significant. This suggests that housing quality in rural areas is lower than it is in urban areas (Figure 3).

*Figure 3: Average Housing Quality Index *, Rural vs. Urban, 2019.*



*higher index score represents lower housing quality

In Table 4, the researchers calculated the mean percentages of the main components of the Index for rural and urban tracts in Pennsylvania. The result indicated that, on average, 74.23 percent of urban residents and 68.74 rural residents live in houses built

before 1980. Lead paint was legally banned in 1978. Therefore, living in houses built before 1980 could expose residents to the possible dangers of lead paint. Second, rural residents, on average, are more likely than their urban counterparts to use coal for heating (2.25 percent higher). Third, on average, 22.21 percent of rural residents and 18.01 percent of urban residents have no Internet service. Rural residents are also slightly more likely to live in housing units without complete plumbing, complete kitchens, and telephone services than urban residents. It is interesting to note that urban residents are slightly more likely to live in crowded housing units (0.38 percent higher), on average, than rural residents.

Table 4: Means of Housing Quality Components, Rural vs. Urban Tracts, 2019.

	Crowded	Coal for heating	Lack Complete Plumbing	Lack Complete Kitchen	No Internet	No Telephone	Older Building	No Heating Fuel	N
Urban	1.58 % *	0.53%*	0.36%*	0.90%*	18.01%*	1.64%*	74.23%*	0.44%	2326
Rural	1.20 %*	2.78 %*	0.54%*	1.06%*	22.21%*	1.94%*	68.74%*	0.38%	864

* The difference between rural and urban is significant.

The results of the field-based validation were inconclusive. *Table 5* shows the Census-based index for the 13 sample tracts compared to both the average and median values for the field-based index, sorted based on the Census-based index. As the distribution of property index values was highly skewed (to the low end), the median value is a better representation of central tendency. Please note that the ACS data are a 5-year average calculated with data collected between 2015-2019. Hence there could be some lag time between the ACS data and the field observation data.

A regression analysis was performed to quantitatively compare the Census-based index to both the field-based mean and median index. In both cases the variance in the Census-based index that was explained by the field-based indices was low (for the mean, $r^2 = 0.10$ and for the median, $r^2=0.09$) and not statistically significant ($p = 0.29$ for the mean, $p=0.31$ for the median).

Table 5: Comparison of Census-based index of housing quality, field-based average, and median housing quality index based on property assessments.

Census-based index	***Field-based average***	***Field-based median***
13	4.54	1.67
16	2.75	0.00
18	2.09	0.00
21	2.33	0.00
24	7.87	1.61
25	3.42	3.33
26	3.55	1.67
27	4.63	1.67
28	4.64	4.17
32	5.86	1.72
33	13.70	3.23
40	5.65	1.61
40	2.47	0.83

While these results indicate that the Census-based index may need to be interpreted with caution, they do not necessarily imply that they are not valid. Such discrepancies could be the result of housing unit selection methods used by the Census Bureau and this project. Some major limitations of the methods used in this project include: 1.) The researchers and research assistants selected housing units based on convenience of access. Specifically, the team selected houses that can be seen from the vehicle. Without permission, it is impossible to take a closer look at those housing units. As a result, some of the 27 items in the assessment could not be assessed. For instance, foundation or roof issues can be hidden and less visible from a distance. 2.) Rural housing units tend to be either too close to each other (i.e., clustered at a crossroads) or too isolated (i.e., remote areas of Census tracts). This required the researchers to make individual decisions in the field on how to select sample units to reach the goal. This decision-making could lead to oversampling of housing units in one area. 3.) The actual sample size achieved, 13 tracts, was smaller than the desired number of 20. A small sample size means that it is less likely that representative observations will make up the sample.

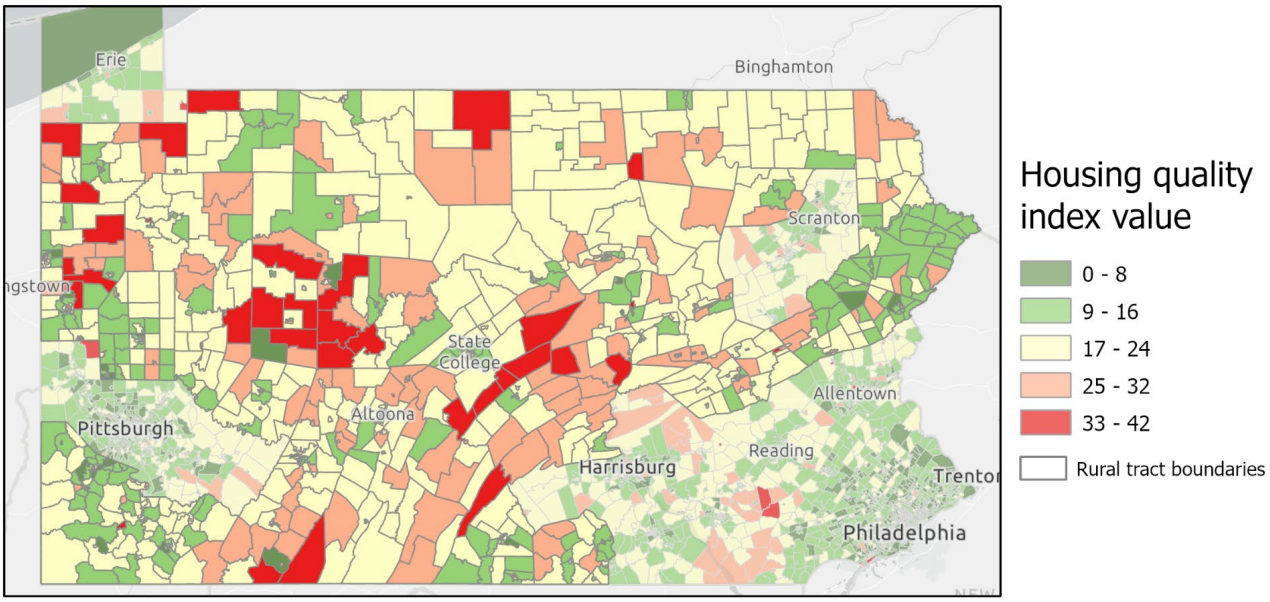
Objective #1b: Visualize the spatial distribution of sub-quality housing in rural Pennsylvania by mapping the index value.

Rural-urban differences noted above are also apparent when the Census-based index was mapped statewide. The upper map in Figure 4 shows the Census-based housing quality index mapped for census tracts. Census tracts shaded in green indicate lower index values/higher housing quality, while tracts shaded in red indicate higher index values/lower housing quality. Tracts outlined in dark black are tracts located in rural counties. There is some apparent clustering of values that is confirmed by the hot spot analysis, shown in the lower map in Figure 4.

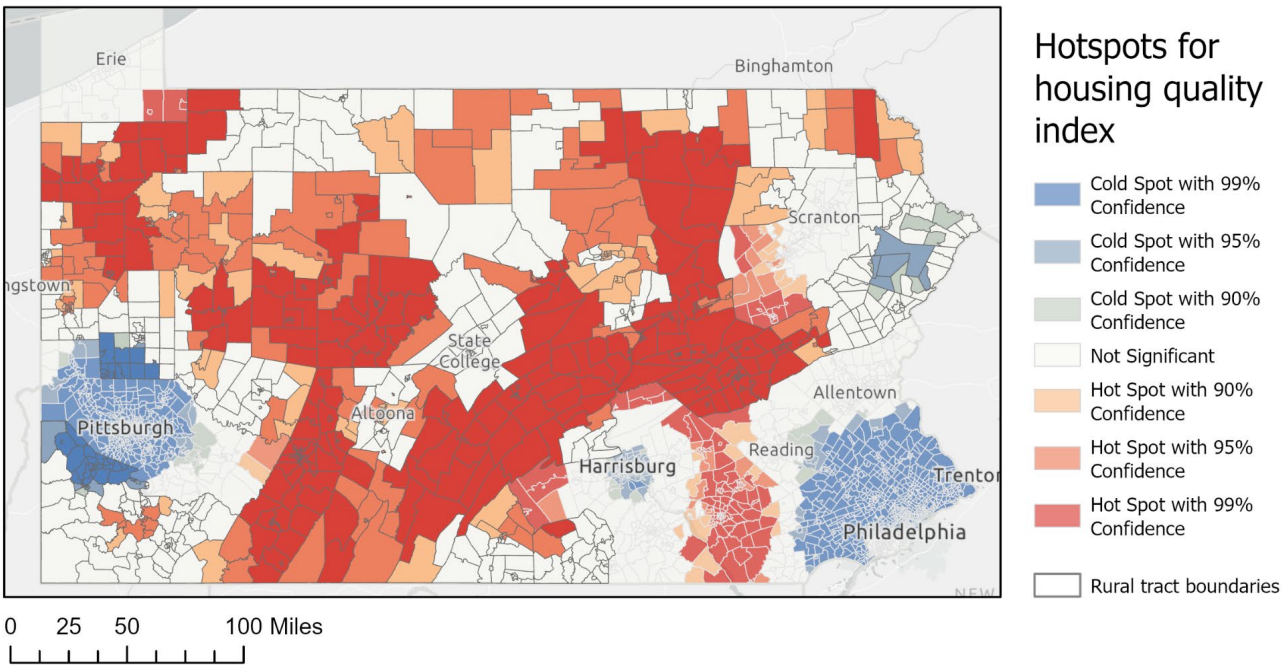
The lower map classified areas into cold spots, which are clusters of low values/high housing quality (shown in shades of blue), and hot spots, which are clusters of high values/low housing quality (shown in shades of red). The confidence levels associated with a tract's membership in a hot spot or cold spot is also indicated; tracts that do not have a statistically significant Gi* statistic (z-score) are shown in white.

The clustering patterns show some notable trends. Urban and suburban areas around Pittsburgh, Philadelphia, and Harrisburg are notable cold spots, where the housing quality index indicates high housing quality. There is also a cold spot in rural Pike and Monroe counties. No other rural areas show cold spots, and hot spots are widespread in central Pennsylvania and the mountains to the west, northwestern Pennsylvania outside Erie, and east of Pittsburgh. Many of these regions correspond with economically depressed counties that have yet to recover from deindustrialization.

Figure 4: Spatial distribution of Pennsylvania Housing Quality Index value (top) and hot spot analysis results (bottom)



Lower index values (in green) indicate higher quality housing, while higher index values (in red) indicate lower quality housing.



Note: In the upper map, Census tracts shaded in green indicate lower index values/higher housing quality, and tracts shaded in red indicate higher index values/lower housing quality. Tracts outlined in dark black are tracts located in rural counties. The lower map classifies areas into cold spots, which are clusters of low values/high housing quality (shown in shades of blue), and hot spots, which are clusters of high values/low housing quality (shown in shades of red). The confidence levels associated with a tract's membership in a hot spot or cold spot is also indicated; tracts that do not have a statistically significant Gi* statistic (z-score) are shown in white.

Objective #1c: Statistically relate the sub-quality housing stock index to socioeconomic characteristics.

Pearson correlation coefficients calculated for pairwise comparisons between the housing index and selected Census variables revealed low to moderate correlations (Appendix E). The correlation coefficient measures the linear relationship between two variables, and the coefficient ranges from -1 to 1. If the correlation coefficient is greater than zero, it is a positive relationship. Conversely, if the value is less than zero, it is a negative relationship. A value of zero indicates that there is no relationship between the two variables, and very lower values (e.g., between -0.1 and 0.1) indicate a very weak relationship. It should also be noted that correlation does not mean causation, it only shows that two variables are related.

When all tracts were analyzed, the highest correlations were found with median household income (-0.45) and the percent of population 25 and older with at least a high school education (-0.40). These same variables also had the highest correlations for rural tracts, although the strength of the relationship differed, where the percent of population 25 and older with at least a high school education produced a correlation coefficient of -0.47 and median household income was -0.32.

Based on the literature, researchers hypothesized that higher levels of income, employment, education, married or cohabitating couples, and owner occupation would generally provide households more economic and social capacity to maintain higher quality housing (resulting in a low housing quality index). Likewise, higher median home values and higher median taxes, variables that are frequently correlated with income, would also be related to the housing quality index. The researchers also assumed that white non-Hispanic households would have better access to funding mechanisms or social capital that would result in higher housing quality/low housing quality index. Conversely, cost burdened households would have lower capacity to address housing quality challenges.

The direction of most of the correlations was as expected: as median home value, median household income, percent owner occupation, median taxes paid, education level, percent married or cohabitating couples, and percent of white non-Hispanic households decreases, the housing index increases and housing quality decreases. While the unemployment rate was expected to also show a negative correlation, the relationship instead showed a positive correlation, although the strength of that correlation is weak, especially for rural tracts (0.20 for all tracts, 0.10 for rural tracts). Cost burdened households also demonstrated a very low correlation.

The fact that several correlations for rural tracts are as strong as -0.30 (or stronger) indicates that the index is capturing some of the underlying processes related to housing quality, highlighting the usefulness of this index despite the inconclusive findings of the field-based validation. Variables that demonstrate moderate correlations (median household income, median taxes paid, and education) likely have an important relationship to housing quality, especially since the variables that make up the housing

quality index capture relatively rare occurrences. For example, the percentage of homes in rural tracts that lack complete plumbing ranges from 0-9.02 percent, with a mean of 0.41 percent, and a median of 0.00 percent; the percentage of homes that lack a complete kitchen range from 0-12.76 percent, with a mean of 0.87 percent, and a median of 0.32 percent; homes with no phone service range from 0-18.97 percent, with a mean of 1.49 percent, and a median of 1.10 percent. The low occurrence of the index input variables may also explain why some of the correlates show low to no relationship (cost burdened households, unemployment rates).

Outcome #2: A demographic and socioeconomic database that describes the factors that affect rural Pennsylvanians' eligibility to obtain a home improvement loan

With the 2019 Home Mortgage Disclosure Act (HMDA) data, the researchers first selected only those who live in Pennsylvania. The researchers then limited analysis to those who applied for a home repair/improvement loan, as this project focuses on housing quality. Lastly, data were collected for tracts within rural/urban counties, according to the Center for Rural Pennsylvania's definition of rural and urban counties. Hence, in the following tables, "rural" refers to tracts located in rural counties in Pennsylvania.

Table 6 shows the basic socioeconomic, demographic, and financial characteristics of rural Pennsylvania loan applicants, compared to their urban counterparts (see *Appendix F* for definitions of key terms and variables related to this section). The results indicated that rural applicants are more likely to be white (87.39 percent) compared to urban applicants (71.53 percent). Black residents constitute only 1.33 percent of rural applicants, while the figure is 9.99 percent in urban areas. The same pattern was seen for Asians, who are more likely to apply for a loan if they live in urban areas. In terms of age distribution, there was no major difference between rural and urban applications.

Table 6: Socioeconomic, demographic, and financial characteristics of rural Pennsylvania loan applicants, compared to their urban counterparts

	Urban	Rural
Race		
N	51,291	14,675
White	71.53	87.39
Black	9.99	1.33
Asian	3.56	0.67
American Indian	0.35	0.24
Native Hawaiian	0.35	0.16
White/minority joint applicants	1.05	0.94
2 or more race applicants	0.18	0.05
Age Category		
25-34	10.98	12.24
35-44	24.15	21.09
45-54	26.97	26.66
55-64	24.36	25.84
65-74	13.53	14.17
Sex		
Male	0.57	0.62
Female	0.43	0.38
Loan amount	$55,000	$45,000
Loan to value ratio	74.20%	71.77%
Interest rate	5%	4.86%
Property value	$245,000	$165,000
Income	$85,000	$73,000
Debt to income ratio	30-43%	30-43%
Minority population percentage per tract	13%	4.14%
Median age of building per tract	51	44

When the researchers examined economic and financial characteristics, they found that the average property value is much lower in rural Pennsylvania than it is in urban Pennsylvania, at $165,000 and $245,000, respectively. On average, rural applicants have lower family income compared to their urban counterparts.

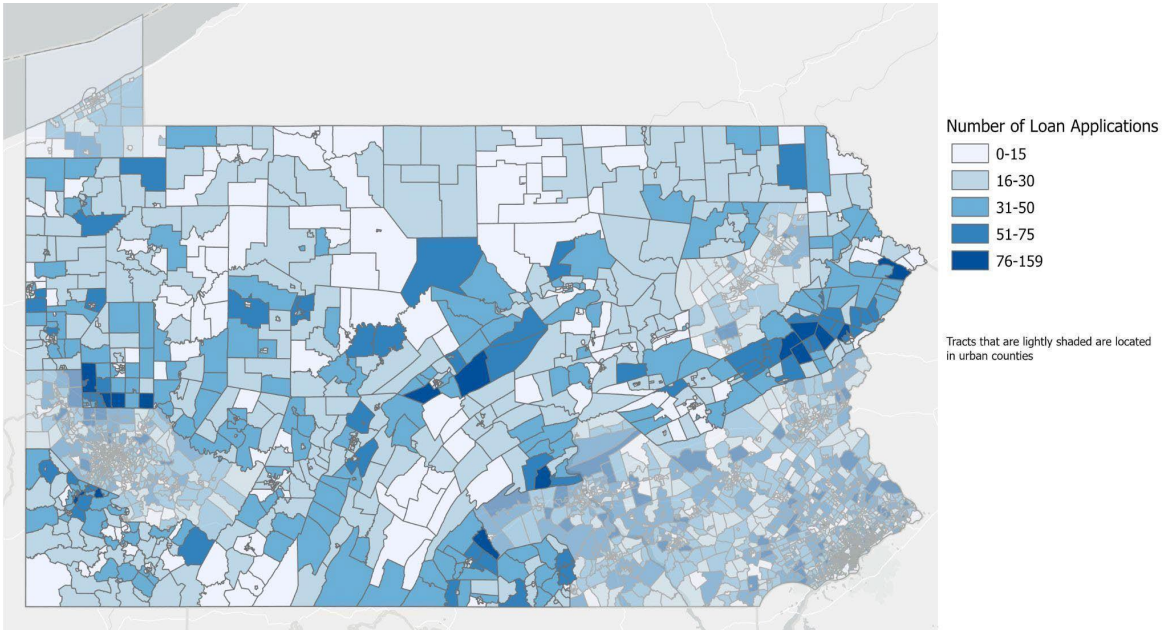
Table 7 presents information on loan decisions, reasons for denial, and debt-to-income ratio for rural and urban applicants. More than 50 percent of both urban and rural applications were approved. The rejection rates were 34.16 percent and 30.98 percent for urban and rural applicants, respectively. When examining reasons for denial, the researchers found that poor credit history, lack of collateral, and high debt-to-income ratio are the top three reasons for applications to be denied. Close to one-third (30.31 percent) of urban applicants and 23.88 percent of rural applicants had a debt-to-income ratio of more than 44 percent.

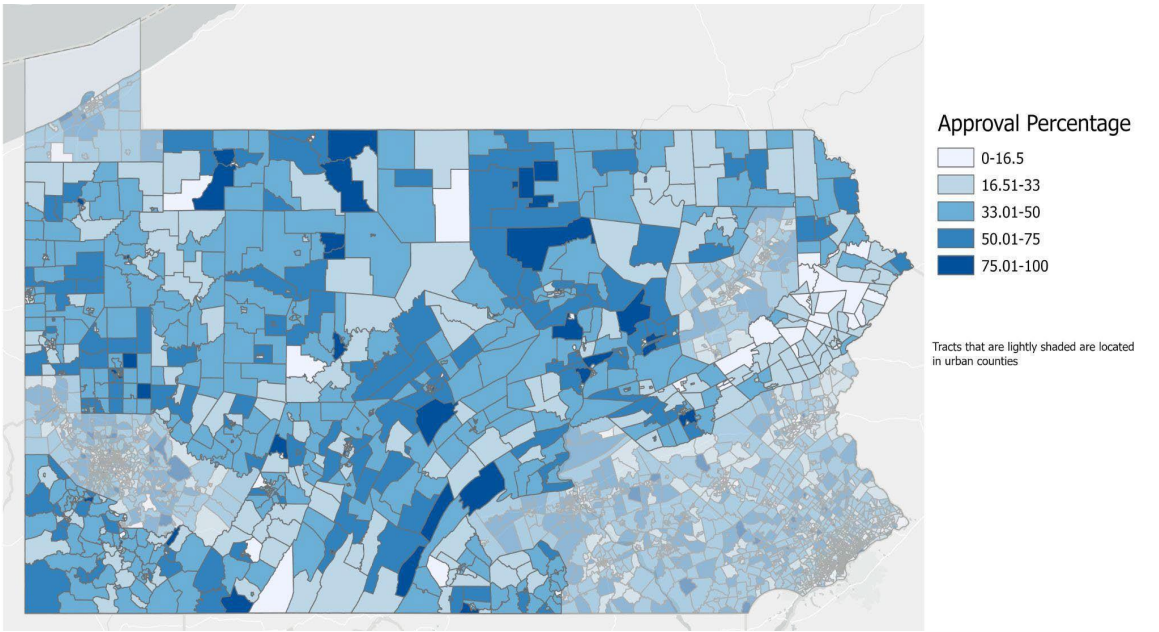
Table 7: Descriptive Data on Loan Decisions and Reasons for Denial, Urban vs Rural, 2019.

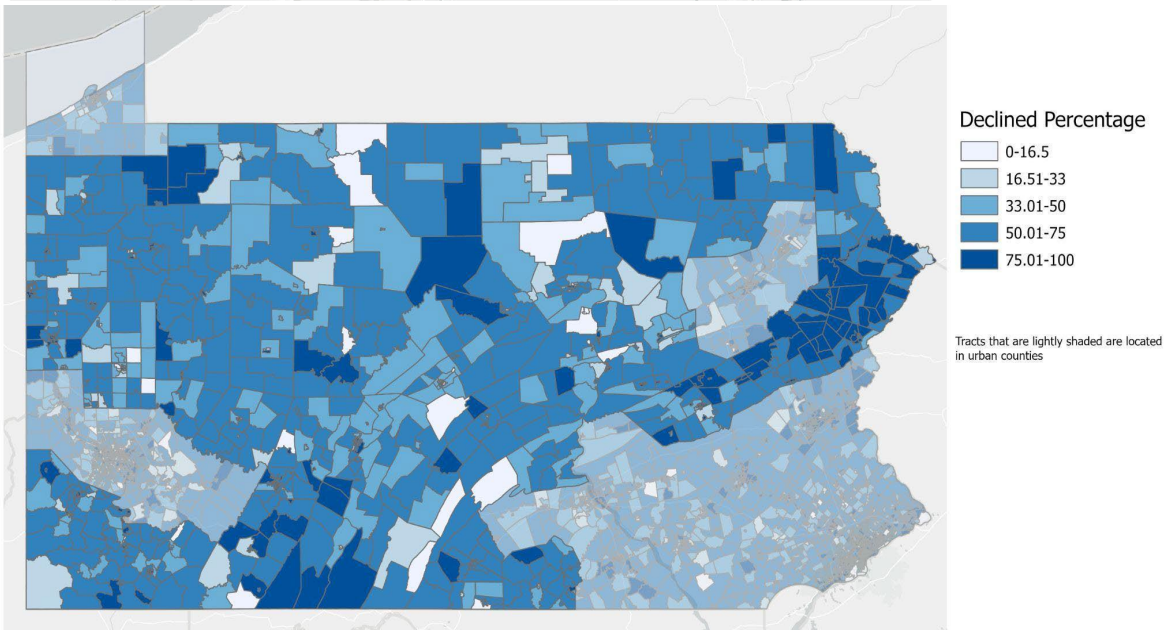
	Urban	Rural
Loan Decisions		
Loan originated (%)	51.69	56.26
Application approved but not accepted (%)	2.60	2.57
Application denied (%)	34.16	30.98
Application withdrawn by applicant (%)	7.70	6.82
File closed for incompleteness (%)	3.46	3.13
Purchased loan (%)	0.39	0.25
Reasons for Denial		
Debt-to-income ratio (%)	25.32	20.44
Employment history (%)	0.46	0.31
Credit history (%)	42.61	46.21
Collateral (%)	22.01	25.95
Insufficient cash (down payment, closing costs) (%)	0.38	0.45
Unverifiable information (%)	2.83	2.53
Credit application incomplete (%)	6.39	4.08
Other (%)		0.02
Debt to income ratio		
Less than 30% (%)	34.69	40.89
30-43% (%)	35.00	35.23
44% and above (%)	30.31	23.88

Figure 5 shows the spatial patterns, by Census tracts, of the number of loan applications, the approval rate, and the denial rate. The number of applications doesn't show any strong spatial patterns, although there is a cluster of high numbers in northeastern Pennsylvania (Pike, Monroe, and Carbon counties). While the approval rates don't show any clear spatial patterns, there appear to be clusters of the highest denial rates in northeastern Pennsylvania (Pike, Monroe, and Carbon counties), outside of Erie (parts of Warren and Crawford counties), parts of Potter and Clinton counties in north-central Pennsylvania, and parts of Somerset and Bedford counties in the south.

Figure 5: The total number of loan applications for Census tracts (first map), the approval rate (second map), and the decline rate (third map). Tracts that are lightly shaded are located in urban counties.

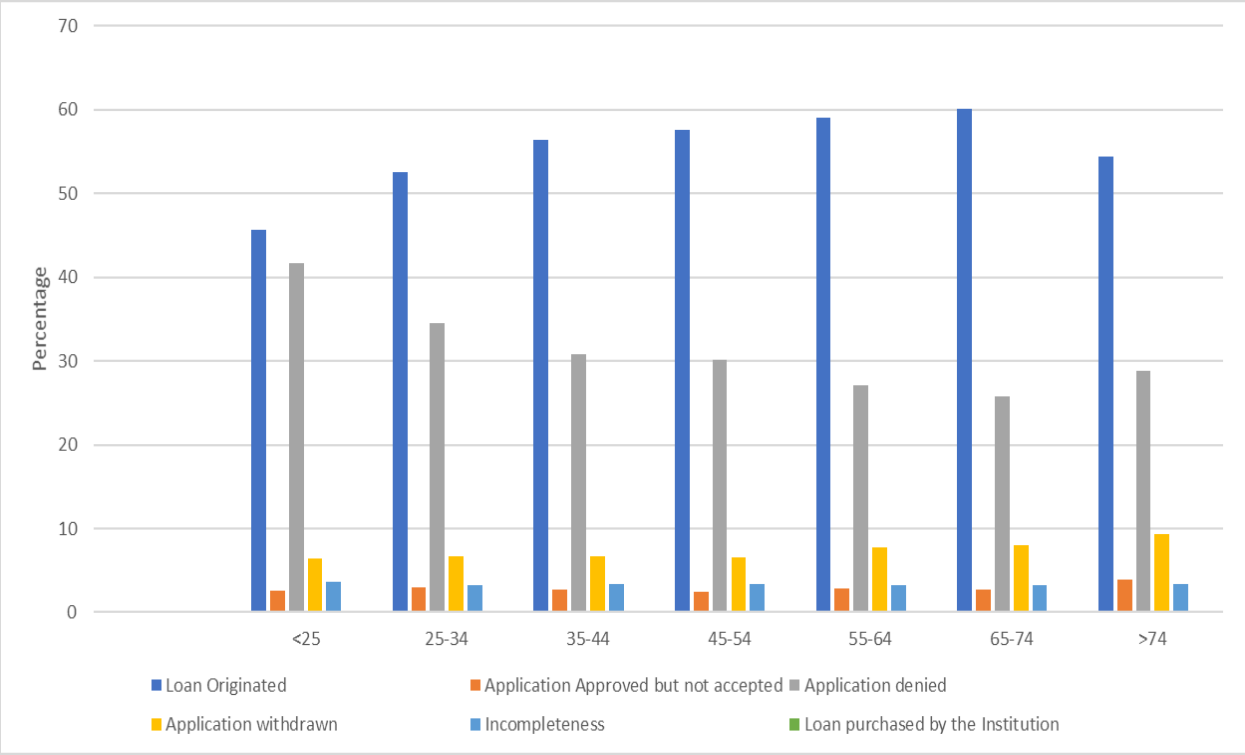






Age has been listed as one key requirement by all the major federal and state level home improvement loan programs. Specifically, most of the existing programs/assistance are designed to help those who are 65 years or older. *Figure 6* shows the relationship between age groups and loan application decisions. In Pennsylvania, applicants between the ages of 65 and 74 are the group most likely to obtain home improvement loan approval, followed by those between the ages of 55 and 64, and those between the ages of 45 and 54. Young applicants under age 25 have the highest denial rate at 41.73 percent.

Figure 6: Loan Decisions by Age Group, 2019.



The research team further investigated reasons why applications were denied across different age groups. *Table 8* shows there is a weak yet significant relationship between age and denial reasons. Regardless of the location, credit history, collateral, and debt-to-income ratio are the top three reasons that applications were denied. Rural residents were more likely than their urban counterparts to be negatively affected by credit history and collateral; while urban residents were more likely to be negatively affected by debt-to-income ratio than rural residents. For the category of debt-to-income ratio, compared to younger applicants, those in the 65-75 age category were affected the most. Credit history affected the middle age groups the most, and collateral was the top denial reason for younger applicants.

Table 8: Denial Reasons by Age Category, Rural vs. Urban, 2019.

			Urban		
Age Categories	**25-34**	**35-44**	**45-54**	**55-64**	**65-74**
Debt-to-income ratio (%)	20.80%	21.50%	22.70%	27.40%	33.80%
Employment history (%)	0.50%	0.50%	0.40%	0.40%	0.10%
Credit history (%)	37.90%	41.20%	46.80%	44.00%	39.40%
Collateral (%)	32.60%	27.50%	21.10%	18.30%	14.40%
Insufficient cash (down payment, closing costs) (%)	1.00%	0.60%	0.10%	0.20%	0.30%
Unverifiable information (%)	2.90%	3.00%	2.80%	2.40%	2.80%
Credit application incomplete (%)	4.30%	5.80%	6.00%	7.30%	9.20%
N	1,807	3,688	4,053	3,365	1,832
			Rural		
Age Categories	**25-34**	**35-44**	**45-54**	**55-64**	**65-74**
Debt-to-income ratio (%)	17.20%	16.10%	19.50%	24.70%	29.70%
Employment history (%)	0.80%	0.10%	0.20%	0.40%	0.00%
Credit history (%)	42.30%	50.00%	50.00%	46.20%	37.40%
Collateral (%)	33.40%	28.60%	23.60%	20.40%	21.90%
Insufficient cash (down payment, closing costs) (%)	0.30%	0.20%	0.50%	0.30%	1.00%
Unverifiable information (%)	3.60%	2.10%	2.00%	2.70%	2.80%
Credit application incomplete (%)	2.30%	2.90%	4.20%	5.30%	7.30%
Mortgage Insurance Denied	0.20%	0.00%	0.00%	0.00%	0.00%
N	647	1,054	1,223	1,068	508

Existing research suggests that minority applicants are more likely to be rejected for home loan applications. The research team examined HMDA data to see whether or not race could have an impact on home improvement loan application status (*Appendix G, Table G2*). First, regardless of urban/rural location, minority groups were more likely to get denied for home improvement loans compared to their white counterparts. Second, "joint" applicants, with one of them being white, had the second highest approval rates. Blacks and American Indians appeared to be disadvantaged in rural Pennsylvania with a more than 60 percent denial rate. There was a statistically significant relationship between race and loan application status.

Regardless of location, across the Commonwealth, high debt-to-income ratio, poor credit history, and lack of collateral were the top three reasons for loan denial across all race/ethnic groups (*Appendix G, Table G2*). In urban areas, Asian applicants were more likely to be denied because of the debt-to-income ratio. The largest obstacle for Black applicants was credit history. The same obstacle was experienced by American Indian, white/minority joint applicants, and two or more race applicants. The same pattern was found for Blacks and Asians in rural Pennsylvania.

Table 9 presents the relationship between loan decisions and the applicant's debt-to-income ratio. There is a strong and significant relationship between debt-to-income ratio and loan decisions.

Table 9: Cross Tabulation between Loan Decisions and Debt-to-income ratio, by Location, 2019

		Urban	
Loan Decisions	Less than 30%	30-43% (%)	44% and above
Loan Originated	70.10%	71.50%	36.60%
Loan Approved but not accepted	3.90%	3.30%	1.80%
Loan Denied	26.00%	25.10%	61.60%
N	13,616	13,772	11,941
		Rural	
Loan Originated	72.40%	71.70%	36.00%
Loan Approved but not accepted	3.60%	3.20%	1.70%
Loan Denied	24.00%	25.10%	62.30%
N	5,230	4,570	3,201

Despite rural/urban location, those with 44 percent or higher debt-to-income ratio were the most likely group to be denied for their loan applications. For example, in rural Pennsylvania, 72.40 percent of applicants with less than 30 percent debt-to-income ratio would obtain loan approval; while the rate for those with 44 percent or higher debt-to-income ratio was 36 percent.

The research team further compared the mean differences in economic and community-level characteristics across groups based on their loan status (*Appendix G, Table G3*). The results showed significant differences in means of the major predictors between the denied group and others. Overall, loan applicants who were denied tended to borrow a lower amount; have lower income; were more likely to live in tracts with a higher percentage of minority population; have lower income levels; have a lower number of homeowners; and lived in older housing units. Such a pattern was found in both rural and urban Pennsylvania.

After reviewing those important demographic and economic characteristics and their relationship with loan application approval and denial patterns, using logistic regression, the researchers estimated how various factors, such as age, race, gender, income, location, and economic characteristics could affect one's chance of getting home improvement loan approval (*Appendix G, Table G4*). Overall, white applicants were much more likely to have loan applications approved, compared to all other race/ethnic groups. For instance, the chance for Black applicants to get loan approval was 33.2 percent lower than white applicants. If applicants were of two or more minority groups, then their chance of getting an approval was 63.6 percent lower than white applicants. Living in urban areas increased an applicant's chance to obtain a loan by 24 percent. Increase in age improved the chance of getting loan approval by 12 percent. A joint applicants' chance of getting loan approval was 64.7 percent higher than a single applicant. Interestingly, neither an increase in income nor in loan amount had any impact on being approved for a home repair loan in Pennsylvania. Increase in debt-to-income ratio reduces one's chance of getting loan approval by 54.7 percent. Neighborhood level characteristics, such as percentage of minority population, and median age of homes, had small to negligible effects on one's odds of getting loan approval.

Outcome #3: An assessment of the effectiveness of PHFA home improvement loans

The research team first reviewed the PHFA website to assess the purpose, eligibility, and limitations of the five home improvement loan programs operated by the agency: The ACCESS Home Modification Program, HomeStyle® Renovation Program, Purchase & Improvement Loan, Homeowners Energy Efficiency Loan Program (HEELP), and Pennsylvania Infrastructure Investment Authority (Pennvest) Homeowner Septic Program.

The ACCESS program is designed to provide payment deferred loans to those who have a permanent disability or who have a family member with a permanent disability to make their houses accessible. Upon approval, applicants can secure a loan amount between $1,000 and $10,000. To apply, applicants must meet the income limit and credit requirement set by PHFA. Applicants with a credit score of 680 or lower need to take a course before the loan can be closed. In addition, as part of the application requirement, applicants need to provide a signed contract for construction between the buyers and a PHFA contractor. In such a contract, applicants must include detailed information on modifications, estimates, and drawings of proposed work. PHFA will then review both the application and contract to determine whether or not the project is approved. Another noteworthy procedure is that after the funded project begins, if actual costs are higher than the original proposal, the applicant will have to pay the difference. Lastly, projects must be completed within 90 days, which in many cases may be an unrealistic timeline.

Despite a clear purpose of maximizing efficiency and streamlining projects, the current ACCESS application requirements could pose challenges to applicants. First, the applicant needs to find a contractor who is willing to provide detailed drawings and estimates before the loan is secured. Second, actual construction costs are often higher than

estimates; applicants may have difficulties paying the difference. PHFA does allow qualified ACCESS loan applicants to apply through the HOMEstead program to get down payment and/or closing cost assistance. However, if applicants did receive both HOMEstead and ACCESS funds, they cannot make any modifications to the painted surface in houses that were built before January 1978. There is no further clarification regarding this restriction on the PHFA website.

Funded through Fannie Mae, the HomeStyle® Renovation program allows homeowners or home buyers to apply for a mortgage to "repair, remodel, renovate, or complete energy improvements" (PFHA, 2021). Borrowers can use funds to repair or replace roofs; install or improve heating or cooling systems; improve kitchen or bath areas; repair or improve plumbing and/or electric systems; and add additions to existing living space. Compared to conventional mortgages, this program offers low interest rates and extended repayment plans. This program does have a minimum credit requirement of 620 and the borrower's debt-to-income ratio cannot exceed 45 percent. These limitations echo previous findings that credit history and high debt-to income ratio are two main factors that disqualify individuals from obtaining home improvement loans. In addition, if the borrower defaults before funded construction is over, Fannie Mae can ask them to re-purchase the loan. The borrower is responsible not only for monitoring progress and the quality of construction work but must also cover any costs that exceed the loan amount. Overseeing a construction project requires the borrower to have the knowledge and time to properly supervise the construction work.

The Purchase & Improvement Program allows those who are qualified for the Keystone Advantage Assistance Loan Program to purchase and repair/improve a house with one loan. Through this program, applicants can borrow from $1,000 to $15,000 to pay for home repair. One advantage of this loan is that the borrower can begin repairs or improvements right away and does not have to take another loan. This loan allows for similar repairs and/or improvements as the HomeStyle® loan. To be eligible for this loan, the borrower needs to be a first-time home buyer; with the exception of the borrower purchasing a home in a targeted area or being a veteran of the U.S. Armed Forces. Second, the gross annual household income cannot exceed limits set by the Keystone Home Loan Program. Third, the price of the home cannot exceed program limits. Fourth, the borrower must have an acceptable credit history with a debt-to-income ratio of less than 30 percent. Last, the borrower must have enough funds to cover down payment, mortgage application, and closing fees. As discussed before, these eligibility requirements are rather restrictive to those without a decent credit history and/or sufficient cash reserve.

HEELP offers loans ranging from $1,000 to $10,000 to homeowners who want to make certain energy efficient repairs. It offers low interest rates that can be repaid in 10 years, and there is no prepayment penalty. Borrowers must meet income requirements set by PHFA, though there can be exemptions based on individual circumstances. Once again, the borrower may only use a contractor that has been approved by the HEELP program.

This requirement can be an obstacle for individuals that live in rural and remote areas who cannot locate approved contractors.

Finally, the Pennvest Homeowner Septic Loan Program is designed to assist qualified individuals to repair or replace their septic system or connect to a public sewer system. It offers a low interest rate for up to 20 years. Individuals may borrow up to $25,000. To be eligible for this loan, the applicants must be free from any form of federal loan delinquency and provide satisfactory explanations to PHFA about any open medical or small non-medical collection accounts. Additionally, the applicant must be up to date in their tax payment; PHFA can decline loan applicants who have not paid real estate taxes in full. This program has no income limit, and there is a requirement of no more than a 45 percent debt-to-income ratio. Furthermore, PHFA does not allow the borrower to delay loan repayment, even if the project is delayed due to weather conditions or contractor availability.

Unfortunately, neither the executive director nor policy director were available to meet the research team, as they were focused on program implementation and federal and state directives to assist in COVID-19-related housing crises. Hence, the researchers composed a list of six questions and PHFA provided responses (*Appendix D*). PHFA was supportive of the research, reporting "no studies of HEELP, Pennvest, the first mortgage products or HEMAP have been conducted" and they were "pleased to learn of your research focused on housing quality and rural impacts."

According to PHFA's response, the number of applications for HEELP the PHFA received in the past five years ranged from 261 to 445, which averages to 339 per year. For the Pennvest program, the PHFA received on average of 102 applications per year. Due to the increase in the price of construction materials during the pandemic, the number of applications has declined. For example, before the pandemic, the number of HEMAP applications averaged 2,400 per year. In 2020, the number dropped to 792, and then further dropped to 604 by 2021. PHFA pointed out that since the Fannie Mae loan program increased their interest rate in 2021, they had purchased "2 loans paired with Purchase & Improvement; 5 loans paired with the Access Modification funds and zero HomeStyle® Renovation." For the HEELP program, the approval rate is around 30 percent. PHFA added that many of the HEELP program applicants actually can be "better served by grant funds which are scarce and not administered by PHFA."

The approval rate for the Pennvest program was much higher at 78 percent. To be qualified for the HEELP and Pennvest programs, the applicants' debt-to-income ratio cannot exceed 45 percent. PHFA stated that the ratio limit can go up to 47 percent for Pennvest and 52 percent for HEELP "when there are strong compensatory factors such as other household income in addition to the applicant's or additional applicant's income such as an employer provided car allowance. We also require paid in full real estate taxes; third or better lien position. In the HEELP program we also look at a 120 percent Combined Loan to Value Ratio covering all debts secured by the home to its valuation." To be able to obtain funds from the ACCESS program, the Purchase & Improvement

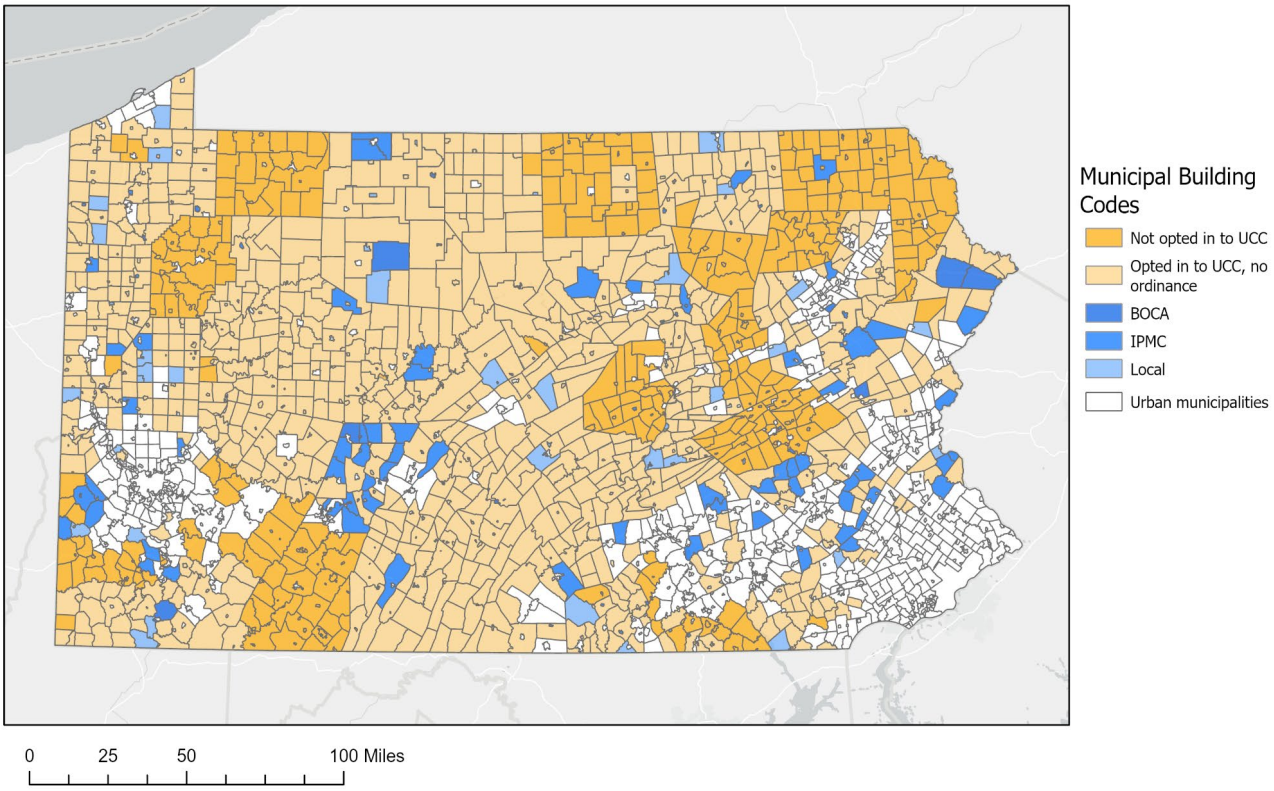
Program, and the HomeStyle® Renovation program, the applicants' maximum debt-to-income ratio is 50 percent. However, the debt-to-income ratio has been reduced to 45 percent for government loans.

In terms of special assistance and educational programs, PHFA provided more detail in the written response. There are no special efforts to provide assistance for those in rural Pennsylvania, as similar outreach is conducted across the state. Similarly, legislation requirements for HEMAP do not consider the urban or suburban character of the residence. Educational outreach for HEELP includes mailings and discussions with "legislators, Community Action Agencies, Weatherization providers, municipal authorities and municipalities" and a network of counseling agencies with free homebuyer education is available to those with an interest in securing PHFA financing.

Outcome #4: A database of municipal property maintenance codes for municipalities that have adopted the UCC

The research team identified 1,201 rural Pennsylvania municipalities that have opted in for the UCC, and it created a database of their property maintenance code adoption status. Of the 1,201municipalities, 112 have adopted the International Property Maintenance Code (IPMC); 10 have adopted BOCA (Building Officials and Code Administrators International, Inc.) National Property Maintenance code; 53 enacted and adopted local ordinances; and 1,026 have not adopted property maintenance codes (*Figure 7*). In other words, 1,417 out of the 1,592 rural municipalities in the Commonwealth (88.8 percent) have not adopted property maintenance codes. Among those who do not have property maintenance codes, they often have some coded requirements embedded in their zoning ordinance with regard to nuisance or dangerous buildings, and some loosely assembled regulations that pertain to landscape maintenance (i.e., weed or sidewalk). Despite these inclusions, such loosely stated local-level regulations can be difficult to enforce. If the violator refused to correct the problem, the code office could not bring the case to court.

Figure 7: Municipal building code status.



Among the 110 municipalities who have adopted IPMC, the version of code adopted ranged from 2003 to 2018. The IPMC has general guidelines for penalties and allows local governments to establish specific penalties based on individual state civic laws. Hence, the extent of penalty varies across boroughs and townships, depending on their interpretation of the guidelines. In general, the penalty often involves monetary fines and/or imprisonment if violators fail to pay the fine. The fine can be as small as $25 or higher than $5,000, depending on the municipality and severity of the problem. Of all those who adopted IPMC, only one borough did not specify the penalty.

Another issue raised while compiling the dataset was who is in charge of code enforcement. Out of the 175 municipalities that adopted property maintenance code, 72 (41.1 percent) appointed code enforcement officers; 79 (45.1 percent) contracted with third party companies; and the remaining were "unknown," as the research team could not locate the information anywhere. Interestingly, municipalities in Armstrong County joined others to form a group, then contracted with a company to perform third party inspections. Two other counties, Bradford and Cambria, created intergovernmental agreements and enforce codes at the county level.

In sum, given that the majority of rural municipalities do not have property maintenance codes in place, local supervisors or officers are faced with challenges when violations occur or blight appears.

Outcome #5: Survey of municipal code enforcement officers

The research team developed an online survey instrument to gain more in-depth information about the practice of property maintenance code in municipalities. This survey also allowed the research team to collect first-hand information on the most common types of violations recorded in local communities, and the effectiveness of penalties. Most importantly, this survey looked to uncover the major challenges/obstacles that local code enforcement officers experienced to help develop policy considerations for policymakers.

In November 2021, the research team sent 2,423 emails to municipal secretaries to invite them to participate in the survey - the research team was not able to obtain contact information for all 2,560 municipalities. The team sent another round of reminders by the end of November in an effort to increase the response rate. The goal was to achieve 336 valid responses for a margin of error of 5 percent. The survey had a total of 427 views, and 158 valid entries, for a 36.8 percent conversion rate. The actual margin of error is 8 percent, which is still considered acceptable at the 95 percent confidence interval. Out of the 158 responses, 92 were from rural municipalities and 66 were from urban municipalities. Furthermore, 71 of the respondents came from boroughs, 82 from townships, one from a municipality, three from cities, and one unknown. The response rate was lower than expected.

Survey results indicated that 57.6 percent of rural respondents and 26.9 percent of urban respondents do not have property maintenance codes. Among respondents, the earliest adopted property maintenance code was in 1928 and the most recent was in 2021. When asked when the codes were last updated, out of the 81 valid entries, 12.3 percent last updated the codes in 2018, and another 12.3 percent updated their codes in 2021. Half of the respondents updated their codes before 2016. In terms of the number of violations, most recorded three violations in the previous 12 months. The highest number of violations recorded was 2,500, and the median number was 15 violations recorded in the previous 12 months. Rural municipalities, on average, recorded a lower number of violations (21.34) than urban municipalities (176.84). One possible explanation is that there are more housing units in urban areas.

The survey also collected information on the violation types. The top four types of violations were: 1. Excessive weed growth or presence of noxious weeds; 2. Presence and accumulation of objectionable materials and substances; 3. Display of inoperative vehicles; and 4. Grading and drainage problems (see *Table 10*). Interestingly, urban areas were significantly more likely than rural areas to have all four types of violations.

Table 10: Top Four Violations Reported, Rural vs. Urban PA, 2022

	Rural	Urban
N	92	66
Excessive weed growth or presence of noxious weeds	30.40%	65.20%
Presence and accumulation of objectionable materials and substances	26.10%	48.50%
Display of inoperative vehicle	18.50%	43.90%
Grading and drainage problems	3.30%	15.20%

The survey results indicated that 59 percent of rural municipalities have an appeal board, compared to 80.4 percent of urban municipalities. For those who have an appeal board, the question of how long it usually takes for an appeal to be solved ranged from "haven't had any" to a couple of days to 10 years; most appeals take months. Qualitative answers suggest that in-person meetings usually result in a resolution. One of the answers stands out: "most offenders do not appeal; they just ignore the issue which forces a summary citation." In terms of the number of appeals municipalities have received in the previous 12 months, on average, rural municipalities received 10 appeals, while urban municipalities received 3.42 appeals. It is important to note that due to the extremely low number of responses for this question, the statistical test for this question is insignificant. In other words, due to the small sample, there is no difference in the average number of appeals received between rural and urban municipalities.

The survey then asked the question of how municipalities handle possible disputes if they do not have an appeals board. Twelve rural and 10 urban municipalities answered this question. The most common answer was "district magistrate," followed by "borough council." It is interesting to note that the latter is a common choice among rural municipalities, and none of the urban municipalities wrote this option down.

Researchers used a Likert scale of 1 to 5 to assess how likely it is for owners who committed violations to pay the fine, with 1 being the least likely and 5 being the most likely. The most common answer in both rural and urban areas was "3" or neutral, but the results suggest that it may not be easy for rural municipalities to collect fines from those individuals who violate the property maintenance code, as 39.50 percent of rural respondents chose either "1" or "2" as their answer. This figure is 25.50 percent for urban respondents.

The survey collected opinions on whether or not property maintenance codes have been effective in maintaining the quality of housing in their areas. In total, 66.7 percent of rural respondents and 87.8 percent of urban respondents said "yes." Among those who

believe that property maintenance codes have been effective, their answers can be summarized into two main themes: 1. The codes serve both as a benchmark for residents and as reference books for borough council members or code enforcement officers. With the codes in place, it is easier for the municipality to explain the types of violations and for the residents to see which violation it is and how to address it. 2. Enforcement is the key for success. Having a dedicated enforcement officer and establishing a citation/fine system serve as effective deterrents for violators to quickly fix the problem presented. One respondent wrote “the threat of fines is enough for most homeowners to remove the offending issues.” A good supporting system is important for the process as well, as one respondent noted that “a competent Code Officer who knows and understands the ordinances and has the assurance Council has their back is the key.”

Among those who do not think property maintenance codes are effective, responses centered on two themes: efficiency and enforcement. One respondent wrote that when a citation of code violation went to the magistrate, often, “the property maintenance issues are left to the end... by the time a grass cutting citation gets to the magistrate it is winter and he throws it out...” Based on the responses collected, property maintenance code violations are treated with low priority. One respondent wrote “rural areas should not be held to such a high standard. These high standards infringe on individual property rights.” A couple of respondents noted that violators “do not take the codes seriously.” In terms of enforcement challenges faced, one code enforcement officer provided the following information:

> *1. The inability to establish the "Owner" or responsible party of the property. The serious game players create LLC's, Trusts, Partnerships, etc. which are then owned by other LLC's, Trusts, Partnerships, or other phony legal entities. They buy investment properties and hire a "Broker" to collect the rent and pretend to manage them. Who do you send the Notice of Violation / Citation to for resolution? Everybody says they don't own the property. Hours and hours of staff time spent searching the State Corporations website and endless paper trails to what end? Then if you are lucky enough to locate an owner and they are out of the local area, good luck trying to get a Constable to serve them. Most citations sit INACTIVE at the Magistrate level forever or a Bench Warrant gets issued but no Police Officer is going around searching for the person to arrest them.*
>
> *2. When all the stars do align and you finally locate and get the owner of the property in front of the Magistrate, all the Magistrate can do is issue a fine. A payment arrangement is then established which could be as low as $5 / month. If multiple citations and fines are issued, they run concurrently so the guilty party just pays $5 / month for life and the violation never gets corrected. Many owner-occupied property owners in these situations are elderly or low functioning, living day by day and do not have the money or resources to make the required corrections. Government agencies are overrun with re-housing people if a Code Officer must condemn the property due to unsafe or self-created unsanitary conditions. Add Hoarding to the mix and your head just spins off its axle. All codes*

> *have a section that says the municipality can make required repairs and file a lien to collect what is spent. The majority of the smaller, rural municipalities do not have the resources to abate the issues and the property values are so low that the lien becomes more the property is worth. It's a vicious cycle.*
>
> *3. JUNK / INOPERABLE VEHICLES / ABANDONED VEHICLE - Process needs to be simplified! Tow Truck Companies and municipalities need to be protected! Code Enforcement Officers must be able to have the authority to tow vehicles (after proper notification) off of private property and streets. Most smaller municipalities utilize the State Police who do not enforce local ordinances. In addition, the State Police are stretched so thin, they do not want to take the time to deal with junk vehicles and I don't blame them. IT MUST BE DEALT WITH AT THE CODE OFFICER LEVEL. If we can just get them towed to a storage facility / salvage yard, the salvage company will do the work but the tow company will not tow the vehicle without the police for liability issues. CRAZY!!*

Similarly, another respondent wrote, "we generally have to incur fees to have problem properties brought up and sit on those until the property is sold or the amount is high enough to take them to sheriff sale." These answers shed light on the obstacles that could hinder communities from maintaining healthy and safe housing stocks for their residents.

Discussion and Policy Considerations

Policy Consideration #1: Social, Economic, and Demographic Barriers to Housing Quality in Rural Pennsylvania

Prior to this assessment, there was no systematic study about housing quality in rural Pennsylvania; this project fills the gap by creating a housing quality index to measure housing quality and assessing statewide programs. The findings point to potential social, economic, and demographic barriers that result in rural Pennsylvania having lower quality housing stock compared to urban areas, highlighting the fact that housing quality is a multifaceted challenge. To address this issue holistically, it may be important to consider policies outside of the traditional housing policy realm.

When the research team examined the individual measurements of housing quality, the results revealed that rural Pennsylvanians are more likely to use coal/coke as heating fuel, have incomplete kitchens and/or plumbing in their houses, and have no high-speed internet compared to their urban counterparts. Urban residents, on the other hand, are more likely to live in housing units built before 1980, which could expose them to lead paint. These issues have negative impacts on residents' health, safety, and access to resources. Policies that encourage and increase affordable housing, clean and affordable heating fuel, and communication infrastructure improvements in rural Pennsylvania should be considered by the legislature. While these policies may come under the purview of energy policy, land use (zoning) policy, or infrastructure, they would nevertheless likely have a positive impact on housing quality. For example, at the federal level, investments

in green energy and climate resilience through the Rural Energy for America Program (REAP) and Community Facilities Disaster Grants will bring $1 million to rural Pennsylvania (Blottenberger, 2021). Bringing a rural focus to existing state programs, such as the Pennsylvania Energy Development Authority (PEDA), would help to make clean energy more broadly available as well as bring high quality economic development to rural areas.

Statistical analysis of the relationship between tract level socioeconomic characteristics and the housing quality index shows that median household income, median taxes paid, and education all have moderate to strong relationships with housing quality. Social, economic, and demographic factors were also found to impact access to home improvement loans: minority groups are more likely to get denied for home improvement loans compared to their white counterparts, and young applicants under age 25 have the highest denial rate by age group. In terms of household economics, high debt-to-income ratio, poor credit history, and lack of collateral are the top three reasons for loan denial. Marital status also has an influence: joint applicants' chance of getting loan approval is 64.7 percent higher than single applicants. Finally, there is also an urban/rural divide: living in urban areas increases one's chance to obtain a loan by 24 percent.

Programs or policies that offer opportunities for high quality education and foster economic development, especially development that can offer higher wages, will have a positive impact on housing quality. The USDA Rural Development program is one example at the federal level that focuses specifically on rural areas, supporting infrastructure improvements, including expanding access to high-speed internet, business development, housing, and community facilities such as schools, public safety, and health care. This program has invested more than $3.5 billion in rural Pennsylvania over the past four years (Morgan, 2021). Continued strong participation in this program, along with leveraging state economic development programs, will contribute to improved housing quality in rural Pennsylvania. In addition, providing mechanisms to help young and/or single homeowners accumulate savings that could be used toward home purchase and improvements would have a significant impact. Senate Bill 309 (reintroduced in Regular Session 2019-2020) would have established first-time home buyer savings accounts for first-time home buyers and is one example of such a policy.

Policy Consideration #2: Spatial Targeting

With digital mapping technology, researchers were able to illustrate the distribution and concentration of sub-quality housing. These visualization technologies make it easier for policymakers to identify rural areas that have the most critical needs with respect to housing.

In terms of access to homeowners' assistance loans, clusters of the highest denial rates were found in northeastern Pennsylvania, outside of Erie, parts of north-central Pennsylvania, and in parts of southern Pennsylvania. These areas may be prioritized for technical support or outreach, as discussed below.

Policy Consideration #3: Review Pennsylvania Home Improvement Loan Programs and Eligibility Criteria

Review of the five state-level loan programs yielded the following findings: 1. These programs have been providing low-interest loans or interest-free grants to Pennsylvania families to improve their housing quality; 2. The Pennvest program has the highest approval rate (78 percent) out of the five; potentially as this program has the most lenient requirement on income (no income limit) and the debt-to-income ratio can be as high as 47 percent. While the other four programs allow the ratio limit to go up to 50-52 percent, they often have income limits or credit score requirements in place; 3. Some of the programs such as ACCESS, HomeStyle®, and HEELP require applicants to submit detailed contracts and estimates as part of their applications. HEELP also requires the applicants to use contractors approved by this program. Such requirements can be burdensome to some applicants, especially when they are not equipped with the knowledge of how to hire and work with contractors and/or live in areas where it is hard to locate an approved contractor. The implication is that such applicants, though they might be able to secure a loan, are less likely to achieve satisfying results; 4. Currently, there is no targeted effort to provide assistance for those in rural Pennsylvania, as similar outreach is conducted across the state. Educational outreach for HEELP includes mailings and discussions with legislators, community action agencies, weatherization providers, municipal authorities and municipalities. This calls for further analysis of their received applications to see what percentage came from urban areas versus rural areas. It would also be interesting to study how effective those outreach activities are in reaching rural residents.

Given these findings, coupled with the fact that poor credit history, lack of collateral, and high debt-to-income ratio are the top factors that prevent residents from getting home improvement loans, the research team suggests that policymakers take these factors into account when reviewing current loan assistance programs and consider lowering these bars to accessing funds. Especially with the impact of the pandemic, many more rural residents are experiencing financial challenges, and it is more important than ever before to provide effective programs to help residents lead a healthy and safe life.

Policy Consideration #4: Address Inconsistent Property Maintenance Codes Across Rural Municipalities

The research team established that most rural municipalities do not have official property maintenance codes in place. Some who have not adopted the official codes have loosely defined ordinances in place for property maintenance purposes. Such disparities in property maintenance codes across rural municipalities, in conjunction with practices of either hiring staff or contracting with some third-party agencies, contribute to overall confusion, misinterpretation, and/or misunderstanding regarding ordinances within rural communities. Based on these findings, policymakers should consider programs to incentivize or support municipalities in adopting building codes and keeping them current, and to provide training or professional development programs to help achieve a common understanding of these ordinances and best practices for enforcement.

Enforcement, especially how to enforce codes, is the major problem in the Commonwealth. One main reason is lack of personnel and resources in rural areas. Without proper supervision and clearly defined authority, it is difficult to enforce any ordinance or code. Unfortunately, housing quality related issues are often a low priority with the district magistrates as well. Another main reason is that even among those municipalities that have adopted the official property maintenance code, penalties to violators vary in amount and payment plans. One survey respondent noted that violators can break the cash penalty into monthly payments over a long period of time. As a result, rural areas are more likely to have blighted housing units or severe violations that cannot be addressed in a timely manner. The properties tend to be neglected for years, which in turn can negatively affect the safety, health, and economy of local neighborhoods.

In the process of conducting this research, the researchers noted that Bradford County formed a council of government to assist municipalities in enforcing the UCC code through a third-party agency. The reason for them to do so is to “have a single uniform contract in order to ease the process for business owners and residents alike. It also reduces the price of the service overall rather than through an individual basis” (Bradford County Resources Data Book, 2012). This approach can be beneficial, especially to small rural municipalities who have insufficient funds or shortage of staffing, to enforce the codes. Researchers recommend that models and best practices from successful municipalities be identified and promoted.

Conclusions

Sub-quality housing poses negative effects both on the safety and health of residents and on the overall social welfare and economic vitality of communities. This research assessed housing quality and policies in rural Pennsylvania through the development of a housing quality index to measure housing quality, an assessment of home improvement loan programs, the creation of a demographic and socioeconomic database of eligibility to obtain home improvement loans, the development of a database of municipal property maintenance codes, and a survey of code enforcement officers.

This project had two major contributions. First, the database, maps, and analysis of housing stock quality provide important information on the prevalence of sub-quality housing in rural Pennsylvania communities. Second, evaluation and assessment of public program effectiveness and local ordinances provides insights on how these could be improved to extend coverage to individuals struggling with low-quality housing and support the effectiveness of property maintenance ordinances at the municipal level.

The research team found a significant difference between the rural and urban housing quality index, suggesting that housing quality in rural areas is lower than urban areas. When the spatial distribution of sub-quality housing in rural Pennsylvania was mapped, statistically significant clusters of low housing quality areas, largely in rural Pennsylvania, were identified. The sub-quality housing index was also statistically correlated to socioeconomic characteristics. Aside from the unemployment rate, the direction of the correlations was as expected: as median home value, median household income, owner occupation, and education level decreased, the housing index increased/housing quality decreased. Several strong correlations indicated that the index is capturing some of the underlying processes related to housing quality, indicating the importance of addressing issues related to educational opportunities and income as an avenue to improving housing quality.

The research team established factors that could negatively affect individuals' ability to get home improvement loan approvals. In general, rural applicants were less likely than urban applicants to obtain loan approvals. Minority applicants were also less likely than their white counterparts to secure a loan. Applicants who are younger than 25 or between the ages of 25 and 34 were the least likely group to get a home improvement loan. The top three obstacles for rural Pennsylvanians were poor credit score, high debt-to-income ratio, and lack of collateral. These three obstacles were closely tied to community level socioeconomic characteristics, such as employment rate, income level, and educational attainment. This information sheds light on areas in which policymakers can focus on and enact policy/programs to help address.

Review of the PFHA home improvement loan programs allowed the research team to compile a list of their eligibility requirements and assess the accessibility of these programs. The list shows that, while the programs' credit and debt-to-income ratio requirements are within or even below the government loan limit, given the fact that so many rural Pennsylvanians (60 percent) have high debt-to-income ratios and poor credit

history (46 percent), many will not be qualified to apply for these loans. One noted discrepancy was the credit and debt-to-income ratio requirements published on the PFHA website are stricter than what PHFA actually considered acceptable. One possible solution is to provide educational opportunities to rural residents to help them better understand financial management. In addition, it would be beneficial to educate rural residents about the loan opportunities and their actual requirements. Lastly, as younger applicants are less likely to secure a loan, it would be beneficial to implement a program to help them to get a head start in living in healthy and affordable housing units.

A web-based search of municipalities that adopted maintenance codes showed that 88.8 percent of rural municipalities do not have codes in place. Even among those who adopted the official property maintenance codes, their penalties vary, which can cause confusion among residents. Lack of regulations and clearly defined terms are the first obstacle that makes it difficult to maintain the quality of local housing stock. The second challenge for many small rural municipalities is lack of resources and staffing. Hence enforcement becomes almost impossible in such areas. The supplemental online survey sent to municipalities provided more in-depth information on the benefits and challenges of property maintenance codes. On the positive side, having the codes provide a benchmark for the residents and authority to follow. The penalty system does deter local residents from possible violations. In terms of challenges, the main obstacle is enforcement. As stated before, many small municipalities often do not have the resources to hire dedicated code enforcement officers. Hence at the community level, local residents may not treat the property maintenance codes seriously since the enforcement is often weak or missing. The last issue is that some rural properties have low value, which does not provide enough incentives for authorities or local courts to take timely actions. As time lapses, many of the troubled buildings become blighted. To address such issues, the research team recommends that policy makers consider the importance of streamlined and consistent property maintenance codes and develop programs or incentives to make it more relevant at the local community level.

In conclusion, this project identified an extensive network of factors that affect housing quality in rural Pennsylvania, which ranges from individual-level socioeconomic and finance characteristics to community-level economic well-being and policy adoption status to state-level loan programs. It is important for policymakers to take these factors into consideration and enact policies that can help improve the overall health and well-being of rural residents.

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Appendices

Appendix A – Property Inspection Sheet- Paper Version

Data Collector		
Date of Assessment		
Property Address		
Zip Code		
Weather		

Does the property appear to be occupied? YES NO
Is the home consistent with the neighborhood? YES NO
Does the neighborhood show signs of blight? YES NO

	GROUNDS	
	Standing water	2
	Tree overhanging roof or touching structure	2
	Dilapidated fence or detached structures	1
	Garbage and/or abandoned vehicles, appliances, etc.	1
	Damaged or no exterior lighting	1
	Property borders railroad tracks or airfield	1
	Industrial properties in close proximity	1
	STRUCTURE	
	Porch or deck appears structurally compromised	5
	Elevated deck with missing/damaged railing	5
	Bowing/sagging exterior wall(s)	5
	Foundation crumbling or shifting	5
	Chimney damaged, leaning, or separating from structure	2
	WINDOWS AND DOORS	
	Front door is not intact or does not appear sound/secure	2
	Broken or cracked windows	2
	Boarded windows	5
	Windows covered with insulating material	2
	BUILDING EXTERIOR	
	Loose, missing, rotten, or damaged siding	2
	Masonry has major cracks or deterioration	2
	Wall(s) have significant vine growth	1
	Peeling or deteriorated paint	1
	ROOF	
	Curled, broken, or missing shingles	2
	Moss growth present	1
	Rust or rot present	1
	Tarps or other temporary materials present	5
	Broken skylight	2
	Gutters show signs of rust, sagging, detachment or vegetation growth	1
	Gutters missing	2
	TOTAL	

Appendix B – Property Inspection Sheet- ArcGIS Survey123 Screenshots

CRPA Housing Assessment - Field Data Assessment

This survey will be used for data collection for the CRPA housing assessment.

Date and time of data collection

m/d/yyyy | hh:mm

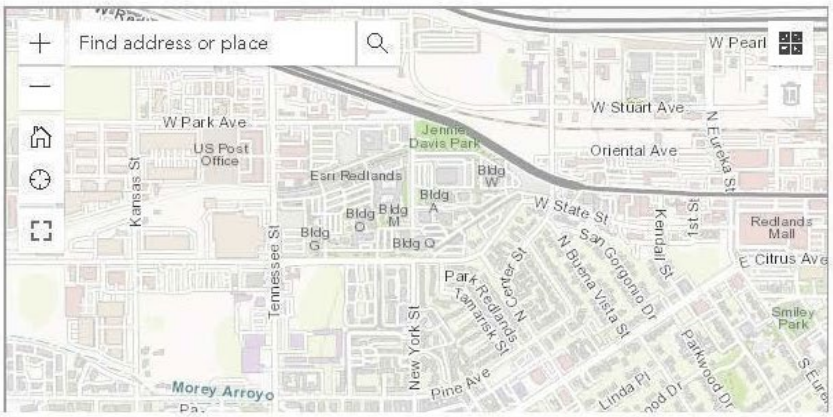
Weather conditions

- Clear
- Overcast
- Light rain
- Heavy rain
- Other

Photo

Select image file

Location



No geometry captured yet.

General neighborhood conditions

	Yes	No	Unable to assess
Does the property appear to be occupied?	○	○	○
Is the home consistent with the neighborhood?	○	○	○
Does the neighborhood show signs of blight?	○	○	○

Grounds

	Present	Absent	Unable to assess
Standing water	○	○	○
Tree overhanging roof or detached structures	○	○	○
Dilapidated fence or detached structures	○	○	○
Garbage and/or abandoned vehicles, appliances, etc.	○	○	○
Damaged or no exterior lighting	○	○	○
Property borders railroad tracks or airfield	○	○	○
Industrial properties in close proximity	○	○	○

Structure

	Present	Absent	Unable to assess
Porch or deck appears structurally compromised	○	○	○

missing/damaged railing	○	○	○
Bowing/sagging exterior wall(s)	○	○	○
Foundation crumbling or shifting	○	○	○
Chimney damaged, leaning, or separating from structure	○	○	○

Windows and Doors

	Present	Absent	Unable to assess
Front door is not intact or does not appear sound/secure	○	○	○
Broken or cracked windows	○	○	○
Boarded windows	○	○	○
Windows covered with insulating materials	○	○	○

Building exterior

	Present	Absent	Unable to assess
Loose, missing, rotten, or damaged siding	○	○	○
Masonry has major cracks or deterioration	○	○	○
Wall(s) have significant vine growth	○	○	○
Peeling or deteriorated paint	○	○	○

Roof

Curled, broken, or missing shingles	○	○	○
Moss growth present	○	○	○
Rust or rot present	○	○	○
Tarps or other temporary materials present	○	○	○
Broken skylight	○	○	○
Gutters show signs of rust, sagging, detachment, or vegetation growth	○	○	○
Gutters missing	○	○	○

Any other notes or observations

1000

Submit

Powered by ArcGIS Survey123

Appendix C – Survey Instrument for Municipalities

1. Does your municipality have property maintenance code in place?
   Yes (continue to question 3)
   No (continue to question 2)
2. How does your municipality address potential construction code violation?

3. In which year did your municipality adopt the property maintenance code?

4. When was the last time the code was updated?

5. During the past 12 months, how many property maintenance code violations have been recorded?

6. Please choose the three most common types of violations from the following list:
   a. Excessive weed growth or presence of noxious weeds
   b. Grading and drainage problems
   c. Sidewalks and driveways deteriorating
   d. Exterior structure deficiencies (foundation, wall, doors, windows, or roof)
   e. Accessory structures (i.e. shed, garage, fence and walls) are not maintained
   f. Interior safety issues (handrail, paint, stairs and interior doors)
   g. Lack of heating and/or cooling
   h. Insufficient plumbing facilities
   i. Violation of mechanical and electrical requirements
   j. Unauthorized wood burning stove
   k. Pest infestation
   l. Display of inoperative vehicle
   m. Presence and accumulation of objectionable materials and substances
   n. Fire safety violation
   o. Other_____

7. Does your municipality have an appeal board?
   Yes (continue to 8)
   No (continue to 9)
8. During the past 12 months, how many appeals have you received?
9. Without an appeal board, how does your municipality handle possible dispute?
10. 1 being the least likely and 5 being the most likely, how likely are the owners in your municipality who committed violations to pay the fine?
    1 2 3 4 5
11. How long does it usually take for an appeal to be resolved?
12. Do you think the property maintenance codes in your municipality have been effective in maintaining the quality of housing in the area?
    Yes (continue to question 14)
    No (continue to question 13)
13. Please use the space below to tell us why the codes have not served their purpose in your area.
14. Please list the reason(s) why you believe the codes have been effective.

Appendix D - PHFA Written Response

PHFA
PA HOUSING FINANCE AGENCY

January 20, 2022

Ying Yang, PhD, Associate Professor of Sociology
Shippensburg University
Center for Land Use and Sustainability
1871 Old Main Dr.
Shippensburg, PA 17257

Dear Dr. Yang:

PHFA is pleased to learn of your research focused on housing quality and rural impacts. We hope that you will provide us with a copy of your paper. Unfortunately, Executive Director Robin Wiessmann and Policy Director Bryce Maretzki regret that they are unable to meet with you at this time. They are busy ensuring the implementation of new programs, and federal and state directives for existing ones to assist as many Pennsylvanians as possible with COVID-related housing crises. If you would like to videoconference with either of them in the future, please reach out to Bryce at (717-780-1867 or bmaretzki@phfa.org) and he will coordinate scheduling.

To support your research, we have enclosed the information you requested from our first mortgage products that offer home repair funds, as well as our repair programs and HEMAP. We hope that this information is useful in your work. Please reach out to Roberta Schwalm (717-780-3838 or rschwalm@phfa.org) for any additional assistance.

Sincerely,

Roberta R Schwalm

Roberta R. Schwalm

PS Please click here to learn about the Kathy A. Possinger Housing Policy Fellowship that may be of interest to you or your students in the future.

Cc: Bryce Maretzki

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PHFA
PA HOUSING FINANCE AGENCY

Shippensburg University Center for Land Use and Sustainability
-- Response to Request for PHFA Program Information --

1. **What is the practice in determining applicants' qualifications?**

   ANSWER: For the HEELP, and Pennvest Homeowner Septic Loan (Pennvest) programs, our underwriting looks for 45% Debt to Income ratios (with exceptions up to 47% for Pennvest and 52% for HEELP, when there are strong compensatory factors such as other household income in addition to the applicant's or additional applicant income such as an employer provided car allowance. We also require paid in full real estate taxes; third or better lien position. In the HEELP program we also look at a 120% Combined Loan to Value Ratio covering all debts secured by the home to its valuation.

   The Purchase & Improvement program is paired with our Conventional option under the Mortgage Revenue Bond funding source. For Conventional loans our maximum DTI is set to 50%. The Homestyle Renovation Program is paired with our Fannie Mae option with a maximum of 50% DTI as well. The Access Modification loan can be utilized with Conventional and government financing (FHA & RD loans). The DTI for Conventional financing remains at 50% and the DTI for government loans are reduced to 45%.

   HEMAP applicants must meet all the requirements mandated by law. We evaluate income to determine their ability to resume their payments after cure of delinquency, The housing expense ratio must be at least 40%.

2. **How many applications are received per year?**

   ANSWER: The number of applications received in the last 5 years for HEELP ranges from 261 to 445; with an average of 339 per year. In the Pennvest program we have received between 72 and 130; with an average of 102 per year.

   Production under these products have slowed down during the pandemic due to rise in raw material prices. For 2021 we purchased 2 loans paired with Purchase & Improvement; 5 loans paired with the Access Modification funds and zero Homestyle Renovation due to the increased interest rate of the Fannie Mae loan program.

Pre-Pandemic HEMAP applications averaged 2,400 per year, for 2020 we received 792, and for 2021 we received 604 total applications.

3. **What is the approval ratio?**

ANSWER: In HEELP the approval rate is approximately 30%, with many applicants being better served by grant funds which are scarce and not administered by PHFA.

In the Pennvest program, the approval rate is 78%.

It is the lender's responsibility to determine if the borrower is eligible for PHFA financing prior to submitting the loan for PHFA review. Our approval rating is 100% as long as we receive eligible loans.

HEMAP approval ratio averages 21.5%

4. **Is there any data that assesses the effectiveness of the program?**

ANSWER: No studies of HEELP, Pennvest, the first mortgage products or HEMAP have been conducted.

5. **Is there any special effort to provide assistance for those who live in rural PA?**

ANSWER: Similar outreach is conducted across the state regardless of urban or rural character of the community.

PHFA first mortgages are provided in all counties.

HEMAP is only available to those persons who meet the requirements of legislation and does not consider urban or suburban character of the residence.

6. **Are there any educational programs to educate PA residents about their loan programs?**

ANSWER: Outreach for the HEELP program includes discussions with and mailings to interested legislators, Community Action Agencies, Weatherization providers, municipal authorities and municipalities.

3

The Pennvest program is advertised through outreach to local governments receiving Pennvest Authority funding for their projects as well as engineering firms that work on these municipal projects; professional organizations focused on local governments, such as the PA State Association of Boroughs and the PA State Association of Township Supervisors; and professional organizations focused on sewage management professionals including the PA Association of Sewage Enforcement Officers and PA Septage Management Association.

PHFA has a network of counseling agencies to through the Commonwealth that provides free homebuyer education to those interested in PHFA financing. Courses provided include homebuyer workshops, credit reporting analysis, methods to help for accessibility modification and much more.

PHFA's website describes the HEELP and Pennvest programs and agency staff provide website content and brochures as requested to other housing providers.

The HEMAP program is specific to its legislative purpose of saving homes from foreclosure; and as such the availability of the program is documented on the ACT 91 notice which is the initial step in the foreclosure process. In addition, applicants must apply through a HEMAP certified housing counselors and these agencies are aware of the program and can offer the application if a client fits the required criteria.

Appendix E: Pearson correlation coefficients and statistical significance for each pairwise comparison with the housing index for all tracts and for rural tracts. All correlations are statistically significant at p<0.01.

Variable	All tracts	Rural tracts
Median home value (N=3,159; 851)	-0.30	-0.27
Median household income (N=3,159; 851)	-0.45	-0.32
Median taxes paid (N=3,056; 860)	-0.39	-0.37
Selected monthly owner costs greater than 30% of household income for housing units with a mortgage (N=3,182; 858)	0.11	0.02
Selected monthly owner costs greater than 30% of household income for housing units without a mortgage (N=3,182; 858)	0.05	0.04
Percent owner occupied housing units (N=3,159; 851)	-0.34	-0.11
Percent owner occupied white non-Hispanic (N=3,176; 859)	-0.11	-0.18
Unemployment rate (N=3,159; 851)	0.20	0.10
Percent of population 25 and older with at least a high school education (N=3,159; 851)	-0.40	-0.47
Married or cohabiting couples (N=3,182; 858)	-0.25	-0.02

Appendix F - HMDA Term Explanations

Joint Application	One applicant is white and the co-applicant is a minority
2 or more Minority Application	Both applicants are minority
Debt-to-income ratio	The ratio, as a percentage, of the applicant's or borrower's total monthly debt to the total monthly income relied on in making the credit decision
Collateral	Value or type of collateral not sufficient

Appendix G – Statistical tables supporting the assessment of the factors that affect rural Pennsylvanians' eligibility to obtain a home improvement loan

Table G1: Loan Application Status by Race and Urban/Rural Status, Pennsylvania, 2019.

				Urban			
Race	White	Black	Asian	American Indian or Alaska	Native Hawaiian	2 or more minority races	White/ minority joint
Loan Status							
Loan Originated (%)	57.50%	28.50%	35.50%	29.90%	30.10%	17.80%	57.10%
Application Approved but not accepted (%)	2.80%	1.60%	1.90%	1.80%	3.60%	2.20%	3.30%
Application Denied (%)	**29.00%**	**57.90%**	**49.40%**	**59.10%**	**53.00%**	**72.20%**	**28.80%**
Application withdrawn by applicant (%)	7.30%	8.30%	8.30%	7.30%	7.20%	5.60%	7.40%
File Closed for Incompleteness	3.40%	3.70%	4.80%	1.80%	6.00%	2.20%	3.10%
Purchased loan (%)	0.10%	0.00%	0.10%	0.00%	0.00%	0.00%	0.20%
N	34642	5041	1776	164	166	90	513
				Rural			
Loan Originated (%)	56.80%	25.80%	39.90%	22.90%	45.00%	30.00%	52.40%
Application Approved but not accepted (%)	2.50%	0.00%	3.40%	2.10%	5.00%	0.00%	3.00%
Application Denied (%)	**30.60%**	**67.40%**	**45.30%**	**64.60%**	**37.50%**	**60.00%**	**36.60%**
Application withdrawn by applicant (%)	6.90%	5.40%	8.10%	0.00%	2.50%	10.00%	5.50%
File Closed for Incompleteness	3.20%	1.40%	3.40%	10.40%	10.00%	0.00%	2.40%
Purchased loan (%)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
N	14869	279	148	48	40	10	164

Table G2: Denial reasons by Racial Groups, Urban vs. Rural, 2019.

	Urban						
	White	Black or African American	Asian	American Indian or Alaska	Native Hawaiian or Other	White/ Minority Joint	2 or more minority applicants
Debt-to-income ratio (%)	26.30%	20.40%	37.30%	26.40%	25.60%	16.90%	19.70%
Employment history (%)	0.40%	0.30%	1.10%	0.00%	0.00%	0.00%	0.00%
Credit history (%)	39.00%	58.50%	28.70%	52.70%	41.50%	52.20%	52.50%
Collateral (%)	24.40%	14.50%	20.40%	15.40%	18.30%	23.50%	13.10%
Insufficient cash (down payment, closing costs) (%)	0.40%	0.30%	0.00%	0.00%	0.00%	0.00%	0.00%
Unverifiable information (%)	2.70%	1.50%	5.10%	3.30%	4.90%	2.20%	6.60%
Credit application incomplete (%)	6.80%	4.60%	7.40%	2.20%	9.80%	5.10%	8.20%
N	9321	2739	820	91	82	136	61
	Rural						
Debt-to-income ratio (%)	21.10%	14.80%	38.70%	4.20%	14.30%	16.70%	33.30%
Employment history (%)	0.30%	0.00%	1.60%	0.00%	0.00%	0.00%	0.00%
Credit history (%)	46.30%	61.50%	33.90%	79.20%	57.10%	55.60%	66.70%
Collateral (%)	25.50%	21.30%	16.10%	12.50%	28.60%	25.90%	0.00%
Insufficient cash (down payment, closing costs) (%)	0.40%	0.00%	1.60%	0.00%	0.00%	0.00%	0.00%
Unverifiable information (%)	2.30%	1.20%	1.60%	4.20%	0.00%	0.00%	0.00%
Credit application incomplete (%)	4.10%	1.20%	6.50%	0.00%	0.00%	1.90%	0.00%
N	4138	169	62	24	14	54	6

Table G3: Mean Differences in Selected Economic and Community-Level Characteristics between Those Whose Application Denied and Others, by Location, PA 2019.

	Urban						
	Loan Originated	Application Approved but not accepted	Application Denied	Application withdrawn by applicant	File Closed for Incompleteness	Purchase Loan	Group Comparisons Turkey Test
	Mean	Mean	Mean	Mean	Mean	Mean	
N	25265	1278	16552	3756	1687	191	
Loan Amount ($)	$86,635.66	$82,676.06	$68,725.23	$117,591.85	$83,067.58	$607,434.55	Denied <Approved; Denied < Withdraw
Income ($1,000)	118.13	111.16	87.1	115.87	115.31	95.69	Denied <Approved; Denied< Approved not accepted; Denied < Withdrew;
Tract level Minority Population Percentage (%)	18.77	19.44	33.16	26.17	24.97	25.54	Denied >all categories
Track to MSA Income percentage (%)	116.74	115.84	103.02	112.46	116.67	122.03	Denied <all categories
Tract level Owner occupied units (counts)	1424.57	1458.31	1249.52	1301.23	1340.91	1280.46	Denied <all categories
Tract level Median Age of Housing Unit	48.43	48.15	55.08	52	51.14	51.77	Denied >all categories (except purchase loan)
	Rural						
	Loan Originated	Application Approved but not accepted	Application Denied	Application withdrawn by applicant	File Closed for Incompleteness	Purchase Loan	Group Comparisons Turkey Test
	Mean	Mean	Mean	Mean	Mean	Mean	
N	9502	435	5514	1192	547	47	
Loan Amount	$62,239.00	$59,321.84	$53,405.88	$84,207.21	$61,526.51	$114,574.47	Denied <withdrew
Income ($1,000)	96.64	90.14	75.05	90.48	89.52	74.52	Denied >all categories (except purchase loan)
Tract level Minority Population Percentage (%)	7.47	8.73	11.19	9.04	8.81	15.56	Denied >all categories (except purchase loan)
Track to MSA Income percentage (%)	106.07	103.28	99.12	103.42	102.4	100.21	Denied >all categories (except purchase loan)
Tract level Owner occupied units (counts)	1435.3	1471.5	1360.12	1402.91	1368.15	1408.62	Denied <approved; Denied <not accepted;
Tract level Median Age of Housing Unit	47.15	46.53	49.39	47.9	48.53	43.36	Denied >approved; Denied >approved not accepted; Denied

Table G4: Logistic Regression Estimates for Loan Approval.

	B	O.R
Race		
White	-	-
Black	-0.403**	0.668
Asian	-0.551**	0.577
American Indian	-0.890**	0.411
Native Hawaiian	-0.239	0.787
White/minority Joint	-0.147	0.863
Minority joint	-1.096**	0.334
Location		
Rural	-	-
Urban	0.218**	1.244
Demographic Characteristics		
Age	0.113**	1.120
Male	-	-
Female	0.077*	1.080
Joint	0.499**	1.647
Economic and Financial Information		
Income	-0.000*	1.000
Loan amount	0.000**	1.000
Debt to income ratio	-0.771**	0.463
Tract Level Characteristics		
Percentage of minority population for track	-0.012**	0.988
Tract median age of homes	-0.008**	0.992
Median family income for the MSA	0.000	1.000

Note: ** the estimate is significant at .000 level; * the estimate is significant at .05 level.

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