

**Title Page**

Hardship in the Heartland: Associations Between Rurality, Income, and Material Hardship

*Under Review*

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### **Abstract**

Approximately one in three US households have experienced material hardship, including food, healthcare access and transportation hardship. The inadequate or unstable provision of basic needs is more typical in households with children or persons of color and is associated with numerous negative outcomes. Little is known, however, about the relationship between rurality, income, and material hardship. Using data from the 2016 State Innovation Model (SIM) Statewide Consumer Survey (weighted  $N = 2,371,739$ ), we used logistic regression to examine the association between rurality, income, and four forms of material hardship, including food hardship, healthcare access hardship, transportation hardship, and any material hardship. Rural respondents had higher odds than non-rural respondents for experiencing healthcare access hardship. In contrast, rural respondents incurred lower odds than non-rural respondents for experiencing food hardship, transportation hardship and any hardship. All models of hardship indicated that lower income respondents incurred greater odds for having material hardship.

### **Keywords**

Material hardship; food insecurity; healthcare access; transportation; low-income households; rural poverty

### **Hardship in the Heartland:**

#### **Associations Between Rurality, Income, and Material Hardship**

Approximately one in three US households have experienced material hardship (Conrad-Hiebner & Paschall, 2017; Rodems & Shaefer, 2020; Schenck-Fontaine et al., 2020). *Material hardship* occurs when a household's consumption of goods and services falls below an acceptable standard, often determined by measuring insecurities related to food, transportation, and housing, inability to pay bills, and access to medical care (Beverly, 2001). The inadequate or unstable provision of basic needs is more commonplace among households with children or persons of color (Rodems & Shaefer, 2020), and is associated with numerous negative outcomes.

Material hardship negatively impacts adult mental health and parenting behaviors, leading to an increased likelihood of poor physical, emotional, and behavioral health outcomes for children (Ashiabi & O'Neal, 2007; Case et al., 2002; Huang, Kim, & Sherraden, 2017; Schenck-Fontaine et al., 2020). Parents with material hardship, for example, are more likely to have high levels of stress and depression, engage in harsh parenting, and experience child welfare involvement (Conger & Donnellan, 2007; Gershoff, Aber, Raver, & Lennon, 2007; Hernández, Phillips, & Siegel, 2016; Kang, 2013; Warren & Font, 2015). Moreover, pregnant women who experience material hardship have increased risk of prenatal depression and anxiety, which may have serious effects on the health of unborn children (Katz, Crean, Cerulli, & Poleshuck, 2018).

Approximately 30% of US households have experienced material hardship, yet only 20% of households have reported low annual incomes below \$25,000 (Conrad-Hiebner, Paschall, & Johnson, 2019; Rodems & Shaefer, 2020; Schenck-Fontaine et al., 2020; Semega, Kollar, Creamer, & Mohanty, 2019). Though there is a discrepancy between the prevalence of material

hardship and income, we do not know how material hardship is experienced by households of various income levels. This knowledge gap is problematic for higher-income households with material hardship. Unlike low-income households, higher-income households do not qualify for social safety net programs that provide food, cash, and housing assistance (U. S. Department of Health and Human Services [DHHS], 2020). In absence of knowledge on the relationship between income levels and material hardship, social safety net programs will continue targeting low-income households, which may neglect higher-income households also experiencing material hardship.

There are a few explanations for why higher-income households are unable to afford basic necessities. First, income and material hardship may represent different aspects of household financial uncertainty (Gershoff et al., 2007; Schenck-Fontaine & Panico, 2019). Whereas income represents the monetary resources available to households, material hardship indicates a household's day-to-day experience with financial uncertainty (Schenck-Fontaine & Panico, 2019). In addition to income, factors like financial illiteracy, geographical differences, childcare costs, student loan debt, and unexpected expenses related to medical emergencies may explain why some households have material hardship while others do not (Beverly, 2001; Lusardi, 2008; Mayer & Jencks, 1989; Ouellette, Burstein, Long, & Beecroft, 2004).

Literature supports the contention that income and material hardship are separate constructs of financial uncertainty. Researchers have demonstrated a weak association between income and material hardship (Mayer & Jencks, 1989; Schenck-Fontaine & Panico, 2019). This may account for the higher-income households with material hardship and the lower-income households without material hardship (Conrad-Hiebner et al., 2019). In sum, measures of income describe the financial resources within households, yet are insufficient for determining whether

this income is adequate for meeting a household's basic needs. In response, we included measures of both income and material hardship in our study.

There are limitations related to literature on income and material hardship. Research on income and material hardship has not focused on geographical areas with significant rural populations (Conrad, Paschall, & Johnson, 2019; Gershoff et al., 2007; Mayer & Jencks, 1989; Schenck-Fontaine & Panico, 2019). Although we know that children from rural households have higher rates of low income than non-rural households (Schaefer, Mattingly, & Johnson, 2016), we have not yet identified the prevalence of material hardship among rural families. Without understanding the impact of rurality on material hardship, we do not know whether rural households fare better or worse than non-rural households. We also do not know how material hardship and income may intersect in rural areas where daily life and challenges differ from those in urban populations. In response, we examined the relationship between rurality, income, and material hardship among households in a rural state.

Because rural areas are less densely populated than urban areas, residents often need to travel longer distances to daily activities (Ratcliffe, Burd, Holder, & Fields, 2016). Given this geographic barrier, rural households may face unique challenges related to transportation. Rural households without a reliable vehicle, for example, may lack other transportation options for work or healthcare appointments, whereas non-rural households may have more options through public transportation or ride-sharing services (Fletcher, Garasky, Jensen, & Nielsen, 2010). Few researchers, though, have investigated the prevalence of transportation hardship in rural areas or the relationship between transportation hardship and rurality. This knowledge gap is problematic because transportation hardship is cited as a barrier to healthcare services (Arcury et al., 2005; Locatelli et al., 2017; Syed et al., 2013). In response to this knowledge gap, we examined both

the percentage of households experiencing transportation hardship among rural and non-rural households and the association between rurality, income, and transportation hardship.

There is a similar knowledge gap for the relationship between food hardship, healthcare access hardship, and rurality. Estimates on the prevalence of food hardship and healthcare access hardship vary. Whereas Rodems and Shaefer (2020) reported 10 to 12% of households with food or healthcare access hardship among a nationally representative sample, Conrad and colleagues (2019) found that 36% of households had food hardship and 6% of households had healthcare access hardship among a national sample of low-income urban mothers. What remains unknown is whether rural households experience the same percentage of food hardship and healthcare access hardship as non-rural households. In the absence of this knowledge, we may underestimate the prevalence of food hardship and healthcare access hardship among rural households, which may downplay the influence of rurality on the experience of material hardship. In response, we described the prevalence of food hardship and healthcare access hardship among rural and non-rural households and investigated linkages between food hardship, healthcare access hardship, income, and rurality.

In sum, there is a dearth of research on the relationship between rurality, income, and material hardship. This is problematic both for rural households with low income or material hardship and rural policymakers advocating for more community resources. In response, we used logistic regression to study the association between rurality, income, and four forms of material hardship, including food hardship, healthcare access hardship, transportation hardship, and any material hardship. We hypothesized that 1) rural households would have increased odds for experiencing material hardship than non-rural households, and 2) lower-income households would incur greater odds for having material hardship than higher-income households.

## Method

### Study Design

We examined associations between household income, rurality, and material hardship using data from the 2016 Iowa State Innovation Model (SIM) Statewide Consumer Survey (SCS) ( $N = 2,132$ ) after being approved by our institutional review board. Through dual-frame random digit dial sampling procedures with landline and cellular phones, SIM researchers conducted Computer Assisted Telephone Interviewing (CATI) between September 2016 and April 2017 with adult Iowans 18 years and older about their physical health, mental health, and healthcare use as part of a broader evaluation of the State of Iowa's implementation of healthcare innovations. The overall response rate was 27.1% with a cooperation rate of 73.5%. The SCS data is representative of all adult Iowans after applying weights that account for SCS's sampling strategies and differential nonresponse (weighted  $N = 2,371,739$ ) (Bentler et al., 2017). Prior to analysis, we examined the percentage of missingness, which ranged from 0% to 12.7% for the study variables. The demographic variables, including income, gender, race, ethnicity, age, education, and employment, were imputed using hot-deck procedures, a widely used imputation strategy for survey non-response (Andridge & Little, 2010). We did not impute data for the other variables due to the small amount of missingness (e.g., <3.7%) (Bennett, 2001).

### Measures

#### *Material Hardship*

The literature lacks consensus on how to measure material hardship or what hardships to include (Heflin, Sandberg, & Rafail, 2009; Ouellette et al., 2004), with many researchers assessing both individual and overall hardship and overall hardship (Pilkauskas, Currie, & Garfinkel, 2012; Osborne, Berger, & Magnuson, 2012; Teitler, Reichman, & Nepomnyaschy,

2002). We examined four indicators of material hardship, including transportation hardship, healthcare access hardship, food hardship, and any hardship. Our indicators were dichotomized, with scores of “1” indicating that respondents reported a hardship in the last year, and scores of “0” indicating the absence of that type of hardship. In Appendix A, we detail our approach for constructing each material hardship, following Pilkauskas and colleagues’ (2012) approach for calculating material hardship.

### ***Rurality***

We computed a dichotomous measure of rurality, with respondents who lived on a farm, in a rural area, or a rural subdivision with less than 5,000 coded as rural (“1”) and everyone else as non-rural (“0”). We describe our coding approach in Appendix A.

### ***Income***

Income was measured using five categories: (1) < \$25,000, (2) \$25,000 – < \$50,000, (3) \$50,000 – < \$75,000, (4) \$75,000 – < \$100,000, and (5) \$100,000 or more. We created four dummy variables for income, with the final category, \$100,000 or more, as the reference category.

### **Statistical Approach**

Using chi-square tests, we first examined the differences between respondents with any material hardship and respondents without material hardship by income, rurality, and several covariables. Next, using binary logistic regression, we investigated the odds of having transportation hardship, healthcare access hardship, food hardship, and any material hardship by levels of income, rurality, and several covariates in SPSS 26 (IBM Corporation, 2019) (see Table 2). As a post hoc analysis, we also estimated the predicted probability of any hardship for rural and non-rural respondents at each income level using Stata 16 (StataCorp., 2019).

## Results

### Sample Characteristics

Weighted frequencies are reported in Table 1. Two-fifths (40%) of respondents experienced one or more material hardships (40%), with more respondents reporting food hardship (26%) than healthcare access hardship (20%) and transportation hardship (15%). There were statistically significant group differences for respondents with material hardship based on income, rurality, race, gender, age, education, employment, and the presence of children in the household.

<<<<INSERT TABLE ONE ABOUT HERE>>>>

Respondents reporting any material hardship were more likely to live in non-rural areas and earn less than \$50,000 per year (Table 2). Respondents with material hardship were more likely to report being young (ages 18 – 24) or persons of color than respondents without hardship. Conversely, respondents without hardship were most likely to be older (age 65+), earn annual incomes of \$75,000 or more, live in rural areas, and have college degrees.

<<<<INSERT TABLE TWO ABOUT HERE>>>>

### Logistic Regression Models

In Table 3, we present results from our four logistic regression models testing the relationship between rurality, income, food hardship, healthcare access hardship, transportation hardship, and any hardship. All associations were statistically significant. Only the model of healthcare access hardship supported our first hypothesis on the relationship between rurality and hardship: Rural respondents had higher odds than non-rural respondents for experiencing healthcare access hardship. Contrary to our hypotheses, rural respondents incurred lower odds than non-rural respondents for experiencing food hardship, transportation hardship and any

hardship. All models of hardship provided support for our second hypothesis on the association between income and hardship: Lower income respondents incurred greater odds than higher income respondents for having material hardship.

<<<<INSERT TABLE THREE ABOUT HERE>>>>

### ***Food Hardship***

Income, age, and healthcare access hardship shared a strong association with food hardship, whereas gender and race shared a negligible association (see Table 3). Respondents of every income level and age group had higher odds for food hardship than respondents in the reference groups. The lowest-income earners were nine times more likely to experience food hardship than the highest-income earners. Interestingly, non-White respondents had lower odds for experiencing food hardship than healthcare access hardship, transportation hardship, and any hardship. Finally, respondents reporting healthcare access hardship, ages of 25 to 34, or incomes of \$50,000 to 7\$5,000 had nearly four times the odds for experiencing food hardship than respondents in the reference groups.

### ***Healthcare Access Hardship***

In contrast to the other three hardships, respondents in rural areas incurred higher odds for healthcare access hardship than respondents in non-rural areas. Similar to food hardship, income and age shared strong associations with healthcare access hardship. Respondents reporting ages of 18 to 24, lowest incomes, non-White racial status, and food hardship incurred four times the odds for having healthcare access hardship than respondents in the reference groups.

### ***Transportation Hardship***

Gender, race, and employment status were related more strongly with transportation hardship than with food or healthcare access hardship (see Table 3). Respondents reporting as female or non-White incurred higher odds for experiencing transportation hardship as compared to the reference groups. Likewise, unemployed respondents sustained nearly twice the odds for having transportation hardship than employed respondents, which is greater than the odds for experiencing the other three types of hardship.

Income, age, food hardship, and healthcare access hardship were associated with weaker odds for experiencing transportation hardship. Respondents earning \$50,000 – \$74,999, for example, had 1.64 times the odds for experiencing transportation hardship, which are lower than the odds for the other three hardships. Similar findings emerged for age. Middle-aged respondents (ages 45 – 54) had 1.27 times the odds for having transportation hardship, which fall below the odds for experiencing the other three hardships. Likewise, respondents with healthcare access hardship or food hardship had approximately 1.5 times the odds for reporting transportation hardship than respondents without healthcare access or food hardship. The association between food or healthcare access hardship and transportation hardship was weaker than the relationship between food hardship and healthcare access hardship ( $OR = 1.36 - 1.84$  v.  $3.76 - 3.82$ , respectively).

Interestingly, there were more negative associations between income, age, education, and children in the home and transportation hardship than for the other three hardships. Unlike the other three hardships, respondents earning \$75,000 – \$99,000 had lower odds for experiencing transportation hardship than respondents earning \$100,000 or more (see Table 3). Similarly, respondents reporting ages 35 to 44 or 55 to 64 had decreased odds for having transportation hardship than the other three hardships. Whereas having some college education and children in

the home predicted higher odds for having food, healthcare access and any hardship, having some college or children in the home predicted lower odds for experiencing transportation hardship.

### ***Any Hardship***

Respondents in the lowest income group, a non-White racial status, and the youngest age group sustained increased odds for having any hardship. Non-White respondents had 2.5 times the odds for experiencing any hardship than White respondents. Young respondents (ages 18 – 24) had 4.5 times higher odds for reporting any hardship than the reference group, with the magnitude of the odds decreasing as age increased. Most striking is the difference between the lowest and highest income groups. Like the relationship between income and food hardship, respondents earning less than \$25,000 had 10 times the odds for experiencing any hardship than the highest-income group. Like the other three hardships, the magnitude of the odds decreased considerably as income increased.

There were also differences for education and households with children. Respondents with children in the home or an education of high school or less had higher odds for reporting any hardship than college-educated respondents or respondents with children in the home. Completing a high school degree or less and having children in the home predicted greater odds for experiencing any hardship than for experiencing transportation, food, and healthcare access hardship.

### **Post Hoc Analyses**

Contrary to our hypotheses, rurality did not increase the odds for experiencing food hardship, transportation hardship, or any hardship. We conducted post hoc analyses to investigate the relationship between rurality, income, racial status, age, and hardship given the

strong associations between these variables and surprising finding on rurality. We generated predicted probabilities for each hardship among rural and non-rural respondents across categories of income, race, and age (Figures 1 – 8).

### ***Rurality, Income, Racial Status, and Hardship Type***

The negative slopes plotted in Figures 1 – 4 indicated an inverse relationship between the predicted probabilities for each hardship type and income. Predicted probabilities for transportation hardship, healthcare access hardship, food hardship and any hardship decreased as income increased, with White respondents in both rural and non-rural settings reporting lower predicted probabilities for each hardship (Figures 1 – 4). Rural respondents had lower predicted probabilities for any hardship, transportation hardship and food hardship than non-rural respondents (Figure 1, 2, 4). In contrast, rural respondents had higher predicted probabilities for healthcare access hardship than non-rural respondents (Figure 3).

<<<<INSERT FIGURES 1 – 4 ABOUT HERE>>>>

The pattern of predicted probabilities for food hardship (Figure 2) diverged from the other hardship types. The marked differences in slopes for transportation hardship, any hardship and healthcare access hardship were not present for the food hardship slopes (Figures 1, 3, 4 v. 2). Instead, the food hardship slopes depicted small differences by race and rurality, with both rural and White respondents having lower predicted probabilities for food hardship than non-rural and non-White respondents. Further, the small differences in predicted probabilities for food hardship by race and rurality became negligible as respondents reported more income.

### ***Rurality, Income, Age, and Hardship Type***

Given the large odds ratios for the two youngest age categories, we plotted predicted probabilities for respondents ages 18 – 24 and 25 – 34 versus ages 65 or older (see Figures 5 – 8).

<<<<INSERT FIGURES 5 – 8 ABOUT HERE>>>>

The negative slopes in Figures 5 – 8 demonstrated an inverse relationship between the predicted probabilities for each hardship type and income by rurality and age. Figures 5 – 7 demonstrated considerable gaps in the slopes for younger respondents versus older respondents, meaning that both rural and non-rural respondents age 65 and older had lower predicted probabilities than younger respondents. Across all groups, predicted probabilities for food, healthcare access and any hardship declined as respondents reported more income. There were differences in predicted probabilities by rurality for specific age groups. Rural respondents had lower predicted probabilities for food, transportation or any hardship than non-rural respondents by age category (e.g., rural and non-rural 18 – 24 years old) while rural respondents who reported healthcare access hardship had slightly higher predicted probabilities than non-rural respondents in the same age categories (Figure 8).

### ***Summary of Findings***

Results from the logistic regression indicated that rural residents had lower odds for experiencing food, transportation, and any hardship and greater odds for experiencing healthcare access hardship. Predicted probabilities provide context for these relationships, demonstrating that rurality bears more economic consequences for non-White and young respondents. Non-White and young respondents in non-rural areas had higher predicted probabilities for most hardship types, and although predicted probabilities for all hardship types decreased as

respondents earned more income, the rural versus non-rural disparities remained consistent across all groups (e.g., income, race, age).

### **Discussion**

According to the literature, both material hardship and rural poverty negatively impact personal wellbeing (Ashiabi & O'Neal, 2007; Case et al., 2002; Huang et al., 2017; Schaefer et al., 2016; Schenck-Fontaine et al., 2020), yet little is known about the association between rurality and material hardship or between material hardship and income in rural US spaces. In the absence of this knowledge, we cannot determine the unique influence of rurality on material hardship nor the interplay between material hardship and income within rural communities. In response, we described the prevalence of rurality, income, and four hardship types, and conducted chi-square difference testing and logistic regression to examine the relationship between rurality, income, food hardship, transportation hardship, healthcare access hardship, and any hardship. We found support for the following themes: 1) Hardship is a widespread experience; 2) Rurality decreased the odds for experiencing all hardships besides healthcare access hardship; and 3) Food hardship and healthcare access hardship shared a stronger association with each other than with transportation hardship. Taken together, our findings contribute to the literature on material hardship.

Material hardship was pervasive in our study, with 40% of respondents reporting at least one hardship related to food, healthcare access or transportation. Our findings suggest that material hardship is more prevalent in the US than formerly reported. Previous estimates indicated 14 to 36% of respondents with one or more hardships (Heflin, 2016; Rodems & Shaefer, 2020; Schenck-Fontaine & Panico, 2019). Surveillance issues (e.g., low-income samples versus nationally-representative samples) and measurement differences most likely

contribute to the contrasting estimates of material hardship and have been thoroughly discussed elsewhere (see Conrad-Hiebner & Byram, 2020; Heflin, 2006; Ouellette et al., 2004). In the following paragraphs, we outline a few examples that pertain directly to our study.

First, like other researchers, we measured food and health insurance hardship (Ouellette et al., 2004). However, we expanded our inquiry to transportation and healthcare access hardship, which are understudied in literature on material hardship. Accounting for additional hardships may have increased the number of households reporting hardship in our study. Further, decisions about how to count material hardship may have impacted our estimates. We operationalized food hardship as the presence of one or more indicators from Blumberg and colleagues' (1999) Household Food Security Survey, for example, while another research team defined food hardship as the presence of two or more indicators from the same survey (Rodems & Shaefer, 2020). Though our calculation of material hardship is more liberal than those in Rodems and Shaefer's (2020) study, our operationalization closely aligns with other literature on material hardship (Conrad et al., 2019; Pilkauskas et al., 2012; Schenck-Fontaine, Gassman-Pines, & Hill, 2017).

Second, our unique sample may partially explain why material hardship is more prevalent in our study compared to others. We engaged a sample of households from a rural state, which is not common in literature on material hardship in the US. Most US studies on material hardship rely on samples of urban or low-income households (e.g., Heflin, 2006), which may not represent households from rural states. The overall differences in study samples and material hardship measures provide explanation for why our estimates of material hardship contrast with previous estimates. In particular, discrepancies in measurement indicate a need for standardized measures of material hardship, which are in initial stages of development (e.g., [name redacted

for review], 2020). Standardized measures would help researchers compare rates of material hardship across various samples and settings.

Comparable to other studies, material hardship was more frequent among respondents reporting young ages, children, status as persons of color, or low socioeconomic status (Mayer & Jencks, 1989; Rodems & Shaefer, 2020). Most low-income respondents experienced material hardship (76%) in our study, with odds for all hardship types increasing as age, income, educational attainment and employment decreased. Interestingly, though our lowest-income respondents experienced the most material hardship, higher earners also reported material hardship. Nearly 20% of high-income respondents (\$100,000+) had material hardship, with those in the second highest-income group (\$75,000 – 99,000) incurring 1.27 to 1.51 higher odds for any hardship, food hardship, and healthcare access hardship. Our findings align with other researchers who documented the presence of material hardship among non-poor households (Iceland & Bauman, 2007; Mayer & Jencks, 1989; Short, 2005).

There are multiple factors that may clarify why higher-income households have material hardship. High income describes one dimension of financial uncertainty, yet on its own cannot guarantee that households are adequately fed, housed, and clothed. Along with a lack of financial literacy, there are differences in cost-of-living, debt and savings, fluctuations in health insurance coverage, and unanticipated expenses that contribute to household financial uncertainty (Beverly, 2001; Brown et al., 2015; Lusardi, 2008; Mayer & Jencks, 1989). Nearly 85% of US households, for example, carry debt (Brown et al., 2015), with 25% of middle-income families unable to secure US\$2000 for unexpected purchases (Lusardi, Schneider, & Tufano, 2011).

Despite the prevalence of material hardship, income poverty rather than material hardship drives eligibility guidelines for US social safety net programs providing cash and food

assistance. Social safety net programs are designed to help households afford food, housing, and medical care, yet only target low-income households. Once household income matches or doubles the financial threshold determined by federal poverty guidelines, US households likely do not qualify for assistance through social safety programs (DHHS, 2020). Although some might argue that higher income households do not require assistance through social safety net programs, our results on the relationship between middle-income households and material hardship suggest otherwise. A median household income of US\$63,179 exceeded federal poverty guidelines in 2018 (US Census Bureau, 2019), yet is below the US\$67,146 estimated to meet day-to-day necessities for a family of four (Nadeau & Glasmeier, 2019). The difference between median income and the living wage calculator (Glasmeier & Massachusetts Institute of Technology, 2020) indicates a gap between the intended and actual recipients of social safety net programs. This means that a number of households with material hardship may not receive the assistance they need.

In addition to describing the incidence of material hardship, our study is one of the first to estimate material hardship for rural US households. Besides healthcare access hardship, our results indicated a buffering impact of rurality on material hardship: Rural households had lower odds than non-rural households for food hardship, transportation hardship, and any hardship. These findings contextualize rural *financial uncertainty*, that is, the combined impact of economic resources (income) and lived experience of financial uncertainty (material hardship) on households (Schenck-Fontaine & Panico, 2019). Given these findings, it is possible that rural households have less overall financial uncertainty than non-rural households. Though there is limited literature on rural material hardship, recent trend data on rural poverty supports our tentative hypothesis: Nolan and colleagues (2017) found that rural poverty dramatically declined

from 1967 to 2014 as compared to urban poverty because social safety net programs have strengthened in rural areas. Together, our findings on material hardship and Nolan and colleagues' (2017) findings indicate a need for future research on the mechanisms of financial uncertainty in rural households, including material hardship, income, debt, savings, and perceived financial stress.

Our findings on rural material hardship also demonstrate that other factors, yet to be identified, may protect rural households from material hardship. For example, informal and formal social supports may be more robust in rural areas, including borrowing money from friends or family, receiving food from a food bank, and assistance programs like the Supplemental Nutrition Assistance Program (SNAP) (Morton, Bitto, Oakland, & Sand, 2005; Nolan et al., 2017). In the instance of healthcare access hardship, however, geographic isolation may explain why rural respondents experienced more hardship compared to urban. Rural areas have less healthcare resources, forcing households to drive long distances for their care, which aligns with the questions we asked and barriers described in the literature. This may also help clarify our finding that respondents with transportation hardship were more likely to experience healthcare access hardship than respondents without transportation hardship. To date, few researchers have examined the relationships between transportation hardship and food or healthcare access hardships, although lack of transportation is a barrier to food and healthcare access (Syed, Gerber, & Sharp, 2013; Walker, Keane, & Burke, 2010).

Along with our surprising findings on rurality and material hardship, our findings indicate a complex, nuanced association between rurality, income, age, race, and material hardship. Predicted probabilities of hardships by race, age, income, and rurality revealed that rurality may be particularly protective for people who are low-middle income, young, and non-

white. Our finding that rurality may protect non-White rural residents is important in light of researchers reporting that material hardship impacts the mental health of non-White respondents more than White respondents (Marshall, Thorpe, & Szanton, 2017). The effect of rurality on the probability of transportation hardship was particularly strong for non-White respondents across all income groups in our study. Previous studies have documented more transportation hardship among non-White residents in rural areas (Park et al., 2010), but ours is the first to examine differences by race in both rural and urban settings.

Finally, we found a strong relationship between food hardship and healthcare access hardship, which supports previous research. Access to healthcare coverage, for example, may reduce worry about paying for food, particularly in households with children (Kino, Sato, & Kawachi, 2018). Likewise, households with food insecurity may be more likely to delay healthcare for children, including routine well-child care visits, medications, and sick care (Ma, Gee, & Kushel, 2008). This may be because parents experiencing material hardship or financial uncertainty need to prioritize the purchase of resources like food and medical care based on the most immediate need.

### **Limitations and Conclusions**

Our findings on the prevalence of US material hardship may differ from other studies due to the hardships we calculated and our rural sample. Whereas our sample is generalizable to the general population of adults in a rural Midwestern US state, most researchers use nationally representative samples concentrated in urban areas (Conrad-Hiebner & Paschall, 2017), households with children (Gershoff et al., 2007; Rodems & Shaefer, 2020), or low-income households (Heflin, 2016). Another limitation relates to our cross-sectional survey design: Our

data offers a snapshot of financial uncertainty and cannot address issues of causality or temporal ordering.

Despite these limitations, our study contributes to the literature by investigating the relationship between rurality, material hardship, and income. Two in five households in our study had material hardship, suggesting that material hardship in the US is more common than previously reported. Socioeconomic status, age, rurality and race did not prevent respondents from experiencing material hardship, though material hardship was more prevalent for respondents who were non-White, young, and lower income. Interestingly, rural living buffered households from having more material hardship. In all, researchers should seek to explain the mechanisms by which rurality influences the experience of material hardship. Identifying the underlying factors of rurality could lead to new efforts to prevent material hardship among our most vulnerable citizens and enhance their financial wellbeing.

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**Table 1**  
***Descriptive Statistics for Study Variables***  
 (Weighted  $N = 2,371,739$ )

Variable	$N$	%
Place of Residence		
Rural	456,486	20.0%
Non-Rural	1,826,966	80.0%
Income		
Under 25K	296,982	12.5%
25-49K	534,898	22.6%
50-74K	427,337	18.0%
75-99K	354,539	14.9%
100K ≤	757,983	32.0%
Race		
Non-White	298,629	12.6%
White	2,073,110	87.4%
Gender		
Female	1,203,703	50.8%
Male	1,168,036	49.2%
Age		
18-24	278,125	11.7%
25-34	429,189	18.1%
35-44	372,301	15.7%
45-54	384,084	16.2%
55-64	421,298	17.8%
65 ≤	486,742	20.5%
Education		
High School ≥	931,379	39.3%
Some College	760,912	32.1%
4-Year Degree ≤	679,448	28.6%
Employment Status		
Unemployed	788,847	33.3%
Employed	1,582,892	67.7%
Children in Household		
Yes	886,076	37.5%
No	1,479,288	62.5%
Food Hardship		
Yes	624,778	26.4%
No	1,744,068	73.6%
Healthcare Access Hardship		
Yes	473,763	20.0%
No	1,897,976	80.0%
Transportation Hardship		
Yes	357,364	15.1%

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No	2,006,017	84.9%
Any Hardship		
Yes	942,789	39.8%
No	1,428,950	60.2%

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**Table 2**  
***Chi-Square Results for Study Variables and Any Hardship***

Variable	No Hardship		Any Hardship	
	Weighted <i>N</i>	%	Weighted <i>N</i>	%
Place of Residence				
Rural	317,503	70%	138,983	30%
Non-Rural	1,085,755	59%	741,211	41%
Income				
Under 25K	70,028	24%	226,954	76%
25-49K	241,087	45%	293,811	55%
50-74K	237,158	55%	190,179	45%
75-99K	254,365	72%	100,174	28%
100K ≤	626,312	83%	131,671	17%
Race				
Non-White	86,066	29%	212,563	71%
White	1,342,884	65%	730,226	35%
Gender				
Female	701,609	58%	502,094	42%
Male	727,341	62%	440,695	38%
Age				
18-24	103,005	37%	175,120	63%
25-34	207,910	48%	221,279	52%
35-44	234,181	63%	138,120	37%
45-54	248,217	65%	135,867	35%
55-64	289,621	69%	131,677	32%
65 ≤	346,015	71%	140,727	29%
Education				
High School ≥	432,567	46%	498,812	54%
Some College	478,821	63%	282,091	37%
4-Year Degree ≤	517,562	76%	161,886	24%
Employment Status				
Unemployed	434,658	55%	354,189	45%
Employed	994,292	63%	588,600	37%
Children in Household				
Yes	474,939	54%	411,138	46%
No	950,748	64%	528,540	36%

*Note.* All associations are significant at  $p < .01$ .

**Table 3**  
***Odds Ratios for Hardship Models***

Variable	Food		Healthcare		Transportation		Any	
	$\beta$ (SE)	OR	$\beta$ (SE)	OR	$\beta$ (SE)	OR	$\beta$ (SE)	OR
Rural	-0.19 (.005)	0.82	0.09 (.005)	1.09	-0.31 (.006)	0.73	-0.23 (.004)	0.79
Income								
Under 25K	2.22 (.007)	9.24	1.24 (.007)	3.48	0.99 (.008)	2.69	2.27 (.006)	9.75
25K-49K	1.28 (.006)	3.62	1.01 (.006)	2.74	1.08 (.007)	2.95	1.39 (.005)	4.01
50K-74K	1.27 (.006)	3.55	0.53 (.007)	1.70	0.50 (.008)	1.64	1.06 (.005)	2.89
75K-99K	0.41 (.007)	1.51	0.38 (.007)	1.46	-0.14 (.009)	0.86	0.24 (.005)	1.27
100K $\leq$ (ref)	--	--	--	--	--	--	--	--
Non-White	-0.08 (.006)	.92	0.74 (.005)	2.11	0.88 (.006)	2.41	0.92 (.005)	2.51
Female	0.03 (.004)	1.03	-0.01 (.004)	0.99	0.25 (.004)	1.29	0.04 (.003)	1.04
Age								
18-24	1.11 (.007)	3.05	0.96 (.008)	2.61	0.68 (.007)	1.97	1.49 (.006)	4.44
25-34	1.35 (.007)	3.86	0.89 (.008)	2.44	0.54 (.008)	1.72	1.11 (.006)	3.05
35-44	1.09 (.008)	2.99	0.92 (.008)	2.52	-0.16 (.009)	0.85	0.60 (.007)	1.83
45-54	1.05 (.007)	2.86	0.50 (.008)	1.65	0.24 (.008)	1.27	0.68 (.006)	1.98
55-64	0.57 (.007)	1.77	0.72 (.007)	2.06	-0.22 (.007)	0.85	0.36 (.006)	1.43
65 $\leq$ (ref)	--	--	--	--	--	--	--	--
Education								
$\leq$ High School	0.46 (.005)	1.59	0.44 (.006)	1.56	0.35 (.006)	1.42	0.62 (.004)	1.86

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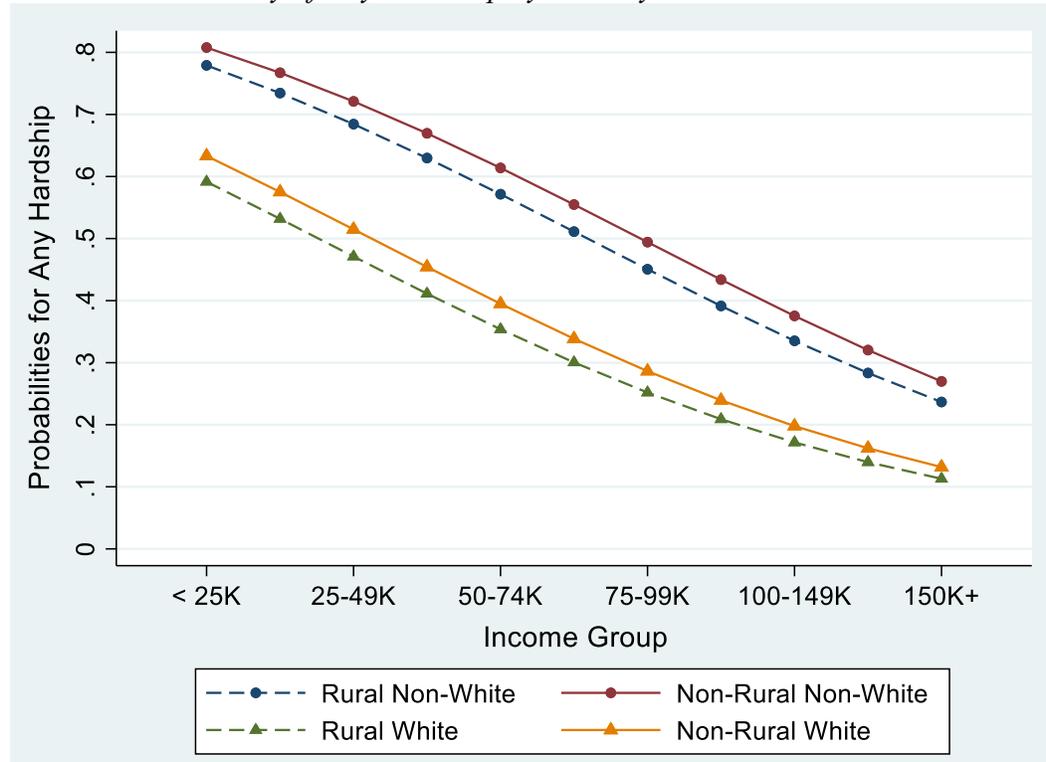
Some College	0.43 (.005)	1.54	0.10 (.006)	1.11	-0.05 (.006)	0.94	0.24 (.004)	1.28
4-Year Degree $\leq$ (ref)	--	--	--	--	--	--	--	--
Unemployed	0.28 (.005)	1.32	0.22 (.005)	1.24	0.65 (.005)	1.91	0.30 (.004)	1.35
Children in the Home	0.29 (.004)	1.34	0.16 (.005)	1.17	-0.05 (.005)	0.94	0.41 (.004)	1.50
Transportation Hardship	0.53 (.005)	1.70	0.30 (.005)	1.36	--	--	--	--
Healthcare Access Hardship	1.32 (.004)	3.76	--	--	0.30 (.005)	1.36	--	--
Food Hardship	--	--	1.34 (.004)	3.82	0.61 (.005)	1.84	--	--

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*Note.* All associations are statistically significant at  $p < .01$ .

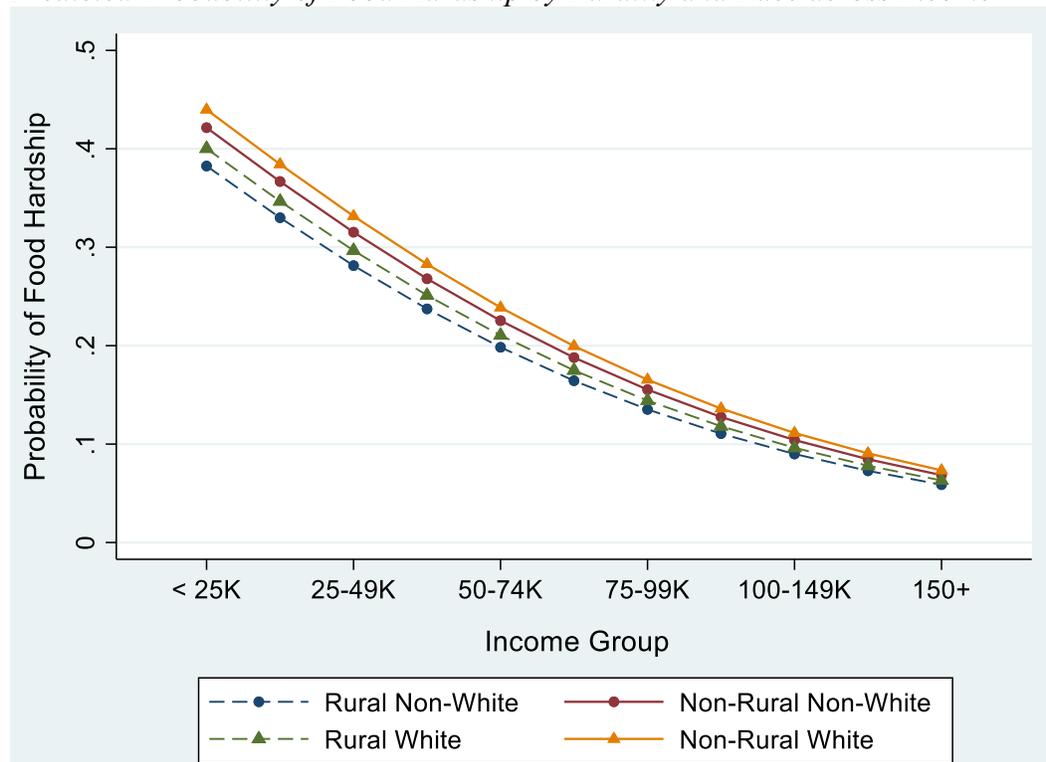
**Figure 1**

*Predicted Probability of Any Hardship by Rurality and Race across Income*



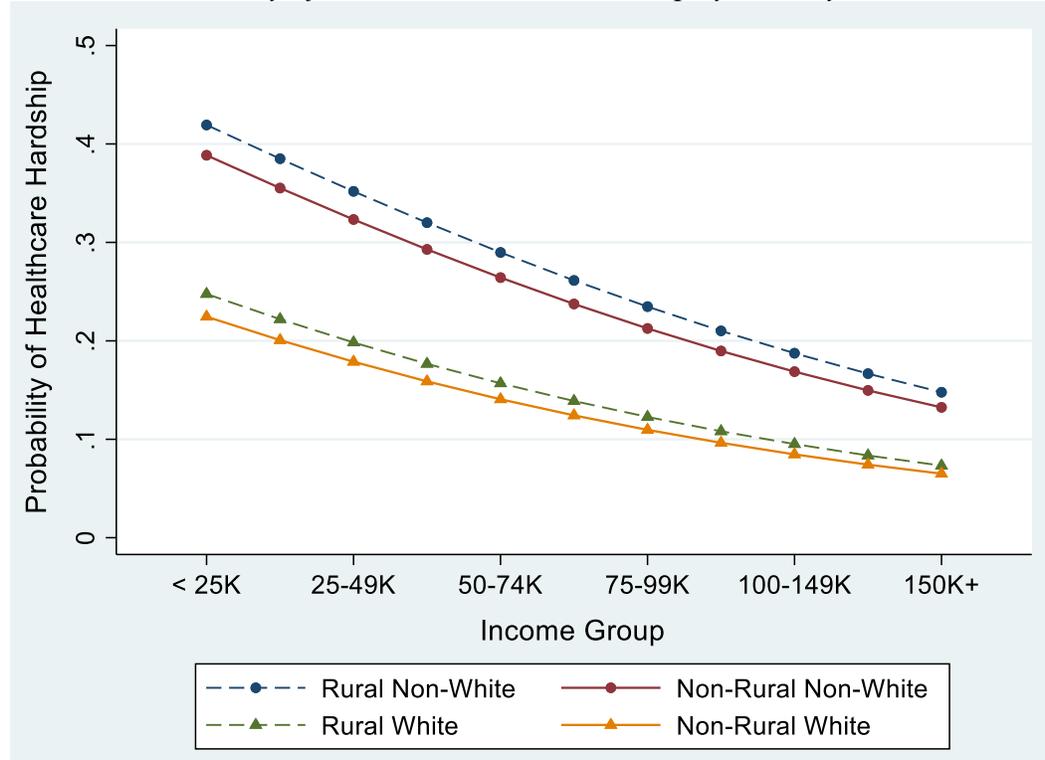
**Figure 2**

*Predicted Probability of Food Hardship by Rurality and Race across Income*



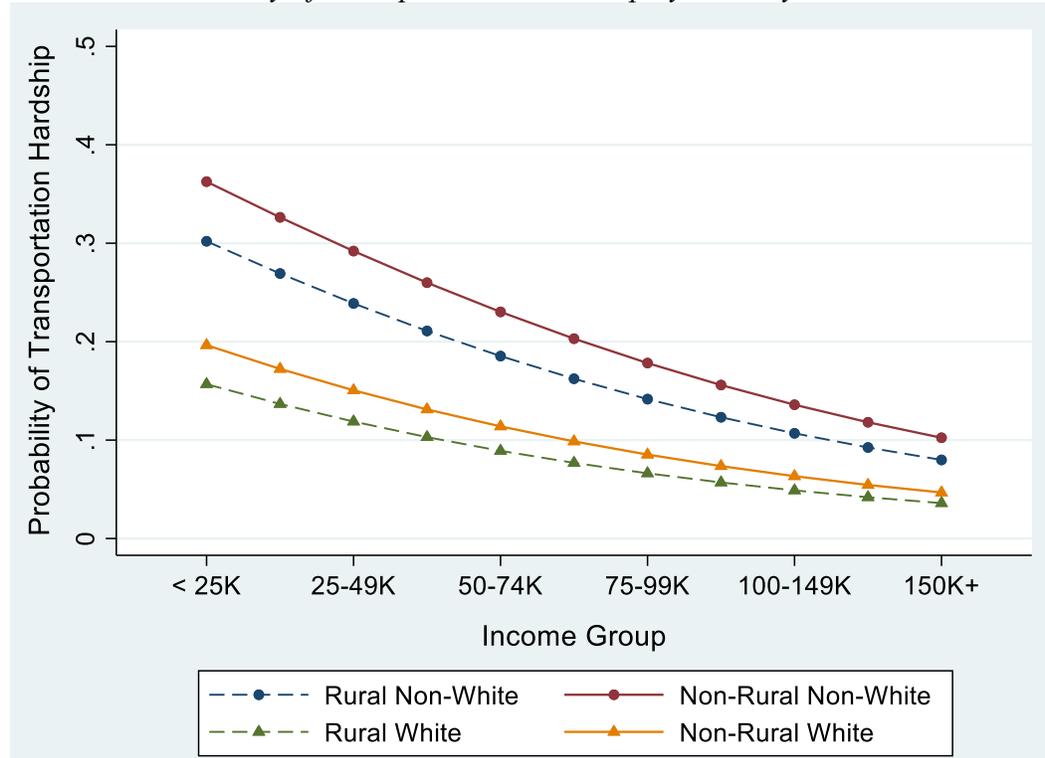
**Figure 3**

*Predicted Probability of Healthcare Access Hardship by Rurality and Race across Income*



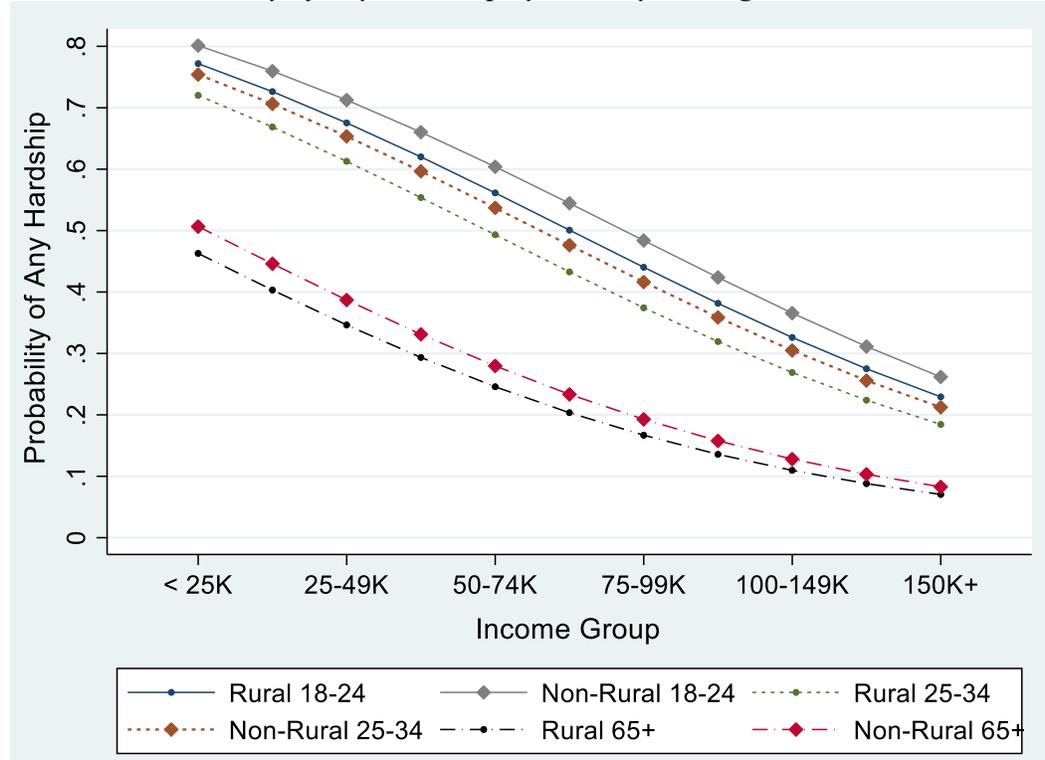
**Figure 4**

*Predicted Probability of Transportation Hardship by Rurality and Race across Income*



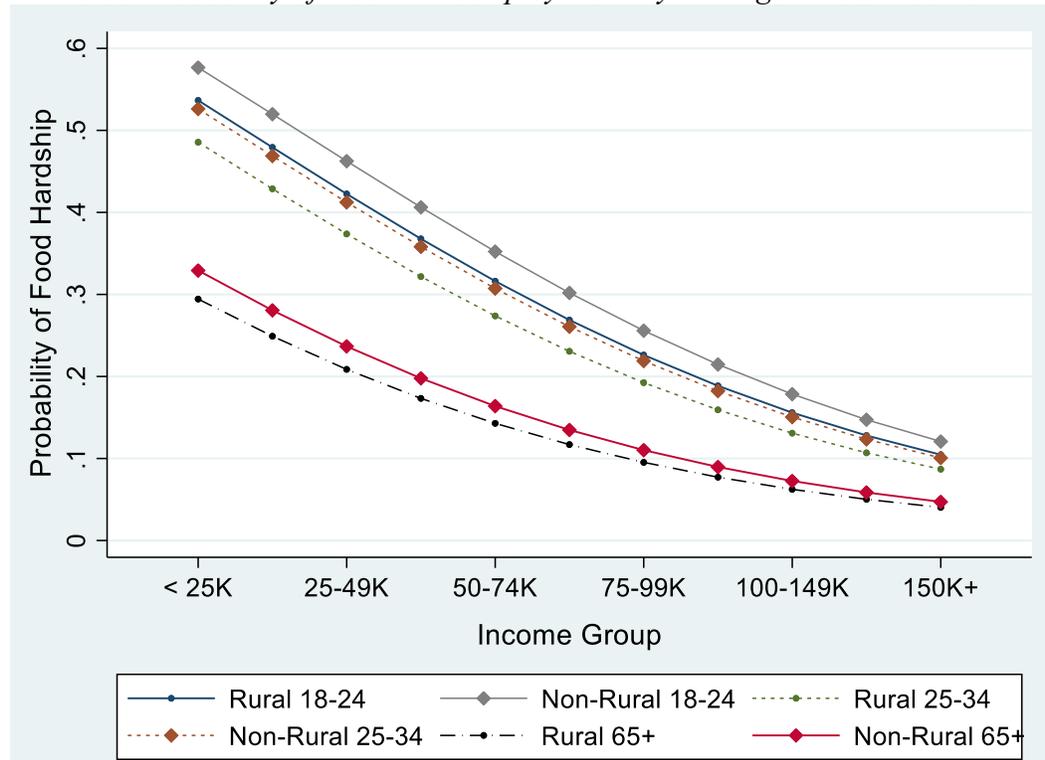
**Figure 5**

*Predicted Probability of Any Hardship by Rurality and Age across Income*



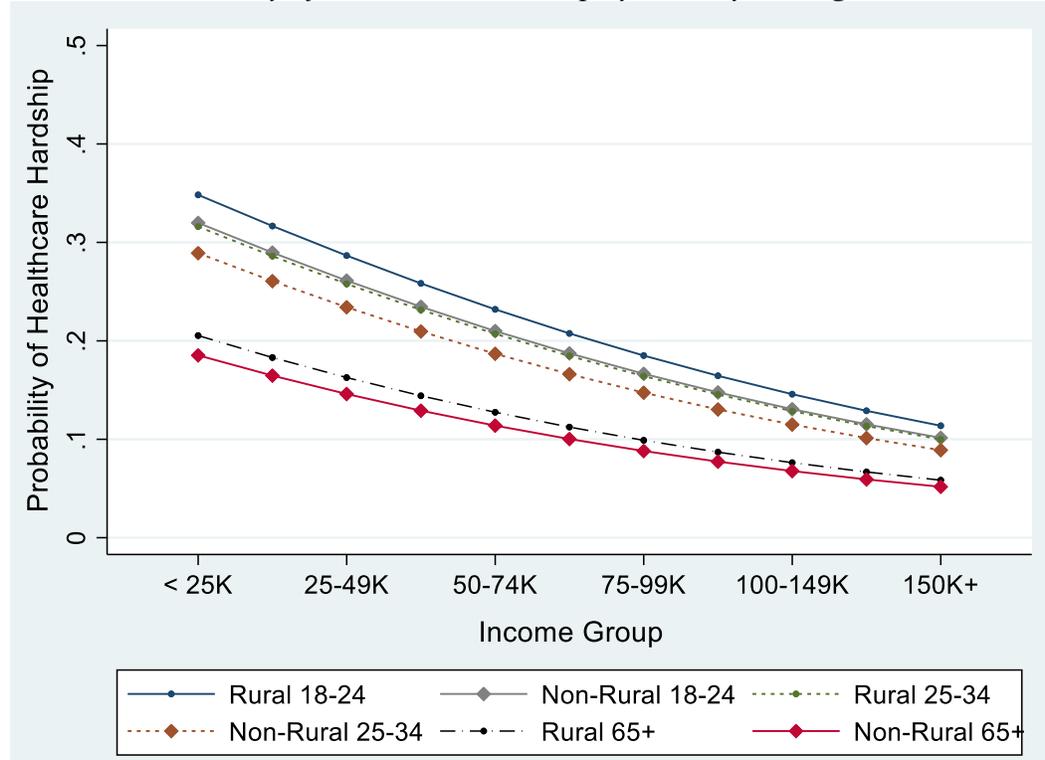
**Figure 6**

*Predicted Probability of Food Hardship by Rurality and Age across Income*



**Figure 7**

*Predicted Probability of Healthcare Hardship by Rurality and Age across Income*



**Figure 8**

*Predicted Probability of Transportation Hardship by Rurality and Age across Income*

