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Urban/rural differences in food security in America's East North Central Region

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The literature on food insecurity in America is extensive, but there is still a lack of understanding of urban/rural differences. Food insecure populations in urban communities undoubtedly experience different and unique challenges to food access than food insecure populations in rural areas. While urban households may face a lack of options for fresh produce, rural households may find that they live an inaccessible distance from the nearest grocer. Through analysis of the Census Bureau's Current Population Survey and Food Security Supplement, this project seeks to discover common, underlying variables in food-insecure communities in metropolitan and nonmetropolitan areas in America's East North Central Region (Wisconsin, Michigan, Illinois, Indiana, and Ohio) to better understand the policy environment surrounding food security in America.

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URBAN/RURAL DIFFERENCES IN FOOD SECURITY IN AMERICA'S EAST NORTH CENTRAL REGION

By

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Abstract

The literature on food insecurity in America is extensive, but there is still a lack of understanding of urban/rural differences. Food insecure populations in urban communities undoubtedly experience different and unique challenges to food access than food insecure populations in rural areas. While urban households may face a lack of options for fresh produce, rural households may find that they live an inaccessible distance from the nearest grocer. Through analysis of the Census Bureau's Current Population Survey and Food Security Supplement, this project seeks to discover common, underlying variables in food-insecure communities in metropolitan and nonmetropolitan areas in America's East North Central Region (Wisconsin, Michigan, Illinois, Indiana, and Ohio) to better understand the policy environment surrounding food security in America.

Introduction

Clifford and Alma, a married American couple, were both born in 1923. They spent most of their developing years in what's referred to today in niche circles as "The Great Depression". This extremely tumultuous time in American history was characterized by extreme uncertainty. Not only uncertainty about what the future of the country would look like, but uncertainty about where next month's rent would come from and if they would have enough money to afford food for the week. For many of us, this widespread uncertainty has led to older relatives with extreme attachment issues with food. Alma grew up extremely poor in rural Appalachia and experienced many barriers to access to food. Now that she's older with money and constant access to any kind of food, she often finds herself overindulging — eating entirely too much, as if she's worried that the food in her cupboard will disappear overnight. On the other side of the spectrum, Clifford grew up in a big city. He also grew up food insecure during the Great Depression, but his history has manifested in a different way than with his wife. Instead of this ravenous, "bottomless pit" mentality with food, he eats very little. He's not emaciated and has a healthy amount of muscle mass for his age, but diagnostic tests and screenings have always reported that his metabolism is very very low. His doctors have suggested that years of intense "dieting" during his developmental years made his body very efficient at surviving off of very little food. This poses problems for him when he doesn't need many calories, so he doesn't eat much, so he finds himself deficient in a lot of vitamins and minerals that become vital as a person ages. Clifford and Alma's lack of food security in their youth have had severe consequences for their health as they've

aged, and I would imagine that many Americans share similar stories, in the Silent Generation and beyond.

What is Food Insecurity?

According to the USDA ERS, 1 in 10 Americans today lack food security, defined by the USDA "as access…at all times to enough food for an active, healthy life". (USDA, 2022). Food insecure people have their normal patterns of eating disrupted from not being able to find or afford food or are unable to sustain normal eating habits for a period of time. "Normal" varies from culture to culture, and from person to person, but a common definition of food security describes it as an "assured ability to acquire acceptable foods in socially acceptable way…that is, without resorting to emergency food supplies, scavenging, stealing, or other coping strategies" (USDA ERS, 2022). Limited access to food can manifest itself in physiological conditions, like heart disease and stroke, or have psychological consequences in the form of intense food focus and a disordered relationship with food (Hazzard, Hooper, Loth, Wall, Neumark-Sztainer, 2022). A number of sociodemographic variables affect the likelihood that a household will have trouble finding consistent access to food, but the variable that we are most interested in is spatial location and access. More specifically, the relationship between urban environments, rural environments, and how individuals living in each spatial "ecosystem" experiences food insecurity. We're especially interested in the following questions:

1. Does living in a metropolitan area affect the relative amount of spending needed to meet weekly food needs? Does metropolitan city status effect if a household

spends exactly what they need to, or could spend less and still meet their base nutritional needs?

2. Does living in a metropolitan area affect the likelihood of the existence of a food pantry in the respondent's community?
3. Does living in a metropolitan area affect the likelihood of SNAP benefit (or food stamp) usage?

Answering these questions will hopefully shed light on some of the differences in how metropolitan and non-metropolitan areas experience food insecurity. Clifford and Alma undoubtedly experienced unique challenges that were specific to their location; although the food security research hasn't truly examined these differences to the fullest extent, that conclusion, while conjectural, is an intuitive one. A food-insecure man living below the poverty line in the heart of New York City will undoubtedly experience different challenges than a food-insecure man in rural Kentucky. This assumption (an assumption supported by recent literature) serves as the basis for this research.

Literature Review

In a thorough review of current literature, we seek to understand not only urban vs rural *rates* of food insecurity, but also if there are different causal models for food security at the varying levels of spatial planning. First and foremost, it's important to identify what exactly food security means in America, what the causes are, and why food insecurity is important for people to understand and for policymakers to address. Then, we must establish a means of defining an urban setting versus a rural setting. Additionally, is there a consensus on what "rural food security" looks like, and how does

that differ from the popular image of "urban food security"? For our purposes, we are concerned exclusively with prior research that compares or at least considers differences across the urban/rural spectrum. (Research that only addresses determinants or solutions to food security in a general sense is not particularly relevant, although helpful for context). Is there a consensus on best practices for addressing the food security of urban, rural, and suburban populations, and do these solutions tackle these areas as separate environments or as synergistic parts of a whole? This review will inform the analysis in the second half of the paper.

Food Insecurity in America

Many conceptualize malnutrition and food insecurity as it exists in the global context - the images of emaciated children that catapulted UNICEF into the public eye or startling statistics about wasting disease in developing countries may come to mind. The American brand of food insecurity, however, manifests itself in a few different ways:

1) Lack of access to food itself and the nutrient deficiencies that arise as a result of not getting enough calories to maintain one's bodily functions. This kind of food insecurity produces hunger, or "an uncomfortable or painful physical sensation" (FAO, 2022) and is most consistent with the dominant cultural perception of what food insecurity looks like (Nestle, 1999).
2) Sufficient caloric intake, but a lack of sufficient vitamins and minerals to sustain one's general health and well-being. The CDC's Dietary Guidelines for Americans cite 1 in every 10 adolescents and adults as consuming well under the recommended daily amounts of fruits and vegetables. There is evidence to suggest

that this stems from a lack of access to *fruit and vegetables specifically* and nutritional education (Laraia, 2013). "Type 2" food insecurity is much more common in America, and as we'll discuss later, is a chief cause of chronic health concerns and ultimately, death for citizens of the United States.

Contributing factors

A significant portion (10 percent) of Americans are food insecure. In an era of abundance, where food is plentiful and modern technologies have allowed for the speedy transportation and longer shelf lives of perishable food (Bender, 1988), every person *should* have access. In the food security literature, there are a few variables that are accepted as contributing to a household's food security: spatial access, income, and education. These variables have significant empirical support and are extensively studied as chief contributors to food insecurity in America.

The first indicators of food security are spatial access and income. Lack of *spatial* access to *affordable* food manifests itself in geographic pockets of hunger known as "food deserts". The USDA offers two criteria for identifying food deserts: 1) The area is low-income, with a poverty rate of 20 percent or greater, or a median family income at or below 80 percent of the statewide or metropolitan area median family income, and 2) the area is low-access: at least 500 persons and/or at least 33 percent of the population lives more than 1 mile from a supermarket or large grocery store (10 miles, in the case of rural census tracts). Notice that it's adjusted slightly for rural areas — we will return to that later.

To be food insecure, according to the USDA, both criteria must be present. This means of identification is the standard in food policy research but doesn't paint the whole picture. Although less than 33% percent of the population may live within a mile of a grocery store, how many miles away is the next one? Or the third? And what products, fresh produce, or other foods does the grocer offer? The low-income criterion is also not all-encompassing, on its own. A piece from Gunderson, Kreider, and Pepper, examined economic determinants of food insecurity (2011). They found that not only are a significant portion of households below the poverty line were food secure, but that the inverse was true as well: a significant portion of the food insecure households lived above the poverty line. Because of these limitations, using low income and low access as indicators for food insecurity (on their own) would be flawed. However, since the two are used in tandem with each other, with room for discretion, the research community has been able to move forward with a shared understanding of what it means to be food insecure.

Individual and societal implications for health

America's policymakers have long determined that food security is an important issue that requires political intervention. The importance of food security in the development of a happy, healthy successful society is based on two principles: 1) the role of food as a basic need and 2) the role of adequate nutrition in preventing disease and encouraging favorable health outcomes. In the introduction for *The Bitter Cry of the Children* (1906), Robert Hunter wrote:

“Few of us sufficiently realize the powerful effect upon life of adequate nutritious food. Few of us ever think of how much it is responsible for our physical and mental advancement or what a force it has been in forwarding our civilized life." (Spargo, 1906)

Food is a basic physiological need — a need that must be satisfied before pursuing things like interpersonal connection, personal accomplishment and prestige, and achieving one’s full potential through academics or creativity (Maslow, 1943). A hungry society has no energy to dream, have ambitions, create, or innovate. Again, 10 percent of Americans perceive themselves as food insecure. How many of these people could be the next Shakespeare or Curie if they had their hygienic need for sustenance satisfied?

Beyond sociocultural implications, there is no shortage of biology/nutrition literature that corroborates the idea that hunger is, well, bad for the human anatomy. Think back to the earlier example of Clifford and Alma. Although this example is highly anecdotal, their stories are corroborated by research detailing the physiological and psychological effects of hunger.

The conversation surrounding food security in America is not just one about basic access to food — it also involves concerns about the types of foods Americans have access to. The USDA, in collaboration with the US Department of Health and Human Services, has defined an average American diet as low in protein, micronutrients, and minimally processed food, and high in sodium, saturated fats, and added sugars. These dietary choices have clear and empirically verified consequences. Diets with unbalanced micro and macronutrient profiles can lead to unfavorable health outcomes, including an increased risk of breast cancer, colorectal cancer, osteoporosis, type 2 diabetes, and heart disease, according the latest set of Dietary Guidelines for Americans. The latter — which

includes conditions like stroke, hypertension, coronary artery disease — is the leading cause of death in America (2020).

Why should this matter to healthy Americans? Food security for all Americans matters, not only because food itself is a human right, but because access to healthy, affordable foods allows people to take control of their health and avoid nutrition-related diseases. When individuals are at lower risk of chronic illness, healthcare premiums are lower (U.S. Senate Committee on Health, Education, Labor and Pensions, 2017), risk of communicable, non-lifestyle disease goes down (O'Connor, Taylor, and Hughes, 2006), and people are able to work harder for longer, supporting their local and national economies (DeVol, Bedroussian, Charuworn, Chatterjee, Kim, Kim, Klowden, 2017).

What is Urban? What is Rural?

Food insecurity affects people in every state in America, and can affect all incomes and education levels. However, not every American community experiences food insecurity in the same way. Different states, zip codes, and cities have different lived experiences pertaining to their access to food and the unique challenges that they face as a result of living in a particular area. Definition, delineation, and clarification are the first steps in understanding the differences between urban and rural areas (or for our purposes, metropolitan vs. nonmetropolitan areas). A universal, standard definition of exactly what constitutes an urban v. rural area is elusive. There are multiple definitions of what constitutes an urban area floating about - even our federal government can't seem to come to a shared understanding of what it means to be urban. The USDA ERS encapsulates the crux of the concept beautifully - "Researchers and policy officials

employ many definitions to distinguish rural from urban areas, which often leads to unnecessary confusion and unwanted mismatches in program eligibility. However, the existence of multiple rural definitions reflects the reality that rural and urban are multidimensional concepts (2019).

Depending on the organization, there are different standards for how an urban area is delineated. The most common standard relates to the presence of densely populated clusters of housing. According to the Census Bureau, the threshold for "urbanity" is 5,000 people. According to the US Department of Agriculture, this threshold is 50,000 people (or more). There is clearly a large disparity between these two figures, but both departments have reasoning for using the figures they do:

> The choice of a rural definition should be based on the purpose of the application, whether that application is for research, policy analysis, or program implementation. For instance, tracking urbanization and its influence on farmland prices is best approached using the Census urban-rural definition because it is a land-use definition that distinguishes built-up territory from immediately surrounding, less developed land. Studies designed to track and explain economic and social changes often choose to use the metro-nonmetro classification, because it reflects a regional, labor-market concept and allows the use of widely available county-level data. The key is to use a rural-urban definition that best fits the needs of a specific activity, recognizing that any simple dichotomy hides a complex rural-urban continuum, often with very gentle gradations from one level to the next. (USDA ERS, 2019).

The most important concept to extract is that urban centers are characterized by dense populations and densely arranged structures.

There is a consensus in the literature that the "status" of rural is an exclusionary one — that there is urban, and anything that exists outside of an urban (and suburban) environment is by default, rural. This is reflected in intentional language choices from the federal government's survey instruments, diving areas by "metropolitan" and "nonmetropolitan". This is opposed to deciding to frame the same areas as "agrarian" and "nonagrarian" - it's entirely a rhetorical device that reflects how policy experts conceptualize the geography of modern America. When the country is largely urbanized, it makes sense that urban is the "default". This is useful for our purposes, as it can be stifling to only think of rural environments as agrarian utopias of farms, open fields, and grazing livestock. Rural environments are not defined by what they are, but by what they are not.

In food policy circles, there's a widely circulated idea that food security is more extreme in rural areas. On a superficial level, data does not support this claim. The 2021 Household Food Security report from the USDA reports that food security is most prevalent in principal cities in metropolitan areas (for our purposes, urban areas, where 12.2 percent of the population is food insecure), followed by nonmetropolitan areas (in rural areas, 10.8 percent are food insecure). The lowest rates of food insecurity are reported in metropolitan areas outside of principal cities - the suburbs, where only 8.8 percent of the population reports being food insecure. This pattern remains consistent among the "low food security" and "very low food security" populations - suburbs are the least insecure, and urban areas are the most food insecure.

Considering Rural Bias

If the idea that rural areas face more food insecurity is not supported by the raw numbers supplied by the USDA, then where does the idea stem from? A 2018 piece from Crush and Riley posits that the recent attention given to rural food systems results from a "rural bias" in policymaking, and efforts to undermine or ignore urban food security in policy discussions. At times, this bias could be construed as outright "anti-urban". Crush and Riley defy any assumption that food security is a production and rural development issue, or that there is a strict urban/consumer and rural/producer dichotomy. The piece posits that this bias is an attempt by policymakers to simplify food system discourse into more palatable packaging. However, when nuanced issues like sustainable development and economic security are reduced to binaries, it makes it hard, if not impossible, to advance discourse or produce innovative policy solutions. These ideas are important to keep in mind moving forward — rural areas do not exist only to produce, and urban areas do not exist only to consume.

Shellabarger, Voss, Egerer, and Chiang (2019) expand on the ideas of Crush and Riley by challenging the notion that agricultural interests (or "agribusiness" interests, rather) inherently align with those of rural communities, and that our dominant cultural perceptions of the urban/rural divide only serve to exacerbate food insecurity in urban environments. American agriculture has become undoubtedly industrialized. With this industrialization came a gradual, lessening dependence on small-scale production run by rural families, and rural economies shifted in response to this change. America's median "farm household" relies on off-farm sources for nearly 80 percent of its income (Mishra,

El-Osta, Morehart, Johnson, and Hopkins, 2002; USDA Economic Research Service, 2018). Only 6 percent of the rural population is dependent on farming for their livelihoods (USDA Economic Research Service, 2015). Shellabarger et al. ultimately argues that positioning "rural as agricultural" doesn't help rural communities; it helps the corporate farms. The Farm Bill, as it exists currently, serves large-scale farms and already wealthy farming households - 77% of subsidy payments from 1995 to 2014 went to the largest 10% of recipients (Lyson et al. 2008; Faber 2017). Meanwhile, programs that would actually improve the self-sufficiency of rural, regional food systems lack attention and funding - for example, the Value-Added Producer program, which has the potential to "expand and diversify" rural retail chains. In the meantime, food insecurity in both urban and rural areas continues to proliferate, despite the best efforts of policymakers.

Food Security as a subset of Economic Development

There is a tendency in some spaces to assume that solving poverty in America will solve food insecurity, regardless of urban/rural identity. We know that there is a relationship between poverty and food security in America- in 2021, 32.1 percent of households with incomes below the Federal poverty line were food insecure. (USDA ERS). Theoretically, it makes sense that families struggling to pay their bills would also be struggling to afford groceries. However, although there are links to household income and food security, this connection is not supported conclusively by the data. These findings don't necessarily indicate that food security operates completely separately from economic policy issues. For individual households, food hardship is a financial issue. For example, in 2001, Gunderson and Gruber found that income over a two-year period, as

opposed to current income, can be a powerful predictor of household food security. However, if food security was just an issue tied to individual finances, the conversation surrounding food access would be largely, if not completely, tied to economic policy, regardless of the setting - urban, rural, or suburban. America's current federal policy solutions view food security this way, with programs that offer financial help to buy food (SNAP, TANF, National Free/Reduced School Lunch Program). These policies are different from policies designed at a local level to promote food access in that community. For example, in 2014, the Navajo Nation initiated a program that recruited local clinics and small stores to implement a fruit and vegetable prescription program. After the months following implementation, the targeted populations increased their fruit and vegetable consumption by 48 percent (Sundberg, et al., 2020). Please note that this program was designed specifically in the context a *rural* food desert.

When food security is addressed as its own issue, with its own unique set of policy variables and solutions, instead of *only* existing under the economic policy umbrella, room is left for nuance and creative problem-solving. This notion is further corroborated in research by Beverly (2022), which examines economic growth as a determinant of food security in both urban and rural settings. Low-income households exist in every community, and if pure financial security was a one-to-one determinant of food security, the same policy solutions could be applied regardless of if the affected area was urban, rural, or suburban. This is not the case. According to Beverly, things like facilitated inter-county food trade and food manufacturing/processing facilities only had an effect in rural counties. Beverly does not provide a theoretical proposal for why this is. One might extrapolate that since these policies only had an *effect* in rural areas, that may

mean that rural areas have unique *causes* behind their systemic lack of access to food. Additionally, if rural areas are operating in a unique context, this means that their urban and suburban counterparts are also operating in unique contexts, with unique causes and policy solutions to address food insecurity among its most vulnerable members. Even if there is a relationship between income and food security, there should be tailored approaches for supporting local economic development in a way that benefits the food system.

Food Pantries

Stigma and societal pressure can be powerful. Although food pantries are a completely free food resource (and sometimes, a food resource that lacks eligibility requirements or intake procedures), they go vastly underused by the populations that need those services. Before COVID-19, only about 28% of food insecure families reported using food pantries (Coleman-Jensen, Rabbitt, Gregory, and Singh, 2020). There is a general consensus in the literature that this is due to behavioral economics related to pantry stigma. This includes travel time to the pantry, opportunity costs, and a perception that pantry food is of lesser quality than the same brands at a grocery store. (Byrne, Just, and Barrett, 2023). Food insecure families are also likely to outright avoid using food pantries when they have SNAP benefits available for use, and will only visit food pantries after these monthly benefits have run out (Byrne and Just, 2021).

Despite this, food pantries continue to play a powerful and important role in mitigating food insecurity for Americans. Many of these food pantries are able to act responsively to the specific needs of the people in their local communities. Some would

argue that this flexibility and responsiveness is because of the relationships that are built by working with people in a shared geographic region. Does it matter, however, if this area is urban or rural? According to Burke and Hoffman (2023), it does — in a study of over 48,000 unique food pantries, they determined that rurality was negatively correlated with the number of food pantries in a community. When espousing theoretical causal mechanisms behind this disparity, the researchers suggested that "geographic isolation, lack of social service networks, and general lack of resources compared with more urban counties" played a role in the lack of food banks in rural areas.

SNAP Benefit Usage

Congress's Agricultural Improvement Act (commonly referred to as "The Farm Bill") sets aside allocations every four years to fund/facilitate America's food system. The programs that receive funds range from local food businesses to crop insurance to energy conservation programs. The line item that is most significant to our work, however, is the SNAP Benefits program. Designed to provide low-income households with funds to buy supplemental food at grocery stores, the SNAP program is administered in all 50 states and several US provinces and territories. SNAP has monumental impacts –- not only does it help protect against food insecurity for our most vulnerable populations, but it also helps to sustain the economy and provides low-income, disabled, and otherwise food-insecure populations with a way to obtain food in a way that maintains their dignity.

Before the onset of COVID-19, rural, low-income populations were more likely to use SNAP benefits. We saw these same results in 1998 (McConnell and Ohls, 2002) and again in 2018 (Vollinger, 2018). McConnell et al. suggests that this disparity is due to

experience; rural populations were more likely to report being more satisfied with their treatment by their caseworkers than urban SNAP recipients. Having a good relationship with the SNAP program means people are more likely to recertify. Urban SNAP recipients were more likely to outright complain with how they were treated by their caseworker.

Although the literature has consistently showed that SNAP is more utilized in rural areas, limited research has been conducted peri-COVID. We know that SNAP caseworker load exploded dramatically with the increased funding (as a result of increased need) brought about by the pandemic. It's possible that this increase in caseloads has also shifted urban and rural perceptions of their caseworkers, and consequently, of the SNAP benefits as a whole.

Causal mechanisms for food insecurity in urban and rural areas

The literature thus far has established that food security is, indeed, a spatial issue with underlying economic concerns. Although rural bias should be avoided, the notion that rural areas face food access problems at a greater magnitude than rural ones is still widely circulated and should be examined. Losada-Rojas argues that rural and urban areas face different levels of food insecurity because of disparities in transportation access. For those living in food deserts, the time and money (in the form of gas) it takes to drive to a grocery store can be prohibitive. This cost is lower for urban residents, who are able to walk or use public transportation more readily. This was corroborated in food access research conducted in Minnesota, which determined that most low-income urban residents reach grocery stores by walking or by bus. The low-income rural residents

reported trouble ascertaining transportation to grocery stores, either because the distance was too long, because they felt unable to spend the extra money on gas, or because they simply lacked access to a vehicle.

Transportation, however, is not the only variable when it comes to food accessibility. The Minnesota piece by Hendrickson, Smith, and Eikenberry (2006) acknowledges that low-income rural residents face barriers to food security. However, the conclusions of their research are a stark departure from the "rural people have it worse" mentality. It appears that urban grocers, when compared to their rural counterparts, carry a smaller, more expensive, selection of fruits and vegetables, and the produce that was available was of poor quality. Because of the tendency of urban areas to be culturally diverse, many of the local grocers are ethnic food stores. These grocers carry foods that are culturally significant, but not very relevant to a general population who are looking for staple pantry foods, fruits, and vegetables. Because of urban design factors, many of these grocery stores are smaller in scale and lack proper refrigeration - compounding upon quality issues and making fresh produce less available for urban residents who lack the ability to shop outside of their neighborhoods.

Summation

As evidenced, there are many competing theories for which type of community experiences greater barriers to food access. Because of this, some might say that the literature on urban vs rural food security disparity is inconclusive. To refer back to a previous point, I disagree. The current literature is decidedly conclusive — neither community has it worse nor better, they simply experience food insecurity in a manner

that is unique to their specific spatial context. To quote Shellabarger et al.: "Central among these (priorities) is the need to acknowledge the complexities and even contradictions associated with different scales of the urban–rural divide… However, the ideas of urban and rural remain as complex social representations on which people act, and therefore constitute important—if often imprecise—categories for analysis (2018). Thus, before bespoke policy solutions can be devised that tackle food insecurity both in individual communities and as a symptom of an inequitable food system, we must first give careful consideration to which variables are at play in urban v. rural food-insecure environments. This is where our research comes in.

Research Question(s)

One question serves as the axis on which our research revolves: "How does a food-insecure person living in a metropolitan area experience food insecurity differently than a food-insecure person living in a non-metropolitan area?". Food insecurity is a seemingly nebulous, deeply systemic issue, so to further guide this project, the above question has been broken down into several, smaller, more digestible questions to be addressed by their own hypothesis

1. Does living in a metropolitan area affect the relative amount of spending needed to meet weekly food needs? Does metropolitan city status affect if a household spends exactly what they need to, or could spend less and still meet their base nutritional needs?
2. Does living in a metropolitan area affect the likelihood of the existence of a food pantry in the respondent's community?

3. Does living in a metropolitan area affect the likelihood of SNAP benefit (or food stamp) usage?

Hypothesis

Based on the above review of the current literature, there are several hypotheses to address the research questions. Both the null and alternative hypotheses are listed.

H0$_1$ There is no statistically significant relationship between metropolitan city status and food insecurity rates.

HA$_1$ There is a statistically significant relationship between metropolitan city status and food insecurity rates.

H0$_2$ There is no statistically significant relationship between metropolitan city status and the relative amount needed to reach weekly food needs.

HA$_2$ There is a statistically significant relationship between metropolitan city status and the relative amount needed to reach weekly food needs.

HO$_3$ There is no statistically significant relationship between metropolitan city status and the existence of a food pantry in the respondent's community.

HA$_3$ There is a statistically significant relationship between metropolitan city status and the existence of a food pantry in the respondent's community. We know from the literature that food pantries are, on average, more prevalent in urban/metropolitan areas than in rural ones.

$H0_4$ There is no statistically significant relationship between metropolitan city status and SNAP (food stamp) recipiency.

HA_4 There is a statistically significant relationship between metropolitan city status and SNAP (food stamp) recipiency. Based on the literature, we would expect that rural households will be more likely to report SNAP usage.

Methodology

Data Selection

Our research utilizes survey data from the Census Bureau's Current Population Survey (most specifically, the December 2021 Food Security Supplement of the CPS). The CPS, because it includes an annual Food Security Supplement, is the most widely used dataset for analyzing trends in food security in America. Much of the above cited literature utilizes the CPS FSS, and as it's conducted by a federal agency, the survey is extensively reviewed before the results are published in the USDA's annual reports on food insecurity. Participating households are asked questions about "food security, food expenditures, and use of food and nutrition assistance programs" (USDA ERS, 2022). To gather our data, we used the Integrated Public Use Microdata Series (IPUMS) database, created by the University of Minnesota. Our data extract included the 2021 Food Security Supplement Data, the CPS data for 2021, and the accompanying codebook.

To make economical use of our limited time and resources, we opted to only use respondents from America's Midwest (or East North Central) Region. This region includes the states of Michigan, Ohio, Illinois, Indiana, and Wisconsin. The East North

Central Region was chosen because of the large number of observations, an appropriate balance of urban and rural respondents, and the personal significance to the researchers, who reside in the state of Michigan. Because of this significance, there is potential for bias, but this potential is mitigated by the nature of the study. We do not seek to compare Michigan's food security with that of Indiana or Wisconsin; we are seeking to understand how rural communities and urban communities in all of these states (collectively) are different.

Variable Selection

The Current Population Survey delineates geography as metropolitan and nonmetropolitan. The urban-rural delineation has received attention from the USDA, with the development of a numeric classification to describe the different levels of urbanization. This classification is useful for highlighting differences between urban (or rural) areas with different population sizes and qualifications. The code also differentiates between urban populations that are adjacent to metropolitan areas vs urban populations that are not adjacent to metropolitan areas. This is helpful for policy purposes, as it acknowledges the different levels of urbanization instead of thinking about urban/rural life as binary. This project delineates urban/rural by metro/nonmetropolitan city status. This is partly due to the fact that that's the measure the Census Bureau's CPS survey (the data collection tool we utilize) uses, and because it's most appropriate for what we wish to determine through our research. We are attempting to explain an economic or social phenomenon, so it's helpful to be able to utilize labor market and county-level data, instead of just basing our analysis on population alone.

Although the questions asked by the Food Security Supplement provide rich, useful information about the state of food security in America, since we are interested in urban/rural differences, we are limited to analyzing variables with a reasonable number of observations in both metropolitan and nonmetropolitan areas. The independent variable in this study is metropolitan city status. We are looking to see if metropolitan city status (in other words, if the resident lives in an urban or rural area) exerts influence on perceptions of food security. Perception is a key idea — since the CPS is self-reported, it does include a fair degree of self-reflection on the part of the respondent. We cannot measure with exact precision how many times someone visits a food pantry in a month, or exactly how much money they spend on food from week to week, but we can come to similar conclusions by asking questions about their *perceptions* of if there exists a food pantry in their neighborhood, or if they *think* they need more or less money to meet their food needs. This is fitting for this particular line of research, which deals with personal experiences dealing with exposure to food insecurity.

The four dependent variables this project examined were: if the household is food insecure, if the household use SNAP benefits, the relative amount of money needed to meet weekly food needs (more, less, or the same), and if a food pantry exists in the respondent's community. These variables were selected for their relevance and because the number of observations/responses were enough to conduct sound statistical analysis.

Analysis

To analyze the variables we selected, we first ran descriptive frequency tables to determine if there were enough observations to constitute an appropriately sized sample.

If the variable passed that test, it moved on to the next step of the analysis, where it was run in a Chi-Square test against metropolitan city status. In statistics, Chi-Sqaure tests are descriptive statistical hypothesis tests used to determine if there is a relationship between two variables by comparing the expected counts of observations with the actual counts of observations. The two variables must be two-level (binary) nominal variables for the Chi-Square test to determine not only that there *is* a significant relationship, but *what* the significant response categories are. To account for this, we limited our tests to variables that could be broken down into a binary version. This includes variables that were originally three-leveled (i.e., the respondents could pick from three possible choices), but were paired down to a binary version and ran independently. You'll see this concept in the case of FSSPDML/FSRAN –- "Relative Amount Needed to Meet Food Needs". This question related to the respondent's perception of how much they could afford to spend on food and still meet their weekly food needs. The respondents could choose between three possible choices: they could spend less on food and still meet their needs, they would need to spend the same amount on food to meet their weekly needs, and they would need to spend more on food to meet their weekly needs (less, same, and more). Although the first Chi-Square test showed statistical significance, because there were 3 dependent categories (or "levels"), it was hard to determine what the results meant. Individual tests to were ran to determine which variable was tied to the significance. These categories were "Less/Not Less", "Same/Not Same", and "More/Not More". This departure from standard Chi-Square hypothesis testing allowed us to extract more from the tests and come to very interesting conclusions about the state of urban/rural food insecurity in America.

Results

We came to four conclusions, each corresponding to their respective hypotheses:

1. There is no statistically significant relationship between metropolitan city status and food insecurity rates.
2. There is no statistically significant relationship between metropolitan city status and SNAP (food stamp) recipiency.
3. There is a statistically significant relationship between metropolitan city status and the relative amount needed to reach weekly food needs.
4. There is a statistically significant relationship between metropolitan city status and the existence of a food pantry in the respondent's community.

Food Security Status

We found that there is no statistically significant relationship between metropolitan city status and food insecurity rates. Metropolitan households are just as likely to report being food insecure as nonmetropolitan ones. This is consistent with what we would expect to see, based on the literature; the initial hypothesis was reinforced.

Food Secure or Not Food Secure * Metro Area or Not Metro Area Crosstabulation

			Metro Area or Not Metro Area	
			In Metro or Suburban Area	Not in Metro or Suburban Area
Food Secure or Not Food Secure	Food Secure	Count	4429	1127
		Expected Count	4431.7	1124.3
	Not Food Secure	Count	853	213
		Expected Count	850.3	215.7
Total		Count	5282	1340
		Expected Count	5282.0	1340.0

In total, there were 5282 metropolitan responses and 1340 nonmetropolitan reponses. The Chi-Sqaure test for this variable showed an asymptotic significance value of .821 - for a result to be statistically significant, this value needs to be below .5.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.051[a]	1	.821		
Continuity Correction[b]	.034	1	.854		
Likelihood Ratio	.051	1	.821		
Fisher's Exact Test				.835	.429
Linear-by-Linear Association	.051	1	.821		
N of Valid Cases	6622				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 215.71.

b. Computed only for a 2x2 table

SNAP Benefit Usage

We found no statistically significant relationship between metropolitan city status and the likelihood of being a SNAP benefit recipient. Here is the crosstabulation and result of the Chi-Square test.

Metro Area or Not Metro Area * Received SNAP benefits Crosstabulation

Count

		Received SNAP benefits		
		No	Yes	Total
Metro Area or Not Metro Area	In Metro or Suburban Area	1229	508	1737
	Not in Metro or Suburban Area	389	129	518
Total		1618	637	2255

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.712[a]	1	.054		
Continuity Correction[b]	3.501	1	.061		
Likelihood Ratio	3.780	1	.052		
Fisher's Exact Test				.059	.030
Linear-by-Linear Association	3.710	1	.054		
N of Valid Cases	2255				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 146.33.

b. Computed only for a 2x2 table

For this test, the asymptotic significance value is .54 — greater than .5, and therefore, not statistically significant. This result is a diversion from the existing literature, and from our initial hypothesis.

Existence of food pantry in community

This question asked respondents to identify if a food pantry, food bank, church with food assistance, or other similar program exists in their community. We found that there was a statistically significant relationship between metropolitan city status and the existence of a food pantry in the respondent's community (see next page for results).

Metro Area or Not Metro Area * Food pantry exists in community Crosstabulation

			Food pantry exists in community		
			No	Yes	Total
Metro Area or Not Metro Area	In Metro or Suburban Area	Count	91	399	490
		% within Metro Area or Not Metro Area	18.6%	81.4%	100.0%
	Not in Metro or Suburban Area	Count	10	125	135
		% within Metro Area or Not Metro Area	7.4%	92.6%	100.0%
Total		Count	101	524	625
		% within Metro Area or Not Metro Area	16.2%	83.8%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.736[a]	1	.002		
Continuity Correction[b]	8.930	1	.003		
Likelihood Ratio	11.248	1	.001		
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	9.721	1	.002		
N of Valid Cases	625				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.82.

b. Computed only for a 2x2 table

This relationship was statistically significant at a level of .002, which passes the .5 threshold and exhibits a clear relationship between the two variables. Nonmetropolitan (rural) respondents were more likely to report the existence of a food pantry in their community; adversely, metropolitan (urban) respondents were less likely to report the same. This finding is partly consistent with the initial hypothesis; while a relationship between geographic location and the existence of a food pantry makes, the Burke (2023) piece indicated that urban respondents would be more likely to report the existence of a food pantry. Based on the above chart, this was not the case.

Amount of money needed to meet weekly food needs

This question asked respondents to self-identify the relative amount of money they would need to meet their weekly food needs. Again, they could say less (they would be able to spend less money on food and still meet their basic food needs), the same (they spend exactly what they need to in order to meet their weekly food needs), or more (they would need to spend more in order to meet their food requirements. The results of the first crosstabulation are below.

Metro Area or Not Metro Area * Relative Amount of money needed to meet food needs Crosstabulation

			Relative Amount of money needed to meet food needs			
			Less	Same	More	Total
Metro Area or Not Metro Area	In Metro or Suburban Area	Count	1911	2441	594	4946
		% within Metro Area or Not Metro Area	38.6%	49.4%	12.0%	100.0%
	Not in Metro or Suburban Area	Count	431	741	117	1289
		% within Metro Area or Not Metro Area	33.4%	57.5%	9.1%	100.0%
Total		Count	2342	3182	711	6235
		% within Metro Area or Not Metro Area	37.6%	51.0%	11.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	28.330[a]	2	.000
Likelihood Ratio	28.592	2	.000
Linear-by-Linear Association	1.248	1	.264
N of Valid Cases	6235		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 146.99.

The asymptotic significance value is .000, so there is a certain confidence that there is a relationship between metropolitan city status and the amount of money needed to meet weekly food needs. To understand this relationship better, individual Chi-Square tests were ran where each level was examined on its own.

Metro Area or Not Metro Area * Less or Not Less Crosstabulation

			Less or Not Less		
			Not Less	Less	Total
Metro Area or Not Metro Area	In Metro or Suburban Area	Count	3035	1911	4946
		% within Metro Area or Not Metro Area	61.4%	38.6%	100.0%
	Not in Metro or Suburban Area	Count	858	431	1289
		% within Metro Area or Not Metro Area	66.6%	33.4%	100.0%
Total		Count	3893	2342	6235
		% within Metro Area or Not Metro Area	62.4%	37.6%	100.0%

Metro Area or Not Metro Area * Same or Not Same Crosstabulation

			Same or Not Same		
			.00	1.00	Total
Metro Area or Not Metro Area	In Metro or Suburban Area	Count	2505	2441	4946
		% within Metro Area or Not Metro Area	50.6%	49.4%	100.0%
	Not in Metro or Suburban Area	Count	548	741	1289
		% within Metro Area or Not Metro Area	42.5%	57.5%	100.0%
Total		Count	3053	3182	6235
		% within Metro Area or Not Metro Area	49.0%	51.0%	100.0%

Metro Area or Not Metro Area * More or Not More Crosstabulation

			More or Not More		
			.00	1.00	Total
Metro Area or Not Metro Area	In Metro or Suburban Area	Count	4352	594	4946
		% within Metro Area or Not Metro Area	88.0%	12.0%	100.0%
	Not in Metro or Suburban Area	Count	1172	117	1289
		% within Metro Area or Not Metro Area	90.9%	9.1%	100.0%
Total		Count	5524	711	6235
		% within Metro Area or Not Metro Area	88.6%	11.4%	100.0%

There is overlap between the households that report being able to spend less money on food/spending exactly what their household needs to and food security. Consequently, there is also ovsevable overlap between the respondents that need to spend more money to meet their need and the food insecure population (an intuitive finding, as

they are not meeting their food needs). Thus, assigning the "less" and "same" respondents to a "food secure" category would be reasonable. When analyzing the above tables, it became apparent that food-secure rural respondents were more likely to report spending exactly what they needed on food when compared to their urban counterparts, who were more likely to report being able to spend less and still meet their food needs. This is a departure from the initial hypothesis; there was no literature that dealt specifically with this variable, but based on what we know about rural/urban rates of food insecurity, it would be intuitive to surmise that both metropolitan and nonmetropolitan communities have similar perceptions about the relative amount of money they need to meet their food needs. Although an intuitive hypothesis, it was not supported by this data.

Discussion/Future Research

It is made clear, once again, that neither urban environments nor rural environments experience food insecurity in a manner that is worse, more intense, or more worthy of public concern. As evidenced by the above data, both metropolitan and nonmetropolitan areas experience similar rates of food insecurity. Both metropolitan and nonmetropolitan households also report similar usage of SNAP benefits. The literature is clear that rural areas used to see higher participation rates in the SNAP program in the decades before COVID-19. According to the literature, this is due to good relationships with caseworkers and a positive perception of the SNAP program (McConnell et. al 2002). It is possible that the shift in SNAP funding and the additional case load caused a shift in these perceptions; it's possible that rural SNAP recipients are experiencing less positive relationships with their caseworkers, or maybe urban SNAP recipients are

experiencing more positive relationships with their caseworkers. This would be an area that would be interesting to examine further in future research; it is not clear what the causal mechanisms are, only that there is a sudden departure from what has been empirically established in the past.

The food bank variable is also one of interest for future research; there appears to be a disparity between perception and fact. Urban respondents are less likely to perceive the existence of a food pantry in their community. However, literature shows that there are more food pantries in urban areas than in rural ones (Burke et. al, 2023). More research would be needed to determine why this relationship exists, and why urban residents are less aware of the food access resources available to them.

Finally, it's especially interesting to note the precarious position that food-secure rural respondents were in. Whereas the urban respondents were more likely to report being able to spend less, more rural respondents reported spending exactly what they needed to. Although these rural respondents are technically food secure, not being able to spend any more or less to meet their weekly food needs puts them in a vulnerable position for becoming food insecure in the future. It comes down to flexibility and adaptability — when a household has limited flexibility with food-related expenditures and lives in a rural environment, where we know that grocery stores tend to be farther spread out, all it takes is one nearby grocery store going out of business to uproot that family's access to food. In future research, it would be interesting to examine the behavioral economics of food insecurity, and how these almost-food-insecure families make economical decisions about the food they buy.

Conclusion

Policymakers have determined that food insecurity is an issue worthy of public intervention - and for good reason. Access to food has a profound impact on an individual's health, both short-term and long-term, and their ability to participate in and contribute to society. Although our understanding of the determinants of food insecurity in America (and abroad) is fairly thorough, gaps in the literature do exist, especially where the relationship between urban and rural environments is concerned. Our research sought to fill this gap, examining the unique ways in which these very different populations experience food insecurity, the ways in which they're similar, and the ways in which they are different.

We found that there is no difference in the rates of urban and rural food security; a metropolitan household is just as likely to be food insecure as a nonmetropolitan household. Urban residents are less aware of the food pantries in their communities. Rural residents are more likely to have limited flexibility when it comes to spending on food. Possibilities for future research are plentiful; especially when it comes to resource awareness and the behavioral economics of food insecurity. Urban and rural life is not a binary; things like speedy and facilitated transportation and the internet have made this distinction less relevant, but there's clear evidence that each population experiences different challenges. "One size fits all" policy approaches may not be appropriate. When each environment is treated with respect to its bespoke characteristics and challenges, room is made for innovative and nuanced policy solutions that address food security at a foundational level. This work must continue diligently until every American has unconditional access to the food they need to live an active, healthy life.

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