

**SURTCOM 24-01**

## **Utilizing Public Transportation to End Food Insecurity in Rural and Small Urban Areas by Providing Better Access: A Case Study of Rural Counties in North Dakota**



**Prepared for:**

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## **ABSTRACT**

This report examines the role of public transportation in addressing food insecurity in rural and small urban areas of North Dakota, specifying that a "small urban area" encompasses cities with populations ranging from at least 2,500 to no more than 49,999 individuals. Food insecurity is a significant issue in these areas, exacerbated by limited access to healthy food options and the lack of public transportation. The report analyzes the potential of public transportation in improving access to nutritious food and reducing reliance on personal vehicles or dependence on others for rides.

The Supplemental Nutrition Assistance Program (SNAP) is discussed as a key program in reducing food insecurity, and the report examines its utilization in North Dakota. Despite the existence of SNAP and food banks, food insecurity remains a challenge in the state.

Child food insecurity is identified as a pressing issue, with implications for children's health and development. The report explores the correlation between child food insecurity rates and Native American populations, as well as the correlation between child food insecurity rates and poverty levels in various counties.

Ranking counties by food insecurity rates is highlighted as a useful tool for identifying areas in need of interventions. Specific counties, such as Rolette, Benson, Sioux, and Ramsey, are identified as having higher rates of food insecurity, particularly among children, compared to the national average.

The report analyzes the availability and accessibility of public transportation services in rural counties. It reveals that many rural areas lack adequate transit service, making it challenging for residents to access food stores, including food banks, food pantries, supermarkets, and other retailers.

Food banks and food pantries play a crucial role in addressing hunger, but their service days and hours vary across counties. The report also examines the distribution of food stores, highlighting disparities and limited options in some rural counties.

The findings emphasize the relationship between limited access to healthy and affordable food and poverty rates, particularly in Native American regions and urban areas. The report underscores the importance of addressing transportation barriers and improving access to healthy food options to effectively combat food insecurity.

Overall, the report provides insights into the current state of food insecurity, public transportation availability, and the distribution of food stores in rural and small urban areas of North Dakota. The findings aim to inform policymakers, community organizations, and stakeholders to develop targeted interventions that ensure residents have access to nutritious and affordable food. The report emphasizes the need for improved transportation access, and food assistance programs as potential solutions to address food insecurity in these areas.

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## EXECUTIVE SUMMARY

Food insecurity is a significant problem in North Dakota, particularly in rural areas with limited access to healthy food options. The lack of public transportation further compounds the issue by making it difficult for households without vehicles to reach grocery stores and supermarkets that offer fresh and nutritious food.

This report focuses on the potential of public transportation to alleviate food insecurity by providing better access to healthy food options and reducing reliance on personal vehicles. It explores the availability and accessibility of public transportation services in rural counties and their impact on residents' ability to access nutritious food.

The Supplemental Nutrition Assistance Program (SNAP), administered by the United States Department of Agriculture, is discussed as a key program in reducing food insecurity. The report examines the utilization of SNAP benefits in North Dakota and highlights the need for additional interventions despite the existence of programs like SNAP and food banks.

Child food insecurity is identified as a pressing issue, as it puts children at risk of malnutrition, poor health outcomes, and developmental delays. The report analyzes child food insecurity rates and their correlation with Native American populations and poverty levels in different counties.

The report emphasizes the importance of ranking counties by food insecurity rates as a tool to identify areas in need of interventions. It identifies specific counties, such as Rolette, Benson, Sioux, and Ramsey, with higher rates of food insecurity, particularly among children, compared to the national average. This information can guide policymakers and community organizations in targeting resources and implementing programs that address the specific needs of these counties.

In terms of public transportation, the report examines the transit span of service, which measures the availability of public transportation in terms of days per week and hours per day. It reveals that rural areas are generally underserved, with limited or no transit service in many counties. This lack of service hinders residents' access to food suppliers, including food banks, food pantries, supermarkets, and other food retailers.

The report also highlights the role of food banks and food pantries in addressing hunger by distributing food to those in need. However, the service days and hours of these organizations vary across counties, with limited availability in some areas.

Furthermore, the report analyzes the distribution of food stores, including supermarkets, grocery stores, convenience stores, and gas stations, across North Dakota counties. It identifies disparities in the availability of food stores, with some rural counties lacking any food stores and limited options in others. Supermarkets, the primary source of fresh and nutritious food, are generally open seven days a week but may have limited presence in rural areas.

The findings underscore the correlation between limited access to healthy and affordable food and poverty rates, particularly in Native American regions and urban areas. The report emphasizes the need to address transportation barriers and improve access to healthy food options to combat food insecurity in these areas effectively.

Overall, the report highlights the importance of utilizing public transportation to alleviate food insecurity in rural and small urban areas of North Dakota. It provides insights into the current state of food insecurity, public transportation availability, and the distribution of food stores. The findings aim to inform policymakers, community organizations, and stakeholders to develop targeted interventions, such as improved transportation access, school meal initiatives, and food assistance programs, to ensure that residents have access to nutritious and affordable food.

## 1. INTRODUCTION

For many, obtaining food as a regular and simple part of our lives, but for a significant portion of the U.S. population, food insecurity is a harsh reality. According to the United States Department of Agriculture (USDA), 12.8% of households in the United States were food insecure in 2022 (Rabbitt, et al. 2023). Food insecurity arises because of lack of reliable access to affordable, nutritious food. People particularly at risk of food insecurity may live in neighborhoods with limited public transportation options, an under-invested public transportation system, or no personal transportation options. Additionally, limited access to local full-service grocery stores forces them to travel long distances, making the trip to buy healthy food a significant challenge. As a result, they often settle for less healthy and more expensive food at smaller convenience stores or fast-food restaurants. Overall, the transportation-related obstacles to accessing food are a reminder of the critical importance of accessibility to food for those experiencing food insecurity.

The lack of money or other resources to obtain sufficient food at times during the year is the primary factor that defines households as food insecure (Baek 2016). Similarly, individuals are considered food insecure by the USDA when they face challenges acquiring enough food to meet their dietary needs because of inadequate financial resources or other resources necessary to access food (USDA 2017). Even though lack of money is just one factor that causes food insecurity, the lack of transportation accessibility is another critical factor resulting in food insecurity.

The availability of food depends on various local conditions, including the accessibility of public transportation, the proximity of retail grocery stores, and the number of food supercenters in the region. Without access to a car, public transportation can provide a way for people to travel to and from grocery stores and other essential services. However, the availability and reliability of public transportation can vary depending on the location, which can impact people's ability to access food and other necessities (Baek 2016). If public transportation is unavailable or inaccessible, households without cars might shop for groceries less frequently and use nearby convenience stores to purchase snack foods or other basic items. People in those households are more likely to report being food insecure because they cannot access balanced meals (Cafiero 2013). Without convenient access to public transportation, households may need to use other modes of transportation, such as taxis or ride-sharing services, which can be expensive or may not be available in rural locations. Limited access to public transportation can lead to households without cars spending more time and money to travel to grocery stores, which can be a significant burden, particularly for people with limited mobility or health issues. Higher transportation costs can force households to reduce the size of their meals or skip meals altogether, leading to food insecurity (Baek 2016). This can impact people's ability to access healthy and affordable food and can have significant consequences for their health and well-being.

In this study, the SURCOM team conducted a study to investigate the current public transportation accessibility and the impact of transportation accessibility on food insecurity in 53 counties in North Dakota. The study involved analyzing data related to public transportation availability and usage, as well as food insecurity rates and other related factors. The study focused on identifying mobility gaps that affect food insecurity in rural and small urban areas in North Dakota, and explored how improved public transportation options can help to address these gaps and reduce food insecurity. By examining transportation accessibility in these areas, the study can help to identify specific areas where public transportation improvements are needed, such as increasing the frequency of bus routes or providing more accessible transportation options for people with disabilities. The study also explored other potential solutions, such as increasing the availability of healthy food options in rural areas, to help

address food insecurity in these communities. Ultimately, the goal of the study was to identify ways to improve transportation and food security outcomes in North Dakota and to inform policy decisions that can help to support these efforts.

### **1.1 Background of the Study**

Food insecurity is a significant issue in North Dakota, especially in rural counties where most of the state's population resides. These areas often face higher poverty rates and limited access to healthy, affordable food. The study areas encompass a population of approximately 774,948 individuals, as estimated by the U.S. Census Bureau's Population Estimates Program in 2021 (North Dakota Demographics 2022). According to the data from 2021, the state of North Dakota reported a median household income of \$68,131, based on a five-year estimate. Compared to other states, North Dakota's median household income ranked 19th in the nation. However, it falls slightly below the national average of \$69,021, which represents the median household income for the entire United States (Census Bureau 2022). This provides insight into the economic conditions of households across North Dakota and can help inform policies related to income inequality and poverty reduction. In addition, the U.S. Census Bureau's 2020 American Community Survey estimates that there are 376,597 housing units in North Dakota (North Dakota Demographics 2022).

The study areas' population, combined with the land area encompassed, results in a population density of approximately 11.3 people per square mile. This information is crucial when considering the accessibility of food in these areas. Population density plays a vital role in determining the travel time and distance required to obtain food because individuals living in sparsely populated areas may have to travel longer distances to reach grocery stores or supermarkets (QuickFacts 2023). This can result in higher transportation costs and may limit access to fresh and nutritious food, leading to food insecurity in these areas. By considering the population density of the study areas, policymakers and researchers can better understand the challenges faced by residents in accessing healthy and affordable food. This understanding can inform efforts to improve access to food, such as by investing in transportation infrastructure or supporting local food production initiatives.

Feeding America, a national network of food banks, released a report in 2019 indicating that 1 in 21 North Dakota residents, or approximately 36,130 individuals, were food insecure. The report further highlighted the vulnerability of children in the state, with 1 in 12 children, or approximately 14,490 children, living in food-insecure households (Feeding America 2023).

These findings underscore the pressing need for targeted interventions and policy decisions to address food insecurity in North Dakota, especially in rural areas where access to healthy food is limited. Children's nutritional needs are especially important, as poor nutrition during childhood can have long-term effects on health and well-being. Without adequate access to nutritious food, children may face developmental delays and academic struggles.

### **1.2 Statement of the Problem**

The United States Department of Agriculture Economic Research Service (USDA-ERS) published a report in 2022 titled "Household Food Security in the United States," which revealed that 12.8% of households in the United States experienced food insecurity at some point during the year (Rabbitt, et al. 2023). This is a slight increase from the 10.2% reported in 2021. The "Rural Hunger and Access to Healthy Food" report highlighted that the rate of food insecurity in rural areas has decreased slightly, from 11.6% in

2020 to 10.8% in 2021. While this decrease is encouraging, it is still concerning that more than 1 in 10 households in rural areas continue to experience food insecurity (RHIhub 2022).

Food insecurity has significant consequences for populations, with individuals who lack access to sufficient and nutritious food at a higher risk of developing chronic diseases, stress-related disorders, lower academic achievement, and depression. In comparison, individuals with access to food security are more likely to maintain better physical and mental health outcomes (Camp 2015).

Moreover, chronic health issues are interlinked with food insecurity, with individuals experiencing physical and mental health problems at a greater risk of experiencing food insecurity. This cyclical relationship between health issues and food insecurity emphasizes the need for effective solutions to address both factors for vulnerable populations (V. Tarasuk, A. Mitchell, et al. 2013).

To address food insecurity and its impacts on populations, a comprehensive approach is required that acknowledges the underlying social and economic determinants of food insecurity. This approach aims to provide adequate resources and support to vulnerable populations to enable them to access nutritious food and maintain good physical and mental health outcomes.

Rural residents face several challenges to obtaining affordable and healthy food. These challenges are often related to limited access to nutritious food options and difficulties in transportation. Financial limitations and transportation barriers are some of the major constraints that rural residents face when trying to access food.

Limited access to nutritious food options is a common problem in rural areas. People living in rural areas may have to rely on less nutritious and costly food options, such as those available in gas stations and convenience stores. These food options are often high in calories, saturated fats, and added sugars, which can lead to health problems like obesity, heart disease, and diabetes. To access fresh produce, milk, eggs, and other essential items, rural residents may have to travel to nearby towns, which can be time-consuming and costly.

The limited availability of public transportation in rural areas is a significant challenge for food-insecure populations. Some rural residents may not own a vehicle or have access to reliable transportation, making it difficult to travel long distances to purchase food. Even when a vehicle is available, the cost of fuel and maintenance can make regular trips to the grocery store unaffordable for many rural residents. Therefore, many rural residents depend on public transportation to reach grocery stores and other food retailers. However, in some areas, public transportation options are inadequate or non-existent, which can make it difficult for food-insecure populations to access healthy and affordable food options, especially if they lack reliable transportation.

As a result of these challenges, some rural residents and households experience food insecurity, which means they lack consistent access to affordable and nutritious food. Food insecurity is a significant problem because it increases the risk of negative health outcomes, such as malnutrition, obesity, and chronic diseases.

To address this problem, innovative solutions are required to improve public transportation options and ensure that all rural residents have access to healthy and affordable food. For example, local governments could explore partnerships with ridesharing services or other private transportation companies to provide affordable transportation options for food-insecure populations. Additionally, expanding public transportation services to areas with high levels of food insecurity could help improve

access to healthy food options. It is also important to consider the unique needs of rural communities when developing transportation solutions. For instance, many rural residents live in areas with limited road infrastructure, making traditional transportation solutions challenging. Therefore, policymakers must prioritize the development of innovative transportation options that consider the specific needs of rural communities.

In conclusion, addressing the problem of inadequate public transportation in rural areas is crucial in ensuring that food-insecure populations have access to healthy and affordable food options. Innovative transportation solutions that consider the unique needs of rural communities are essential in improving access to healthy food options and reducing the negative health outcomes associated with food insecurity.

### **1.3 Objectives**

The objectives of this study encompass a comprehensive approach to address the issue of food insecurity in the rural counties of North Dakota. These objectives aim to not only identify and understand the factors contributing to food insecurity and mobility challenges, but also to provide practical recommendations for improving access to healthy food and transportation services.

#### **Objective 1: Demographic Analysis and Food Insecurity Measures**

The first objective involves conducting a detailed demographic analysis to gain a deeper understanding of the populations affected by food insecurity. This analysis will consider factors such as income levels, age, and other relevant demographic data. Furthermore, it will encompass an exploration of various measures of food insecurity in North Dakota, aiming to provide a comprehensive understanding of this complex issue.

#### **Objective 2: Mapping Food Insecurity and Mobility Gaps**

The second objective focuses on developing a comprehensive map that highlights areas grappling with food insecurity and identifies food deserts within the rural counties of North Dakota. This mapping initiative is pivotal for addressing the challenges of food insecurity in these regions. By visually representing areas with food insecurity, the map becomes a vital resource for policymakers and stakeholders to concentrate their efforts on enhancing the health and well-being of individuals and families living in these communities.

#### **Objective 3: Assessing Transit Services and Mapping Food Resources**

The third objective involves a thorough assessment of the existing levels of transit services available across the rural counties of North Dakota. This assessment is essential given the prevalent transportation challenges in these regions, stemming from extensive distances and sparse populations. Additionally, this study will entail the mapping of essential food suppliers, encompassing supermarkets, food stores, food banks, and food pantries. This mapping will provide valuable insights into areas where access to food coincides with the availability of transit services, thereby identifying both opportunities and challenges in food accessibility.

## **Objective 4: Developing Community-Centric Recommendations**

The final objective centers on the development of recommendations that address the intertwined challenges of food insecurity and limited mobility in these areas. It is vital to engage with the affected communities to gain a profound understanding of their unique challenges and requirements. This community-driven input will serve as the foundation for crafting a multifaceted approach to improve mobility services, which may include enhancing public transportation options, implementing targeted transportation programs, and fostering community-driven initiatives.

In summary, these objectives form a holistic strategy to combat food insecurity in rural North Dakota. They encompass demographic analysis, measures of food insecurity, mapping of food resources, and transit span of services, all woven into the assessment of mobility gaps. By collectively addressing these challenges, we aspire to eliminate food insecurity and foster healthier and more prosperous communities throughout North Dakota.

### **1.4 Definition of Terms**

The U.S. Department of Agriculture (USDA) has developed a series of surveys to assess the prevalence of food insecurity in a population. These surveys provide a clear and accurate picture of the state of food security or insecurity within a community (Blessing and Plaxedes 2017). From these surveys, categories of food security/insecurity were given definitions. The following are terms and their definitions that were relevant to this study:

#### **1.4.1 Defining Food Security**

The term food security continues to be reconceptualized by non-governmental organizations and governmental and international bodies. “At the heart of the various instruments for measuring food security is the notion that everyone has access to foods that will maintain and perhaps enhance their health” (Fazzino 2008).

In 1974, a definition emerged during the first World Food Conference as “availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices” (Renzaho and Mellor 2010). The USDA currently utilizes one of the most cited definitions of food security: “access by all people at all times to enough food for an active, healthy life and includes at a minimum: a) the ready availability of nutritionally adequate and safe foods, and b) the assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, and other coping strategies) (Gurney, Caniglia and Mix 2015). This definition is noteworthy because it expands the household food security concept to include “... underlying social, economic, and institutional factors within a community that affect the quantity and quality of food available and its affordability or price relative to the sufficiency of financial resources available to acquire it” (Fazzino 2008).

#### **1.4.2 Defining Food Insecurity**

The most rudimentary definition assigned to food insecurity is an inadequate amount of food available at the global, national, community, or household level (Pinstруп-Andersen 2009). Household and child food insecurity are associated with being at risk for overweight and overweight status among many demographic categories of children. Child food insecurity is independently associated with being at risk for overweight status or greater while controlling for important demographic variables (Casey, et al.



2006). Food insecurity has a direct correlation with the health of a population (Casey, et al. 2006). Consumption of an unhealthy, unbalanced diet contributes to adverse health conditions which consequently strain the financial and human resources of the community healthcare system (Bronte-Tinkew, et al. 2007). Surprisingly, obesity/overweight is the most prevalent condition originating from food insecurity. Such a condition occurs from not only consuming food low in nutrition but also the over-consumption of food when it becomes available in anticipation of there being a food deficiency in the future (Food Research and Action Center 2013).

### **1.5 History of Measure**

The official measurement of food insecurity by the U.S. government began in 1995 with the addition of a food security supplement to the Current Population Survey (CPS). Based on the results from this survey and subsequent annual surveys, a report has been issued by the by the USDA, which portrays the current status of food insecurity in the United States. The issuance of this report is reported extensively in the media and is followed closely by policymakers inside and outside of the USDA (Gundersen 2008).

The development of the methods of food security measurement that underlie these reports began in the early 1980s when policymakers began to ask for a better description of what was meant by poverty-related hunger in the United States. As part of this drive, an expert panel was convened which established definitions for “food security,” “food insecurity,” and “hunger.” Using these definitions, the National Nutrition Monitoring and Related Research Program (established by a 1992 Act of Congress) began to operationalize these concepts within a survey framework. The culmination of these efforts led to the current methods of measuring food insecurity (Gundersen 2008).

## 2. LITERATURE REVIEW

The purpose of this case study was to investigate the extent to which public transit services were available in rural communities in North Dakota and to explore potential solutions to address food insecurity in these areas. The study aimed to establish a prevalence baseline by assessing the current state of public transit services in rural areas and identify gaps in service. To provide a comprehensive understanding of the issue, it is important to review the definition of food insecurity. The USDA defines food insecurity as a household-level economic and social condition that results from limited or uncertain access to nutritionally adequate and safe foods (USDA 2017). However, the study area of North Dakota lacked information and organized studies on food insecurity, which is why this chapter aims to provide a literary overview of food insecurity in rural and small urban settings within the state. This overview will focus on the causes and effects of food insecurity to better understand the challenges faced by individuals and families in North Dakota who are struggling to access nutritious and safe food.

A. Coleman-Jensen, M. P. Rabbitt, C. Gregory, et al. (2021) provide a comprehensive analysis of food security in the United States during the COVID-19 pandemic. The study utilized data from the Food Security Supplement to the Current Population Survey (CPS) conducted in December 2020, with a sample of approximately 34,330 households, applying sample weights to ensure nationally representative statistics on household food security in the United States. It shows that 10.5% of households were food insecure, with 3.9% experiencing very low food security. Food insecurity remained unchanged from the previous year. Children experienced food insecurity in 7.6% of households with children, with some also experiencing very low food security. The COVID-19 pandemic had a significant impact on food insecurity, with households headed by those unable to work or prevented from looking for work due to the pandemic experiencing higher levels of food insecurity. Despite government programs such as SNAP and WIC, a significant number of households were still unable to provide adequate, nutritious food for their members. A potential limitation of the report is its reliance on data from a single survey conducted in December 2020, potentially overlooking short-term variations in food security (A. Coleman-Jensen, M. P. Rabbitt and C. Gregory, et al. 2021).

Ploeg et al. (2009) explored the challenges of accessing affordable and nutritious food in a study commissioned by the USDA-ERS for Congress. Researchers used a variety of analytical methods and data to identify areas with limited access about where people can get affordable, healthy food. They found that some people can't go to supermarkets that have a lot of food options because they live too far away and don't have a way to get there. When people shop at small stores for food, they usually pay more money for the same things than if they shopped at supermarkets. The study found that low-income people don't spend much money on food at small convenience stores. Instead, they usually go to big supercenters where prices are lower. Middle income households also tend to go to these big stores. The study also found that SNAP participants who shopped frequently at supermarkets bought more fresh fruits, fresh vegetables, and milk than those who did not shop at supermarkets (Ploeg, et al. 2009).

Food insecurity and transportation are closely linked, as access to transportation can greatly impact an individual's ability to access healthy food options. Studies have shown that transportation plays a crucial role in determining the extent of food insecurity in a given area. Individuals who live in areas with limited access to transportation may have difficulty accessing supermarkets, grocery stores, and other sources of healthy food, leading to higher rates of food insecurity. Conversely, individuals who live in areas with robust transportation networks tend to have greater access to healthy food options, which can contribute to overall health and well-being (Ploeg, et al. 2009).

Baek (2016) examined the relationship between public transportation accessibility and food insecurity in the United States, focusing on whether local public transportation access impacts levels of food insecurity. The study, using household-level food insecurity measures and information on public transportation accessibility from 2006 to 2009, examines whether public transportation accessibility at the local level affects food insecurity. The results suggest that policy makers should consider increasing public transit service to reduce food insecurity, particularly for the poor. The study finds evidence that public transportation reduces food insecurity in low-income households but not for non-low-income households. Specifically, an additional bus-equivalent vehicle per 10,000 people is associated with a decrease in food insecurity of households by 1.6 percentage points. Poor African-American households are more likely to benefit from public transportation in reducing the risk of exposure to food insecurity than poor white households, consistent with the fact that black households are less likely to own an automobile. The study examined alternative measures of public transportation such as vehicle revenue hours and miles and found a negative causal effect between public transportation availability and food insecurity. This highlights the important role of public transportation in reducing food insecurity (Baek 2016).

Blanchard and Lyson (2002) presented their research on the impact of large retailers on the accessibility to low-cost groceries in nonmetropolitan counties and the creation of food deserts at the Measuring Rural Diversity Conference in 2002. This article highlights that accessibility to large supermarkets and supercenters varies across different regions in the United States, and people living in nonmetropolitan areas are more likely to experience low access to large retailers, making these areas food deserts. The research found that people living in nonmetropolitan counties that do not have a community with at least 2,500 residents have the highest proportion of the population with low access to large food retailers. The article points out that individuals living in areas with low access to large food retailers are likely to pay higher prices for groceries at small local stores or incur greater travel costs to access large food retailers, which is particularly challenging for economically vulnerable segments of the population, such as the elderly, children, people without access to transportation, and single-parent families. The viability of small grocers is also threatened as large retailers tend to dominate the market (Blanchard and Lyson 2002).

Piontak and Schulman (2014) explore the issue of food insecurity in rural areas of the United States in their article. The authors argue that unemployment and underemployment are key predictors of food insecurity in rural households and that employment in rural areas tends to be concentrated among low-wage workers lacking sufficient work supports such as childcare. The consolidation of large grocers is another factor contributing to food insecurity, as it has resulted in a decrease in the number of local stores. This has created "food deserts" in many rural areas where there is limited access to healthy and affordable food. Additionally, rural areas lack the infrastructure and commodity chains found in cities, making resources like public transportation less available for getting people to grocery stores. Finally, many small rural communities lack adequate social service supports such as food pantries and soup kitchens found in urban areas. The article concludes that addressing food insecurity in rural areas requires a multifaceted approach that includes improving employment opportunities, increasing access to healthy food, and providing social service supports for those in need (Piontak and Schulman 2014).

Gundersen, Hake, et al. (2021) describe the methodology of the Map the Meal Gap (MMG) study and project an increase of 17 million Americans who are food insecure in 2020 due to COVID-19, with an estimated total of 54 million food-insecure Americans, including 18 million children. However, the article highlights that the resiliency of the agricultural supply chain in the face of COVID-19 has helped to keep food prices stable, and the projected increase in food insecurity is due to projected increases in unemployment and poverty. A limitation of the study is that its estimates rely on annual food insecurity

measures for the entire calendar year, rather than shorter time frames, which could potentially result in the omission of short-term fluctuations in food insecurity (Gundersen, Hake, et al. 2021).

Gundersen (2008) discusses different approaches to measuring food insecurity that go beyond simple breakdowns of food-secure versus food-insecure households, with a specific application to American Indians in the United States. The author applies this method to American Indians and finds that they have higher levels of food insecurity than non-American Indians, even after controlling for other factors. The author used three different measures of food insecurity like the food insecurity rate, food insecurity gap, and squared food insecurity gap and concluded that the significance of the differences between American Indians and non-American Indians depends on the specific measure used. The strengths of the study lie in its targeted approach to examining food insecurity among a specific demographic group, the American Indians. By focusing on a marginalized community, the study offers valuable insights into the unique factors contributing to their food insecurity, which can inform targeted interventions and policies. However, there are potential shortcomings to consider. The study's reliance on self-reported survey data for measuring food insecurity could introduce response bias or inaccuracies, as respondents might underreport or misrepresent their food access situation due to social desirability bias (Gundersen 2008).

Gottlieb et al. (1996) evaluated the ability of the food system to meet the needs of a South-Central neighborhood of Los Angeles, focusing on food-related transportation strategies in low-income and transit-dependent communities. The study documented a wide range of food insecurity indicators, including the absence of nearby supermarkets, lower-than-average vehicle ownership, and bus lines not corresponding to market locations. Lack of transportation for food buying purposes was defined as a major community problem. The study emphasized that the concept of food security referred to community and ownership issues such as access, availability, resources, price, quality, environmental considerations, income levels, and other community-related factors. The report recommended programs designed to address supermarket location and transportation access needs to represent possible food security initiatives, including joint venture operations to attract supermarkets in low-income areas and creating new paratransit services or innovative transportation programs for increased food access (Gottlieb, et al. 1996).

Fuller, Cummins, and Matthews (2013) used regression analysis to analyze cross-sectional data from the Philadelphia Neighborhood Food Environment Study to investigate how transportation mode interacts with distance to food stores, fruit and vegetable consumption, and BMI in predominantly African American neighborhoods. The results of the study showed that the mode of transportation used to access a food store may influence the relationship between distance to the store and dietary habits, as well as BMI. The study concluded that access to transportation, particularly access to cars, may play a significant role in the ability of individuals in low-income neighborhoods to maintain a healthy diet and maintain a healthy weight. The study's limitations include contradictory findings on the association between transportation mode, fruit and vegetables consumption, and BMI, lack of detailed physical activity data, and limited generalizability due to the focus on only two neighborhoods (Fuller, Cummins and Matthews 2013).

Losada-Rojas et al. (2021) employed GIS tools to calculate travel costs for walking, transit, and driving modes, addressing spatial autocorrelation in their empirical analysis of access to healthy food in urban and rural areas. However, the analysis focused on aggregate accessibility, assumed mode availability, and excluded perceived costs and trip time. The study aimed to compare healthy food access in urban and rural areas, revealing significant disparities, but its limitations encompassed shared characteristics among modes, assumptions about travel, no temporal considerations, unexplored correlations with

health outcomes, focus on larger stores, aggregation bias, and exploratory nature (Losada-Rojas, et al. 2021).

Liese et al. (2007) aim to understand the built nutritional environment of a rural area by examining food store types, availability, and the cost of selected food items in their article. The study reveals that rural areas have fewer options for healthful and inexpensive foods due to lower geographic purchasing power and business decisions about the location and types of food stores. Convenience stores were found to offer lower availability of more healthful foods, while supermarkets had the highest variety of produce. The study underscores the challenges of shopping for healthful and inexpensive foods in rural areas and adds to a growing body of evidence suggesting that rural populations face significant disparities in terms of health outcomes and health behaviors. Research is needed to evaluate how the transportation challenges faced by rural community's impact decisions to shop in more healthful and lower-cost food environments (Liese, et al. 2007).

Bailey (2015) investigates the accessibility of supermarkets for low-income households in Indianapolis, Indiana, through a multimodal analysis that identifies areas of poor accessibility and suggests intervention strategies. The study uses a multimodal approach to identify areas with poor accessibility and recommend intervention strategies. The author employs GIS mapping, network analysis, and statistical modeling to assess supermarket accessibility for low-income households. The study reveals that low-income households in Indianapolis face significant difficulties in accessing supermarkets because of a lack of public transportation options and limited supermarket density in low-income neighborhoods. The study recommends several intervention strategies, such as improving public transportation, incentivizing supermarkets to locate in low-income neighborhoods, and providing financial aid to low-income households to purchase healthy foods. The author concludes that addressing the problem of supermarket accessibility for low-income households requires a comprehensive and multimodal approach that considers transportation infrastructure, land use patterns, and social and economic factors (Bailey 2015).

Hull (2019) aimed to study the prevalence of food insecurity in rural areas of the Midwest and the role of food distribution programs, particularly food pantries, in alleviating it. The study found that food pantries can positively impact food insecurity, but there is a need for policies that define the nutritional content of donated or purchased food. The research site, which serves rural communities, has the potential to improve food insecurity by modifying distribution protocols. Small changes made by the site can result in significant improvements for individuals and families (Hull 2019).

Raja, Ma, and Yadav (2008) examine racial disparities in neighborhood food environments in Erie County, New York. The study employs a cross-sectional design to compare food access between neighborhoods of color and predominantly white neighborhoods in Erie County, NY. It utilizes Gini coefficients and Lorenz curves to analyze spatial distribution and Poisson regression to examine racial disparities in food store access, considering variables like area, population, and income. The research expands on previous models by incorporating travel time and different food destinations. The study concludes that while there are no food deserts, there is a lack of supermarkets in neighborhoods of color. However, there is an abundance of small grocery stores in those neighborhoods. The study recommends supporting small, high-quality grocery stores to ensure access to healthy foods in minority neighborhoods. The article emphasizes the significance of improving food systems and environments through planning to address racial inequalities in accessing healthy food (Raja, Ma and Yadav 2008).

Nettles (2012) highlights the persistent issue of food insecurity among low-income, elderly, disabled, and transit-dependent Americans, even during periods of economic growth, emphasizing the importance of access to transportation and food. The solution proposed is to link food insecurity and

transportation, as it has the potential to revitalize both rural and urban neighborhoods and improve the health and wellbeing of millions of people. By connecting family farmers, food retailers, and consumers, this approach can facilitate increased affordable and healthy food access and improve supermarket accessibility for those who are transit-dependent. The article specifically focuses on the issues of rural areas, where food insecurity is rampant, with 13.5% of rural people facing food insecurity in 2000, compared to a nationwide figure of 10.5%. The low population density and the scattered stores in rural areas make the distance to the market a significant barrier for low-income, elderly, and disabled residents. Furthermore, about half of rural counties, including the most isolated areas, have no public transit system at all, which makes access to healthy food even more challenging for families who do not have or cannot afford a dependable automobile (Nettles 2012).

Stevens (2021) discusses the challenges faced by rural U.S. consumers in accessing retail food stores, particularly in areas with high poverty rates and declining population, focusing on the shift from traditional grocery stores to other types of food retailers. The 2010 Healthy Food Financing Initiative was introduced to encourage grocery stores to establish themselves in such areas and incentivize existing retailers to sell healthy products. The USDA-ERS recently analyzed the retail food landscape in the United States, focusing on rural areas and grocery stores. The research found a decline in grocery stores and an increase in dollar stores and supercenters in rural counties. Single-location grocery stores have been decreasing in share of food retailers. USDA-ERS researchers identified several trends in the retail food landscape in rural nonmetro counties during the 25-year study period. The share of grocery stores decreased, while convenience stores, specialty food stores, warehouse clubs and supercenters, and dollar stores became more plentiful (Stevens 2021).

Gantner et al. (2011) discuss the availability of food stores in rural areas, focusing on the Northeastern United States, and examine the prevalence of nontraditional food stores and distance to healthy foods in a rural food environment. It notes that previous studies have found that rural areas have fewer food stores per square mile compared to urban areas, and that convenience stores are more common. The lack of supermarkets in rural areas means that some residents have to travel long distances to access fresh food. Economic decline and population out-migration in rural areas have also contributed to the closure and consolidation of food stores. In addition, the lack of public transportation in rural areas increases the reliance on automobiles and makes walking less likely. To get a better understanding of the food environment in rural areas, it may be necessary to measure accessibility to food stores several miles away from a resident's home (Gantner, et al. 2011).

Corrigan (2010) presents a promising solution to address food insecurity by developing community gardens and improving food security. The research demonstrates that community gardens can play a vital role in enhancing food security by providing communities with access to fresh, locally grown produce. By empowering individuals and neighborhoods to cultivate their own food, community gardens not only increase the availability of nutritious options but also promote self-sufficiency and a sense of community. This approach aligns with the broader strategy of fostering sustainable and resilient food systems, making it a practical step toward mitigating food insecurity in both urban and rural settings (Corrigan 2010).

"Feeding the Line, or Ending the Line? Innovations among Food Banks in the United States" is a report that underscores innovative solutions in the fight against food insecurity. By examining the strategies employed by food banks across the United States, the report offers insights into addressing hunger more effectively. These innovative approaches include diversifying food sources, fostering community partnerships, and prioritizing nutrition. By evolving beyond traditional food distribution models, food banks can better meet the changing needs of their communities and contribute to long-term solutions for food insecurity. This report serves as a valuable resource for policymakers, food bank organizers, and

community leaders seeking to create more sustainable and impactful strategies to combat hunger (Reinvestment Fund 2022).

Zepeda and Reznickova (2013) provide valuable insights into addressing food insecurity by measuring the effects of mobile markets on healthy food choices. Their research demonstrates that mobile markets effectively promote healthier eating habits in food deserts. Participants who shopped at these markets increased their consumption of fruits and vegetables. To further alleviate food insecurity, the study recommends strategies such as education and outreach programs, affordable pricing, expanded operating hours, and improved advertising to enhance the accessibility and awareness of healthy food options through mobile markets. These findings offer a practical blueprint for addressing food insecurity and improving food choices in underserved communities (Zepeda and Reznickova 2013).

Freedman, Bell, and Collins (2011) serve as a noteworthy example of addressing food insecurity through innovative interventions with their case study on a multi-component farmers' market intervention known as The Veggie Project. This study showcases the positive impact of multi-component farmers' market initiatives in underserved areas. By combining affordability, educational programs, and community engagement, this approach not only increases access to fresh produce but also empowers individuals to make healthier food choices. The findings highlight the potential of similar multi-component interventions in promoting food security, demonstrating that holistic strategies can play a pivotal role in improving nutrition and well-being in communities facing food insecurity (Freedman, Bell and Collins 2011).

The Supplemental Nutrition Assistance Program (SNAP) is a vital program that has reduced poverty, improved food security, and enhanced health for millions of Americans. However, current benefit levels may be inadequate for many households, and some vulnerable groups have limited eligibility. Policymakers should consider increasing benefits and expanding eligibility to address these issues and combat food insecurity more effectively (Keith-Jennings, Llobrera and Dean 2019).

The case studies of Bowdon, North Dakota, and Leeton, Missouri, demonstrate innovative approaches to combatting food deserts in rural areas. These initiatives, based on cooperative and community-owned grocery store models, provide valuable insights into addressing food insecurity. By involving the local community and offering affordable, healthy food options, these models help alleviate food deserts and promote community development. Additionally, they create opportunities for partnerships with local farmers and producers, making sustainably-grown food accessible (National Young Farmers Coalition 2011). While these models aren't comprehensive solutions to ending food insecurity, they offer practical steps that communities can take to improve access to nutritious food in underserved areas.

The National School Lunch Program (NSLP) is associated with a reduction in household food insecurity, particularly among low-income households with kindergarten-aged children. While the NSLP plays a beneficial role in alleviating food insecurity, it may not be a comprehensive solution to ending food insecurity entirely. Instead, it demonstrates that targeted programs like school lunch initiatives can have a positive impact on food security, especially during critical developmental periods for children. To fully address and end food insecurity, a multifaceted approach may be necessary, including a combination of social programs and policies targeting various aspects of food access and affordability (Arteaga and Heflin 2014).

### 3. METHODOLOGY

The report's methodology encompasses the study's design, data collection techniques, and data analysis methods utilized to evaluate food insecurity and public transportation options for food-insecure communities in North Dakota. The methodology outlines the demographic attributes of the population at both the county and zip code levels, identifies regions with restricted food resources, and examines possible interventions to enhance food security in those areas. This study's aim was to evaluate the food insecurity and public transportation options available to food-insecure populations in North Dakota.

To analyze the population characteristics of North Dakota, demographic data was collected at the county level. The 2020 U.S. Census Bureau American Community Survey (ACS) 5-Year Estimates data for North Dakota was accessed, and information on population estimates, population growth rates from 2010 to 2020, projected population estimates for 2032, age and disability status of the population, economic situation including the poverty level and unemployment rates, and availability of vehicles in households were gathered. The relevant data was extracted and compiled into a spreadsheet for analysis. The data was sorted by county to allow for a county-level analysis of the demographic characteristics of the population. The data was then cleaned and checked for accuracy before being used to create maps to visualize the demographic characteristics of the population at the county level.

Data for demographic characteristics at the zip code level was collected from the U.S. Census Bureau. The collected data was then cleaned and checked for accuracy. Using the cleaned data, population densities for different demographic groups were calculated by dividing the population of a specific group by the area of the zip code. The demographic groups could include age, race, disability, poverty, income level, and other relevant categories. Maps were created using ArcGIS Pro software to visualize the population densities by demographic group at the zip code level. The maps were designed to provide a clear and easy-to-understand representation of the demographic distribution and population densities for each group. The population density data was analyzed to identify patterns, trends, and disparities in the distribution of different demographic groups. This analysis was used to understand the factors affecting the health and well-being of food insecure individuals and communities in each zip code.

The methodology for measuring food insecurity and public transportation options for food-insecure populations involved collecting data from various sources. The first source was North Dakota Census 2020, which provided data on households receiving food stamps/SNAP, the percent of households receiving food stamps/SNAP, total food insecurity (population), food insecurity rate, number of children suffering food insecurity, and child food insecurity rate in North Dakota in 2020. The second source of data was Map the Meal Gap 2020 from Feeding America, which provided information on the percent of food-insecure children in households with household incomes below 185% of the federal poverty line and the percent of food-insecure children in households with household incomes above 185% of the federal poverty line.

The study collected transit span of service data from the websites of North Dakota's transit agencies. This data was used to determine the days per week that public transit service is available in each county. The transit span of service data was used to create ArcGIS maps that display the days per week and hours per service that public transit service is available in each county.

Two primary data sources were used to collect information on food bank and food pantry locations - Map the Meal Gap and a Google search. Map the Meal Gap is a research project conducted by Feeding America that provides estimates of food insecurity and the availability of food resources at the county



and congressional district levels across the United States. For each food bank and food pantry location, the following information was collected:

- Address of the location
- Number of service days per week
- Number of open hours in each service day
- Zip code of the location

Using ArcGIS Pro, various maps were created to visualize the food bank and food pantry location data collected. These maps included:

- Food bank and food pantry location by zip code
- Food bank and food pantry service days per week by zip code
- Food bank and food pantry open hours per service day by zip code

The food bank and food pantry location data collected were analyzed to determine the availability of food resources in each zip code. This information was then used in conjunction with other data sources, such as transit span of service data, to identify areas with limited access to food resources and potential interventions to improve food security in those areas.

The study aimed to gather location and service information for supermarkets, grocery stores, convenience stores, and gas stations in the study area. The data collection process involved several steps. First, the research team searched online for a comprehensive list of food stores in the study area. Google Maps, Yelp, and other online directories were used to identify potential stores. Next, the team compiled a list of the stores' addresses and other information, such as hours of operation and zip code. For each store, the team recorded the number of days per week the store is open and the number of open hours in each day.

After the data collection process was complete, the research team used ArcGIS Pro to create maps that show the number of food stores by county and by zip code. The team also created maps that show the food stores' open days per week and open service hours per service day, both by zip code level. Finally, the team analyzed the data to identify any patterns or trends related to food store accessibility and availability in the study area.

To create the low access to healthy foods map in North Dakota, the study used data from the USDA-ERS. This data included information on the location of supermarkets and grocery stores in relation to low-income areas, as well as the level of vehicle access in these areas. Using this data, the study created a map of North Dakota showing areas that are considered to have low access to healthy food options. This map was created using ArcGIS Pro, and it highlights areas where residents have limited access to supermarkets or grocery stores that provide fresh, healthy food options.

Additionally, the study also created related maps such as low-income tracts, low income and low access at 1 mile and 10 miles, low income and low access at 1 and 20 miles, low income and low access using vehicle access, and low vehicle access. These maps were created using the same data sources and analysis methods as the low access healthy food map, and they provide additional context for understanding food access issues in North Dakota. Overall, these maps and data sources were used to help identify areas of North Dakota where residents may face challenges in accessing healthy food options, which can have negative impacts on their health and well-being.

## 4. DEMOGRAPHIC PROFILE

Understanding the distribution of different demographic population groups is an important part of planning public transit services. Population demographics, such as age distribution, people with disabilities, individuals with low income, and those without vehicle access, may relate to the use of transit service. Some demographic groups may demonstrate greater propensity to use transit services than others, depending on the population density (Felsburg Holt & Ullevig 2015).

North Dakota is located in the northern Great Plains region of the United States, bordered by Minnesota to the east, Montana to the west, South Dakota to the south, Canada to the north. Geographically, North Dakota is the 19th largest state in the country, but it is extremely sparsely populated. The current population growth rate is 1.99%, which ranks 2nd in the nation. North Dakota has a surface area of 70,700 square miles, and for every square mile of land, there is an average of just 9.7 people (World Population Review 2023). Since 2010, North Dakota has been among the nation’s fastest-growing states, estimated to have grown by more than 16%. In comparison, the U.S. population grew 7.3% and North Dakota's population grew 14.8% during that period (KX News 2022).

In terms of food insecurity, North Dakota faces unique challenges because of its rural nature and its relatively isolated communities. According to data from Feeding America, 36,130 people in North Dakota, including 14,490 children, are facing hunger. Approximately 41.7% of households receiving SNAP benefits have children. In particular, rural and Native American communities in the state face higher rates of food insecurity (Feeding America 2023).

### 4.1 County Level Population Estimates

County-level population estimates are a method of estimating the number of people living in a specific county or other geographic area. In North Dakota, the majority of the population is concentrated in a few urban areas, while many rural counties have lower populations. County-level population estimates in North Dakota released by the U.S. Census Bureau are shown in Figure 4.1. The total population in North Dakota is currently 760,394 people. North Dakota has 53 counties, with Cass County as the most populous with 179,937 people, followed by Burleigh County with 95,509, Grand Forks County with 70,243, Ward County with 68,962, and Williams County with 36,044. The least populous county is Slope County with 788 people.

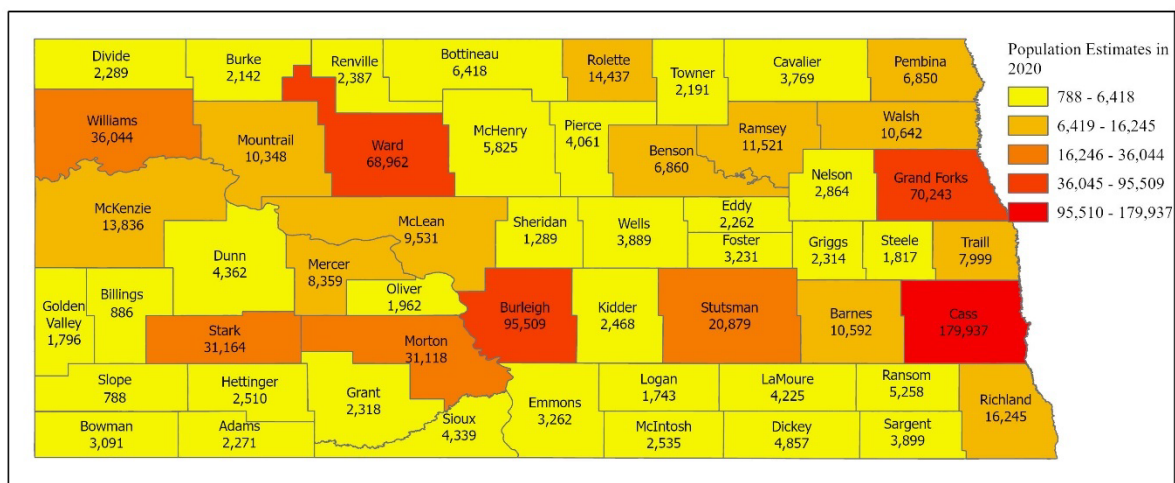
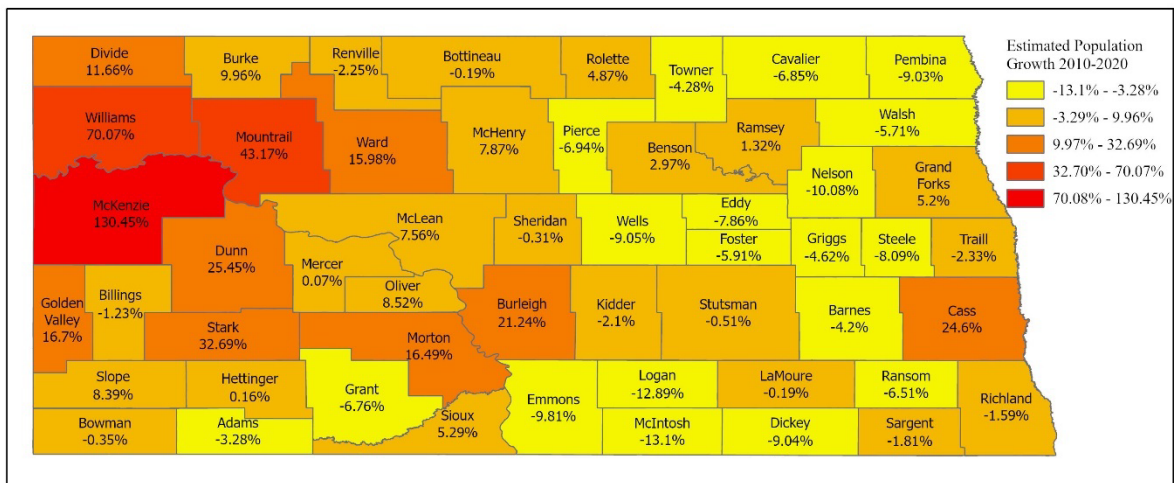


Figure 4.1 County Level Population Estimates in North Dakota, 2020 ACS 5-Year Estimates

## 4.2 Population Growth Estimates

Population growth estimates provide an indication of the change in population over time and are important for understanding the demographic trends of a region or state. In North Dakota, population growth has been relatively slow until recently, but the state has experienced some notable changes in population distribution.

According to recent data, North Dakota's population has increased by about 15.8% between 2010 and 2020. While some of the state's urban areas have experienced relatively strong growth, many rural areas have continued to experience population decline. The most population growth occurred in the northwest part of the state since 2010, as shown in Figure 4.2. The population in McKenzie County increased 130.45% from 2010 to 2020. Significant population growth also occurred in Williams, Mountrail, Stark, and Dunn counties as well as two most populated counties, Burleigh and Cass. Meanwhile, many rural counties in the northeast and southern part of the state lost population. The population of McIntosh County, in 2020 was 2,535, down 13.1% from the 2,917 who lived there in 2010.



**Figure 4.2** Estimated Population Growth from 2010 to 2020

## 4.3 Projected Population Growth Estimates

Projected population growth estimates provide an indication of the expected change in population in the future, based on current trends and demographic data. Based on previous trends of the population growth from 2010 to 2020, population projections were estimated for 2032, as shown in Figure 4.3. The projected population growth in the northwest might be dependent on the future of the oil industry. A significant number of the rural counties of the state are expected to lose population. Meanwhile, three populated counties, such as Cass, Burleigh, and Grand Forks counties, are expected to experience more consistent growth rates.

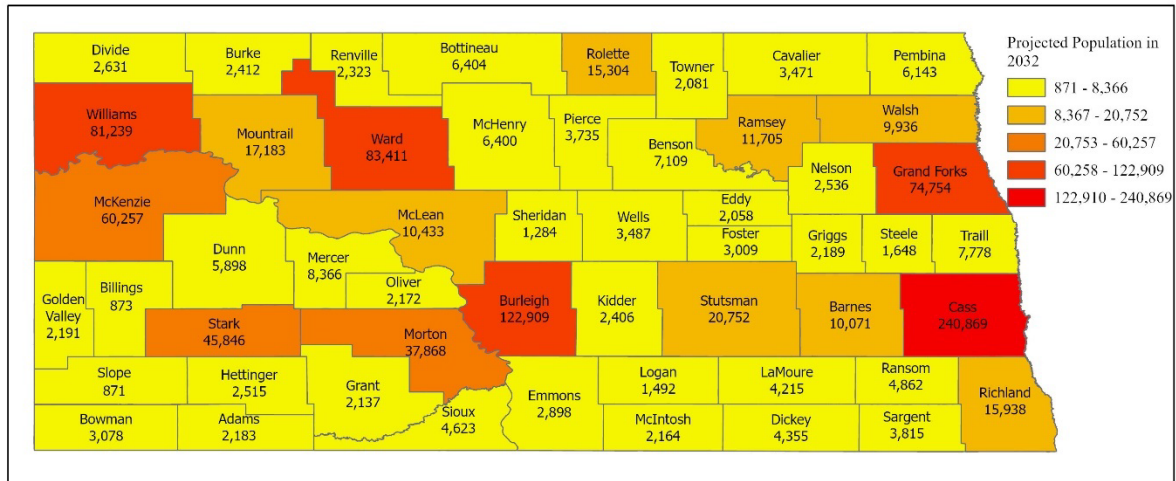


Figure 4.3 Projected Population in 2032

#### 4.4 Population 65 Years and Over

Data highlighted in Figure 4.4 on the population 65 years and older reveals that a significant portion of the population aged 65 years and above resides in urban counties like Burleigh, Cass, Grand Forks, and oil-rich Ward County. In contrast, Figure 4.5, which represents the percent of population 65 years and older, shows a different pattern. The higher percentage of individuals aged 65 years and above is found in various rural areas scattered throughout the state, rather than in the urban counties mentioned earlier. This indicates that while urban areas may have a larger number of elderly residents, the proportion of older individuals is relatively higher in certain rural regions of North Dakota.

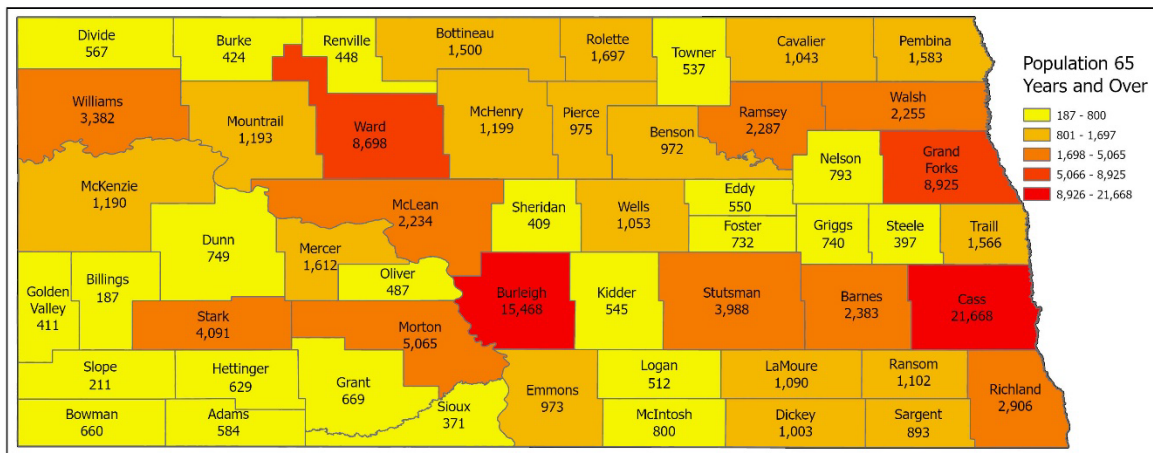


Figure 4.4 Population 65 Years and Over, 2020 ACS 5-Year Estimates

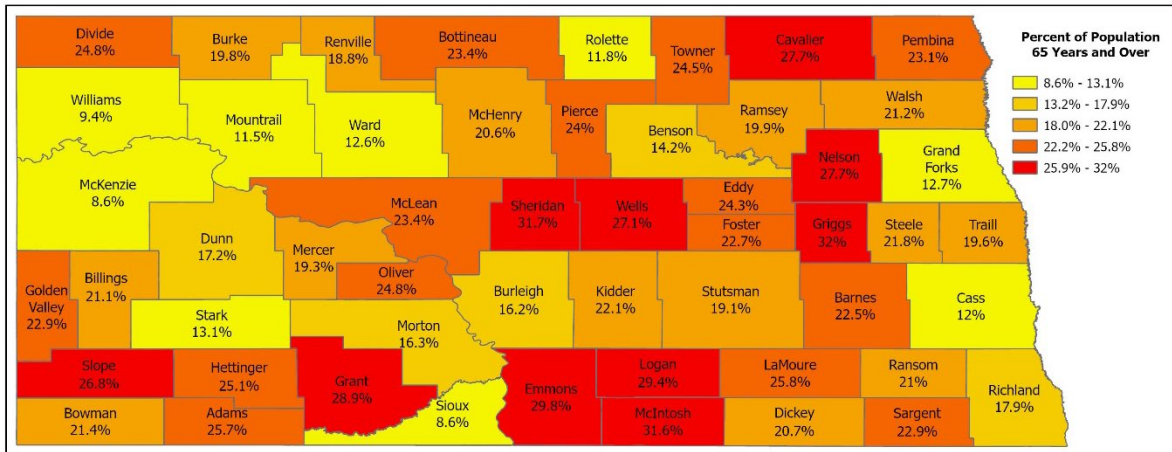


Figure 4.5 Percent of Population 65 Years and Over, 2020 ACS 5-Year Estimates

#### 4.5 County Level Tribal Population Estimates

County-level tribal population estimates are critical for addressing food insecurity in North Dakota's tribal communities. In North Dakota, there are several tribal communities spread across various counties. There are five federally recognized tribes and one Indian community located at least partially within North Dakota. These include the Mandan, Hidatsa, & Arikara Nation, the Spirit Lake Nation, the Standing Rock Sioux Tribe, the Turtle Mountain Band of Chippewa Indians, the Sisseton-Wahpeton Oyate Nation, and the Trenton Indian Service Area (North Dakota Indian Affairs Commission 2023). In total, there are 40,169 American Indians living in North Dakota, making up about 5.3% of the current North Dakota population. Figure 4.6 shows the 2020 tribal population estimates, and Figure 4.7 shows the percent of tribal population by county level. The largest tribal population is in Rolette County, while Steele and Billings counties have no tribal population. Sioux County has the highest percent of tribal population with 82.8%. Other counties with a significant percent of tribal population are Rolette (76.7%), Benson (54%), and Mountrail (29.2%) counties.

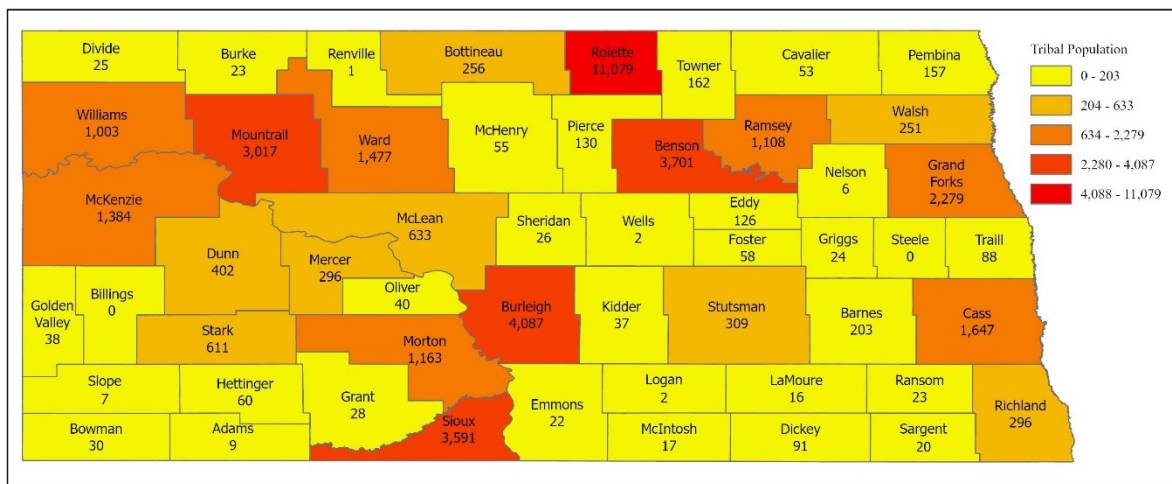


Figure 4.6 Tribal Population in North Dakota, 2020 ACS 5-Year Estimates

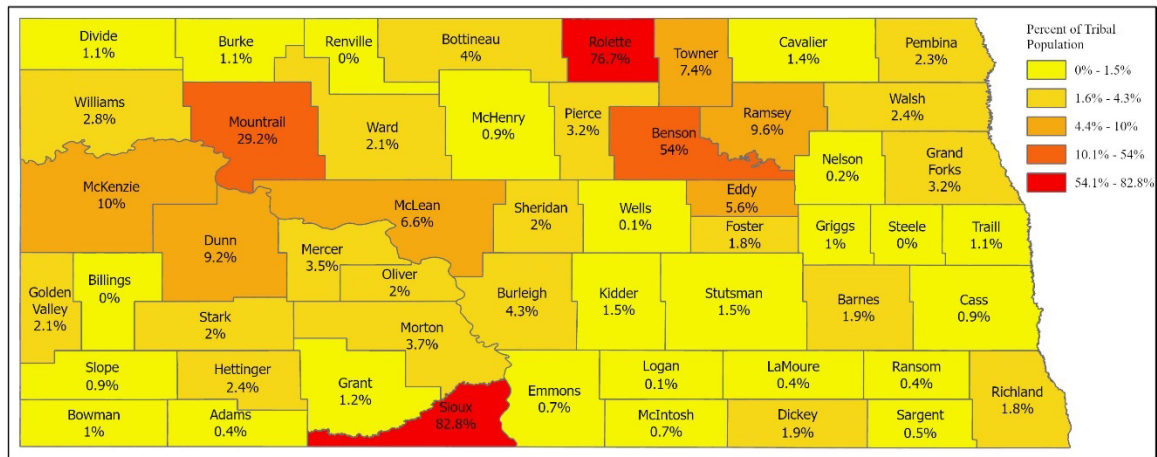


Figure 4.7 Percent of Tribal Population in North Dakota, 2020 ACS 5-Year Estimates

#### 4.6 Population with a Disability

The number of those with a disability in North Dakota is an important consideration when estimating food insecurity. Individuals with disabilities are often at an increased risk of food insecurity, because of a variety of factors such as limited mobility, high medical expenses, and reduced ability to work. Accurate estimates of the population with a disability and where they are located can help identify areas where food insecurity is particularly prevalent and target interventions to those who need it most. Sizeable disabled population groups in rural counties are likely to show a strong need for transportation services (Felsburg Holt & Ullevig 2015). Figure 4.8 shows the population with a disability by county, and Figure 4.9 shows the percentage of the population with a disability based on data from the 2020 ACS five-year estimates. The ACS data shows that about 10.9% of the overall state’s population is disabled. Counties with a significantly high portion of population with disabilities include Benson, Eddy, Golden Valley, Nelson, Ramsey, Rolette, Slope, and Stutsman.

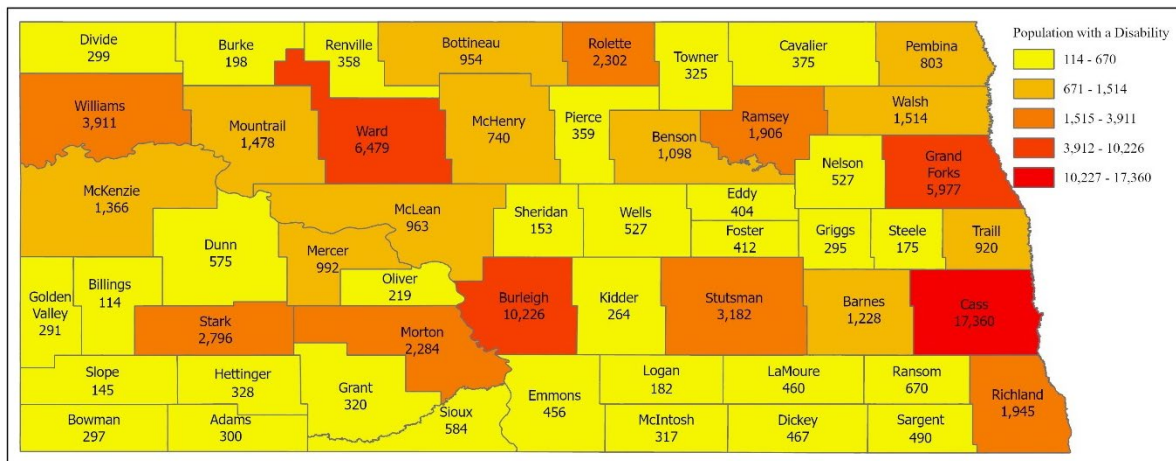


Figure 4.8 Population With a Disability, 2020 ACS 5-Year Estimates

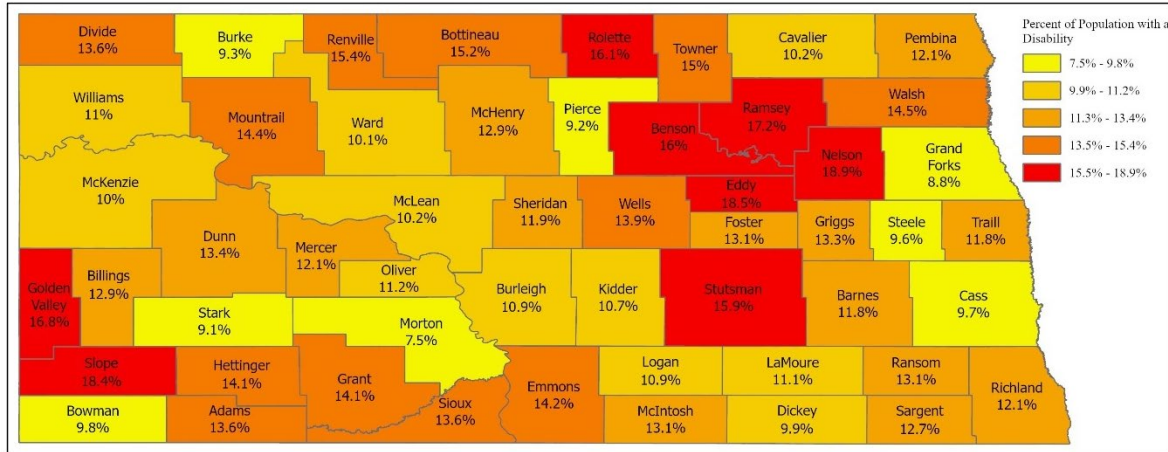


Figure 4.9 Percentage of Population with a Disability, 2020 ACS 5-Year Estimates

#### 4.7 Unemployment Rate for Population 16 Years Old and Over

The unemployment rate for the population 16 years old and older is a critical factor to consider when estimating food insecurity and transportation options in rural areas. By using accurate data on unemployment, policymakers and service providers can design and implement programs that effectively address food insecurity and transportation challenges in rural areas and support the health and well-being of communities across North Dakota.

The unemployment rate is the percentage of the population that is actively looking for work but is unable to find a job. The unemployment rate is calculated using the total population in North Dakota that are over the age of 16. The unemployment rate for North Dakota in 2020 was 3.1%. Figure 4.10 shows the unemployment rate for those 16 years old and over in North Dakota based on data from the ACS 2020 five-year estimates. Rural Sioux county has the highest unemployment rate of 16.8% of population over 16 years and older.

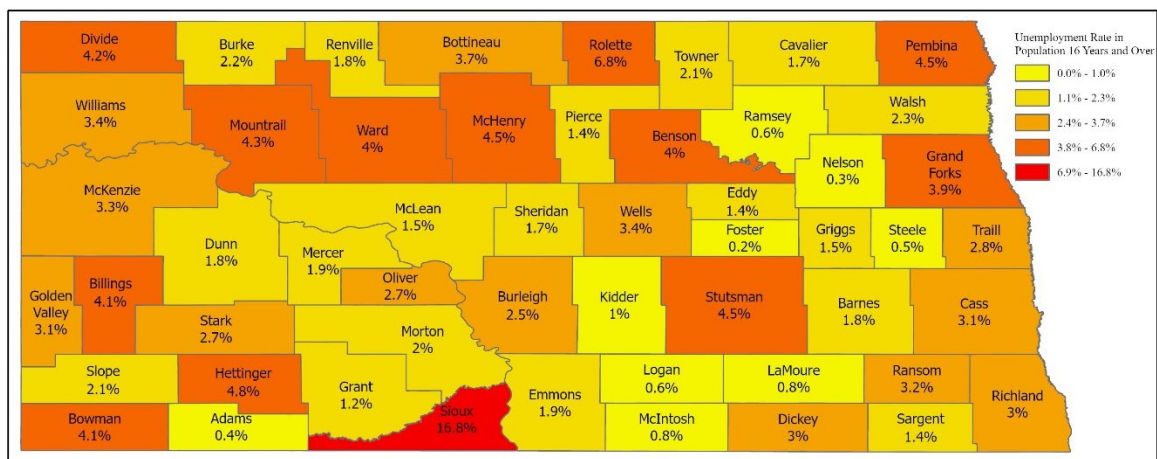


Figure 4.10 Unemployment Rate for Population 16 Years Old and Over, 2020 ACS 5-Year Estimates

#### 4.8 Unemployment Rate Below Poverty Level

The unemployment rate of those below poverty level is a critical factor to consider when estimating food insecurity and transportation options in rural areas. Individuals who are unemployed and below the poverty level are more likely to struggle to afford food, and may not have access to adequate nutrition. In 2020, about 13.5% of North Dakota's population who lived below the poverty line were unemployed. Figure 4.11 shows the unemployment rate for those below poverty level based on data from the ACS 2020 five-year estimates. In Sheridan County, 100% of the unemployed population are below poverty level. A significant number of rural counties in the west, such as Billings, Bowman, Golden Valley, and McKenzie have higher unemployment rates for those below poverty level. Other counties in the south, such as Dickey, Ransom, and Sioux have higher unemployment rates for those below poverty level.

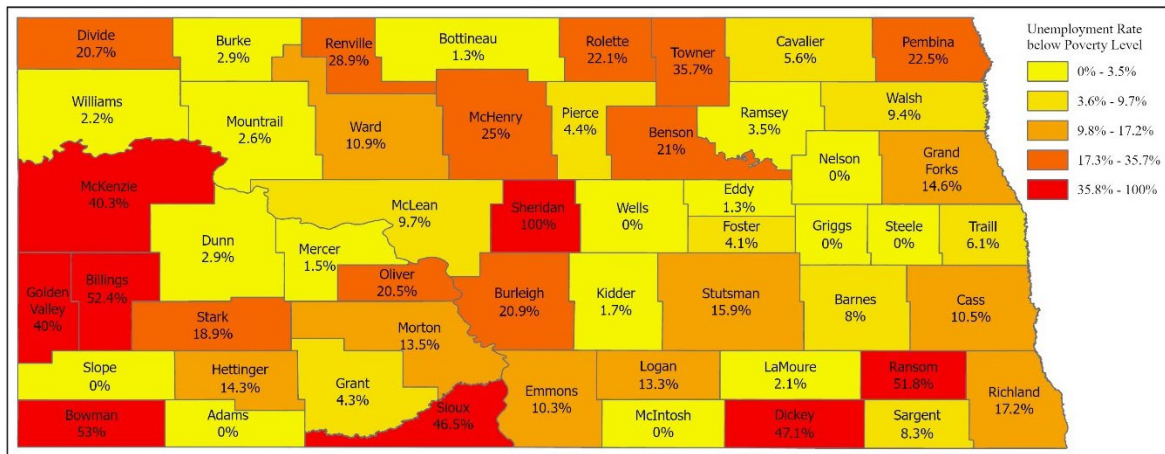


Figure 4.11 Unemployment Rate for Those Below Poverty Level, 2020 ACS 5-Year Estimates

#### 4.9 Unemployment Rate at or Above the Poverty Level

The unemployment rate at or above the poverty level can provide valuable information for estimating food insecurity in a given area and for designing interventions to address it. In 2020, North Dakota has a 1.9% unemployment rate for those who are at or above poverty level. Figure 4.12 shows the unemployment rate for those at or above the poverty level based on the data from the ACS 2020 five-year estimates. In Sioux county, 12.7% of people at or above the poverty level were unemployed.

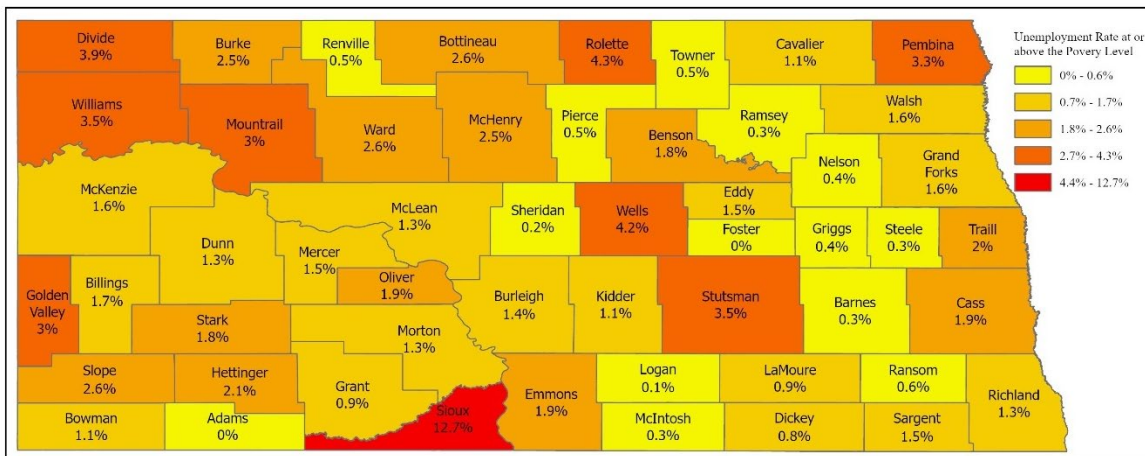


Figure 4.12 Unemployment Rate for Those at or above the Poverty Level, 2020 ACS 5-Year Estimates



#### 4.10 Unemployment with Disability

People with disabilities often face unique challenges, such as discrimination and limited opportunities, in the job market. As a result, individuals with disabilities may be more likely to experience unemployment and poverty which can contribute to food insecurity. By understanding the unemployment rate among people with disabilities, policymakers can identify areas where food insecurity is particularly prevalent among this population and target interventions to those who need it most. The unemployment rate for persons with a disability is 6.5% in North Dakota in 2020. This is lower than the national rate of 7.6% for the same year (U.S. Bureau of Labor Statistics 2021). The lower unemployment rate in North Dakota for persons with a disability may be due to a number of factors, including the state's strong economy and its relatively low cost of living. Figure 4.13 shows the unemployment rate for persons with any disability at the county level based on the data from the ACS 2020 five-year estimates. The highest unemployment rate of 60.7% of people with any disability is in Golden Valley county. Other rural counties, including Bowman (21.2%), Divide (23.1%), Emmons (18.8%), Pierce (23.3%), and Sioux (32.7), have significant unemployment rates among those with any disability.

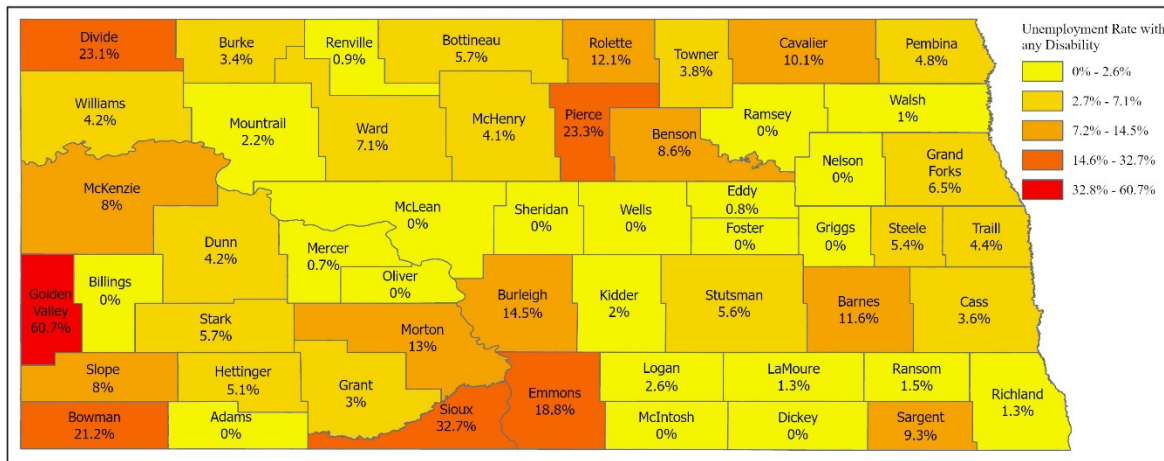


Figure 4.13 Unemployment Rate with any Disability, 2020 ACS 5-Year Estimates

#### 4.11 Vehicles Available per Household

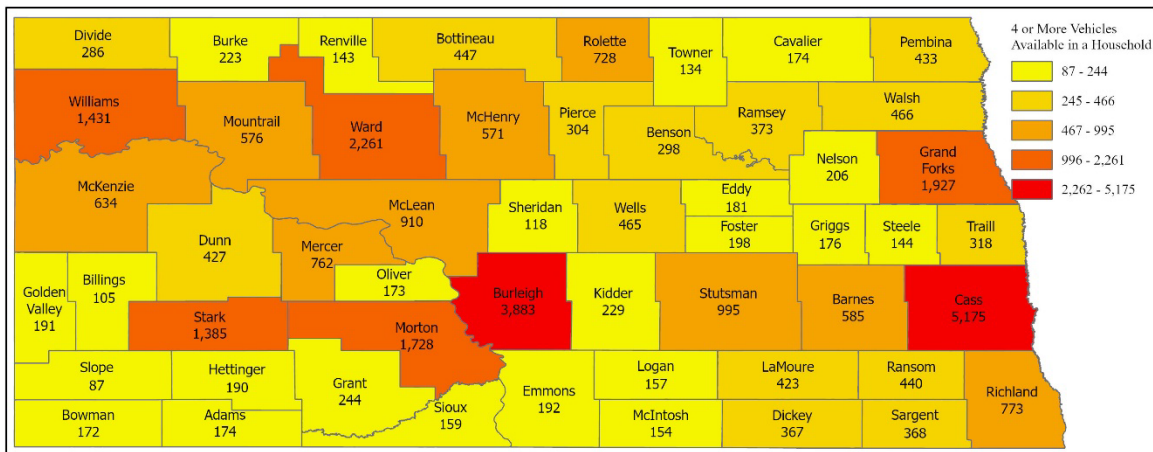
The average number of individuals per household in North Dakota is 2.37, according to ACS 2017-2021 estimates (Census Bureau 2022). The number of vehicles available per household can have a profound impact on food insecurity and access to healthy food options. In areas where households have access to vehicles, they are able to more easily access grocery stores and other food outlets, which can increase their access to fresh and healthy food. This increased access to food options can help to reduce food insecurity, as families are better able to meet their nutritional needs. Where households do not have access to vehicles, they may face challenges in accessing healthy food options, which can increase their risk of food insecurity. This can be particularly challenging in rural areas where grocery stores may be few and far between. The lack of transportation can also make it difficult for individuals to travel to food banks or other resources that can help to alleviate food insecurity. There is a total of 320,873 households in North Dakota. There is an average of two cars available per North Dakota household. The table below breaks down the number of vehicles available per household.

**Table 4.1** Vehicles Available per Household, 2020 ACS 5-Year Estimates

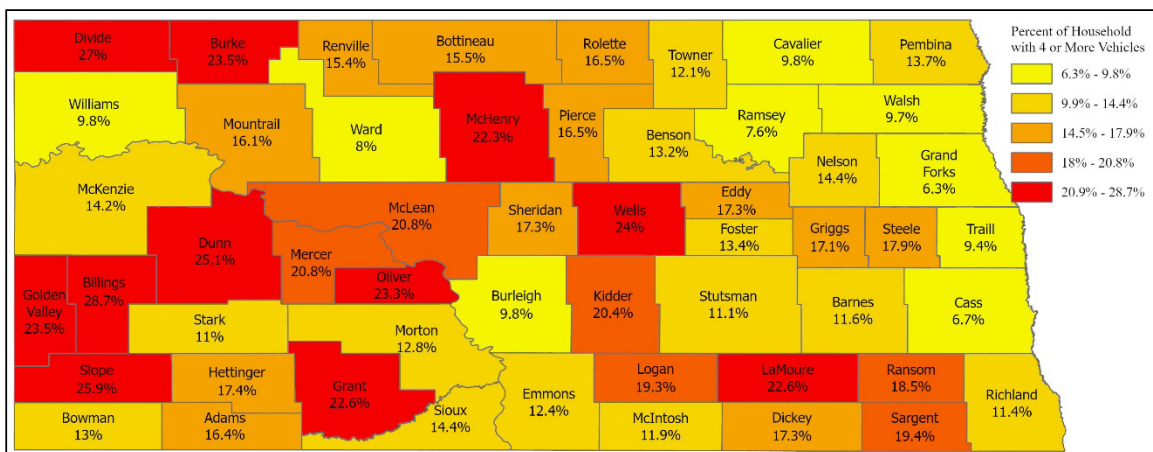
No vehicles available	16,515
4 or more vehicles available	33,663
3 vehicles available	54,716
2 vehicles available	124,141
1 vehicle available	91,838

**4.12 Households with 4 or More Vehicles Available**

Households with four or more vehicles available are generally considered to have a lower risk of food insecurity, as they have access to a greater number of resources and opportunities (Antrum, Waring and Stowers 2023). The availability of multiple vehicles provides these households with the ability to travel to different grocery stores, farmers markets, and food banks, which can increase their access to a wider variety of food options. Overall 10.5% of households have four or more vehicles available in North Dakota. Figure 4.14 shows the number of households with four or more vehicles available, and Figure 4.15 shows the percent of households with four or more vehicles available in the county level. Many rural counties in the west such as Billings (28.7%), Dunn (25.1%), Golden Valley (23.5%), Slope (25.9%) have higher percentages of households with four or more vehicles available.



**Figure 4.14** Households with four or more Vehicles Available, 2020 ACS 5-Year Estimates



**Figure 4.15** Percent of Households with four or more Vehicles Available, 2020 ACS 5-Year Estimates

### 4.13 Household with 3 Vehicles Available

The availability of three vehicles provides these households with the ability to travel to different grocery stores and food sources, but not as easily as households with four or more vehicles. These households may also have more disposable income than households with fewer vehicles, but not as much as households with four or more vehicles. Overall 17% percent of households have three vehicles available in North Dakota. Figure 4.16 shows the number of households with three vehicles available, and Figure 4.17 shows the percent of households with three vehicles available in the county level based on the data of 2020 ACS five-year estimates. Slope county has the highest percentage of households (30.1%) that own three vehicles. Urban counties such as Burleigh (15.5%), Cass (13.1%), and Grand Forks (14.2%) have a lower percentage of households with three vehicles than the average percent of household with three vehicles in North Dakota.

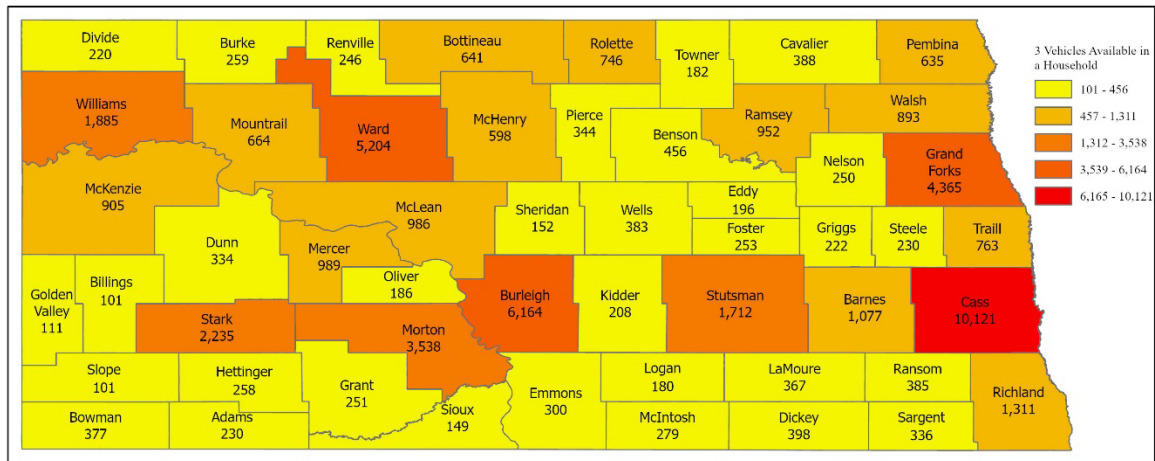


Figure 4.16 Households with three Vehicles Available, 2020 ACS 5-Year Estimates

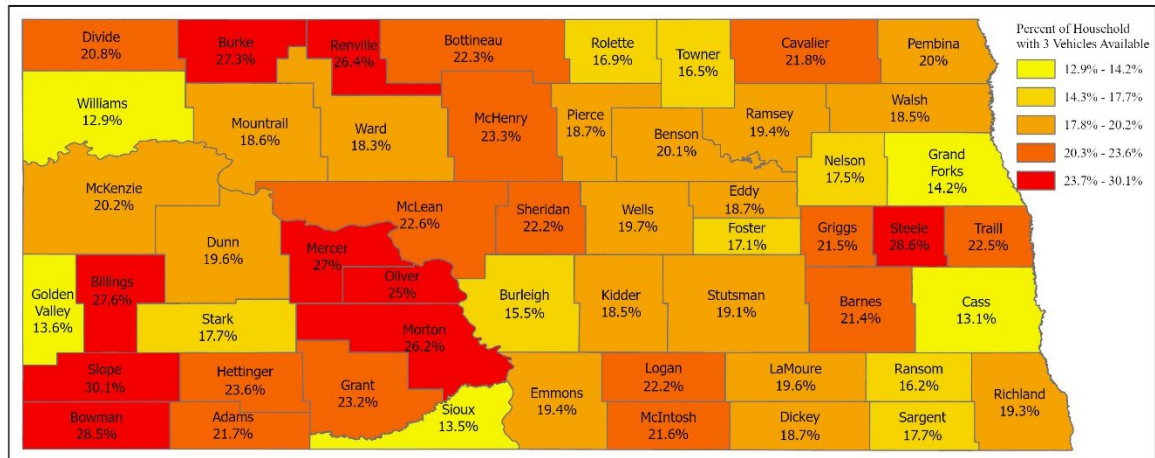


Figure 4.17 Percent of Households with three Vehicles Available, 2020 ACS 5-Year Estimates

#### 4.14 Households with 2 vehicles available

The availability of two vehicles in a household can have both positive and negative effects on food security, with access to food resources and income being two of the key factors to consider. The availability of two vehicles provides these households with some flexibility in terms of transportation, but not as much as households with three or more vehicles. They may face some challenges in traveling to different grocery stores or food sources, particularly if they are located in more remote areas. Overall 38.7% of households in North Dakota own two vehicles. Figure 4.18 shows the number of households with two vehicles available and Figure 4.19 shows the percent of household with two vehicles available at the county level based on the data of 2020 ACS five-year estimates. The most populated urban county, Cass has the highest percentage (43.7%) of households with two vehicles.

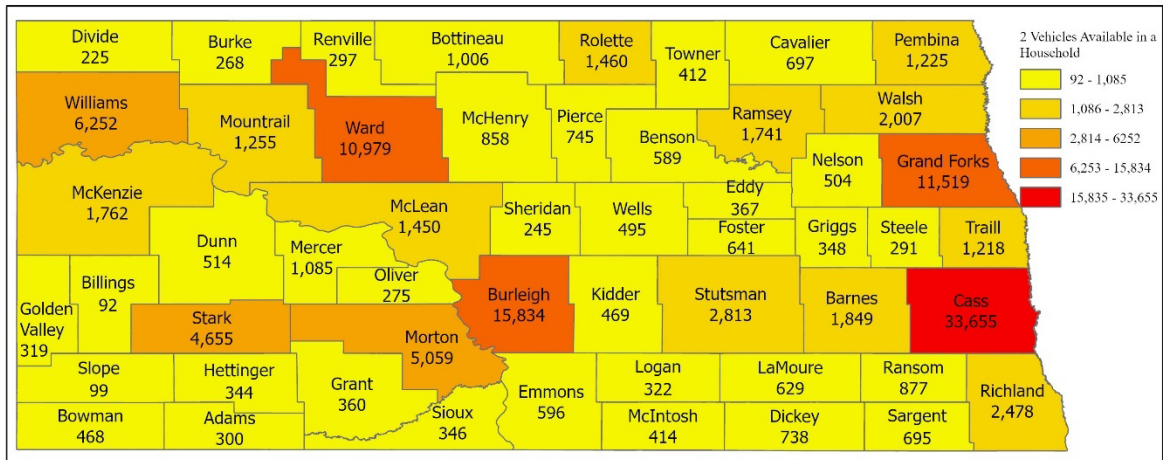


Figure 4.18 Number of Households with two Vehicles Available, 2020 ACS 5-Year Estimates

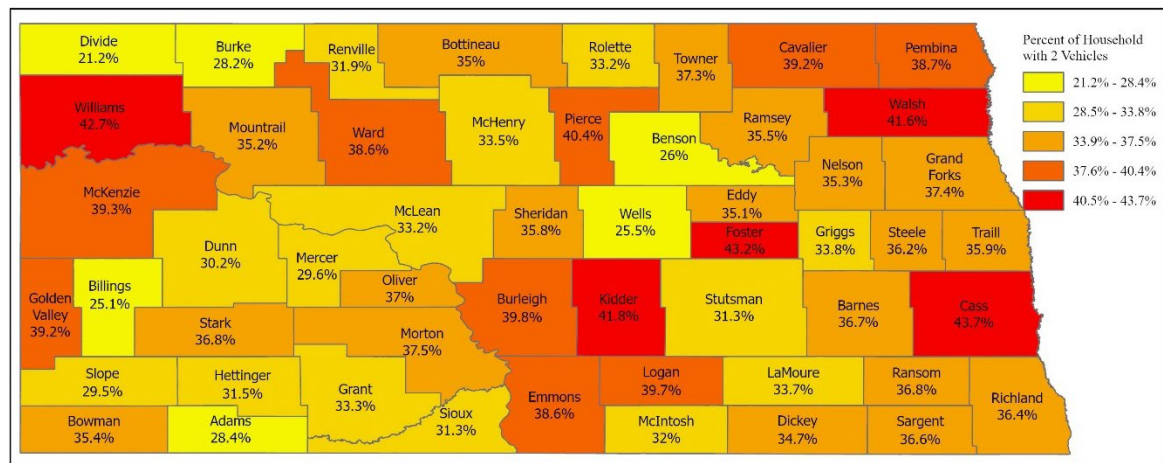


Figure 4.19 Percent of Households with two Vehicles Available, 2020 ACS 5-Year Estimates

#### 4.15 Households with 1 Vehicle Available

The availability of one vehicle in a household can significantly impact food security and access to healthy and diverse food options for those households. The availability of a single vehicle can make it difficult for these households to travel to different grocery stores or food sources, particularly if they are located in more remote areas. As a result, households with one vehicle may be more likely to rely on convenience stores and fast food restaurants for meals, which can have negative consequences for their overall diet and health. Overall, 28.6 percent of households have one vehicle in North Dakota. Figure 4.20 shows the

number of households with one vehicle available and Figure 4.21 shows the percentage of households with one vehicle available in the county level based on the data of 2020 ACS five-year estimates. The urban county, Grand Forks (36.6%) has highest percentage of households that own one vehicle, and other two urban counties such as Burleigh (29.8%), and Cass (30.3%) have a higher percentage of households that have one vehicle than the state average.

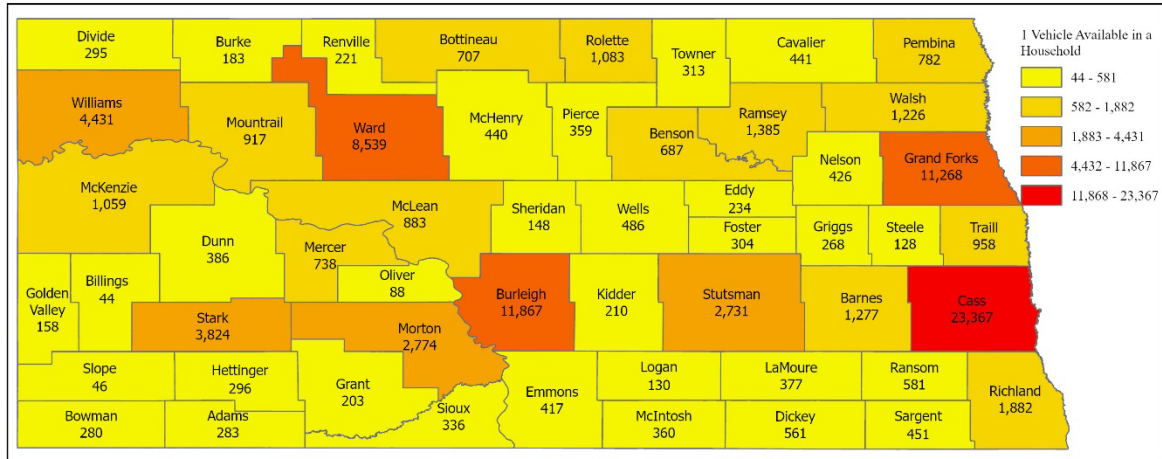


Figure 4.20 Number of Households with One Vehicle Available, 2020 ACS 5-Year Estimates

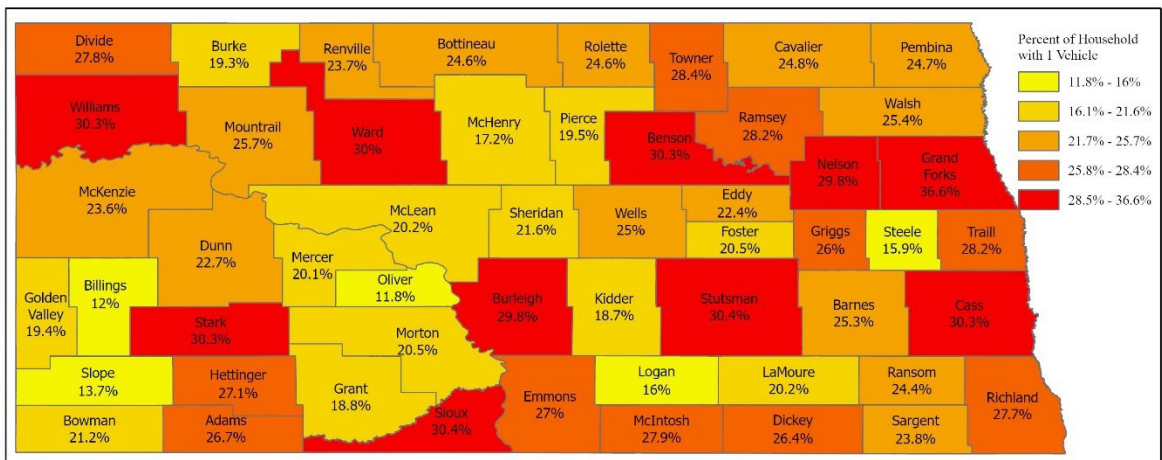


Figure 4.21 Percent of Households with One Vehicle Available, 2020 ACS 5-Year Estimates

#### 4.16 Households with No Vehicle

The absence of a vehicle in a household can significantly impact individuals' food security and access to healthy and diverse food options. They may have to rely on public transportation, which may have limited availability and limited service hours, and is less convenient. The lack of a vehicle can limit their ability to purchase large quantities of food, which can make it difficult to plan and prepare healthy meals in advance. Overall 5.1 percent of North Dakota households have no vehicle available. Figure 4.22 shows the number of households with no vehicle, and Figure 4.23 shows the percent of households with no vehicle available at the county level based on the data from 2020 ACS five-year estimates. Sioux County (10.6%) has the highest percentage of households without a vehicle. The rural Midwest counties such as Benson (10.4%), Ramsey (9.2%), Rolette (8.7%), and Stutsman (8.1%) also have a higher percent of no vehicle households.

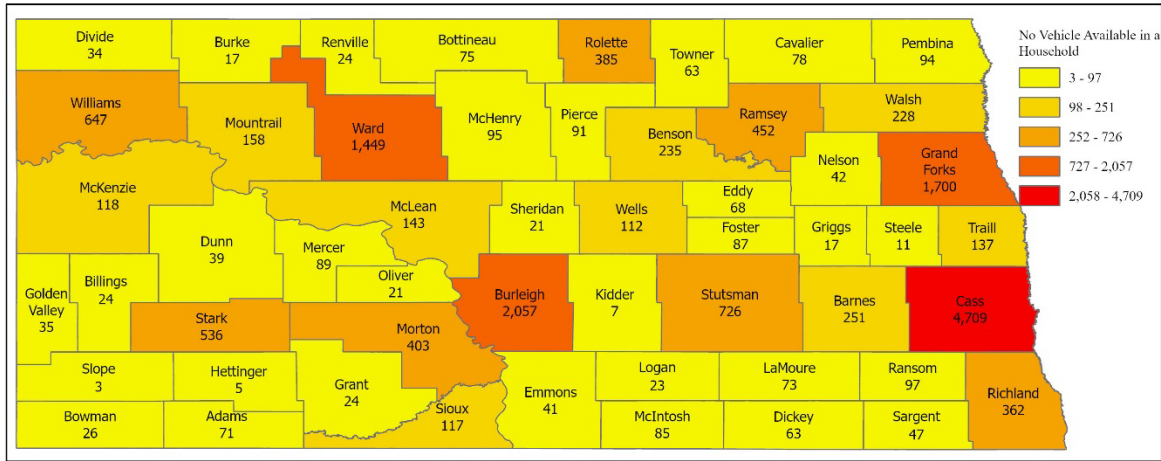


Figure 4.22 Number of Households with No Vehicle Available, 2020 ACS 5-Year Estimates

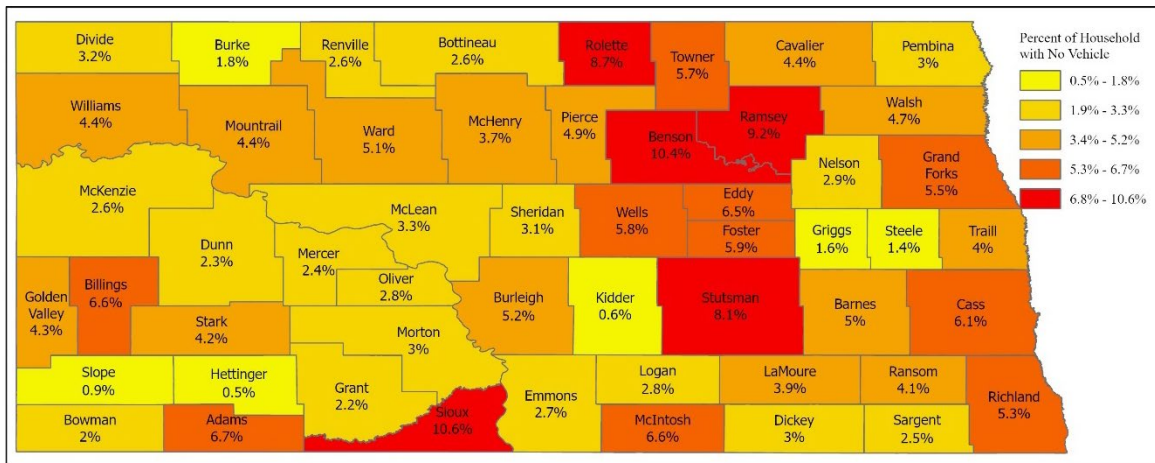


Figure 4.23 Percent of Households with No Vehicle Available, 2020 ACS 5-Year Estimates

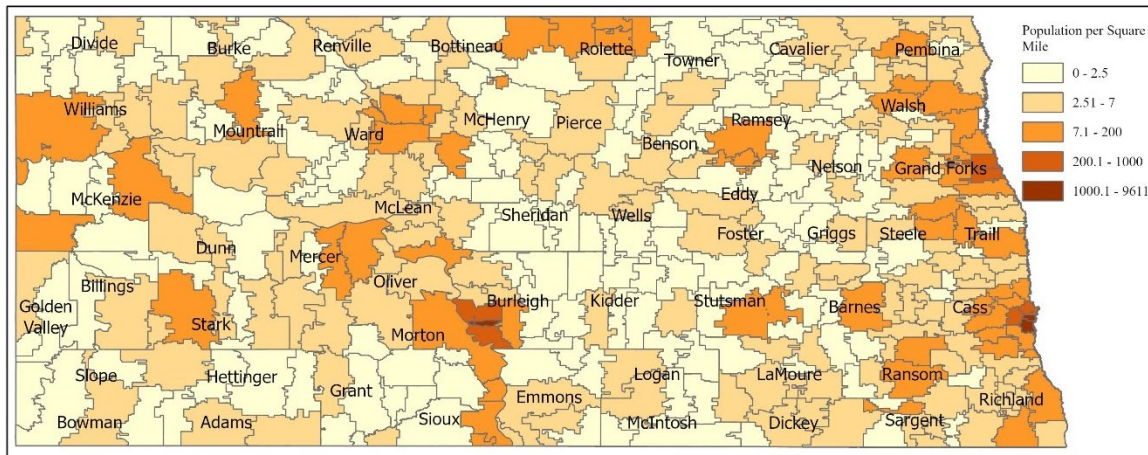
#### 4.17 Population Densities by Demographic Group

Population densities of various demographic groups can have a significant impact on the levels of food insecurity, affecting the health and well-being of individuals and communities. Understanding population densities by demographic group can help policymakers make informed decisions about resource allocation, urban planning, and social services. Generally, urban areas tend to have higher population densities than rural areas, due to the concentration of job opportunities and other amenities in cities. However, demographic factors such as age, race, disability, poverty, and income level can also play a significant role in determining food insecurity. Understanding the impact of food insecurity on different demographic groups is important for addressing the root causes of hunger and promoting equity and access to healthy, nutritious food for all.

Demographic characteristics were analyzed with data at the zip code level. Population densities by demographic group can vary greatly and can give important insights into the distribution of a state's population. Thus, by considering population densities by demographic group, policymakers and communities can work together to create transit accessible communities for all residents.

#### 4.17.1 Total Population Density

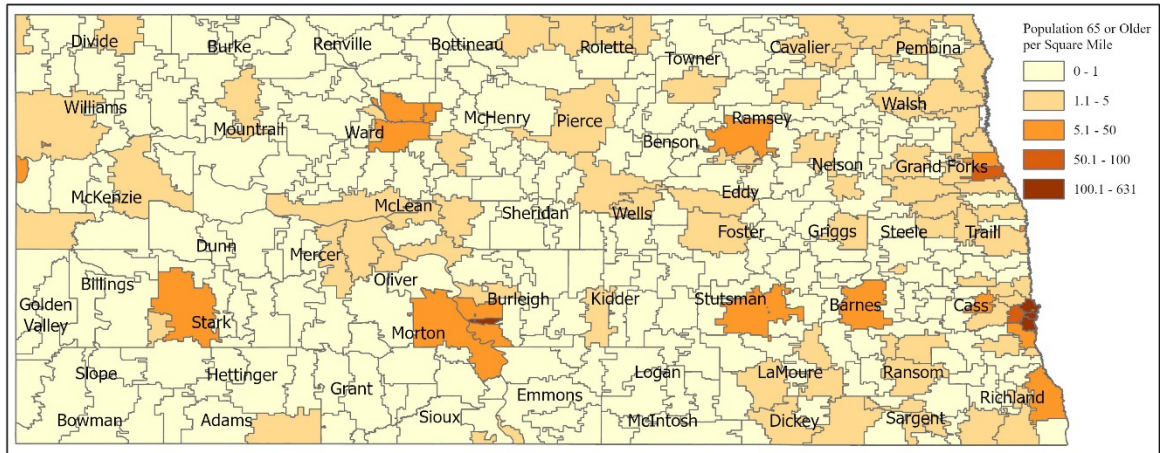
Population density per square mile can significantly influence food insecurity, particularly in areas with a high concentration of households lacking reliable access to nutritious food. Total population density at the zip code level in North Dakota can provide valuable insights into the distribution of residents across the state. Figure 4.24 shows total population per square mile at the zip code level, allowing for a deeper understanding of population trends and characteristics. Zip codes in urban areas have higher population densities than rural areas, reflecting the concentration of residents in cities. Similarly, zip codes in oil-rich regions experienced more rapid growth due to the energy industry, and generally have higher population densities.



**Figure 4.24** Total Population Density by Zip Code, 2020 ACS 5-Year Estimates

#### 4.17.2 Population Aged 65 or Older per Square Mile

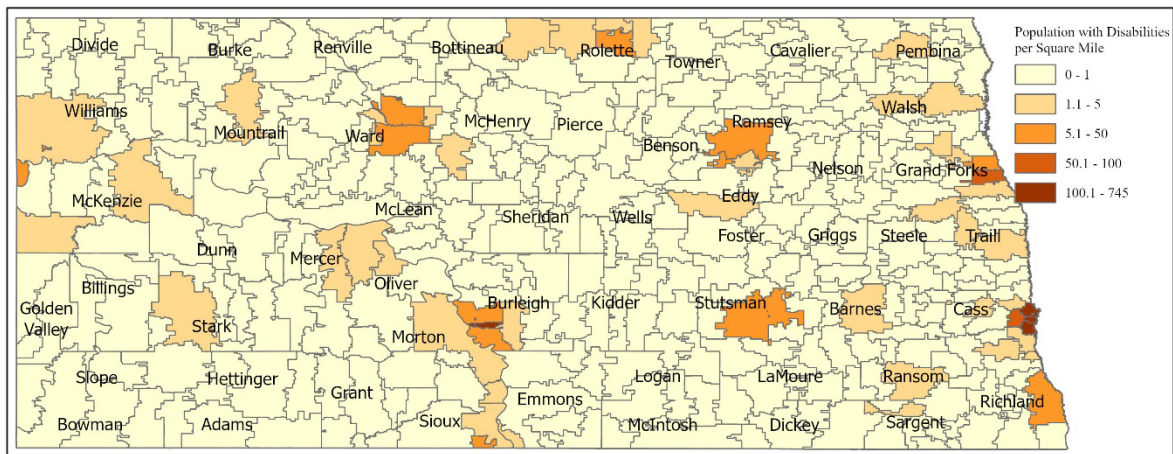
Figure 4.25 shows the total population aged 65 or older per square mile. The population aged 65 or older per square mile is an important metric for understanding the distribution of aging populations. The density of the population aged 65 or older per square mile can significantly influence food insecurity. Older individuals are often more vulnerable to food insecurity because of limited mobility and income. As a result, they may struggle to access adequate, nutritious food, which can lead to negative health outcomes such as malnutrition and chronic health conditions. Figure 4.25 shows a high concentration of older individuals in urban areas, and a lower concentration of older individuals in rural areas. Addressing food insecurity among the population aged 65 or older is critical for ensuring their health, well-being, and quality of life.



**Figure 4.25** Population Aged 65 or Older per Square Mile by Zip Code, 2020 ACS 5-Year Estimates

#### 4.17.3 Population with Disability per Square Mile

The density of the population with disabilities per square mile can profoundly affect food insecurity. Figure 3.26 shows population with disability per square mile by zip code level. There are high concentrations of individuals with disabilities living in rural and tribal areas. The necessary resources and infrastructure may not be in place to address food insecurity among this demographic, leading to potential disparities in access to adequate nutrition. The disability density is higher in urban areas. However, there are higher concentration of population with disabilities in the Native American populated areas.

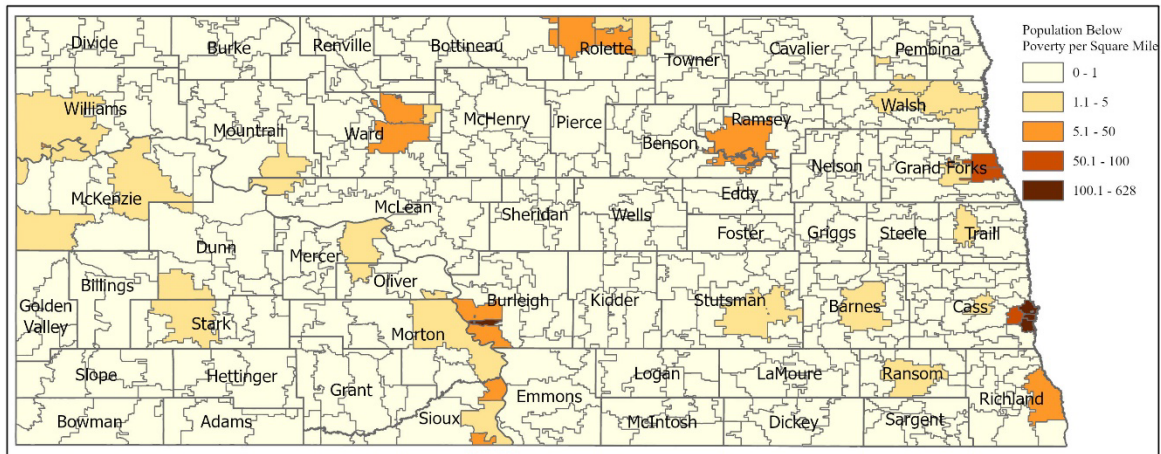


**Figure 4.26** Population with Disability per Square Mile by Zip Code, 2020 ACS 5-Year Estimates

#### 4.17.4 Population Below Poverty Line per Square Mile

Food insecurity is a major concern for populations living below the poverty line. For populations living in poverty-stricken areas, this can result in malnutrition, poor health, and reduced quality of life. In such areas, there may be limited access to affordable, nutritious food options, and transportation to grocery stores or supermarkets can also be a challenge. This can result in people resorting to low-nutrient, unhealthy food options that are more readily available and cheaper. Figure 4.27 shows population below poverty line per square mile by zip code level.



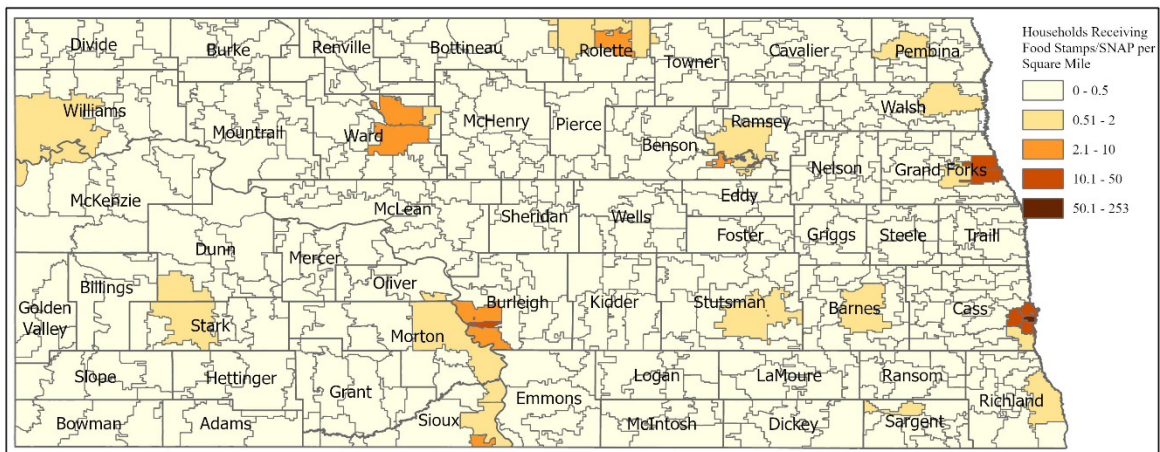


**Figure 4.27** Population Below Poverty Line per Square Mile by Zip Code, 2020 ACS 5-Year Estimates

#### 4.17.5 Households Receiving Food Stamps/SNAP per Square Mile

Households receiving Food Stamps/SNAP per square mile is a statistical measure that shows the concentration of households receiving food assistance in a given geographic area. This measurement provides a way to visualize the distribution of food insecurity and the demand for support from the Supplemental Nutrition Assistance Program (SNAP), also known as food stamps. This metric can be useful for understanding the socio-economic conditions of communities and for planning programs and services that address food insecurity. Note that this measure does not take into account the total number of households in a given area, and a higher concentration of households receiving food stamps in a small area does not necessarily indicate a higher overall rate of food insecurity in the larger surrounding area. Nevertheless, it is a useful tool for evaluating the need for food assistance and ensuring that support is available to those who need it most.

Figure 4.28 illustrates the density of households receiving food stamps, also known as SNAP benefits, on a per square mile basis. The map highlights that urban areas have a higher concentration of SNAP recipients. It also shows a substantial number of recipients in regions with larger Native American populations. Rural counties, particularly Burleigh and Ward, are also shown to have a considerable number of households that rely on SNAP benefits.

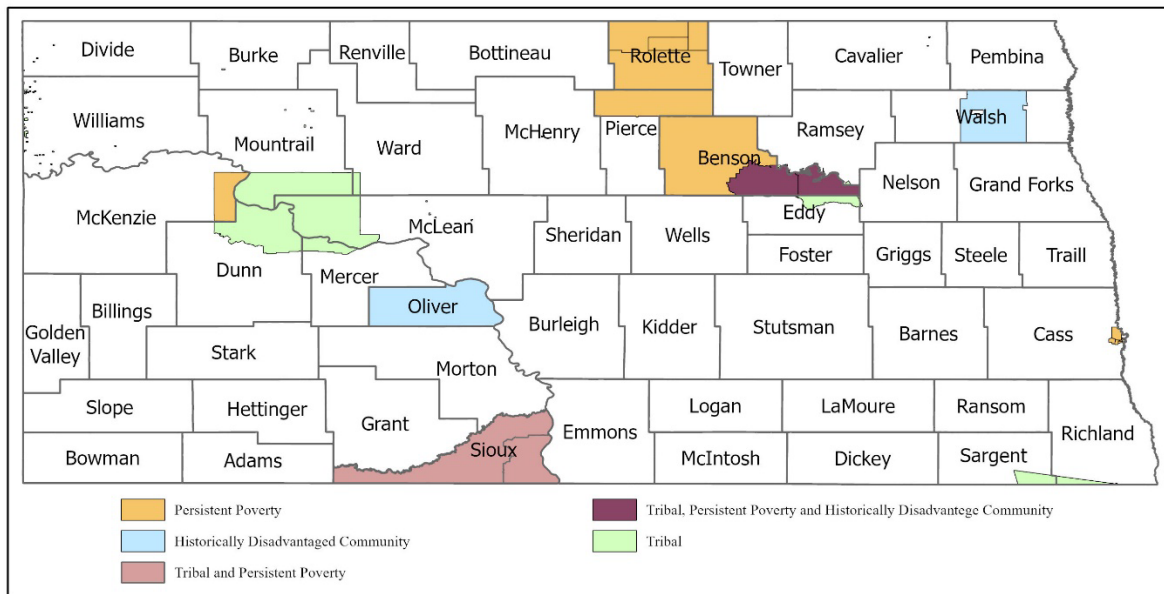


**Figure 4.28** Households Receiving Food Stamps/SNAP per Square Mile by Zip Code, 2020 ACS 5-Year Estimates

#### 4.18 Persistent Poverty and Historically Disadvantaged Community

Historically disadvantaged communities are groups of people who have faced systematic and structural barriers that have prevented them from accessing the same opportunities and resources as the rest of society (USDOT 2023). Persistent poverty refers to the ongoing experience of living below the poverty line for an extended period of time. In many cases, persistent poverty is experienced by individuals and families who belong to historically disadvantaged communities, such as ethnic and racial minorities, indigenous peoples, and those who live in geographically isolated or economically marginalized areas. Persistent poverty can have a profound impact on individuals, families, and entire communities, leading to poor health outcomes, limited educational opportunities, and reduced access to basic necessities like food, housing, and healthcare (Farrigan 2022).

Figure 4.29 shows areas of persistent poverty and tribal and historically disadvantaged communities in North Dakota. Persistent poverty is an ongoing issue in several North Dakota counties, including Benson, Eddy, McKenzie, Pierce, Ramsey, Rolette, and Sioux. Many of these areas are rural and sparsely populated, with limited access to economic opportunities and resources. The map suggests a correlation where increased levels of persistent poverty are associated with a higher presence of minority populations in these remote and isolated locations. The four counties of Benson, Oliver, Ramsey, and Walsh in North Dakota have a history of disadvantaged communities, particularly among indigenous populations. These counties are home to several Native American reservations, including the Spirit Lake Reservation, the Standing Rock Reservation, and the Turtle Mountain Band of Chippewa Indians Reservation. These reservations have faced numerous challenges, including poverty, limited access to healthcare and education, and high rates of unemployment.

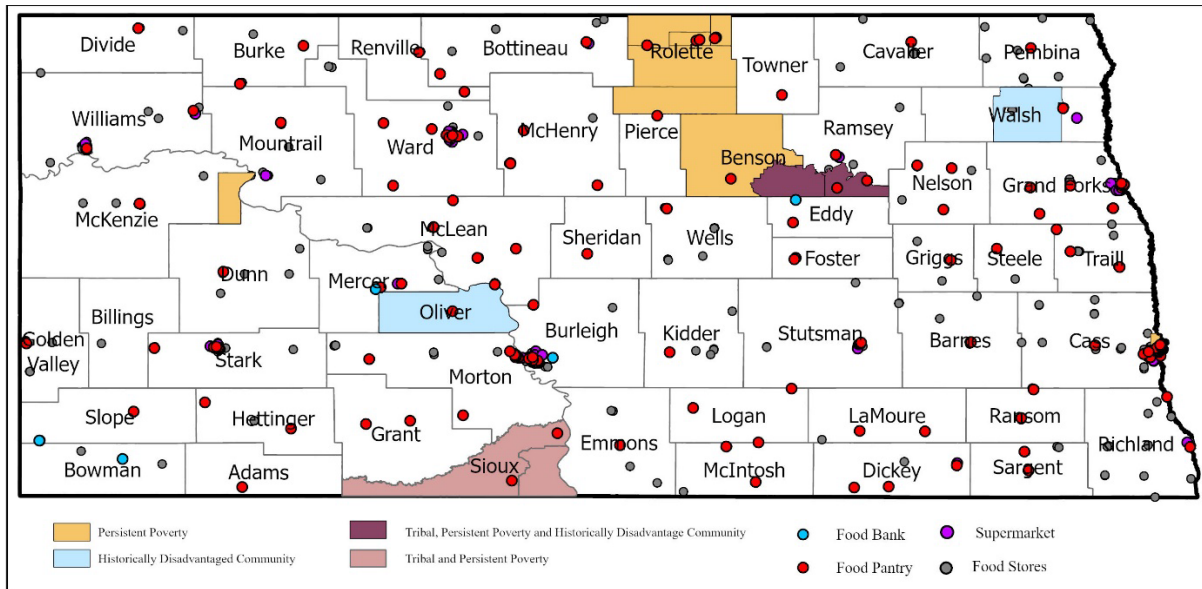


**Figure 4.29** Persistent Poverty, Tribal and Historically Disadvantaged Community

Source: U.S. Department of Transportation’s RAISE Mapping Tool at: <https://maps.dot.gov/BTS/GrantProjectLocationVerification/>

#### 4.19 Persistent Poverty and Historically Disadvantaged Communities with the Locations of Food Banks, Food Pantries, and Supermarkets

Figure 4.30 illustrates the distribution of areas of persistent poverty and tribal and historically disadvantaged communities, along with the placement of food banks, food pantries, supermarkets, and food stores. Notably, the figure underscores the absence of supermarkets and food stores within the areas designated as persistent poverty and historically disadvantaged communities, signifying a concerning lack of access to essential food resources in these regions.



**Figure 4.30** Areas of Persistent Poverty and Tribal and Historically Disadvantaged Community with the Locations of Food Banks, Food Pantries, Supermarkets, and Food Stores

Source: U.S. Department of Transportation’s RAISE Mapping Tool at: <https://maps.dot.gov/BTS/GrantProjectLocationVerification/>

#### 4.20 Demographic and Geographic Characteristics

A comparison of key demographic and economic indicators from 2020 between North Dakota and the United States reveals notable differences that are relevant in assessing food insecurity. In terms of median household income, North Dakota reports a lower figure of \$61,197 compared to the national median of \$67,521. Family poverty rates in North Dakota stand at 11.6%, slightly higher than the national average of 10.5%. Individual poverty rates in the state are 14.1%, again higher than the national rate of 11.4%. The percentage of the population under 18 years old in North Dakota is 24.3%, slightly higher than the national average of 22.7%. Minority representation in the state is 14.8%, significantly lower than the national average of 37.8%. In terms of education, North Dakota reports a higher percentage of individuals who have completed high school or higher at 91.7%, compared to the national average of 88.6%. The rural population in North Dakota stands at 56.7%, notably higher than the national average of 19.3%. Mean travel time to work in North Dakota is 21.1 minutes, lower than the national average of 26.3 minutes, and a smaller percentage of people work outside the county in North Dakota (7.5%) compared to the national figure (15.8%). These disparities in demographic and economic indicators can be important factors to consider in measuring food insecurity in North Dakota.

**Table 4.2** Demographic and Geographic Characteristics of North Dakota and Compared to National Averages, 2020 ACS 5-Year Estimates

<b>Geographic Information</b>		
	<b>North Dakota</b>	United States
Census Tracts	<b>205</b>	72,633
Land Area (Sq. Mi)	<b>70,698</b>	3,797,000
Population density (Sq. Mi)	<b>11</b>	93
<b>Demographic Information</b>		
Population	<b>779,261</b>	331,449,281
Households	<b>344,433</b>	129,323,340
Median Household Income (\$)	<b>61,197</b>	67,521
Family Poverty (%)	<b>11.6</b>	10.5
Individual Poverty (%)	<b>14.1</b>	11.4
Population under 18 Years (%)	<b>24.3</b>	22.7
Minority (%)	<b>14.8</b>	37.8
High School Graduates or Higher (%)	<b>91.7</b>	88.6
Rural Population (%)	<b>56.7</b>	19.3
Mean Travel Time to work (min)	<b>21.1</b>	26.3
Worked Outside County (%)	<b>7.5</b>	15.8
<b>Store Count</b>		
Supermarkets	<b>55</b>	
Grocery Stores	<b>221</b>	
Convenience Stores	<b>115</b>	
Total Stores	<b>391</b>	
<b>Store Distribution (per 100 square miles)</b>		
Supermarkets	<b>0.08</b>	
Grocery Stores	<b>0.31</b>	
Convenience Stores	<b>0.16</b>	
Total Stores	<b>0.55</b>	
<b>Store Distribution (per 10,000 residents)</b>		
Supermarkets	<b>0.71</b>	
Grocery Stores	<b>2.84</b>	
Convenience Stores	<b>1.48</b>	
Total Stores	<b>5.02</b>	
<b>Food Distribution Centers</b>		
Food Bank	<b>7</b>	
Food Pantry	<b>150</b>	
Meal Site	<b>6</b>	
Parking Lot	<b>5</b>	
Total Food Distribution Centers	<b>168</b>	
<b>Food Distribution Centers (per 100 square miles)</b>		
Food Bank	<b>0.01</b>	
Food Pantry	<b>0.212</b>	
Meal Site	<b>0.008</b>	
Parking Lot	<b>0.007</b>	
Total Food Distribution Centers	<b>0.238</b>	
<b>Food Distribution Centers (per 10,000 residents)</b>		
Food Bank	<b>0.090</b>	
Food Pantry	<b>1.925</b>	
Meal Site	<b>0.077</b>	
Parking Lot	<b>0.064</b>	
Total Food Distribution Centers	<b>2.156</b>	

## 4.21 Summary

Chapter 4 provides an in-depth exploration of North Dakota's demographic landscape, shedding light on critical factors that influence public transit planning and food insecurity in the state. Demographics, such as age, disabilities, income, and vehicle access, play a vital role in determining the use of transit services, and these factors are closely linked to population density. Understanding these demographics is crucial for effective transit planning.

The chapter begins by discussing the demographic profile of North Dakota, emphasizing the importance of demographic distribution. It highlights that population groups like age, disabilities, income, and vehicle access significantly affect the use of transit services. Certain population groups are more likely to use these services, often based on population density.

The chapter explores county-level population estimates for North Dakota. It underscores the state's low population density, with urban areas like Cass County being the most populous, while rural counties have lower populations. This demographic distribution impacts transit planning and food access. The study then delves into population growth estimates in North Dakota. It points out that population growth has been relatively slow in recent decades but highlights significant growth in the northwest due to the energy industry. Rural areas have experienced population decline, raising important considerations for food insecurity. Projected population growth estimates for 2032 are discussed, with potential increases in specific regions dependent on the future of the oil industry. These projections offer insights into future population trends in North Dakota.

The chapter also addresses the distribution of the elderly population in North Dakota. While urban areas have higher absolute numbers of elderly residents, the proportion of elderly individuals is higher in various rural regions, providing crucial insights for food insecurity considerations. Additionally, it examines county-level tribal population estimates, focusing on the American Indian population. These demographics vary across different counties, with varying concentrations in different areas.

The population with disabilities is a significant point of interest, with higher susceptibility to food insecurity. The chapter highlights the challenges faced by this demographic.

Unemployment rates are examined in detail, with sections on both overall unemployment rates and those below or at the poverty level. These figures play a pivotal role in assessing food insecurity and transportation options, particularly in rural areas.

The availability of vehicles per household is discussed, emphasizing its importance relative to food security. The chapter offers insights into the distribution of households with varying numbers of vehicles. Moreover, the chapter addresses areas characterized by persistent poverty, often coinciding with historically disadvantaged communities, such as Native American reservations. These areas face various challenges, including limited access to healthcare and high unemployment rates.

The chapter concludes by comparing key demographic and economic indicators between North Dakota and the United States. It underscores the disparities that should be considered when evaluating food insecurity in North Dakota. These demographic insights are crucial for comprehending the challenges of food insecurity and effective public transit planning in the state.

## 5. FOOD INSECURITY MEASURE AND PUBLIC TRANSPORTATION OPTIONS

Food insecurity is a significant issue, especially in rural areas where access to healthy food options can be limited. The availability of public transportation options can greatly impact the food insecurity in these areas. In rural areas, where the population is widely dispersed, the reliance on personal vehicles is higher and public transportation options are often limited. In such areas, access to grocery stores and supermarkets, which sell fresh and healthy food options, becomes a challenge for households without vehicles. This exacerbates the problem of food insecurity and contributes to health issues resulting from a lack of access to nutritious food. The availability of affordable and accessible public transportation options in rural areas can help address this issue by providing residents with greater access to healthy food options and reducing their dependence on personal vehicles.

This chapter delves into the critical aspects of food insecurity measures and public transportation options in North Dakota to provide a comprehensive understanding of the current landscape of food insecurity and the availability of public transportation services in the state.

The chapter begins by presenting informative maps that illustrate the distribution of households receiving food stamps/SNAP, including the prevalence of food insecurity and child food insecurity populations across North Dakota. These maps offer valuable insights into the areas that are most affected by food insecurity.

We also explore the geographic coverage of transit services, evaluating the availability of public transportation by examining the number of service days per week and hours per day. By analyzing this data, we gain a deeper understanding of the areas that are adequately served by public transportation and those that require further attention and improvement.

To provide a comprehensive picture of the food landscape in North Dakota, we collected data on the number and types of food retailers, as well as the presence of food banks and food pantries in each county. This information allows us to assess the accessibility of food resources in different areas and identify potential gaps or limitations.

The chapter also features a map overlaying the locations of food stores, food banks, and food pantries onto the layout of transit service in each county. This visualization helps identify the areas where access to healthy food options aligns with robust transportation services, as well as areas where there may be disparities or challenges in reaching essential food resources.

Additionally, we present a map depicting low access to healthy food at the county level in North Dakota. This map offers a comprehensive overview of areas with limited access to nutritious food options, providing valuable insights for policymakers and stakeholders to focus their efforts on addressing food insecurity in these regions.

Finally, we explore the connection between low-income and low-access areas, considering indicators such as distance to stores, the number of stores in an area, family income, and the availability of public transportation. By mapping these indicators, we gain a better understanding of the complex interplay between socioeconomic factors and food access, guiding us in developing effective strategies and interventions. Overall, chapter 5 serves as a crucial foundation for addressing food insecurity in North Dakota, combining comprehensive data analysis with insightful visual representations.

### 5.1 Household Receives Food Stamps/SNAP

The United States Department of Agriculture administers the Supplemental Nutrition Assistance Program (SNAP). This program, previously known as food stamps, is designed to help guarantee low-income households and individuals access to a basic level of nutrition (LiveStories 2023). In North Dakota food stamps/SNAP program provides support to low-income households in need of assistance purchasing food. By providing financial assistance for food purchases, SNAP helps to reduce food insecurity and improve the overall well-being of North Dakota residents.

In 2020, approximately 6.6% of North Dakota households participated in the SNAP program. The visual data from Figure 5.1 depicts the actual count of households per county that benefit from SNAP, with the highest number recorded in Cass County. Billings and Slope counties report the fewest SNAP recipients, possibly because of their smaller populations.

Figure 5.2 complements this by illustrating the percentage of households within each county that rely on SNAP benefits, offering insight into the relative scale of assistance. Rolette, Sioux, and Benson counties have the highest percentages, at 25.4%, 24.2%, and 20.7% respectively, highlighting a significant reliance on food assistance programs, which may correlate with higher levels of poverty within these counties.

The data collectively point to a greater prevalence of SNAP usage in certain counties where economic challenges are more acute and a larger share of the population lives below the poverty threshold. This suggests that while SNAP use is spread throughout North Dakota, it is particularly vital in areas with pronounced economic disadvantages.

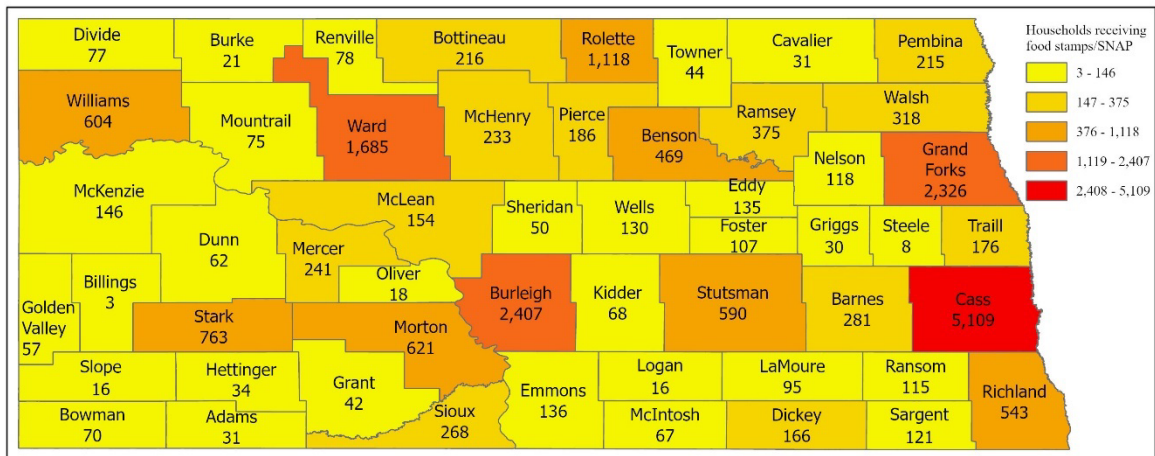
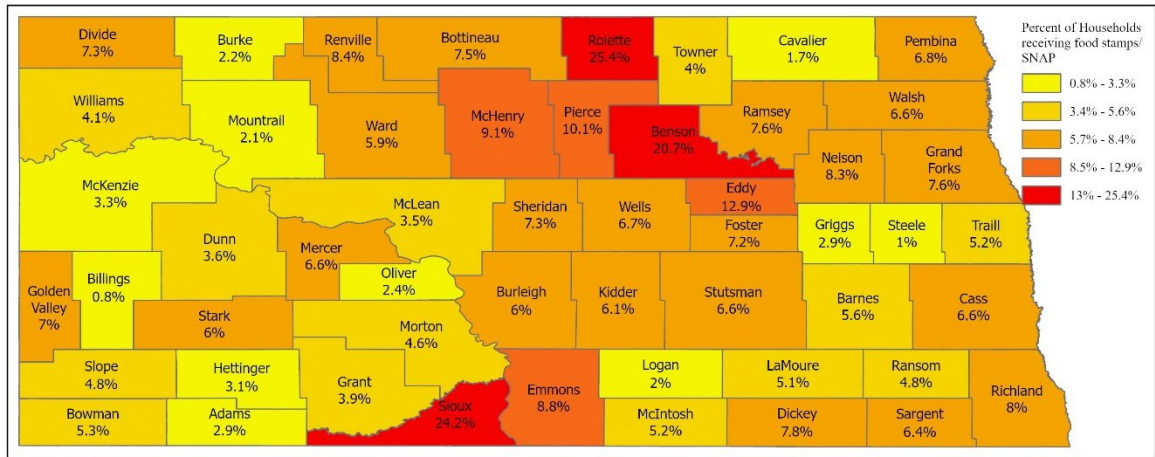


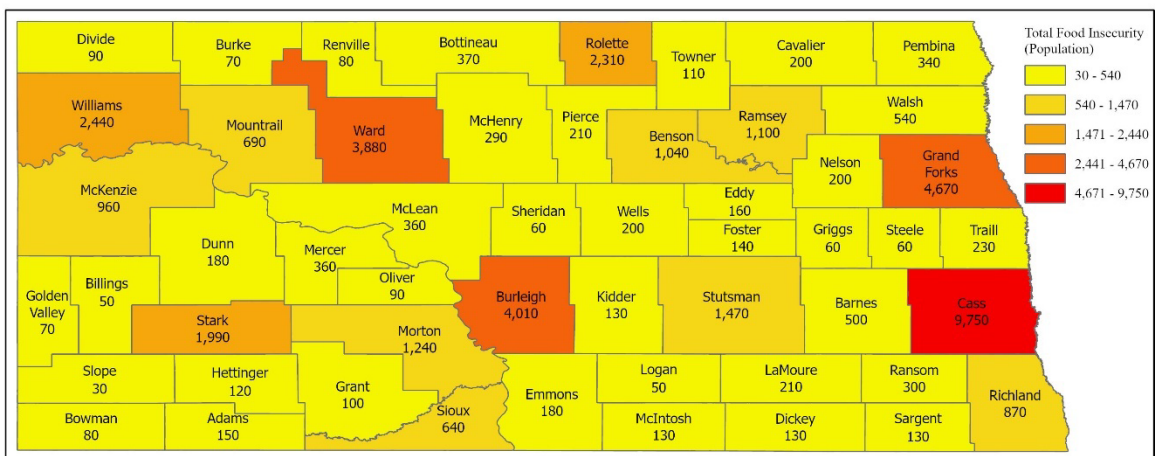
Figure 5.1 Households Receiving Food Stamps/SNAP Benefits, 2020 ACS 5-Year Estimates



**Figure 5.2** Percent of Households Receiving Food Stamps/SNAP Benefits, 2020 ACS 5-Year Estimates

### 5.2 Food Insecurity Population in North Dakota

The total food insecurity population in North Dakota refers to the number of individuals and households in the state who lack consistent access to sufficient and nutritious food. Food insecurity is a major issue in North Dakota, affecting thousands of residents and leaving them vulnerable to hunger and malnutrition. The causes of food insecurity in North Dakota can be attributed to a variety of factors, including poverty, unemployment, and lack of access to healthy food options in certain areas. Despite efforts to address the issue through programs such as SNAP and food banks, the total food insecurity population in North Dakota remains high. There are 43,820 food insecure people in North Dakota which equates to a 5.5% food insecurity rate in 2020, according to data from the Map the Meal Gap from Feeding America. Figure 5.3 shows the number of food insecure, and Figure 5.4 shows the overall food insecurity rate in 2020 at the county level. Counties with higher food insecurity rates tend to have higher percents of Native American populations. The highest percent of population who are food insecure live in Rolette county (16.0%) followed by Benson (15.1%), and Sioux (14.8%) counties. A high number of Native American populations live in these counties. The counties with higher food insecurity rates also tend to have lower vehicle ownership rates.



**Figure 5.3** Total Food Insecurity (Population) in 2020, Map the Meal Gap 2020, Feeding America



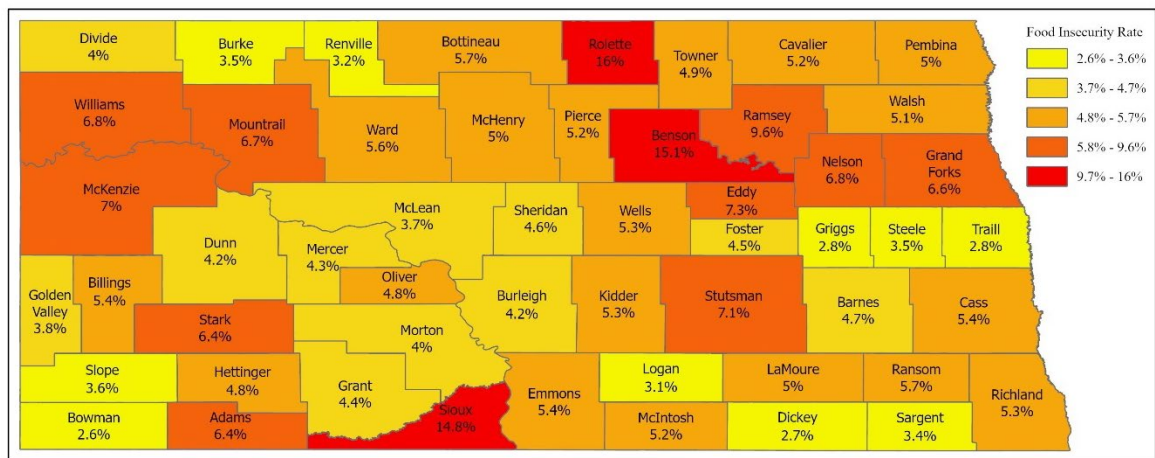


Figure 5.4 Food Insecurity Rate in North Dakota, Map the Meal Gap 2020, Feeding America

### 5.3 Child Food Insecurity in North Dakota

Food insecure children are those children living in households experiencing food insecurity. Children who experience food insecurity are at higher risk for malnutrition, poor health outcomes, and developmental delays. In North Dakota, 18,210 children experienced food insecurity in 2020. Figure 5.5 shows the number of children experiencing food insecurity, and Figure 5.6 shows the percentage of children who are food insecure by county. Child food insecurity rates are higher in Native American populated counties. Rolette County has the highest percent of children experienced food insecurity (26.7%). The other two tribal counties, Benson (24.2%) and Sioux (20.9%), also have higher rates of child food insecurity.

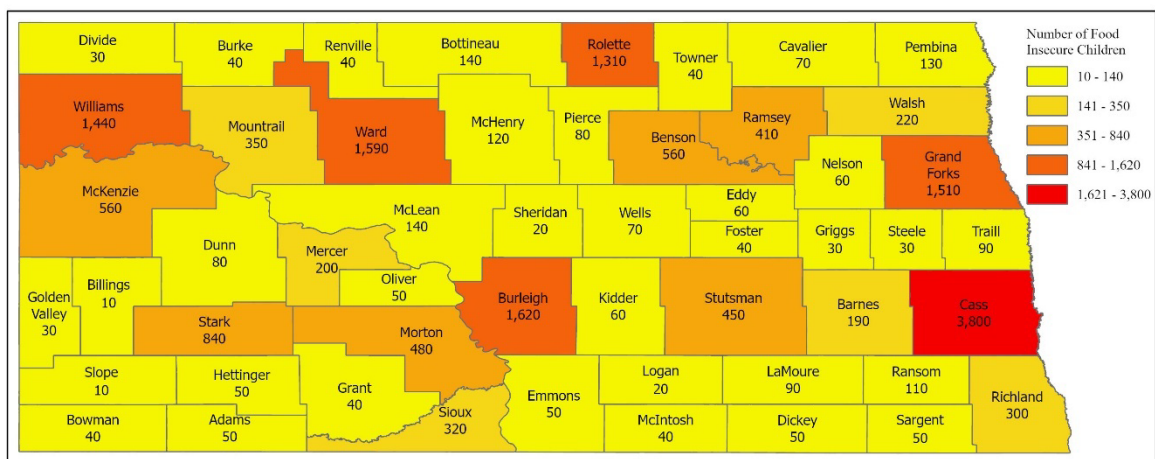
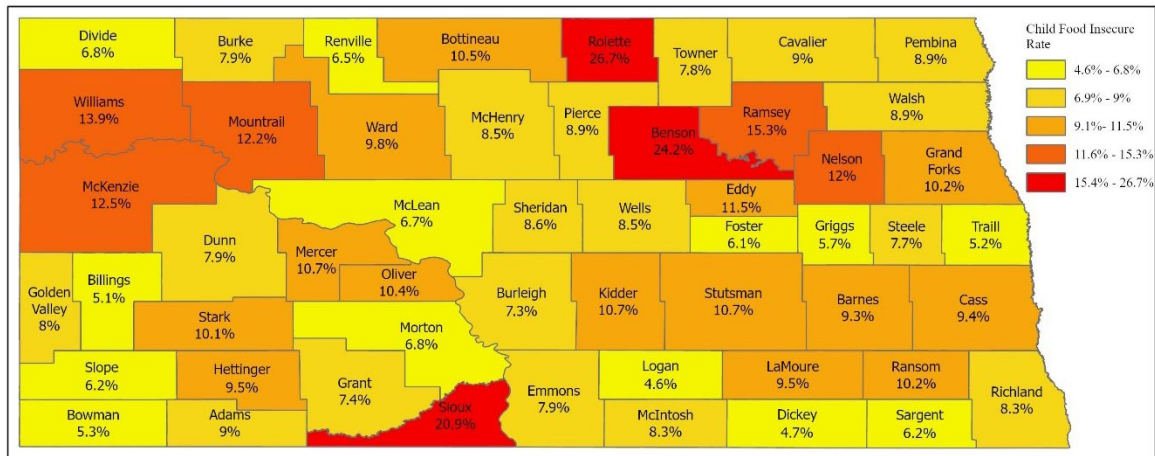


Figure 5.5 Number of Children Food Insecurity in North Dakota, Map the Meal Gap 2020, Feeding America

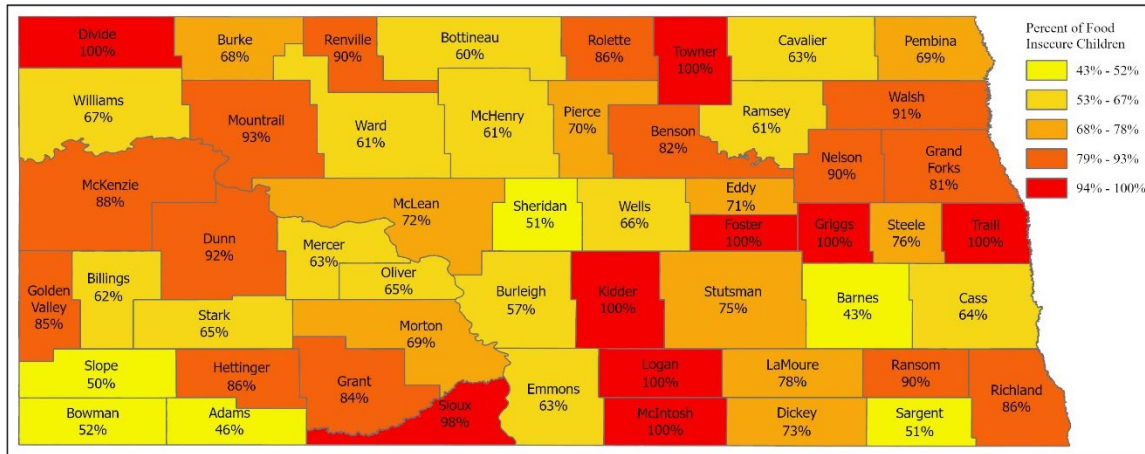


**Figure 5.6** Child Food Insecurity Rate in North Dakota, Map the Meal Gap 2020, Feeding America

### 5.3.1 Percent of Children in Households with Incomes below 185 Federal Poverty Line

The percentage of children in households with income below 185% of the federal poverty line is a measure of child poverty in the United States. The federal poverty line is the income level determined by the government that is necessary to meet basic needs. When a household's income falls below this threshold, members of the household are considered to be living in poverty. The 185% threshold is used as a measure of near-poverty, as households with income slightly above the poverty line may still face significant financial challenges. The percentage of children in households with income below 185% of the federal poverty line is an important indicator of the well-being of children in the United States, as poverty can have significant negative impacts on their health, education, and future opportunities.

Child hunger is an alarming issue that is present in all the counties of North Dakota, highlighting a significant challenge that requires urgent attention and resolution. However, the Feeding America's Map the Meal Gap study indicates that child food insecurity differs from county to county across the state. The data in Figure 5.7 reveals that in counties such as Kidder, McIntosh, Towner, Divide, Foster, Griggs, Traill, and Logan, 100% of children live in households with an income below 185% of the Federal poverty line. Additionally, Sioux county has 98% of children in households with income below the same threshold. These findings indicate that a large number of children in these counties may not have access to enough healthy food to maintain good health and wellbeing. This is a pressing issue that requires targeted interventions to address the underlying causes of child hunger, such as poverty, inadequate income, and limited access to nutritious food. This study underscores the urgency of taking immediate action to address this problem and improve the lives of vulnerable children and families across North Dakota.



**Figure 5.7** Percent of Food Insecure Children in Household with Household Incomes below 185 Federal Poverty Line, Map the Meal Gap 2020, Feeding America

### 5.3.2 Percent of Children in Households with Incomes above 185 Federal Poverty Line

The percentage of children living in households with incomes above 185% of the Federal poverty line are likely not income-eligible for federal nutrition assistance. Although these households have incomes above the poverty line, some families may still find it difficult to afford adequate and nutritious food. This situation can arise from various factors, including limited availability of healthy food in their communities or other financial constraints. Therefore, it is crucial to monitor the percentage of food-insecure children in households with incomes above 185% of the Federal poverty line. This measure can help identify areas where targeted interventions are necessary to improve access to healthy and affordable food for all children, irrespective of their household income. Improving food security for children in the United States can enhance their overall health, growth, and educational outcomes.

## 5.4 Ranking North Dakota Counties by Food Insecurity

Ranking counties by food insecurity can provide valuable information about which areas may be most in need of interventions to address this issue. By identifying which counties have the highest rates of food insecurity, policymakers, community organizations, and other stakeholders can focus their efforts on these areas to ensure that all residents have access to nutritious and affordable food. This may include initiatives such as school meal programs, food assistance programs, and public transportation access, which can help ensure that all food insecurity population have access to nutritious and affordable food.

Recent data shows that North Dakota has a food insecurity rate of 4.8% and a child food insecurity rate of 8.1%, both below the national average food insecurity rate of 11.8% and child food insecurity rate of 16.1% (Feeding America 2023b). However, there is significant variation in child food insecurity rates across different counties in the state. To rank counties by child food insecurity rate, Table 4.1 uses data from Feeding America’s 2020 report. The child food insecurity rate in counties ranges from 4.6% to 26.7%, while overall food insecurity rates range from 2.6% to 16%. Rolette, a Native American-populated county, has the highest food insecurity rate of 16.0%, which is 4.2% above the national average. Furthermore, Rolette has a child food insecurity rate of 26.7%, 10.6% above the national average. Benson and Sioux counties, also Native American-populated, ranked second and third, respectively, with child food insecurity rates of 24.2% and 20.9%. These counties have overall food insecurity rates and child food insecurity rates that are above the national average. Ramsey County, another Native American-populated county, ranked fourth with a child food insecurity rate of 15.3%.

**Table 5.1** Ranking Counties in North Dakota by Food Insecurity and Percentage Points Higher or Lower than National Average

Rank	County	Food Insecurity			Child Food Insecurity			Cost Per Meal	Weighted Annual Food Budget Shortfall
		Overall Rate	# of Food Insecure Persons Overall	Compare with National Average	Food Insecurity Rate	# of Food Insecure Children	Compare with National Average		
1	Rolette	16.0%	2,310	4.2%	26.7%	1,310	10.6%	\$3.32	\$1,235,000
2	Benson	15.1%	1,040	3.3%	24.2%	560	8.1%	\$3.16	\$529,000
3	Sioux	14.8%	640	3.0%	20.9%	320	4.8%	\$3.30	\$340,000
4	Ramsey	9.6%	1,100	-2.2%	15.3%	410	-0.8%	\$3.19	\$566,000
5	Williams	6.8%	2,440	-5.0%	13.9%	1,440	-2.2%	\$3.46	\$1,358,000
6	McKenzie	7.0%	960	-4.8%	12.5%	560	-3.6%	\$3.46	\$534,000
7	Mountrail	6.7%	690	-5.1%	12.2%	350	-3.9%	\$3.32	\$369,000
8	Nelson	6.8%	200	-5.0%	12.0%	60	-4.1%	\$3.19	\$103,000
9	Eddy	7.3%	160	-4.5%	11.5%	60	-4.6%	\$3.16	\$81,000
10	Stutsman	7.1%	1,470	-4.7%	10.7%	450	-5.4%	\$3.16	\$748,000

Rank	County	Food Insecurity			Child Food Insecurity			Cost Per Meal	Weighted Annual Food Budget Shortfall
		Overall Rate	# of Food Insecure Persons Overall	Compare with National Average	Food Insecurity Rate	# of Food Insecure Children	Compare with National Average		
11	Mercer	4.3%	360	-7.5%	10.7%	200	-5.4%	\$3.18	\$184,000
12	Kidder	5.3%	130	-6.5%	10.7%	60	-5.4%	\$3.30	\$69,000
13	Bottineau	5.7%	370	-6.1%	10.5%	140	-5.6%	\$3.32	\$198,000
14	Oliver	4.8%	90	-7.0%	10.4%	50	-5.7%	\$3.18	\$46,000
15	Ransom	5.7%	300	-6.1%	10.2%	110	-5.9%	\$3.38	\$163,000
16	Grand Forks	6.6%	4,670	-5.2%	10.2%	1,510	-5.9%	\$3.19	\$2,402,000
17	Stark	6.4%	1,990	-5.4%	10.1%	840	-6.0%	\$3.36	\$1,078,000
18	Ward	5.6%	3,880	-6.2%	9.8%	1,590	-6.3%	\$3.32	\$2,074,000
19	LaMoure	5.0%	210	-6.8%	9.5%	90	-6.6%	\$3.16	\$107,000
20	Hettinger	4.8%	120	-7.0%	9.5%	50	-6.6%	\$3.36	\$65,000
21	Cass	5.4%	9,750	-6.4%	9.4%	3,800	-6.7%	\$3.38	\$5,309,000
22	Barnes	4.7%	500	-7.1%	9.3%	190	-6.8%	\$3.16	\$254,000
23	Cavalier	5.2%	200	-6.6%	9.0%	70	-7.1%	\$3.19	\$103,000
24	Adams	6.4%	150	-5.4%	9.0%	50	-7.1%	\$3.36	\$81,000
25	Walsh	5.1%	540	-6.7%	8.9%	220	-7.2%	\$3.19	\$278,000
26	Pierce	5.2%	210	-6.6%	8.9%	80	-7.2%	\$3.32	\$112,000
27	Pembina	5.0%	340	-6.8%	8.9%	130	-7.2%	\$3.19	\$175,000
28	Sheridan	4.6%	60	-7.2%	8.6%	20	-7.5%	\$3.30	\$32,000
29	Wells	5.3%	200	-6.5%	8.5%	70	-7.6%	\$3.30	\$106,000
30	McHenry	5.0%	290	-6.8%	8.5%	120	-7.6%	\$3.32	\$155,000
31	Richland	5.3%	870	-6.5%	8.3%	300	-7.8%	\$3.43	\$480,000
32	McIntosh	5.2%	130	-6.6%	8.3%	40	-7.8%	\$3.16	\$66,000
33	Golden Valley	3.8%	70	-8.0%	8.0%	30	-8.1%	\$3.36	\$38,000
34	Emmons	5.4%	180	-6.4%	7.9%	50	-8.2%	\$3.30	\$96,000
35	Dunn	4.2%	180	-7.6%	7.9%	80	-8.2%	\$3.36	\$97,000
36	Burke	3.5%	70	-8.3%	7.9%	40	-8.2%	\$3.46	\$39,000

Rank	County	Food Insecurity			Child Food Insecurity			Cost Per Meal	Weighted Annual Food Budget Shortfall
		Overall Rate	# of Food Insecure Persons Overall	Compare with National Average	Food Insecurity Rate	# of Food Insecure Children	Compare with National Average		
37	Towner	4.9%	110	-6.9%	7.8%	40	-8.3%	\$3.32	\$59,000
38	Steele	3.5%	60	-8.3%	7.7%	30	-8.4%	\$3.19	\$31,000
39	Grant	4.4%	100	-7.4%	7.4%	40	-8.7%	\$3.18	\$51,000
40	Burleigh	4.2%	4,010	-7.6%	7.3%	1,620	-8.8%	\$3.30	\$2,128,000
41	Morton	4.0%	1,240	-7.8%	6.8%	480	-9.3%	\$3.18	\$635,000
42	Divide	4.0%	90	-7.8%	6.8%	30	-9.3%	\$3.46	\$50,000
43	McLean	3.7%	360	-8.1%	6.7%	140	-9.4%	\$3.18	\$184,000
44	Renville	3.2%	80	-8.6%	6.5%	40	-9.6%	\$3.32	\$43,000
45	Slope	3.6%	30	-8.2%	6.2%	10	-9.9%	\$3.36	\$16,000
46	Sargent	3.4%	130	-8.4%	6.2%	50	-9.9%	\$3.38	\$71,000
47	Foster	4.5%	140	-7.3%	6.1%	40	-10.0%	\$3.16	\$71,000
48	Griggs	2.8%	60	-9.0%	5.7%	30	-10.4%	\$3.16	\$31,000
49	Bowman	2.6%	80	-9.2%	5.3%	40	-10.8%	\$3.36	\$43,000
50	Traill	2.8%	230	-9.0%	5.2%	90	-10.9%	\$3.19	\$118,000
51	Billings	5.4%	50	-6.4%	5.1%	10	-11.0%	\$3.36	\$27,000
52	Dickey	2.7%	130	-9.1%	4.7%	50	-11.4%	\$3.19	\$67,000
53	Logan	3.1%	50	-8.7%	4.6%	20	-11.5%	\$3.16	\$25,000
Total	North Dakota	5.5%	43,820	-6.3%	9.5%	18,210	-6.6	\$3.28	\$23,320,000

Source: Map the Meal Gap 2020, Feeding America

According to Feeding America's Map the Meal Gap 2020 data, North Dakota has a total of 43,820 individuals experiencing food insecurity, representing approximately 5.5% of the state's population. Among these, there are 18,210 children who are food insecure. The average meal cost in North Dakota is reported to be \$3.28. Based on this, the state's annual food budget shortfall amounts to \$23,320,000, indicating the financial gap between what is needed for individuals and families to access adequate and nutritious food and what is currently available. These findings underscore the significance of addressing food insecurity issues in North Dakota, particularly among children, and highlight the need for targeted interventions and programs to ensure that all residents have access to sufficient and nutritious food.

## 5.5 Food Stores

Store types were categorized as supermarkets, grocery stores, convenience stores, or gas stations etc. Supermarkets are large self-service retail stores that specialize in selling a wide variety of food and household goods. Grocery stores are smaller retail stores that also specialize in selling food and household goods but may have a more limited selection and smaller footprint compared to supermarkets. Convenience stores are small retail stores that offer a limited selection of food and household items, with a focus on providing convenient access to items for customers on-the-go. They often have extended hours and are located in easily accessible areas such as gas stations or near public transportation. A gas station is a retail facility where customers can fill up their vehicles, as well as a small convenience store or attached retail store where customers can purchase snacks, drinks, and other items.

In this section, we collected data on the number and types of food retailers in each county in North Dakota. Our analysis identified four categories of food stores: grocery stores, convenience stores, gas stations, and supermarkets. As of 2022, North Dakota had 219 grocery stores, 217 gas stations, 122 convenience stores, and 55 supermarkets. We found that three rural counties have no food stores at all. Additionally, one county (Billings) had no grocery stores, and eight counties (Adams, Billings, Bottineau, Burke, Cavalier, Foster, Grant, and Sheridan) had no gas stations. Furthermore, fifteen counties (Adams, Benson, Burke, Eddy, Emmons, Golden Valley, Grant, Kidder, LaMoure, McHenry, Nelson, Pierce, Sheridan, Towner, and Wells) did not have any convenience stores. Lastly, we identified that eleven counties had at least one supermarket, while seven counties had more than one.

### 5.5.1 Number of Food Stores by County Level

According to the data presented in Figure 5.9, there are three rural counties, Oliver, Slope, and Sioux, that do not have any food retailers. Oliver county has a population of 788, while Slope County has a population of 1,962. Sioux County, which has a predominately Native American population, has a total population of 4,339, out of which 3,591 are Native Americans. Fifteen out of the 53 counties included in the study have between one and five food stores. These counties are rural and sparsely populated. Among all the counties, only Cass County has more than 50 food retail stores. The counties of Burleigh, Grand Forks, and Ward have between 26 and 50 food stores. Figure 5.10 displays the number of food stores by zip code level in each county. The data reveals that many rural areas across the state lack access to food stores, as depicted in the figure.

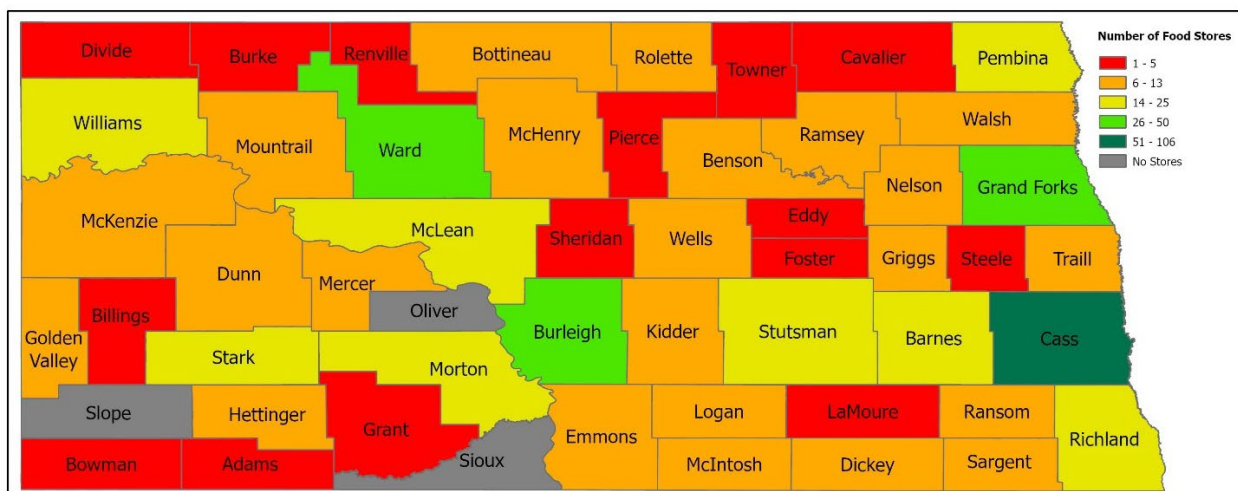
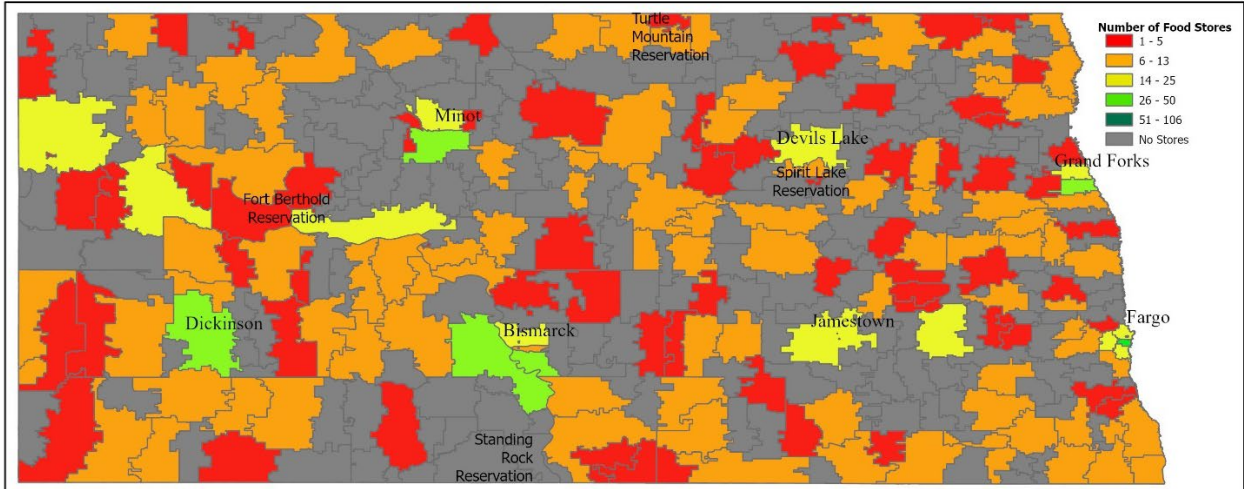


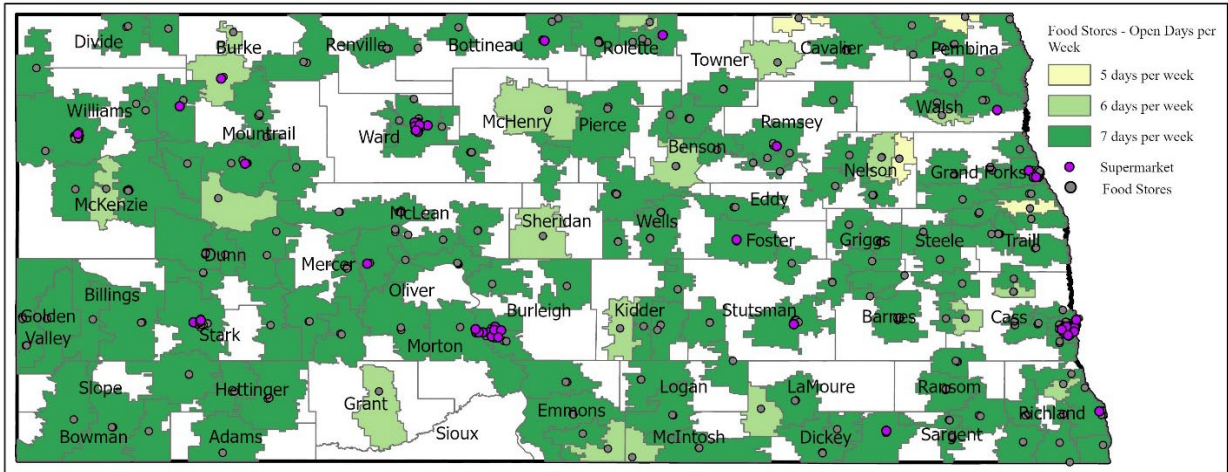
Figure 5.8 Number of Food Stores by County



**Figure 5.9** Number of Food Stores by Zip Code Level

5.5.2 Food Stores Open Days per Week by Zip Code Level in Each County

Food stores in North Dakota, such as supermarkets, grocery stores, and specialty food retailers, typically operate seven days a week. This level of service provides convenient access to healthy and nutritious food for residents. The days of the week that smaller, specialty food stores are open also vary, depending on the location and the demand for their services. Figure 5.11 shows the days per week that food stores are open by zip code level. Notably, in Sioux County, which has a significant Native American population, there is a complete absence of food retail stores, highlighting potential challenges in accessing essential groceries in this area.

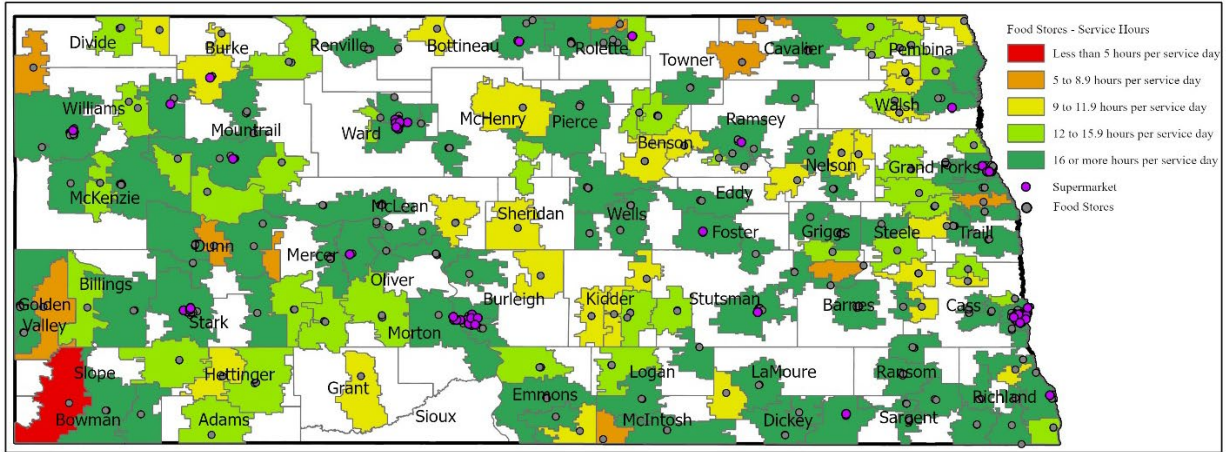


**Figure 5.10** Days per Week that Food Stores are Open Days by Zip Code Level

5.5.3 Food Stores Service Hours per Service Day by Zip Code Level in Each County

In North Dakota, the hours of operation for food stores such as supermarkets, grocery stores, and specialty food retailers vary, but most are open during regular business hours, typically from 9 a.m. to 9 p.m. on weekdays and 9 a.m. to 7 p.m. on weekends. However, some stores may operate extended hours, especially in busy locations, and smaller specialty food stores may have different hours. The specific hours of operation vary depending on the demand for services in a particular area. Figure 5.12 shows food stores service hours per service day by zip code level.

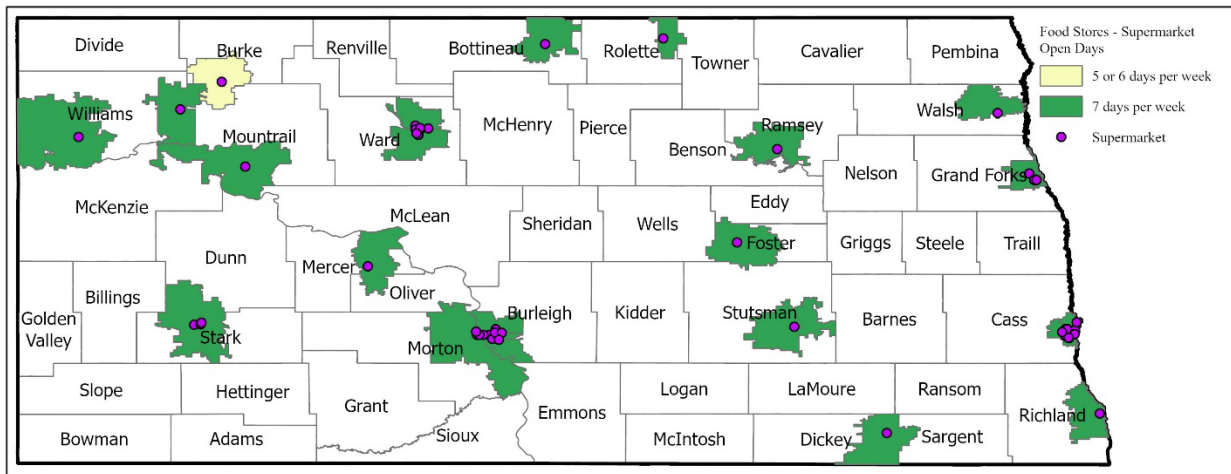




**Figure 5.11** Food Stores Service Hours per Service Day by Zip Code Level

### 5.5.4 Supermarket Open Days per Week by Zip Code Level in Each County

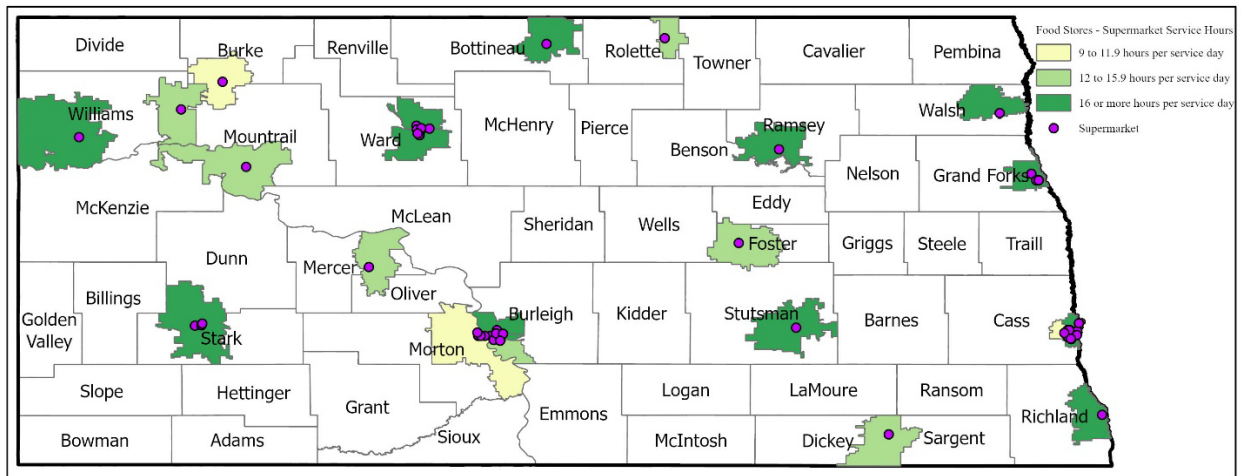
In North Dakota, supermarkets are typically open seven days a week, providing convenient access for customers to purchase groceries and household items. Despite being a large state in terms of area, North Dakota has a relatively small population, and this is reflected in the number of supermarkets available. In many rural areas, there may only be one or two supermarkets for the entire community, leading to limited choices for residents. In some cases, residents may have to travel a long distance to reach a supermarket, making grocery shopping a time-consuming and sometimes challenging task. Figure 5.13 shows days per week that supermarkets are open by zip code level.



**Figure 5.12** Days per Week that Supermarket are Open by Zip Code Level

### 5.5.5 Supermarket Open Hours per Service Day by Zip Code Level in Each County

The open hours of supermarkets in North Dakota vary by location, but most stores are open more than 16 hours per day. On weekdays, stores typically open early in the morning and close late at night, with some stores staying open 24 hours. On weekends, store hours may be extended to accommodate busy shopping times. Some supermarkets also have special hours for seniors or other groups, such as early-bird shoppers or late-night shoppers. Figure 5.14 shows the number of hours that supermarkets are open per service day by zip code level.



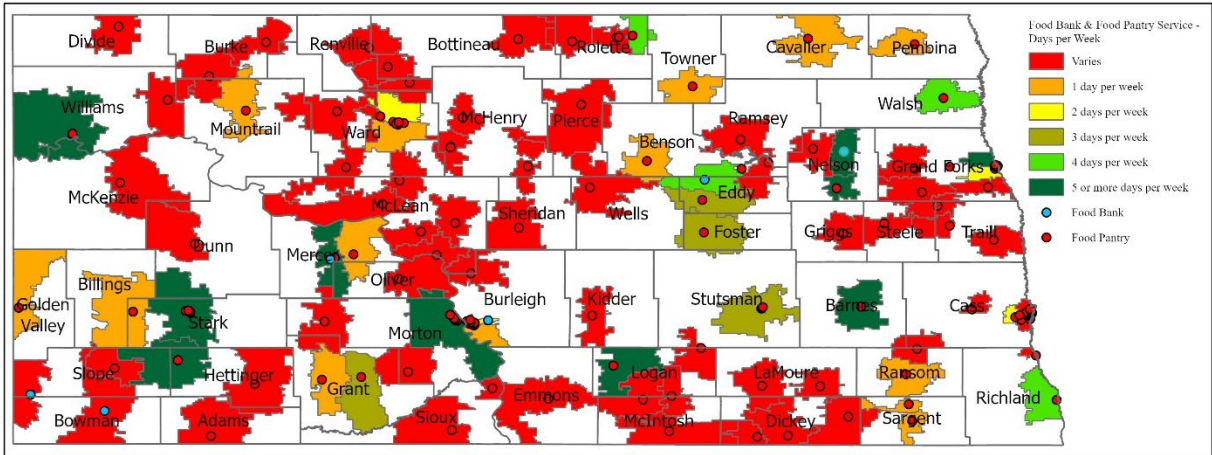
**Figure 5.13** Number of Hours Supermarkets are Open per Service Day by Zip Code Level

## 5.6 Food Bank and Food Pantry

Food banks and food pantries are both organizations that aim to alleviate hunger by distributing food to people in need. However, there are some key differences between the two. According to Feeding America, food banks are typically large-scale, centralized organizations that collect and distribute food to other charitable organizations or directly to people in need. Food banks often receive donations from grocery stores, manufacturers, and other food businesses. Food pantries are typically smaller, local organizations that distribute food directly to individuals and families in need. Food pantries often rely on donations from individuals, community organizations, and religious groups. Food banks and food pantries both play important roles in addressing food insecurity in the United States. According to Feeding America, one in nine Americans struggle with hunger, and food banks and pantries provide essential support to these individuals and families.

### 5.6.1 Food Bank and Food Pantry Service Days per Week by Zip Code in Each County

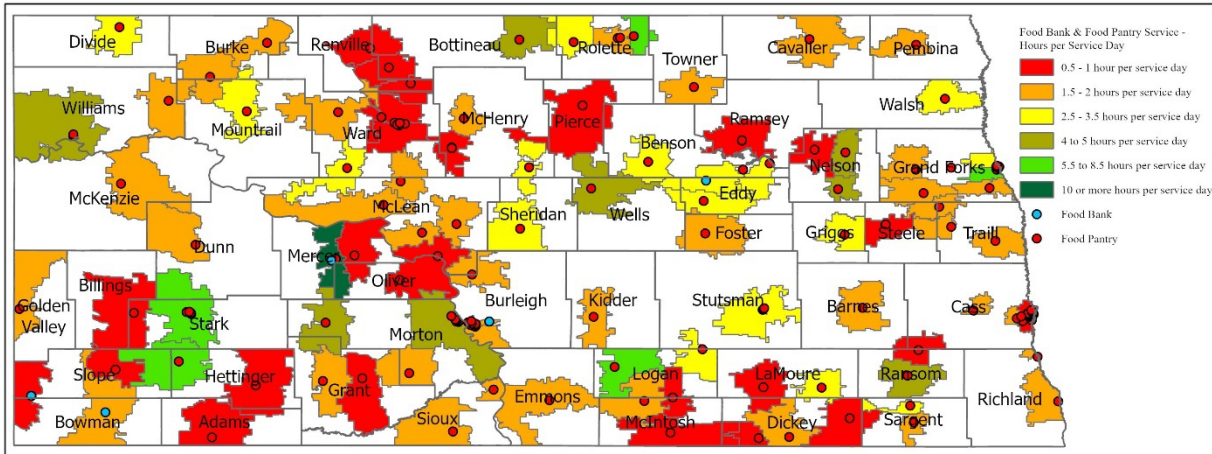
In North Dakota, food banks and food pantries offer a critical service to those in need by providing access to nutritious food. The days of the week that food banks and food pantries are open can vary depending on the specific location and the demand for their services. Figure 5.15 shows the service level in days per week by food bank and food pantry in each county by zip code level. The red highlight in the figure shows that the majority of food banks and food pantries operate on an appointment basis, requiring individuals to call ahead to ascertain distribution dates or set up appointments for food access. In many cases, these service days are limited to just 1 or 2 days per month. Consequently, this restricted schedule poses a significant challenge for people in need of food assistance, making it difficult for them to access nutritious food consistently.



**Figure 5.14** Food Bank and Food Pantry Days of Service Per Week by Zip Code Level

**5.6.2 Food Bank and Food Pantry Service Hours per Weekday by Zip Code Level in Each County**

The food bank and food pantry service hours in North Dakota are designed to meet the needs of its residents and provide access to healthy and nutritious food for everyone, regardless of their circumstances. The hours of operation for food banks and food pantries vary, but most are open 2 hours or less per service day. However, some food banks and food pantries offer extended hours, especially in communities where there is a high demand for their services. Figure 5.16 shows the service in hours per weekday by food bank and food pantry in each county by zip code level. A food bank in Mercer County is open for 10 or more hours per service day. A few food pantries provide regular service for more than 5 hours but less than 10 hours per service day in a few zip code areas in Grand Forks, Hettinger, Logan, Rolette, Slope, and Stark counties.



**Figure 5.15** Food Bank and Food Pantry Hours of Service Per Service Day by Zip Code Level

**5.7 Transit Span of Service**

Service span measures the days per week and hours per day that service is available in a particular area. It is one of the measures of demand-response quality of service used in the Transit Capacity and Quality of Service Manual (TCQSM) (Kittelsohn & Associates et al. 2013). Every county within the state has some level of rural transit service. The data for the transit span of service was collected from the websites of individual transit agencies across North Dakota. These data were visualized in the maps to show the geographic coverage of the transit service, measured by days per week and hours per day. The mapping

is not perfect, as service levels do not exactly follow zip code boundaries, and zip code boundaries often cross county borders, but the results are a good approximation of the span of service across the state.

### 5.7.1 Transit Span of Service – Number of Days for Transit Service

The number of days for transit service in North Dakota refers to the number of days in a week that public transportation services are available to the public in the state of North Dakota. In some areas of North Dakota, public transportation services may be available seven days a week, while in others, service may be limited to weekdays only.

Figure 5.17 shows the number of days per week that public transit service is available in each county. The rural areas in the state are severely underserved by transit, as illustrated by the figure. The vast majority of Stark County, and a small portion of Sheridan and Ransom counties have no transit service at all. In counties with transit service, it is limited and varies based on request, with some counties having less than weekly service. Pre-planning is necessary to ensure trips are made when the service is available.

In the northwest region of the state, a large rural area has one or two days per week of transit service, while most of McLean County has three days of service. Some areas of Cass, Dicky, Grand Forks, Kidder, and Sargent counties have three days of service. In Grant and Morton counties, as well as some northern counties such as Burke, Divide, Pembina, Rolette, and Williams counties, some areas have four days of transit service.

Most rural transit operators provide service five days per week, which is used for traditional weekday employment, education trips, shopping, and medical services. Transit services that are not available at least five days per week cannot be regularly used for full-time work trips. However, they can provide access for shopping, medical trips, and other activities. Most counties in North Dakota have transit services five days per week.

The urban areas of Cass and Grand Forks counties, and some areas of McKenzie, Walsh, and Ward counties, have six days per week of transit service. The majority of Burleigh County and other counties such as Barnes, Morton, Ramsey, Stark, Stutsman, and Ward have transit service seven days per week. Transit service on weekends is mostly used for weekend employment, shopping, and medical trips.

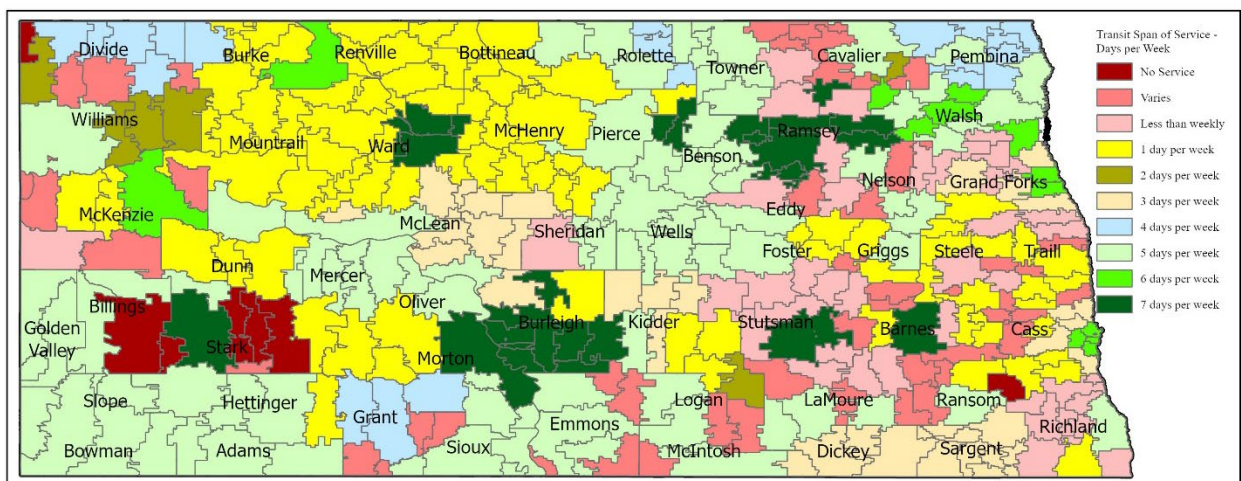


Figure 5.16 Days Per Week that Public Transit Service is Available in Each County

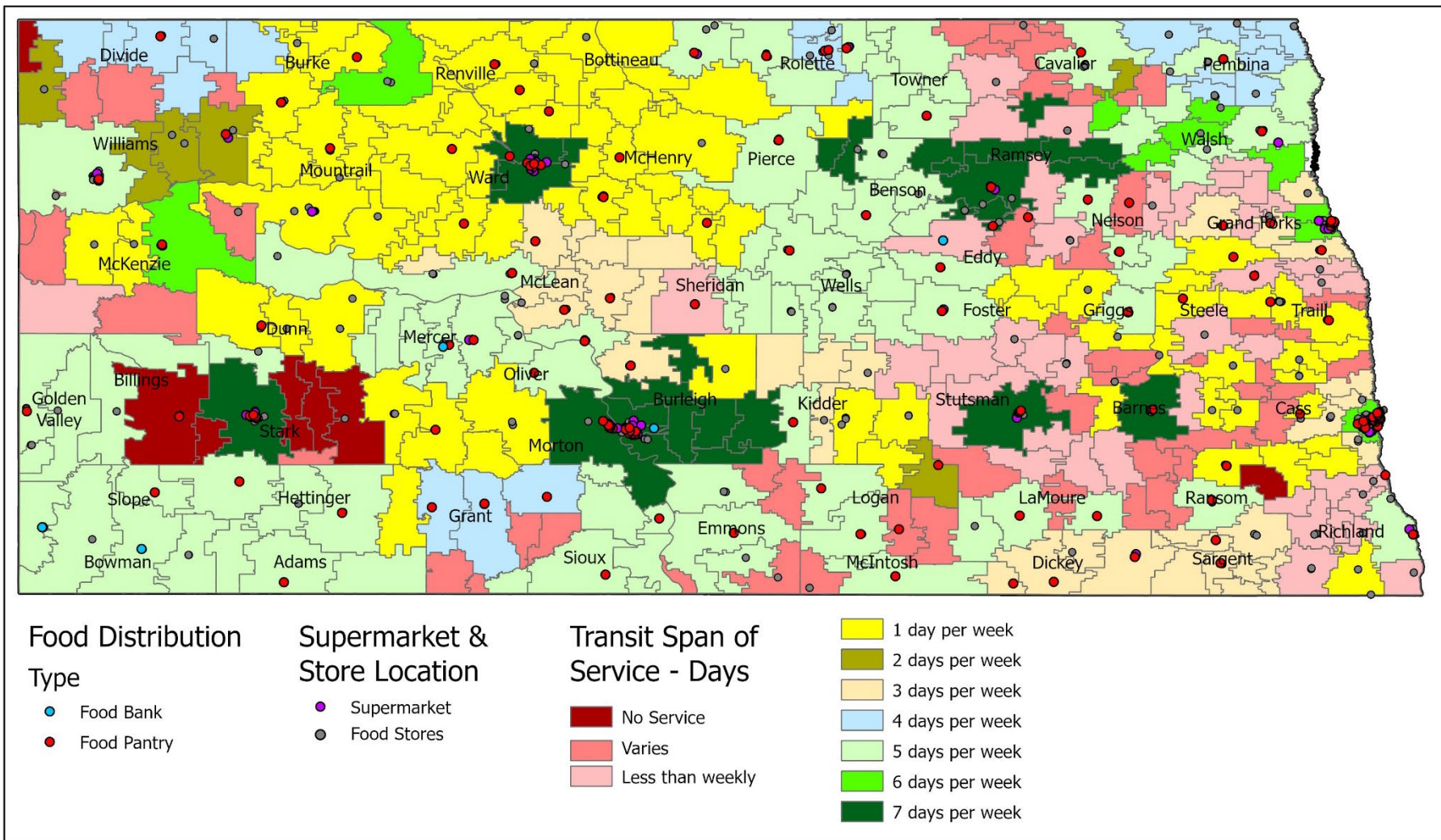
### 5.7.2 Transit Span of Service – Number of Days for Transit Service with Locations of Food Banks, Food Pantries, Supermarkets, and all other Food Stores

The number of days for transit service relative to the location of food banks, food pantries, supermarkets, and other food stores is an important factor in evaluating the accessibility of healthy food options for people who rely on public transportation in North Dakota. If public transportation services are available seven days a week, people may be able to access food banks, food pantries, and supermarkets more easily, which can improve their ability to access healthy food options. However, if public transportation services are limited to weekdays or any specific days only, people may have difficulty accessing food banks, food pantries, and supermarkets on weekends or other days when transit service is not available, which can make it more difficult for them to access healthy food options.

The availability of transit service days per week in each county is depicted in Figure 5.18, which also shows the locations of all food stores, food banks, and food pantries. Note that some areas lack transit service, leaving some food pantries inaccessible via public transit. For instance, one of the food pantries is located in western Stark County which has no transit service at all.

Most supermarkets are located in small urban areas where transit service is available 5 to 7 days a week. Notably, the supermarkets in Burke and Mountrail counties have transit service 1 day per week, the supermarket in Williams County has 2 days per week of transit services, and the supermarket in Dickey County has 3 days of transit services per week.

Although the majority of food stores are conveniently located in areas with 5 to 7 days of weekly transit service, some stores are located in regions where transit service is either absent or limited. Notably, Sioux County, which is home to a significant Native American population, faces a distinct challenge as it lacks any food stores within its boundaries. This underscores the critical need for tailored solutions to ensure equitable access to nutritious food, particularly in underserved areas.



**Figure 5.17** Days Per Week that Public Transit Service is Available with the Location of Food Bank, Food Pantry, Supermarket, Grocery Stores, Convenience Stores, and Gas Stations in Each County

### 5.7.3 Transit Span of Service – Hours of Transit Service per Day

The hours of transit service per day refers to the hours during which transit services are available to the public each day. In North Dakota, transit services operate for varying hours of the day, depending on the specific transit agency and the route in question. The transit span of service varies by transit agency and route, but most transit services operate from 5 to 9 hours a day, with some routes offering limited or extended hours, particularly on weekends and holidays.

The number of hours per day of transit service were measured by zip code level statewide. Figure 5.19 shows the number of hours of transit service on a weekday. The highest level of transit service is 16 or more hours per service day. Only a few counties such as Barnes, Burleigh, Cass, Grand Forks, Morton, and Ramsey counties have this level of service in some areas. This level of service allows for transit to be used for all trip purposes including work trips that begin earlier in the morning or end later in the evening. The next highest level of transit service is at least 12 hours but less than 16 per day, which is provided in Cass, Stark, and Ward counties. This allows for transit to be used for work trips during typical work hours and for medical and shopping trips. Many rural counties, especially in the northwestern part of the state, have service at least nine hours per day but less than 12. This level of service can be used for full-time work trips, daytime activities, and medical trips. Many counties in the state have either at least five hours of transit service, but less than nine or less than five hours of service or service may vary in some areas depending on the demand. This level of service doesn't support full-time jobs and sometimes it requires pre-planning to ensure that the entire round-trip can be scheduled during service hours. This level of service is limited and requires an advance reservation. Most transit agencies in the region require that reservations be made one day in advance. A few require a reservation be made two or three days prior to a trip.

The Native American populated Benson and Rolette counties have transit service at least nine hours per day but less than twelve. Similarly, Sioux County, also with a substantial Native American population, has a large region with less than five hours of transit service per day, with only a few areas receiving at least five hours, but no more than nine hours of service per day.

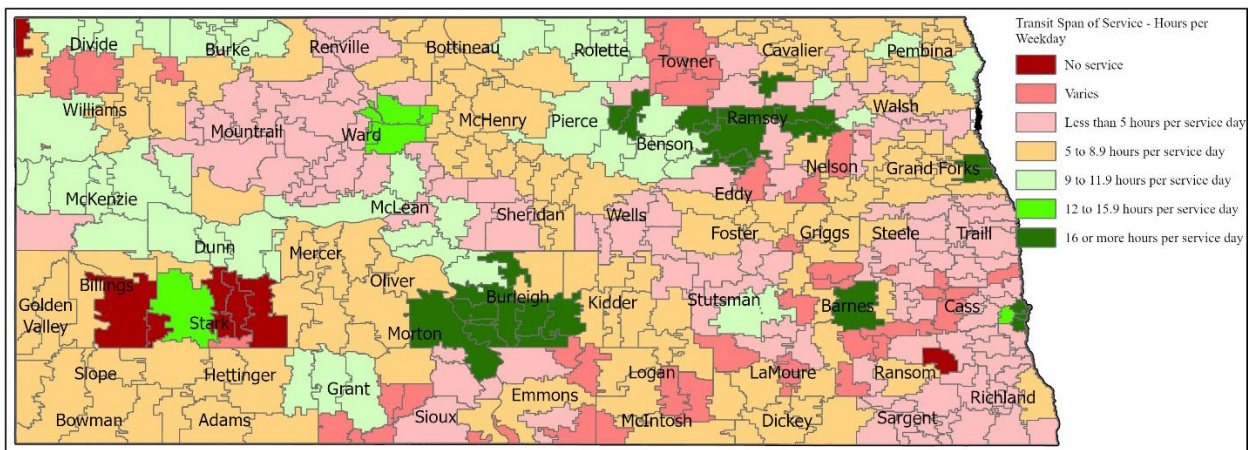


Figure 5.18 Hours of Service Per Weekday in Each County

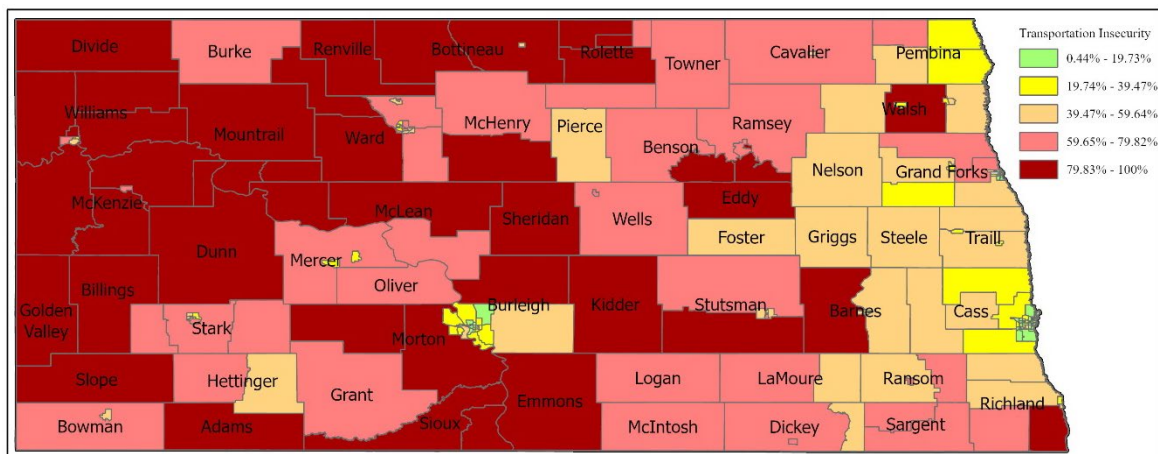
## 5.8 Utilizing Transportation Insecurity Analysis Tool (TIAT) for Food Insecurity Analysis in the Study

In this research, the Transportation Insecurity Analysis Tool (TIAT) was employed to ascertain the extent of food insecurity. Developed as part of the Justice40 initiative, TIAT is an integral component of the USDOT's Equitable Transportation Community (ETC) Explorer. Its primary function is to present data on transportation insecurity at both state and national scales, thereby facilitating a deeper understanding of the relationship between transportation insecurity and various factors. The tool utilizes numerous indicators to quantify transportation insecurity. These include the percentage of the population living at or below 200% of the federal poverty line, median household income, the burden of transportation costs, estimated transportation expenses, housing cost burden, the proportion of households lacking vehicles, availability of transit, time taken for driving and walking to essential locations, access to broadband, and statistics on traffic-related fatalities (USDOT 2023).

### 5.8.1 Transportation Insecurity in North Dakota by Census Tract Level

Transportation insecurity, defined as the inability to access transportation consistently, reliably, and safely for daily activities, is a significant yet often overlooked factor contributing to persistent poverty, as noted by the U.S. Department of Transportation in 2023 (USDOT 2023). In North Dakota, this issue is unevenly distributed, as revealed by census tract analyses.

The Figure 5.20 provides an overview of transportation insecurity by census tract level in North Dakota. The most pronounced levels of transportation insecurity are found in the western regions of North Dakota and in counties with large Native American populations, such as Rolette and Sioux. These areas contrast with other Native American-populated counties like Benson and Ramsey, which, while still facing transportation challenges, fare slightly better. The pattern suggests that certain regions, especially those with sparse urban development and significant Native American populations, are disproportionately affected. Contributing factors likely include insufficient public transportation infrastructure and the remote location of essential services, coupled with economic constraints and systemic issues within Native American communities. This data-driven insight into the distribution of transportation insecurity is critical for policymakers and planners, highlighting the urgent need for dedicated efforts to improve transportation access in the most affected areas, thereby addressing a critical barrier to overcoming poverty.



**Figure 5.19** Transportation Insecurity in North Dakota Census Tract Level, 2023

Source: US DOT Justice40 initiative ETC Explorer



### 5.8.2 Transportation Insecurity with the Location of Food Bank, Food Pantry, Supermarket and Food Store

Figure 5.21 provides a comprehensive overview of transportation insecurity overlaid with the distribution of food resources such as food banks, food pantries, supermarkets, and stores across the state of North Dakota. This figure highlights the relationship between the accessibility of transportation and the availability of food resources within various counties.

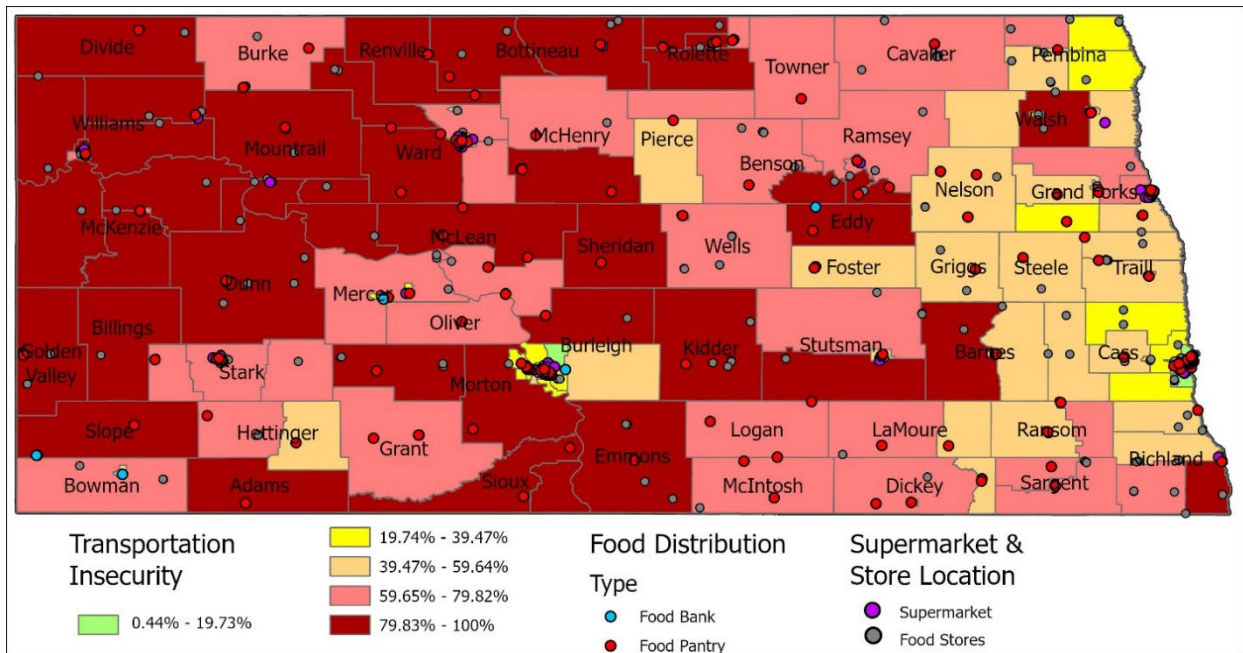
Figure 5.21 highlights that transportation insecurity is notably higher in the western regions of the state. These areas, which face significant transportation accessibility challenges, also show a sparse distribution of food resources. This raises concerns about the ease with which residents in these regions can access essential food supplies, especially considering the limited transportation options.

Urban counties such as Burleigh, Cass, and Grand Forks, which exhibit lower transportation insecurity, also have higher concentrations of food resources, including supermarkets and stores. This correlation suggests that residents in these areas have better access to food supplies, likely because of more robust transportation networks and infrastructure.

Counties with substantial Native American populations, particularly Rolette and Sioux, display a marked level of transportation insecurity and also have fewer food resources, as indicated by the few food banks, food pantries, and supermarkets. This scarcity is a significant issue, as it may contribute to food insecurity and compound the challenges faced by these communities. In contrast, other Native American-populated counties, such as Benson and Ramsey, show somewhat better conditions with a slightly higher presence of food resources, despite still struggling with transportation insecurity.

The disparities identified indicate that residents in areas with greater transportation insecurity might struggle to access food resources, possibly leading to heightened food insecurity. While food banks and pantries are more prevalent in areas with better transportation, this distribution reflects the higher population densities in such areas, rather than a misalignment of food assistance services. These areas, having more residents, naturally have a higher demand for food assistance, highlighting the challenge of adequately serving highly rural areas with significant poverty levels.

This visual analysis emphasizes the importance of integrated planning approaches that consider both transportation and food distribution networks. Improving transportation infrastructure and services in insecure regions could enhance access to food resources, particularly in western and Native American-populated counties. Such efforts would not only address transportation insecurity but also have the potential to mitigate food insecurity in these communities.



**Figure 5.20** Transportation Insecurity with the Location of Food Bank, Food Pantry, Supermarket and Food Store in North Dakota Census Tract Level, 2023

Source: US DOT Justice40 initiative ETC Explorer

### 5.9 Low Access to Healthy Food

In the Food Access Research Atlas, low access to healthy food is defined as being far from a supermarket, supercenter, or large grocery store. Low-access areas are Census tracts with at least 500 people, or 33% of the population, living more than 1 mile in urban areas or 10 miles in rural areas from the nearest supermarket, supercenter, or large grocery store (USDA 2022). Understanding the patterns of low access to healthy food in North Dakota is important for identifying areas in need of improvement and for developing effective solutions to increase access to healthy food options for residents. The extent of low access to healthy food in North Dakota varies by location and demographic characteristic.

Some areas of the state may have a high percentage of residents with limited access to healthy food, while others may have low or no instances of low access. A 100% low access to healthy food means that all individuals in a certain geographic area or population have limited access to supermarkets, grocery stores, or other sources of nutritious food. This means that they are unable to purchase fresh fruits and vegetables, whole grains, and other healthy food items that are necessary for a balanced diet. Figure 5.22 shows low access healthy food by county level in North Dakota. About 50% of counties have 100% of low access to healthy food.

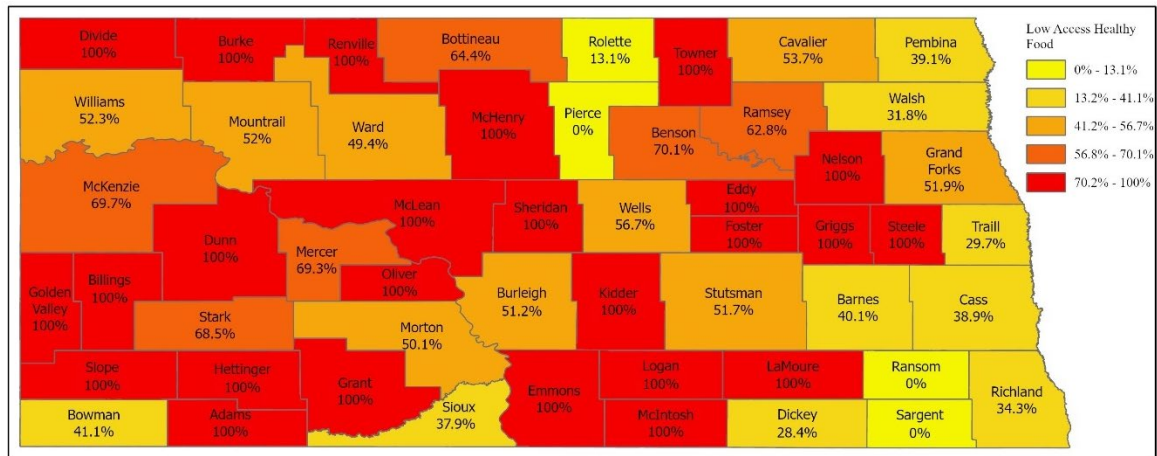


Figure 5.21 Low Access Healthy Food in North Dakota, USDA Economic Research Service

### 5.10 Estimate of Low Income and Low Access Populations

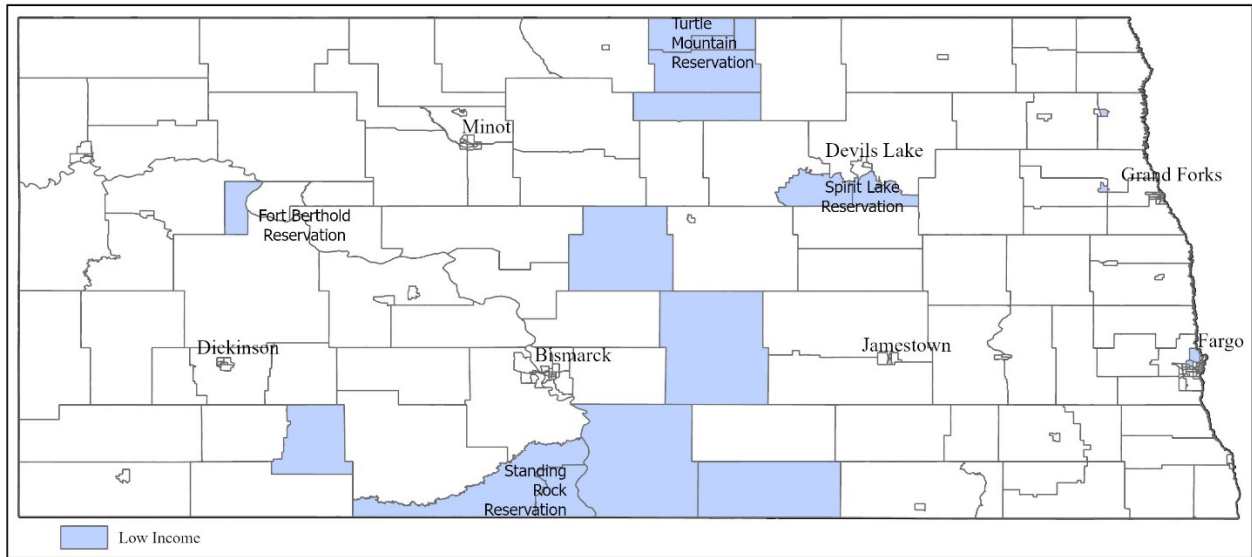
In the United States, limited access to supermarkets, supercenters, grocery stores, or other sources of healthy and affordable food can pose a significant challenge for many individuals and neighborhoods. Various measures are used to define which areas are considered low-income and low-access, with indicators such as distance to stores, number of stores in an area, family income, and public transportation availability considered. Low-income census tracts with poverty rates of at least 20% or median family incomes at or below 80% of the metropolitan or state median are considered low-income areas, while low-access census tracts with populations of at least 500 people or at least 33% of the population living more than a mile away from a food store in urban areas, or more than 10 miles away in rural areas, are defined as low-access areas. The lack of healthy food sources in these neighborhoods can make it harder for people to eat a healthy diet (USDA 2022).

#### 5.10.1 Low Income Tract

Figure 5.23 is a visual representation of the distribution of census tracts in North Dakota that meet certain economic criteria. Specifically, the figure shows tracts that have a poverty rate of 20% or higher, or tracts with a median family income less than 80% of median family income for the North Dakota. These areas have been identified as having higher levels of poverty and economic hardship compared to other parts of the state. The figure also indicates that the majority of the tracts that meet these criteria are located in Native American regions in North Dakota. These regions include Spirit Lake Reservation, Standing Rock Reservation and Turtle Mountain Reservation.

In addition to Native American regions, the figure also shows low-income population tracts in several city areas such as Bismarck, Dickinson, Fargo, Grand Forks, Jamestown, and Minot. While these areas may have different socioeconomic characteristics compared to Native American regions, they are also

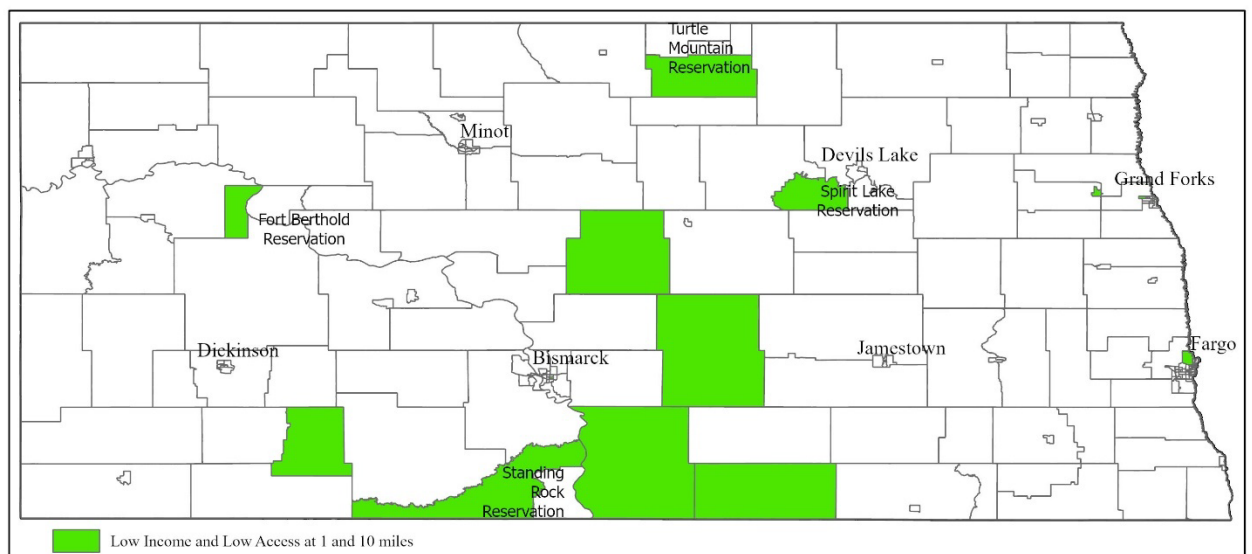
experiencing economic hardship and require attention and resources to address poverty and other related issues.



**Figure 5.22** Low Income Tract, USDA Economic Research Service (ERS), 2019

### 5.10.2 Low Income and Low Access Tracts Measured at 1 and 10 Miles

Figure 5.24 displays areas with limited access to supermarkets, supercenters, or large grocery stores and where low-income tracts have at least 500 residents, or 33% of the population, living beyond 1 mile (urban areas) or more than 10 miles (rural areas) from the nearest grocery store. The figure shows that areas with limited access to grocery stores are primarily concentrated in Native American regions, as well as certain urban areas such as north of Fargo and west of Grand Forks. Additionally, the Figure illustrates that these areas also tend to have lower-income populations.

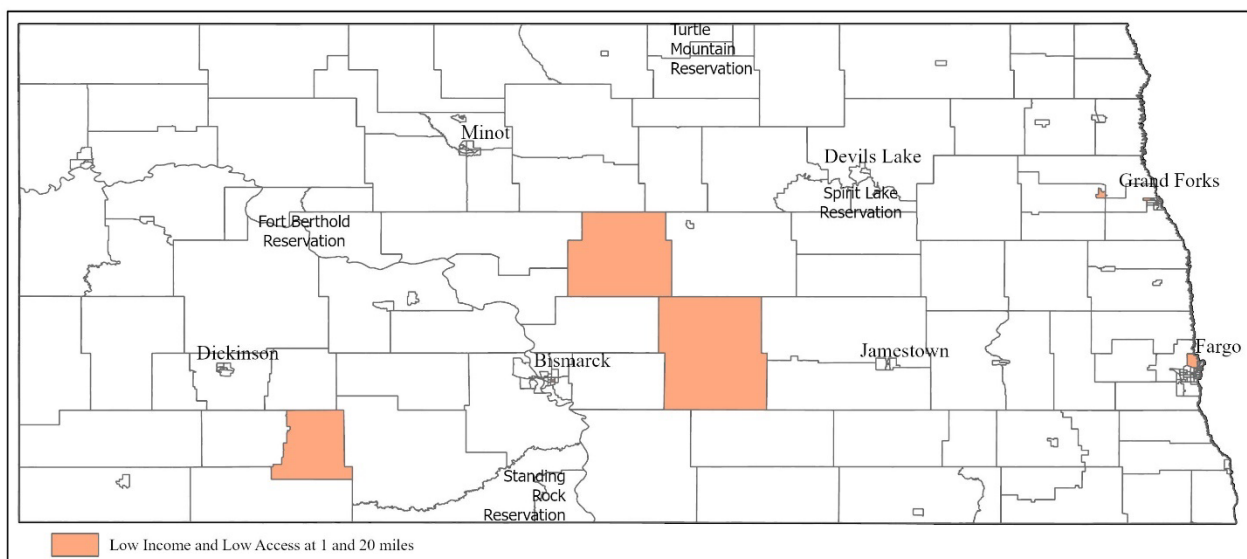


**Figure 5.23** Low Income and low Access at 1 Mile and 10 Miles, USDA Economic Research Service (ERS), 2019

### 5.10.3 Low Income and Low Access Tracts Measured at 1 and 20 Miles

Figure 5.25 indicates areas in North Dakota with limited access to supermarkets, supercenters, or large grocery stores, where low-income tracts have at least 500 residents, or 33% of the population, living beyond 1 mile (urban areas) or more than 20 miles (rural areas) from the nearest grocery store. The figure highlights that few rural counties, such as Kidder, Sheridan, and eastern Hettinger, continue to experience low income and limited access to grocery stores at distances greater than 20 miles.

Furthermore, the figure shows that low income and limited access at distances greater than 1 mile remain a concern in certain urban areas, including Bismarck, Fargo, and Grand Forks, but only in a small portion. The visualization highlights the importance of addressing food insecurity and limited access to grocery stores, particularly in rural areas, to ensure that all residents have access to healthy and affordable food options.

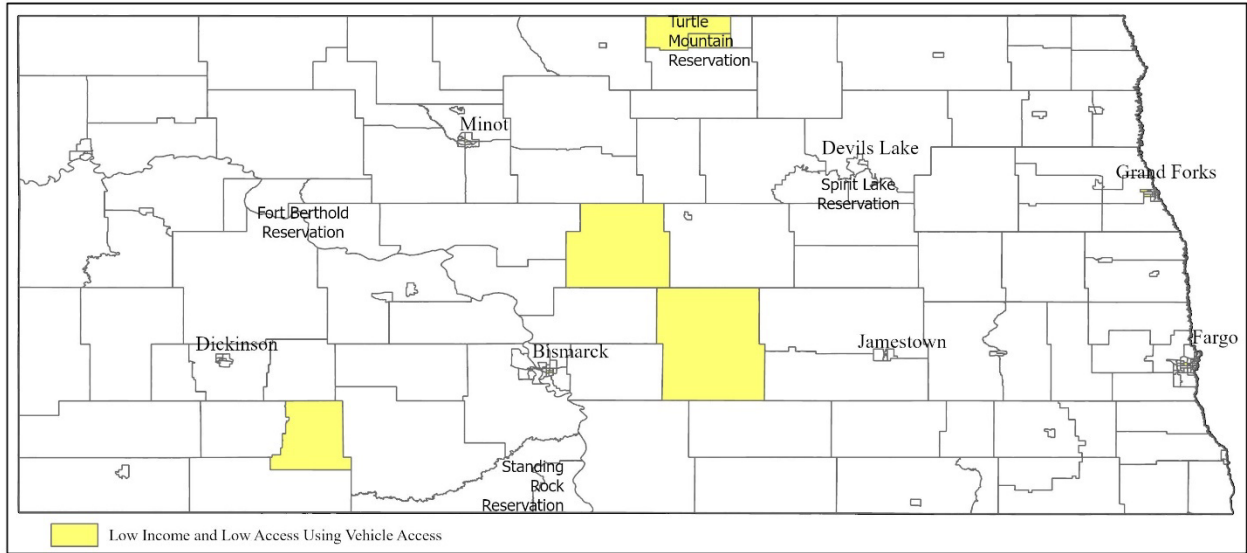


**Figure 5.24** Low Income and Low Access at 1 and 20 Miles, USDA Economic Research Service (ERS), 2019

### 5.10.4 Low Income and Low Access Tracts Using Vehicle Access at 20 Miles

Figure 5.26 represents a low-income tract in North Dakota where either at least 100 households are situated more than one-half mile from the nearest supermarket and lack vehicle access or at least 500 people, or 33% of the population, reside more than 20 miles from the nearest supermarket, regardless of vehicle availability. The figure demonstrates that only a few rural counties, such as Kidder, Sheridan, and eastern Hettinger, continue to encounter low income and limited access tract, making use of vehicle access and at 20 miles.

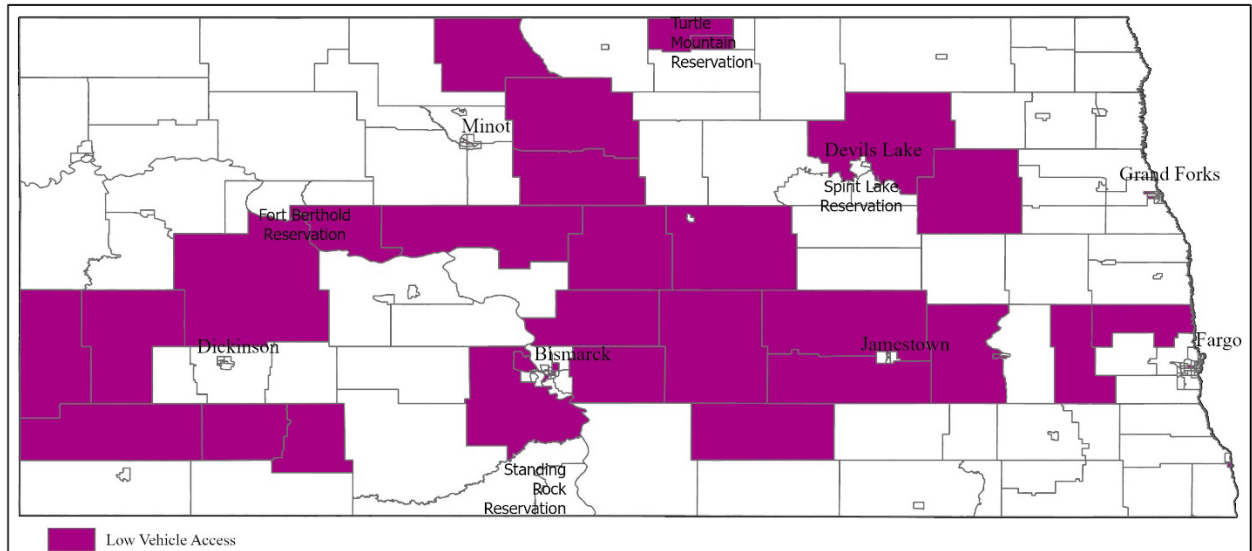
Low-income census tracts where more than 100 housing units do not have a vehicle and are more than half mile from the nearest supermarket, remain a concern in certain urban areas, including Bismarck, Fargo, and Grand Forks, but only in certain areas within the cities. This visualization underscores the importance of addressing transportation and access to supermarkets for low-income households, particularly those in rural areas. It highlights the need for policies and programs that promote access to healthy and affordable food options for all residents.



**Figure 5.25** Low Income and Low Food Access Based on Vehicle Access, USDA Economic Research Service (ERS), 2019

### 5.10.5 Low Vehicle Access Tract

Figure 5.27 illustrates the regions in North Dakota where more than 100 households face food insecurity due to lack of access to a vehicle and are situated more than 1/2 mile away from the closest supermarket. Additionally, the figure highlights areas where a significant number or proportion of residents are located more than 20 miles away from the nearest supermarket, resulting in limited food access. The figure emphasizes that this measure remains persistently high, primarily in the rural areas of the state's mid and southwest regions. To address this issue, improvements to public transportation in these areas could help increase accessibility to healthy food options and reduce food insecurity.



**Figure 5.26** Low Vehicle Access, USDA Economic Research Service (ERS), 2019

## 5.11 Summary

This chapter discusses the Supplemental Nutrition Assistance Program (SNAP), which provides financial assistance to low-income households for purchasing food. In 2020, approximately 6.6% of households in North Dakota received SNAP benefits. According to the Food Stamps/Supplemental Nutrition Assistance Program (SNAP) for 2020, the national average of households receiving SNAP benefits was 11.4%. This indicates that North Dakota had a lower percentage of households receiving SNAP benefits compared to the national average.

Despite efforts through programs like SNAP and food banks, food insecurity persists in North Dakota, with 4.8% of the population experiencing food insecurity in 2020. Counties like Benson, Rolette, and Sioux exhibit elevated food insecurity rates, reaching 15.2%, 16%, and 14.8% respectively. These counties share a common characteristic of having a higher percentage of Native American populations and lower vehicle ownership rates, contributing to the challenges faced by their residents in accessing sufficient and nutritious food options.

Child food insecurity is also a pressing issue in North Dakota, with approximately 18,210 children experiencing food insecurity in 2020. Child food insecurity rates tend to be higher in counties with larger Native American populations. The report identifies counties where a high percentage of children live in households above the poverty line but face challenges in accessing adequate and nutritious food.

Ranking counties by food insecurity rates is a useful tool for identifying areas that likely require interventions. Native American-populated counties such as Rolette, Benson, Sioux, and Ramsey have higher rates of food insecurity compared to the national average. This information can guide policymakers and community organizations in targeting resources and implementing programs to ensure access to nutritious and affordable food.

North Dakota has a varied distribution of food stores across counties. Some rural counties have no food stores at all, while others have limited options. Supermarkets are typically open seven days a week but may be open limited days in rural areas. Store hours vary, with the majority open during the standard business hours, which are from 9 a.m. to 5 p.m.

Food banks and food pantries play crucial roles in addressing hunger by distributing food to those in need. However, their service days and hours vary across counties in North Dakota, with limited availability in some areas.

This chapter also explores the utilization of the Transportation Insecurity Analysis Tool (TIAT) within the framework of the Justice40 initiative, as it is incorporated into the USDOT's ETC Explorer. TIAT helped analyze the extent of food insecurity, considering factors like household income, transportation costs, and availability of transit. The tool's findings were pivotal in understanding the relationship between transportation insecurity and food accessibility.

Approximately 50% of counties in North Dakota have 100% low access to healthy food. Understanding these patterns helps identify areas in need of improvement and informs efforts to increase access to nutritious food.

Low-income and low-access populations in North Dakota, particularly in Native American regions and urban areas, face challenges in accessing healthy and affordable food. Addressing transportation and improving access to healthy food options are essential in combating food insecurity in these areas.

## 6. FINDINGS AND RECOMMENDATIONS

### 6.1 Summary of Findings

This study examined the potential of utilizing public transportation to end food insecurity in rural and small urban areas, focusing on a case study of rural counties in North Dakota. Through a comprehensive analysis of the current food access challenges and the role of public transportation in addressing these challenges, several key findings emerged.

- **Limited access to healthy food options** - Limited access to healthy food is a pressing concern in rural areas, particularly evident in regions classified as 100% low access to healthy food according to the Food Access Research Atlas. These areas, predominantly rural, are characterized by Census tracts with at least 500 people, or 33% of the population, residing more than 10 miles from the nearest supermarket, supercenter, or large grocery store. This results in residents being unable to readily purchase essential nutritious foods like fresh fruits, vegetables, and whole grains, which are vital for a well-balanced diet. The severity of this issue varies across North Dakota's counties, with approximately half of them falling under the 100% low access category and occurring primarily in rural regions. This discrepancy underscores the need for targeted efforts and effective solutions to enhance access to healthy food options, especially in these rural areas where limited access is most prevalent.
- **Distance between residences and food outlets** - Accessing grocery stores and essential food outlets poses significant challenges for residents in rural North Dakota, especially those lacking personal vehicles or reliable transportation. In certain remote regions, the nearest grocery store could be situated more than 20 miles away, as observed in rural counties like Kidder, Sheridan, and eastern Hettinger. Even in smaller urban areas, low-income neighborhoods may experience limited access to grocery stores, often with distances exceeding 1 mile, as seen in areas like Bismarck, Fargo, and Grand Forks, although to a lesser extent. These disparities highlight the pressing need to address food insecurity and the constrained availability of grocery stores, particularly in rural settings. North Dakota's vast geographical expanse and relatively small population have resulted in limited supermarket availability, often with just one or two serving entire rural communities. Consequently, residents frequently face lengthy journeys to access these essential resources, turning grocery shopping into a time-consuming and occasionally challenging endeavor.
- **Food pantry access and transportation challenges** - The absence of food pantries or community food distribution centers in rural areas significantly contributes to food insecurity in North Dakota. Food banks and food pantries are vital organizations that combat hunger by distributing food to those in need. In North Dakota, these essential services vary in their days of operation and service hours. Most food banks and food pantries in the state offer limited service days, sometimes only 1 or 2 days a month or by appointment only. Service hours typically span 2 hours or less per service day, although some, like a food bank in Mercer County, extend their hours for 10 or more hours per service day. Unfortunately, Stark County in the west, lacks transit services, leaving the food pantry in the region inaccessible by public transportation. This underscores the need to expand food pantry access and address transportation challenges to alleviate food insecurity effectively.
- **Transportation access for vulnerable populations** - To combat food insecurity and ensure equitable access to healthy food options, it's imperative to implement transportation programs tailored to vulnerable populations, particularly those in rural areas who often face significant challenges because of limited transportation options. Individuals with disabilities residing in rural regions, for instance, encounter difficulties accessing grocery stores and nutritious food sources, particularly if they rely on specialized transportation services like paratransit, which may not be widely available.



- **Food insecurity challenges among Native American populations** - Native American counties in North Dakota face elevated poverty and food insecurity rates, despite the state's overall low rates. In Sioux, Benson, and Rolette counties, poverty rates exceed 30%, and food insecurity rates exceed 14%. Rolette County, with a poverty rate of 16.0%, exhibited a food insecurity rate of 16.0%, while Benson County at 15.1% and Sioux County at 14.8% similarly experienced elevated food insecurity. Alarming, child food insecurity reached 26.7% in Rolette County, 24.2% in Benson County, and 20.9% in Sioux County. Child food insecurity is also disproportionately high in these counties, with rates reaching 26.7% in Rolette County. Transportation challenges further exacerbate the challenges faced by Native American populations in these areas. Transit services are available for 9 to 12 hours per day in some counties, but Benson, Rolette, and Sioux counties continue to grapple with significant transit service gaps. Bridging these disparities and enhancing transit services are critical steps toward ensuring equitable access to nutritious food and bolstering the well-being of North Dakota's Native American communities.

## **6.2 Bridging the Gap: Enhancing Public Transportation to Combat Food Insecurity in North Dakota**

This study on food insecurity has highlighted the critical role that public transportation could play in providing access to healthy food options in rural and small urban areas of North Dakota. In light of these findings, the insights from the "Assessment of North Dakota Mobility Options, Transit Needs, and Characteristics of Users" become particularly relevant. This assessment identified significant service gaps in rural transit, with most regions falling below the benchmarks for trips provided per population of older adults, people with disabilities, and low-income individuals (Mattson, Mistry and Hough 2020).

These service gaps are largely due to the rural nature of North Dakota, characterized by low population densities and long travel distances, necessitating more vehicle miles and hours to provide the same number of trips. To meet the service benchmarks for rural transit in North Dakota, there is a significant need for an increase in service. The study found that the state needs an additional 0.5 to 1.0 million vehicle miles of service per year, and an additional 16-17 thousand vehicle hours of service per year to serve transportation-disadvantaged populations in rural areas (Mattson, Mistry and Hough 2020).

In terms of funding, the state faces a significant challenge. To bridge the service gaps in both urban and rural transit, Mattson, Mistry and Hough (2020) found that an increase in annual operating funding statewide of \$5.3 million was needed, with this need projected to rise to \$14.4 million by 2030. This represents a funding increase of 21% for rural transit and 14% for urban transit, escalating to 55% and 46%, respectively, by 2030. Additionally, one-time new vehicle purchases will require substantial investment, amounting to \$13.5 million immediately and \$33.5 million by 2030. This increase in the fleet size will further lead to a long-term increase in annual vehicle replacement costs of \$1.0 million, rising to \$2.5 million by 2030 (Mattson, Mistry and Hough 2020).

Addressing these service gaps and funding needs is crucial for improving food security in North Dakota. Enhancing public transportation services will not only facilitate better access to food outlets but also support the broader goal of alleviating food insecurity, especially in areas with high rates of child food insecurity and populations with limited vehicle access. The implementation of targeted transportation programs and the expansion of existing services are vital steps towards achieving this goal. However, these initiatives require substantial funding and strategic planning to ensure their sustainability and effectiveness in meeting the community's needs.

In summary, integrating the findings from the assessment of mobility options and transit needs into the food insecurity study underscores the importance of a comprehensive approach that considers both transportation and food access challenges. By addressing the service gaps and expanding public transportation services, North Dakota can make significant strides in ensuring equitable access to nutritious food, particularly in its rural and small urban areas.

### **6.3 Recommendations**

The findings of this study have several recommendations for policymakers, transportation authorities, and community stakeholders to recognize the importance of integrating public transportation strategies into broader food security initiatives to ensure that rural populations have equitable access to the nutritious food they need. To effectively utilize public transportation to end food insecurity, the following recommendations are put forth:

#### **6.3.1 Enhancing Public Transportation Services**

The proposed strategies for utilizing public transportation to improve food access presented in this study offer practical and actionable solutions to address the challenges of food insecurity in rural and small urban areas. Enhancing public transportation services is a crucial step in ensuring that individuals have the means to reach grocery stores and other food outlets conveniently and reliably.

Increasing the frequency and coverage of existing public transportation routes is a key strategy to improve food access in rural and small urban areas. By expanding the reach of public transportation, more individuals can connect with grocery stores, farmers markets, and other food retail outlets. This can help address the issue of limited transportation options, especially for those without access to private vehicles. Increasing the frequency of public transportation routes ensures that individuals have more opportunities to travel to food outlets, reducing the time and effort required to access healthy and affordable food options.

Another crucial aspect of enhancing public transportation services is extending operating hours. Many individuals in rural and small urban areas may have varying work schedules or limited availability due to other responsibilities. By extending the operating hours of public transportation services, it becomes easier for individuals to access food outlets even outside regular working hours. This flexibility allows them to shop for groceries or visit farmers markets at times that are convenient for them, reducing barriers to food access.

Improving transportation infrastructure is essential to ensure safe and convenient travel for individuals accessing food outlets. In rural areas, road conditions may be challenging, making it difficult for public transportation vehicles to navigate. By investing in improving road conditions, such as repairing potholes or addressing unpaved roads, the reliability and efficiency of public transportation can be enhanced. Additionally, ensuring the accessibility of public transportation stops, such as by providing ramps or elevators, can enable individuals with mobility challenges to easily access transportation services. These infrastructure improvements contribute to a more seamless and inclusive transportation system, benefiting individuals seeking better food access.

Enhancing public transportation services through increased frequency and coverage, extended operating hours, and improved transportation infrastructure can significantly improve food access in rural and small urban areas. These strategies work together to address the challenges faced by individuals in reaching grocery stores, farmers markets, and other food retail outlets. By creating a

robust and accessible public transportation network, communities can make significant strides towards ending food insecurity and ensuring equitable access to healthy and nutritious food options.

### 6.3.2 Implementing Targeted Transportation Programs

The implementation of targeted transportation programs for vulnerable populations, such as low-income individuals, the elderly, and individuals with disabilities, is crucial in ensuring equitable access to healthy food options and improving food security. Recognizing that certain populations face unique transportation challenges, it is essential to develop specialized programs that cater to their specific needs. This may involve providing subsidized transportation services or establishing dedicated routes to connect underserved communities with grocery stores and other food outlets. By tailoring transportation services to meet their specific needs, programs can help these populations overcome the barriers they face and have reliable and accessible transportation options to reach food outlets. By addressing the transportation barriers faced by vulnerable populations, these programs can enhance targeted populations' access to nutritious food, promoting food security and improving overall well-being. It is essential to collaborate with relevant stakeholders, including community organizations, transportation authorities, and advocacy groups, to design and implement these programs effectively and ensure that they address the unique needs of each population.

Exploring the feasibility of demand-responsive transportation services, such as ride-sharing or shuttle services, to accommodate specific food-related events or activities, like food pantries or community gardening initiatives, may reveal new options for improving food access. Demand-responsive transportation services offer flexibility and adaptability to meet the specific needs of the community (Transport Equity 2020). By leveraging ride-sharing or shuttle services, transportation can be tailored to support food-related events or activities that are vital for addressing food insecurity. These programs can be designed to align with the schedules and locations of these events, ensuring that individuals have convenient access to food resources when they need them the most.

### 6.3.3 Creating Targeted transportation programs for Native American populations

Based on the findings that highlight the pressing issue of food insecurity within the Native American community in rural areas of North Dakota, several recommendations can be made to address this challenge and end food insecurity:

- **Develop targeted transportation programs:** Create specialized transportation programs specifically designed to meet the needs of the Native American population in rural areas. These programs should consider the unique challenges faced by these communities, such as limited access to grocery stores and food outlets. Collaboration between tribal governments, transportation agencies, and community organizations is crucial for designing and implementing effective transportation solutions.
- **Increase transportation options:** Enhance transportation options by providing reliable and affordable means of transportation for Native American individuals in rural areas. This could include subsidized transportation services or partnerships with existing transportation providers to ensure regular access to grocery stores and food retail outlets. It is important to address the distance barrier by expanding transportation coverage and extending operating hours to accommodate the needs of the community.
- **Support local food production:** Promote collaboration between targeted transportation programs and local food producers within the Native American communities. This can involve establishing partnerships with local farmers, supporting community gardens, and incorporating

fresh, locally sourced food into transportation initiatives. By supporting local food production, transportation programs can enhance food access and provide culturally relevant and nutritious options for the community.

- Culturally sensitive approach: Recognize and respect the unique cultural and historical perspectives of the Native American population in developing and implementing targeted transportation programs. Collaborate closely with tribal governments and community leaders to ensure that the programs align with the cultural values and preferences of the communities they serve. Incorporate traditional food knowledge and practices to promote cultural preservation and enhance the overall well-being of the Native American population.

It is essential to engage in ongoing evaluation and collaboration with the Native American communities to continuously assess the effectiveness of these recommendations and adapt them as needed based on community feedback and changing needs. By implementing these recommendations, we can work towards addressing food insecurity and improving food access for the Native American population in rural areas of North Dakota, thus fostering healthier and more sustainable communities.

#### 6.3.4 Creating Partnerships and Collaborations

Foster collaborations between public transportation agencies, local governments, food retailers, and community organizations to develop innovative solutions. These collaborations can lead to the identification of transportation routes that best serve the needs of the community, the establishment of pickup and drop-off points near food retail outlets, and the implementation of fare subsidy programs to make transportation more affordable for low-income individuals.

Establish partnerships with local farmers and food producers to incorporate fresh, locally sourced food into transportation programs, such as mobile markets or farm-to-table initiatives. For example, mobile markets can be set up in partnership with local farmers, allowing them to bring their produce directly to underserved communities. Similarly, farm-to-table initiatives can be established, where public transportation vehicles are used to transport fresh produce from local farms to food retail outlets or community centers. These partnerships not only enhance food access but also support local farmers and promote the consumption of nutritious, locally grown food.

Engage community stakeholders, including residents, and organizations, in the planning and implementation of public transportation initiatives aimed at improving food access. Community stakeholders can provide valuable insights into transportation preferences, identify areas of high need, and contribute to the design of services that meet the specific requirements of the local population.

#### 6.3.5 Promoting Education and Outreach

To improve access to healthy food, it is important to promote education and outreach efforts. This can be done by conducting outreach campaigns to inform people about public transportation services and how they connect to food access. By using community events, social media, and local publications, we can raise awareness about transportation options and their benefits. Additionally, educational programs and resources should be provided to promote the benefits of healthy eating and help individuals make informed food choices. Collaboration with local community centers, schools, and healthcare facilities can enhance these efforts by delivering nutrition education and cooking classes focused on budget-friendly and nutritious meals. By combining education, outreach, and collaboration, we can increase

awareness, empower individuals to make healthy food choices, and ultimately address food insecurity in rural and small urban areas.

### 6.3.6 Evaluation and Continuous Improvement

Evaluation and continuous improvement are crucial aspects of utilizing public transportation to improve food access in rural and small urban areas. Establishing mechanisms for ongoing evaluation and monitoring of public transportation initiatives is essential to assess their impact and identify areas for improvement. This includes tracking ridership data, customer satisfaction levels, and the extent to which the initiatives have positively impacted food access in the community. Feedback from stakeholders, including transportation users, retailers, and community members, should be actively sought and incorporated to refine and enhance public transportation strategies. By actively listening to the needs and experiences of the community, adjustments can be made to better meet the demands and preferences of the population. Additionally, it is vital to continuously assess the effectiveness of the implemented strategies, considering any changes in community needs and available resources. Flexibility and adaptability are key in ensuring that public transportation initiatives remain responsive to the evolving circumstances of the community and continue to effectively address food insecurity.

## 7. CONCLUSION

This report has examined the potential of utilizing public transportation to reduce food insecurity in rural and small urban areas, with a focus on rural counties in North Dakota. The findings presented in this study have shed light on the key challenges related to food access in these areas and the role that public transportation can play in addressing these challenges.

Limited access to healthy food options was identified as a significant issue in rural areas, making it difficult for residents to meet their nutritional needs. The distance between residences and food outlets was found to be considerable, especially for individuals without personal vehicles or reliable transportation options. Additionally, the absence of food pantries or community food distribution centers in rural areas contributed to the problem of food insecurity.

To effectively utilize public transportation to assist in alleviating food insecurity, several recommendations have been put forth. Enhancing public transportation services through increased frequency and coverage, extended operating hours, and improved infrastructure is crucial. These strategies aim to improve accessibility and reliability for individuals to reach grocery stores and other food retail outlets.

Implementing targeted transportation programs for vulnerable populations, such as low-income individuals, the elderly, and individuals with disabilities, is also recommended. These programs would address the unique challenges faced by these populations and provide specialized transportation services that cater to their specific needs.

Furthermore, creating targeted transportation programs for Native American populations in rural areas is essential, given the pressing issue of food insecurity within these communities. Developing specialized transportation programs, increasing transportation options, supporting local food production, establishing community food distribution centers, and adopting a culturally sensitive approach are key recommendations for addressing food insecurity in Native American communities.

Creating partnerships and collaborations between public transportation agencies, local governments, food retailers, and community organizations is crucial for developing innovative solutions. These collaborations can lead to the identification of transportation routes that best serve the needs of the community, the establishment of partnerships with local farmers, and the implementation of fare subsidy programs to make transportation more affordable for low-income individuals.

Promoting education and outreach efforts is another important recommendation to improve access to healthy food. Conducting outreach campaigns, providing educational programs, and collaborating with local community centers, schools, and healthcare facilities can raise awareness about transportation options and the benefits of healthy eating.

Finally, evaluation and continuous improvement are essential to ensure the effectiveness and sustainability of public transportation initiatives. Establishing mechanisms for ongoing evaluation, monitoring ridership data, seeking stakeholder feedback, and adapting strategies based on community needs are key elements of this process.

Furthermore, Mattson, Mistry, and Hough (2020) integrate insights from their assessment, revealing significant service gaps in rural transit, particularly affecting older adults, people with disabilities, and low-income individuals (Mattson, Mistry and Hough 2020). This assessment highlights the need for a substantial increase in service, quantified in additional vehicle miles and hours. The financial implications of addressing these service gaps are significant, necessitating an increase in annual operating funding and substantial investment in new vehicle purchases.

By addressing these services and funding gaps, and implementing the proposed recommendations, rural and small urban areas in North Dakota can make considerable progress in eradicating food insecurity and ensuring equitable access to nutritious food. It is imperative for policymakers, transportation planners, community organizations, and other stakeholders to collaborate effectively to implement these strategies. With focused efforts and continued commitment, public transportation can act as a driving force for positive change, guaranteeing that all individuals have equitable access to nutritious food, regardless of their geographic location or economic status. By embracing these recommendations, rural counties in North Dakota can set a precedent for other regions facing similar challenges, thereby contributing to a more food-secure and resilient society.

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