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Assessing the existence of food deserts, food swamps, and supermarket redlining in Saginaw: A small, racially segregated mid-Michigan city

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Abstract

Food insecurity is an issue that is commonplace in American cities but that impacts Blacks disproportionately. Unfortunately, most food access studies focus on large cities, leaving us with little knowledge of food access in small cities. This paper focuses on Saginaw, a small, racially segregated Michigan city. We examined the following questions: (1) How has the distribution of Saginaw's food outlets changed between 2013 and 2023? (2) Does Saginaw fit the definition of a food desert in 2013 or 2023? (3) Does Saginaw fit the definition of a food swamp in 2013 or 2023? (4) Has supermarket redlining occurred in Saginaw in 2013 or 2023? (5) How is population decline related to food outlet distribution? (6) How do food store closures impact food store distribution?

Food store data were collected and verified in 2013 and 2023 from Data Axle and other sources. We used ArcGIS 10.8.1 for spatial mapping and

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SPSS 28 for statistical analyses. We conducted regression analyses to determine how the distribution of food outlets changed over a decade, comparing the 577 food outlets identified in 2013 with the 452 found in 2023, a decline of 21.7%. There were 85 fewer food outlets in Saginaw in 2023 than in 2013. The study found evidence of a vanishing food infrastructure. Eighty-nine food outlets were shuttered in 2023; 43 were in Saginaw.

Restaurants dominated the food landscape in both study periods. Though many food access studies focus on supermarkets and large grocery stores, these venues composed only 4.9% of the food outlets in 2013 and 3.8% in 2023. Though portions of Saginaw had limited access to supermarkets and large grocery stores, describing the whole city as a food desert is inaccurate, nor did the findings support the food swamp or supermarket redlining theses.

Keywords
food insecurity, food access, supermarkets, grocery stores, food outlets, Whites, Blacks

Introduction

Food insecurity is a persistent worldwide phenomenon: about 258 million people in 58 countries were acutely food insecure in 2022 (Food Security Information Network and Global Network Against Food Crises, 2023). Food insecurity is also prevalent in the U.S.; in 2021, an estimated 33.8 million people lived in food-insecure households. The highest rate of food insecurity was found among Blacks and Hispanics/Latinx (Coleman-Jensen et al., 2017, 2021; Odoms-Young & Bruce, 2019).

Though Michigan is a significant agricultural producer, food insecurity and food accessibility, particularly among Blacks, are growing concerns (Taylor, Bell, et al., 2022). Numerous food access studies have been conducted in the state, but generally in Michigan's largest or more famous cities like Detroit, Grand Rapids, and Flint (Bell & Taylor, 2022; Budzynska et al., 2013; LeDoux & Vojnovic, 2021; Mayfield et al., 2017; Murthy, 2016; Pothukuchi, 2005; Reppond et al., 2018; Rybarczyk et al., 2020; Sadler et al., 2011, 2013a, 2013b, 2019, 2021a, 2021b; Saxe-Custack et al., 2019; Shaver et al., 2018; Taylor & Ard, 2015; Taylor, Farias, et al., 2022; Veldman, 2012; Westphal et al., 2012; Zenk et al., 2005, 2006, 2009, 2013, 2020). This study does something different. Defining food outlets as places where food is grown, produced, prepared, processed, sold, or distributed for free, it examines the small, racially segregated mid-Michigan city of Saginaw to find how food outlets are distributed and whether racial, income, and educational inequities are evident, in first-of-a-kind research on Saginaw's changing food landscape. The study examines the following questions: 1) How has the distribution of Saginaw's food outlets changed between 2013 and 2023? (2) Does Saginaw fit the definition of a food desert in 2013 or 2023? (3) Does Saginaw fit the definition of a food swamp in 2013 or 2023? (4) Has supermarket redlining occurred in Saginaw in 2013 or 2023? (5) How does population decline relate to food outlet distribution? (6) How do food store closures impact food store distribution?

The paper examines three common concepts from food access discussion: food deserts, food swamps, and supermarket redlining. This study assesses whether any of these terms describe Saginaw accurately or help us understand the city's food landscape. We argue that population decline, extensive food store closures, and the intermingling of different types of food outlets help explain the contemporary distribution of food outlets in Saginaw. This research is important because it is among the first to accomplish several milestones. It is one of the first studies to analyze an extensive array of food venues in a city in two different periods. It is also one of the earlier studies to examine the relationship between long-term population decline and a city's food infrastructure, and one of the first to analyze Saginaw's widespread closure of food venues and the impact on food access.

The paper will first summarize Saginaw's history and the demographic changes the city has undergone. The literature review focuses on the relevant theoretical concepts and the state of food access in Saginaw. Results from the two time periods follow an accounting of the methodology used and an analysis of the findings. The study's strengths and limitations are discussed and future directions are identified.

Saginaw: Historical Context

European explorers first visited the mid-Michigan region in 1790. The Chippewa were forced to cede the territory of which Saginaw is part in the 1819 Treaty of Saginaw (Cooper, 1933; Darling, 1950; Fierst, 2019; Manning, 2014; Mills, 1918;). Louis Campau established a trading post on the western side of the Saginaw River in 1816 and one on its east side in 1820. The two settlements, Saginaw and East Saginaw, developed simultaneously, but by 1860 East Saginaw outgrew Saginaw, and the cities merged in 1890 (Castle Museum of Saginaw County History, 2022; Cooper, 1933; Mills, 1918; Romig, 1973). Despite over a century of functioning as a municipality, the divide between the east and west sides of town influences contemporary food access.

Saginaw grew rapidly because of the timber boom, from 900 residents in 1850 to 29,500 in 1880. Settlers called the timber "green gold" and the Saginaw Valley the "lumber capital of the world." At its peak, in 1882 area mills produced over a billion board feet of timber. Saginaw also produced and exported salt (Cooper, 1933; Mills, 1918; Warner, 2006). By 1899, Saginaw expanded its economic activities to include agricultural production (sugar beet and beans) and coal mining. Automobile manufacturers also operated in Saginaw; the first car was produced in 1905 and by 1919 several automobile and truck companies, including General Motors, called the city home (City of Saginaw, 2020). Today, Saginaw County continues to have fertile soils: over 60% of the land is used for agricultural production and food preparation (Saginaw County Community Health Assessment, 2020; Saginaw County Roadmap to Health, 2017). However, access to food is a significant challenge for the city.

The Changing Racial Climate of the City

Saginaw's contemporary residential patterns are rooted in the nineteenth-century slavery and Reconstruction era when Black migrants from the South began settling on the city's Eastside in the 1860s, from 37 in 1860 to 276 in 1870 (Ross & Jezierski, 1982; Warner, 2006). Though the city's population reached its zenith in 1960, its White population peaked a decade earlier at 84,247. In 1950, there were only 8,608 Blacks in the city, but fueled by the Great Northern Migration and the promise of industrial jobs, the Black population soared. The rising Black population triggered White flight that began in the 1950s and has not ceased. The city's Black population peaked in 1990 at 28,040 (McKether et al., 2011; Warner, 2006). Saginaw is also home to Latinx/Hispanic residents. Drawn by agricultural and manufacturing jobs, 2,066 Mexican migrants from Texas and Mexico were settled in the city by 1930 (Cooper, 1933; Rosales, 2014). Saginaw is now a racially divided city: most Blacks reside on the east side of the Saginaw River, and most Whites reside west of the river or in the suburbs. Latinx/Hispanic residents are concentrated in the southwest corner (U.S. Census Bureau, 2010, 2020a, 2020b).

Today, Saginaw is a poor city dotted with vacant and abandoned properties (Mallach, 2012). About 21.8% of the city's residents live below the poverty level, compared to 13.1% of Michigan (U.S. Census Bureau, 2021). So, despite Saginaw County's agricultural productivity, food insecurity in the city is high.

Literature Review

Conceptualizing Saginaw's Food Landscape

The Food Desert Framing

Saginaw is frequently described by the media, civic leaders, and policymakers as a food desert (Bleu & Mose, 2024; Dent, 2023; Hunton, 2014). The concept of a food desert originated in the U.K. in the 1990s to describe suburban developments that lacked food stores and other community amenities (Beaumont et al., 1995; Cummins & Macintyre, 2002). The term is now commonly used to describe communities where residents lack ready access to fresh, healthy, and affordable foods. In the U.S., poor urban neighborhoods with high percentages of People of Color are often described as food deserts. However, some researchers argue that the food desert frame is misleading as it conjures images of empty landscapes lacking places to buy healthy foods. Such framing underestimates food availability and often ignores independent grocers, ethnic groceries, and small food stores that stock

healthy and culturally desired food (Alkon et al., 2013; Bell & Taylor, 2022; Bodor et al., 2007; Hale, 2004; Hill, 2017; Hubley, 2011; McKinnon et al., 2009; Raja et al., 2008; Sharkey et al., 2009; Short et al., 2007; Taylor & Ard, 2015; Taylor et al., 2023; Taylor, Farias et al., 2022; Taylor, Lusuegro et al., 2022). Moreover, the food desert framing ignores residents' initiatives to grow, produce, and sell healthy and affordable foods (Taylor & Ard, 2015; White, 2010, 2011a, 2011b).

Food Swamp

The food swamp concept has been used, including by U.S. Department of Agriculture researchers (Ver Ploeg, 2010a, 2010b; Ver Ploeg et al., 2009), to describe low-income urban communities like Saginaw that are saturated with fast-food restaurants, convenience stores, mini-marts, gas stations, and liquor stores selling highly processed foods. The argument claims that stores selling energy-dense foods overwhelm and displace those selling healthy food options, thereby forming food swamps. As a result, few or no supermarkets and large grocery stores are found in them (Bodor et al., 2010; Hager et al., 2017; Robitaille & Paquette, 2020; Rose et al., 2009; Schuck, 2022; Sushil et al., 2017).

Supermarket Redlining

A related term with increasing usage, supermarket redlining, describes the distribution of supermarkets and large grocery stores in urban areas (Wang, 2022; Joyner et al., 2022). Those supporting the concept contend that supermarkets and large grocery stores abandon low-income, inner-city neighborhoods and reopen in high-income or suburban areas, and that such economic decisions are racialized and facilitate the inequitable distribution of these food outlets (Crowe et al., 2018; Eisenhauer, 2001; Joyner et al., 2022; Shannon, 2016, 2018, 2021; Shannon et al., 2016, 2018, 2021; Zhang & Ghosh, 2016).

Food advocates argue that supermarket redlining is an outgrowth of the residential segregation and neighborhood redlining initiatives promoted by the Home Owners' Loan Corporation (HOLC) in 239 cities in the 1930s and 1940s (Eisenhauer, 2001; Joyner et al., 2022; LeDoux & Vojnovic, 2021; Sadler et al., 2021). Taylor (2014) discusses redlining, restrictive covenants, government-endorsed residential segregation, and White flight extensively. The HOLC 1937 map of Saginaw red-lined neighborhoods with Black renters; neighborhoods were yellow-lined because of the "threat of negro invasion" and "possible negro encroachment." Yellow-lined neighborhoods typically had recent European immigrants, working-class Whites, and a small number of Black residents and were adjacent to Black neighborhoods. Blue-lined neighborhoods contained native-born Whites in white-collar jobs and high incomes, while the wealthiest, most prestigious neighborhoods were green-lined; they contained native-born White executives in white-collar jobs. Furthermore, homes in green-lined neighborhoods were bound by racially restrictive covenants and deeds or zoning laws to prevent Black "infiltration" (Nelson et al., 2017). Zhang and Ghosh (2016) studied the relationship between redlining and the location of supermarkets. They constructed a supermarket redlining index and impact model that determined that when supermarkets closed in low-income Communities of Color, residents found it difficult to obtain healthy foods. Shannon (2018) found few supermarkets and superstores in Atlanta in once-redlined neighborhoods. Shannon (2021) also argues that supermarket redlining is connected to the spread of dollar stores in Communities of Color. Other researchers have supported the supermarket redlining concept (Cameron et al., 2010; Cantor et al., 2020; Chan-Tack, 2014; Li & Yuan, 2022; Miller et al., 2021; Russell & Heidkamp, 2011; Sbicca, 2012; Shannon et al., 2021; Widener & Shannon, 2014).

New Conceptualizations of Saginaw's Food Environment

Population Size, Decline, and Demographic Shifts

The protracted exodus of people from Saginaw is associated with the number of food outlets and their location in the city and suburbs. The city has lost many food stores, and we argue that population decline plays a major role in the loss because supermarkets and large grocery stores tend to operate where there are enough people to make the businesses viable. Hence, communities with few

residents or dwindling numbers have difficulty attracting or keeping food outlets.

Saginaw had a population of 98,265 in 1960, but less than half that number in the latest census. Table A1 (Appendix) shows how the population changed from 2010 to 2020 (U.S. Census Bureau 2010a, 2010b; 2020a, 2020b). While Michigan's population grew by 2% over the decade, Saginaw's population shrank as both Whites and Blacks fled the city. In 2010, there were 51,508 residents; by 2020, the population had plummeted 14.2% to 44,202. As the table shows, the city is composed mainly of Blacks, Whites, and Hispanics/Latinx. The largest racial group, Blacks (not Latinx/Hispanic), constituted 44.9% of the population in 2010 and 43.4% in 2020. From 2010 to 2020, Saginaw lost 17.1% of its Black population. The outmigration of Whites was even more pronounced, 21.1% moving from the city during the intercensal period. Thus, Whites composed 37.5% of Saginaw's population in 2010 and 34.4% in 2020. The Latinx/Hispanic population declined more gradually, falling 4.8% during the decade. Latinx/Hispanic residents made up 14.3% of the city's population in 2010 and 15.8% in 2020 (U.S. Census Bureau, 2010a, 2010b, 2020a, 2020b).

Vanishing Food Infrastructure and Store Closures

Researchers are addressing food store closures and have identified a vanishing food infrastructure in some Michigan cities, such as Flint (Bell & Taylor, 2022), Lansing and East Lansing (Taylor et al., 2023), and Detroit (Taylor et al., 2024), that have widespread food store closures. The studies found many closed grocery stores, restaurants, dollar and variety stores, urban farms and community gardens, and emergency food assistance organizations. Scholars have also found extensive grocery store closures in rural communities (Gillespie et al., 2022; Yeager & Gatrell, 2014). Food store closures accelerated during the COVID-19 pandemic and continued in the post-pandemic era.

The Intermingling of Food Outlet Types

To date, the food access literature has not identified configurations of food outlets that reflect what is commonplace in Saginaw. The city and surrounding suburbs present examples of neighborhoods where supermarkets and large grocery stores are *intermingled* with dollar stores, variety stores, corner and convenience stores, and other food outlets. The findings are similar in Detroit: rather than being driven out of neighborhoods and commercial strips by small grocery stores, dollar stores, variety stores, and fast-food restaurants, there is ample evidence that many of Detroit's supermarkets and large grocery stores co-mingle with smaller food stores or outlets selling unhealthy food. An analysis of the distribution of food outlets in Detroit found intermingled food outlets, rather than supermarkets and large grocery stores occupying exclusive zones (Taylor et al., 2024).

Food Access in Saginaw

Food insecurity and lack of access to food are common problems in Michigan and particularly in communities with large numbers of Black residents. According to Feeding America, 11.5% of Michigan residents are food insecure (2023b), as are 13.6% of Saginaw County residents (Feeding America, 2023a), compelling reasons to examine food access in Saginaw. The city is relevant to food access discussion as 59.2% of the residents are Black and Latinx/Hispanic. This is significant because Black and Latinx/Hispanic households nationwide are about twice as likely as White households to be food insecure; about 21.7% of Black and 17.2% of Latinx/Hispanic households are food insecure (Coleman-Jensen et al., 2017, 2021; Odoms-Young & Bruce, 2019). About 28.0% of Saginaw County Black residents, about 19% of Latinx/Hispanic residents, and 10.0% of non-Hispanic Whites experience food insecurity (Feeding America, n.d.). (Although Saginaw residents can obtain food from subsistence activities, they must be cautious about obtaining it; they live close to fishing and hunting areas, but fish from the Tittabawassee and Saginaw Rivers are contaminated with polychlorinated dibenzo-*p*-dioxins (PCDDs), dibenzofurans (DBFs), and polychlorinated biphenyls (PCBs) (Jude et al., 2010; Wan et al., 2010).

Despite the many food access studies conducted in Michigan, few assessments have been done in Saginaw. In 2014, Saginaw Valley State University students canvassed the city to find out

what was sold in 33 food stores (Hunton, 2014). Another indicator of food access in the city comes from a 2019 health assessment, that found that one in eight Saginaw County residents had difficulty traveling to food stores, and that Black residents earning less than US$30,000 were most likely to say they had difficulty accessing food (Saginaw County Community Health Assessment/Community Health Improvement Committee, 2020).

Saginaw conducted a city-wide feasibility study to assess food access and the likelihood of converting a publicly owned vacant building into a grocery store in 2023. When asked what the most significant barrier was to acquiring food (N = 493), 78% of the respondents who drove to buy food and 69% of those who took the bus said that the high cost of food was the biggest obstacle to obtaining the food they wanted and needed. It was found that 55% of 637 responses indicated that attracting a new grocery store to the city is the most likely way to expand food access. To improve access, 43% of the respondents suggested more food pantries, 30% suggested more significant support for urban farms and locally grown food, and 19% suggested greater opportunities to grow food in community gardens would. There was an income divide in resident preferences. Most very low-income respondents (56%) wanted to see more food pantries, and 42% wanted a new grocery store. In contrast, 60% of the low-income respondents and 71% of those who were not low-income desired a new grocery store. Food pantries were the top priority to expand food access for 39% of those classified as low-income and for a third of respondents who were classified as not low-income (Colby et al., 2024).

Ninety-eight percent of the respondents said they got their groceries at Kroger, Walmart, or other supermarkets. However, very low-income respondents obtained groceries from dollar stores, convenience stores, gas stations, and food pantries. Eastside respondents were more likely to say they got groceries from dollar stores and food pantries than Westside residents. In the end, most residents selected the new grocery store option as the strategy the city should use to enhance food access, with 70% of Blacks wanting a new store (Colby et al., 2024). Residents preferred a non-profit grocery store or food club to a member-owned food cooperative or a for-profit grocery store (Colby et al., 2023; Dent, 2023).

Superstores built on the outskirts of town try to attract customers. For instance, Walmart has operated a free bus program since 2012 to facilitate Saginaw residents' trips to and from the store (Hunton, 2014). Nonetheless, 22% of survey respondents said that making it easier to get groceries by bus would enhance food access (Colby et al., 2024).

The USDA's Classification of Food Access in Saginaw's Census Tracts

The USDA Economic Research Service (ERS) classifies most Saginaw census tracts as low-income and low-access (2023). In 2009, the ERS began mapping food access to identify communities with low availability of and access to affordable, nutritious food, and found that food deserts were ubiquitous (Karpyn et al., 2019). Since 2013, the USDA has reduced its reliance on the term food desert, the ERS replacing it with low-income, low-access terminology for census tracts with limited access to healthy food. However, even with the new terminology, access is still measured as the presence of supercenters, supermarkets, and large grocery stores in each census tract. The ERS excludes drug, dollar, and convenience stores from its calculations because it claims to lack information on these types of food outlets (USDA Economic Research Service, 2023). However, the ERS identifies the locations of full-service and fast-food restaurants, convenience stores, and specialty food stores in its Food Environment Atlas (USDA Economic Research Service, 2019; 2024).

Methodology

Defining the Study Area

We undertook a comprehensive study of food outlets in Saginaw and surrounding townships in 2013 and 2023. Data were collected in 2013, when scholars were beginning to challenge the dominant food desert narrative by studying a broader range of food outlets and expanding understanding of the food environments in low-income communities of color. The second round of data was collected

because we were interested in determining how the distribution of food outlets had changed in the decade since we first collected data.

We included the surrounding townships to account for the "edge effect." Research has demonstrated that urban dwellers do not stop at a city's boundary when shopping for food; they frequently buy food in adjacent suburbs (Devries & Linn, 2011; LeDoux & Vojnovic, 2013; Rose, 2011). Data from Saginaw indicate that most residents shop for groceries outside the city (Colby et al., 2024). Therefore, it is judicious to create a buffer around the city and gather and analyze data within the buffer, which offers a more realistic assessment of food access than analyzing only the food outlets within city limits. Scholars have used buffers ranging from four to sixteen kilometers in food studies, depending on the size of the city or metropolitan area and shopping patterns (Rybarczyk et al., 2020; Sadler et al., 2011). We used an eight-kilometer buffer around Saginaw to define the study area. Eight kilometers is appropriate because the number of food outlets declined precipitously beyond this distance. The buffer captured food venues with food delivery services and those that provide bus service to their stores.

Data Collection and Sources

Data were collected on the food outlets of Saginaw and its surrounding townships in 2012–2013 and 2022–2023. We developed a typology of 13 major categories and 57 subcategories of food outlets (Bell & Taylor, 2022; Taylor, Bell et al., 2022) to determine how many food venues of what type were present. Each outlet is defined in Supplement Table S1, which also lists the sources of definition when they were derived from elsewhere.

Taylor, Bell et al. (2022) developed a comprehensive typology of food venues used in this study. The typology incorporates numerous types of food establishments overlooked in earlier studies. Data Axle (formerly ReferenceUSA), our primary data source, stores information on U.S. and Canadian businesses and is the foremost source of information on establishments that sell food, providing information to scholars such as Liese et al. (2010), Lisabeth et al. (2010), Raja et al. (2008), Rybarczyk et al. (2020), Taylor & Ard (2015), and Taylor, Bell, et al. (2022). To search for food venues, we used the Standard Industrial Classification (SIC) division code, the federal government's primary classification system for commercial enterprises, which groups businesses into divisions, major groups, and industry groups. We used 153 SIC codes to identify food establishments to study, also using the major group, industry group, and industry codes as filters to help identify more food establishments. This multi-stage search technique is the most effective way of identifying outlets and finding significant numbers of them. Consequently, other food access researchers have used SIC codes to identify food outlets (Lisabeth et al., 2010; Moore & Diez Roux, 2006; Raja et al., 2008; Rybarczyk et al., 2020; Taylor & Ard, 2015; Taylor, Bell et al., 2022).

As not all food outlets can be found through Data Axle searches, we found additional food vendors using directories of urban farms, community gardens, local emergency food assistance programs, stores that accept electronic benefits transfer (EBT) cards and that participate in Women, Infants, and Children (WIC) programs, and Google and Bing search engines.

Spatial Mapping

After identifying food outlets, we mapped and displayed them visually and analyzed them statistically. The latitude and longitude coordinates were plotted on maps using ArcGIS Pro 10.8.1. We acquired jurisdictional boundaries from the U.S. Census Bureau Open Data mapping tool (2020d), then extracted the shape files for Saginaw and its suburbs.[1] We also combined 2020 census tract data and neighborhood characteristics with the spatial data. The food vendor data were inserted as a comma-separated value file. We used the NAD 1983 Michigan GeoRef to project the shapefiles onto the map.

Census tract data on Saginaw's population size,

[1] These are Carrollton Township, Buena Vista Charter Township, Zilwaukee Township, Kochville Township, Tittabawassee Township, Saginaw Charter Township, Thomas Township, James Township, Spaulding Township, and Bridgeport Charter Township (U.S. Census Bureau, 2020c).

median household income, racial characteristics, and the percentage of residents with high school education were obtained from the 2010 and 2020 census. We computed the demographic information for census tracts partly contained in city, township, and county boundaries by clipping the tracts and using proportional allocation to estimate demographic characteristics (see also Taylor & Bell, 2022). See the complete data in Supplement Table S2.

Statistical Analyses

This study sought to understand how the distribution of food outlets in Saginaw and surrounding townships is related to racial and socio-economic factors and how these have changed over time. To this end, we examined census tract characteristics in each study period and their association with the number and type of food outlets present.

We used census tract data from 2010 and 2020, as these two data-gathering years were closest to our study periods. In 2010, the study area had 48 census tracts with about 132,021 residents; it had 51 census tracts and about 123,185 residents in 2020. We examined the demographic attributes of the census tracts for 2010 and 2020. We created a categorical variable for the year the data was collected, and we analyzed the racial characteristics of census tracts by creating another categorical variable to describe the percentage of Black residents in each tract. Two groups of census tracts were studied: census tracts with 0%–40% Blacks were categorized as low Black (LB) tracts. Tracts with more than 40% Blacks were classified as high Black (HB) tracts.

Because the data is not normally distributed, we used a Mann-Whitney U Test to determine whether there were significant differences in the number and types of food vendors in the two categories of census tracts and years of data collection (Figures B1a and B1b in Appendix B).

We created two models: the direct model analyzed the census tracts' racial attributes, population density (pop/km^2), median household income per US$1,000, and residents' education (Supplement Table S3), while the interaction model added and examined the relationship between the census tract racial composition and median household income per US$1,000 (Supplement Table S4). However, we omitted some types of food outlets from the regression analysis if there were not enough observations in particular food categories.

Results

The Food Landscape of Saginaw and the Surrounding Area

The paper involves hundreds of food outlets from Saginaw and its suburbs. Only the categories and types of food stores we collected data on in *both* study periods are analyzed in this portion of the article. We compared 577 food outlets in the 2013 study area with the 452 found in 2023. Tables A2a and A2b in the Appendix show that the number of food venues declined by 125 (21.7%) during the study period, and the decline was evident in both the city and suburbs. More food outlets were built outside the city than inside it; in 2013, 228 were in Saginaw and 349 were in the surrounding townships. However, the number and percentage of food outlets in Saginaw dropped precipitously by 2023; 143 were within the city limits, and the remaining 309 were in the suburban area. In other words, there were 85 fewer food outlets in Saginaw in 2023 than in 2013. Figures B2a and B2b in Appendix B show the distribution of these outlets in and around Saginaw. Figure B2c visually compares the number of each type of food outlet in Saginaw and the suburbs in each study period.

The Grocery Sector

The study area's grocery sector had two major categories of food venues: supermarkets and large grocery stores, and small grocery and convenience stores. There were 28 supermarkets and large grocery stores in the study area in 2013 but only 17 in 2023. Almost 90% of the supermarkets in both study periods were in the surrounding townships. However, it should be noted that supermarkets and large grocery stores compose only a tiny portion of the study area's food landscape in each period—4.9% in 2013 and 3.8% in 2023 (Figures B3a and B3b in Appendix B).

In 2013, Saginaw had two traditional supermarkets and one limited-assortment store. The city lost one of the Eastside supermarkets, leaving the

city with only one supermarket/large grocery store on each side of the river in 2023. The suburbs had a much richer array of supermarket and large grocery store options than Saginaw in both study periods.

Small grocery and convenience stores were the second most common food outlet type in the study area. These stores declined during the study period. The city lost 12 small groceries, convenience, corner stores, and mini marts between 2013 and 2023, 57.1% of its small grocery/convenience/corner stores. In comparison, the suburbs also lost 19 (38.7%) of these food venues in the study period (Figures B4a and B4b in Appendix B).

Pharmacies and Variety Stores

We studied pharmacies, drug stores, dollar stores, and variety stores because food is often sold in them. Such food establishments proliferated in the study area, forming an increasing percentage of the food outlets. However, most of the growth occurred in the suburbs. The suburbs had 20 pharmacies, dollar stores, and variety stores in 2013 and 34 in 2023. The city of Saginaw had fewer of these food outlets in the second study period than in the first, 21 pharmacies, dollar stores, and variety stores in 2013 and 15 in 2023 (Figures B5a and B5b in Appendix B).

Bakeries and Other Specialty Vendors

The specialty food stores and vendors remained remarkably stable during the decade. There were 38 such venues in 2013 and 39 in 2023. However, the number of bakeries increased by 60%. Saginaw gained four new bakeries and five opened in the suburbs. There were fewer health food stores and meat markets/delicatessens, Saginaw losing two health food stores and three meat markets/delicatessens. Saginaw had no ice cream parlors or confectionary shops during either study period (Figures B6a and B6b in Appendix B).

Restaurants and Food Services

Restaurants and other food service operations were the most common food venues in the study area in both periods. During the study period, however, the area lost 66, or a fourth of its restaurants and food service establishments. The decline was more evident in Saginaw, which lost 46 (54.8%) of its 2013 84 restaurants and food services (Figures B7a and B7b in Appendix B).

It should be noted that the study area had more full-service restaurants (109) than fast-food restaurants (100) in 2013, but by 2023, there were fewer of both types of restaurants, and fast-food restaurants outnumbered full-service ones. In 2023, there were 82 fast-food and 60 full-service restaurants. The shift occurred because many more full-service restaurants closed than fast-food ones. The study area lost 49 of its full-service restaurants. Saginaw lost 21 (60%) of its full-service restaurants, while the suburbs lost 28 (37.8%) of theirs. In comparison, the study area lost 18 of its fast-food restaurants. Saginaw had 21 fast-food restaurants in 2013 and 16 in 2023.

Agricultural Sector

The urban agriculture sector is important for growing and producing food for personal consumption, sale, or donation. The number of urban farms, community gardens, farmers markets, and produce markets in the study area dropped from 15 in 2013 to six in 2023—a 60% decline. Most of these food venues were in Saginaw, so the decline was steepest in the city. During the study period, Saginaw lost seven of 10 (70%) of these food venues. In 2023, Saginaw contained the study area's sole farmers market/produce market and two of the three urban and community gardens. However, Saginaw had no community-supported agriculture (CSA) or dairy outlets (Figures B8a and B8b in Appendix B).

Distributors and Other Supply Chain Vendors

This study identified 11 distributors and supply chain establishments in 2013 and eight in 2023. In 2013, 63.6% of the distributors and supply chain venues were in Saginaw; half of them were in the city in 2023. Saginaw had five wholesalers in 2013, but none in 2023 (Figures B9a and B9b in Appendix B).

Food Assistance Organizations

Food assistance organizations are critical to the food landscape as they distribute free or nominally priced food. the sole or primary food source for many low-income people. During the study period,

the area lost 24 (38.1%) food pantries, soup kitchens, and food banks. The area had 63 emergency food outlets in 2013, which dropped to 39 by 2023. Saginaw had most of the emergency food venues in both study periods. Over the decade, Saginaw lost 14 food pantries and soup kitchens, while the suburbs lost 12. They accounted for 15.7% of the food outlets in 2013 and 16.1% in 2023 (Figures B10a and B10b in Appendix B). Despite the drop in emergency food outlets, these venues remain essential to the city's food infrastructure.

Additional Food Retailers Studied in 2023

Thus far, we have compared 577 food outlets identified in 2013 with 452 identified in 2023. The 2023 data collection efforts, however, expanded the categories and types of food outlets that were searched for, in order to include food sources such as mobile vendors and take-out food operations that were not included in our 2013 data collection efforts. The COVID-19 pandemic highlighted the significance of these food outlets as places where people obtained food, so we incorporated them into our study in 2023.

The expanded search yielded an additional 146 food outlets, recorded in Table A2b in Appendix A and shown in Figure B11 in Appendix B. Table A2b shows that the expanded search yielded 27 take-out restaurants, 21 farmers markets and produce vendors, and 13 mobile food vendors. The new search also found 69 social, educational, religious, and community service establishments.

Changing Distribution of Food Outlets: Population Density and Census Tract Racial Characteristics

The 2013 Distribution

Analyzing the percentage of food outlets alone is insufficient to help understand their distribution fully, so we also examined the density of food outlets. We found 4.26 outlets per thousand residents in 2013 (Supplement, Table S4a), with 3.73 outlets per thousand in Saginaw and 4.37 per thousand in the surrounding townships. However, the rate of occurrence of small grocery stores/convenience stores/corner stores and pharmacies/dollar stores/variety stores was higher in Saginaw than in the suburbs. Emergency food assistance was also more concentrated in Saginaw than the surrounding townships. There were 1.15 emergency food assistance operations per thousand residents in Saginaw and 0.59 per thousand in the suburbs. The reverse was true for restaurants and other food service: there was a greater concentration in the surrounding townships than in Saginaw.

The racial composition of census tracts was related to the distribution of food outlets. LB census tracts had more food outlets per thousand than HB tracts, 4.30 food outlets per thousand in LB tracts and 4.13 per thousand in HB tracts. Saginaw's HB census tracts had higher concentrations of small grocery stores/convenience stores/corner stores and emergency food outlets than LB tracts. The reverse was true for pharmacies/dollar stores/variety stores and restaurants/food service. Except for specialty food stores and vendors, all the categories of food outlets studied were located at higher rates in LB census tracts than in HB tracts in the surrounding townships.

The 2023 Distribution

There was a decline in the density of food outlets between 2013 and 2023. In 2023, the study area had 3.61 food venues per thousand residents (Supplement, Table S4b). As was the case in 2013, the density of food outlets was much lower in Saginaw than in the surrounding townships, 2.70 food outlets per thousand in Saginaw and 3.93 per thousand in the suburbs. The density of restaurants was higher in the suburbs than in Saginaw, but the reverse was true for the density of small grocery stores/convenience stores/corner stores and pharmacies/dollar stores/variety stores.

Multivariate Analyses of Temporal Changes in the City's Food Environment

Regression Analysis and Tests for Significance

Thus far, we have examined six bivariate relationships. We probed deeper by examining how food outlet distribution changed when several variables were analyzed simultaneously. We conducted a Mann-Whitney U Test to ascertain statistically significant differences in the number of food outlets in each major food category studied in 2013 and

2023 (Supplement, Table S5). Only one significant difference was identified: the total number of food outlets identified in Saginaw in 2013 significantly differed from the number found in 2023 (U = 112.00, p = 0.045).

Poisson and negative binomial regressions were conducted to determine the likelihood of having an additional food outlet in a census tract. We assessed whether the year of data collection was related to the likelihood of having an additional food outlet. Then we investigated whether the census tract's racial composition, median household income, percentage of the population with at least a high school education, and population density per square kilometer contributed to an increase or decrease in likelihood of having a food venue (Supplement, Table S6). The results of regression analysis reveal that in most major food categories, there was an increase in the likelihood of having an additional food outlet in 2013 compared to 2023, but that none of the increases were statistically significant. For example, the results indicate that for the entire study area and suburban area, an additional supermarket or large grocery store is about 2.6 and 2.5 times more likely to be present in 2013 than in 2023.

Supermarkets and large grocery stores were not analyzed in Saginaw because there were too few in the city. Nonetheless, the findings for Saginaw reveal that an additional restaurant or other food service was about 1.4 times more likely to be present in 2013 than in 2023. Moreover, an additional emergency assistance outlet was about 1.2 times more likely to be present in Saginaw in 2013 than in 2023. It should be noted that two major food categories, small groceries and convenience stores, and pharmacies/dollar/variety stores, were less likely to be found in the study area in 2013 than in 2023.

Census Tract Racial Composition

Regression results for the study area showed a 52.8% decrease in the likelihood of having an additional small grocery or convenience store in tracts that are more than 40% Black compared to those that are 0–40% Black. In Saginaw, HB tracts are less likely to have an additional food outlet regardless of type than LB tracts. Statistically significant results were observed for most food categories analyzed in the city.

Median Household Income and Educational Attainment

Several statistically significant relationships were observed between median household income and major food categories. Generally speaking, the likelihood of having an additional food outlet decreased for every US$1,000 increase in median household income.

For every percentage increase in the population having at least a high school education in the study area, the likelihood of having an additional supermarket or large grocery store increased by 15%, and the likelihood of having an additional pharmacy, dollar, or variety store increased by 6.1%. In Saginaw, the likelihood of having an additional food outlet dropped as the percentage of the population having at least a high school education increased. In the suburbs, for every percentage point increase in the population having at least a high school education, there was an increased likelihood of having an additional supermarket or large grocery store, pharmacy/dollar store/variety store, or specialty food store or vendor.

Supermarket Redlining

The analysis led us to examine popular theses used to explain food access and how food outlets are distributed. We first investigate if the supermarket redlining thesis accurately described what we found in Saginaw and its suburbs. We examined how supermarkets, large grocery stores, dollar stores, and variety stores were distributed in relation to the HOLC 1937 redlining map. Figures B12a and B12b in Appendix B show the location of supermarkets/large grocery stores and dollar stores/variety stores superimposed on the redlining map. Most of Saginaw was yellow-lined; only tiny slivers were green-lined. There were no supermarkets, large grocery stores, or dollar stores/variety stores in formerly green-lined neighborhoods in either study period. In both study periods, the maps and Table A3 in the Appendix show that the supermarkets and large grocery stores were in formerly yellow-lined and uncolored areas. In 2013, there was one dollar/variety store in a formerly blue-

lined neighborhood and seven in formerly yellow-lined areas (Figure 12a). The 2023 map shows that nine dollar/variety stores are in formerly yellow-lined neighborhoods, and 15 are in neighborhoods not color-coded (Figure 12b).

Food Swamp or Intermingling of Food Outlets

We also examined whether the food swamp thesis accurately described the study area's food landscape by analyzing the distribution of supermarkets and large grocery stores, small grocery/convenience/corner stores, liquor stores, gas stations, and fast-food restaurants. We found no evidence that supermarkets/large grocery stores were displaced from locations by the other types of food establishments studied (Figures B13a and B13b in Appendix B). Rather, we found that supermarkets and large grocery stores were intermingled with other food outlets. The supermarkets and large grocery stores were neither isolated nor in stand-alone locations; they operated beside or close to the other food venues. The intermingling of supermarkets/large grocery stores occurred in Saginaw and the surrounding townships.

Store Closures and Vanishing Infrastructure

Many cities have seen food store closures, especially since the COVID-19 pandemic. Thus, in 2023 we identified the closed food outlets in the study area (Figure B14 in Appendix B). The study found 89 closed food outlets: 43 in Saginaw and 48 in the surrounding townships. The many food store closures signal a vanishing infrastructure that significantly impacts the study area.

Most of the closed food venues were in LB census tracts: 56 in LB census tracts, and 35 in HB tracts. Most of the suburban closed food venues were also in LB census tracts: 39 closed food establishments in the surrounding townships were in LB tracts, and nine in HB census tracts. However, the reverse was true for Saginaw; 26 of Saginaw's closed food venues were in HB tracts, and 17 in LB census tracts.

Discussion, Implications, and Actions

Despite the many food access and food insecurity studies conducted in Michigan, because none as comprehensive as this has been conducted in Saginaw our study provides needed information on a city with limited food access assessments (Colby et al., 2024; Hunton, 2014). A highly relevant and timely contribution, our study fills a gap by comprehensively examining food access in the city and surrounding townships. The study is also important because most Saginaw census tracts have been designated as low-income and low-access tracts by the ERS (2023). The study provides a detailed analysis of food outlets in such a community during two periods by showing how food access changed with time.

We included the surrounding townships and extended the study area beyond the city of Saginaw boundary because research shows that people do not limit their food shopping activities to the confines of their cities or always shop at the food retailers closest to their residences. Studies show that shoppers routinely travel three or more miles to obtain food (Reed, 2011; Rose et al., 2011; Rybarczyk et al., 2020; Sadler et al., 2013; Zenk et al., 2005). Thus, incorporating the surrounding townships in the study provided a more accurate depiction of residents' food environments. The expanded study area also allowed us to compare the city and suburbs, examine inequities in the two locales, and learn about access to different food retailers and how it changed over time. This work also builds on earlier food access studies by examining a comprehensive list of food retailers and mapping their locations to produce a more detailed view of the local food environment.

Distribution of Food Retailers

Racial Characteristics and Population Decline

We studied eight major categories of food stores and compared the 577 food stores found in 2013 with the 452 found in 2023. The food outlets are not distributed equitably across census tracts; most were in LB tracts in both study periods.

The Saginaw results mirror the findings of similar studies conducted in other Michigan cities. In Flint, census tracts where 40% or more of the residents were Black had lower access to traditional full-line supermarkets and large grocery stores than residents of census tracts with 40% or fewer Blacks (Taylor, Bell et al., 2022). The same was seen in

Lansing and East Lansing, where census tracts composed of more than 60% Blacks had less access to these outlets than those in census tracts with 60% or fewer Blacks (Taylor et al., 2023).

Supermarkets and Large Grocery Stores

Food access scholarship has focused heavily on the presence of and access to supermarkets and large grocery stores when characterizing and analyzing food environments. However, our study found that supermarkets and large grocery stores accounted for less than 5% of the area's food outlets in 2013 and 2023. Similar findings have been reported in other cities. Traditional full-line supermarkets and large grocery stores composed 3.3% of Lansing food outlets, 1.4% for East Lansing, 0.7% for Flint, and 1.8% for Detroit (Taylor et al., 2023; Taylor & Ard, 2015; Taylor, Bell, et al., 2022).

In 2023, only 17 supermarkets and large grocery stores operated in the study area. Saginaw had three supermarkets in 2013 but only two in 2023. Not only are most of the supermarkets and large grocery stores in the surrounding townships, but the bulk of them are in the northwestern portion of the suburban area. This indicates a racialization and disproportionate impact not identified in earlier food access studies. The clustering of supermarkets/large grocery stores and other food venues in the northwestern quadrant means that Saginaw Westside residents can travel more readily to suburban food outlets than Eastside residents. Colby et al. (2024) found that residents of Eastside had greater difficulty accessing food stores than Westside residents. Westside residents are mostly White and Latinx/Hispanic and Eastside residents are primarily Black. Any efforts to remediate inequitable access to supermarkets and large grocery stores must consider the distribution and focus foremost on improving access on the Eastside.

Saginaw lost many of its supermarkets long ago as the city deindustrialized and lost much of its population. The number of grocery stores in the Saginaw urbanized area peaked at 41 in 1934, when the city had 15 A&P grocery stores and 10 Kroger supermarkets. The rapid growth in supermarkets and grocery stores corresponded to brisk population growth. Saginaw's population grew by 22.6% from 1920 to 1930 and 30.4% between 1930 and 1940. However, since 1970, the city's population has declined rapidly, dropping by 6.5 to 15.6% during each intercensal period. From 1970 onwards, there have been fluctuations in the number of supermarkets and grocery stores in the study area, but generally they have declined (Gwynn, n.d.; U.S. Census Bureau 2010a, 2010b; 2020a, 2020b, 2020d).

A declining population makes it challenging to keep supermarkets in a city or town (Colby et al., 2023). Since 1925, 42 supermarket and grocery chains have operated in the Saginaw Urbanized Area, including national and regional brands such as Kroger, A&P, Kmart, Meijer, IGA, Farmer Jack, and Save-A-Lot. Most operated for a few years before abandoning the area. Between 1934 and 1965, nine to eleven supermarket/grocery chains operated in the area. Since 2000, between four and seven chains do. Not only is the total number of supermarkets and large grocery stores shrinking, but the variety that customers can choose from has also shrunk.

Small Grocery and Convenience Stores

Our study supports the claim that small grocery stores, convenience stores, corner stores, and mini marts abound in cities. We found that small grocery and convenience stores composed a significant portion of the food landscape, about a fifth of Saginaw's food landscape in 2013 and nearly a fourth in 2023. Studies find that these food establishments are also plentiful in Lansing, East Lansing, Flint, and Detroit (Taylor et al., 2023, 2024; Taylor & Ard, 2015; Taylor, Bell et al., 2022).

Small grocery and convenience stores were unevenly distributed in the study area. Overall, HB tracts had a higher rate of small grocery stores or convenience stores per 1000 in 2013 and 2023 than LB census tracts. This finding supports claims made by other researchers that poor communities and People of Color communities host a greater density of small grocery and convenience stores than high-income communities or ones with low percentages of People of Color (Dawkins et al., 1979; Gordon et al., 2011; LaVeist & Wallace, 2000; Lee et al., 2010; Morland et al., 2002; Sharkey & Horel, 2008). We make a more nuanced

argument, however, because it matters where the food outlets are being examined, city or suburb. Our study found that small grocery and convenience stores were located at a higher rate per 1000 residents in HB tracts than in LB census tracts in Saginaw, but not in the surrounding townships. In the suburban ring, the LB census tracts had a higher density of small grocery and convenience stores than the HB census tracts. In Saginaw and the surrounding townships, HB census tracts had a substantially higher poverty rate, lower household income, and lower educational attainment than LB census tracts.

Powell et al. (2007) also add nuance to the argument that low-income communities and Communities of Color have more small grocery and convenience stores than high-income neighborhoods with a low percentage of People of Color. Their research found that the mean number of supermarkets, grocery stores, and convenience stores peaks in middle-income neighborhoods and is lowest in upper-income communities.

Though Saginaw's civic leaders and food advocates focus on increasing supermarket access (Saginaw Community Food Club & Kitchen, 2024; Saginaw County Community Health Assessment/ Community Health Improvement Committee, 2020; Mose, 2022), our findings suggest an urgent need to pay attention to small grocery stores, convenience stores, and corner stores as well. Although these stores are often maligned for selling high-priced, unhealthy foods (Bodor et al., 2010; Caspi et al., 2017; Cavanaugh et al., 2013; Gebauer & Laska, 2011; Gittelsohn & Kumar, 2007; Laska et al., 2010; Sadler et al., 2013a; Sharkey et al., 2012; Shaver et al., 2018), they occupy an important niche in the food landscape of urban, low-income neighborhoods and rural communities. In Saginaw, 85% of the food stores that accept Supplemental Nutrition Assistance Program (SNAP) cards are convenience stores, corner stores, and dollar stores (Colby et al., 2024; USDA Food and Nutrition Service, 2023). The study shows that Saginaw lost 57.1% of its small grocery, convenience, and corner stores over a decade. The significant loss of these stores in Saginaw could mean that some residents will have difficulty finding places to purchase food and other essentials.

While there are healthy corner store initiatives in cities like Detroit, Philadelphia (The Food Trust, 2022; Pothukuchi, 2005), and many others, Saginaw has no such program. There is great need for an initiative like this in the city, and Saginaw should implement one soon. Civic leaders should provide funds and other resources to help convert existing corner stores into venues that sell fresh, healthy, and affordable food. Existing vacant stores like the Walgreens and Rite Aid pharmacies can be converted into grocery stores. These types of brick-and-mortar stores already have infrastructure for equipment like refrigerators and freezers that are necessary in food stores. A healthy corner store initiative could also create new small grocery stores where none exist.

Experimenting With Small-Format Grocery Stores

Cities like Saginaw can also try to attract downsized grocery stores. Recent assessments of the grocery retail industry have found that small-format grocery stores are revolutionizing the industry. The pandemic helped to push retailers in this direction (Ghai, 2023). Some grocery chains have gone from building 50,000+ square-foot stores to 10,000-square-foot outlets. For instance, Detroit's Whole Foods Supermarket is smaller than the usual 40,000+ square-foot store the chain usually builds. The chain is building small-format, "daily shop" Whole Foods stores in New York City and other urban areas that are 7,000–14,000 square feet. Trader Joe's opened a 2,800-square-foot grab-and-go store in Manhattan in 2024 (Bigora, 2024; Kang, 2024). Other retailers like Big Y are introducing 10,000-square-foot small-format stores. Meijer, Publix, Wegmans, Hy-Vee, and Target are also experimenting with small-format stores (Ghai, 2023).

Restaurants Dominate the Food Environment

Restaurants are the most common food outlet type identified in our study, representing 45.6% of the study area's food landscape in 2013 and 43.6% in 2023. These data align with findings from other Michigan cities where restaurants compose over a fourth of the food environment (Taylor et al., 2023, 2024; Taylor & Ard, 2015; Taylor, Bell et al., 2022). In both study periods, the LB census tracts

had more restaurants and food services per 1000 persons than the HB tracts; this was true for the entire study area and Saginaw. Fast-food restaurants surpassed full-service restaurants in number and, by 2023, composed the most significant component of the restaurant sector.

Michigan has a Restaurant Meal Program that allows residents on food assistance programs to use their Michigan Bridge or SNAP card to purchase prepared food. To be eligible, one must receive food assistance benefits, or be 60 years or older, or be disabled, or be homeless, or be the spouse of a food assistance recipient. Only three Saginaw restaurants participate in the program. All are Subway Restaurants, and all are on the Westside (Michigan Department of Health and Human Services, 2024). Not only should there be oversight of the extent to which participating restaurants sell fresh and healthy foods, but the city should also make the program more accessible and equitable by having participating food outlets on the Saginaw Eastside.

Urban Farms, Farmers Markets, Community Gardens, and Produce Vendors

Our analysis of Saginaw's urban farms, farmers markets, community gardens, and produce vendors revealed another unique finding that contributes to the food access literature. The study found that two-thirds of the food outlets in this category were in Saginaw in 2013, and half were in the city in 2023. Of those in Saginaw, only two were in the HB census tracts in 2013, and all were in the HB tracts in 2023. This finding corroborates earlier studies that show that farmers markets can reduce food insecurity and provide access to healthy foods in low-income areas (Becot et al., 2020; Karpyn et al., 2012; Taylor, Farias et al., 2022; Widener et al., 2012). National studies also show that the number of low-income people in government food assistance programs shopping at farmer's markets has increased significantly since 2013 (Farmers Market Coalition, 2020; USDA, 2020). Past studies have also shown that community gardens are vital for food production and practicing food justice and sovereignty in poor Communities of Color. Community gardens also enhance access to free food in such communities (Taylor, Lusuegro et al., 2022). Saginaw could increase food access by supporting mobile food trucks, or "veggie vans," that could travel through city neighborhoods on specified days and routes. The trucks can sell or give away local urban farm and community garden produce.

The USDA collects information on farmers markets and maintains the *National Farmers Market Directory*, but the information from the Agricultural Marketing Service is not connected to the information that the ERS provides on their Food Access Research Atlas or Food Environment Atlas (USDA Agricultural Marketing Service, 2024; USDA Economic Research Service, 2023, 2024). These databases should be connected in order to enhance efforts to understand and assess food access.

Emergency Food Assistance Venues

In 2013, most of the study area's emergency food assistance venues (58.7%) were in LB census tracts. There was a difference between Saginaw and the suburbs; 69.4% of Saginaw's emergency food outlets are in the HB census tracts. In contrast, in the suburbs 96.3% of the emergency food outlets are in the LB tracts. In 2023, emergency food outlets were found to have shrunk considerably and are almost equally divided between the LB and HB census tracts. The distinction between the city and suburbs remains, as 73.9% of Saginaw's emergency food assistance venues are in the HB tracts. Conversely, 87.5% of the suburban emergency food assistance venues are in the LB census tracts.

The concentration of food assistance organizations in Saginaw HB census tracts can be attributed to the high poverty rate, low household income, and low educational attainment that characterize these tracts. The presence of so many emergency food assistance venues indicates that food outlets that distribute free food are a vital part of the urban food landscape that should not be overlooked in assessments of food access. There is no question that these food outlets are vital food sources for Saginaw residents. As Colby et al. (2024) found, most of the very low-income respondents in their survey thought that food assistance organizations would be the most effective means to enhance food access in the city.

Earlier studies found a robust emergency food assistance infrastructure in other cities (Taylor et al., 2023; Taylor & Ard, 2015; Taylor, Bell et al., 2022; Taylor, Wright et al., 2022). Scholars also point to the expanded role that emergency food assistance programs played in enhancing food access during the COVID-19 pandemic and continue to play in the post-pandemic era (Taylor, Wright, et al., 2022).

This study points to the need to assess the emergency food infrastructure of communities where food access studies are being conducted. In cities like Saginaw, where many people rely heavily on emergency food assistance organizations (Colby et al., 2024), care must be taken that such food outlets are serving and distributing healthy foods. Researchers have found that emergency food outlets sometimes serve and give away unhealthy, highly processed, energy-dense foods (Oldroyd et al., 2022; Short et al., 2022; Sisson & Lown, 2011). Moreover, assessments of the impact on food access of the closure of emergency food assistance venues are urgently needed in a city like Saginaw, with persistently high poverty rates.

Lack of Evidence for Food Deserts, Food Swamps, and Supermarket Redlining

Saginaw has neighborhoods with limited access to supermarkets and large grocery stores, but it would be inaccurate to claim that the entire city is a food desert. As Taylor et al. (2023) contend, the assumption that census tracts lacking traditional full-line supermarkets or large grocery stores are food deserts is faulty. Though supermarkets and grocery stores stock large volumes of food and are vital parts of a city's food landscape, this study and similar work have shown that a city's food environment is much larger and more complex than the landscape of its supermarkets and large grocery stores. Research shows that urban residents purchase food from vendors other than supermarkets or large grocery stores (Bodor et al., 2007; Cannuscio et al., 2010, 2013; Caspi et al., 2017; Fish et al., 2013; Lucan et al., 2011, 2015). Therefore, the time has come for scholars to abandon the practice of studying only supermarkets and large grocery stores and to examine a broader range of outlets in their food access and food insecurity studies. Investigators such as Powell et al. (2007) have pioneered this perspective.

Though the food swamp thesis is widely used (Rose et al., 2009; Bodor et al., 2010; Sushil et al., 2017; Hager et al., 2017; Robitaille & Paquette, 2020; Schuck, 2022; Ver Ploeg, 2010a, 2010b; Ver Ploeg, 2009), it does not accurately describe Saginaw or the surrounding townships. If food swamps were present, we would find isolated supermarkets and large grocery stores in the study area. Instead, we find supermarkets and large grocery stores in saturated commercial strips, adjacent to, across the street from, or within the same malls, with dollar stores, variety stores, and fast-food restaurants in both study periods.

The study did not provide support for the supermarket redlining thesis either. Although many scholars and activists espouse this thesis (Crowe et al., 2018; Eisenhauer, 2001; Joyner et al., 2022; LeDoux & Vojnovic, 2021; Sadler et al., 2021; Shannon, 2016, 2018, 2021; Shannon et al., 2016, 2018, 2021; Zhang & Ghosh, 2016), our study did not find evidence to suggest that supermarkets were closed in formerly redlined neighborhoods and relocated to formerly greenlined neighborhoods. The redlining thesis suggests that dollar and variety stores replace supermarkets in formerly redlined neighborhoods, and ignores formerly yellow-lined and blue-lined neighborhoods as well as neighborhoods that were not color-coded. Our results show why researchers exploring this thesis should consider all five neighborhood types. In our study area, most supermarkets/large grocery stores and dollar and variety stores were in formerly yellow-lined neighborhoods in both study periods. A similar finding has been made in the study of supermarket redlining in Detroit (Taylor et al., 2024). To date, no research has investigated the movement of stores from formerly redlined to formerly yellow-lined neighborhoods or to neighborhoods that were not color-coded. More research should be done to identify how the movement of food stores may or may not be related to the racial and class categorization of the HOLC system that was superimposed on hundreds of American cities decades ago.

Hollowed Out: The Disappearing Food Infrastructure

The number of food outlets declined noticeably between 2013 and 2023 in both the city and the surrounding townships, as the number of outlets fell by 21.7%. However, the decline was steeper in Saginaw than in the neighboring townships. During the decade, Saginaw lost 37.3% of its food outlets, while the neighboring townships lost 11.5%. The loss of food outlets is even more severe than these numbers suggest. In 2023, we documented 89 closed or non-operational food establishments in the study area; 43 were in Saginaw. We argue that the number of food venues that had already disappeared from the foodscape, in addition to those found shuttered, represent a formidable vanishing food infrastructure that requires urgent attention. Though food outlets had vanished from the surrounding townships, the phenomenon was more alarming in Saginaw and could potentially imperil the lives of residents. Few researchers have studied this problem (Bell & Taylor, 2022; Gillespie et al., 2022; Taylor et al., 2023, 2024; Yeager & Gatrell, 2014).

Vanishing food infrastructures can limit food access and disproportionately impact Communities of Color and low-income urban areas. Our study found that HB census tracts lost a higher percentage of their food stores over the decade and had more closed food stores in 2023 than LB tracts; 60.5% of the city's closed food outlets were in HB tracts.

The large number of closed food outlets in Saginaw and other cities is concerning. The closures raise questions about urban residents' continued access to food. Despite ample evidence of vanishing food infrastructures elsewhere (Bell & Taylor, 2023; Engler-Stringer et al., 2016; Gillespie et al., 2022; Guy, 1996; Jia, 2008; Lowery et al., 2022; Morland, 2010; Sadler et al., 2013a; Taylor et al., 2023; Taylor et al., 2024; Yi et al., 2021), the USDA does not track or incorporate food store closures in its food access measures. With the severe extent of store closures around the country, it behooves the USDA to begin tracking this phenomenon and incorporating it into their measures of reduced or low access to food.

Developing Food Policies

Food policy oversight is important and part of many cities' governance structure. Though most jurisdictions in Michigan have a local food council (Gensler, 2024), Saginaw and Saginaw County do not, meaning that the city and county have little oversight of food policies. No individual, office, committee, or group is responsible for developing and overseeing consistent and equitable food policies. The city and county need to form a local food council so that all aspects of food insecurity and food access can be understood more coherently and strategically. A food council would allow the city to be proactive about food-related matters. The city also needs to identify and track the distribution of food outlets, so that leaders and residents can better understand food access and how to enhance it for everyone.

Expanding Opportunities for Low-Income Residents to Purchase Healthy Foods

Jurisdictions can enhance food access by participating in federal, state, and local food initiatives that help low-income people purchase healthy foods. Saginaw participates in one such program, Double-Up Food Bucks (DUFB), but the city should expand it to include more food outlets. Only two outlets, both on the Eastside—the Downtown Saginaw Farmers Market and Great Giant Market (a grocery store)—participate in the program. Program participants get double the fruits and vegetables when they use their Bridge card to purchase fruit and vegetables up to US$20 per day (Fair Food Network, 2021).

New Initiatives

The Saginaw Community Food Club and Kitchen

Food activists in Saginaw have worked to develop the Saginaw Community Food Club and Kitchen. The Saginaw Food Club (as the entity is called) is modeled after the Community Food Club in Grand Rapids. The leaders spearheading the Saginaw project raised US$4 million of the US$5 million in startup costs needed. The Food Club will operate a grocery store and commercial kitchen on Saginaw's Eastside in an HB census tract; construction begins in 2024 (Mose, 2022; Saginaw Community Food

Club & Kitchen, 2024). The Saginaw Food Club will operate the grocery store as a nonprofit membership organization, with annual operating costs of US$500,000–$600,000. It will source its products from donated food, low-cost food from the USDA and other vendors, and local gardens. The club will also rely on grants, foundations, and membership fees. Member households will pay fees of US$12–$16, based on household size and income, for a 30-day membership. Members receive and shop with points; the club also accepts cash, credit, and debit cards. To encourage purchase and consumption of healthy foods, fruits and vegetables are assigned the lowest points and snacks and processed foods are assigned higher points (Saginaw Community Food Club & Kitchen, 2024).

Grocery Busses

The city has also focused on enhancing transportation options to and from grocery stores. The Saginaw Transit Authority Regional Services (STARS) and the Saginaw City Council are collaborating to use a US$100,000 American Rescue Plan Act (ARPA) grant to build bus shelters at the East Side Soup Kitchen, senior citizens apartment buildings, and income-based housing developments. The goal is to make it easier for residents to take the "grocery buses" to acquire food. Each bus accommodates 10–15 people at a time (Bleu & Mose, 2024).

Strengths, Limitations, and Recommendations

Our study has several strengths. We conducted the first comprehensive food access study of Saginaw's food landscape over two periods. By analyzing an extensive list of food outlets, we added complexity to the understanding of food access in the city. Utilizing an eight-kilometer buffer around the city was helpful because city residents, especially of a city as compact as Saginaw, are not bounded by city limits when they shop. Saginaw is like other cities where large food retailers place their stores on the urban fringe, where they can build sprawling facilities and ample parking lots that attract customers. If such venues are ignored in the study of food access, then it is likely that food access will be underestimated.

This study contributes to food access scholarship because small cities like Saginaw are often overlooked. As this paper has shown, small and mid-sized cities have much to add to the discussion of food access and the impact of racial composition on the kinds of food outlets residents have access to. The paper outlines detailed methodologies for identifying, mapping, and analyzing food outlets, including an appendix that defines each type of food outlet studied. It presents the most extensive categorization of food outlet types so far in this genre of research, which will help researchers replicate or add new dimensions to this sort of food access study.

The study, however, has limitations. Data were collected in 2013 and 2023. The 2023 data collection might have been influenced by the COVID-19 pandemic, which resulted in the closure of several food outlets that may have impacted the results. The study adds depth to our understanding of the distribution of food outlets by studying two time periods; however, if data were collected and analyzed for each year, much more information could be gained about changing food access. We urge cities and researchers to collect and track such data annually.

The study used proportional allocation to estimate the population of census tract fragments. This approach may cause either an over- or underestimation that can introduce bias into the analysis. Although it is helpful to describe local food landscapes, considering the increasing burden of adverse health outcomes, such as diabetes and obesity, on residents of small U.S. cities, future studies should document the types of food sold to determine their nutritional value. Researchers have analyzed this for a small number of food outlet types; most food outlet types have been ignored in this genre of research.

Food access studies like ours typically do not study how subsistence activities like hunting, fishing, foraging, and gathering impact food access. Food gifting and sharing are also activities that influence food access. Future food access studies should examine these activities to expand our understanding of how and where people obtain food.

The study also highlights the need to examine

the impacts of race and income on food store access in more nuanced ways. Such factors can be explored further in studies that examine the types of food sold in a broad range of food stores. Our study examined the Black and White composition of census tracts. However, further studies can be conducted to examine how the Latinx/Hispanic composition of census tracts is related to the distribution of food outlets. Further research should also be conducted to see in more detail how food store closures impact food access.

Conclusions

This study described the food landscape of Saginaw, a small Michigan city that has not received much attention from food access scholars. Because the city has a long history of segregation, the study examined the relationship between the racial composition of census tracts and the number and types of food outlets present. Our study addresses a critical gap in food access research by calling attention to smaller cities. The study also examined racial, income, and educational dynamics in a city where Blacks and Whites made up most of the population. As a result, the study added nuance to common arguments scholars make about food access, race, educational attainment, and poverty.

Though Saginaw is described as a food desert, the label is misleading. Our study found a diverse food landscape in the city. Though the city has a limited number of supermarkets and large grocery stores, there are other food outlets, such as farmers markets, where residents can purchase food or obtain it for free. Nevertheless, we acknowledge that Saginaw faces challenges in ensuring that all city residents consistently have access to healthy and affordable foods. The declining population base will make attracting new supermarkets or midsized and large grocery stores difficult. Building new stores or rehabilitating old ones can be cost-prohibitive in the cash-strapped city. However, the city is taking steps to enhance food access among the most vulnerable populations.

The USDA has abandoned its use of terms like food desert and now relies on "low access" to describe the ease or difficulty of acquiring food in a community. Our study suggests that the USDA should further refine the definition of low access to more accurately describe food landscapes. When food access is focused on a few components of the food environment (supermarkets, large grocery stores, wholesale clubs or supercenters, and convenience stores), crucial indicators are overlooked and not analyzed or incorporated into assessments.

This Saginaw paper identifies one such conundrum. Though city residents had a wide variety of places to obtain food, the many emergency food assistance organizations—especially soup kitchens—indicate that high poverty rates hinder residents' ability to purchase food. Thus, we should not focus solely on where the supermarkets and large grocery stores are located and how far away people live from them; more significant efforts should be put into making sure that residents can find places to purchase food when they want to.

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Appendix A

Table A1. Racial Characteristics of Michigan and the City of Saginaw, 2010 and 2020

	Michigan					City of Saginaw				
	2010		2020		Percent	2010		2020		Percent
Population Characteristics	Population	Percent	Population	Percent	Change	Population	Percent	Population	Percent	Change
Total population	9,883,640	100.0	10,077,331	100.0	2.0	51,508	100.0	44,202	100.0	-14.2
White alone (Hispanic or Latinx)	7,569,939	76.6	7,295,651	72.4	-3.6	19,310	37.5	15,227	34.4	-21.1
Black alone (not Hispnic or Latinx)	1,383,756	14.0	1,358,458	13.5	-1.8	23,127	44.9	19,176	43.4	-17.1
Hispanic or Latinx	436,358	4.4	564,422	5.6	29.3	7,344	14.3	6,988	15.8	-4.8
Native American or Alaska Native	54,665	0.6	47,406	0.5	-13.3	180	0.3	120	0.3	-33.3
Asian	236,490	2.4	332,288	3.3	40.5	145	0.3	184	0.4	26.9
Native Hawaiian or Pacific Islander	2,170	0.0	2,603	0.0	20.0	10	0.0	17	0.0	70.0
Other	9,866	0.1	37,183	0.4	276.9	72	0.1	271	0.6	276.4
Two or more races	190,396	1.9	439,320	4.4	130.7	1,320	2.6	2,219	5.0	68.1

Compiled from: U.S. Census Bureau (2020a). Hispanic or Latin, or Not Hispanic or Latino by Race. Table P9. DEC Demographic and Housing Characteristics. https://data.census.gov/table/DECENNIALDHC2020.P9?q=michigan%20race%20and%20ethnicity; U.S. Census Bureau (2020b). Hispanic or Latin, or Not Hispanic or Latino by Race. Table P9. DEC Demographic and Housing Characteristics. https://data.census.gov/table/DECENNIALDHC2020.P9?q=race%20and%20ethnicity%20saginaw%20city%20michigan (2010a). Hispanic or Latin, or Not Hispanic or Latino by Race. Table P9. DEC Summary File 1. https://data.census.gov/table/DECENNIALSF12010.P9?q=michigan%20race%20and%20ethnicity; U.S. Census Bureau (2010b). Hispanic or Latin, or Not Hispanic or Latino by Race. Table P9. DEC Summary File 1. https://data.census.gov/table/DECENNIALSF12010.P9?q=race%20and%20ethnicity%20saginaw%20city%20michigan

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Table A2a. Comparing 2013 and 2023 Food Outlets for Saginaw City and the Surrounding Townships

	2013 Food Outlets						2023 Food Outlets						Percentage Change					
	Entire Study Area		Saginaw City		Surrounding Townships		Entire Study Area		Saginaw City		Surrounding Townships		Entire Study Area		Saginaw City		Surrounding Townships	
Food Outlet Type	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
All food venues	**577**	**100.0**	**228**	**100.0**	**349**	**100.0**	**452**	**100.0**	**143**	**100.0**	**309**	**100.0**	**−125**	**−21.7**	**−85**	**−37.3**	**−40**	**−11.5**
Supermarkets and large grocery stores	**28**	**4.9**	**3**	**1.3**	**25**	**7.2**	**17**	**3.8**	**2**	**1.4**	**15**	**4.9**	**−11**	**−39.3**	**−1**	**−33.3**	**−10**	**−40.0**
Traditional supermarkets	14	2.4	2	0.9	12	3.4	5	1.1	1	0.7	4	1.3	−9	−64.3	−1	−50.0	−8	−66.7
Limited-assortment stores	7	1.2	1	0.4	6	1.7	6	1.3	1	0.7	5	1.6	−1	−14.3	0	0.0	−1	−16.7
Fresh format supermarket	1	0.2	0	0.0	1	0.3	0	0.0	0	0.0	0	0.0	−1	∞	0	∞	−1	∞
Supercenters	3	0.5	0	0.0	3	0.9	5	1.1	0	0.0	5	1.6	2	66.7	0	∞	2	66.7
Mass merchandiser	1	0.2	0	0.0	1	0.3	0	0.0	0	0.0	0	0.0	−1	∞	0	∞	−1	∞
Wholesale clubs	2	0.3	0	0.0	2	0.6	1	0.2	0	0.0	1	0.3	−1	−50.0	0	∞	−1	−50.0
Small groceries and convenience stores	**109**	**18.9**	**45**	**19.7**	**64**	**18.3**	**96**	**21.2**	**35**	**24.5**	**61**	**19.7**	**−13**	**−11.9**	**−10**	**−22.2**	**−3**	**−4.7**
Gas stations with food	21	3.6	9	3.9	12	3.4	37	8.2	10	7.0	27	8.7	16	76.2	1	11.1	15	125.0
Liquor stores and party stores	36	6.2	15	6.6	21	6.0	38	8.4	16	11.2	22	7.1	2	5.6	1	6.7	1	4.8
Small groceries, convenience, and corner stores	52	9.0	21	9.2	31	8.9	21	4.6	9	6.3	12	3.9	−31	−59.6	−12	−57.1	−19	−61.3
Pharmacies, dollar, and variety stores	**41**	**7.1**	**21**	**9.2**	**20**	**5.7**	**49**	**10.8**	**15**	**10.5**	**34**	**11.0**	**8**	**19.5**	**−6**	**−28.6**	**14**	**70.0**
Pharmacies or drug stores	26	4.5	14	6.1	12	3.4	24	5.3	6	4.2	18	5.8	−2	−7.7	−8	−57.1	6	50.0
Dollar stores and variety stores	15	2.6	7	3.1	8	2.3	25	5.5	9	6.3	16	5.2	10	66.7	2	28.6	8	100.0
Specialty food stores and vendors	**38**	**6.6**	**15**	**6.6**	**23**	**6.6**	**39**	**8.6**	**14**	**9.8**	**25**	**8.1**	**1**	**2.6**	**−1**	**−6.7**	**2**	**8.7**
Bakeries	15	2.6	7	3.1	8	2.3	24	5.3	11	7.7	13	4.2	9	60.0	4	57.1	5	62.5
Ice cream parlors	0	0.0	0	0.0	0	0.0	3	0.7	0	0.0	3	1.0	3	∞	0	∞	3	∞
Health foods	7	1.2	3	1.3	4	1.1	5	1.1	1	0.7	4	1.3	−2	−28.6	−2	−66.7	0	0.0
Meat markets and delicatessens	11	1.9	5	2.2	6	1.7	6	1.3	2	1.4	4	1.3	−5	−45.5	−3	−60.0	−2	−33.3
Confectionaries	5	0.9	0	0.0	5	1.4	1	0.2	0	0.0	1	0.3	−4	−80.0	0	∞	−4	−80.0
Restaurants and other food service	**263**	**45.6**	**84**	**36.8**	**179**	**51.3**	**197**	**43.6**	**46**	**32.2**	**151**	**48.9**	**−66**	**−25.1**	**−38**	**−45.2**	**−28**	**−15.6**
Full-service restaurants	109	18.9	35	15.4	74	21.2	60	13.3	14	9.8	46	14.9	−49	−45.0	−21	−60.0	−28	−37.8
Fast-food restaurants	100	17.3	21	9.2	79	22.6	82	18.1	16	11.2	66	21.4	−18	−18.0	−5	−23.8	−13	−16.5
Coffee, tea, and juice shops	6	1.0	2	0.9	4	1.1	13	2.9	2	1.4	11	3.6	7	116.7	0	0.0	7	175.0
Banquet halls and hotels	2	0.3	1	0.4	1	0.3	18	4.0	2	1.4	16	5.2	16	800.0	1	100.0	15	1500.0
Bars and clubs	37	6.4	22	9.6	15	4.3	22	4.9	11	7.7	11	3.6	−15	−40.5	−11	−50.0	−4	−26.7
Caterers	9	1.6	3	1.3	6	1.7	2	0.4	1	0.7	1	0.3	−7	−77.8	−2	−66.7	−5	−83.3
Urban farms, community gardens, farmers markets, and produce vendors	**15**	**2.6**	**10**	**4.4**	**5**	**1.4**	**6**	**1.3**	**3**	**2.1**	**3**	**1.0**	**−9**	**−60.0**	**−7**	**−70.0**	**−2**	**−40.0**
Urban farms and community gardens	8	1.4	7	3.1	1	0.3	3	0.7	2	1.4	1	0.3	−5	−62.5	−5	−71.4	0	0.0
Farmers market and produce market	5	0.9	3	1.3	2	0.6	1	0.2	1	0.7	0	0.0	−4	−80.0	−2	−66.7	−2	∞
Community supported agriculture (CSA)	2	0.3	0	0.0	2	0.6	1	0.2	0	0.0	1	0.3	−1	−50.0	0	∞	−1	−50.0
Dairy	0	0.0	0	0.0	0	0.0	1	0.2	0	0.0	1	0.3	1	∞	0	∞	1	∞

Supply chain	**11**	**1.9**	**7**	**3.1**	**4**	**1.1**	**8**	**1.8**	**4**	**2.8**	**4**	**1.3**	**–3**	**–27.3**	**–3**	**–42.9**	**0**	**0.0**
Manufacturers, processors	2	0.3	1	0.4	1	0.3	2	0.4	2	1.4	0	0.0	0	0.0	1	100.0	–1	∞
Food hub (aggregator)	0	0.0	0	0.0	0	0.0	1	0.2	1	0.7	0	0.0	1	∞	1	∞	0	∞
Distributors	1	0.2	1	0.4	0	0.0	5	1.1	1	0.7	4	1.3	4	400.0	0	0.0	4	∞
Wholesalers	8	1.4	5	2.2	3	0.9	0	0.0	0	0.0	0	0.0	–8	∞	–5	∞	–3	∞
Emergency food assistance	**63**	**10.9**	**36**	**15.8**	**27**	**7.7**	**39**	**8.6**	**23**	**16.1**	**16**	**5.2**	**–24**	**–38.1**	**–13**	**–36.1**	**–11**	**–40.7**
Food pantries or soup kitchens	62	10.7	35	15.4	27	7.7	36	8.0	21	14.7	15	4.9	–26	–41.9	–14	–40.0	–12	–44.4
Food banks/distribution	1	0.2	1	0.4	0	0.0	3	0.7	2	1.4	1	0.3	2	200.0	1	100.0	1	∞
Social, religious, educational, and community services	**9**	**1.6**	**7**	**3.1**	**2**	**0.6**	**1**	**0.2**	**1**	**0.7**	**0**	**0.0**	**–8**	**–88.9**	**–6**	**–85.7**	**–2**	∞
Service organization	5	0.9	4	1.8	1	0.3	1	0.2	1	0.7	0	0.0	–4	–80.0	–3	–75.0	–1	∞
Shelter	4	0.7	3	1.3	1	0.3	0	0.0	0	0.0	0	0.0	–4	∞	–3	∞	–1	∞

f = frequency; ∞ represents a rate of increase from 0. A percent change can not be calculated when starting value is 0.

Table A2b. Food Outlets Studied Only in 2023

	Entire Study Area		Saginaw City		Surrounding Townships	
	f	%	*f*	%	*f*	%
Additional food outlets	**146**	**100.0**	**79**	**100.0**	**67**	**100.0**
Restaurants and other food service	**27**	**18.5**	**10**	**12.7**	**17**	**25.4**
Takeout establishments	27	18.5	10	12.7	17	25.4
Urban farms, community gardens, farmers markets, and produce vendors	**21**	**14.4**	**21**	**26.6**	**0**	**0.0**
Market produce vendors	7	4.8	7	**8.9**	0	**0.0**
Market prepared food vendors	12	8.2	12	**15.2**	0	**0.0**
Market stores	2	1.4	2	**2.5**	0	**0.0**
Mobile food sources	**13**	**8.9**	**11**	**13.9**	**2**	**3.0**
Food trucks	10	6.8	9	**11.4**	1	**1.5**
Mobile food distributions	3	2.1	2	**2.5**	1	**1.5**
Attractions and amusement parks	**5**	**3.4**	**3**	**3.8**	**2**	**3.0**
Attractions	5	3.4	3	**3.8**	2	**3.0**
Social, religious, educational, and community services	**69**	**47.3**	**30**	**38.0**	**39**	**58.2**
School cafeterias	33	22.6	15	**19.0**	18	**26.9**
Retirement communities and homes	13	8.9	2	**2.5**	11	**16.4**
Childcare	20	13.7	10	**12.7**	10	**14.9**
Youth organizations and centers	3	15.0	3	**30.0**	0	**0.0**
Gyms and heath centers	**10**	**6.8**	**4**	**5.1**	**6**	**9.0**
Fitness centers and health centers	2	1.4	0	**0.0**	2	**3.0**
Hospitals and medical centers	8	5.5	4	**5.1**	4	**6.0**
Internet, online purchase, and delivery	**1**	**0.7**	**0**	**0.0**	**1**	**1.5**
E-commerce, online	1	0.7	0	0.0	1	1.5

Note: *f* = frequency

Table A3. Home Owners' Loan Corporation (HOLC)'s Neighborhood Codes and the Distribution of Supermarkets, Large Grocery Stores, Dollar and Variety Stores in 2013 and 2023

			Supermarkets and Large Grocery Stores				Dollar Stores and Variety Stores			
HOLC's Codes	HOLC's Color	HOLC's Description	2013	Percent	2023	Percent	2013	Percent	2023	Percent
Entire Study Area										
A	Green	Best	0	0.0	0	0.0	0	0.0	0	0.0
B	Blue	Still desirable	0	0.0	0	0.0	1	6.7	1	4.0
C	Yellow	Definitely declining	4	19.0	2	18.2	7	46.7	9	36.0
D	Red	Hazardous	0	0.0	0	0.0	0	0.0	0	0.0
Uncoded	No Color		17	81.0	9	81.8	7	46.7	15	60.0
Total			21	100.0	11	100.0	15	100.0	25	100.0
Saginaw City										
A	Green	Best	0	0.0	0	0.0	0	0.0	0	0.0
B	Blue	Still desirable	0	0.0	0	0.0	1	14.3	1	11.1
C	Yellow	Definitely declining	2	66.7	2	100.0	6	85.7	6	66.7
D	Red	Hazardous	0	0.0	0	0.0	0	0.0	0	0.0
Uncoded	No Color		1	33.3	0	0.0	0	0.0	2	22.2
Total			3	100.0	2	100.0	7	100.0	9	100.0
Surrouding Townships										
A	Green	Best	0	0.0	0	0.0	0	0.0	0	0.0
B	Blue	Still desirable	0	0.0	0	0.0	0	0.0	0	0.0
C	Yellow	Definitely declining	2	11.1	0	0.0	1	12.5	3	18.8
D	Red	Hazardous	0	0.0	0	0.0	0	0.0	0	0.0
Uncoded	No Color		16	88.9	9	100.0	7	87.5	13	81.3
Total			**18**	**100.0**	**9**	**100.0**	**8**	**100.0**	**16**	**100.0**

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Appendix B.

Figure B1a. Map Showing the Census Tracts and the Percentage of Non-Hispanic Blacks in 2010

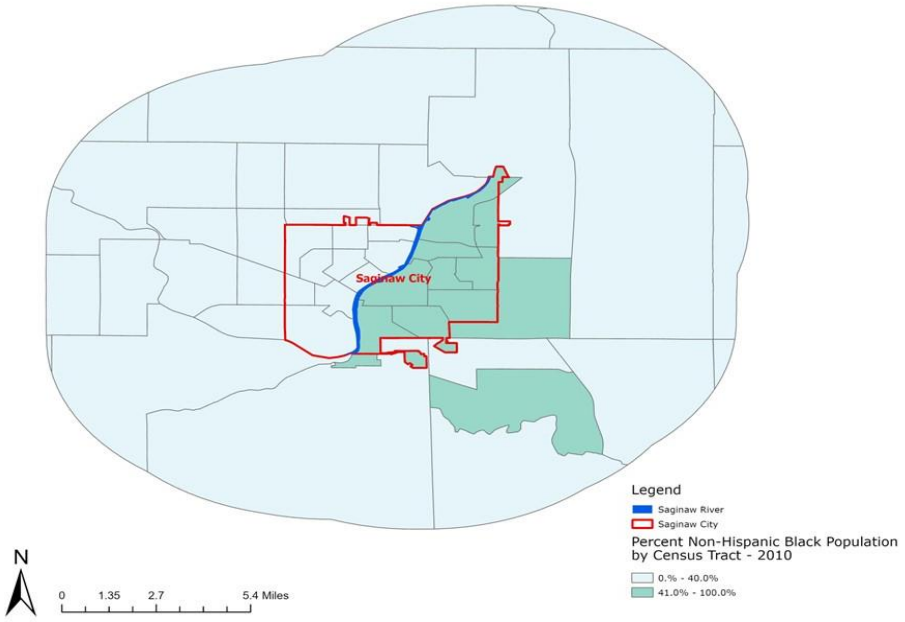


Figure B1b. Map Showing the Census Tracts and the Percentage of Non-Hispanic Blacks in 2020

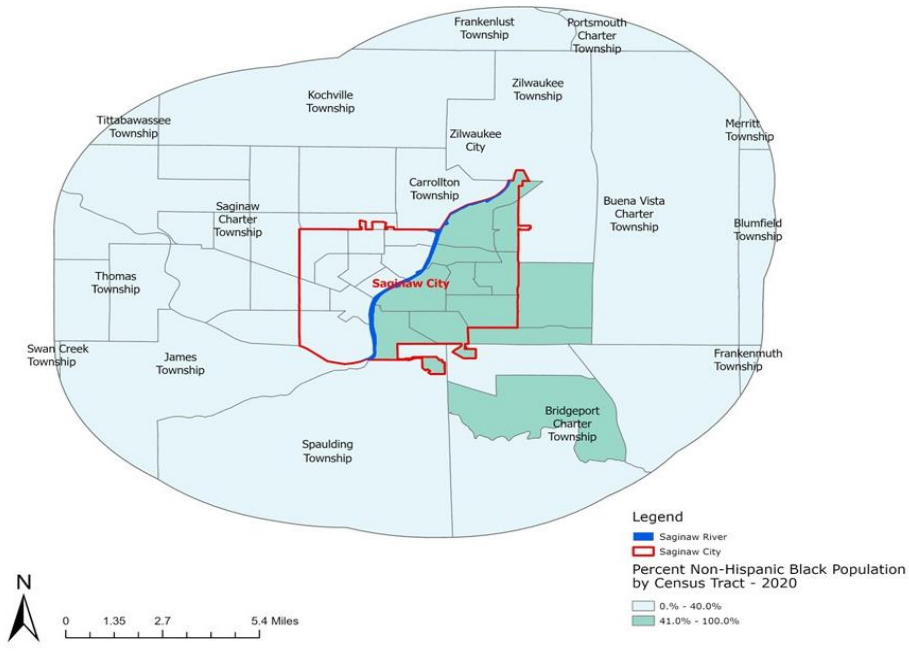


Figure B2a. Map Showing the Location of Food Outlets Studied in 2013

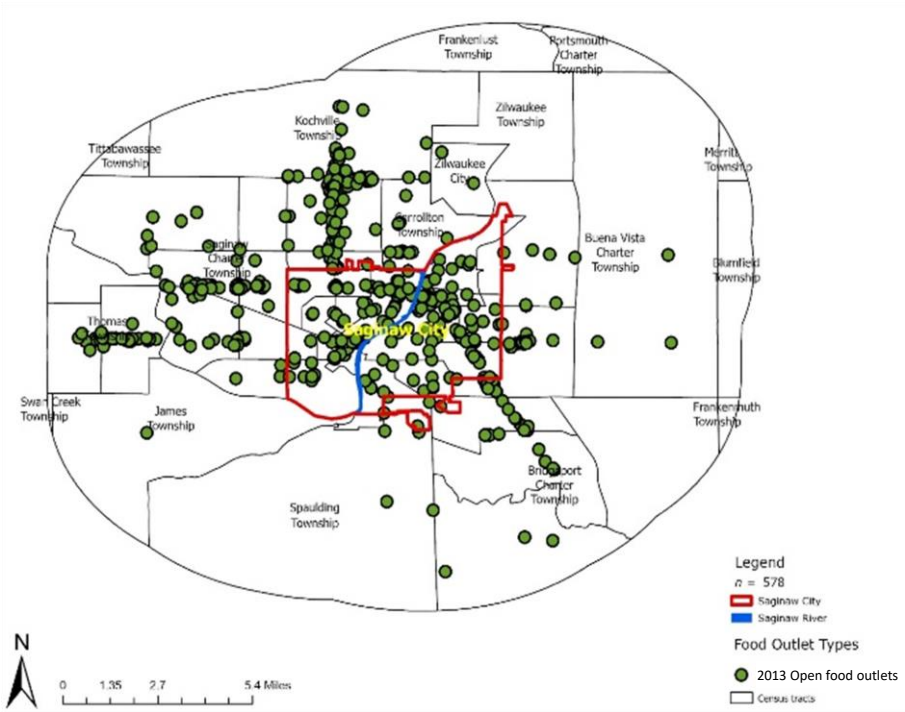
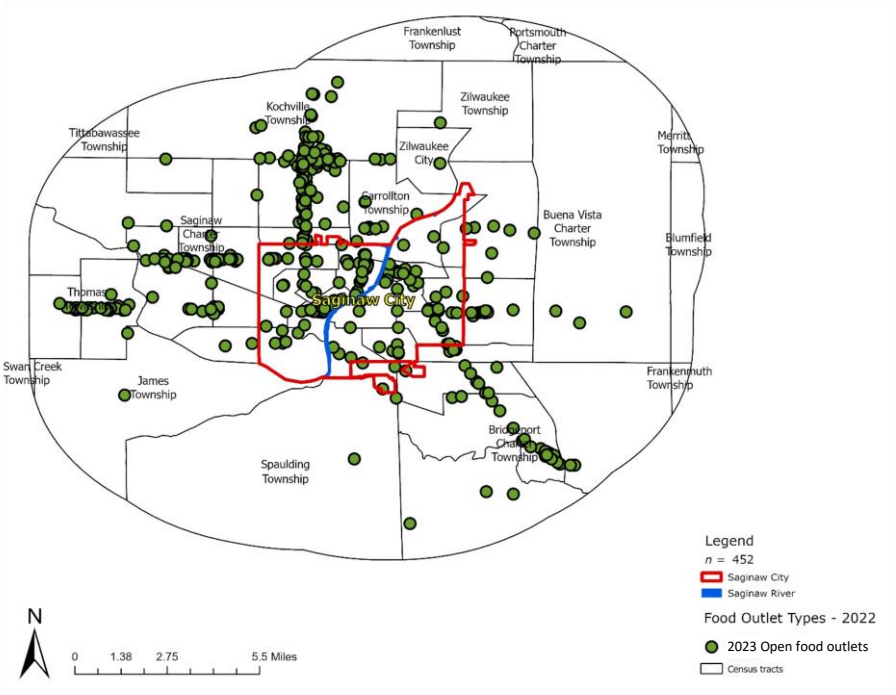


Figure B2b. Map Showing the Location of Food Outlets Compared to 2023



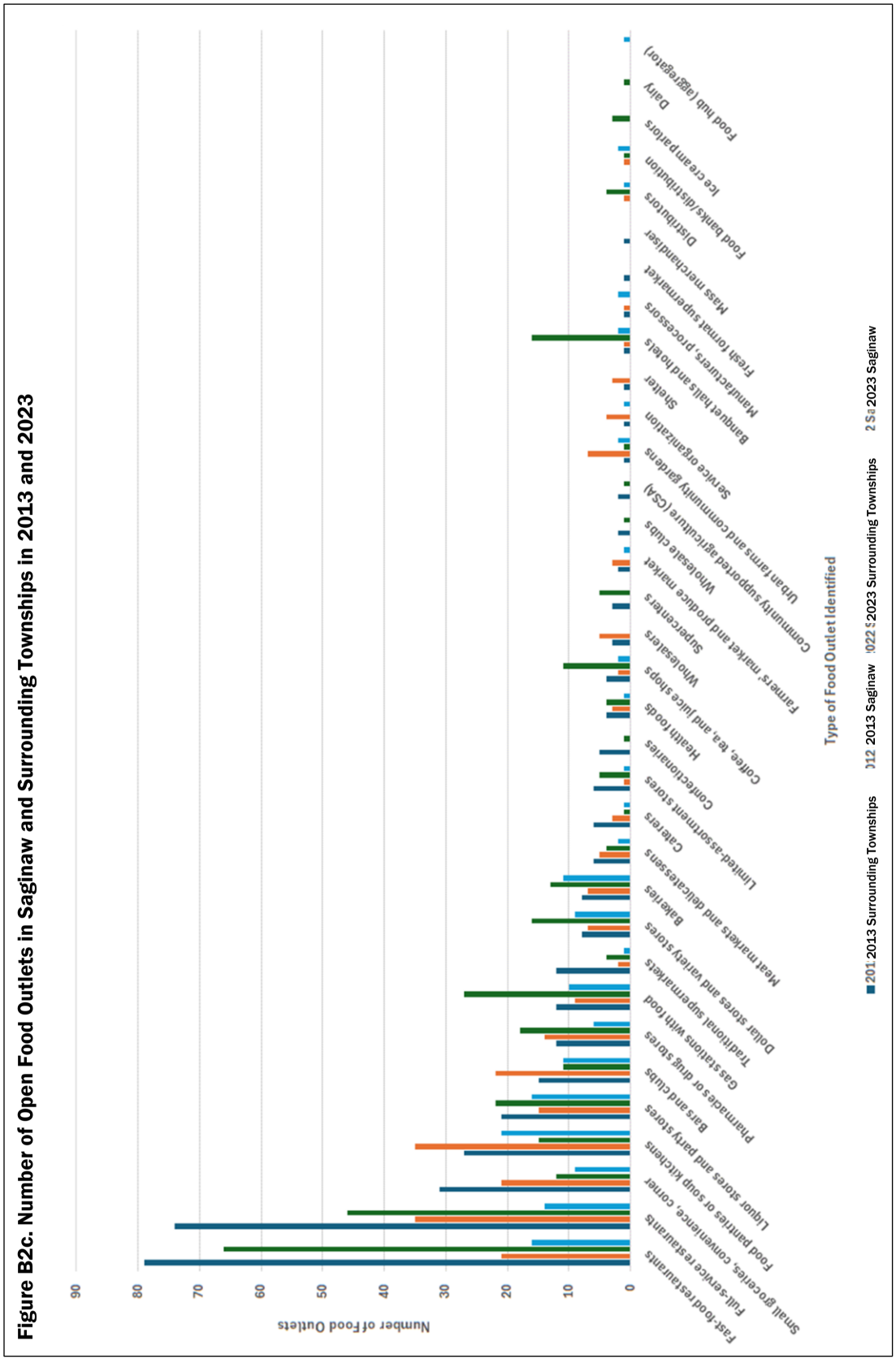


Figure B2c. Number of Open Food Outlets in Saginaw and Surrounding Townships in 2013 and 2023
Number of Food Outlets
0
10
20
30
40
50
60
70
80
90
Fast-food restaurants
Full-service restaurants
Small groceries, convenience, corner
Food pantries or soup kitchens
Liquor stores and party stores
Bars and clubs
Pharmacies or drug stores
Gas stations with food
Traditional supermarkets
Dollar stores and variety stores
Meat markets and delicatessens
Bakeries
Caterers
Limited-assortment stores
Confectionaries
Health foods
Coffee, tea, and juice shops
Wholesalers
Superstores
Farmers, market and produce market
Wholesale clubs
Community supported agriculture (CSA)
Urban farms and community gardens
Service organization
Shelter
Banquet halls and hotels
Manufacturers, processors
Fresh format supermarket
Mass merchandiser
Distributors
Food banks/distribution
Ice cream parlors
Dairy
Food hub (aggregator)
Type of Food Outlet Identified
2013 Surrounding Townships
2013 Saginaw
2023 Surrounding Townships
2023 Saginaw

Figure B3a. Map Showing the Location of Supermarkets and Large Grocery Stores in 2013

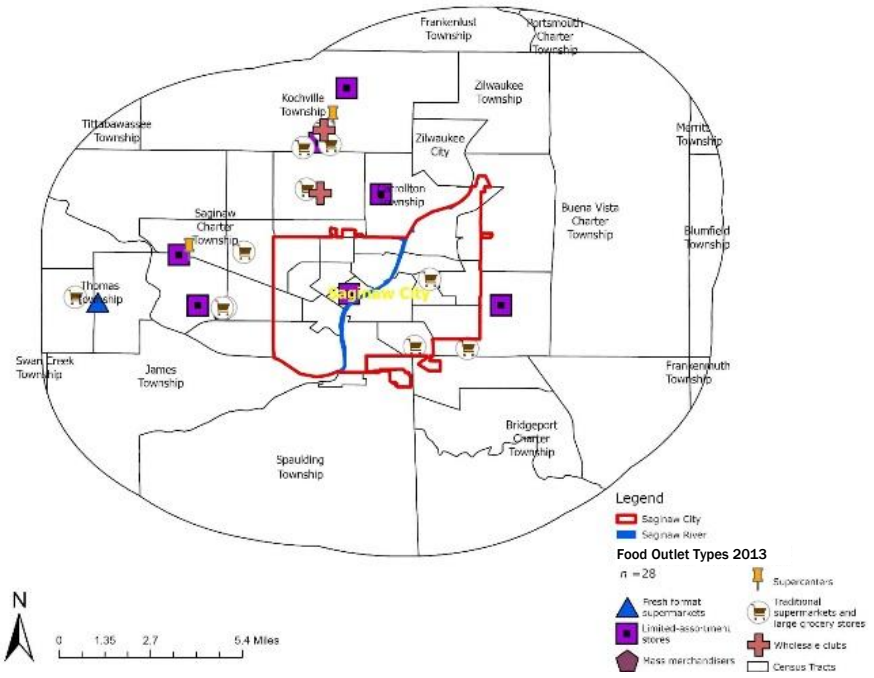


Figure B3b. Map Showing the Location of Supermarkets and Large Grocery Stores in 2023

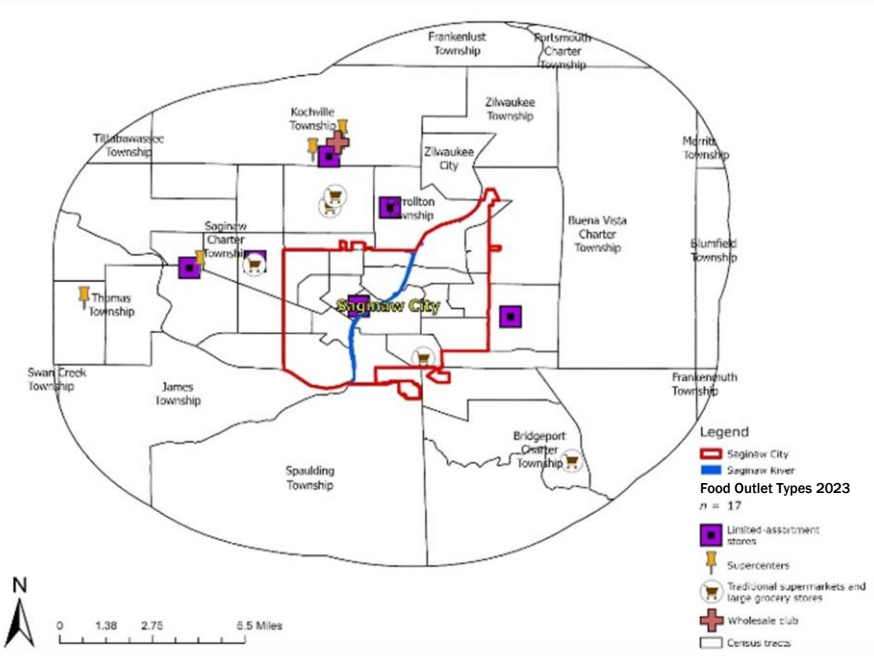


Figure B4a. Map Showing the Location of Small Grocery and Convenience Stores in 2013

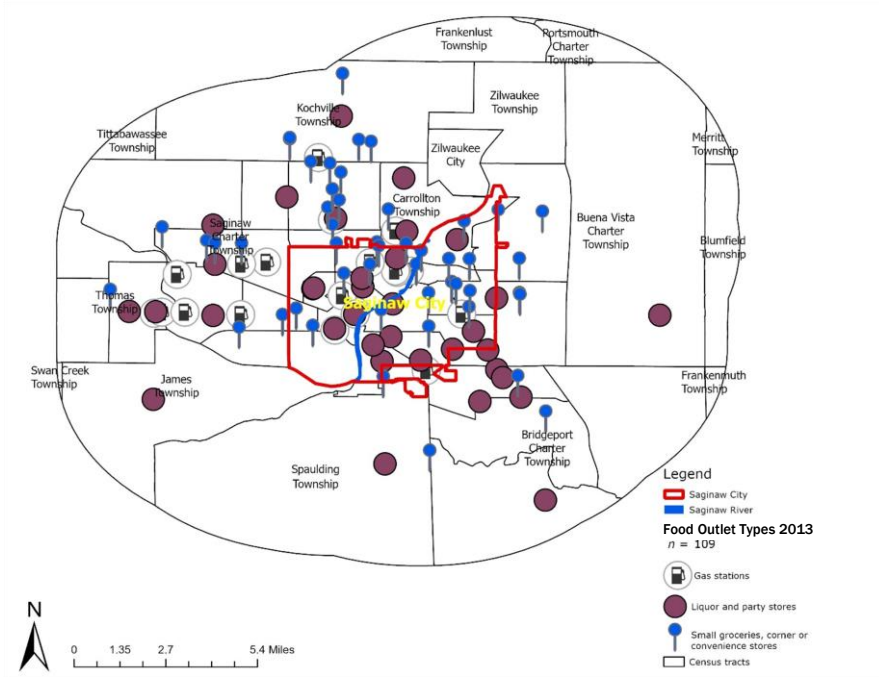


Figure B4b. Map Showing the Location of Small Grocery and Convenience Stores in 2023

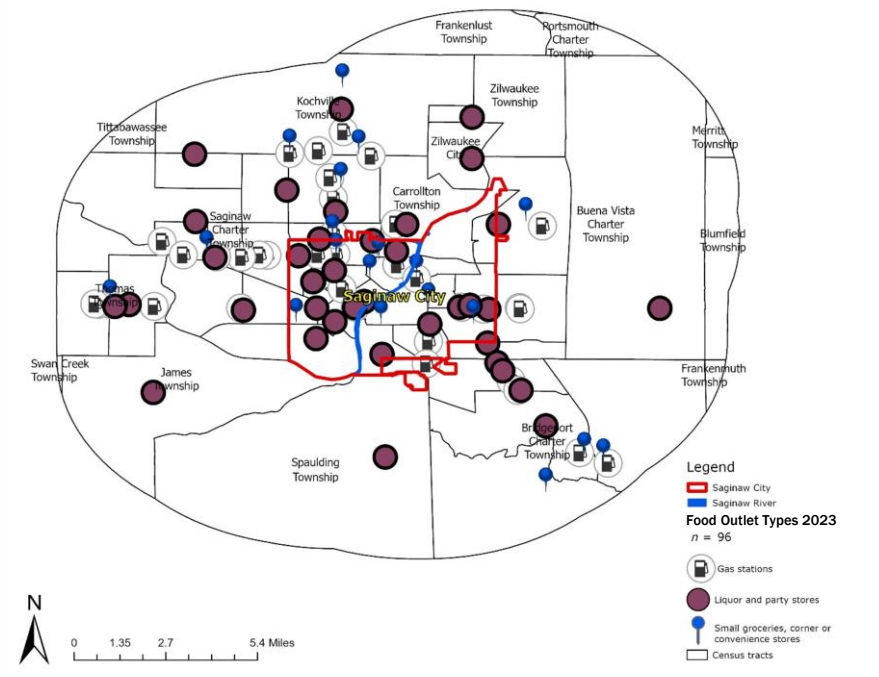


Figure B5a. Map Showing the Location of Pharmacies, Dollar, and Variety Stores in 2013

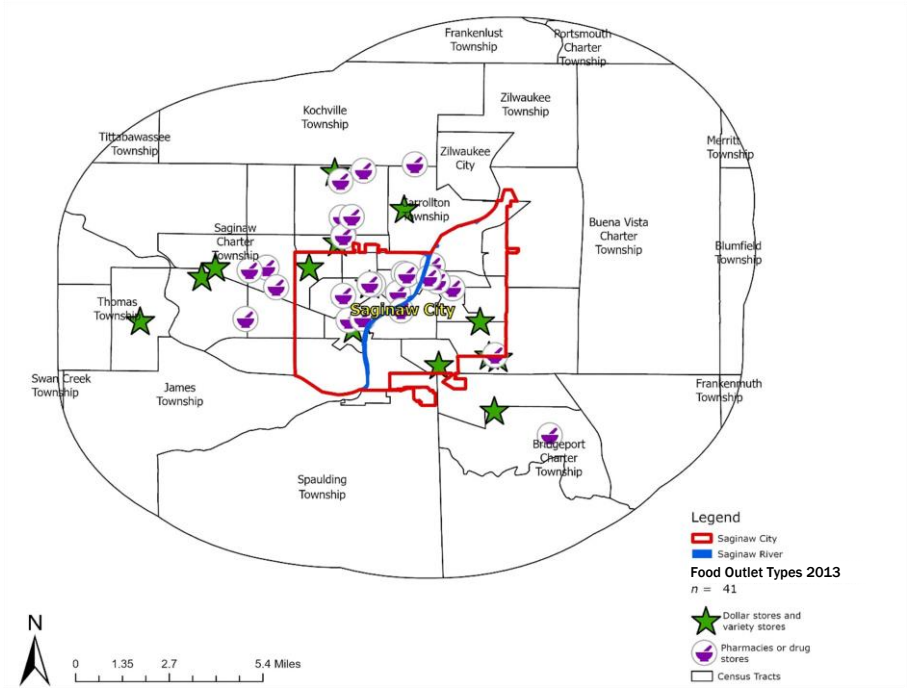


Figure B5b. Map Showing the Location of Pharmacies, Dollar, and Variety Stores in 2023

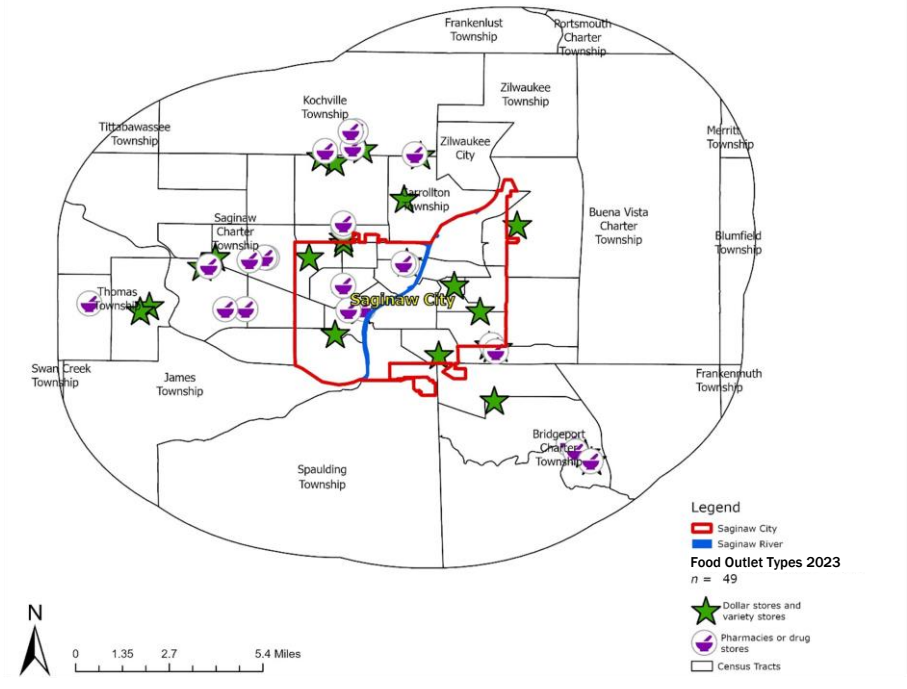


Figure B6a. Map Showing the Location of Specialty Food Stores and Vendors in 2013

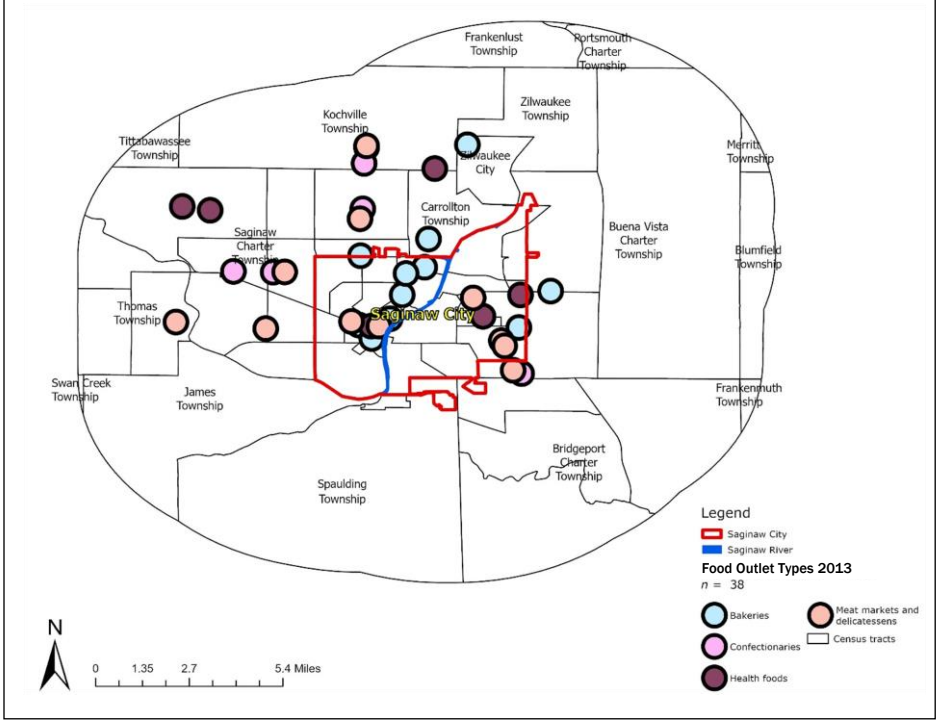


Figure B6b. Map Showing the Location of Specialty Food Stores and Vendors in 2023

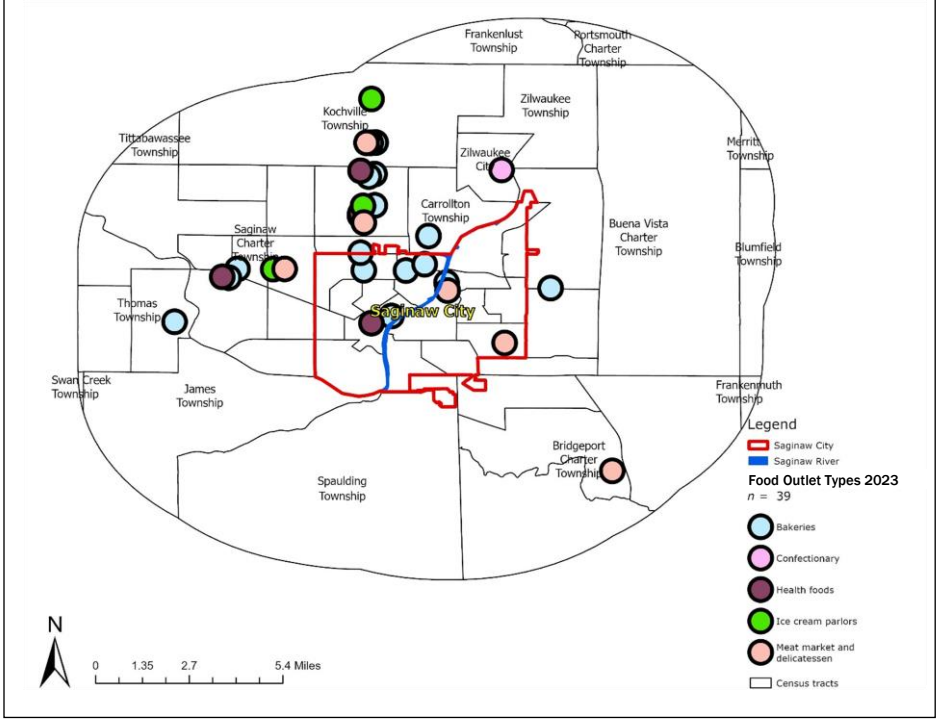


Figure B7a. Map Showing the Location of Restaurants and Food Services in 2013

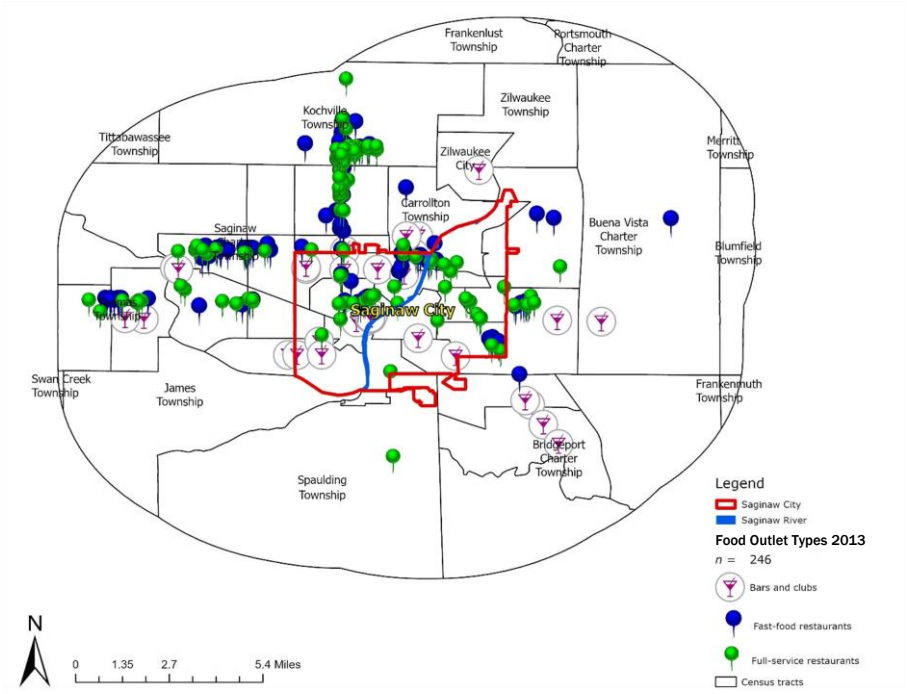


Figure B7b. Map Showing the Location of Restaurants and Food Services in 2023

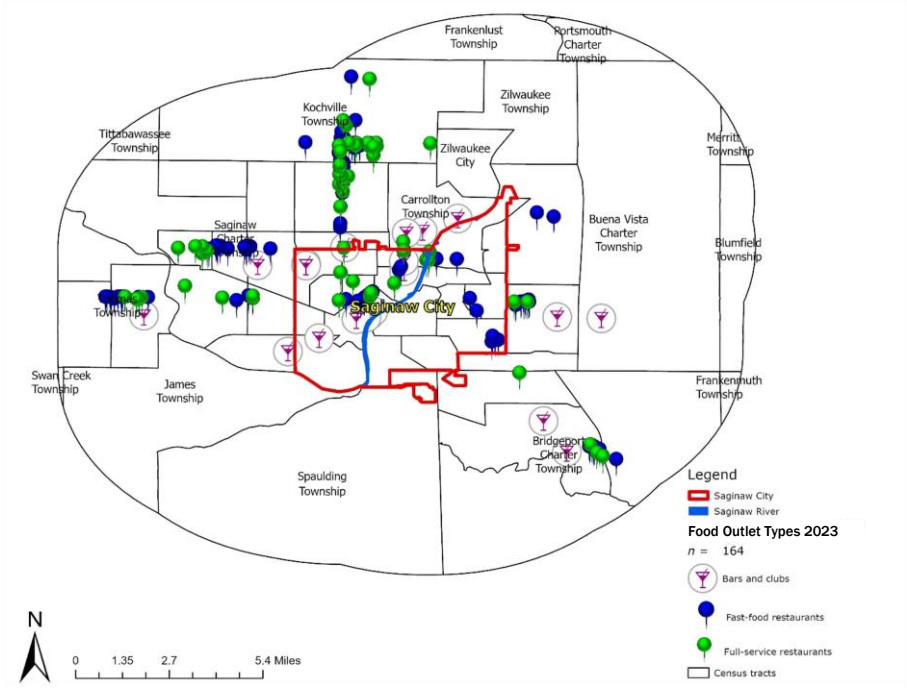


Figure B8a. Map Showing the Location of Urban Farms, Community Gardens, Farmers Markets, and Produce Vendors in 2013

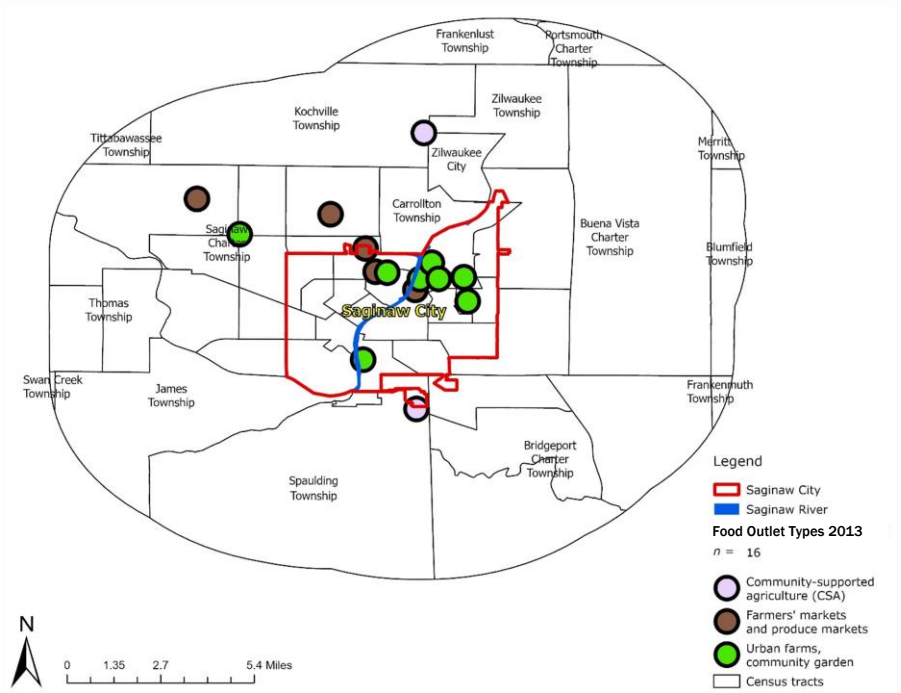


Figure B8b. Map Showing the Location of Urban Farms, Community Gardens, Farmers Markets, and Produce Vendors in 2023

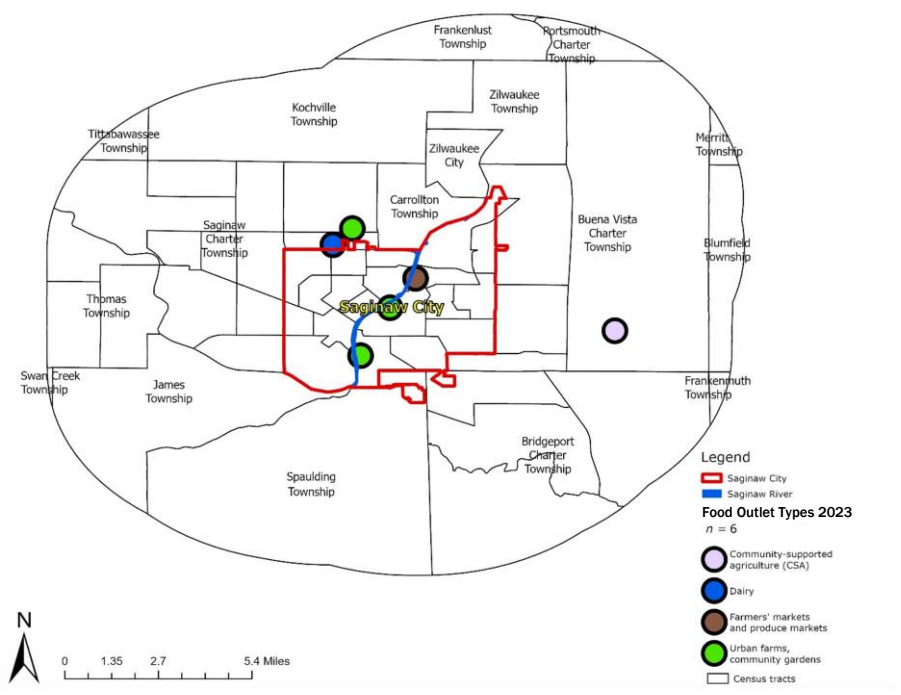


Figure B9a. Map Showing the Location of Distributors and Supply Chain Vendors in 2013

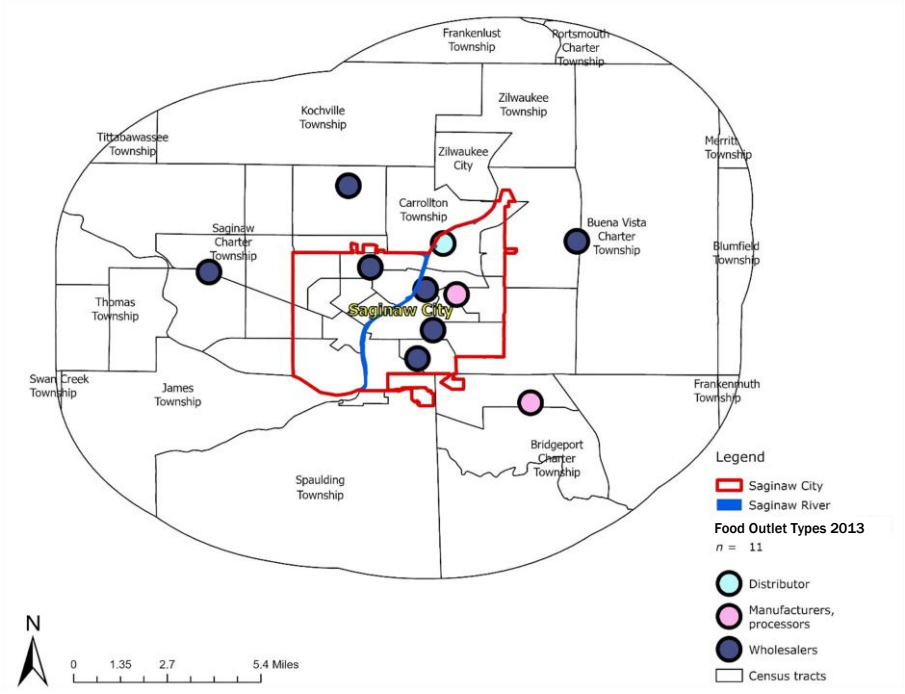


Figure B9b. Map Showing the Location of Distributors and Supply Chain Vendors in 2023

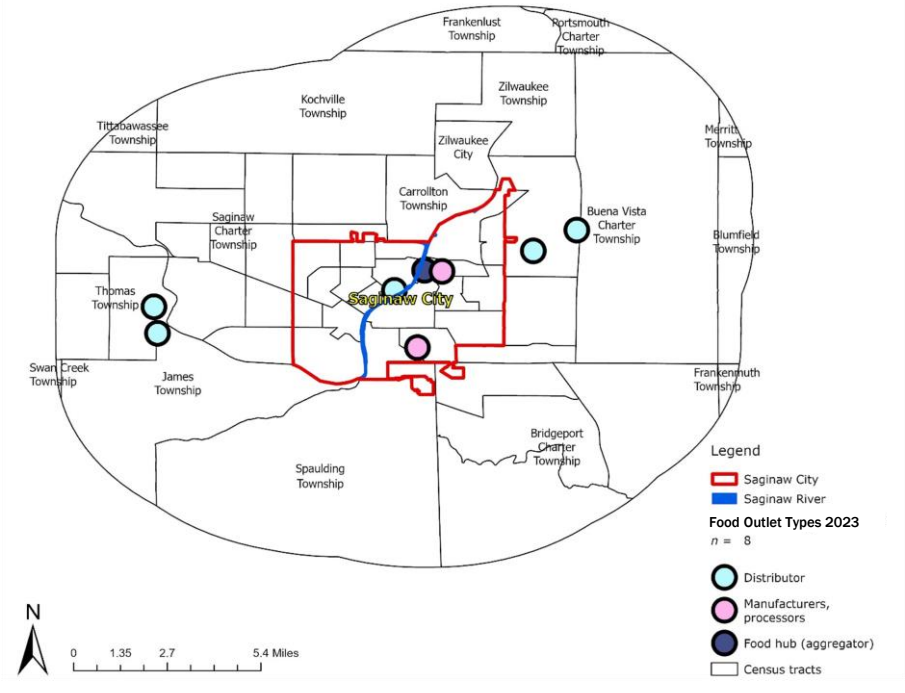


Figure B10a. Map Showing the Location of Food Assistance Organizations in 2013

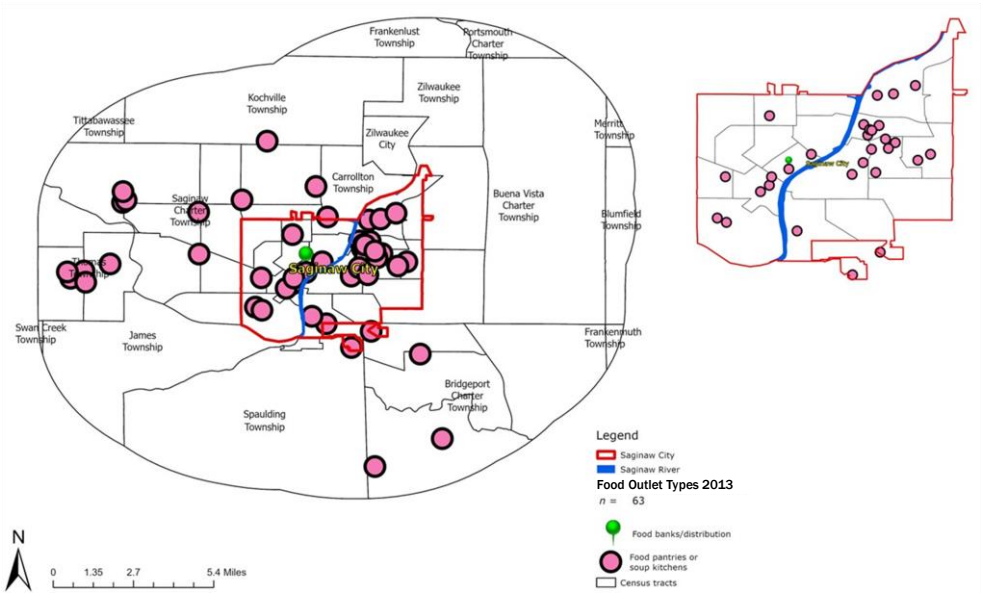


Figure B10b. Map Showing the Location of Food Assistance Organizations in 2023

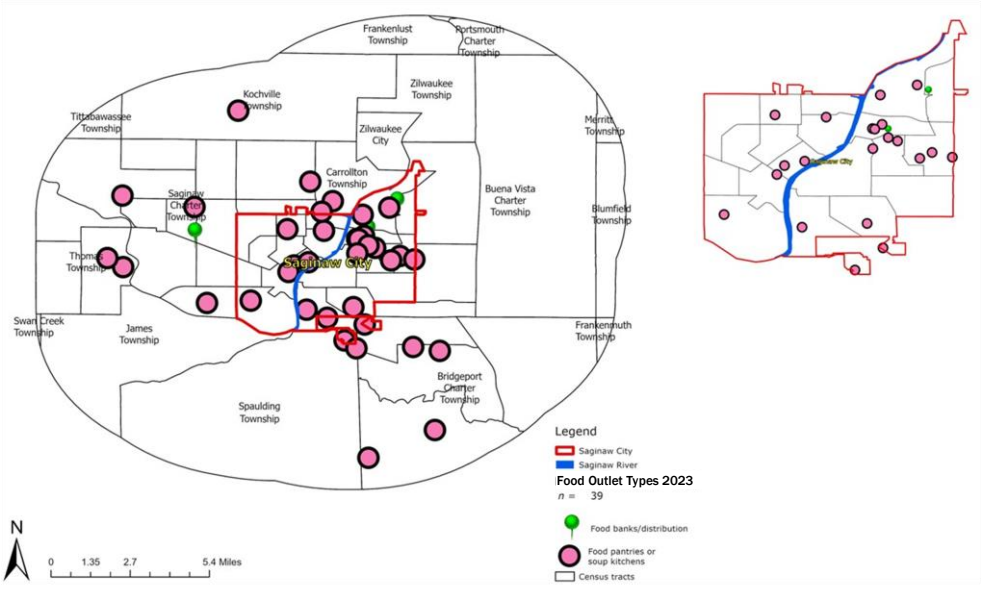


Figure B11. Map Showing the Location of All Food Outlets Studied in 2023

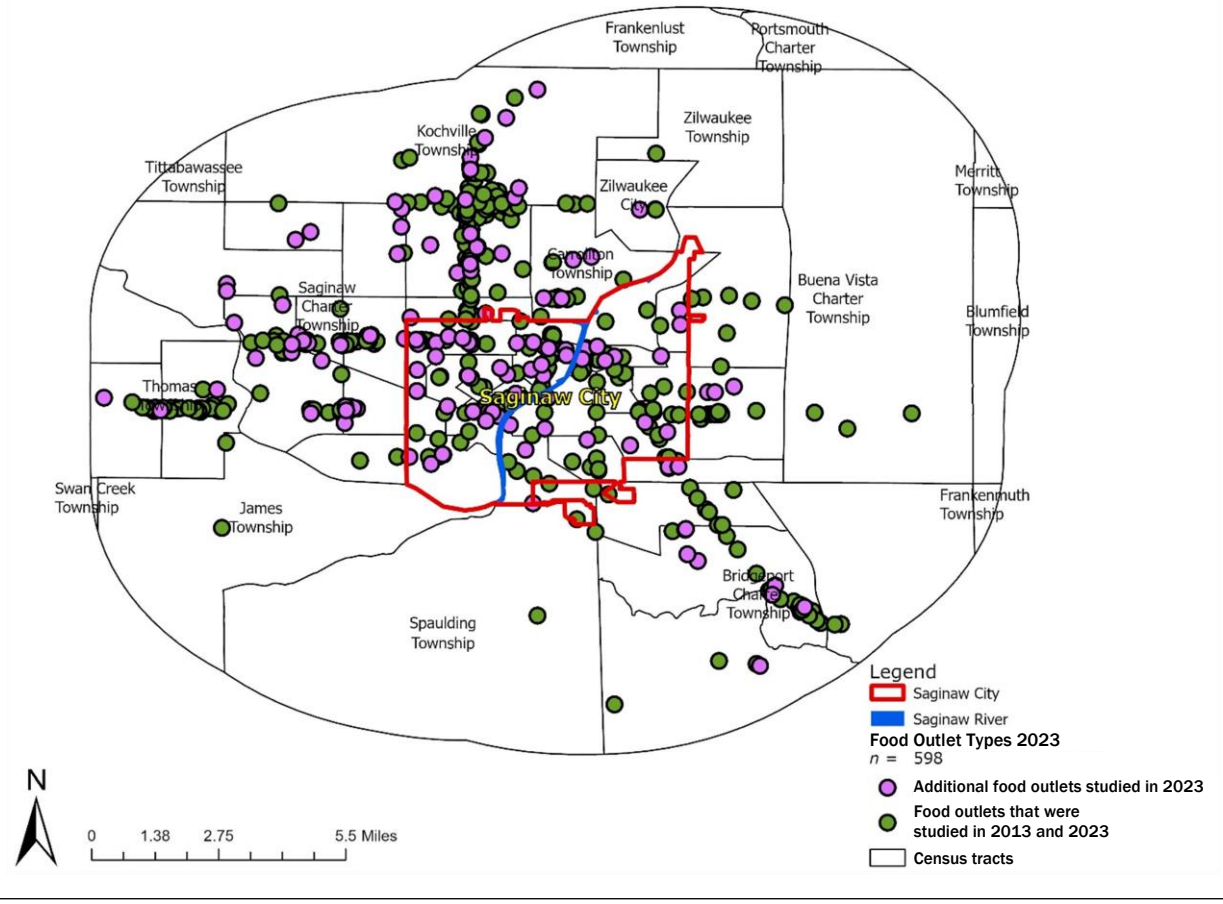


Figure B12a. Map Examining the Supermarket Redlining Thesis for 2013

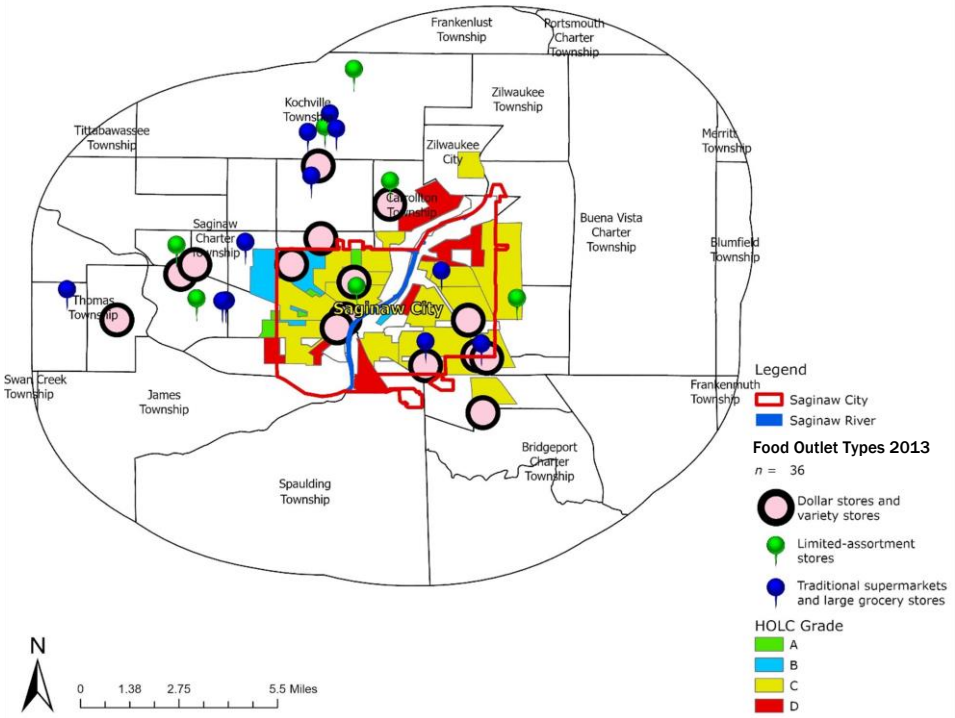


Figure B12b. Map Examining the Supermarket Redlining Thesis for 2023

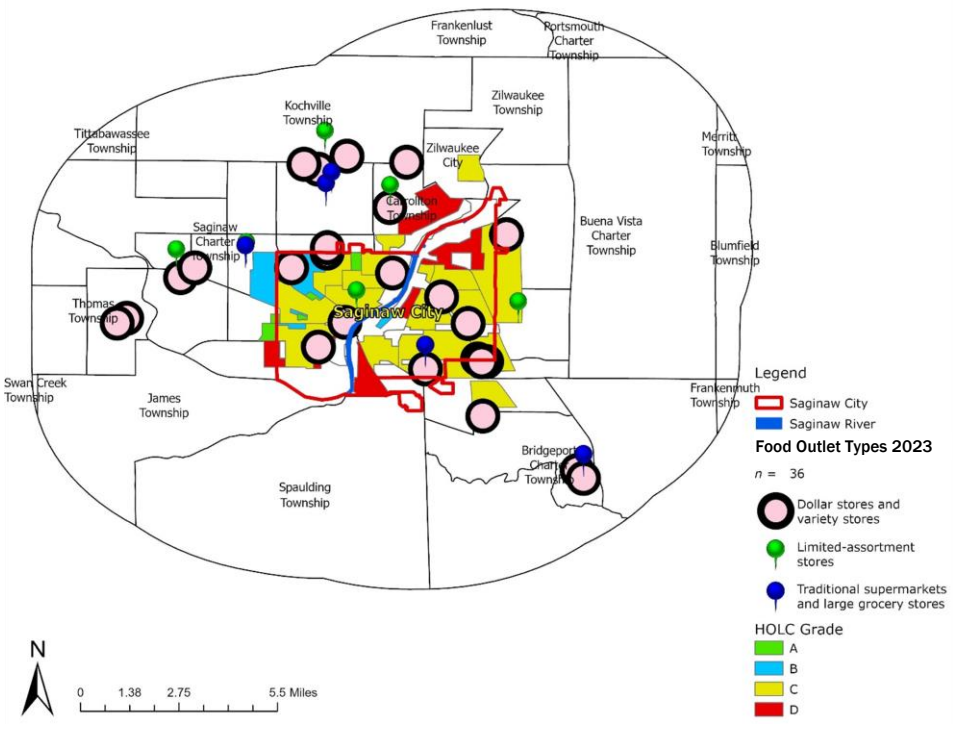


Figure B13a. Map Examining the Food Swamp Thesis for 2013

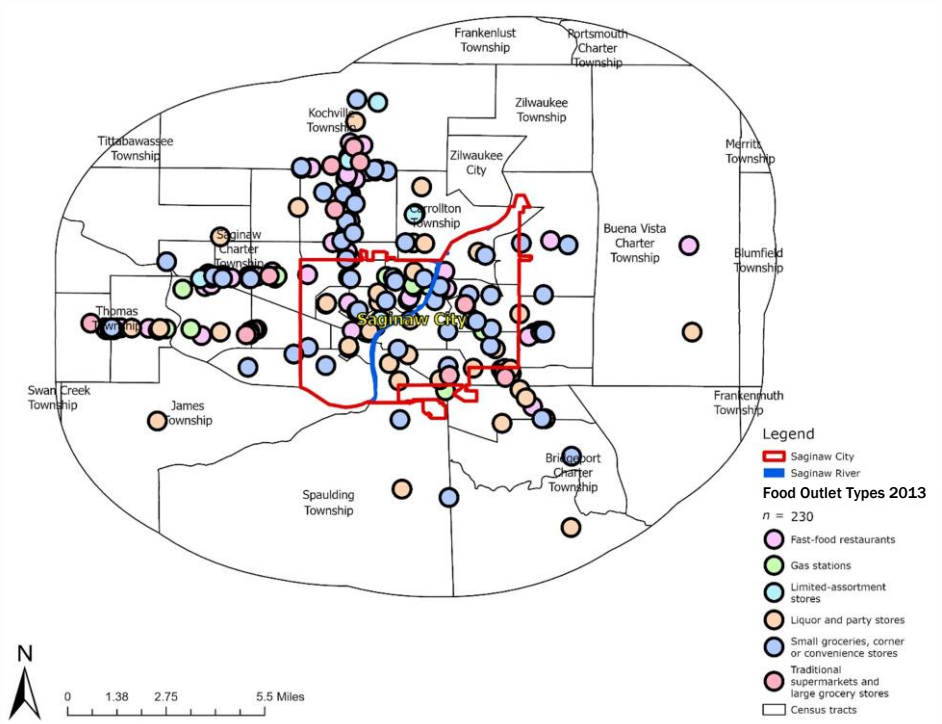


Figure B13b. Map Examining the Food Swamp Thesis for 2023

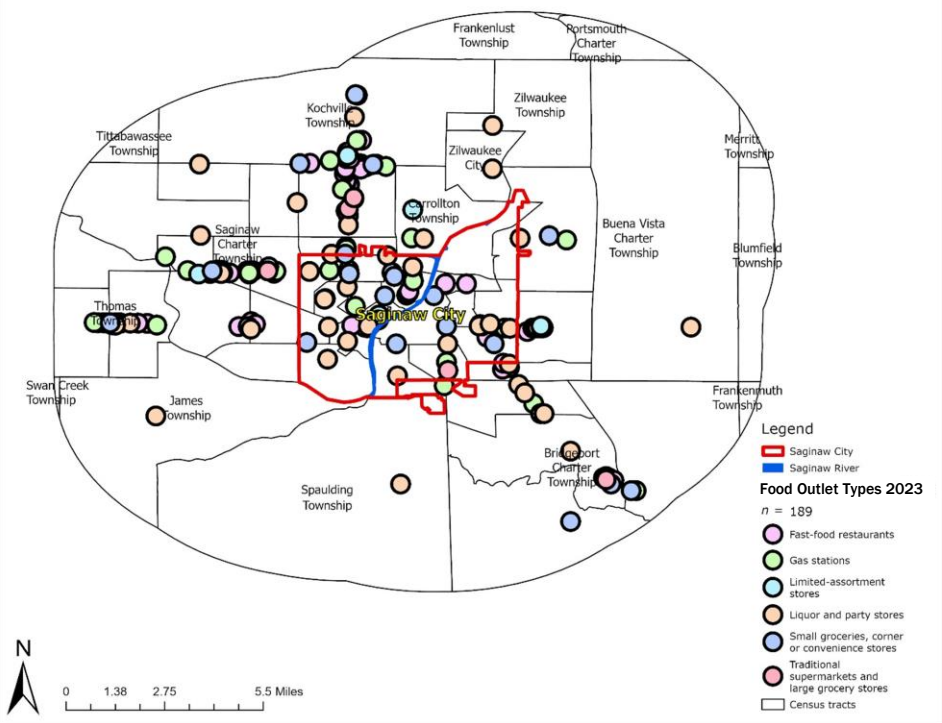


Figure B14. Map Showing the Location of Food Outlets that were Closed in 2023