

What's In A Name? The Future of "Food Desert"

By Mia Jean

AUTHOR BIOGRAPHY

Mia Jean is a senior at Northern Highlands Regional High School in Allendale, NJ. She is a student researcher and documentary filmmaker with a strong interest in food systems, sustainability, and social justice. Mia is committed to using research and media to advocate for lasting change in critical global challenges and promote equity and sustainability.

ABSTRACT

Food insecurity, often framed in terms of "food deserts," has become a focal point for policymakers and researchers aiming to address disparities in food access. However, the current USDA definition of food deserts, which primarily focuses on geographic proximity to grocery stores, fails to capture the complexities of food availability, affordability, and the racial and economic inequalities that underlie food insecurity. This paper critiques the existing approach and proposes a more comprehensive framework—the Food Nexus Score (FNS)—which integrates multiple dimensions of food insecurity: availability, affordability, quality, and equity. By expanding beyond mere geographic proximity, the FNS considers factors such as the nutritional quality of food, economic barriers to healthy eating, and systemic disparities, providing a more complex and actionable tool for addressing food insecurity. Through the application of the FNS in Detroit, Michigan, this paper demonstrates the framework's potential to better capture the realities of food insecurity and support targeted, community-driven interventions. In conclusion, the FNS represents a shift from theoretical debates toward practical, systemic solutions that aim to dismantle food insecurity and create more equitable food systems.

Keywords: *food desert, food apartheid, food oppression, nutrition, community health, food equity, human rights, capitalism*

INTRODUCTION

Food is the driving source of our nutrition, health, and livelihood, whether as a societal force or as a supplement to our anatomy. However, the inevitability of hunger does not necessarily confer, at least in a capitalist society, to a right to access food; instead, it is effectively a privilege that needs to be earned regardless of one's socioeconomic status, background, and practical options to act as a consumer. This situation has caused a rise over the last twenty years in debate over the usage and proper definition of the term *food desert*. *Food desert* has traditionally been used to describe an area in which there is limited access to affordable food within a certain radius. *Food desert* was first used in Scotland in the early 1990s to describe a lack of access to an affordable and healthy diet (Beaulac et al., 2009). The term gained prominence later on when revived by researchers in the UK.

At the time of this writing, *food desert* generally speaks of “a geographic area that lacks sufficient access to grocery stores, especially in low-income communities” (Karpyn, 2019). There is disagreement over the use of the term; some people think that “food apartheid would be more appropriate, as ‘food desert’ obscures the presence of community and backyard gardens, farmer’s markets, food businesses, and other food sharing activities that exist in these areas” (Sevilla, 2021). Still, whichever name is chosen will ultimately refer only to a loosely-defined concept focused on geographical proximity to grocery stores rather than rooted in the actual nutritional quality of the food that is available.

This paper argues that the current definition and understanding of a food desert must evolve to emphasize the nutritional value of food over the technical availability of food that can be accessed despite its lack of nutrition. Examining the limitations of the traditional definition, this research explores some alternative approaches to addressing food insecurity and nutrition voids in food deserts. This review also posits a new approach to food deserts—the Food Nexus Score—that could have significant positive implications for public health, ensuring that our communities prioritize access to high quality nutrient rich foods.

LITERATURE REVIEW

The term *food desert* is believed to have originated in Scotland in the early 1990s. Its usage rapidly gained traction in the United Kingdom, and, by the 2000s, it had become widely adopted by advocates for public health and food policy in the United States. The term was first included in American federal legislation with the 2008 Farm Bill, formally named the Food Conservation and Energy Act of 2008 (H.R.2419), when Congress instructed the United States Department of Agriculture (USDA) to investigate and report on “food deserts.” The emphasis of the term—during this period of time—was primarily on geographic access to food outlets, highlighting the troublesome lack of supermarkets in low-income neighborhoods.

The controversial term faced immediate pushback, and, in 2013, the USDA stopped using *food desert*, instead referring to these same areas as “low income and low access areas” (Mancini, 2023). The government’s change of heart marked the era in the 2010s when the term faced the most pushback and criticism. It was too late to remove the term from the public sphere, however, and critics emerged, arguing that ‘*food desert*’ oversimplified the manifold complex issues related to food access. Concerns were raised about the stigma it created for affected communities, as well as the term’s focus on physical access to food over other factors like the affordability of food and the consequences of systemic racism (Mancini, 2023). Related concepts such as *food swamps*, areas with a high density of unhealthy food options, and *food apartheid*, which highlights systemic inequalities, began to emerge during this time as well (Lu, 2021).

THE CASE OF THE USDA

The importance of language when discussing so-called food deserts cannot be overstated. This is because the terms that we choose to use to describe a social phenomenon can significantly shape perceptions, policies, and community responses about that phenomenon (Glüer et al., 2024). For instance, *food desert* evokes a natural, inexplicable, even necessary lack of resources as opposed to targeting a systemic failure of a capitalist society rife with discrimination based on race, culture, and background. Obesity and diabetes rates are rising, bringing access to healthy food to the center of the global health conversation.

This concern was further examined in a USDA discussion of food deserts (Dutko et al., 2012). The 2008 Farm Bill mandated the USDA to evaluate areas in the US that were coming to be known as “food deserts,” or areas where access to healthy and affordable food is limited, a particular challenge for low-income households. The 2009 USDA report found that 23.5 million people lived in these areas—11.5 million of which were classified as low-income by government standards (Dutko et al., 2012).

The 2009 USDA report measures food deserts by analyzing distances to supermarkets and large grocery stores. Areas more than a specific distance from supermarkets were classified as food desert. Additionally, the USDA defined *food deserts* as places that were considered “low income” tracts, meaning that a significant portion of the population is identified as having a poverty rate of 20% or higher, or a median family income at or below 80% of the area’s median. “Low access” areas described those where at least 500 people or 33% of the population live more than one mile away from a supermarket, in urban settings, or more than 10 miles in rural areas Using these criteria, the USDA characterized 6,529 census tracts as food deserts (see Table 1). (Dutko et al., 2012).

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Table 1

Measuring food deserts

Number and percentage of food desert tracts by rural and urban status and by low-income status			
	Overall	Rural	Urban
Food desert tracts	6,529	2,204	4,175
Number of low-income tracts	24,927	6,519	17,940
Total number of tracts	64,999	13,827	50,784
Percent			
Food desert tracts as percentage of low-income tracts	26.2	33.8	23.3
Food desert tracts as percentage of total tracts	10.0	15.9	8.2

Note. Reprinted from Characteristics and Influential Factors of Food Deserts in *Economic Research Service, U.S. Department of Agriculture*, from https://ers.usda.gov/sites/default/files/_laserfiche/publications/45014/30940_err140.pdf?v=36423. Copyright 2012 by Paula Dutko, Michele Ver Ploeg and Tracey Farrigan.

CRITICISMS OF THE USDA FORMULA

In recent years, researchers have criticized the USDA's methodology for identifying food deserts, prompting some advocates to suggest discontinuing use of the term "food desert" as a whole and favoring alternative language when addressing areas with poor access to quality food (Johnson & Stewart, 2021). Within the government, Congressional interest in improving access to healthy foods remains, as seen by the introduction of the Healthy Food Access for All Americans Act in 2021 (S.203). This Act proposed tax credits and grants for food providers in designated food deserts. Additionally, legislation was proposed aiming to fund grocery stores with nutritious foods in underserved areas and to expand salad bars in schools (H.R. 2688).

The USDA's methodology has evolved since the 2008 Farm Bill, with updated estimates available in the USDA Economic Research Service's Food Access Research Atlas (2025). The criteria for a low-income and low-access area are poverty rates of 20% or greater and a distance of over 1 mile for urban areas (and 10 miles for rural areas) from a supermarket. This data suggests that approximately 19 million people fall into the category of a low-income and low-access area.

Still, critics of the USDA study and its terminology argue that the criteria of the USDA study do not accurately reflect the reality of food access, as they rely too heavily on income and distance to supermarkets while completely neglecting other factors, such as race, local conditions, and the quality of the food in existing supermarkets present in the area (Johnson & Stewart, 2021). Additionally, the USDA's reliance on census tracts may lead to inaccuracies because the Census undercounts Black, homeless, and undocumented people (United

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States Census Bureau, 2023). The focus on supermarkets excludes other food sources, ignoring other culturally-specific systems of food distribution. Terms like “supermarket redlining,” “food apartheid,” and “food mirage” are gaining more traction in recent years, in an attempt to address the limitations of the previous conception of a food desert (Johnson & Stewart, 2021).

Why Should It Be A “Desert”?

There are also programs like the Food Empowerment Project that critique the term *food desert* which they suggest ignores broader issues like racism, economic factors, cultural relevance of food, and the ability to grow food on one’s own. Instead, some such organizations prefer terms like *food apartheid* or *food oppression* (Food Empowerment Project, n.d.). To those groups, *food apartheid*, for instance, better encapsulates the deeply-rooted racial inequalities that shape food access, especially in marginalized communities. Unlike, *food desert*, which implies a simple lack of physical food outlets, *food apartheid* acknowledges the discriminatory systems that contribute to the uneven distribution of food resources. By overlooking these structural injustices, the USDA definition thus fails to recognize the real barriers to achieving nutrition that communities of color face.

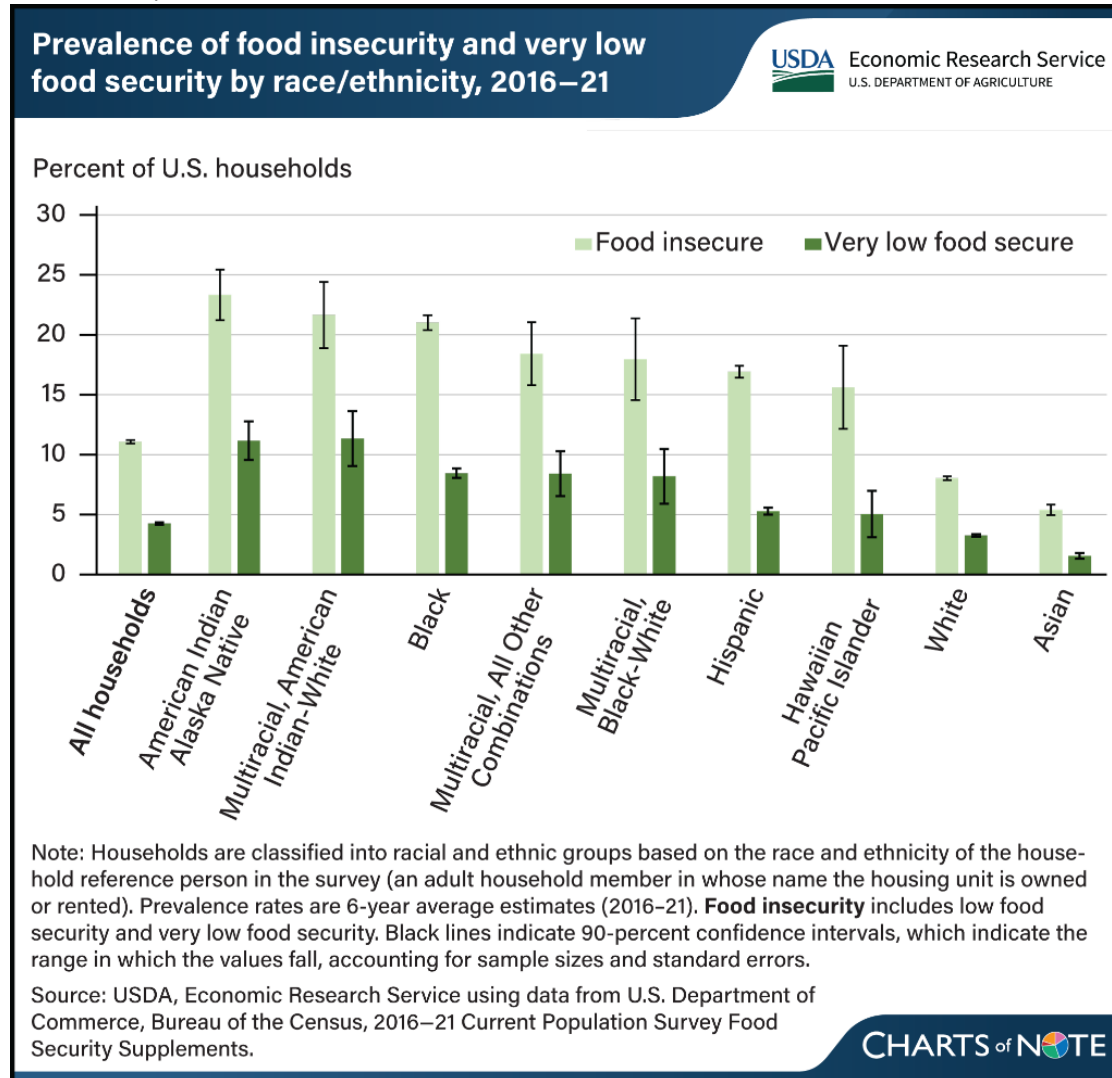
By framing food insecurity, defined by the USDA as “a household-level economic and social condition of limited or uncertain access to adequate food,” (USDA Economic Research Service, n.d.) as a form of *food oppression*, the term *food apartheid* places responsibility for the man-made distance between people and healthy food on the policies, economic systems, and institutional practices that have historically excluded certain populations. *Food apartheid* shifts the conversation from mere proximity to grocery stores to a broader examination of how the food system is shaped by racial power dynamics, ensuring that solutions focus on the root causes rather than just the symptoms of food insecurity (Food Empowerment Project, n.d.).

The connection between food insecurity and racial inequality becomes even more apparent when examining the disproportionate impact on Black and Brown communities. The issue of food insecurity is especially prominent in Black, Brown, and low-income communities, where so-called food deserts are most prevalent (see Figure 1) (Food Empowerment Project, n.d; Young 2018). Black communities in the United States are most disproportionately affected by food insecurity, with 22% of Black people experiencing hunger in 2023, more than twice the rate of white people; this issue is particularly severe for Black children, who are twice as likely to face hunger, with 27% of Black children living in food-insecure households. Other economic disparities further exacerbate this problem, as Black families are more likely to live in poverty, with a poverty rate of 17.9% compared to the national average of 11.1%. Systemic racism and economic inequality, including low wages and limited job opportunities, contribute to these disparities, making it harder for Black communities to afford healthy food (Young, 2018).

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Figure 1

Food insecurity in U.S. households



Note. Reprinted from Food insecurity in U.S. households varies across race and ethnicity in *Economic Research Service, U.S. Department of Agriculture*, from <https://ers.usda.gov/data-products/charts-of-note/chart-detail?chartId=108925>. Copyright 2024 by Laura J. Hales.

Other minority groups are subject to the same discriminatory forces in the food distribution system. There is a consistent disparity in food insecurity between racial and ethnic groups. Data shows that food

insecurity rates for non-Hispanic Black and Hispanic households are at least twice as high as those for non-Hispanic white households. American Indian/Alaska Native populations also experience significantly higher food insecurity rates. This racial/ethnic disparity is intertwined with broader socio-economic determinants such as poverty, unemployment, incarceration, and disability, but some studies suggest that racial disparities in food insecurity persist even after controlling for these factors (Young, 2018).

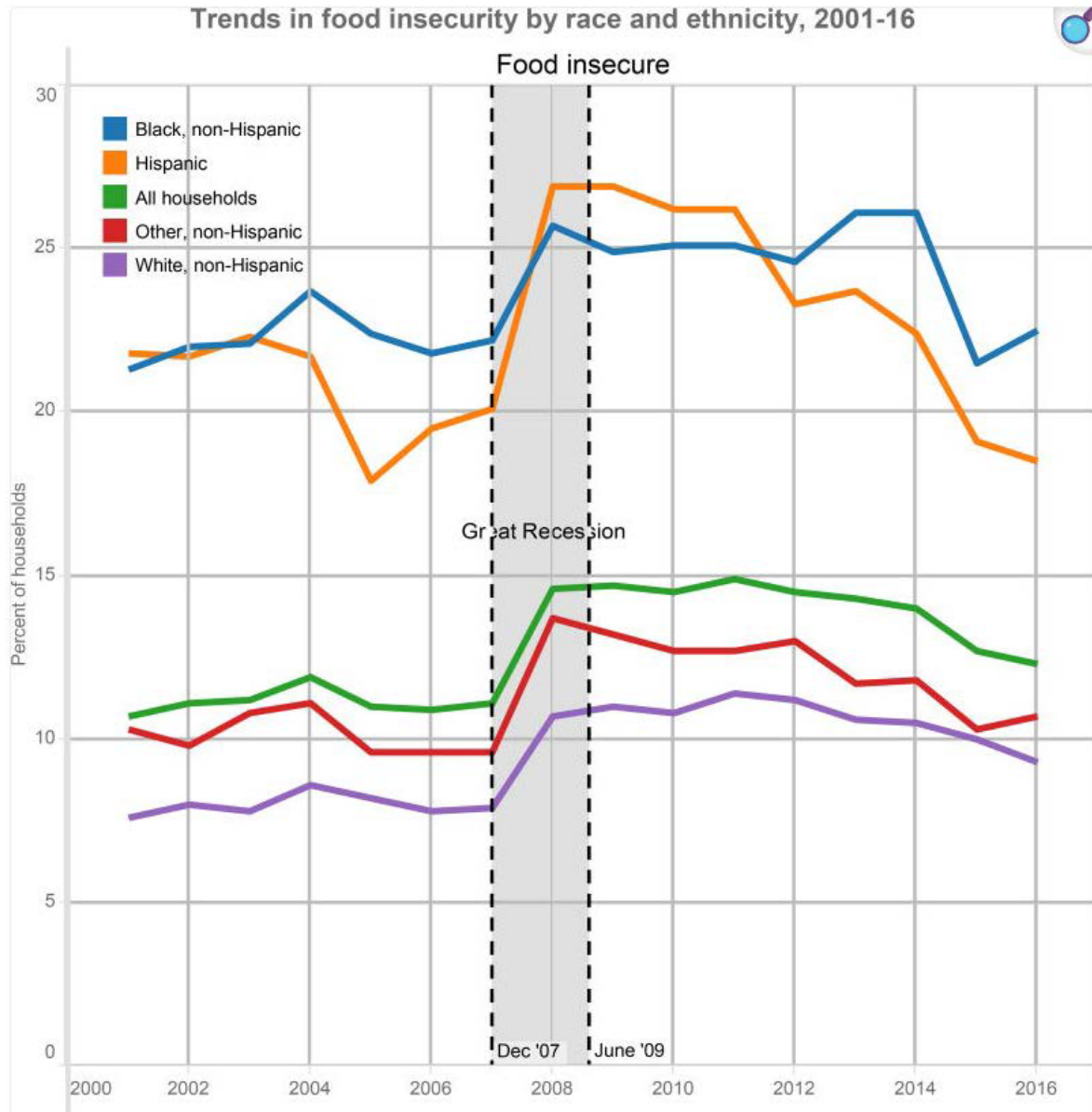
The Relationship Between Access to Food, Good Health, and Racism

Increasingly, public health organizations are recognizing that discrimination and structural racism contribute significantly to health and food inequities (see Figure 2) (Young, 2018). Systemic racism and discrimination contribute to worsening health outcomes for Black communities and other communities of color, and these forces are closely linked to the concepts of food deserts and food insecurity. African Americans face higher mortality rates for leading causes of death like heart disease, cancer, and diabetes, and these disparities persist even after controlling for socioeconomic status. Systemic racism has historically led to the disinvestment in neighborhoods predominantly inhabited by people of color, creating environments where access to healthy food is low, creating a vicious cycle of poor health outcomes driven by both lack of access to food and the chronic stress of racial discrimination. Therefore, addressing health disparities requires tackling the root causes of food deserts, which are deeply intertwined with the systemic racism that disproportionately affects minority populations (Williams, 2010).

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Figure 2

Trends in food insecurity between races and ethnicities



Note. Reprinted from Examining the Impact of Structural Racism on Food Insecurity: Implications for Addressing Racial/Ethnic Disparities in *National Library of Medicine, National Institutes of Health*, from <https://pmc.ncbi.nlm.nih.gov/articles/PMC5823283/>. Copyright 2019 by Angela M Odoms-Young.

The connection between food insecurity and systemic racism becomes even clearer when considering the historical and ongoing practices of supermarket “redlining.” Just as discriminatory housing policies kept Black and Brown communities isolated from economic opportunities and resources, supermarket redlining ensures that these same communities remain underserved when it comes to access to healthy food (Li, 2022).

Redlining is a practice made famous by the federal Home Owner Lending Corporation (HOLC) in the 1930s. Redlining refers to the process of grocery stores and food retailers deliberately avoiding or limiting their services in low-income neighborhoods, often those predominantly inhabited by racial or ethnic minorities. This exclusion results in reduced access to fresh, healthy food. The persistent lack of access to fresh, healthy food in these areas is not merely a consequence of market forces or individual choices, but a direct result of decades of system-level discriminatory practices. Historically redlined neighborhoods are more likely to have unhealthy retail food environments (Li, 2022). Predominantly white neighborhoods contain an average of four times as many supermarkets as predominantly black ones do, and grocery stores in African American communities are usually smaller with less of a selection (Food Empowerment Project, n.d.). This creates a vicious cycle where, due to the historical and ongoing impact of systemic racism, Black, Brown, and low-income communities are forced to rely on convenience stores or fast food chains, which offer unhealthy and overpriced options.

Many argue that the term *food apartheid* is the more fitting descriptor for the plight of food-insecure households because it highlights the systemic racism and structural inequalities that shape access to food. While *food desert* focuses on the lack of grocery stores in certain areas, *food apartheid* better addresses the racial and historical forces that have contributed to food access disparities, allowing for a broader understanding of the ways in which structural racism perpetuates unequal access to healthy food.

An Activist Perspective

To further elaborate on these critiques, it is important to consider the perspectives of activists working within affected communities. One such individual is Malik Yakini, prominent food activist and educator based in Detroit, Michigan. Yakini is the co-founder and executive director of the Detroit Black Community Food Security Network (DBCFSN), an organization focused on promoting food sovereignty and justice within Black communities. Yakini advocates for equitable access to healthy food and works to address the systemic issues contributing to food insecurity, including economic and racial disparities. His efforts emphasize the importance of self-determination in food systems and the need to transform how communities engage with food and nutrition. Yakini also argues against the term *food desert* and opts for *food apartheid* (Lu, 2020).

Yakini once said that, when he hears the word *desert*, he envisions a barren landscape lacking life and abundance. *Food desert*, he explains, is an outsider label that overlooks the history and resilience of affected

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communities. While these areas may lack supermarkets, they often have numerous convenience stores selling unhealthy foods, highlighting a lack of nutritious food, like fresh produce, rather than food scarcity overall. Lastly, the use of the word *desert* implies that the issue of food insecurity is a natural occurrence, ignoring the centuries of public policies and economic practices that have led to these conditions. Yakini emphasizes that this framing does not address the intentionality and capitalistic strategy behind the lack of food access in these neighborhoods (Lu, 2020).

The term *apartheid* evokes historical systems of racial discrimination and segregation, highlighting ongoing inequalities in access to resources. *Food apartheid* captures the systemic barriers to food access, particularly for communities of color. Activist Dara Cooper describes food apartheid as the deliberate undermining of Black self-determination in food systems, characterized by the prevalence of unhealthy foods and discriminatory corporate practices that contribute to high rates of diet-related diseases in these communities.

The availability of grocery stores is closely linked to income and race, with fast food restaurants often more prevalent in communities of color than in higher-income areas. This disparity stems from historical factors, such as the "white flight" after the Civil Rights movement, where many white American families left urban areas, taking businesses and jobs with them. Consequently, low-income communities of color faced challenges like limited access to healthy food and employment opportunities (Lu, 2020).

The NAICS Problem

The expansion of fast food chains in inner cities, while creating jobs and community spaces, often perpetuates reliance on unhealthy foods and does not provide living wages, exacerbating poverty. As a result, Black individuals experience the highest rates of obesity and heart disease among racial groups in the U.S., highlighting the urgent need for addressing both food and economic justice (Lu, 2020).

Therefore, the *food desert* concept fails to take into account the nutritional quality of the food in any given area, and so-called food deserts may actually contain an overabundance of fast food chains that sell cheap foods high in fat, sugar, and salt. This reflects an inadequacy in the original USDA classification system and standards when determining which areas would be considered a food desert. According to the North American Industry Classification System (NAICS) code used by the USDA, small corner grocery stores are lumped together with supermarkets for data capturing purposes (Wing, 2002). Therefore, a community that has no supermarket but a few corner stores would not be counted as a food desert, even when the food offered is extremely limited and/or consists mainly of food with no nutritional value.

This issue is examined further in a Food Empowerment Project study, which surveyed food establishments in Santa Clara County, California to explore the relationship between income, health, and access to healthy foods (Hawthorne, 2010). The study specifically aimed to compare food access in higher-income and lower-income areas by selecting census tracts that varied in income, education levels, and ethnic composition. Lower-income areas, predominantly in San Jose, were characterized by populations with significantly fewer years of education, higher poverty rates, and a larger proportion of ethnic minorities. In contrast, higher-income areas, which included cities like Campbell, Los Altos, Palo Alto, and Saratoga, had populations with higher education levels, lower poverty rates, and were primarily white. Using the ReferenceUSA® database, which catalogs over 14 million U.S. businesses, researchers surveyed a range of food-related establishments, including supermarkets, convenience stores, liquor stores, meat markets, and fruit/vegetable markets. Excluded from the survey were restaurants and other food service-focused locations.

The survey revealed significant disparities in the availability of food establishments between higher-income and lower-income areas. Higher-income areas had twice as many large supermarkets as lower-income areas, with a per-capita ratio of 2.4 times more supermarkets. Lower-income areas, however, had nearly twice as many liquor stores and 50% more meat markets compared to higher-income areas. While both areas had a similar proportion of supermarket-classified locations, higher-income areas had a much higher proportion of large supermarkets. Large supermarkets made up 57.1% of supermarket locations in higher-income areas but only 22.2% in lower-income areas. This highlights a reliance on small corner markets in lower-income neighborhoods, which typically offer a more limited selection of fresh produce compared to larger grocery stores in wealthier areas (Hawthorne, 2010).

Higher-income areas had more access to fresh, frozen, and organic produce, with twice as many locations offering fresh fruits and vegetables compared to lower-income areas. Frozen produce was even more limited in lower-income areas, with 14 times fewer locations offering frozen fruits and six times fewer offering frozen vegetables. Access to organic produce was virtually nonexistent in lower-income areas. In addition to the limited availability, the variety of produce was also restricted in lower-income communities. Meat and dairy alternatives were similarly scarce, further limiting healthy food options. The quality of produce in lower-income areas was generally rated lower, with more than 70% of locations receiving a "fair" or "poor" rating, compared to just half of the locations in higher-income areas. Furthermore, produce in lower-income stores was often poorly priced or not marked, leaving customers vulnerable to inconsistent pricing (Hawthorne, 2010). With the advent of artificial intelligence, shoppers may now fall victim to surge pricing at stores as well (Totty, 2023).

The USDA's current definition of *food desert*, which relies heavily on the NAICS code classification system, fails to fully capture the complexities of food access in underserved communities. While both types of areas may have a comparable number of supermarket-classified locations, higher-income areas are overwhelmingly served by larger supermarkets offering a greater variety of fresh, frozen, and organic produce. In

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contrast, lower-income areas depend more on small, corner grocery stores with limited and often unhealthy food options. The NAICS code's lack of distinction between small and large food outlets fails to account for the differences in food quality, variety, and pricing that have a profound impact on health. By overlooking these crucial aspects, the USDA's definition of *food desert* does not provide a complete picture of the food insecurity faced by many low-income communities.

The Significance of Affordability

In addressing the issue of so-called food deserts, many initiatives focus on simply increasing the number of grocery stores in underserved areas, under the assumption that access to more food outlets will lead to healthier eating. However, this approach overlooks a critical factor: affordability. While expanding the availability of grocery stores may seem like a straightforward solution, the reality is that the cost of healthy foods remains as significant a barrier as access for many low-income households (Fu, 2020). Simply adding more grocery stores to food deserts does not automatically translate into improved nutrition or healthier eating habits. The affordability of nutritious foods plays a far more significant role in shaping dietary choices, and without addressing this key issue, efforts to eliminate food deserts will fall short of their goals.

The Healthy Food Financing Initiative (HFFI), for instance, has invested \$300 million to help areas known as food deserts. The HFFI was established by the 2014 Farm Bill (H.R.2642) and remains a comprehensive effort aimed at tackling the widespread issue of food deserts in underserved communities. The HFFI aims to solve this problem by facilitating the establishment and expansion of grocery stores, supermarkets, and other food retail outlets in these underserved neighborhoods (USDA, 2025).

To achieve this goal, the initiative provides financial support in the form of grants, loans, and tax incentives to businesses, non-profits, and other organizations interested in opening or improving food retail spaces in areas that lack access to fresh and nutritious food. By partnering with financial institutions, private investors, and local governments, the initiative is able to mobilize a broad range of resources to support the development of new grocery stores. These partnerships also allow HFFI to offer a combination of low-interest loans, grants, and tax credits to help bring grocery stores into food deserts where they would otherwise be economically unfeasible—for corporations (Lu, 2020).

In addition to traditional grocery stores, the HFFI also supports the development of other innovative food retail solutions such as farmers' markets, community-based food cooperatives, and mobile grocery units. By adding more grocery stores and healthy food outlets, the HFFI is hoping to not just address the immediate issue of food access but to also foster long-term economic development in underserved areas. As more grocery stores open in these communities, they can create jobs, improve the local economy, and attract further investment, ultimately leading to a cycle of positive change and improved quality of life for residents.

However, while the Healthy Food Financing Initiative (HFFI) represents a significant effort to expand grocery store access in underserved communities, the initiative's primary focus on increasing food availability overlooks a crucial factor: affordability for the actual consumers, rather than those who are only in it for the capital. Despite well-intentioned efforts to build more stores in food deserts, the challenge of making nutritious food affordable remains a persistent issue. Studies have shown that simply increasing the number of grocery stores does not guarantee improved access to healthy food for low-income families (Fu, 2020).

The affordability of healthy food, rather than just its availability, plays a far more significant role in shaping dietary choices. As cities like Fort Worth and Tulsa have begun to recognize, simply placing grocery stores in underserved areas does little to address the economic barriers that keep fresh food out of reach for many residents (Hart, 2019). In recent months, these cities have implemented bans on new dollar stores to address the lack of fresh food options in underserved communities. Fort Worth, Texas passed a law prohibiting new dollar stores within two miles of existing ones and requiring new stores to dedicate at least 15% of their space to fresh food. Similarly, Tulsa, Oklahoma blocked new dollar stores from opening within a mile of existing ones in neighborhoods with high unemployment and a predominantly Black population. Other cities, like New Orleans and DeKalb County, have followed suit. The reasoning behind these bans is that dollar stores, with their lower operating costs and limited fresh food offerings, undermine traditional supermarkets, which struggle to compete. As grocery stores close, communities are left with fewer options for fresh produce and meat (Fu, 2020).

There are still countless programs with heavy funding that aim only to add more grocery stores to food deserts, still under the impression that by doing this, more nutritious food will be provided to all. NJ Food Desert Relief Tax Credit Program, for instance, encourages the development and long term operation of supermarkets and grocery stores in Food Desert Communities (NJDE, 2020).

DISCUSSION

The majority of the existing literature on food deserts has focused more on refining the operational definitions of such an area than on actively addressing the root causes of food insecurity. Researchers have debated the merits of *food deserts* versus *food apartheid* or *food swamps*, yet these discussions often distract from the more pressing need to implement tangible solutions. By focusing on terminology, much of the research risks normalizing the issue, as it may inadvertently suggest that food deserts are a naturally occurring phenomenon, rather than a product of historical and contemporary injustices.

Furthermore, much of the research has examined food deserts in terms of availability—i.e., the number of grocery stores or food outlets in a particular area—rather than the affordability and nutritional quality of the

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food provided. Although initiatives like the USDA's Healthy Food Financing Initiative (HFFI) have aimed to increase the number of grocery stores in underserved communities, these efforts often fail to address the critical issue of affordability. Simply increasing the number of grocery stores does not guarantee that nutritious food will be affordable or accessible for low-income households. In fact, some initiatives, such as the expansion of dollar stores in food deserts, can worsen the problem by offering low-cost, highly processed foods rather than fresh produce or healthy alternatives.

The most effective approach to addressing food insecurity requires a focus on both food availability and affordability. While some neighborhoods may have access to grocery stores, the prices of fresh fruits, vegetables, and other nutritious foods may be prohibitively expensive for many residents. This economic barrier to healthy eating has become a focal point in recent years, with cities like Fort Worth and Tulsa attempting to regulate the expansion of dollar stores to mitigate their negative impact on food access.

In sum, while the literature on food deserts has made significant strides in understanding the scope of the issue and refining the terminology used to describe it, there remains a critical gap in the literature regarding how to actively combat food insecurity. Rather than focusing solely on labeling the problem, future research should take a more proactive stance by exploring practical, systemic solutions that address both the availability and affordability of healthy food in underserved communities. This approach should involve a deeper investigation into policy reforms, community-led food sovereignty initiatives, and economic justice efforts that target the root causes of food insecurity. Moving beyond naming the issue and toward meaningful action is essential for fostering long-term change and improving food access for marginalized populations.

THE FOOD NEXUS SCORE (FNS)

To effectively tackle food insecurity and the deep-rooted issues of food deserts, we need a comprehensive, actionable solution that goes beyond simply defining or labeling the problem. This paper offers the Food Nexus Score as a solution. The Food Nexus Score (hereafter FNS) is a robust framework that accounts for the multiple dimensions of food access, affordability, quality, and equity. Such a score would not only combine elements of the USDA's current food desert criteria but also expand to include additional metrics addressing affordability, food quality, and the social, economic, and racial disparities that underpin food insecurity. By integrating these factors, the FNS could serve as a tool for policymakers, community organizations, and activists working to improve food systems, providing a more complete picture of food insecurity, driving targeted interventions, and retiring the term *food desert*.

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Availability of healthy food

The USDA's definition of food deserts emphasizes geographic proximity to grocery stores, often focusing on the presence or absence of supermarkets and fresh food outlets. While proximity to fresh food is crucial, it fails to consider the nutritional quality of food available. For example, communities in so-called food deserts might have access to numerous convenience stores and fast food outlets, but these are often stocked with highly processed, nutrient-poor foods such as snacks, sugary drinks, and frozen meals.

The FNS would factor in not only the proximity to food outlets, but also the types of food available. It would track the availability of fresh, nutritious foods such as fruits, vegetables, whole grains, and lean proteins. It would also consider the ratio of healthy food outlets to unhealthy ones, such as the prevalence of fast food chains or convenience stores that primarily sell processed foods. Areas that have a disproportionate number of unhealthy food outlets compared to fresh produce vendors, supermarkets, or farmers' markets would score poorly under this dimension of the FNS.

For example, a neighborhood that is technically classified as having "food access" because of the presence of several corner stores might still be considered a food insecurity hotspot due to the lack of fresh produce or nutritious options. In this case, the FNS would capture the severity of the issue and highlight areas where food quality, not just availability, needs urgent attention.

Affordability of healthy food

The second critical factor in addressing food insecurity is affordability. While increasing the number of food outlets is an important step, it does not automatically guarantee that residents in low-income areas can afford healthy food. The USDA's food desert definition largely ignores affordability, focusing solely on access to food outlets. The FNS would address this issue directly by incorporating an affordability component into its score.

To determine affordability, the FNS would look at the price disparity between healthy and unhealthy food items in different neighborhoods. For example, fresh fruits and vegetables, which are often more expensive than processed foods, might be cost-prohibitive for low-income families, even if they are available in local grocery stores. Additionally, the FNS would account for regional economic conditions, such as average household income, unemployment rates, and local poverty levels, which directly affect residents' ability to purchase healthy food.

The affordability aspect of the FNS would focus on creating a clear picture of the economic barriers to accessing healthy food. Neighborhoods where the price difference between healthy food and processed food is

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significantly large would receive a lower FNS score, signaling that simply expanding grocery store access is insufficient without making nutritious food more financially accessible. Policies that lower the cost of healthy foods—such as subsidies, tax breaks for retailers offering affordable produce, or income-based food assistance programs—would be vital in addressing the affordability gap.

Economic and racial disparities

Food insecurity is deeply intertwined with broader economic and racial inequalities. The FNS would place a strong emphasis on economic disparities and racial equity by factoring in income levels, unemployment rates, and the presence of systemic barriers that hinder access to both economic opportunities and healthy food.

This component of the FNS would take into account historical and contemporary practices, such as redlining, "white flight," and the corporate practices that have historically undermined Black communities' access to healthy food. It would also consider the role of discriminatory policies, like the lack of investment in minority communities or the expansion of predatory businesses (such as fast food chains or dollar stores) in low-income areas.

For example, communities that experience high rates of poverty and unemployment and that are predominantly racial minorities would likely receive a lower score on the FNS. Areas where long-standing economic segregation has led to a lack of grocery stores or fresh food outlets would also be penalized. By considering the impact of racial and economic inequalities, the FNS would provide a more nuanced and practical evaluation of food access.

The FNS would also enable more equitable and efficient policy interventions. Areas with high levels of racial and economic marginalization could derive targeted recommendations for investment in both food infrastructure and broader economic revitalization, including jobs, housing, and education. Addressing the root causes of economic and racial disparities is central to improving food access in these communities.

Community engagement and policy advocacy

The FNS would also factor in community engagement in addressing food insecurity. Areas where local groups, activists, and organizations are actively involved in advocating for food justice or working on food-related issues would score higher on the FNS. For example, neighborhoods with robust community food networks, such as those with organizations working on food sovereignty, local food policy councils, or active community gardens, would have a higher FNS score, indicating a proactive, self-determined approach to food access.

Moreover, communities that are involved in advocating for policy change—such as expanding SNAP benefits, securing zoning reforms to allow urban agriculture, or lobbying for healthy food financing initiatives—would be recognized as taking an active stance in dismantling food insecurity. This dimension emphasizes the need for systemic change in food policies and encourages communities to lead the charge in pushing for comprehensive reforms at local, state, and federal levels.

Actionable steps for implementing the FNS

To effectively address food insecurity and make lasting improvements in underserved communities, we must take actionable steps to implement the Food Nexus Score (FNS). The first step is to gather comprehensive data on food availability, affordability, food quality, and the racial and economic disparities that contribute to food insecurity. Through the use of Geographic Information Systems (GIS), surveys, and census data, local governments and organizations can map food access, track the availability of healthy food options, and monitor pricing patterns. The FNS also requires information on income levels, unemployment rates, and racial disparities to develop a more nuanced understanding of food insecurity. This data will be critical for identifying areas of need and guiding future interventions.

Collaboration with local stakeholders is essential for ensuring that the FNS accurately reflects the lived experiences of residents. Those interested in deriving an FNS must work closely with local organizations, food justice groups, and community activists to ensure that data collection efforts are inclusive and comprehensive. By integrating community input, researchers can identify local priorities and gaps in food access. This collaborative approach will ensure that the FNS is not just a tool for researchers and policymakers, but a reflection of the needs and desires of the communities most affected by food insecurity. Activists, organizers, and policymakers should come together to develop tailored interventions based on the insights gathered from the FNS data.

Once the FNS is in place as a standard, it can serve as a powerful tool for policy advocacy. Local governments can use the FNS to justify investments in grocery stores, farmers' markets, and community-based food projects. This data can also be used to push for policies that make healthy food more affordable, such as subsidies for fresh produce, healthier school meals, and urban agriculture initiatives. By leveraging the FNS, we can advocate for the systemic changes that are needed to ensure that food insecurity is addressed from multiple angles.

Finally, it is important to regularly assess and update the FNS to reflect changes in local food environments, economic conditions, and policies. Ongoing monitoring and evaluation will help ensure that the FNS remains dynamic and responsive, enabling researchers and policymakers to make timely adjustments to this

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approach and continue addressing food insecurity effectively, ensuring that communities have the resources they need to thrive.

Case study: the FNS & Detroit, Michigan

To demonstrate the effectiveness of the Food Nexus Score (FNS) in addressing food insecurity, this study applied both the original USDA definition of food deserts and the revised FNS parameters to the city of Detroit, Michigan. Detroit, a city historically marked by significant economic challenges, high poverty rates, and a lack of access to quality food options (Santarossa, 2021), presents a clear example of how food deserts are more complex than simply geographic proximity to food outlets. Under the USDA's original definition, food deserts are identified as areas with low-income populations that live more than a mile (urban areas) or ten miles (rural areas) from the nearest supermarket or large grocery store. In Detroit, many neighborhoods meet this criteria, with large swathes of the city classified as food deserts due to a lack of grocery stores in proximity. For example, areas such as Brightmoor, located on the northwest side of Detroit, have limited access to large grocery stores, and residents often rely on convenience stores or fast food chains for their food needs (Santarossa, 2021). Under the USDA's food desert definition, Brightmoor would be labeled as a food desert simply because of its distance from major supermarkets.

However, while this definition acknowledges the lack of access, it fails to consider the quality of food available or the economic barriers that make it difficult for residents to afford healthy food, even if it were accessible. In many of these neighborhoods, the convenience stores that are present primarily offer processed, unhealthy food options—snack foods, sugary drinks, and frozen meals—rather than fresh produce or nutritious whole foods. The USDA definition does not account for this critical factor in food insecurity, thus presenting an incomplete picture of the issue. In contrast, the FNS takes a broader and more nuanced approach by not only considering geographic proximity but also evaluating the types of food available, affordability, and the underlying racial and economic disparities that contribute to food insecurity.

When applying the FNS to Detroit, the first key factor to consider is the availability of healthy food. Under the FNS, the focus is not just on the presence of grocery stores, but on the nutritional quality of food available. While some areas of Detroit may have supermarkets or food outlets within the USDA's defined distance, these stores often stock limited quantities of fresh produce or offer low-quality, processed foods. For example, in neighborhoods like Brightmoor or parts of the East Side, fresh fruits and vegetables may be scarce, and processed food options dominate (Santarossa, 2021). The FNS would reflect this disparity by incorporating food quality into the score, highlighting that proximity to grocery stores alone does not guarantee access to healthy food. This makes the FNS a more accurate and actionable tool for identifying areas where food quality needs urgent attention.

In addition to availability, the FNS addresses the affordability of healthy food, which is another critical factor often overlooked by the USDA's food desert definition. Even if fresh produce is available in some parts of Detroit, the high cost of healthy foods often makes them out of reach for many residents, especially in low-income areas. For instance, a head of lettuce in some neighborhoods may cost significantly more than a meal at a fast food restaurant (Zenk, 2009). This affordability issue is exacerbated by high unemployment rates and economic instability in many of Detroit's neighborhoods. The FNS captures this issue by evaluating the price disparity between healthy and unhealthy food options, providing a more comprehensive view of the economic barriers to accessing nutritious food. It also accounts for regional economic conditions such as income levels, unemployment rates, and local poverty levels, which directly affect residents' ability to purchase healthy food. This feature of the FNS highlights that simply increasing the number of food outlets is insufficient without making nutritious food more financially accessible to the community. (see Table 2)

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Table 2

Multilevel regression results

	Model 1: Fully unconditional			Model 2: Individual co-variables			Model 3: Food store availability			Model 4: Perceived fruit and vegetable supply		
	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value
Intercept	3.362	0.144	<0.001	3.333	0.103	<0.001	3.269	0.178	<0.001	3.333	0.103	<0.001
Age, years				<0.001	0.007	0.960	0.001	0.007	0.857	<0.001	0.007	0.972
Household size, # members				0.021	0.087	0.812	0.020	0.087	0.821	0.019	0.087	0.827
Years of residence in neighborhood				-0.012	0.008	0.137	-0.014	0.008	0.097	-0.012	0.008	0.134
Female (Ref: Male)				-0.237	0.251	0.345	-0.225	0.254	0.375	-0.230	0.254	0.365
Currently married (Ref: Not married)				0.681	0.296	0.021	0.693	0.294	0.019	0.674	0.288	0.020
Race/ethnicity (Ref: African-American)												
Latino				1.707	0.360	<0.001	1.730	0.381	<0.001	1.678	0.357	<0.001
White				-0.361	0.217	0.096	-0.300	0.206	0.145	-0.371	0.218	0.089
Education (Ref: At least some college)												
Less than high school				0.102	0.316	0.748	0.159	0.313	0.611	0.075	0.310	0.810
High school diploma or GED				-0.434	0.310	0.162	-0.455	0.298	0.127	-0.453	0.299	0.130
Annual income (Ref: ≥\$35,000)												
<\$10,000				0.123	0.322	0.696	0.146	0.316	0.644	0.133	0.320	0.677
\$10,000–\$19,999				0.385	0.456	0.399	0.378	0.446	0.397	0.383	0.464	0.409
\$20,000–\$34,999				-0.168	0.283	0.552	-0.132	0.285	0.644	-0.168	0.284	0.553
Currently employed (Ref: Not employed)				0.297	0.309	0.338	0.281	0.314	0.372	0.292	0.312	0.349
Owns car (Ref: Does not own car)				-0.143	0.261	0.584	-0.157	0.258	0.542	-0.140	0.260	0.591
Large grocery store							0.691	0.210	0.002			
Specialty store							-0.030	0.230	0.896			
Convenience store							-0.110	0.238	0.643			
Liquor stores, #							-0.041	0.046	0.376			
Small grocery store							-0.289	0.193	0.136			
Distance to nearest supermarket, miles							0.056	0.120	0.638			
Satisfaction neighborhood fruit and vegetable supply										0.099	0.150	0.500
Neighborhood variance	0.930		<0.001	0.271		0.013	0.058		0.065	0.266		0.014
Individual variance	7.210			6.791			6.875			6.789		

Note. Reprinted from Neighborhood Retail Food Environment and Fruit and Vegetable Intake in a Multiethnic Urban Population in *National Library of Medicine, National Institutes of Health*, from <https://pmc.ncbi.nlm.nih.gov/articles/PMC3305995/table/T2/>. Copyright 2012 by Shannon N Zenk. Reprinted with permission.

Furthermore, the FNS emphasizes the economic and racial disparities that contribute to food insecurity. Detroit has a large African American population and a history of systemic economic inequality, including

practices like redlining and disinvestment in predominantly Black neighborhoods (Mehdipanah, 2023). These systemic factors play a significant role in limiting access to healthy food, as many of Detroit's neighborhoods, particularly those on the city's West Side and Southwest, have faced disinvestment in both food infrastructure and broader economic development (Mehdipanah, 2023). The FNS takes these factors into account by considering income levels, unemployment rates, and the historical and ongoing effects of racial segregation. The FNS would highlight these racial and economic disparities, offering a more comprehensive understanding of food insecurity in Detroit and making it a better tool for identifying the root causes of food insecurity.

Another important aspect of the FNS is its evaluation of the quality of the food environment. This includes not only the availability of grocery stores but also the presence of community-driven food systems such as urban farms, farmers' markets, food cooperatives, and mobile food markets. In Detroit, emerging local initiatives aimed at improving food access, such as the Detroit Black Community Food Security Network and urban farms like the Detroit Garden Resource Program, provide a positive alternative to the corporate-controlled food outlets that dominate many neighborhoods. These community-based initiatives help to supply healthier, fresher, and more culturally appropriate food to local residents. By incorporating these local food systems into the FNS score, Detroit's neighborhoods with active food justice movements would be recognized for their efforts in combating food insecurity. In contrast, neighborhoods with little to no access to such initiatives would score poorly, reflecting the need for greater investment in sustainable, community-driven food solutions.

Ultimately, the FNS offers a more holistic view of food insecurity than the USDA's original definition, making it a more useful tool for policymakers and community organizations. By integrating multiple factors such as food quality, affordability, economic disparities, and community-driven food systems, the FNS provides a more accurate representation of the challenges residents face. While the USDA definition may label large portions of Detroit as food deserts based on proximity to food outlets, it fails to capture the complexities of food insecurity in these neighborhoods. The FNS, on the other hand, not only highlights the lack of healthy food but also emphasizes the economic barriers that prevent residents from accessing nutritious food, the disparities in food environments, and the importance of local solutions. This makes the FNS a better framework for developing targeted interventions and policies to address food insecurity in Detroit, providing a path toward building a more equitable and sustainable food system.

LIMITATIONS

This study acknowledges several limitations inherent in the development and application of the Food Nexus Score (FNS). The primary challenge lies in the technical complexity of creating a standardized, quantitative measure that accurately reflects the multidimensional nature of food insecurity. The exact variables and weightings used to calculate an FNS are not specified here, as the framework is designed to be flexible and

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adaptable to different contexts. This flexibility allows for the integration of diverse data sources, but it also introduces variability in how the score is constructed. The primary and secondary data collected from various organizations may not always be synchronized or comparable, leading to potential inconsistencies when aggregating or analyzing the data. Furthermore, because food insecurity is influenced by a broad array of social, economic, and cultural factors, capturing the full scope of these influences within a single numerical score remains a difficult task.

Additionally, while the FNS aims to address systemic issues such as racial and economic inequality, it is important to note that societal pressures—such as historical practices of redlining, disinvestment, and discrimination—are difficult to quantify. These pressures may manifest in ways that are not immediately visible through data collection methods, making them challenging to incorporate fully into the FNS model. While the FNS provides a more comprehensive understanding of food insecurity compared to the USDA's definition of food deserts, there remains a level of subjectivity in how certain variables are defined and measured, particularly in relation to local food systems and community engagement.

CONCLUSION

Addressing food insecurity requires a more complex approach than simply increasing the number of grocery stores in underserved areas. While the USDA's definition of food deserts has served as a foundational concept in understanding food access issues, it overlooks critical aspects such as food quality, affordability, and the deep-seated racial and economic disparities that shape food insecurity. The Food Nexus Score (FNS) proposed in this paper offers a holistic framework that goes beyond geographic proximity, factoring in food availability, affordability, the nutritional quality of food, and the socio-economic contexts that contribute to food insecurity. By incorporating these dimensions, the FNS provides a clearer picture of the challenges that low-income and marginalized communities face and offers actionable insights for policymakers and community organizations. Ultimately, the FNS encourages a shift from labeling food insecurity as a passive phenomenon to addressing the root causes of food inequality, fostering long-term, sustainable improvements in food systems across the nation.

REFERENCES

- Bailey, Z. D., Krieger, N., Agénor, M., Graves, J., Linos, N., & Bassett, M. T. (2017). Structural racism and health inequities in the USA: Evidence and interventions. *The Lancet*, 389(10077), 1453–1463. [https://doi.org/10.1016/S0140-6736\(17\)30569-X](https://doi.org/10.1016/S0140-6736(17)30569-X)
- Black, C., Moon, G., & Baird, J. (2014). Dietary inequalities: What is the evidence for the effect of the neighbourhood food environment? *Health & Place*, 27, 229–242. <https://doi.org/10.1016/j.healthplace.2013.09.015>

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- Bureau, U. C. (n.d.). *About the 1990 Decennial Census*. Census.Gov. Retrieved January 17, 2025, from <https://www.census.gov/programs-surveys/decennial-census/decade/1990/about-1990.html>
- Colabianchi, N., Antonakos, C. L., Coulton, C. J., Kaestner, R., Lauria, M., & Porter, D. E. (2021). The role of the built environment, food prices and neighborhood poverty in fruit and vegetable consumption: An instrumental variable analysis of the moving to opportunity experiment. *Health & Place*, 67, 102491. <https://doi.org/10.1016/j.healthplace.2020.102491>
- Data Products | Economic Research Service. (n.d.). Retrieved January 17, 2025, from <https://www.ers.usda.gov/data-products>
- Food Apartheid: Racialized Access to Healthy Affordable Food. (2021, April 2). <https://www.nrdc.org/bio/nina-sevilla/food-apartheid-racialized-access-healthy-affordable-food>
- Food Desert Relief Supermarket Tax Credit · Custom Portal. (n.d.). Retrieved January 17, 2025, from <https://programs.njeda.com/en-US/fdtc/>
- Food Deserts*—Food Empowerment Project. (n.d.). Retrieved January 17, 2025, from <https://foodispower.org/access-health/food-deserts/>
- Food Security in the U.S. - Definitions of Food Security | Economic Research Service. (n.d.). Retrieved January 17, 2025, from <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security>
- Glüer, K., Wikforss, Å., & Ganapini, M. (2024). The Normativity of Meaning and Content. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford Encyclopedia of Philosophy* (Fall 2024). Metaphysics Research Lab, Stanford University. <https://plato.stanford.edu/archives/fall2024/entries/meaning-normativity/>
- Healthy Food Financing Initiative. (2021, October 1). Rural Development. <https://www.rd.usda.gov/about-rd/initiatives/healthy-food-financing-initiative>
- In A Fight For Healthier Food, Fort Worth Is Fending Off Dollar Stores. (2019, December 19). KUT Radio, Austin's NPR Station. <https://www.kut.org/texas/2019-12-19/in-a-fight-for-healthier-food-fort-worth-is-fending-off-dollar-stores>
- Karpyn, A. E., Riser, D., Tracy T., Wang, R., & Shen, Y. (2019). The changing landscape of food deserts. *UNSCN Nutrition*, 44, 46–53.
- kmenke. (2023, September 27). When Surge Pricing Comes to the Supermarket. *UCLA Anderson Review*. <https://anderson-review.ucla.edu/when-surge-pricing-comes-to-the-supermarket/>
- Li, M., & Yuan, F. (2022). Historical redlining and food environments: A study of 102 urban areas in the United States. *Health & Place*, 75, 102775. <https://doi.org/10.1016/j.healthplace.2022.102775>
- Lu, I. (2020, December 14). Food Apartheid: What Does Food Access Mean In America? *Center for Nutrition Studies*. <https://nutritionstudies.org/food-apartheid-what-does-food-access-mean-in-america/>

WINTER 2025/2026

- Martin, M. (2020, January 25). "Franchise" Tracks The Rise And Role Of Fast Food In Black America. *NPR*. <https://www.npr.org/2020/01/25/797143165/franchise-tracks-the-rise-and-role-of-fast-food-in-black-america>
- Mehdipanah, R., McVay, K. R., & Schulz, A. J. (2023b). Historic Redlining Practices and Contemporary Determinants of Health in the Detroit Metropolitan Area. *American Journal of Public Health*, 113(Suppl 1), S49–S57. <https://doi.org/10.2105/AJPH.2022.307162>
- Morland, K., Wing, S., Diez Roux, A., & Poole, C. (2002). Neighborhood characteristics associated with the location of food stores and food service places. *American Journal of Preventive Medicine*, 22(1), 23–29. [https://doi.org/10.1016/s0749-3797\(01\)00403-2](https://doi.org/10.1016/s0749-3797(01)00403-2)
- Odoms-Young, A. M. (2018). Examining the Impact of Structural Racism on Food Insecurity: Implications for Addressing Racial/Ethnic Disparities. *Family & Community Health*, 41(Suppl 2 FOOD INSECURITY AND OBESITY), S3–S6. <https://doi.org/10.1097/FCH.0000000000000183>
- Preventing Chronic Disease: July 2009: 08_0163*. (n.d.). Retrieved January 17, 2025, from https://www.cdc.gov/pcd/issues/2009/jul/08_0163.htm
- Santarossa, S., Hill, A. B., Sitarik, A. R., Taylor, M., Hawkins, S., Scher, K., Sohaski, A., Baseer, M., Dombrowski, R., Plum, A., & Joseph, C. L. (n.d.). Food insecurity in Detroit: Exploring the relationship between patient-reported food insecurity and proximity to healthful grocery stores. *Public Health Nutrition*, 25(4), 954–963. <https://doi.org/10.1017/S1368980021003128>
- smithaa02. (2023, April 25). *Moving Beyond Food Deserts in Healthy Food Policy*. Healthy Food Policy Project. <https://healthyfoodpolicyproject.org/key-issues/moving-beyond-food-deserts-in-healthy-food-policy>
- What is Food Justice?* (n.d.). Dara Cooper. Retrieved January 17, 2025, from <http://www.daracooper.com/1/post/2017/03/what-is-food-justice.html>
- Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. *Journal of Behavioral Medicine*, 32(1), 20. <https://doi.org/10.1007/s10865-008-9185-0>
- Zenk, S. N., Schulz, A. J., Kannan, S., Lachance, L. L., Mentz, G., & Ridella, W. (2009). Neighborhood Retail Food Environment and Fruit and Vegetable Intake in a Multiethnic Urban Population. *American Journal of Health Promotion*, 23(4), 255–264. <https://doi.org/10.4278/ajhp.071204127>