

Addressing US Food Deserts: Evaluating Current Solutions and Proposing Other Comprehensive Alternatives

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ABSTRACT

Food deserts, characterized by limited access to affordable and nutritious food options due to the absence of nearby grocery stores, affect the lives of approximately 19 million individuals across the United States. This study critically evaluates the efficacy of current solutions and proposes a comprehensive approach that addresses the spatial challenges inherent in food deserts. Through an extensive literature review and insightful interviews with academic experts and a local food bank, this research examines the limitations of existing initiatives such as SNAP, SNAP-Ed, HFFI, and urban agriculture in effectively tackling food deserts. Notably, most of these programs tackle financial support but do not tackle the widespread and systemic accessibility of supermarkets that is a key characteristic of food deserts. While these programs have shown some positive impact in mitigating food insecurity, they fail to directly address the fundamental issue of distance between individuals and food resources. In response to these limitations, this study proposes a comprehensive solution that centers on enhancing public transit systems and establishing robust online delivery platforms. By improving transportation options, such as implementing shuttle buses, individuals residing in food deserts can more easily access supermarkets and grocery stores, thereby overcoming the distance challenge. Additionally, online delivery services can bridge the gap by providing convenient access to nutritious food, regardless of geographic location. To ensure the effectiveness of these solutions, government subsidies should be considered to alleviate delivery fees and reduce costs.

Introduction

Food deserts are geographic areas where access to affordable, healthy food options is restricted or even nonexistent due to the absence of supermarkets within convenient traveling distance. According to a study done in 2017 by the USDA there were about 19 million people in America living in food deserts. They also found that nearly 2.3 million people in America (2.2 percent of all U.S. households) live more than one mile away from a supermarket and do not own a car. According to Magee, the main contributors of food deserts in the U.S. are found to be race and poverty. Communities of color have continuously faced barriers to food security, including poor access to large food retailers, an overabundance of small food retailers, and limited availability of hunger-relief programs (Singleton). Data shows that 30% more non-white residents encounter inadequate food access to food retail than their white counterparts. Figure (1a) and (1b) show a similar pattern in their shade patterns: the places where Black population is relatively high have a higher percentage of occurrence of food deserts. These maps clearly show the relationship between race and food access. Moreover, poverty serves as one of the factors that create food deserts. Table 1 shows that residents in low-income areas often have to travel further and have lower access to food compared to those in higher-income areas. It indicates the lack of food outlets or the absence of vehicle ownership in low-income areas.

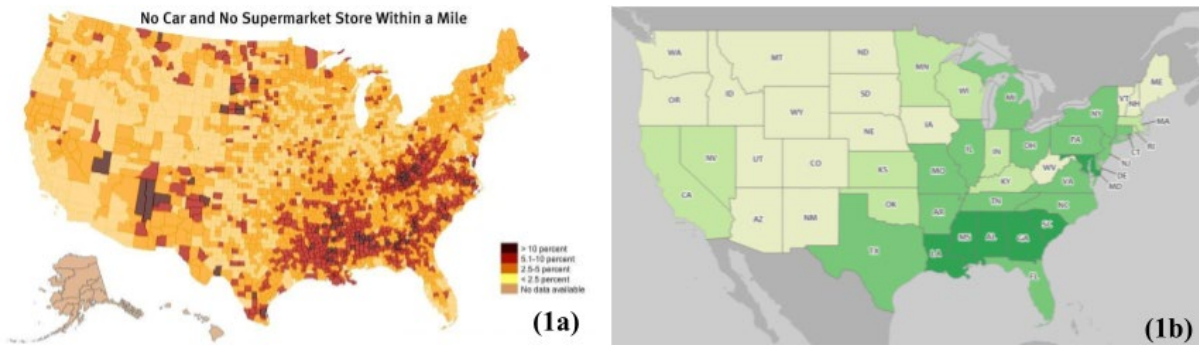


Figure 1. (a) Percentage of people who have no car and no supermarket store within a mile. (b) Percentage of the total population that reported their race as Black or African American alone in the 2020 Census at the state, county, and census tract levels

Sources: (a) Department of Agriculture, Centers for Disease Control; (b) USDA, United States Census 2020

Table 1. Average time spent on travel to grocery shopping on average day in low-income and not-low-income areas Source: 2003-2007 American Time Use Survey data, Current Population Survey sampling frame from Census Bureau

Income Area	Access to Grocery Store	Minutes
Low income areas	Low access	17.7
	Medium access	19.4
	High access	17
Not-low-income areas	Low access	16.5
	Medium access	14.4
	High access	14.4

In recent years, Covid-19 has aggravated foregoing racial/ethnic disparities in food deserts. The USDA classifies urban food deserts and rural food deserts differently. Urban food deserts are the areas where people live more than 1 mile from a supermarket in urban areas. They are often located in older urban neighborhoods with higher low-income and ethnic-minorities populations. The main causes of urban food deserts have been urban sprawl and supermarket redlining. Urban sprawl is a term that refers to urban and suburban growth that generates “a low-density environment with a high segregation between residential and commercial areas with harmful impacts on the people living in these areas” (The Yale Ledger). From the 1950s, wealthier households moved outward from urban areas to suburban areas due to high rates of automobile ownership and easy availability of peripheral land. (Hamidi, 2019) Many supermarkets and grocery stores abandoned the inner city and moved outwards with them as well. Supermarkets in suburban areas were also more profitable because they provided larger areas with parking lots. (Crowe, Lacy, & Columbus, 2018) This urban sprawl wrought the lack of supermarkets and grocery stores in inner cities, thus creating urban food deserts. As a result, urban residents have to pay higher prices for low quality food from corner stores or spend more time traveling between distant supermarkets for nutritious food. According to Andreyeva, Blumenthal, Schwartz,

Long, and Brownell, “economies of scale, technological advancements, and increasing market competition” reduce the price of food in supermarkets compared to those in smaller stores. In other words, consumers who do not have access to supermarkets may have to pay higher prices for food. Urban sprawl has also caused supermarket redlining, which describes a phenomenon when supermarkets are reluctant to locate their stores in urban low-income neighborhoods and relocate them to suburbs (National Library of Medicine). Supermarket redlining is also based on stereotypes of gross income, race and reputation of a neighborhood (Crowe, Lacy, & Columbus, 2018). Suburbs most often had residents with higher buying power and increasing demand, which attracted from smaller grocery stores to larger supermarkets. Supermarkets also left urban neighborhoods due to what is called “urban obstacles,” including not enough space, environmental cleanup, demolition of existing structures, site preparation costs, depopulating neighborhoods, demanding regulations, and presence of urban crime. Moreover, urban food deserts are more likely to be formed in low-density neighborhoods because they do not provide enough profit for food retailers to invest. On the other hand, compact neighborhoods are likely to have more grocery stores and nearby stores in close proximity due to higher profitability for food retailers with a higher number of shoppers.

The second type of food deserts are rural food deserts. Rural food deserts are the areas where people live an average of more than 10 miles from a supermarket in rural areas. Research by Piaskoski, Reilly, & Gilliland found that there are many barriers to obtaining food in rural areas, including reliance on transportation, distance to travel, nutritious food cost, healthy food obtainability, absence of competitive food vendors, lack of variety and choice, and issues with food quality. Moreover, there are many characteristics of rural food deserts. Rural food deserts have from 9 to 14% smaller populations than in other rural areas. Economic factors also play here, as median family income in rural food deserts is about 18% lower than in rural non-food deserts. The research found that a higher percentage of households receive public assistance in rural food deserts than in other rural areas (Dutko, Ver Ploeg, & Farrigan, 2012). Unemployment among rural food desert residents is higher by 13 to 37% than in non-food deserts. Also, the proportion of vacant housing units is higher in rural food deserts than in other rural areas, which reflects a trend of movement out of rural areas and creation of rural food deserts with smaller populations and abandoned neighborhoods.

SNAP

Supplemental Nutrition Assistance Program (SNAP) is the largest hunger safety net program in the U.S. According to Gilkesson, SNAP helps about 38 million people from food insecurity. SNAP provides low-income households with gross monthly incomes at or below 130% of the Federal Poverty Level who meet specifically resource requirements with financial benefits to purchase food items from authorized retail stores (Rivera, Maulding, & Eicher-Miller, 2019). Eligibility for SNAP is determined by a household’s income and resources. Most states use gross income tests between 150 percent and 200 percent federal poverty level (FPL) gross income test while few states use the 130 percent FPL. The net income is the key factor of determining SNAP benefit amount. It is calculated by subtracting deductions, such as work expenses, child care, excess housing costs, and medical expenses, from a household’s gross income. According to federal SNAP policy, a household refers to a group of people who live together and buy groceries together for more than half of their meals, regardless of their relations. Once SNAP benefits are determined, they are paid monthly through Electronic Benefit Transfer (EBT) cards. EBT especially targets recipients that do not have a deposit account. A research by Humphrey found that there are approximately 31 million users of EBT out of 86 million SNAP benefit recipients, which affect about 12% of the U.S. population and entail \$112 billion in payment transfers. These recipients can use SNAP benefits to buy groceries at authorized retailers, but they cannot use benefits to buy hot meals or prepared food, such as fast food. (Gilkesson, 2021) According to Gilkesson, SNAP has been proven to support work, stimulate economic growth, improve academic outcomes for children, and improve health outcomes for recipients. Another study by Ratcliffe, McKernan, & Zhang found that SNAP can reduce households’ food-related hardships. SNAP overall reduces the likelihood of being food insecure by 31.2% and the likelihood of being very food insecure by 20.2%. Due to its positive outcomes, SNAP is distributed to more people and helps reduce food insecurity. Figure

(2a), (2b), and (2c) show the upward trend in SNAP benefits and participation. Especially, the average SNAP amounts given to recipients has been increasing since 1969 and was the highest in 2021. While the SNAP participation rate among the eligible population is about 82 percent, it is still lower among certain groups including the elderly, non-citizens, and those with earned income (Schanzenbach, 2023). These differences are due to various costs of administrative burdens driven by state-level decisions in deciding SNAP policies.

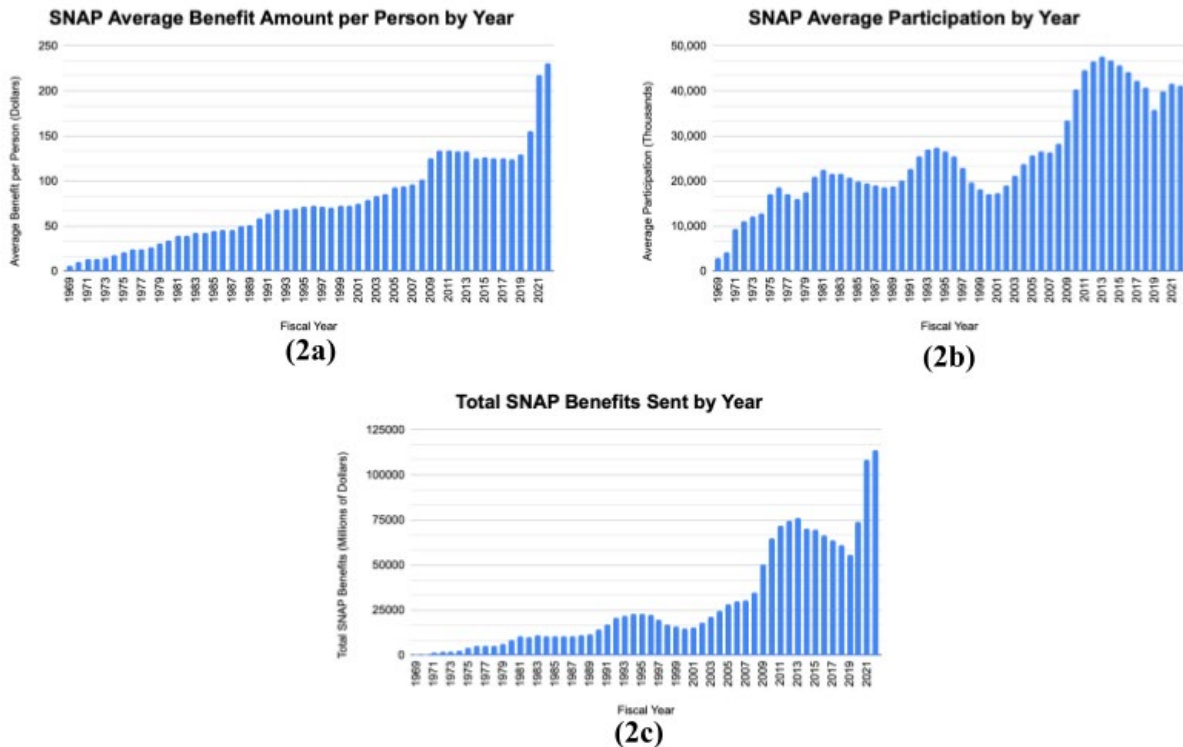


Figure 2. a) The average SNAP benefits amount per person by year from 1969 to 2021; b) The average number of participating in SNAP by year from 1969 to 2021; c) The total SNAP benefits distributed to recipients by year from 1969 to 2021 Source: USDA Food and Nutrition Service

However, there is still a limitation to SNAP when it comes to food deserts. One research also found that “SNAP participants tend to travel farther than the nearest SNAP-participating retailer to redeem their benefits” (Cantor, Beckman, Collins, Dastidar, Richardson, & Dubowitz, 2020). The study conducted by Rigby, Leone, Kim, Betterley, Johnson, Kurtz, and Lee was to “examine whether neighborhood characteristics were related to the distribution of food stores accepting SNAP in Leon County, Florida.” Each census tract in Leon County was distinguished as predominantly white, racially mixed, or predominantly black. They also classified 288 stores in the county into one of 4 categories: supermarkets, grocery stores, convenience stores, or other stores. “Other stores” referred to stores such as supercenters, Dollar General stores, specialty food stores, pharmacies/drug stores, and gasoline stations. The result showed that there are disparities in SNAP supermarket access between census tracts. Residents in predominantly black, low-income, or rural neighborhoods were more likely to receive public assistance, such as SNAP, than those in other race, urban, or high-income neighborhoods. About 60% of residents in predominantly black neighborhoods received public assistance compared to 51.2% of mixed neighborhoods and 18.7% of white neighborhoods. Moreover, 60.1% of rural residents received public assistance compared to 40.8% of urban residents. In addition, supermarkets were more likely to accept SNAP benefits than grocery stores, convenience stores, and other stores. However, they

found that “food stores were not distributed evenly across race, income, and rural divisions.” Especially, predominantly black neighborhoods had no supermarkets, which also meant that there was no SNAP accepting stores in those tracts. Their study suggests that “limited SNAP supermarket access in black neighborhoods is due to lack of supermarkets, rather than lack of SNAP participation by existing supermarkets.” Moreover, “lack of stores may lead SNAP recipients to shop in smaller stores, which tend to have higher prices and less variety and may leave them unable to obtain the best value for their benefits”. Their study implies that the SNAP program may not be effective in eliminating food deserts.

SNAP- ED

Supplemental Nutrition Assistance Program Education (SNAP Ed) is the complementary educational program to SNAP that aims to improve household dietary choices and support the food security goals of SNAP. It provides nutrition education to audiences who qualify for federal means-tested assistance programs or to low-income communities. It also supports low-resources individuals to make healthy food choices aligning with the Dietary Guidelines for Americans on a limited budget and to teach the skills and knowledge that end the cycle of food insecurity. It also provides client-tailored budgeting exercises to give participants practical experience to maximize the benefits of SNAP and guidance to maximize nutrition per food dollar in a specific situation and environment. It is a much smaller program than SNAP in terms of funding, participation, and attention. However, it has been proven to effectively promote nutrition knowledge, positive attitudes toward healthy food consumptions, and intake of fresh produce. There are two levels of SNAP Ed program: Direct SNAP Ed and PSE SNAP Ed. Direct SNAP Ed is the level of nutrition education intervention that involves a curriculum of nutrition education lessons delivered to participants. Policy, Systems and Environmental SNAP (PSE SNAP Ed) are the interventions at the environmental, sectors of influence and social and cultural norms levels of the SEM to improve food security outcomes in low income neighborhoods across the U.S. Figure 3 shows the age groups SNAP-Ed reached in 2014, 2015, and 2016. This data shows that SNAP-Ed has impacted populations across all age-groups, indicating its usefulness in enhancing food security for broader groups of population. Moreover, one research suggests that “household food security improved by 25% over their 1-year study period among Indiana households with children when a household adult received a SNAP-Ed intervention compared with a control group” (Rivera, Dunne, Maulding, Wang, Savaiano, Nickols-Richardson, & Eicher-Miller). While SNAP-Ed can increase the well-being of food deserts residents, it does not provide food or food outlets to them. Unless there is an additional solution implemented, SNAP-Ed is not sufficient to meet all demand in food deserts.

Age Groups SNAP-Ed Programs Reached by Implementing Agencies by Fiscal Year

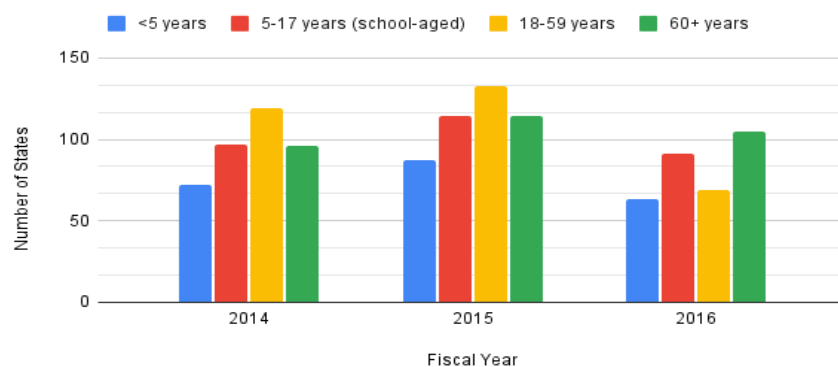


Figure 3. Number of ages groups SNAP-Ed programs reached by implementing the agencies by fiscal year from 2014 to 2016 Source: EARS

Healthy Food Financing Initiative (HFFI)

Healthy Food Financing Initiative (HFFI) is another food program established by the US Department of Health and Human Services. The goal of HFFI is to improve “access to healthy food options while creating job and business development opportunities in low-income communities, particularly as grocery stores often serve as anchor institutions in commercial centers” (US Department of Health and Human Services). It aims to increase the retail availability of healthy and affordable food in communities with the lack of access to healthy food. It provides one-time financing for the opening of full-service supermarkets in food deserts (Cantor, Beckman, Collins, Dastidar, Richardson, & Dubowitz, 2020). HFFI funds are used to supply financial and technical assistance to supermarkets to implement promotion strategies and infrastructure improvements. They are used by Community Development Financial Institutions Fund (CDFI Fund) to finance healthy food retail outlets. They are also utilized by HHS’s Community Economic Development program to provide grants to community development corporations financing food retail and economic development programs (Elizabeth, 2019).

According to Packer, from 2011 to 2016, HFFI has allocated more than \$169 million in grants to food access projects across the country. In detail, as shown in Table 2, Congress has funded three departments to execute those HFFI plans. Until FY 2016, Congress has funded HHS to create a HFFI track that provided “competitive grants to community development corporations for projects that financed grocery stores and other retail outlets that provide healthy foods in low-income communities” (Congressional Research Service). The Treasury also received funding to create a Community Development Financial Institutions (CDFI) Program in underserved communities. However, in 2014, Congress authorized USDA to create its own HFFI program, which is separate from the previous HFFI program, through the Agricultural Act of 2014.

According to America’s Healthy Food Finance Initiative, there are several criteria for eligibility. There should be plans to expand or preserve the availability of staple and perishable foods in underserved areas with low and moderate-income populations. Also, the retailer should accept benefits under the SNAP. Eligible areas to open retailers with HFFI funds include USDA’s 2019 Low Income, Low Access census tracts, census tracts adjacent to USDA’s 2019 Low Income, Low Access census tracts with median family incomes less than or equal to 120 percent of area median family income, and Census Block Groups in 2016 Limited Supermarket Access (LSA) Areas meeting one or more additional distress criteria.

According to “The Partnership for a Healthier America” report, the nation's top 75 food retailers opened approximately 250 new supermarkets in food deserts between 2011 and 2015. Also, residents in the recipient communities saw dietary improvements compared to communities that did not receive any benefits. These dietary improvements included positive changes in overall dietary quality and decreases in intake of added sugars (Cantor, Beckman, Collins, Dastidar, Richardson, & Dubowitz, 2020). However, there is still a limitation to HFFI. According to the research by Packer, HFFI alone is not enough to improve food access in food deserts. In practice, the majority of HFFI award money was not distributed to Census tracts classified as low food access. It is important to grant funds to ensure that neighborhoods with the most in need of new food retail receive financial support for new supermarkets.

Table 2. Healthy Food Financing Initiative funding by federal department from FY 2011 to FY 2022 Source: Congressional Research Service

Fiscal Year	USDA Funding (\$ million)	HHS Funding (\$ million)	Treasury funding (\$ million)
FY2011	0	10	22
FY2012	0	10	22
FY2013	0	10	22
FY2014	0	10	22
FY2015	0	10	22
FY2016	0	10	22
FY2017	1	10	22
FY2018	1	0	22
FY2019	2	0	22
FY2020	5	0	22
FY2021	5	0	23
FY2022	160	0	23

Urban Agriculture

Another current solution implemented is urban agriculture. It is “planting, cultivation, processing, marketing, distribution, and consumption of food” while including such uses as “community gardens, personal backyard gardens, rooftop farms, commercial greenhouses, farmers markets, community supported agriculture (CSA) operations, and apiaries” (Pawlowski, 2018). They specify outdoor farming to include flat land farming in urban areas (such as in community gardens or public and private farms) and rooftop farming (with or without the use of greenhouses or other accessory structures). They also specify indoor farming to include vertical farming, aquaponics (growing plants in water) and aeroponics (using water vapor). Other approaches involve keeping bees and livestock. Urban agriculture also can be divided into non-commercial, commercial, and hybrid types. Non-commercial types refer to “private, community, institutional, demonstration, and guerilla gardens; edible landscaping; and hobby bee and chicken keeping” (Hodgson, Bailkey, & Campbell 2011). Commercial types refer to “market gardens; urban and periurban farms; beekeeping operations; aquaponic and hydroponic systems; and the equipment, materials, and structures required to process, distribute, and sell food products” (Hodgson, Bailkey, & Campbell 2011). Lastly, hybrid types refer to “social enterprises, include any combination of food production, processing, distribution, marketing, or educational activities and are typically operated by a nonprofit organization for social, economic, or environmental purposes” (Hodgson, Bailkey, & Campbell 2011).

Farmers markets are important parts of urban agriculture in distributing food items. Farmers markets are the locations where two or more farmer producers sell their own agricultural products directly to consumers at a fixed location (Karpyn, Riser, Tracy, Wang & Shen, 2019). They are important in low-income communities or food deserts

because farmers markets serve as distribution channels for low-income community residents. According to the study of Pawlowski, UA helps to create more rigid and sustainable food systems by providing additional access to fresh produce to the neighborhood. Moreover, residents in food deserts can save time and money on obtaining fresh food without traveling to farther supermarkets. Low-income households also can establish their own backyard gardens or adopt plots in community gardens to reduce spending on expensive urban produced food from commercial farms. In practice, UA was also found to be helpful. Using vacant lots to start a community garden has increased neighborhood safety, boosted community morale, decreased crime, encouraged population growth in depressed neighborhoods, and even increased neighboring property values. This creation of urban gardens also creates more job opportunities for those unemployed in low-resource areas. Urban and peri-urban farms were also found to be capable of supplying significant amounts of food demand in urban centers (Siegener, Sowerwine & Acey, 2018) Even with these benefits, urban agriculture alone cannot be the main solution in addressing the issue of food desert. According to a research done by Mack, 68 active community gardens in Phoenix, AZ, were found to be serving only 8.4% of food desert populations. Unless there was a spatial analysis to locate urban farms, community garden sites were not effectively serving food desert residents. This study suggests that urban farms may not be covering major populations in food deserts. Moreover, Professor Rivera at Indiana University suggests that urban farms may not supply enough produce to all residents in a food desert area.

Professor Interviews

To investigate innovative solutions to mitigate and relieve food deserts in America, this study also sought to get interviews from experts in the field, to understand the feasibility of the solutions proposed in the paper. The interviews were conducted with Professor Christopher Bosso from Northeastern University and Professor Rebecca L. Rivera from Indiana University. Professor Bosso identifies the problem of food deserts as the combination of limited access to decent stores and people's income in the area. Consequently, he argues that SNAP may not be the most effective solution for addressing food deserts due to two main reasons: individuals may have to travel longer distances to find stores where they can buy affordable food, or they may resort to purchasing unhealthy options from convenience stores. To enhance food security in food deserts, Professor Bosso suggests improving online delivery services. Although more successful in densely populated urban and suburban areas, online delivery can also be viable in rural areas with support from the government. As the US Department of Agriculture is already facilitating online food ordering for SNAP recipients, online delivery proves to be an efficient approach to combating food deserts.

Professor Rivera, from Indiana University, adds that while online delivery is convenient and time-saving, it is perceived as more expensive compared to in-person grocery shopping. This perception arises from companies inflating online shopping costs with delivery fees and tips. To address the issue of expensive delivery fees, the professors propose government subsidies. Another solution to tackle food deserts is the improvement of transportation, as suggested by Professor Rivera. People often report food insecurity due to residing in areas where transportation to food outlets such as grocery stores, corner stores, gas stations, or food pantries is challenging. Professor Bosso emphasizes that food deserts represent a spatial concept, describing the inability to purchase food due to the distance between residents and adequate food resources. Therefore, improving the transit system can serve as a solution by addressing the issue of distance to food outlets. Informal car-sharing and carpooling among neighbors or family members are already practiced, but enhancing the transit system, such as implementing shuttle buses, would be more profitable in densely populated urban areas with guaranteed ridership. However, in rural areas with low population density, shuttle buses may not be as economically viable. Nonetheless, both professors agree that improved transportation contributes to enhancing food security in both urban and rural food deserts.

As a supplementary solution to the aforementioned approaches, urban agriculture can be effective. Programs like the SNAP-Ed Community Growers Grant Program support community-led gardens and farms to combat food insecurity. Nevertheless, there are several limitations to this solution. Professor Bosso notes that urban agriculture alone is insufficient to address food deserts, as it does not serve as the primary solution for the food access issue.

Professor Rivera further emphasizes that the quantity of food produced may not be sufficient to meet the needs of all residents in food deserts. The availability of land and funding for maintenance are significant concerns. Obtaining space for urban farming is challenging due to the value of land, and sustaining urban farms requires funding or regular volunteer support. Additionally, expanding SNAP benefits to include gardening supplies can act as a supplementary solution for food deserts. Professor Bosso contends that encouraging individuals to grow their own food is a positive step and suggests that this approach would work well with the support of local government.

Lastly, Professor Bosso proposes building additional grocery stores as a solution to reduce the prevalence of food deserts in the United States. However, he stresses that different solutions should be implemented in different locations based on their specific challenges. For instance, constructing another supermarket may be more effective in urban areas with high population density compared to rural areas.

Conclusion

In conclusion, while SNAP plays a vital role in lifting individuals out of poverty and has positive community impacts, it falls short in effectively addressing food deserts in the United States. The program's focus on authorized stores does not tackle the underlying issue of supermarket absence in food deserts. Moreover, SNAP benefits, delivered through EBT, restrict recipients from using their benefits for hot meals or prepared food, which is problematic considering the prevalence of fast food restaurants in food deserts. This leaves residents in food deserts with limited options for utilizing their SNAP benefits. Even with SNAP benefits, individuals in food deserts may struggle to find supermarkets or authorized stores to purchase groceries. This is particularly concerning for residents in rural and racially minority neighborhoods who face the greatest need for food assistance.

While SNAP-Ed proves effective in addressing food insecurity in alignment with SNAP, its success requires political support, research focus, and adequate funding to assess its impact on participants' food security and dietary intake. Additionally, the construction of supermarkets under the Healthy Food Financing Initiative (HFFI) without community support has yielded limited success, as such stores were not embraced by local residents and failed to stimulate long-term economic development. Some stores that received HFFI funds even closed due to low revenues, highlighting the low participation of residents. Furthermore, the funding for HFFI has been constrained, with Congress only allocating funds to two out of three departments, except for a notable increase in funding in FY 2022 from the American Rescue Plan Act of 2021. In contrast, SNAP has seen consistent funding growth, while HFFI has experienced minimal program expansion over the past decade.

Urban agriculture, another potential solution, requires significant grant funding or donations to be sustainable in low-income communities. Economic realities, such as the need to pay living wages and sell urban-produced products at below-market costs, must be addressed to achieve the goals of food security. These limitations underscore the challenges in relying solely on urban agriculture as a solution for food deserts.

Considering the limitations of current approaches, the most effective solutions to combat food deserts are improvements in online delivery and transportation. Online delivery directly addresses the issue of distance between residents and food resources, providing a comprehensive solution compared to SNAP and SNAP-Ed. This solution is not limited to urban or suburban food deserts but also extends to rural areas. However, to ensure the effectiveness of online delivery, government subsidies should be implemented to alleviate delivery fees and reduce costs. Another viable solution is enhancing the transportation system, specifically through the implementation of shuttle buses connecting food outlets with food deserts. This approach offers a direct route for residents to access nutritious food, addressing the transportation barrier faced by those without vehicles. Funding for transit systems can come from local governments or chain grocery stores. However, unlike online delivery, shuttle buses are more suitable for densely populated areas and may not effectively address the challenges of rural food deserts. Thus, the implementation of online delivery and transit systems should be tailored to the unique characteristics of each food desert area.

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