Science and Policy Brief Part 4: Final Science and Policy Brief

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Analysis of Scientific Evidence

Imagine living in a neighborhood where the nearest grocery store is a long bus ride away, and the only accessible food options are convenience stores and fast-food restaurants. This is the harsh reality of food deserts, a pressing issue affecting millions of people across the country today. Food deserts are defined by researchers at the USDA as "areas where people have limited access to a variety of healthy and affordable food" (Dutko et al., 2012). Those living in food desert areas face increased exposure to unhealthy food options, in addition to a lack of exposure and accessibility to healthy, nutritious food. Potential outcomes of these exposures include a variety of negative health effects, both physical and mental. Living in a food desert is associated with both food insecurity and poor nutrition. There has been extensive research on the health effects of those who live in food deserts and vulnerable populations who experience food insecurity and unhealthy diets.

The USDA defines a range of food security levels from very low to high. Very low food security is primarily defined in terms of reduced food intake and disrupted normal eating patterns due to a lack of money or resources to acquire food (USDA 2022). For this discussion, "food insecurity" includes what the USDA defines as low and very low levels of food security. Those who are food insecure often report being worried their food would run out, that food purchased would not last, and that they often could not afford balanced meals (USDA 2022). Scholars argue that those who live in food deserts experience a specific and unique kind of food insecurity because it is not that there is no food, but the food that is available is not nutritionally sufficient to sustain those who live in these places in addition to being often unaffordable (Wright et al 2016). In food desert areas, unhealthy, heavily processed foods are often significantly easier to

acquire physically and economically than healthy foods, fresh fruit, and vegetables, leading to food insecurity and a number of other health problems.

The constant food insecurity that those living in food deserts experience and the lack of healthy and nutritious foods available leads to food insecure families and lower-income households being at a higher risk of consuming a less nutritious diet. This causes a number of negative impacts on both the physical and mental health of people who reside in food deserts. Adverse health effects include diabetes, obesity, heart and cardiovascular-related complications, a higher risk of cancer-related hospitalizations, symptoms of depression and suicidal ideation, and lower academic performance.

According to the Center for Disease Control and Prevention (CDC), poor nutrition, which is the result of living in a food desert and consuming a less nutritious diet, can lead to obesity, stroke, heart disease, type 2 diabetes, and some types of cancer (CDC 2022). Additionally, a study published in the *American Journal of Public Health* found that: "excessive exposure to unhealthy food sources and limited access to healthier options may explain the high prevalence of obesity observed in these communities…residing in a low-income or deprived area was independently associated with [the] prevalence of obesity and with poor-quality diets" (Hilmers et al 2012). In food desert areas, which are often found in low-income and otherwise marginalized areas and communities, there is a positive correlation between living in such an environment and a number of health issues, in this case, obesity. Additionally, researchers at the USDA have found that lower-income households often eat less nutritious diets than other, higher-income households, and they often do not meet federal recommendation levels for the consumption of fruit, vegetables, whole grains, and other nutritional categories (Golan et al

2008). This shows that those who live in food deserts, often low-income and marginalized communities, are not eating the same quality of foods as those who do not live in food deserts, often white and majority groups. This leads to a majority of health complications.

One negative health effect associated with living in a food desert is heart and cardiovascular health issues. First, one cohort study found that those living with heart failure and also residing in a food desert are at a 21% greater risk for repeat general hospitalizations, and 30% higher risk for heart failure-related hospitalization than those not living in food deserts (Morris et al., 2019). One limitation noted in this study was a low population of those with heart failure living in a food desert. However, it is important to note the findings of this study and that the risk of hospitalizations is significantly increased for those residing in a food desert even after adjustment for potential clinical and socioeconomic risk factors. Another study found that subjects living in food deserts with coronary artery disease had an "unfavorable" cardiovascular risk profile and a higher risk of heart attacks, independent of cardiovascular risk factors, disease, and education level in comparison to those who do not live in a food desert (Kelli et al., 2019). Both of these studies show how living in a food desert disproportionately increases the risk of heart and cardiovascular issues and has a significant impact on the health of residents.

Researchers have also found that residing in a food desert is associated with higher mortality rates, specifically for breast and colorectal cancers (Fong et al., 2020). Researchers retrieved data from the California Cancer Registry to identify patients with late-stage (II/III) colorectal and breast cancer. They determined if the patients lived in a food desert using the USDA Food Access Research Atlas. They found that residing in a food desert is associated with higher mortality rates of cancer patients. They also found that compared with a group not

residing in a food desert, patients who do reside in a food desert were more likely to have diabetes, hypertension, and obesity in addition to cancer. A few limitations were noted in this study. One important one is that since this study was based on retrospective data, it can only represent a correlation, not causation. Another limitation was that the residential status of patients residing in a food desert was only taken into account at the time of their diagnosis, there was no data for the length of time at this address. These findings are still significant and important to note which further proves the point that those who reside in a food desert are disproportionately affected by a number of health issues and disparities.

Research has also found that patients with esophageal cancer who receive an esophagectomy and reside in a food desert were five times more likely to be readmitted to the hospital after their esophagectomy in comparison to patients who do not live in a food desert (Fay et al., 2022). Researchers conducted a retrospective cohort study to compare data from patients who live in a food desert to those who did not. There were no demographic (age, sex, smoking status, household income, alcohol use, etc) differences between the food desert cohort and the non food desert cohort. Researchers found that patients residing in a food desert had a much higher rate of post-discharge complications in comparison to those not residing in a food desert (30.4% vs 10.9%) and being readmitted within thirty days (39.1% vs 13/2%). One limitation noted was the potential for selection bias, considering their patient population. Regardless, this study is some of the limited literature on this topic and shows the importance of pre-treatment risk assessment.

Constant food insecurity as a result of living in a food desert has been shown to cause negative mental health effects for residents as well. For example, a study published in a peer-

reviewed medical journal found that hunger, a result of food deserts and food insecurity, specifically in children, has been linked to symptoms of depression and suicidal ideation later in young adulthood (McIntyre et al 2013). This study used logistical regression to analyze data on hunger and other exposures to determine the possible mental health outcome of depression and suicidal ideation. They found that "child hunger was a robust predictor of depression and suicidal ideation even after adjustment for potential confounding variables". This shows that those who suffered from hunger, potentially from the effects of living in a food desert as a child, can severely impact mental health well into young adulthood. Another study found that food insecurity among college students is linked to both feelings of depression and poorer academic performance in the form of lower GPAs than food-secure students (Martinez et al 2018). This study used a cross-sectional study design to examine if food insecurity was related to academic performance (specifically grand point averages). They found that mental health was a mediating variable between food insecurity and lower GPA. A limitation of this study is its cross-sectional design, which cannot directly determine cause and effect. Both of these studies show that living in a food desert and experiencing food insecurity and hunger can negatively impact mental health and that physical health is not the only risk factor associated with living in a food desert.

There are key factors to consider when conceptualizing who is mainly affected by the issue of food deserts. Researchers at the USDA found that in comparison to other census tracts, food desert tracts often include a higher number of people of color and those who are of a racial minority. Also, in food desert areas, the median income is lower; therefore, there are higher rates of poverty among those who live in food deserts. Additionally, food desert tracts tend to have fewer people, more vacant houses, and a population have lower levels of education than other

census tracts (Ver Ploeg & Farrigan 2012). These areas contain many commonalities and key differences when compared to non-food desert areas which are often wealthier and nonminority communities. It is important to consider that marginalized, low-income, minority groups, and people of color have a much higher chance of living in a food desert than wealthier, white, majority groups.

One literature review of food deserts summarized many various studies conducted on the overall makeup of various food desert communities (Beaulac et al., 2009). They found that areas in the United States with higher proportions of low-income or African-American people were more likely to be underserved by food retailers in comparison to more affluent and advantaged communities. These areas of low-income or African-American communities had fewer supermarkets or chain grocery stores per capita in comparison to advantaged areas. They also found that the average distance to a grocery store was farther in these communities. The researchers concluded that the evidence they found was strong and plentiful enough to conclude that in the United States, those living in minority and low-income areas tend to have "poor access to healthy food". These findings emphasize the importance of noting who is mainly affected by the issue of food deserts, and that these communities are disproportionately affected by a lack of access to healthy foods.

Food deserts are areas with a lack of access to nutritious, affordable food. Low-income and minority communities are disproportionately affected by food deserts and are more likely to reside in one in comparison to white and majority groups. People who live in food deserts face increased exposure to unhealthy food options, in addition to a lack of exposure to nutritious foods. Potential outcomes of these exposures include a variety of negative health effects, both

physical and mental. Extensive research has been conducted on the effects of food deserts, but there are still strides to be made in the future. Many studies have gaps in their research or other limitations. Further research is needed to determine the exact causality between food deserts and a number of health effects without the potential for confounding variables. In conclusion, the prevalence of food deserts in the United States poses a critical challenge to the health and well-being of underserved communities. Much work remains to be done in addressing this issue fully, and to ensure that no one is left without access to healthy, affordable food. We must advocate for policy changes, support grassroots initiatives, and foster community engagement. By taking these steps, we can make progress toward eliminating food deserts and improving access to healthy foods. It is not only a matter of environmental health but also a crucial step toward promoting a healthier and more equitable society.

Policy Brief

Food deserts are a complex problem that affects many communities throughout the United States. In food deserts, residents often face challenges obtaining access to fresh produce and other nutritious foods necessary to lead a healthy life. Those who live in food deserts often live far from a full-service grocery store, frequently depending on more easily accessible options, like convenience stores and fast food restaurants. This leads to food insecurity and eating a less nutritious diet, which leads to a variety of adverse health effects, both physical and mental. Food deserts have been caused by a variety of factors, one example being redlining. They often have higher populations of people of color and low-income people in comparison to non food desert areas (Beaulac et al., 2009). Food deserts are a systemic issue that requires multifaceted approaches in order to create equitable solutions. Current solutions and policies in place include

the Healthy Food Financing Initiative (HFFI), SNAP, WIC, and grassroots solutions such as urban agriculture. These solutions are just one step towards solving the issue of food deserts and can be improved upon to create an equitable food system for all.

One solution to food deserts that has been researched is the implementation of grocery stores in food desert communities. In one example in Flint, Michigan, researchers found that opening a grocery store in a food desert area improved access to food economically as the cost of a basket of groceries went down from $183 (before the opening of the grocery store) to $151 (after) (Sadler et al., 2013). Additionally, the opening of a new grocery store "marked significant declines in the distance required to reach and cost of obtaining healthy foods in the former food desert". One policy action that has been taken by the United States Department of Agriculture, Health and Human Services, and Treasury was the creation of the Healthy Food Financing Initiative (HFFI), which will "improve access to healthy, affordable foods" in food desert areas. This program committed $50 million in federal money, in addition to other federal support and grants (Block & Subramanian, 2015). The HFFI in partnership with former First Lady Michelle Obama's "Let's Move" campaign, partnered with food retailers to build in underserved areas and communities (Sadler et al., 2015). The implementation of grocery stores in food desert areas will help to alleviate the financial and travel burden that those living in food deserts face to acquire fresh produce and healthy food. The HFFI and the allocation of federal funds to support the establishment of new grocery stores in food desert areas is a vital initiative. This addresses a critical need and improves access to fresh, nutritious food in underserved communities, and would not necessarily be possible without federal funding.

One limitation to this solution is that some researchers have found a "low rate of adoption" after a new supermarket is opened in a food desert community, as residents are hesitant to replace it as their regular grocery store, often a supermarket that is further away and outside their neighborhood (Ghosh-Dastidar et al., 2017). This is one minor limitation and researchers speculate "that habit has a stronger role in behavior than convenience, at least in the short term. With time, more residents may adopt the new supermarket as their regular place of food shopping".

In addition to new federal initiatives, existing federal programs are also important to note. SNAP (Supplemental Nutritional Assistance, formerly food stamps), is a federal program that provides monthly funds to low-income households. Although not specific to food desert areas, it serves low-income populations, which make up a majority of food desert residents. One study monitored the effects of opening a supermarket in a food desert specifically on SNAP participants (Cantor et al., 2020). They found that after opening a supermarket in a food desert area, food security improved specifically for SNAP participants. They "saw a statistically significant improvement in dietary quality…specifically, lowered intake of added sugars". They also "observed a relative reduction in the percentage of daily calories obtained from a combination of solid fats, alcohol, and added sugars". The researchers' findings suggest combining HFFI and SNAP to produce a larger impact than each program individually.

Another promising solution is urban agriculture, which has been proven to alleviate some of the food insecurity caused by food deserts. Research has shown that the practice of urban agriculture cultivation increases food security and food availability, most particularly for those who reside in food deserts and/or are food insecure (Horst et al. 2017). Urban agriculture appears

to be a more holistic solution to food deserts and food insecurity as it is a more grassroots approach that not only addresses a lack of access to food, but also provides community empowerment, and begins to address the effects of systemic racism and its role in the creation of food deserts (Colson-Fearon & Versey, 2022). In a case study conducted in Baltimore, researchers interviewed a variety of stakeholders in the community, and all stakeholders "emphasized the role of farms in providing fresh, affordable, and high-quality food in low-access communities. Equally important, community gardens and farms were described as providing tangible support and assistance to the community by providing food, jobs, and a sense of belonging". Urban agriculture sites were often considered spaces where community members could gather. Urban agriculture can benefit nutritional health, by improving access and affordability to food, but also improve social and community health in the communities they serve. This solution is distinct in that it not only improves the lack of access to food, but it is a solution that is community-controlled and puts the food in the hands of a community's residents.

Unfortunately, urban agriculture is not a complete solution as it is limited by the growing season and is not able to provide fresh food year-round. There are some "season extension" practices that urban farmers/gardeners can utilize, including greenhouses and high tunnels (College of Agriculture and Life Sciences, University of Wisconsin Madison). These practices can allow farmers to cultivate crops year-round or close to it, depending on location. Urban agriculturists may not have the tools and resources to implement these practices. Regardless, urban agriculture is an encouraging potential solution to the issue of food deserts.

To solve the complex and nuanced issue of food deserts, solutions must take a varied approach. I believe that the most effective and holistic approach to solving the issue of food

deserts combines all of the previously mentioned solutions above. First, the Healthy Food Financing Initiative is an important first step in putting forth federal funding to allow grocery stores to open in food desert areas. This solution, combined with increased funding for SNAP and other federal programs for low-income individuals and families such as the special supplemental nutrition program for women, infants, and children (WIC). For example, in Massachusetts, WIC offers farmer's market coupons to current WIC participants. This coupon is worth $30 and can be used to purchase fresh fruits and vegetables at certain farmstands and farmer's markets. This additional stipend is separate from normal WIC benefits and can only be used at farmstands and farmer's markets (Mass.gov). The combination of federal funding (HFFI) and federal programs for low-income households (SNAP and WIC) can potentially have a larger impact on residents of food deserts than each program individually.

Additionally, I believe that urban agriculture is a critical solution to food deserts. While federal funding and programs can help provide increased access to affordable healthy foods, urban agriculture is a more community-focused grassroots approach that not only does that but also provides social and community benefits to the areas they serve. I believe that urban agriculture is an important solution, especially in the context of environmental justice. Instead of just putting grocery stores in a place where there is not one, urban agriculture meaningfully involves communities. Research has found that individuals engaged in urban agriculture, whether in community gardens or formal training programs, acquire practical skills and knowledge about their environment and agriculture. Certain programs extend beyond education, with some offering job opportunities for those in the community, creating economic opportunities as well (Horst et al 2017). In addition, eating fresh and locally grown fruits and

vegetables increases personal connection to food and provides a greater understanding of food systems. Urban agriculture gives communities a way to gain back control over the access and production of their own food, food that was taken from the hands of systemic racism. If the government could put federal funding into urban agriculture organizations and initiatives the same way they fund the HFFI, SNAP, and WIC, these organizations could increase their food production and resources in order to provide greater food access to those living in food deserts.

The issue of food deserts is a complex and deep-rooted issue that affects many communities across the United States. Residents in these areas face considerable barriers to accessing fresh, nutritious food, contributing to widespread food insecurity and adverse health effects. The intricate nature of food deserts requires a multifaceted and holistic approach to solve this systemic problem. While initiatives like Healthy Food Financing Initiative (HFFI), Supplemental Nutritional Assistance Program (SNAP), and Women, Infants, and Children (WIC), have been helpful in improving access to healthy foods, there are a number of challenges associated with some of these programs. This emphasizes the need for change. Urban agriculture emerges as a promising grassroots solution, offering not only increased access to food but also community empowerment and a start to confronting systemic racism. However, recognizing its limitations as well, such as season constraints, emphasizes the importance of combining various strategies to create the best possible solution. To begin to create a comprehensive solution, collaboration between federal initiatives, community-driven programs, and innovative approaches like urban agriculture is imperative. By integrating federal funding and strengthening existing programs, we can make significant strides in alleviating the burdens of food deserts and begin to foster a healthier, more equitable future for all. The journey to eradicating food deserts

requires ongoing dedication and a shared commitment to building resilient and thriving communities.

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