

**FOODS AND THEIR REPERCUSSIONS:  
A STUDY ON FOOD INSECURITY AND SOLUTIONS**

A Research Paper submitted to the Department of Engineering and Society  
Presented to the Faculty of the School of Engineering and Applied Science  
University of Virginia • Charlottesville, Virginia  
In Partial Fulfillment of the Requirements for the Degree  
Bachelor of Science, School of Engineering

By

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March 30, 2023

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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## **FOOD APARTHEID**

The disparagement of food quality and access to healthy foods based on income and race is a pervasive problem in the United States. Studies show that individuals with lower incomes and from marginalized racial and ethnic groups are more likely to live in areas with limited access to healthy foods, such as fresh fruits and vegetables, and instead have greater exposure to fast food restaurants and processed foods (Zheng, 2020, p. 3).

This research paper will explore the rising trend of segregation of health based on income. More specifically, the lack of healthy foods that seem to plague underprivileged communities. Food choice plays a major role in this topic, but the availability of healthier alternatives is something that is not talked about enough. Many healthy food stores avoid low-income communities for fear their profits will decrease and will build in wealthier areas instead (Harris, 2019, p. 3). This, coupled with the increased cost of healthy foods, pose a major health problem to underprivileged communities.

Ever since becoming an engineer, exploring problems and finding solutions was always a passion. This topic drew interest due to the seemingly unfair circumstances everyday people must go through. To create a positive social change in the world, this is the first step. The purpose of this paper is to explore the disparages and their reasons as well as try to find a workable solution. These disparages will be investigated through the Social Construction of Technology (SCOT) framework (Bijker, 1984). In this system, all related and impacting parties will be investigated to show how the engineer can make the best possible solution.

## **THE FUTURE OF FOOD**

A notable concern in American society is the unequal access to food based on income. Those with lower incomes may have limited options in terms of the quality and quantity of food

they can afford. Research has demonstrated that marginalized racial and ethnic groups as well as individuals with lower incomes face a greater likelihood of residing in locations where access to healthy foods is restricted (Zheng, 2020, p. 4). Particularly in food groups such as fresh fruits and vegetables, whole grains, and lean proteins. This is concerning because the quality of food often directly relates to their quality of life (Raghava R. Gundala, 2021, p.3). This phenomenon is often referred to as food deserts. A food desert is defined as areas with limited access to affordable and nutritious foods. This is a serious public health issue that requires attention and action. According to reputable sources like the United States Department of Agriculture, 23.5 million Americans live in food deserts. Low-income and minority communities are disproportionately affected by this issue, with 11.5 million households living more than a mile from a supermarket and without access to a vehicle (Paula Dutko, 2012, p. 1). This means that these individuals are often forced to rely on corner stores and fast-food restaurants for their meals, which are typically higher in calories, saturated fats, and sodium, and lower in essential nutrients like fiber, vitamins, and minerals.

The disparity to access of healthy foods has consequences that are staggering. Many studies show populations within food deserts have far more likely a chance to suffer from diet-related chronic diseases, such as obesity, diabetes, and heart disease (Paula Dutko, 2012, p. 3). Minorities such as African Americans and Hispanic Americans are 60% more likely to have diabetes and hypertension compared to non-Hispanic white Americans. This disparity, although due to many factors, can be partially attributed to differences in access to healthy foods (Office of Minority Health, 2023, p. 1).

High cost of food is a major reason for this disparity. This financial burden makes healthy food less accessible to individuals with limited incomes. Healthy foods are often more expensive

than unhealthy options and according to a report, healthy foods cost an average of \$1.50 more per day than unhealthy foods, which can add up to \$550 more per year (Dwyer, 2023, p. 3). For those who are already struggling to make ends meet, this additional price can make it impossible for them to afford healthy food. This means that individuals with lower incomes may have to choose between buying healthy foods and other essential items, such as rent or medication.

In addition to cost, the availability of healthy food is also limited in many low-income neighborhoods. A study published in the American Journal of Preventive Medicine found that supermarkets, which typically offer a wider range of healthy foods, are more likely to be located in wealthier areas (Zheng, 2020, p. 6). This leaves many individuals in low-income neighborhoods with limited options when it comes to purchasing fresh produce, lean proteins, and other healthy foods.

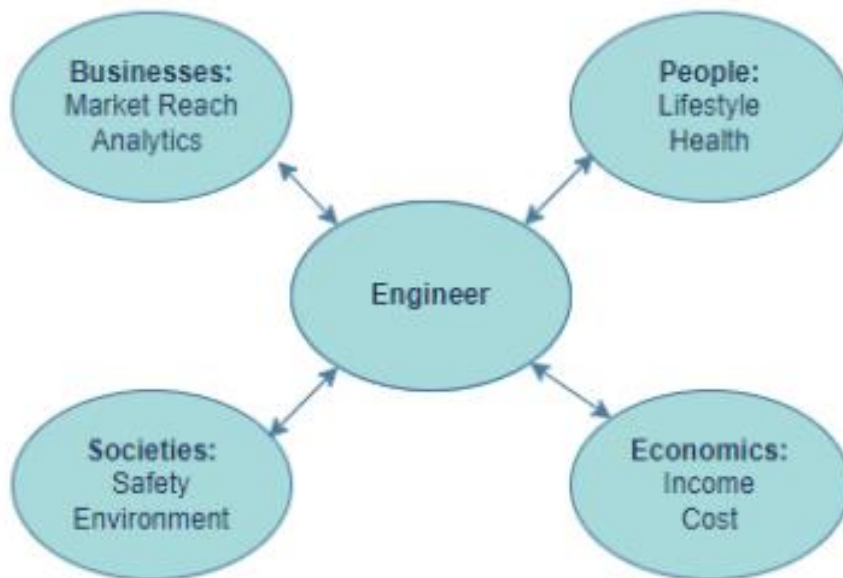


Figure 1: Social Construction of Technology Model. The engineer provides a bridge between each group to form a better solution (Stauffer, 2022)

Through a study of food groups and economic factors, the trends and disparities will be investigated through the Social Construction of Technology (SCOT) framework pioneered by

Trevor Pinch and Wiebe Bijker (Bijker, 1984, p. 10). In Figure 1, the system shows each group provides a unique perspective that informs the engineers efforts and characteristics of the resulting product. This will lead to a better understanding of the problem and an even better solution, in this case the necessary actions to take in order to bridge the disparage between economic groups and their access to healthy and nutritious food. Businesses play a key part in these interactions as they are the suppliers of the food and can choose where and where not to put their business. These businesses do extensive research in their market reach and analytics before ever thinking about building a physical store in a location. A key factor that influences their decision-making is the median household income in the potential county. An analysis by AggData found that Trader Joe's stores, notorious for their healthy and nutritious branding, are located in counties where the household median income is in excess of \$100,000 (Harris, 2019, p. 2). Although they are totally within their rights to dictate where their locations will be, there could be incentives to encourage them to step outside their current demographic. Another key component is the actual people themselves. It has often been shown that families with poor eating habits often pass them on to the next generation (Lubna Mahmood, 2021, p. 3). Poor dietary habits established during childhood persist into adulthood, increasing the risk of obesity and obesity related complications. A person's lifestyle transcends just their life and could lead to their children following in their footsteps. The economic factors of eating healthy also play a major part. Healthy food can be more expensive their unhealthy alternatives (Schauder, 2022, p. 4). Whether the buyer wants to take that factor into account before purchasing their food will directly impact their health and body. Therefore, socioeconomic factors are often brought up when the disparagement of food is raised. It's hard to imagine an impoverished person even being able to afford to think about purchasing the more expensive option when they worry about

the dollars they spend daily. The impact of society on food should not be disregarded. Factors like the environment and safety have an impact on what foods are even able to be processed.

In order to fix the issue of food, there must be new innovative solutions. The technical portion of my project, which is tightly coupled with my STS research, will be to create a team of robots to help self-sustain deep ocean aquaculture farms. Aquaculture farms employ innovative technology to create entire ecosystems where fish are kept in vast nets in the ocean. This way, the number of fish can breed naturally and efficiently, while sustaining their populations. This is in vast contrast to catching fish, where populations are often decimated by overfishing.

### **PROGRESS MADE**

Efforts to address food disparities and improve access to healthy food have led to the implementation of various policies across the United States. One such policy is the Healthy Food Financing Initiative, which was launched by the federal government in 2010 to provide financial support to grocery stores and other food retailers in low-income communities (U.S. Department of Health , 2016, p. 1). This program has helped to bring healthy food options to underserved areas and has increased access to fresh produce and other nutritious foods. Another program that addresses food disparities is Double Up Food Bucks, which provides a dollar-for-dollar match to Supplemental Nutrition Assistance Program benefits when they are used to purchase fruits and vegetables at participating grocery stores and farmers markets (Double Up, 2021, p. 2). This program helps to make healthy food more affordable for people with lower incomes. Community gardens are another way to provide access to fresh produce for people who may not have the space or resources to grow their own food. Many community gardens are located in low-income neighborhoods and provide a source of healthy food for residents.

Some cities and towns have implemented zoning laws that require grocery stores and other food retailers to locate in low-income neighborhoods (Gibbs, 2021, p. 5). These laws help to ensure that residents have access to healthy food options and can help to reduce food deserts in underserved areas. Overall, these policies and programs demonstrate a start to ensuring everyone has access to the basic human right of healthy food. While there is still much work to be done, these efforts are a step in the right direction toward addressing food disparities and promoting equitable access to healthy food.

### **POSSIBLE SOLUTIONS**

Access to healthy food is a fundamental human right that everyone should have regardless of their income and race. Unfortunately, food disparities and lack of access to healthy foods continue to be a major issue in many parts of the world. One solution that can help to address this issue is aquaculture fish farming, which has the potential to increase the availability of fresh, healthy fish for consumers.

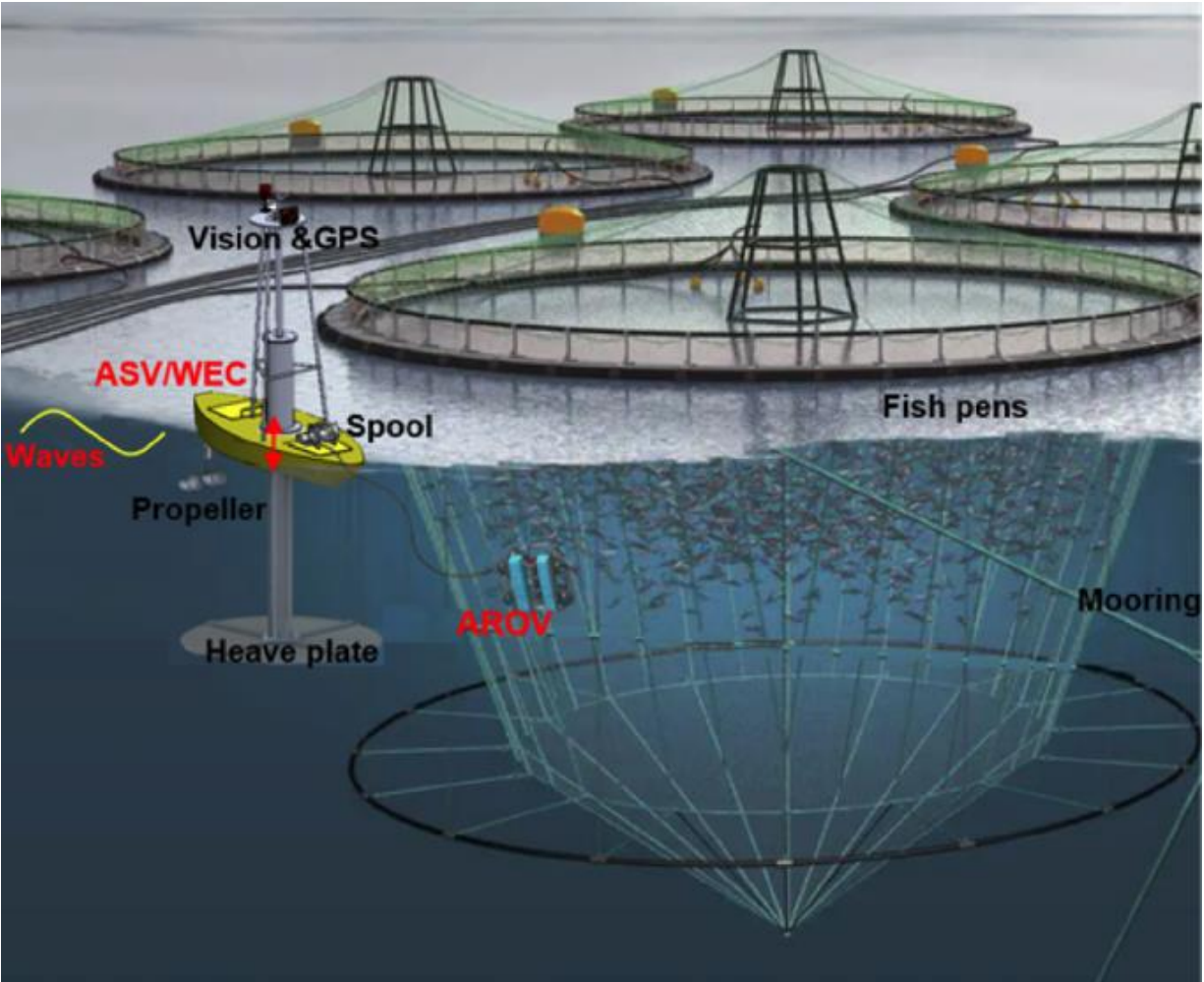


Figure 2: Aquaculture fish pens with accompanying equipment (Stauffer, 2022)

Aquaculture is the practice of raising fish in tanks or pods, rather than catching them from the wild. As seen in figure 2, these pens are housed in the ocean and can be extremely large. This type of farming has many benefits, ranging from environmental to cost. This practice has become increasingly popular in recent years, as demand for fish has grown along with concerns about overfishing. In fact, the global aquaculture industry has grown at an average rate of 6.9% per year over the past four decades (The State of World Fisheries and Aquaculture, 2022, p. 10).

One of the main benefits of aquaculture fish farming is that it can provide a reliable source of fresh fish, regardless of geographic location. This is particularly important in areas



where access to fresh fish is limited, such as landlocked regions or areas with a high demand for seafood but limited supply. Imagine what an increased supply of fish could do for people struggling with daily nutrition. Additionally, fish farming can be done in a sustainable and environmentally friendly way, using practices such as recirculating aquaculture systems or integrated multitrophic aquaculture to minimize waste and reduce the impact on wild fish populations (The State of World Fisheries and Aquaculture, 2022, p. 21). Aquaculture fish farms can also provide economic benefits for local communities. In many cases, fish farming can provide a new source of income for farmers or fishermen who may be struggling due to changing environmental conditions or overfishing. For example, in Bangladesh, where overfishing has led to a decline in wild fish populations, the development of fish farming has helped to provide a new source of income for many families (Hoque, 2021, p. 5). Aquaculture fish farming allowed the natural populations to grow back while also making sure the fishermen were still able to make money. Furthermore, aquaculture fish farming can help to reduce food disparities and improve access to healthy food options. By providing a reliable source of fresh fish, aquaculture can help to increase the availability of healthy protein options for consumers. This is important given that fish is a rich source of omega-3 fatty acids, protein, and other essential nutrients that are important for overall health and wellbeing. Aquaculture fish farming has the potential to address several issues related to food disparities and access to healthy food. It has been shown that if you increase the supply of a product, the price of the goods will decrease. Lowering the prices of these nutritious and essential foods is a great step to encourage all to buy it, regardless of income. As demand for seafood continues to grow, it is important to explore innovative solutions like aquaculture to ensure that everyone has access to healthy, sustainable food options.

## **OVERCOMING DISPARITIES**

Unequal access to healthy foods based on income and race is a pervasive problem in the United States. The consequences of this imbalance are staggering, as it can lead to major health concerns for individuals. It is important for government and businesses to take a more active role in addressing these issues by expanding their reach to low-income communities, rather than solely relying on market research and demographics. By taking a more proactive approach, businesses can play a key role in bridging the disparities between economic groups and their access to healthy and nutritious food, ultimately leading to better health outcomes for all individuals.

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