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UNDERSTANDING THE “INVISIBLE PROBLEM” OF FOOD INSECURITY IN THE ASIAN AMERICAN COMMUNITY IN THE GREATER BOSTON AREA, A SCALING SYSTEM BASED ON SURVEY RESPONSE

Abstract:

The current study employs an online survey to explore the factors that influence food security status at both the individual and household levels. Participants were asked a variety of questions regarding their background and demographics, then were asked questions more specifically tailored towards the topics of food insecurity such as budget, commute time, household income, and whether or not they use government assistance programs. After analyzing the results, the largest correlations were found between budget (0.79) and accessibility (0.84). In the study, affordability emerged as the most prevalent concern among participants, while time, distance, and food freshness were identified as minimal concerns. Using this information and the average household incomes of Boston's 23 recognized neighborhoods, a Food Insecurity Index was calculated as a way to measure the food insecurity rating of that neighborhood. East Boston, Chinatown, and Dorchester had the highest Food Insecurity Index suggesting the potential of relatively high food insecurity among residents.

Keywords:

Food Insecurity, Economic policies, Sustainable development

1 Introduction

Throughout human history, people have struggled with having access to enough food for the exponentially growing population. Since the Green revolution and industrialization of food production, the world, especially the developed nations, has seen a huge decrease in hunger. However, even in the United States, food-related problems have not been fully resolved, and the term food insecurity has been raised in the public eyes. According to the US Department of Agriculture, 12.8 percent (17.0 million) of U.S. households were food insecure at some time during 2022 (USDA). The U.S Department of Agriculture (USDA) defines food insecurity as the long-term lack of regular access to nutritious foods. This definition raises an important distinction that needs to be made: quantity vs. quality. In the US, fast food places can be seen at every corner of every town while the opposite can be said about grocery stores with fresh products. Food deserts – areas where people have limited access to various healthful foods – are especially common in minority-occupied areas (USDA). Minorities are often disproportionately impacted by food insecurity as a result of historical discrimination, systemic barriers and obstacles. Despite the recent upsurge of social pressure and policy change regarding race and economic equality, numerous minority groups still find themselves unjustly disadvantaged in multiple crucial areas such as medical care, housing, and food access. Among the minorities, the Asian immigrant and Asian-American community has received little attention regarding food insecurity

There have been very few Asian-American-focused studies regarding food insecurity. Only in the past few decades has there been any significant effort in collecting data for this minority group. The Asian immigrant story is painted as the “American success story”, as Asians are usually seen as hardworking and positive. Although this label can easily be perceived as a compliment, the reserved nature of many Asian cultures means that challenges within Asian American communities are often less visible or discussed. In addition, while the Asian American community in actuality encompasses the collective group of the many subgroups of Asian communities such as Vietnamese, Chinese, Korean, Malaysian, Japanese, and Indian, these independent and culturally diverse groups are historically viewed and studied as a singular, generalized community. In the past, this term was used to consolidate and grow political power during the civil rights movement where there was a significant need for ethnic solidarity (Kambhampaty, 2020). This collective view creates the so-called “model minority myth”, which is a sociological concept that describes the stereotype that certain minority groups, especially Asian Americans, are highly successful and well-adjusted. This perception obscures the real struggles that many Asian immigrant communities face while simultaneously preventing them from seeking and outsiders from providing assistance. Moreover, existing social barriers also exacerbate the problem by building up additional obstacles that people must overcome to access basic necessities. For example, language barriers- the lack of English proficiency, can lead to difficulty in accessing services or understanding available resources, discouraging people from asking for help. Most of the time, people are unaware of available resources, or even their situations.

It is also important to highlight the fact that not all people understand the idea of food security/insecurity, or can come to the realization that they need help. Given the Western origins of nutrition science and sociology, along with a lack of focus on these issues in many Asian societies,

there is often limited awareness of food insecurity in Asian communities. For many, food insecurity is perceived simply as hunger or the complete absence of food, when in reality, it encompasses a broader range of challenges, such as limited access to nutritious and affordable options. This misunderstanding may partly explain the scarcity of reports and concerns about food insecurity within the Asian American community.

However, the situation changed in 2020. The COVID-19 pandemic devastated the nation, and the Asian American community was particularly affected. In addition to a surge in social discrimination and assaults targeting Asians, the pandemic worsened the group's economic conditions and food insecurity. Many Asian-owned businesses, like those in Boston Chinatown, faced closures, while reduced consumption further strained livelihoods (Chinatown main street). This financial instability made it even more difficult for people to access fresh and affordable food, intensifying food insecurity. While the pandemic brought significant hardships, it also shed light on the often-overlooked issue of food security in Asian American communities, prompting more attention to this growing problem.

Name	Type	Food program	Brief description	Source	Coverage
Food and Nutrition Service (USDA)	Federal	Supplemental Nutrition Assistance Program (SNAP)	Aids distributed monthly through an Electronic Benefits Transfer (EBT) card to purchase groceries	https://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program	National. Available in MA
		Commodity Supplemental Food Program (CSFP)	Aiming to improve the health of low-income elderly persons at least 60 years of age by supplementing their diets with nutritious USDA Foods.	https://www.fns.usda.gov/csfp/commodity-supplemental-food-program	
		Seniors Farmers Market Nutrition Program (SFMNP)	Provide low-income seniors with access to locally grown fruits, vegetables, honey and herb, and support local farmers	https://www.mass.gov/farmers-market-nutrition-program (MA specific)	
		The Child and Adult Care Food Program	Provides fund for food to eligible children and adults who are	https://www.fns.usda.gov	

		(CACFP)	enrolled for care at participating child care centers, day care homes, and adult day care centers	sda.gov/cacfp	
		Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)	Federal grants to states for supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children up to age 5 with nutritional risk.	https://www.fns.usda.gov/wic	
		Nutrition Education & Food Safety	A big team that involves in developing guidelines such as “Dietary Guidelines for Americans” and education for people about food and health	https://www.fns.usda.gov/nutrition-education	
The Great Boston Food Bank	NGO	Mobile Markets	GBFB distributes high-quality, nutritious food to partner agencies that set up free markets to serve low-income populations around Boston	https://www.gbfb.org/	Mass
		Assisting Snaps and other programs applications			
Project Bread	NGO	Flexible Services Program		https://projectbread.org/about-us	Mass
Community servings	NPO	Meal plans	Our mission is to actively engage the community to provide medically tailored, nutritious, scratch-made meals to chronically and critically ill individuals and their families. We commit, in all our programs and business practices, to prioritize racial and economic justice and	https://www.servings.org/about-us/our-programs/	Mass
		Nutrition educations			

			health equity.		
		Local Food	Partner with local farmers , markets and food rescue food. They collect leftover or unsold food.		
ACDC*	NGO	Avoyce youth food resources	Host different programs for community development in Boston Chinatown	https://asiancdc.org/	local/national
		Farmer's Market			
ABCD	NPO	Food drives	ABCD builds pathways out of poverty in partnership with families and communities so that everyone can thrive. Create	https://bostonabcd.org/service/food-accesscenters/	local
		Food delivery			
		Food access centers			
		Food pop-ups			

Table 1. Summarizing Existing efforts of governmental programs, NGO and NPO in helping people, especially Asian Americans in the Greater Boston Area, with food insecurity and other food-related issues.

Since then, there has been a growing effort into understanding food insecurity in the Asian American community. However, there is not a clear standard to evaluate who is food insecure or not. Food insecurity is a multifaceted problem that includes but is not limited to household budgets, the accessibility of grocery stores, the access to fresh and nutritious food and much more. As indicated above, due to the lack of knowledge, people may not have a clear understanding of food insecurity, let alone considering all the factors that may contribute to it. Therefore, it is crucial to

develop an effective system that helps individuals, communities, and organizations identify the presence and the level of food insecurity. This system would provide a clearer framework for addressing the issue and ensuring targeted assistance for those in need. In this study, I create a survey that is easily understandable by the participants, evaluate different aspects of food insecurity, and a scoring system based on some of the important factors that may provide useful information on the level of food insecurity per household/person.

2 Methods

2.1 Survey

I sent out an online survey via different social media platforms to gather data directly from the Asian American Community in the Greater Boston area. I also offered a Chinese version of the survey to try to minimize the language barrier and get as many responses as possible. The survey consisted of 27 questions split into two categories: background information on the participant and food insecurity related questions. The first group of questions were aimed to help me get to know the general background of the participant (age, race, marital status, gender, etc). Specifically I asked for the participant's race, employment status, and place of residence (which Boston town they live in), to evaluate the overall living communities, the socio-economic background, and how susceptible they are to possible food security related issues. Some Boston towns are comparably more wealthy or better-off than others in several categories such as average household income and development. Less developed towns might have few places to access nutritious food and vice versa. This is another important factor to consider when looking at someone's food security status. Taking this into account, the towns are all ranked from high, median and low based on the average household incomes level.

Minorities are also more susceptible to discrimination related obstacles when it comes to accessing different necessities so that is an important factor to consider as well. I also included a question about the citizenship status of the participant because I want to focus on asian immigrants. The question about language fluency is also to help address the previously mentioned language barrier. The second half of the questions are related to food insecurity, and used to create the scoring system. The first question is how accessible are fresh products/ grocery stores to you on the scale of 1 to 5. 1 is easy to get and 5 is very difficult. This question targets the accessibility of food to the person which might be affected by the number of stores near them and whether or not they have accessible transportations.

The second question is how often do you (or your household) go grocery shopping with four answer choices ranging from everyday, 2-3 times per week, to only a few times per month, later on the answer is assigned a number from 1 (the most frequent) to 3 (the least frequent). This question aims to find out how frequent a participant is able to restock their supply and whether this has a correlation with their food security status. This may depend on the person's budget, their accessibility and other factors.

The third question is how long does it take you (or your household) to get to the grocery stores with three answer choices ranging from less than thirty minutes to over an hour. This question serves a similar purpose to the second question but goes more specifically into the transportation

aspect of accessibility. The answers are also assigned numbers later from 1 (the least time) to 3 (the longest time).

The fourth question is do you always have the budget for grocery shopping using a scale from 1 to 5. 1 being always, never having to worry about it and 5 being not enough, always worrying about the budget. The money aspect of food security is a very influential part but asking for superficial dollar amounts is too varied (people have different needs and different circumstances) and so by asking the question in this manner there is more of a focus on whether or not the person has a budget that works instead of if they meet a numerical criteria.

The fifth question is what kind of food do you often eat everyday with 5 answer choices: Traditional food, Food of your own ethnicity (Chinese, Vietnamese, i.e...), American or Fast-food, Frozen/Pre-made/takeout, Freshmade, and Variety. Food preferences can affect accessibility because of how easy or hard it is to find that type of food.

Following these questions, are six questions about SNAPs and other government assistance programs. Lastly there is an open response question about what they think are the main challenges/obstacles (if there are any) to access fresh products/food. All these pieces of information help give a sense of where people prefer to get their groceries and/or what type of food is available to them. In addition to helping me get to know the specific circumstances of the individual doing the survey, they also help me find trends in the prevalence of assistance program use, how many people need the programs, and the general level of awareness of the issue of food insecurity. The main focus of this paper is to help raise awareness for not only the issues of food security but also to the multitude of available assistance programs that so many families can benefit from, especially Asian immigrant families.

2.2 Analysis Method

The results are summarized on an excel sheet and passed into python for analysis. Firstly, using a Spearman correlation – which measures the strength and direction of association between two variables – each factor that was included in the survey is measured against each other to find which ones have the strongest correlation. In total there are six factors: Budget, Accessibility, Shopping Frequency, Travel Efficiency (the amount of time it takes to get to a food source), Household Income, and Geography Wealth (the relative wealth of the town that the participant lives in). Based on the intercorrelations of the factors, the assigned scores of the 5 factors: Budget, Accessibility, Travel Efficiency, Household Income, and Geography Wealth are used to calculate the score of Food (in)security by taking the mean. Higher score indicates higher potential of food insecurity of the household.

3 Results

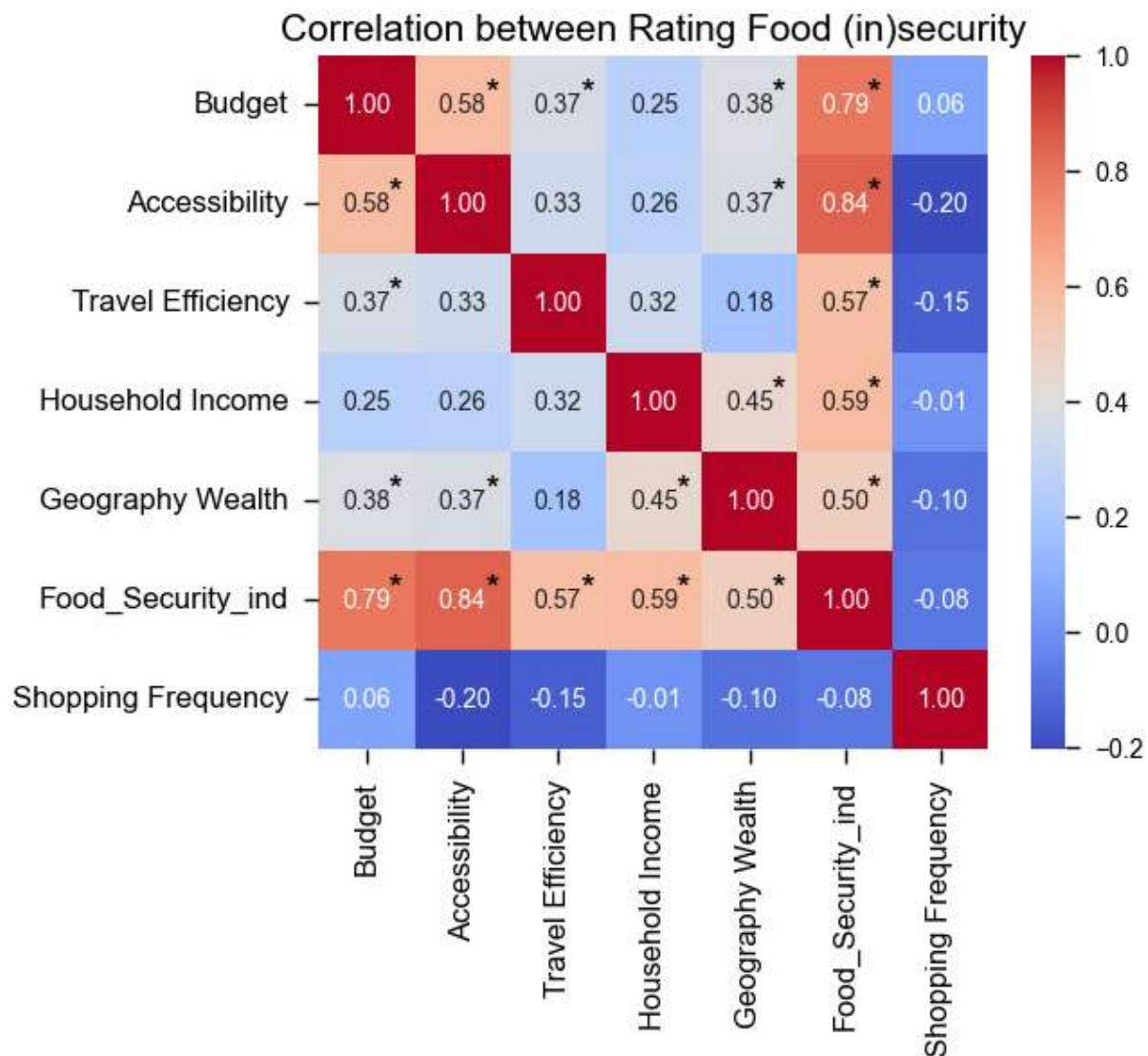
3.1 Biogeography

The geographic distribution of the participants is relatively even (each with approximately 3.4%) with the exception of Dorchester and West Roxbury at 24.1% and 17.2% respectively. The gender

distribution of the participants is 58.1% female and 41.9% male. The ethnic background of the participants is more widespread with 70.9% being Asian, 12.9% Caucasian, 9.7% Hispanic, 3.2% Afro-Latino, and 3.2% of mixed ethnicities. The age distribution of the participants has a majority (83.9%) of people under the age of 18 and the rest (16.1%) being between the ages of 18-24. A majority of the participants are US citizens with the expectation of 3.2% being green card holders and 3.2% being visa holders. Similarly, 90.3% of the participants are identified as students and 9.7% identified as employed. The income ranges are slightly more varied with 64.5% being less than 50 thousand, 6.5% being from 50-100 thousand, and 29% being more than 100 thousand.

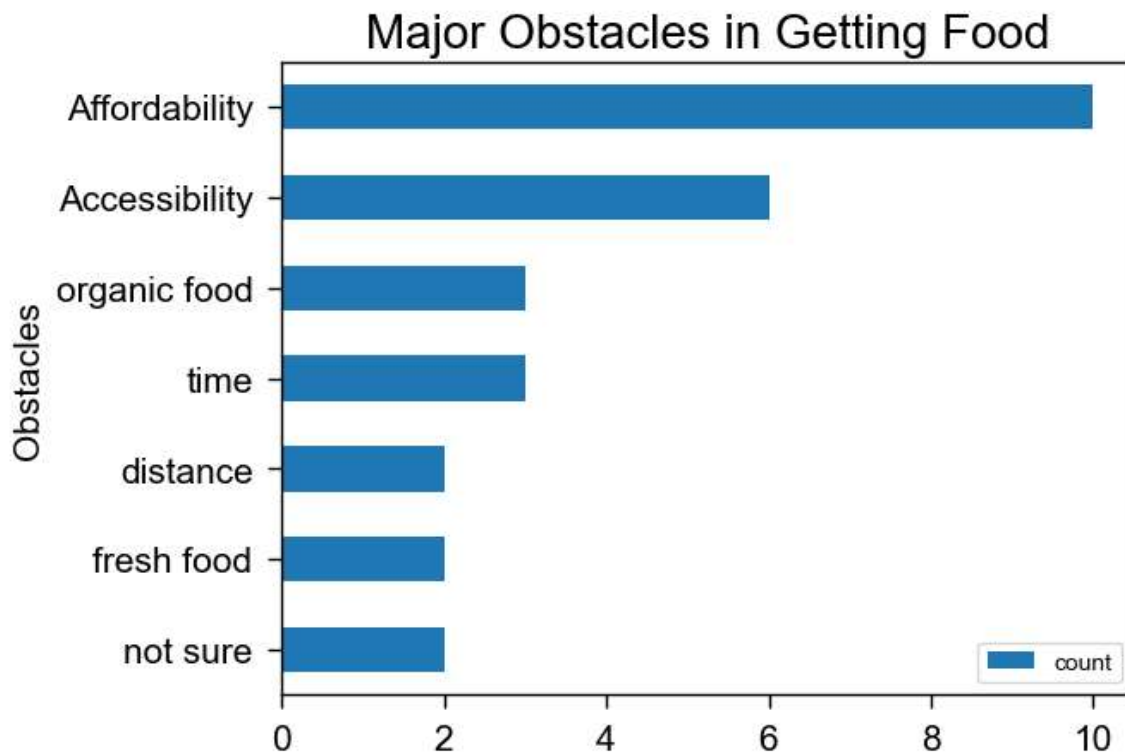
3.2 Food (In)security

Figure 1. The heatmap of spearman correlations between factors that may contribute to food (in)security. * indicates significant correlations with $p\text{-value} < 0.05$. Budget-whether or not the participants/household have the budget to purchase food (rating 1-5). Accessibility- how easy is it for the participants to get to grocery stores/fresh products (rating 1-5). Travel Efficiency- how long does it take to get to the grocery store (rating 1-3). Household income-annual household income (rating 1-3). Geography Wealth- the average household income of the region where participants live (rating 1-3). Food Security Index- the mean of the above 5 factors. Lower means food secured. Shopping Frequency- how often do the participants go shopping (rating 1-3).



The two factors with the highest correlation are Budget and Accessibility with a value of 0.58. The positive correlation means when an individual's budget for food increases, their accessibility to food also increases. The second largest correlation is between Household Income and Geography Wealth with a significant correlation of 0.45, followed by Budget and Geography Wealth of 0.38. Similarly, Geography Wealth and Accessibility has a correlation of 0.37 comparable to the correlation between Travel Efficiency and Budget that can both be explained by the concept of having a higher income gives an individual greater access to resources. On the other hand, Shopping Frequency has no significant correlations with any of the other factors, which makes it a less important factor to consider when studying food security. Food security index is calculated as the mean of the rating of Budget, Accessibility, Travel Efficiency, Household income and Geographic Wealth. The Food Security index ranges from 1 - 3.8. Based on the correlation, the index is mostly affected by the Budget (0.74) and Accessibility (0.84).

Figure 2. Bar charts showing some of the major obstacles that participants identify for getting food and food insecurity.



Additionally in this survey, information is gathered about what specific obstacles people face when trying to access food. The most common answers are compiled into groups and placed on a bar graph to better understand the general trends. The groups are: affordability, accessibility, organic food, time, distance, fresh food, and not sure. The most prevalent concern is the affordability of food. This makes sense especially as inflation rate rises and basic necessities have been increasing in prices, especially nutritious food. Accessibility also is an accepted common factor as the basic “ability to access” is one of the most prevalent issues regarding food security. One important topic brought up in these results is the difference between “fresh food” and “organic food”. These two are often used interchangeably and they may mean different things to different people. The definition of organic food according to Oxford Languages is, “ food produced or involving production without the use of chemical fertilizers, pesticides, or other artificial agents”. Fresh food is defined as foods that are newly picked or made, typically suggesting that the food hasn’t been sitting out or on a shelf too long. Most produce (things that have been produced or grown, especially by farming) are considered “fresh foods” because they spoil easily and are considered the most

healthy due to their “natural” label. Recent trends in regard to food safety, view the chemicals used in farming as health risks and turn to organic food as the safer and healthier option. The general consensus is that fresh organic food is not only healthier but also much more expensive making this food category much less accessible to lower income individuals.

Location	Budget	Accessibility	Travel Efficiency	Household Income	Geography Wealth	Food_Security_ind
Newton	1.0	1.0	1.0	1.0	1.0	1.0
Roslindale	2.0	1.0	1.0	1.0	1.0	1.25
Back Bay	1.0	2.0	2.0	1.0	1.0	1.5
Boston	1.33	1.67	1.0	2.0	2.0	1.5
South end	1.0	3.0	1.0	1.0	1.0	1.5
North End	1.0	1.0	1.0	3.0	1.0	1.5
Jamaica Plain	2.0	1.5	1.5	3.0	1.0	2.0
Brookline	1.0	2.0	2.0	3.0	1.0	2.0
West Roxbury	2.1	2.1	2.0	2.1	1.0	2.1
Hyde park	2.0	3.0	1.0	3.0	1.0	2.25
Charlestown	2.0	2.0	2.0	3.0	1.0	2.25
East Boston	2.5	2.0	2.5	3.0	3.0	2.5
Chinatown	2.0	5.0	1.0	3.0	3.0	2.75

Dorchester	4.0	4.0	1.75	3.0	3.0	3.19
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Table 2. The table showed the summary of data based on the geography. The values were the average of all participants from that town/district. The town/district was ranked by the Food insecurity index, which provided a rough estimate about how the town is rated based on the general aspects regarding food insecurity. The lower the number, the better the food security rating, and vice versa.

We also looked at the food insecurity status at the town/district level. Newton, Roslindale, Backbay, Boston, South end and North End had low food insecurity index, thus relatively high overall food security based on the survey results. They all have high geographical wealth. On the other hand, East Boston, Chinatown and Dorchester, especially, have some of the highest food insecurity indexes with the lowest geographical wealth.

4 Discussion

The results of the survey highlights the interdependence of different factors. The significant correlation between the budget, accessibility, travel efficiency and geographical wealth shows that no obstacle stands alone (Figure 1). It can be said that people who live in lower income neighborhoods tend to have limited budgets on food, and potentially have less available food options, due to both the lack of choices and affordability. In wealthier towns, you can find a variety of grocery stores with fresh and organic food like Trader Joes and Whole Food, and some affordable options like Target and Walmart. In contrast, there would be fewer choices and stores in lower income places. Moreover, the lack of budget and inaccessibility may imply the lack of transportation means. While wealthier regions may possess better public transportations like subway and buses, the infrastructure would be inferior for others. In addition, a limited budget may also affect people's choices on using their cars and fuels, and getting uber and taxi. Lower incomes families also might not be able to afford multiple cars or even any cars. Public transportation is also not free and takes a significantly longer time. Online delivery is also an option but it is one of the most expensive despite usually taking less time. These all contributed to the decrease in accessibility of food.

Given the score of each factor, accessibility and budget contribute the most to the Food insecurity index. For each neighborhood and region, there are always grocery stores, but where it is located, and how much are products in the stores would affect the way people purchase the food and thus

related to the issue of food insecurity. The Food insecurity index is from 1-3.8. The food insecurity index is not an indication for food insecurity but rather it should be seen as a warning of the potential existence of the problem. Table 2 ranks the region/town by their food insecurity index. Hyde park, Charlestown, East Boston, Chinatown, West Roxbury and Dorchester are at the lower end of the index. These towns are categorized as lower income regions with higher potential for food insecurity. These suggest that more efforts should be taken to look into the status of food related problems in these towns.

Furthermore, the survey also asked for people's opinion on their challenges related to food regardless of their status on food insecurity (Figure 2). After looking at all the responses along with the data already available to the public, the obstacles people battling with food insecurity can be split into three categories: financial obstacles, area development obstacles, and awareness obstacles. Unsurprisingly, budget and affordability are the biggest obstacles to accessing food. Interestingly however, there are various aspects to this problem. For lower income families, the price of the food affects their budget. Meanwhile, some people have specifically talked about the affordability of organic food, which is very expensive given their budget. While the accessibility of fresh and organic food is not considered in the index of food security, it is important to unveil people's need in these types of food.

Another major obstacle is the area development of Boston neighborhoods. As previously mentioned, lower income neighborhoods aren't seen as viable investments and therefore are less developed than wealthier parts of Boston. Less developed infrastructure also means fewer grocery stores, lower quality public transportation, and more fast food stores. These factors all hinder access to adequate amounts of nutritious foods. For example, the geographical food insecurity index (Table 2) revealed big differences between neighborhoods on this issue. Some of the wealthier towns, with higher average household income like Newton, Back Bay, North and South end, seemed to have high food security. On the other hand, the high food insecurity index of Dorchester, along with the other high scores, suggested the potential existence of food insecurity.

Lastly there is a severe lack of awareness towards this issue. Families with income trouble may not have access to the internet and therefore are at a severe disadvantage in regards to their ability to access information. Even if an individual is eligible for government assistance programs, without an adequate way to access information, they aren't aware of the possible benefits available to them. There is also an important language barrier especially among Asian immigrant households. Without sufficient translation services, individuals don't even know how to ask others for help.

5 Conclusion

Food insecurity is never just a problem of hunger, lack of healthy food, or limited grocery budgets; it reflects deeper, interconnected issues related to individual and household status, infrastructure, and more. This study revealed a significant relationship between income, biogeography, and individuals/household food security status. Each factor not only influences food security, but also affects other variables, further complicating the issue. A person's income directly impacts a person's budget for food and can also dictate the neighborhood in which the person lives. Depending on how wealthy the neighborhood is, access to stores drastically increases or decreases and transportation now enters the conversation. These overlapping issues highlight the multifaceted nature of food insecurity and the need for holistic solutions.

In order to capture these underlying issues, the survey was specifically made to be accessible and easy to understand to participants regardless of their prior knowledge of food security. By focusing on practical, real-life questions that reflect everyday experiences, the survey enables participants to respond meaningfully, offering valuable data on their food security status. The results of the survey and the multifaceted food insecurity index, not only would help the participants to gain a better understanding of their status, but also could provide meaningful data for NGO/NPO and governmental organizations about the individuals, household and even the district, and their major needs. In addition, the simplicity of the survey allows it to be easily translated into other languages to adapt the needs of diverse populations.

The results of this study, nonetheless, need to be taken with a grain of salt. Although the questions were made with the intention of eliminating as many biases as possible, it is inevitable that there will be factors that influence the answer given by the participants. As previously mentioned, a majority of the participants are either students or young adults. In most cases, the burden of the family's food situation lies on the shoulders of the adults in the household rather than the participant. Consequently they might not have a complete understanding of their exact food security status.

Increasing the diversity of the participants would allow us to have better insights into the food security status of the Boston Asian immigrants community. It would be necessary to include parents or people who are financially supporting the households. Additionally, the senior or elderly population should also be included as they are a majority of the Asian populations in Boston. The older generations may encounter different obstacles such as culture and language barriers than the younger generation. Senior citizens who immigrated to the United States in their youth are more likely to have greater experience in managing life in a new environment. Their perspectives shed

more light on the problems that contribute to food insecurity. Overall, broadening the age range of the participants would be a key improvement to our understanding of food security and the search for better solutions.

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