# HEATH ASSESSMENT MARKERS AND FOOD SECURITY STATUS OF GUESTS AND CULINARY APPRENTICES AT A COMMUNITY CAFÉ

by

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Abstract

In 2022, 12.8% of U.S. households were food insecure, making food security a legitimate concern for the nation (United States Department of Agriculture, 2023). The purpose of this study is to describe food insecurity in a sample of culinary apprentices and community café guests and examine the correlation between food security status and measurable indicators of health status such as blood pressure, body mass index and hemoglobin A1C. The Food Security Survey Module, developed by the United States Department of Agriculture, was used to measure if participants had adequate money and resources to access food. Participants scheduled health assessment visits, where their blood pressure, weight, height and hemoglobin A1C were measured. The researcher looked for a correlation between the participant's level of food security based on the United States Department of Agriculture Adult Food Security Module and their health assessment data values. Current literature supports the idea that food insecure individuals will have higher rates of cardiovascular disease and diabetes. Results from this study showed that the mean systolic blood pressure was statistically significant between the two groups, while no other biological markers were statistically different. As the sample size of the study grows, researchers anticipate that results will match the trends that other researchers have identified between health status indicators and food security.

## Introduction

Despite years of food insecurity, attention by the United States government toward food insecurity only became organized in the 1990s (Carlson et al., 1999). It was during this period that a multitude of research was conducted to examine first world hunger and the connection between poverty and hunger, in the United States (Carlson et al., 1999). Since then, studies have continued to be performed to assess food insecurity in United States households (Carlson et al., 1999).

Beginning in 1992, the United States Department of Agriculture (USDA) worked to create a standardized tool to collect data on the prevalence of food insecurity at the national level (United States Department of Agriculture, 2023). The tool was first developed in the early 1990s but in the early 2000s, federal agencies, researchers and nonprofit organizations met to revise the tool. The biggest change was that food security “with hunger” or “without hunger” was removed, as hunger can be somewhat subjective. The current version of the tool has been used since 2005. The Food Security Survey Module (FSSM) ultimately serves to measure if a household has adequate money and resources to access food (Rabbitt et al., 2023). It includes an 18 item scale, a shorter six item scale and a 10 item scale, all of which can be used for households with or without children (Johnson et al., 2020). The FSSM has been extensively evaluated to determine its validity and reliability in being applied to households as a measure of food security status (United States Department of Agriculture, 2023). This particular study utilized the 10 item survey. Each of the 10 items seeks to ask questions that indicate the possible presence of food insecurity in a particular household.

In 2022, 12.8% of U.S. households were food insecure, a statistically significant increase from the 10.2% in 2021 (United States Department of Agriculture, 2023). Members of these households experienced times where they were unable to access enough food for their needs due to inadequate money and other resources. Food insecurity disproportionally affects low-income households (Byker Shanks et al., 2022). Members of these households reported on the affordability of food, stating that prices were too high to buy enough healthy food or simply enough food (Byker Shanks et al., 2022). All study participants reported a desire to eat healthy, which supports the idea that the problem is centered around barriers to accessing food (Byker Shanks et al., 2022). More research should be conducted to examine the possible effect of decreased access to food on health status indicators.

The term food insecurity was ultimately developed to address the wealth of negative health outcomes that are associated with decreased availability of food (Gunderson & Ziliak, 2015). In their study, Gunderson and Ziliak sought to investigate the connection between food insecurity and health in children, non-senior adults and seniors (Gunderson & Ziliak, 2015). In non-senior adults, it was discovered that food insecurity directly increases the risk for diabetes, hypertension, hyperlipidemia and poor sleep (Seligman et al., 2007), (Stuff et al., 2004), (Seligman et al., 2010), (Ding et al., 2015). Their research also revealed that food insecurity can hinder adherence to health advice (Gunderson & Ziliak, 2015). For example, a new patient diagnosed with hypertension will be unlikely to follow the recommendation for a low sodium diet because of their inability to afford fresh fruits and vegetables. Because food insecurity is directly related to health status, it is recommended that policy makers work to decrease the prevalence of food insecurity to ensure the health of our population (Gunderson & Ziliak, 2015).

The purpose of this study is to describe food insecurity in a sample of culinary apprentices and community café guests and examine the correlation between food security status and measurable indicators of health status such as blood pressure, body mass index (BMI) and hemoglobin A1C.

## Review of Literature

A literature review was conducted of CINAHL Ultimate, Medline Complete, Nursing & Allied Health Database and Cochrane Library. The search was conducted first using the phrase “prevalence of food insecurity” to better understand the relevance of this topic. Search terms then included “food insecurity and health outcomes”, “food security and health indicators” and “food insecurity as a measure of health status”. Filters applied were English language and peer reviewed. No articles found concerning food insecurity in more vulnerable populations and whether their health status is worse as a result of decreased access to food.

Researchers conducted a cross-sectional analysis of the National Health and Nutrition Examination Survey from the years 1999 through 2002 to evaluate the connection between food insecurity and diabetes (Seligman et al., 2007). Participants were classified as either food secure, mildly food insecure, or severely food insecure and diabetes was diagnosed with a self-reported fasting blood glucose level greater than one hundred and twenty-six. The study found that just over sixteen percent of participants in the severely food insecure category had diabetes compared to only eleven percent of the food secure population. Researchers reasonably concluded that food insecurity is in fact a risk factor for diabetes (Seligman et al., 2007).

A cross-sectional analysis was conducted in a group of children aged eight to seventeen to determine the relationship between food insecurity and high blood pressure (South et al., 2019). While this study was performed in a group of children rather than adults, it provided valuable insight into the correlation between one’s food security status and their blood pressure. In their sample, high blood pressure was more common in food insecure households as opposed to food secure households. The findings of this study suggest that there is indeed a correlation between food insecurity and cardiovascular health status, even in childhood (South et al., 2019).

Few studies exist that evaluate the relationship between food security and chronic disease in adults (Seligman et al., 2010). If this correlation is better understood, it might allow for medical care to be provided to the low income, food insecure population and therefore decrease the rate of chronic disease diagnosis. Researchers attempted to use a representative population to study the effects of food insecurity on cardiovascular risk factors such as hypertension, diabetes and hyperlipidemia. The 18 item U.S. Food Security Survey Module was used to define food insecurity in the sample population. The results supported that the prevalence of hypertension and diabetes is higher in food insecure households but there was no evidence to draw the same conclusion about hyperlipidemia. Researchers also found that food insecure household members that are diagnosed with diabetes are likely to poorly control it due to their lack of access to food for the disease (Seligman et al., 2010).

Keenan et al. explored the relationship between household food insecurity, diet quality and obesity (Keenan et al., 2020). The study was conducted in the United Kingdom on a group of six hundred and four participants who were recruited in food banks. The USDA FSSM was used to determine which participants struggled to obtain an adequate amount of nutritional food. Researchers also assessed their body mass index, psychological level of stress, their diet quality and their eating and drinking behaviors. The study ultimately concluded that there is an indirect relationship between food security status and body mass index. Those who were classified as food insecure were more likely to exhibit poorer diet quality and increased unhealthy eating and drinking behaviors. Researchers hypothesized that this is due to the stress of being food insecure, causing disordered eating, resulting in an indirect increase in body mass index (Keenan et al., 2020).

Breaux-Shropshire et al. conducted a systematic review attempting to examine whether home blood pressure monitoring improves patient outcomes (Breaux-Shropshire et al., 2015). While this study is not directly related to home blood pressure monitoring, it provides valuable insight into the use of blood pressure as an indicator of health status. Maintaining a controlled blood pressure is critical to preventing negative cardiovascular outcomes, kidney disease and stroke (Breaux-Shropshire et al., 2015).

Schroeder et al. preformed a longitudinal cohort study to determine the relationship between food insecurity and emergency room visits, hospitalizations, hemoglobin A1C levels and diabetes medication adherence (Schroeder et al., 2019). To participate in the study, adults had to be over sixty-five and diagnosed with diabetes. The results of the study revealed that individuals who were categorized as food insecure were more likely to be hospitalized than those not food insecure. The overall conclusion of the study was that food insecurity can contribute to adverse outcomes for patients with diabetes and poor hemoglobin A1C control (Schroeder et al., 2019).

## Methodology

This study will follow a cross sectional correlational project design. Studies of this nature typically examine the relationship between variables at a particular point in time. This is only preliminary data, as collection is ongoing through December of 2024. This specific correlational study will be quantitative in nature, due to the collection of numerical indicators of health status such as blood pressure, height, weight and hemoglobin A1C. The survey tool measuring food security will also yield quantitative score numbers.

The study consisted of forty-five health assessments, conducted at Taste Community Restaurant in downtown Fort Worth, Texas. The sample consisted of culinary apprentices and community café guests. Participants registered on the platform Monday.com and self-select a time for their screening.

### USDA Adult Food Survey Security Module

The first three questions of the Adult Food Survey Security Module measured a respondent's ability to buy food to meet their needs. Respondents stated whether each of the three statements were often true, sometimes true, never true, did not know if true, or they refused to answer. The statements were:

"I worried whether my food would run out before we got money to buy more."

"The food that I bought just didn't last and we don't have money to get more."

"I couldn't afford to eat balanced meals."

If a respondent answered with "often true" or "sometimes true" to one or more of the questions, the survey continued to stage II. If the respondent answered "never true" or "don't know" or "refused" to all three of the questions, the respondent could skip to the end of the survey and their results were not included.

Respondents then moved on to answer the 10 survey items. Sample questions include:

> "In the last 12 months, did you ever eat less then you felt you should because there wasn't enough money for food?"
>
> "I/we couldn't afford to eat balanced meals." Was that often, sometimes, or never true for your household in the last 12 months?

Based on their responses, survey participants were defined as high food secure, marginal food secure, low food secure or very low food secure. Affirmative responses indicate food insecurity; yes, often true, sometimes true, don't know. A higher number of affirmative responses to the 10 questions indicates a higher level of food insecurity while a lesser number of affirmative answers indicates food security.

**Health Assessment Data Collection**

Each health assessment screening will follow a similar format. Participants will spend time completing the survey module on either a laptop or their personal phone via a QR code. They will then have their blood pressure, height, weight and hemoglobin A1C taken and recorded. The Center for Disease Control reports that hemoglobin A1C is a blood test that measures your average blood sugar levels over the course of the past three months (Center for Disease Control, 2022). This test can serve as an illustration of general blood glucose levels in individuals, giving them time to modify their lifestyle before it progresses to the more complicated disease process of diabetes. Body mass index will be calculated using the participant's height and weight in the CDC BMI Calculator. If any of those values are out of range, nursing judgment will be used to refer patients to physicians and other healthcare services. The research assistants will also provide guided education on hypertension, diabetes, healthy weight and sleep using infographics from the American Heart Association, American Diabetes Association and the Center for Disease Control.

To protect the participant's confidentiality, each volunteer will create a unique identifier that only they know. The document that connects each person to their identifier will only be available to research personnel. Data spreadsheets will be secured under a double password protected system. Human subjects will be protected throughout all phases of the study. Informed consent forms will be signed, and consent can be withdrawn by participants at any time.

Data was analyzed at the end of all forty-five health assessments. The researcher looked for a correlation between the participant's level of food security based on the United States Department of Agriculture Adult Food Security Module and their health assessment data values.

## Results

### Demographic Results

We had a total of 45 participants consisting of 47.7% female ($n$ = 21) and 47.7% male ($n$ = 21). The average age of the participants was 43.07 years ($SD$ = 18.89), with a minimum age of 18 years and maximum of 75 years. Additional participant demographics can be seen in Table 1.

### Food Security and Biological Markers

Four independent t-tests were run to test for the differences in BMI, A1C, systolic blood pressure and diastolic blood pressure between participants who were food insecure versus those who were food secure. Results showed that the mean systolic blood pressure was statistically significant between the two groups, while no other biological markers were statistically different. The food insecure participants had a mean systolic blood pressure of 130.53 (SD = 19.04), while the food secure participants had a lower mean of 119.44 (SD = 9.76), a significant difference of 11.09 ($t(25) = -2.317$, $p = .029$). The food insecure participants had a mean diastolic blood pressure of 80.21 (SD = 9.91), while the food secure participants had a mean diastolic blood pressure of 77.44 (SD = 10.58), a statistically insignificant difference of 2.77 ($t(40) = -.884$, $p = .382$). The food insecure participants had a mean BMI of 27.59 (SD = 7.04), while the food secure participants had a mean BMI of 29.57 (SD = 6.87), a statistically insignificant difference of 1.98 ($t(41) = .931$, $p = .357$). Finally, the food insecure participants had a mean A1C of 5.32 (SD = .51), while the food secure participants had a mean A1C of 5.57 (SD = 6.10), a statistically insignificant difference of .252 ($t(35) = .960$, $p = .344$). Results for the tests are summarized in Table 2.

**Table 1**

*Summary of demographic variables.*

| Demographic | % | *n* |
|---|---|---|
| Sex at Birth | | |
| Female | 47.7 | 21 |
| Male | 47.7 | 21 |
| Prefer Not to Answer | | |
| Ethnicity/Race | | |
| Native American | .1 | 1 |
| White | .5 | 5 |
| Hispanic | .2 | 2 |
| African American | 1.5 | 15 |
| Multi-ethnic | .6 | 6 |
| Prefer not to answer | 1.5 | 15 |
| Highest Level of Education | | |
| Some High School | .6 | 6 |
| High School | .7 | 7 |
| Job Training | .7 | 7 |
| Some College | 1.3 | 13 |
| Associate Degree | .6 | 6 |
| Bachelor’s Degree | .3 | 3 |
| Master’s Degree | .2 | 2 |
| Employment Status | | |
| Culinary apprentice | 1.7 | 17 |
| Full-time | .8 | 8 |
| Part-time | .4 | 4 |
| Unemployed | 1.4 | 14 |

*Note.* N = 45, although some participants chose not to answer select questions.

**Table 2**

*Results from the independent t-tests.*

| | Food Insecure | | Food Secure | | | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *t* | *p* |
| **BMI** | 27.53 | 6.76 | 29.89 | 6.65 | 1.142 | .260 |
| **A1C** | 5.36 | .490 | 5.57 | .992 | .819 | .418 |
| **Systolic Pressure** | 127.79 | 17.650 | 121.52 | 13.080 | -1.355 | .183 |
| **Diastolic Pressure** | 78.63 | 10.626 | 78.64 | 10.210 | .003 | .998 |

*Note.* N = 19 for food insecure, N = 25 for food secure, although some data values were missing due to measurement issues.

## Discussion

The research question of whether health assessment markers differ for individuals who are food secure versus food insecure in a community café guided my results analysis. Current literature supports the idea that food insecure individuals will have higher rates of cardiovascular disease and diabetes. My specific study found that there was a statistically significant increase in systolic blood pressure in food insecure individuals as opposed to food secure individuals. When comparing diastolic blood pressure, body mass index and hemoglobin A1C, no statistical significance was found.

A limitation of the study is the small sample size which makes it difficult to identify any statistical significance. Another limitation is that data collection is incomplete. The study will continue through December of 2024.

## Conclusion

As the sample size of the study grows, researchers anticipate that results will match the trends that other researchers have identified between health status indicators and food security. Implications for clinical practice could be the need for more holistic programs addressing food insecurity in our nation. Combating food insecurity in hopes of better health outcomes would reduce the chronic strain on our healthcare system.

## References

Breaux-Shropshire, T., Judd, E., Vucovich, L. A., Shropshire, T. S., & Singh, S. (2015). Does home blood pressure monitoring improve patient outcomes? A systematic review comparing home and ambulatory blood pressure monitoring on blood pressure control and patient outcomes. *Integrated Blood Pressure Control, 8*, 43-49. https://doi.org/10.2147/IBPC.S49205

Byker Shanks, C., Andress, L., Hardison-Moody, A., Jilcott Pitts, S., Patton-Lopez, M., Prewitt, T. E., Dupuis, V., Wong, K., Kirk-Epstein, M., Engelhard, E., Hake, M., Osborne, I., Hoff, C., & Haynes-Maslow, L. (2022). Food insecurity in the rural United States: An examination of struggles and coping mechanisms to feed a family among households with a low-income. *Nutrients, 14*(24). https://doi.og/10.3390/nu14245250

Carlson, S., Andrews, M., & Bickel, G. (1999). Measuring food insecurity and hunger in the United States: Development of a national benchmark measure and prevalence estimates. *The Journal of Nutrition, 129*(2), 510S-516S. https://doi.org/10.1093/jn/129.2.510S

Center for Disease Control (2022). *All about your A1C*. https://www.cdc.gov/diabetes/managing/managing-blood-sugar/a1c.html

Ding, M., Keiley, M. K., Garza, K. B., Duffy, P. A., & Zizza, C. A. (2015). Food insecurity is associated with poor sleep outcomes among US adults. *The Journal of Nutrition*, *145*(3), 615-621.

Gunderson, C., & Ziliak, J. (2015). Food insecurity and health outcomes. *Health Affairs, 34*(11). https://doi.org/10.1377/hlthaff.2015.0645

Johnson, C., Ammerman, A., Adair, L., Aiello, A., Flax, V., Elliott, S., Hardison-Moody, A., & Bowen, S. (2020). The four domain food insecurity scale: development and evaluation of a complementary food insecurity measure. *Translational Behavioral Medicine, 10*(6), 1255-1265. https://doi.org/10.1093/tbm/ibaa125

Rabbitt, M.P., Hales, L.J., Burke, M.P., & Coleman-Jensen, A. (2023). *Household food security in the United States in 2022* (Report No. ERR-325). U.S. Department of Agriculture, Economic Research Service. https://doi.org/10.32747/2023.8134351.ers

Schroeder, E., Chan, Z., Sterrett, A., Kimpo, T., & Paolino, A. (2019). The longitudinal relationship between food insecurity in older adults with diabetes and emergency department visits, and hospitalizations. *Journal of Diabetes and its Complications, 33*(4), 289-295. https://doi.org/10.1016/j.jdiacomp.2018.11.011

Seligman, H. K., Bindman, A. B., Vittinghoff, E., Kanaya, A. M., & Kushel, M. B. (2007). Food insecurity is associated with diabetes mellitus: results from the National Health Examination and Nutrition Examination Survey (NHANES) 1999–2002. *Journal of General Internal Medicine*, *22*, 1018-1023.

Seligman, H. K., Laraia, B. A., & Kushel, M. B. (2010). Food insecurity is associated with chronic disease among low-income NHANES participants. *The Journal of Nutrition, 140*(2), 304-310. https://doi.org/10.3945/jn.110.135764

South, A., Palakshappa, D., & Brown, C. (2019). Relationship between food insecurity and high blood pressure in a national sample of children and adolescents. *Pediatric Nephrology, 34*, 1583-1590. https://doi.org/10.1007/s00467-019-04253-3

United States Department of Agriculture (2012). *U.S. adult food security survey module: Three-stage design, with screeners*. https://www.ers.usda.gov/media/8279/ad2012.pdf

United States Department of Agriculture (2023). *Early History.* https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/history-background/#scale