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## Determination of food insecurity and negative health indicators in Ohio, USA

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### Abstract

The relationship between food in security (FI) and health is often bidirectional. A cross-sectional FI study was conducted to examine negative health indicators and FI in Ohio, USA. This study involved screening of; 514 subjects over 18 years of age, all Ohio resident slivingin Allen, Hancock or Seneca Counties. The study was assessed indifferent parameters such as age, sex, race, financial status, family structure, food expenditure and health of the participants. The statistical Package for Social Sciences tool was used for data analysis of the total population with Food Insecurity Score (FIS), the highest participants were found in group five (20.23%), while lowest was in FIS group one and two (1.95%). Distribution of participants based on FI score was similar in both genders. There was no significant difference between the two groups that were observed. Also, no significant difference between health groups were observed. The highest population with self-reported diabetes belonged to FIS group five (10.48%) followed by FIS group eight (8.52%).The highest population with self-reported hyper tension belonged to FIS group five (14.41%) followed by FIS group six (13.3%). Finally, the highest population with self-reported heart trouble belonged to FIS group five (8.95 %) followed by FIS group ten (8.06%). We were not able to establish a causal relationship between FI and poor health in the study, though individuals experiencing F reported lower levels of self-efficacy for disease management. These findings demonstrated the need to continue efforts to prevent FIreported lower levels and to ensure that efforts that all are adequately fed become a priority to improve the health of this region and nation.

**Keywords:** Food In security, Negative Health Indicators, Ohio, Hypertension, Diabetes

### 1. Introduction

Insufficient resources for food leads to individual developing poor dietary habits and choosing less expensive, more filling, less healthy food options. Adverse health consequences as discussed below of in adequate access to food are the napparent through out the life span <sup>[1, 2]</sup>. Analyses of data from the National Health Examination and Nutrition Examination Survey revealed that FI was associated with hypertension, hyperlipidemia, and diabetes <sup>[3, 4]</sup>. FI was an independent risk factor for poor glycemc control in diabetes and nearly halfofdiabeticsin safety-net clinics were food insecure <sup>[5]</sup>. Since this risk may be partially attributable to increase difficulty following a diabetes-appropriate diet and increased emotional distress regarding capacity for successful diabetes self-management. Feeding America, the nation's largest hunger relief agency, found that over two-thirds of their clients had to choose between paying for food or medical care with in year 2013 <sup>[6]</sup> Food Insecurity (FI) is defined as the disruption of food in-take or eating patterns because of lack of money and other resources <sup>[7]</sup>. According to survey instrument conducted by Carlson study that measured the severity of food insecurity and hunger in United States, FI does not necessarily cause hunger, but hunger is a possible out-come of FI <sup>[8]</sup>. FI may belong term or temporary <sup>[9]</sup>. It is important to note since having physical and economic access to sufficient, safe and nutritious food meets dietary needs for an active and healthy life. It can be influenced by a number of factor including in come, employment, race, ethnicity and disability. The risk for FI increases when money to buy food is limited or not available <sup>[10]</sup>. The relationship between FI and health is often bidirectional, poor health is both an out-come and, <sup>[11]</sup> a predictor of FI <sup>[12]</sup>. For example, study conducted by Seligman *et al.* <sup>[3]</sup>, considered food insecurity is more likely to increase person's odds of developing diabetes than hypertension.

FI can contribute to poor health and being so can make gaining employment or staying employed more difficult, further reducing food security [13]. Indeed, one study by Warner *et al.* [14] showed that one-third of chronically ill adults can-not afford both food and medicine. Thus, creating the circumstances that necessitate “trade-offs” in deciding whether to purchase food or their medicine. Individuals that experience chronic FI have higher prevalence of diabetes, increased inflammation, and cardiovascular disease. They also have higher odds of being obese. In part, because of lower and in adequate nutrient in takes, food insecure older adults and seniors, especially those with poor health, can experienced declines in health [14]. Because as age progresses old people are more prone to poor health conditions.

Despite what appears to be an obvious relationship among FI, poor health outcomes, and health care costs, no obvious relationships were found. Nevertheless, FI is associated with preventable, chronic conditions that are covered under Medicaid and Medicare. These chronic conditions have been shown to be increasing over the past two decades because of FI [15]. According to Seligman *et al.*, FI is associated with avoidable healthcare costs, including greater risks of hospitalization [16]. Current and prospective Scope of Hunger and Food Security in America Study found food in secure adults with diabetes have five more physician encounters per year than food-secure adults with diabetes [16]. Hence, this study was conducted to examine negative health indicators of FI in Ohio, in a high-income country like America. The study involved screening of FI, documenting the prevalence of FI and health status in the study population. This study could ascertain further research requirements, opportunities and initiatives to update policy and program reactions in the country.

**2. Material and methods**

**2.1. Methods**

This cross-sectional FI screening study was conducted and sponsored by West Ohio Food bank, Ohio, US A from 9<sup>th</sup> August, 2019 to 30<sup>th</sup> September, 2019 in North west Ohio for Allen, Hancock & Seneca counties. The University of Findlay Institutional Review Board (IRB) completed its review of the project utilizing human subjects, granted authorization and had been approved for Exempt Status.

This research was both qualitative and quantitative, research design was non- experimental and data generated was of primary type. Outcomes of responses to appropriate resources were documented to ascertain conditions moving towards food security and leading productive life.

**2.2. Studypopulation**

Study involved screening of 514 subjects over 18 years of age, Residents of Ohio living in Allen, Hancock or Seneca Counties, identified a to below 200% poverty levels using federal guidelines, and from all ethnic groups. The perceived level of risk was less than minimal to the subjects and anonymity of subjects was maintained. The survey questions determined impact of FI and social determinants of health. The participants who were willing to answer the questions were interviewed in person and were included in the study. Consent form details were provided to subjects and no compensation in form of monetary basis was given to subjects.

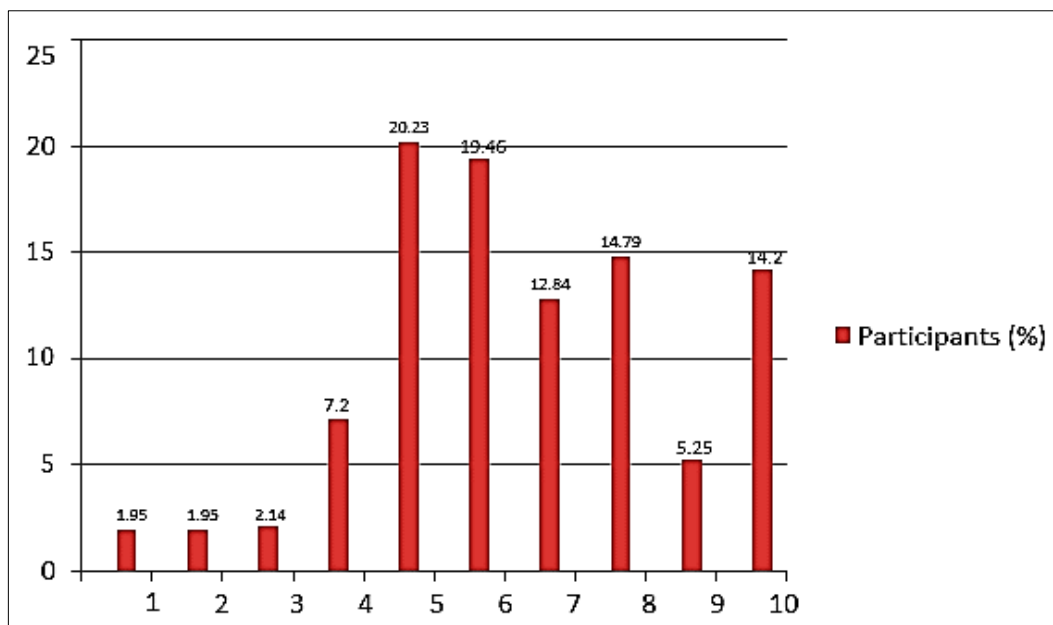
**2.3. Survey instrument and survey administration**

A questionnaire was prepared including general information, health issues and food insecurity of participants. The questionnaire was created in order to answer the research question. The reliability and validity of the questionnaire was verified by performing a pilot test on 10 participants. The questionnaire was validated and then administered to the subjects. All paper questionnaires will be shredded after three years, at West Ohio Food Bank following the organizations destruction policy. Data was stored as soft copy in the office of the Master of Business Administration Assistant Dean for the period prescribed by law.

**2.4. Statistical analysis**

The study was conducted to examine negative health indicators of FI in Ohio population. Responses were analyzed in different parameters such as age, sex, race, financial status, family structure, food expenditure, Health and FI of the participants using the Statistical Package for Social Sciences tool Probability and correlation was used to understand the statistical information and data.

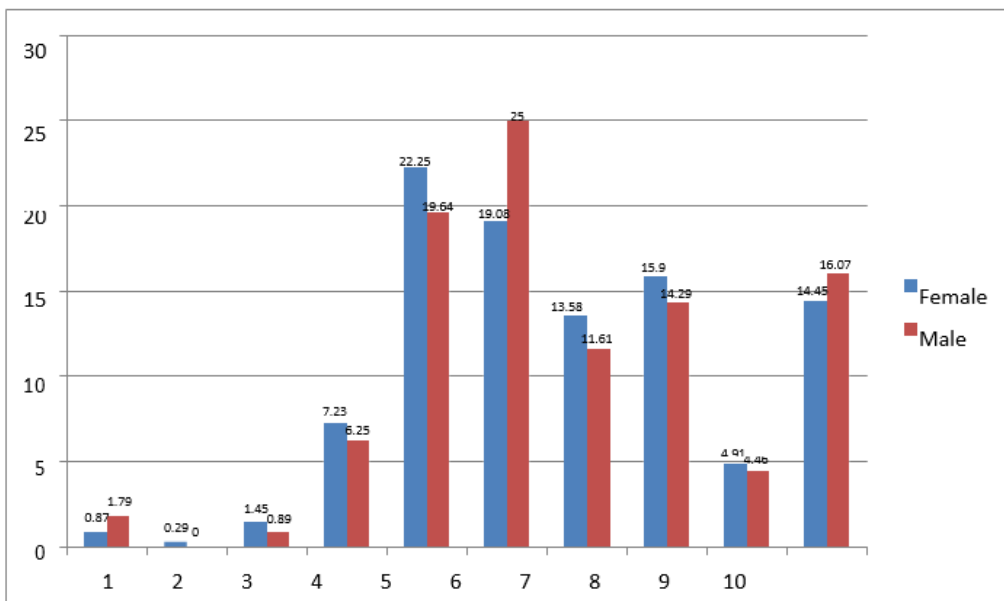
**3. Results**



**Graph 1:** Distribution of participants as per the Food Insecurity score (FIS) n=514  
~ 199 ~

The above graph represents the percentage of FIS on the scale of 1-10 with 10 being the highest need for food security self-reported by the participants. The highest

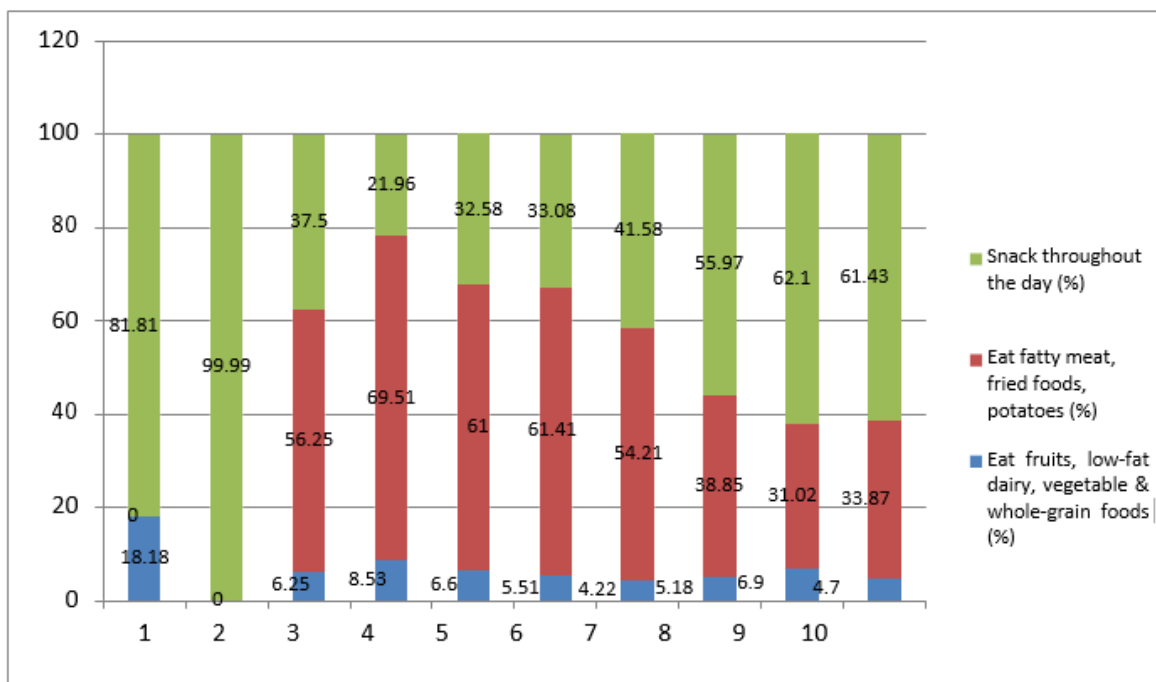
participants were found in FIS group 5(20.23%), followed by in FIS group 6(19.46%), while lowest was in FIS group 1 and 2 (1.95%)



**Graph 2:** Gender wise distribution of participants based on the FIS n=514

Distribution of participants based on FIS was similar in both the genders. Highest male population was found in FIS group 6(25%) and highest female population was found in

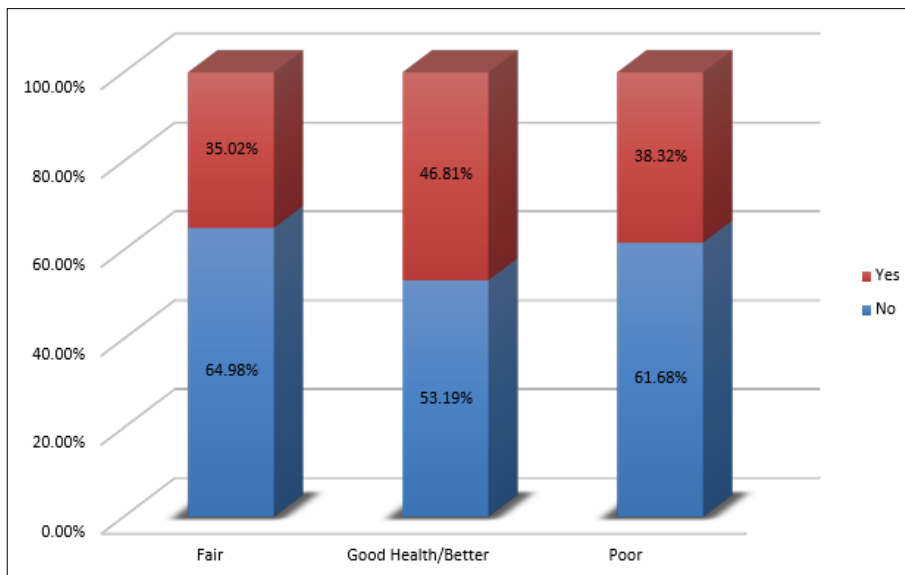
FIS group 5(22.25%). Lowest male population was found in FIS group 2(0%) and lowest female population was found in FIS group 2(0.29%).



**Graph 3:** Distribution of dietary habits of the participants with respect to FIS n=514

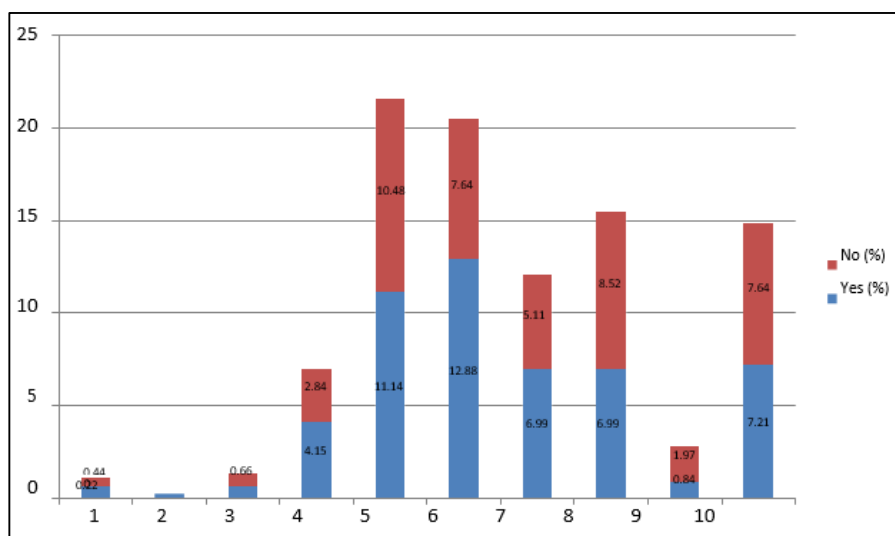
The consumption of fatty meat, fried food and potatoes was least in the FIS group 1 and 2(0.00%), while it was highest in FIS group 4(69.51%). Consumption of fruits, low-fat dairy, vegetable and whole-grain foods was highest in FIS group 1(18.18%), followed by in group 4(8.53%). While it was

least in FIS group 2(0.0%). Snacks through the day consumption, was highest in FIS group 2(100%), followed by In FIS group 1(81.81%), while it was least in the FIS group 4(21.96%).



**Graph 4:** Distribution of participants according to health groups that engaged in exercise n=514

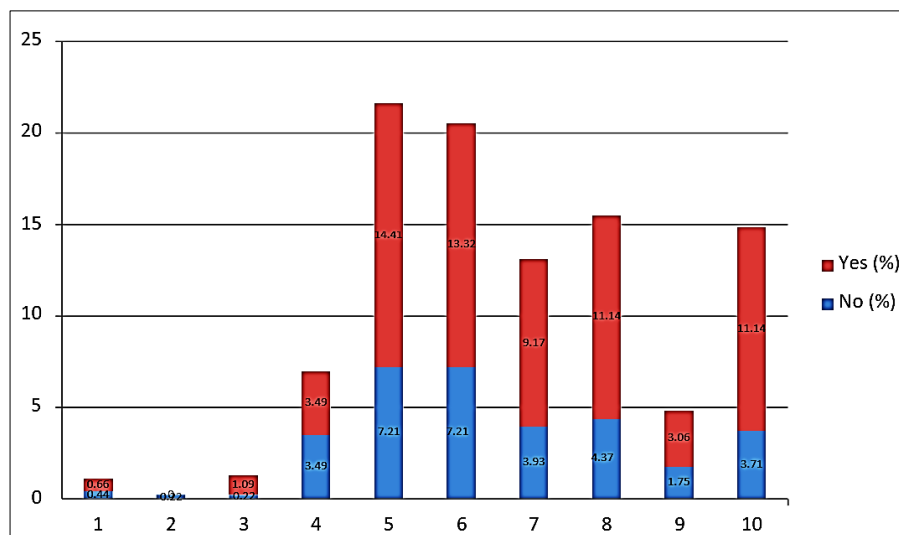
No significant difference between three health groups namely fair, good health/better and poor was observed. ( $p < .001$ )



**Graph 5:** Distribution of diabetic participants based on the FIS n=514

10.48% of the population with self-reported diabetes belonged to FIS group 5 followed by FIS group 8 which had

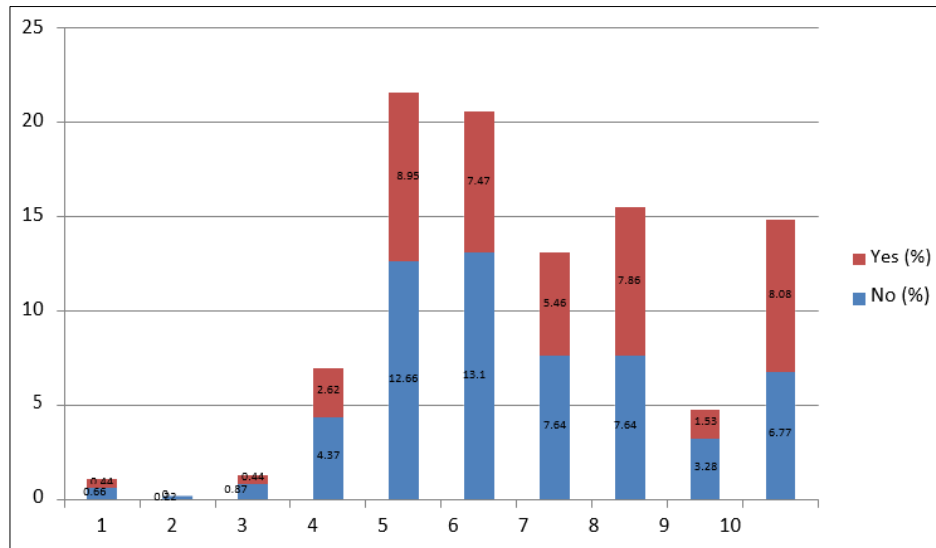
8.52% of diabetic population, followed by FIS group 6 and 10 with 7.64% population.



**Graph 6:** Distribution of Hypertensive participants based on the FIS n=514

14.41% of the population with self-reported hypertension belonged to FIS group 5 followed by FIS group 6 which had

13.3% of hypertensive population, followed by FIS group 8 and 10 with 11.14% population.



**Graph 7:** Distribution of participants having heart ailment based on FIS.

8.95% of the population with self-reported heart trouble belonged to FIS group 5, followed by FIS group 10 which had 8.06% of heart trouble population, followed by FIS group 8 (7.86%) and 6 (7.47%).

#### 4. Discussion

In 2017, an estimated 1 in 8 Americans was food insecure. This equated to 40 million Americans including more than 12 million children. The U.S. Department of Agriculture (USDA) defines FI as a lack of consistent access to enough food for an active, healthy life [7]. FI can have profound consequences on health in adults. FI is linked to poor health status, including poor overall health, obesity and weight gain, and chronic diseases such as diabetes, cardiovascular diseases and mental health challenges.

In present study, we had tried to understand the association of negative health indicators and FI in 514 Ohio residents living in Allen, Hancock, or Seneca counties. Out of this group, 388 were females and 126 were males. Of the total population, we observed the highest number of participants with food insecurity in FIS group 5 (20.23%), followed by in FIS group 6 (19.46%) and lowest in FIS group 2 (1.95%). Distribution of participants based on FIS was similar in both groups in regard to gender. There was no significant difference between the two groups observed in the study ( $p < .001$ ). The consumption of fatty meat, fried food and potatoes was least in FIS groups 1 and 2 (0.00%), while it was highest in FIS group 4 (69.51%). Consumption of fruits, low-fat dairy, vegetable & whole-grain foods was highest in FIS group 1 (18.18%), followed by group 4 (8.53%), and least in FIS group 2 (0.0%). Snacks through the day consumption was highest in FIS group 2 (100%), followed by in FIS group 1 (81.81%), while it was least in the FIS group 4 (21.96%).

In the present study, a random representative population sample of adults of the Ohio region of America, FI was associated with poorer self-rated general health status and lower scores on physical health scales. The same observations were made in another study by Tarasuk and Valerie [18]. Two previous reports by Pheley Alfred M *et al.* [19] and Vozoris & Tarasuk *et al.* [20] showed associations

with lower self-reported health status [19, 20]. Self-reported health status was observed in smaller, convenient, non-representative samples. In the first report, Pheley Alfred M *et al.* [19] found that food-insecure women had long-standing health problems and activity limitations [19]. In the second report, Vozoris and Tarasuk group found that food-insecure respondents had poorer functional status such as physical, mental and social health compared to those that responded as food-secure respondents [20]. Although another report by Ellingrod *et al.* demonstrated an association between food insufficiency and health [21].

In the present study, the effect of FI on physical scores was notable. 10.48% of the population with self-reported diabetes belonged to FIS group 5 followed by FIS group 8 which had 8.52% of diabetic population, followed by FIS group 6 and 10 with 7.64% population. Our findings indicate that FI is independently associated with significantly increased diabetes risk. Similar observations were made by other authors Nelson K *et al.* [22]. Understanding the relationship between FI and type 2 diabetes, future work should aim to further assess the role that obesity and chronic stress have in potentially mediating association. Further, FIS may have a significant impact on cardiovascular health during childhood.

Also, by examining diabetes risk from a broader perspective, including a comprehensive understanding of socioeconomic and biological pathways is vital would all be additional research opportunities.

In the present study, 14.41% of the population with self-reported hypertension belonged to FIS group 5 followed by FIS group 6 which had 13.3% of hypertensive population, followed by FIS group 8 and 10 with 11.14% population. Although these effect sizes were considered "small," they were nonetheless clinically meaningful. The food insecurity score results were consistent with health status reported by individuals experiencing myocardial infarction, hypertension and diabetes. Similar observations were made in other studies too, reported by Tarasuk and Valerie [18]. In one study by Campbell [23] shows that household and child FIS were associated with an increased likelihood of high blood pressure in a large nationally representative cohort of

children and adolescents<sup>[23]</sup>. Another study Dwyer, Johanna T., and John T. Cook<sup>[24]</sup> documented the association of FIS and high blood pressure and Cardiovascular Disease Risk Factors among Mississippi Adults. Hence, further research is needed to ascertain the association of FIS with high blood pressure and cardiovascular disease.

Our findings were also confirmed by earlier studies<sup>[23]</sup> where food sufficiency status and general health status were measured. Siefert et al<sup>[25]</sup> analyzed the relationship between physical and mental health and food insufficiency<sup>[25]</sup>. Food insufficiency was significantly associated with poor or fair self-reported health and physical and mental health consequences. In the sub sample from the Women's Health and Aging Study, Klesges et al<sup>[26]</sup> evaluated the relationship between food insufficiency and three classes of health status, measured by the Patrick scale<sup>[27]</sup>. The scale consists of 20 items that assess 3 dimensions of life quality: cognitive, physical and social. Symptoms of depression are assessed with Geriatric Depression scale. The Hopkins symptom checklist subscale for anxiety categorizes this construct as high (2 or more symptoms), moderate (1 symptom), or low (0 symptom). Women reporting difficulty getting food were more depressed and had a poorer quality of life and physical performance. In a comprehensive health survey of 80,000 Canadians, measures of food insufficiency were significantly associated with a range of health conditions: poor health, poor functional health, restricted activity and health conditions, major depression, and poor social support<sup>28</sup>. Importantly, measures of food insufficiency in these studies estimated only the quantity dimension of FI. Food Security Scale, as used in our study, also assessed the quality and uncertainty components of FI and therefore offered more precision for examining these relationships to health and related outcomes as observed in the study by Tarasuk V. S. *et al.*<sup>[18]</sup>.

In the present study for all outcome measures, the food-secure individuals scored better than those who were deemed insecure. Furthermore, within the food-insecure group, poor physical scores and general health were reported to be higher in the blacks than in the Caucasians. Similar observations were made in some studies<sup>[18, 19]</sup>. Several explanations may account for the different effects of food security status on health by race. First, some research by Briefel et al.<sup>[29]</sup> and Groce *et al.*<sup>[30]</sup> suggests that minority and rural populations may view chronic illness as a condition to be accepted rather than as amenable to intervention<sup>[29, 30]</sup>. Previous studies have found systematic differences in the way members of varying racial or ethnic groups respond to questionnaires and scales. In the present study, African Americans may have had health-enhancing resources, social support, and religious involvement that improved their outcome, which was observed in other studies too<sup>[31]</sup>. Finally, in the study reported by Siefert *et al.*<sup>[25]</sup> on the effect of food insufficiency and on physical and mental health in low-income women, African-American women were found less likely to report poor physical health than Caucasian women. Similar observations were made in some studies too<sup>[18]</sup>. Further research is needed to ascertain whether the sex difference persists in other studies in other regions.

As explained by Dwyer and Cook<sup>[24]</sup> the future direction for FI research must go beyond monitoring to link it with biological or medical and related outcomes including physical and mental health status. While we are not able to

establish a causal relationship between FI and poor health, similar to other authors<sup>[32]</sup> there are a number of plausible biological mechanisms where by FI and poor nutrition lead to poor health. Malnutrition exacerbates disease, increases disability, decreases resistance to infection, and extends hospital stays. Other reports Anderson suggest that stress and anxiety, which may accompany FI induce high blood pressure and produce hormonal imbalances, and these together, with additional factors, can stimulate weight gain, obesity, and insulin insensitivity<sup>[33]</sup>. The explicit reverse causation hypothesis is that poor health especially those with a disability, increases FI. However, the association between FI and poor health argues, against the reverse causal path. Of course, poor health can also increase household expenses, so the reverse causation cannot be entirely ruled out.

In low-income and rural areas, a number of additional obstacles to health care and healthcare access could also contribute to poor health status. Rural Americans face a unique combination of factors that create disparities in healthcare not found in urban areas: economic factors, cultural and social differences, and educational shortcomings. About half as many physicians are in rural areas as urban areas to serve a given population base. Rural residents are also less likely to have employer-provided health care coverage or prescription drug coverage. Collectively, these and other economic factors such as income, employment and education attainment contribute to poorer health status<sup>[33]</sup>.

This study was limited by several factors. First, both predictor and outcome variables were based on self-reported conditions. Second, the cross-sectional design makes it impossible to establish causality.

## 5. Conclusion

An association between FI and adults' poor health may have adverse effects to overall health of individuals. In this representative sample of adults of Northwest Ohio, with respect to association so far, gender, ethnic group, and income category, FI was associated with lower self-reported general health status. Individuals experiencing FI report lower levels of self-efficacy for disease management. Housing insecurity and FI jointly reduces individuals' confidence, in their ability to manage their diseases. These findings demonstrated the need to continue efforts to prevent FI and to ensure that efforts that all are adequately fed become a priority to improve the health of this region and nation.

## 6. Recommendations

Food Insecurity is an important social determinant of health along with affordable housing, social isolation, education level, unemployment or underemployment. These are the conditions in the environments in which people are born, live, learn, work, play, worship and age that affect a wide range of health, functioning and quality-of-life outcomes and risks. Hunger plus health explores the impact of FI as a social determinant of health and its effect on individual and population health outcomes. Also, FI might not always lead to poor health. In some cases, people might have good food but not good medication or no proper medication and can lead to food insecurity. For this, further studies have to conduct to understand this aspect. Hence all the factors and

determinants to be considered and improved upon while considering the negative health indicators with FI.

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### 8. References

- Drewnowski A. The Nutrient Rich Foods Index helps to identify healthy, affordable foods. *The American journal of clinical nutrition*. 2010; 91(4):1095S-1101S.
- Rao M, Afshin A, Singh G, Mozaffarian D. Do healthier foods and diet patterns cost more than less healthy options? A systematic review and meta-analysis. *BMJ*. 2013; 3(12):e004277.
- Seligman HK, Laraia BA, Kushel MB. Food insecurity is associated with chronic disease among low-income NHANES participants. *The Journal of nutrition*. 2009; 140(2):304-310.
- Seligman HK, Bindman AB, Vittinghoff E, Kanaya, AM, Kushel MB. 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*. 2007; 22(7):1018-1023.
- Seligman HK, Jacobs EA, Lopez ANDREA, Tschann J, Fernandez A. Food insecurity and glycemic control among low-income patients with type 2 diabetes. *Diabetes care*. 2012; 35(2):233-238.
- America F. Hunger in America 2014. Retrieved from <http://help.feedingamerica.org/HungerInAmerica/hunger-in-america-2014-full-report.pdf>, 24 Nov, 2016.
- Coleman-Jensen A, Gregory C, Singh A. House hold food security in the United States in 2013. *USDA-ERS Economic Research Report*, 2014, 173.
- Carlson SJ, Andrews MS, Bickel GW. Measuring food insecurity and hunger in the United States: development of a national benchmark measure and prevalence estimates. *The Journal of nutrition*. 1999; 129(2):510S-516S.
- Jones AD, Ngure FM, Pelto G, Young SL. What are we assessing when we measure food security? A compendium and review of current metrics. *Advances in Nutrition*. 2013; 4(5):481-505.
- Nord M. Characteristics of low-income households with very low food security: An analysis of the USDA-PRA food security indicator. *USDA-ERS Economic Information Bulletin*, 2007, 25.
- Klesges LM, Pahor M, Shorr RI, Wan JY, Williamson, D, Guralnik JM. Financial difficulty in acquiring food among elderly disabled women: Results from the Women's Health and Aging Study. *American Journal of Public Health*. 2001; 91(1):68.
- Hager ER, Quigg AM, Black MM, Coleman SM, Heeren T, Rose-Jacobs R. Development and validity of a 2-item screen to identify families at risk for food insecurity. *Pediatrics*. 2010; 126(1):e26-e32.
- Bruening M, Argo K, Payne-Sturges D, Laska MN. The struggle is real: A systematic review of food insecurity on postsecondary education campuses. *Journal of the Academy of Nutrition and Dietetics*. 2017; 117(11):1767-1791.
- O'Connell ME, Boat T, Warner KE. Preventing mental, emotional, and behavioral disorders among young people: Progress and possibilities, Washington, DC: National Academies Press, 2009, 7.
- Martin MS, Maddocks E, Chen Y, Gilman SE, Colman I. Food insecurity and mental illness: Disproportionate impacts in the context of perceived stress and social isolation. *Public Health*. 2016; 132:86-91.
- Seligman HK, Schillinger D. Hunger and socioeconomic disparities un-chronic disease. *N Engl J Med*. 2010; 363(1):6-9.
- Stuff JE, Casey PH, Szeto KL, Gossett JM, Robbins JM, Simpson PM. Household food insecurity is associated with adult health status. *The Journal of nutrition*. 2004; 134(9):2330-2335.
- Tarasuk VS. Household food insecurity with hunger is associated with women's food intake, health and household circumstances. *The Journal of nutrition*. 2001; 131(10):2670-2676.
- Pheley AM, Holben DH, Graham AS, Simpson C. Food security and perceptions of health status: A preliminary study in rural Appalachia. *The Journal of Rural Health*. 2002; 18(3):447-453.
- Vozoris NT, Tarasuk VS. Household food insecurity is associated with poorer health. *The Journal of nutrition*. 2003; 133(1):120-126.
- Ellingrod VL, Schultz SK, Ekstam-Smith K, Kutscher E, Turvey C, Arndt S. Comparison of risperidone with olanzapine in elderly patients with dementia and psychosis. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*. 2002; 22(1):1-5.
- Nelson K, Cunningham W, Andersen R, Harrison G, Gelberg L. Is food insufficiency associated with health status and health care utilization among adults with diabetes? *Journal of General Internal Medicine*. 2001; 16(6):404-411.
- Campbell CC. Food insecurity: A nutritional outcome or a predictor variable? *The Journal of nutrition*. 1991; 121(3):408-415.
- Dwyer JT, Cook JT. Nutrition and Health Perspectives on Establishing a Food Security Research Agenda: What Can We Learn from the Past to Establish a Framework for the Future? In *Second Food Security Measurement and Research Conference*. United States Department of Agriculture, Economic Research Service. 2001; 2:11-2.
- Siefert K, Heflin CM, Corcoran ME, Williams DR. Food insufficiency and the physical and mental health of low-income women. *Women & Health*. 2001; 32(1-2):159-177.
- Klesges LM, Pahor M, Shorr RI, Wan JY, Williamson JD, Guralnik JM. Financial difficulty in acquiring food among elderly disabled women: Results from the Women's Health and Aging Study. *American Journal of Public Health*. 2001; 91(1):68.

27. Patrick DL, Danis M, Souther LI, Hong G. Quality of life following intensive care. *Journal of general internal medicine*. 1988; 3(3):218-223.
28. Vozoris NT, Tarasuk VS. Household food insufficiency is associated with poorer health. *The Journal of nutrition*. 2003; 133(1):120-126.
29. Briefel RR, Woteki CE. Development of food sufficiency questions for the Third National Health and Nutrition Examination Survey. *Journal of Nutrition Education*. 1992; 24(1):24S-28S.
30. Groce NE, Zola IK. Multiculturalism, chronic illness, and disability. *Pediatrics-spring field*. 1993; 91:1048-1055.
31. Warnecke RB, Johnson TP, Chavez N, Sudman S, O'rourke DP, Lacey L. Improving question wording in surveys of culturally diverse populations. *Annals of epidemiology*. 1997; 7(5):334-342.
32. Williams DR, Yu Y, Jackson JS, Anderson NB. Racial differences in physical and mental health: Socio-economic status, stress and is crimination. *Journal of health psychology*. 1997; 2(3):335-351.
33. Anderson SA. Core indicators of nutritional state for difficult-to-sample populations. *The Journal of nutrition (USA)*. 1990; 120(11):1559-600.
34. Radimer KL, Olson CM, Greene JC, Campbell CC, Habicht JP. Understanding hunger and developing indicators to assess it in women and children. *Journal of Nutrition Education*. 1992; 24(1):36S-44S.35.
35. Nelson K, Cunningham W, Andersen R, Harrison G, Gelberg L. Isfood in sufficiency associated with health status and health care utilization among adults with diabetes? *Journal of General Internal Medicine*. 2001; 16(6):404-411.
36. Andrews MS, Prell MA. Second foods ecurity measurement and research conference: Proceedings. *Food Assistance and Nutrition Research Report*, 2001; 1:11-2.
37. Alisha CJ, Rabbitt MP, Gregory CA, Singh A. Household Food Security in the United States in 2016 (No. 291968). United States Department of Agriculture, Economic Research Service, 2017.