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Occurrence of food insecurity in Ohio, USA household woman population

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Abstract
The present survey was conducted to examine Food Insecurity (FI) in women in Ohio, America. The study involved screening of: 388 women over 18 years of age, living in Allen, Hancock or Seneca Counties in Northwest Ohio. This study assessed different parameters such as race, financial status, education, family structure, food expenditure and overall health of women. Statistical tools were used for data analysis. The majority of females reported fair health status (53.30%) and at least had good health status (22.01%). The majority of females were in Food Insecurity Score (FIS) group 5(22.42%) and the least were in FIS groups 1 and 2 (0.77%). Majority of females were of Caucasian origin in this study. Also, the majority of the females found in FIS group 2 (100%), had completed some college education, while the least was found in group 1 (0.0%). Also, a large number of females were found to have diabetes. For example, in FIS group 5 (7.47%), while least amount was found in FIS group 1 and 2(0.51%). Large number of hypertension found in FIS group 5 (13.92%), least was in FIS group 2 (0.26%). Finally, the highest number of heart trouble found in FIS group 5(7.47%), while the lowest number was in FIS group 2 (0.26%). Because of increasing number of females headed households worldwide and their disproportionately poor economic status, women need special consideration in discussions of FI and its effect on health, nutrition, and behavior. Still, gaps remain in understanding associations of FI and these issues in women.

Keywords: Women, Ohio, food insecurity

1. Introduction

Food insecurity (FI) is a limited or uncertain availability of nutritionally adequate and safe foods. It could also be a limited or uncertain ability to acquire needed foods in socially acceptable ways. It is independent of its association with poverty and low income. FI has important implications for the health and nutrition of individuals [1]. According to Barrett, "FI is a multidimensional concept that encompasses aspects of availability, access, and utilization. It is often thought foremost in reference to its effect on the nutrition of individuals; however, its effect on other health and behavior outcomes is increasingly being recognized [2]. FI can be understood and addressed as its own entity but it should also be recognized as an important associate of health and nutrition outcomes [3, 4].

Discussion of issues specific to women is critical in discussions of FI. Women produce up to 80% of the food in developing countries. Despite the fact that they contribute to one-half of the world's food production, they have more difficulty than men in accessing resources such as land, credit, and agricultural inputs and services2. Women's traditional role in society as caregivers and preparers of food for the family, as well as an increasing recognition of their role as heads of households, further support the consideration of women as a special group to evaluate the effect, consequences, and areas for intervention in terms of FI [5]. The highest prevalence of FI is seen in households headed by single mothers (35.3%) as per the report by Coleman-Jensen and colleagues report in 2015. Women are overrepresented among low-income groups compared to men, with visible minority women and single mothers experiencing high rates of poverty in United States [6].

Given women's contribution to food production and preparation, role in society and disproportionately poor economic status, women need special consideration in discussions of FI and its effect on health, nutrition, and behavior.

Gaps remain in understanding the direction of associations and causality of FI and its associations in women with obesity, anxiety, and depressive symptoms. FI has also been shown to be a marker of poor health, with studies identifying associations with many health disorders, particularly among women [7].

According to Ivers, Women as primary caretakers of children, responsible for the maintenance of the household and for food preparation and with less purchasing power than men, women are particularly vulnerable to resorting to risky coping strategies, especially when they have low education and few economic opportunities. In this case women can engage in coping strategies that result in the female caretaker becoming HIV infected. The food security of the entire household is negatively affected because food production and the ability to prepare food decreases with illness [8]. Hence, the study was carried out to examine FI in women in Northwest Ohio, America. It can classify potential research wants and report policy and program reactions for women with respect to FI.

2. Material and Methods

2.1 Methods

This cross-sectional FI screening study was conducted and sponsored by West Ohio Food bank in Ohio, USA from 9 August 2019 to 30 September 2019 in Ohio at 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. Study population

Study involved the screening of 514 subjects over 18 years of age, Ohio residents living in Allen, Hancock, or Seneca counties at or below 200% poverty levels using federal guidelines. Participants were from all ethnic groups. Out of these total 514 participants, 388 were female participants. The perceived level of risk was less than minimal to the subjects and anonymity of subjects was maintained. The questionnaire completed by the participants 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.

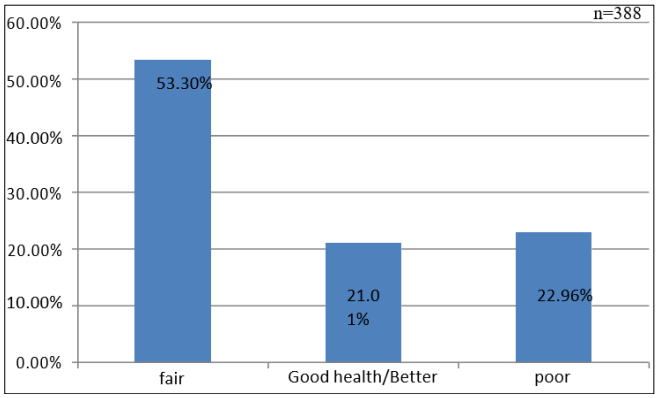
2.3. Survey instrument and survey administration

The questionnaire was prepared to include general information, such as health issues and food insecurity of participants. The questionnaire was created in order to answer the research question, reliability and the validity of the questionnaire was checked by performing a pilot test on 10 participants. The questionnaire was validated and then administered to the participants. All paper questionnaires will be shredded after three years from the time of study, 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

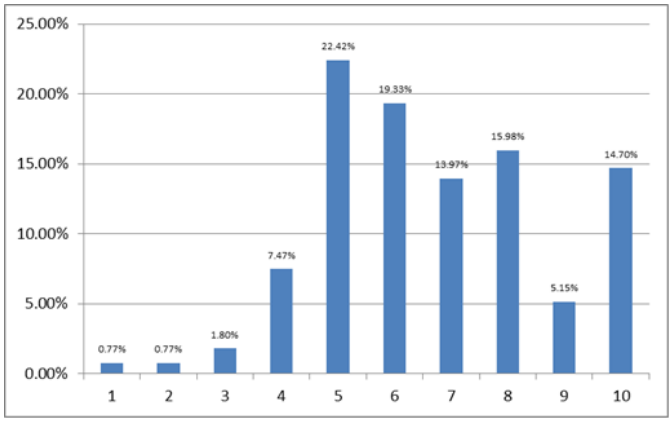
This study was assessed and analyzed in different parameters such as age, sex, race, financial status, family structure, food expenditure Health and FI of the participants using Statistical Package for Social Sciences tool were also utilized. Probability was used to understand the statistical information and data.

3. Results



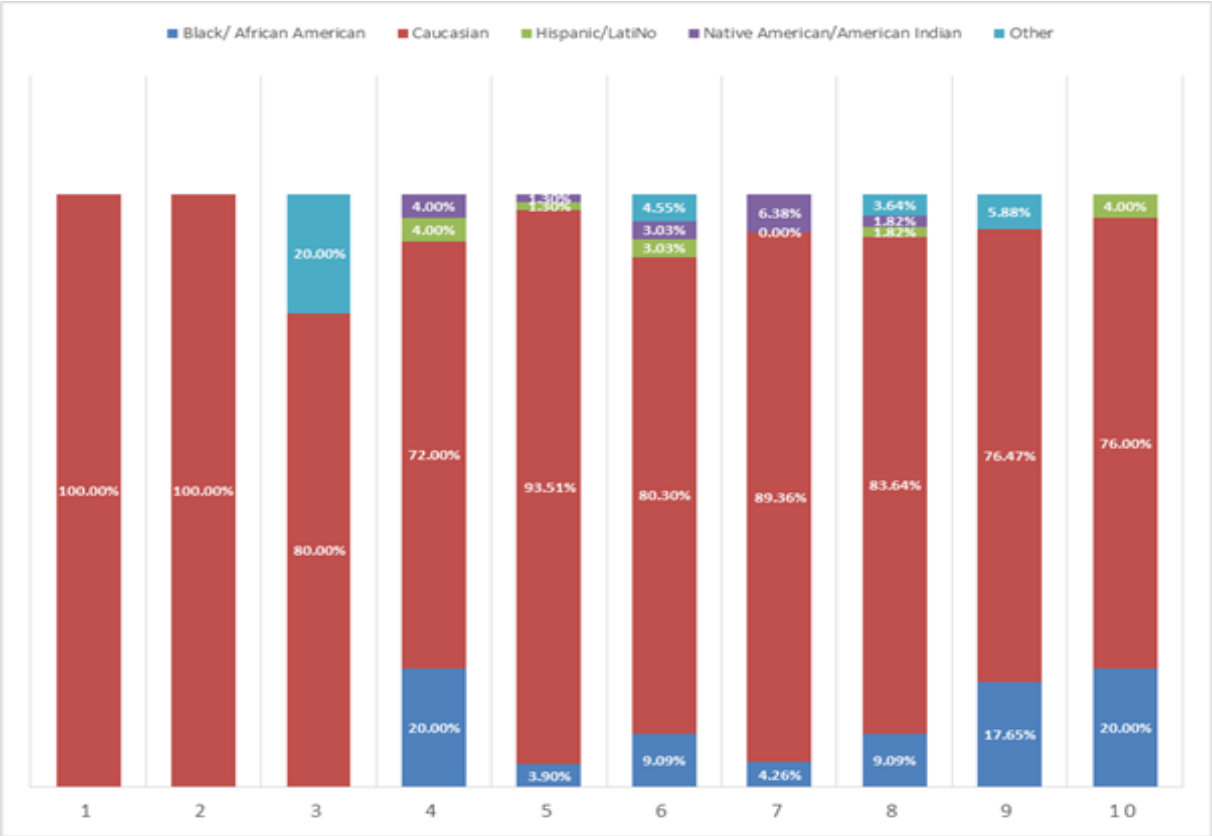
Graph 1: Health status of female population in the study

Majority of the female population surveyed reported themselves in fair health status (53.30%), poor health (22.96%) and least had Good health (22.01%). No significant difference between poor health and good health population was observed (p<.001).



Graph 2: Distribution of female population according to Food Insecurity Score (FIS) n=388

Majority of the female population were in the FIS group 5(22.42%), followed by FIS group 6 (19.33%) and 8 (15.98%). While least were in FIS group 1 (0.77%) and 2 (0.77%).

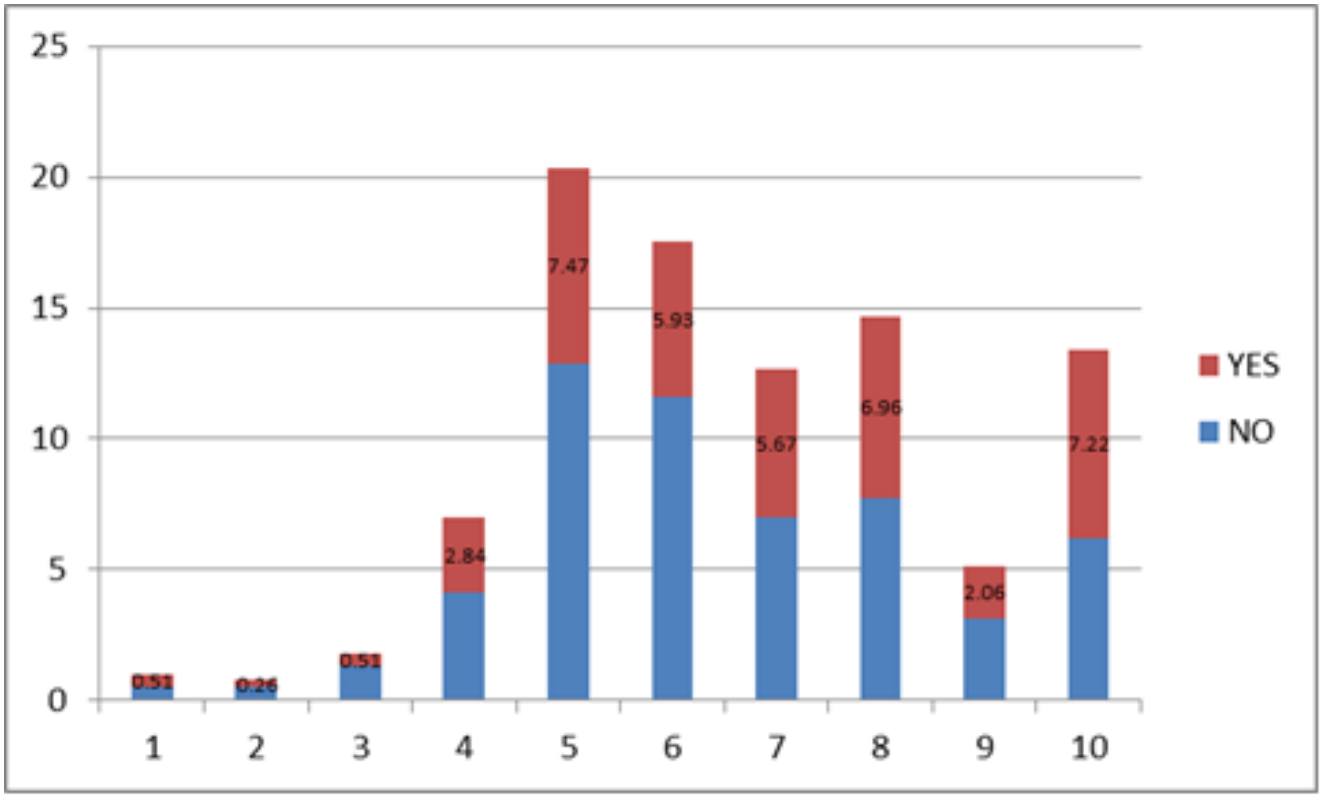


Graph 3: Distribution of female population according to FIS and Ethnicity n=388

Majority of the female population (100%) in the FIS group 1 and 2 are of Caucasian origin. While in others FIS groups Caucasian origin female population predominated.

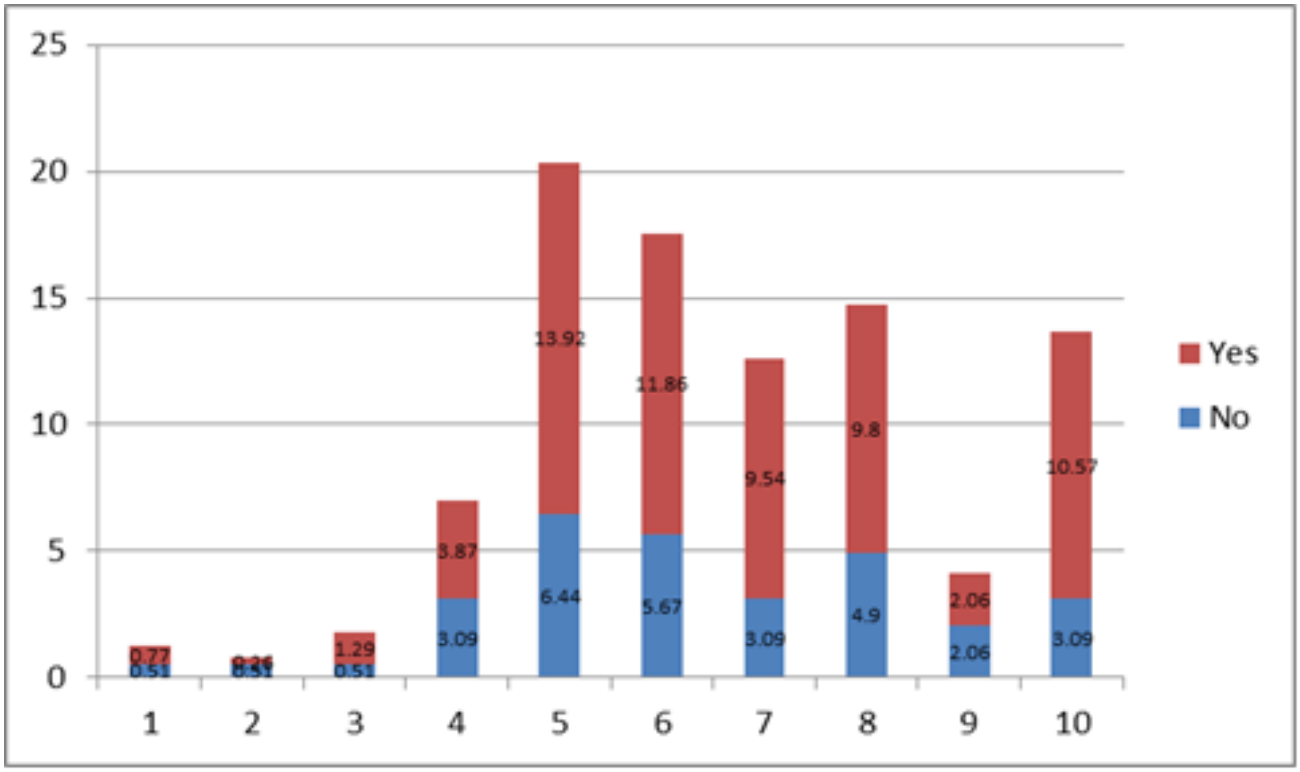
Graph 4: Distribution of female population according to FIS and Education n=388

Majority of the female population in the FIS group 2 (100%) had completed some college education, followed by in FIS group 6 (27.27%), FIS group 10 (24.00%), while least was in group 1 (0.0%). Highest college graduate were observed in FIS group 1 (33.33%), followed by in FIS group 7 (19.15%), while least was in FIS group 2 and 3 (00.00%).



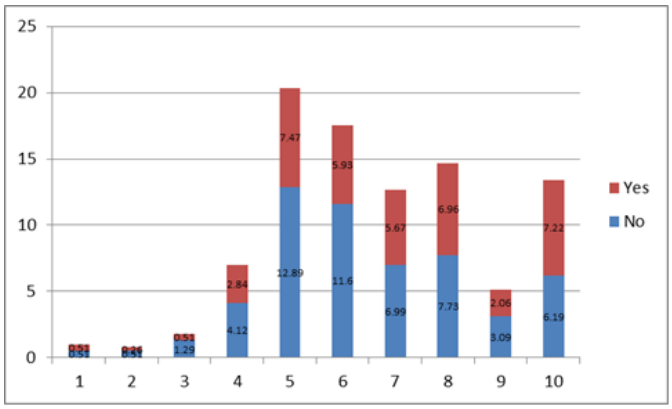
Graph 5: Distribution of female population according to FIS and diabetes n=388

Majority of the female population in the FIS group 5 (7.47%) had diabetes followed by in FIS group 10 (7.22%). While least was in FIS group 2(0.51%) and 1 (0.51%).



Graph 6: Distribution of female population according to FIS and hypertension n=388

Majority of the female population in the FIS group 5 (13.92%) had hypertension followed by in FIS group 6 (11.86%) and 10 (10.57%). While least was in FIS group 2 (0.26%).



Graph 7: Distribution of female population according to FIS and heart trouble n=388

Majority of the female population in the FIS group 5(7.47%) had heart trouble followed by in FIS group 10 (7.22%) and 8 (6.96%). While least was in FIS group 1(0.51%) and 2 (0.26%).

4. Discussion

We found from our study involved screening subjects over 18 years of age, Ohio residents living in Allen, Hancock, or Seneca Counties, at or below 200% poverty line using federal guidelines. The participants were from multiple ethnic groups. A total 514 subjects were included in the study. Out of these 514 subjects 388 were women. We had carried out special observation of this group because women contribute to the world's half of the food production. Health status of these women were fair (53.3%), good health/ better (21.1%) and poor (22.96%) according to their perception. Research from the U.S. Department of Agriculture (USDA), revealed that household food-insecurity rates for households with single mother (30.3 percent) and women living alone (14.7 percent) are particularly high. A large body of evidence demonstrates that FI has detrimental impacts on health and well-being in the short and long terms for children and adults. These impacts often hit women and mothers especially hard. For example, mothers struggling with hunger often sacrifice their own quality of nutrition in order to protect their children from hunger, which can increase the mother's risk of obesity. Data consistently show that women are especially vulnerable to FI and its health consequences [9]. Food security requires nutritional adequacy. The dynamics of both household and individual food security may result in deficiencies in some family members especially women of childbearing age who are at particular risk of poor health due to undernutrition and micronutrient deficiencies [10].

FIS is a method of measurement to provide valid and reliable population estimates of FI in the different regions. FIS has particular potential as a cross-disciplinary indicator capable of promoting the link between different sectorial perspectives. For example, the link between nutrition and agriculture.

In this study, it was observed that the majority of the female population was in the FIS group 5(22.42%), followed by FIS group 6 (19.33%) and 8(15.98%). While fewer were found in FIS group 1 (0.77%) and 2 (0.77%). One reason that women may experience greater levels of food insecurity they are primarily responsible for care giving and food provisioning in their households [11]. Qualitative studies had demonstrated that as household food managers, women often allocate food to others before themselves [12]. The qualitative studies included interviewing respondents at home with questions focused on expenditure and income, SNAP and food shopping habits, eating habits, nutrition, triggers of food hardship and food-related coping strategies[12]. Even in married and cohabitating households with and without children, according to Allen *et al.* [11] research women reported higher FI than men [11]. Socioeconomic characteristics such as level of education and income did not explain the higher odds of the household being classified as food insecure for female versus male respondents. Thus, there was evidence that women's experiences of FI should be considered separately from men's experiences of FI.

The distribution of female population according to the Food Insecurity Score and ethnicity showed that all of the female population (100%) in the FIS group 1 and 2 are of Caucasian origin. While in others FIS groups Caucasian origin female population were found to be predominated. The reason may be that our sample size included more women of Caucasian origin than others as the location in this study comprised of more Caucasian female origin. According to Adams *et al.* [14], the association between FIS and other health conditions like obesity appear to vary greatly by sex/gender as well as race/ethnicity [14]. While the national average of FI is 10.6% of White, 23.7% of Latino and 26.1% of Black households were food insecure [15]. In addition, nearly 25% of all Black women and Latinas were food insecure, compared with 11.1% of White women, according to the last Women's Health USA survey [16].

The Food Insecurity Score and education in the female population was carried out and it was observed that majority of the female population (100%) in the FIS group 2 had completed some college education, while in every FIS group had female population who had not completed high school education. A study by Kalkidan H and group [17], showed education remained one of the critical predictors of households' food insecurity of Ethiopian group. Education can avert food insecurity by enhancing productivity, often regarded through economic paybacks. However, from a broader human development perspective, the impact of education on sustainability indicators goes far beyond, it contributes to the social, political as well as the cultural environment, which can have fundamental influence on the access and utilization of basic resources [18]. Moreover, in their cross country analysis, De Muro and Burrch [19] of the Food and Agriculture Organisation (FAO) of the United Nations suggested that primary education was a crucial element in reducing FI in rural areas compared to other factors such as access to water, health, and sanitation. They concluded that doubling primary education can have a FI reduction of 20% to 24%. Furthermore, the FAO global report labeled education as a "strong engine" which enhanced productivity, employability and earning capacity to alleviate poverty and hunger. Improving education for women could dramatically reduce hunger in developing countries, says a United Nations 2013 report. The report also calls for erasing gender inequalities in land ownership and financing to help address future food security [19].

One study finding by Tait, Christopher A., *et al.* [20], indicated that FI was independently associated with increased diabetes risk, even after adjustment for a broad set of measured confounders. While, Shalowitz, M. U., *et al.* [21] report suggested that patients with Type 2 diabetes mellitus

with lower food security had worse glucose control than those who were food secure. The prevalence of FI in females was higher than males. In this study, a higher proportion of patients with diabetes, particularly females, reported food insecurity. In fact, diabetes was more prevalent in food-insecure households. One of the most important reasons this could be is inadequate accessibility to high-quality and/or high-quantity foodstuff due to an inappropriate socioeconomic situation. A study by Mohammad R *et al.* [22] demonstrated that severe FI, indicating reduced food intake and disrupted eating patterns, may influence the population's ability to follow a healthy eating pattern necessary for effective diabetes management.

The distribution of female population, according to Food Insecurity Score and diagnosis of hypertension, showed the majority of the female population in FIS group 5, had hypertension. This was followed by FIS group's 6 and 10. While FIS group 2 was the least affected.

Distribution of female population according to Food Insecurity Score and heart trouble, showed the majority of the female population in FIS group 5 had heart trouble followed by in FIS group's 10 and 8. The least likely groups were in FIS group 1 and 2.

A study by Vincent and group [23] it was found that the prevalence of FI was significantly higher among blacks than whites, and among females more males. In addition, both the above groups with high blood pressure and without health insurance had a higher prevalence cardiovascular disease than their counterparts. The group also found significant differences in the prevalence of FI by age group, educational level, employment status, marital status, annual household income, body mass index, and smoking status. Food insecurity was significantly associated with high blood pressure, diabetes, obesity, fruit and vegetable consumption, physical inactivity, and smoking status among Mississippi adults [23].

The significant associations between FI and high blood pressure, obesity, diabetes, and physical inactivity are consistent with the findings of previous reports from other states. A possible explanation for the association between FI and physical inactivity was that FI might lead to distress or poor health, any of which could lead to a lower level of physical activity [23].

A study by Mahmoodi M *et al.* [24] sought the prevalence of FI and how cardiovascular risk markers and metabolic syndrome components were significantly different in categories of FI in patients with type 2 diabetes. FI may deteriorate some cardiometabolic biomarkers in type 2 diabetes. Improving food security in patients with diabetes may help reduce cardiovascular disease. Hence, further interventional research is needed in this population to determine associations between improvement of food security and decreasing of cardiovascular risk markers and metabolic syndrome components. Therefore, food security can play a significant role in the prevention and management of diabetes. In turn, improving food security in patients with diabetes may also help reduce cardiovascular disease. The use of a food dietary assessment and screening with a validated measure may facilitate identification of patients at risk of food insecurity. Nevertheless, these significant differences were showed between male and female patients in food secure group. The results of an 11-year study confirmed that relative risks of conventional cardiovascular risk factors for the occurrence of myocardial infarction in postmenopausal women were higher than in men in all age groups [24].

In one study by Saiz Jr, Augustine M., *et al.* [25] about one-third of their patients were hypertensive. However, they could find exclusively a blood pressure increment in hypertensive participants with severe food-insecure patients. The number of patients with low HDL-C was 3.5 times more than patients with high LDL-C. Lipid and lipoprotein profiles such as TG, TC, and LDL-C levels were greater among females from food-secure/insecure households than among males households. This disparity was due to more prevalence of overweight/obesity and hypertension among females than males. Overall, FI was associated with a decreased likelihood of good cardiovascular health (CVH). Participants who were food insecure were significantly less likely to have good CVH compared to participants who were food secure [25].

However, no significant associations could be determined between FI status and cardiometabolic biomarkers, with the exception of BMI and TG concentration. Nevertheless, Ford indicated that adults aged 30–59 years with very low food security showed evidence of increased predicted 10-year cardiovascular disease risk [26]. Generally, women are greater than men at risk of FI. Food insecurity women was 3.2 and 2.4 times higher than in men. Food security scores were significantly different between males and females [27]. In one study Mohammad R *et al.* [22], household FI or in diabetic women was also 1.74, 2.39, and 2.73 times higher than in men for mild, moderate, and severe food insecurity, respectively [22].

5. Conclusion

Women's contribution to food production and preparation, as well as their role in society as child bearers and caregivers cannot be denied. The increasing number of female-headed households worldwide along with their disproportionate poor economic status, women need special consideration for food security. Discussions of FI and its effect on health, nutrition, and behavior in women are important. FI has important implications for the health and nutrition of women. Still gaps remain in understanding associations of FI in women with obesity, anxiety, and depressive symptoms. Existing evidence of associations between FI and health issues like diabetes, hypertension and heart trouble in women are sufficient to value that labors be undertaken to attend to the issue.

6. Recommendations

To channel efficient interventions studies should be encouraged for unbeaten approaches to addressing this problem but, a multifaceted approach is needed. This should include both short-term assistance to women with FI and longer- term development of strategies that will improve livelihoods and health. Also needed to be addressed are behavioral and coping strategies. Attempts should be made to ensure that women have the same economic opportunities, access to land, and economic power as do men. Meticulous monitoring and evaluation of existing programs and standardization of a food-security measurement tool can help add to this body of substantiation.

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