Research Article

Household Food Security and Women's Dietary Diversity in the Rural and Semi-Urban Population of Muzaffargarh, Punjab

Muhammad Asfand Nadeem[1], Muhammad Awais Naseer[2], Muhammad Bilal[3], Muhammad Awais[4], Muhammad Asad Sarwar[5], Minahil Naeem[6], Mehwish Saleem[7],Meerab Kashif[8], Mehrosh Khan[9], Mehwish Jabeen[10], Faiza Aziz[11], Saira Tariq[12], Muhammad Tufail[13]

(13) University Hospitals of Leicester NHS Trust, United Kingdom.
(1-12) King Edward Medical University Lahore, Pakistan.

Abstract:
Objectives: To carry out a thorough study about food security status as well as household dietary diversity for the female population of rural areas of Muzaffargarh, Punjab.
Design: A cross-sectional survey was conducted for design. Structured questionnaires that were translated into the local tongue were used to conduct the survey. Data on household dietary diversity scores, which represented the range of foods eaten by households, were collected through a survey. A modified version of the household food insecurity access scale was also used to categorize homes according to their level of food security.
Study settings: Rural and Semi-urban areas of district Muzaffargarh Punjab, Pakistan.
Population: The study includes women of the rural population, more precisely the women of childbearing age in district Muzaffargarh, Punjab, Pakistan.
Results: Among the households surveyed, 38% were classified as food secure while the remaining 62% were food insecure. Of the group of people who were food insecure, 21% were slight, 23% were moderately, and 18% were severely food insecure. A gap of 2.03 points separated the food secure group's mean Nutritional Diversity Score of 9.12(with a standard deviation of 2.33) from the food insecure group's mean Dietary Diversity Score of 7.09 (with a standard deviation of 2.43). Overall, it was discovered that the average score for the 33% of households with the largest dietary diversity was 2.68 points higher than the average score for the overall population examined.
Conclusion: The study found that better food security was linked to higher levels of dietary diversity, greater household income, and smaller family size. To promote better health outcomes, it is recommended that interventions targeting dietary diversity and household income should continue to be prioritized by regional health leaders.

Corresponding Author: Muhammad Asfand Nadeem | asfand99yar@gmail.com

Supervisor: Dr. Saira Tariq | Department of Community Medicine, KEMU, Lahore

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INTRODUCTION:

Since it guarantees that all household members have access to enough food that is both sufficient and nutritious, food security is essential for maintaining an active and healthy lifestyle. The Food and Agriculture Organization (FAO) defines food security as the state in which all individuals have physical, social, and economic access to safe and nutritious food that meets their dietary needs and preferences. Dietary diversity refers to the range of dietary options available to residents in a household. In recent years, increasing inflation has led to challenges such as malnutrition and reduced dietary diversity, particularly in low socioeconomic countries like Pakistan. Furthermore, Pakistan faces additional challenges such as a rapidly growing population, an unstable economy, and a lack of awareness about the importance of having a diverse diet to meet nutritional needs. In rural areas, women tend to prioritize the nutritional needs of their families over their own, leading to a lack of attention to their dietary requirements. Additionally, a lack of family planning and frequent pregnancies due to insufficient awareness among women in rural areas is a significant factors contributing to food insecurity Previous research has indicated that multiple social factors can have a significant impact on food security, including maternal illiteracy, low socioeconomic status, and lack of awareness1,2. About half of the population of Pakistan is food insecure, with rural and semi-urban areas having the highest rates. Iron-deficiency anemia and vitamin A deficiency affect 42% and 27.3% of women of childbearing age in Pakistan, respectively 3,4. Studies have also shown that only 1.7% of women consume a diverse diet that includes five or more food groups. Factors such as women's education levels, gestational status, financial status, gender of the head of household, family size, religion, place of residence, and land ownership have been linked to appropriate dietary diversity5. Interestingly, women tend to report less dietary diversity than their children, which may be related to a desire to lose weight. In contrast, 80% of children were considered to be of normal weight, while 70% of mothers were considered overweight or obese.

No research has been conducted in rural areas of Punjab regarding food security and dietary diversity, despite the dire need for such studies. To date, there has been a lack of research linking food security and the accessibility of diverse food items in rural areas. These remote regions often face limited access to quality food and are typically male-dominated with prevalent patriarchy and less acknowledgment of women's rights. In these rural areas, working women play a significant role in providing food security as compared to housewives. To lower the danger of food scarcity and nutritional deficiencies in the population, it is crucial to evaluate the prevalence of food shortage and food security factors. Furthermore, research on the connection between dietary diversity and household socioeconomic position can be used to assess personal nutritional demands and develop intervention programs to promote community health.

The primary goal of the study was to carry out a preliminary survey of the rural population to ascertain if there was any food insecurity within households

and to examine the dietary diversity available to women in these areas. The study was intended to provide accurate information to planning and management groups to improve dietary diversity and ensure food security for women in rural areas.

METHODS AND MEASURES:

In this study conducted in Muzaffargarh, Pakistan, data was collected from 90 households in rural areas from July-August 2022. Women aged 15-45 provided written consent and were surveyed in the local language by trained professionals using a structured survey. To assess household dietary diversity, Swindle and Bilinsky's guidelines6 were followed, and a list of 45 different foods from 12 food groups was used. Each of the individual food groups was allocated a score of 1 or 0 based on consumption in the last 24 hours, and the total score ranged from 0-12.

The study also evaluated the status of the household food security in the last 30 days using a modified HFIAS7 scoring system, with households categorized as food secure, mildly insecure, moderately insecure, or severely insecure depending on their scores ranging from 0-27. As shown by (Supplementary Table S1). The three categories of mild, moderate, and severe food insecurity were merged into a single category (food insecure) due to an inadequate number of individuals falling under each of these categories (ordinal logistic regression model).

Data Analysis:

The analysis of data was carried out by utilizing *SPSS* Statistics *V22*.0. Study variables were outlined using descriptive statistics for example mean with standard deviation, frequencies, and percentages. To find out notable differences between the food insecurity groups, ANOVA (Analysis of Variance) was applied for continuous variables, while the Chi-square test was used for categorical variables.

To examine the correlation between food insecurity and the score for dietary diversity, a linear regression analysis was carried out. Additionally, a binary logistic regression was executed to establish the correlation between dietary diversity and food insecurity, where the food secure category was used as a reference for the binary dependent variables.

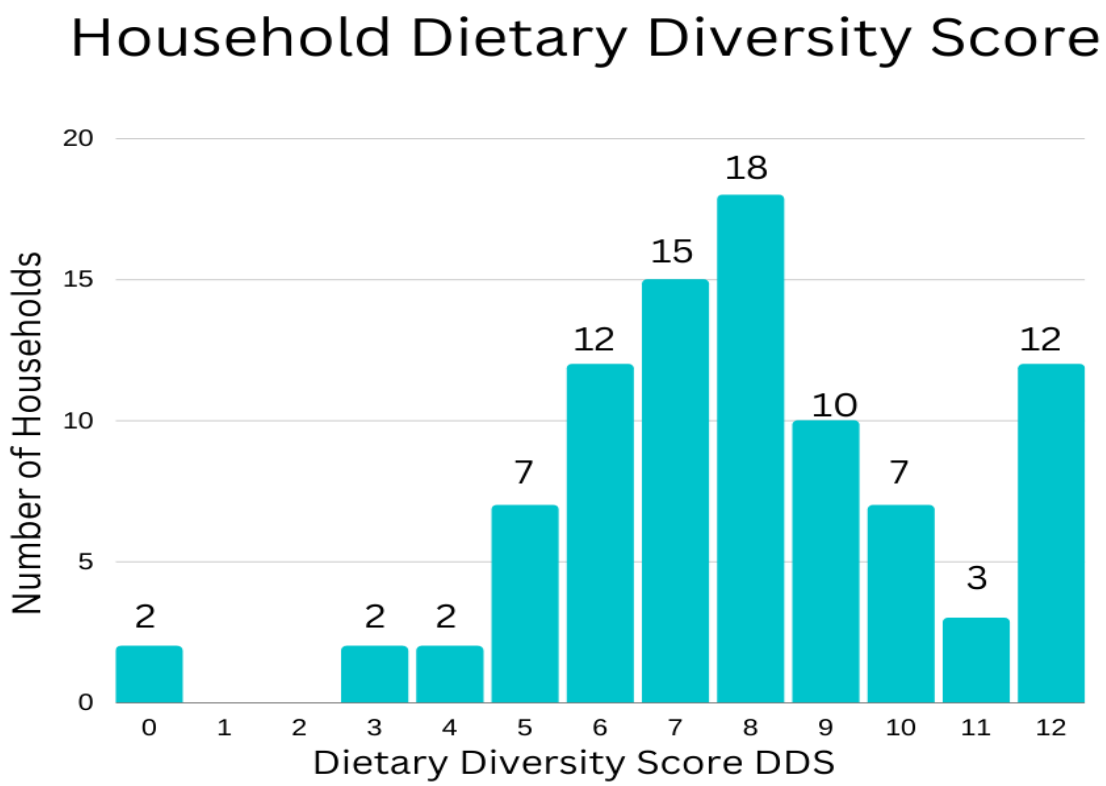
RESULTS:

Dietary Diversity Assessment:

Following data regarding dietary diversity score was obtained that showed how many households were obtained given the number of food groups.

Number of Food Groups (0-12)	Number of Households (n)	Percentage %
0	2	2.22
1	0	0
2	0	0
3	2	2.22
4	2	2.22

5	7	7.78
6	12	13.33
7	15	16.67
8	18	20
9	10	11.11
10	7	7.78
11	3	3.33
12	12	13.33



The mean dietary diversity score of all households came out to be **7.85** with a standard deviation of **2.58.** There is no standard threshold or goal to determine if a household has adequate diversity in its diet. However, FANTA (Food and Nutrition Technical Association) provides two options for utilizing this indicator in a performance evaluation setting. The dietary diversity pattern of wealthier households (the wealthiest 33%) can be used as a benchmark. This first strategy assumes that poorer people will increase their dietary diversity as their income increases. The second strategy uses the average dietary diversity of **33%** of households with the highest diversity as a standard. We used the latter one. The average dietary

diversity count of **33%** of households having the highest diversity was **10.53**, with a standard deviation of **1.27**. Therefore, the average dietary diversity score of the population under study came out to be **2.68** odds less than the dietary diversity score of **33%** of the households with the highest diversity.

Food Security Status

Out of the surveyed population, 38% came out to be food secure (n=34), 21% were mildly insecure (n=19), 23% were moderately insecure (n=21), and 18% were severely insecure (n=16).

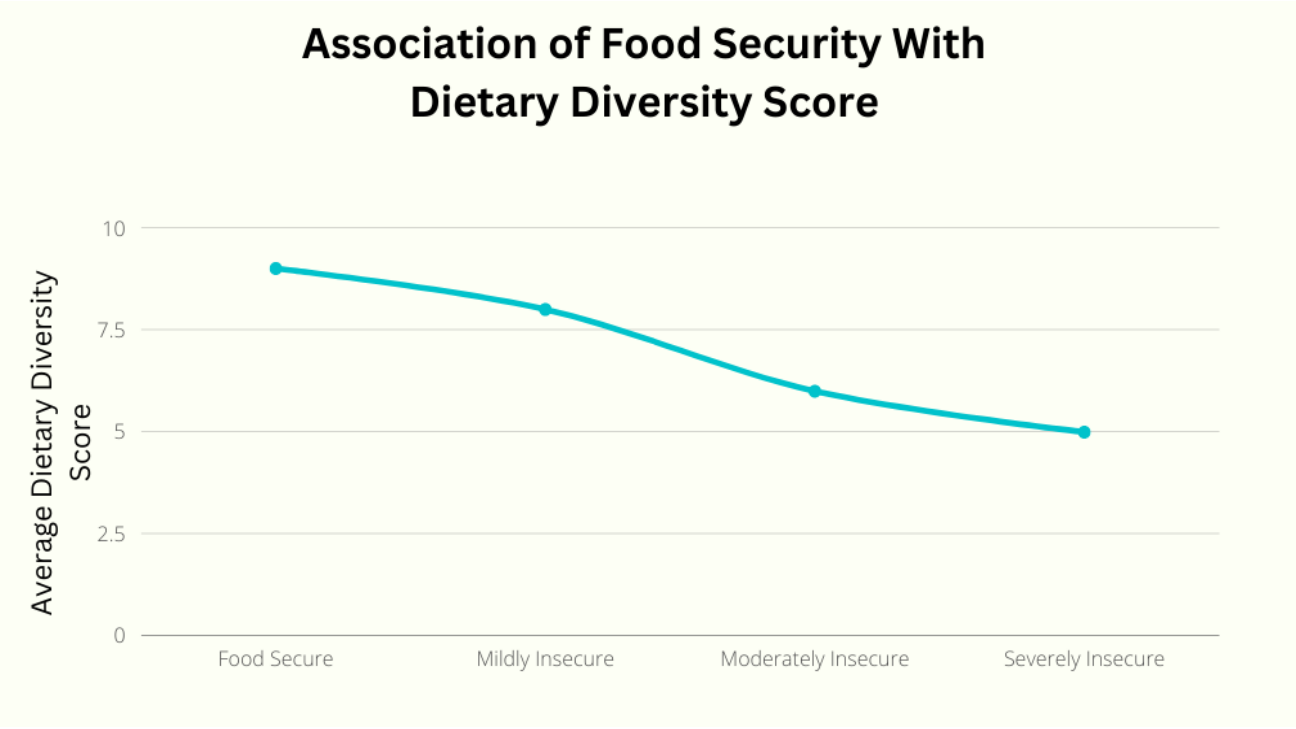
Status	Number of Households (n)	Percentage %
Food Secure	34	38
Mildly Insecure	19	21
Moderately Insecure	21	23
Severely Insecure	16	18

To ensure statistical validity and simplify the analysis, we merged the mild, moderate, and severe food insecure categories into one category called "Food Insecure" (Ordinal Regression). The research revealed that 62% of the study population (n=56) were identified as food insecure.

Association of Food Security with Household Dietary Diversity

A positive association between food security and household dietary diversity was found so that households with reduced dietary diversity scores were more food insecure and linear regression curve was obtained when the dietary diversity score was plotted against food insecurity status. The four classified categories had the following mean dietary diversity scores.

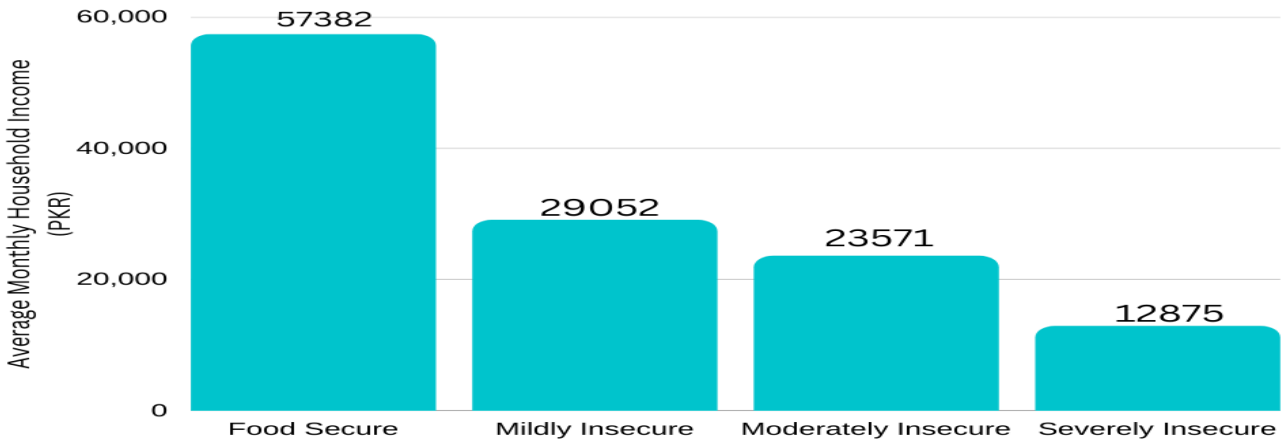
Status	Mean Dietary Diversity Score	Standard Deviation
Food Secure	9.12	2.33
Mildly Insecure	8.58	2.41
Moderately Insecure	6.67	1.43
Severely Insecure	5.88	2.84



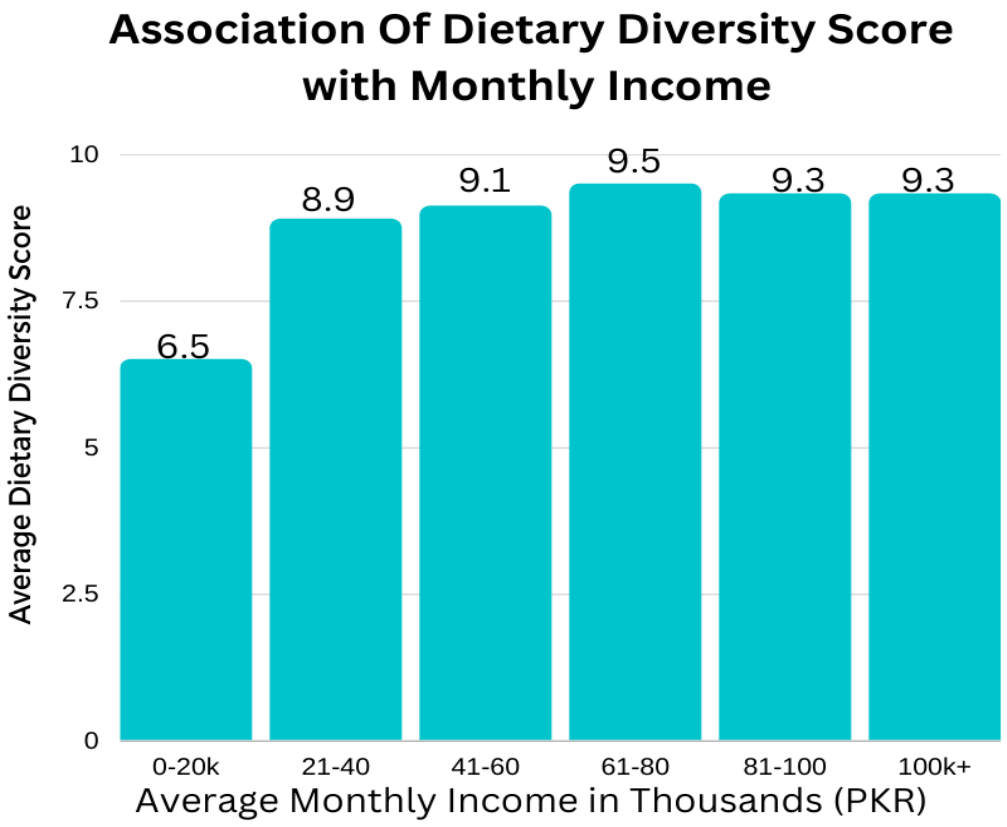
Keeping our classification in view, the food secure group had a mean Dietary Diversity Score of 9.12 (with a standard deviation of 2.33), which was **2.03** odds greater than that of the food insecure group**.** (whose mean Dietary Diversity Score was 7.09 with a standard deviation of 2.43).

Association of Food Security and Dietary Diversity with Household Income

From the data obtained from the given population, it was clear that food security status among women increased as the average monthly income of the given household increased and food insecure groups had less average income.



Similarly, the average dietary diversity score of a household increased as the average monthly income was increased so that households with more monthly wages had more dietary diversity scores. Regarding this the following data was obtained



Association of Food Security with Number of Family Members

From the surveyed data, it was obtained that Food Insecurity Status increases as the number of family members increased in this way the more food-secure groups had less number of family members. The following data was obtained.

Status	Average Number of Family Members	Standard Deviation
Food Secure	6.8	2.1
Mildly Insecure	7.8	3.1
Moderately Insecure	8.6	3.2
Severely Insecure	7.6	2.1

DISCUSSION:

In this typical rural region of Pakistan, women's dietary diversity was consistently found to have a negative correlation with household food insecurity, both before and after adjusting for various potential confounders. This study is the first to find the relationship between women's nutritional intakes, which were assessed repeatedly, with a separately evaluated indicator of household food insecurity. This study demonstrated a direct relationship between food security and dietary diversity and the risk of not consuming many nutritious foods. A derived "wealth index," demonstrating the local standard of living,

explained this dietary risk pattern most clearly8. Other factors, such as the female literacy rate, were far less illustrative. Poverty and low female literacy rate, which often coincide in various households, have been recognized as important causal factors influencing the quality of diet9. As suggested by our results, indigence is the chief cause of low dietary diversity, a conclusion supported by several studies in societies with low levels of income, that have shown an inverse association between household food insecurity and total food expenditures 10.

Additionally, household size, particularly the number of children, was also negatively affecting dietary diversity. This gives the idea that households with more dependents may have to prioritize quantity over quality of food, leading to lower dietary diversity. It is worth mentioning that our study was based in a specific rural area of Pakistan and may not be representative of other regions or countries. However, the findings highlight the importance of addressing poverty and improving socioeconomic status as a means of promoting better dietary diversity and reducing household food insecurity. Such interventions could include targeted social safety net programs, education and employment opportunities, and agricultural development programs.

Strengths and limitations:

Our research's generalizability may be limited by several methodological issues. For instance, we collected data preferentially from households that were easy to approach. The data could not be collected from distant areas. Another limiting factor may recall bias, it could affect the precision and accuracy of remembering past nutritional habits. Nevertheless, we minimized the communication gap between the participants of the research and the investigators as they were familiar with the culture and local language of the area. Still, there could be misinformation by the participants due to hesitation in answering sensitive questions about food consumption.

Despite these limitations, our study has several strengths. First, data were collected by the investigators who could understand the participant's language and culture. Second, we made a comprehensive catalog of food items in our questions about the consumption of food in the last twenty-four hours, which in turn increases the reliance on our data.

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REFERENCES:

1. Akbar M, Niaz R, Amjad M. Determinants of households' food insecurity with severity dimensions in Pakistan: Varying estimates using partial proportional odds model. Health Soc Care Community. 2020;28(5):1698-709
2. Akhtar S. Malnutrition in South Asia-A Critical Reappraisal. Crit Rev Food Sci Nutr. 2016;56 (14):2320-30.
3. UNICEF. National Nutrition Survey 2018 – Key Findings Report [Internet] National

nutrition survey short report; 2018 [cited 2022 June 11]. Available from: https://www.unicef.-org/pakistan/reports/national-nutrition-survey-2018-key-findingsreport.

4. Sheikh S, Iqbal R, Qureshi R, Azam I, Barolia R. Adolescent food insecurity in rural Sindh, Pakistan: a cross-sectional survey. BMC Nutr. 2020;6(1):1–9.
5. Vijay J, Kumar Patel K. Recommendations to scale up dietary diversity data at household and individual level in India. Diabetes Metab Syndr. 2021;15(6):102310.
6. Swindale A, Bilinsky P. Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (Version 2). 2006.
7. Coates J, Swindale A, Bilinsky P. Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide: Version 3. 2007.
8. Gunnsteinsson S, Labrique AB, West KP Jr, Christian P, Mehra S, Shamim AA, et al. Constructing indices of rural living standards in Northwestern Bangladesh. J Health Popul Nutr. 2010;28(2):509–19.
9. Rashid DA, Smith LC, Rahman T. Determinants of dietary quality: evidence from Bangladesh. World Development. 2011;39 (2):2221–31
10. Melgar-Quinonez HR, Zubieta AC, MkNelly B, Nteziyaremye A, Gerardo MF, Dunford C. Household food insecurity and food expenditure in Bolivia, Burkina Faso, and the Philippines. J Nutr. 2006;136(Suppl):1431S–7