

Household Food Security and Women's Empowerment in a selected Rural Community, North-West Nigeria

Aisha Sanusi Hamza¹, Suleiman Usman¹, Khadeejah Liman Hamza^{1,2}, Alhaji Abubakar Aliyu^{1,2}, Bilkisu Nwankwo³

¹ Department of Community Medicine, Ahmadu Bello University Teaching Hospital, Zaria, Kaduna State, Nigeria

² Department of Community Medicine, College of Medical Sciences, Ahmadu Bello University, Zaria, Kaduna State, Nigeria

³ Department of Community Medicine, Kaduna State University, Kaduna State, Nigeria

Abstract

Background: Food security is an urgent global challenge driven by gender inequality. Women's empowerment is seen to improve household food security. This study determined household food security and its association with women's empowerment in Jaja, a rural community in Kaduna state, Northwest Nigeria. **Methodology:** A cross-sectional study of women 15 to 49 years selected from each house in the community using simple random sampling by balloting. Following an informed consent, a pretested semi-structured interviewer-administered questionnaire was used to obtain socio-demographic and household characteristics. Some domains of empowerment measured were level of education, literacy and income. Household food insecurity was assessed using the Household Food Insecurity Access Scale (HFIAS). Data was analysed with IBM SPSS version 26 software, and associations between variables were tested at $p < 0.05$ level of significance. **Results:** The study enrolled 371 women, who were predominantly married, Hausa and Muslims. Mean age of respondents was 26.9(SD±7.3) years, 197(53.1%) had no formal education, 259 (69.8%) were literate and their median monthly income was 500 Nigerian Naira only. 182(49.2%) households were not food secured. Household food insecurity was significantly associated with age ($p < 0.001$), education ($p = 0.001$), literacy ($p < 0.001$) and income ($p = 0.045$). There were significant associations between food security and household size ($p < 0.001$), keeping a backyard garden ($p = 0.016$) and ownership of farmland ($p = 0.006$). **Conclusion:** Household food insecurity remains prevalent in this rural community and is significantly associated with key proxies of women's empowerment. Interventions that promote

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Introduction

Food security is defined by the Food and Agriculture Organization (FAO) of the United Nations (UN) as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.” When people do not have adequate physical, social, or economic access to food as referred to above, they are said to be food insecure.[1] Food security is multi-dimensional; its four dimensions are physical availability of food, access to food, food utilization, and stability of the former three dimensions over

time. Low access to food directly influences food insecurity.[2]

Food security is an urgent global challenge. In 2022, an estimated 28.9 percent of the world population did not have access to adequate food, meaning they were moderately to severely food insecure.[3]

Address for correspondence: Dr. Khadeejah Liman Hamza, Department of Community Medicine, Ahmadu Bello University, Zaria, Kaduna State, Nigeria, Email: deejahamza@yahoo.co.uk klhamza@abu.edu.ng

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In Africa, the number of people who suffer hunger doubles that of any other region in the world. In 2023 also, 61.4 percent of Western African population was food insecure while the three-year average (2021-2023) for Nigeria was 73.9 percent.[1–3] The hunger at the global level as well as the deterioration of the nutritional status of the populations of Africa presents the question of whether the region can achieve the Sustainable Development Goal (SDG) 2 of ensuring food security and ending hunger.

An identified major driver of food insecurity in the world is the persistence of gender inequality. In 2022, 27.8 percent of adult women were moderately or severely food insecure, compared with 25.4 percent of men, and the proportion of women facing severe food insecurity was 10.6 percent compared with 9.5 percent of men.[1–4] In Africa, even though women process and prepare the food, they are subjected to eating that with lower quality or even leftovers while men are to receive the best food because they are regarded as having more economic and religious roles to play. Consequently there is a higher prevalence of undernutrition among female teenagers when compared to males, and they go on to have children with undernourishment, thus the intergenerational undernutrition is perpetuated.[5] Women play a pivotal role towards achieving food security in the population; however, these gender gaps are a hindrance as women are deprived of opportunities to attain empowerment.[6,7]

Studies have shown that empowered women, that is those who have attained power for self-determination through economic agency, education or decision making had improved household food security as they achieve balances in power within the household and provide a healthier allocation of resources.[8–10]

Empowerment of women can certainly reduce the severity of food insecurity. However, most literature focused on the empowerment of women in agriculture rather than other domains of empowerment. This study adopts level of education, literacy, nutrition education and income as proxies for women's empowerment. The study examines the varying associations between these domains of empowerment in women and food security.

Materials and Methods

Study Area

The study location is Jaja, a rural community in Hunkuyi, Kudan Local Government Area of Kaduna state, Nigeria. The people are agrarian and predominantly Hausa, Muslims. The community has one each of public primary and Junior Secondary Schools, a private nursery school and several Islamic schools. There is a health clinic within the community, and water is available through three solar powered boreholes. A major road connects Jaja to other states in the country and the community is connected to the national electricity grid.

Study Design

This was a community based cross-sectional study.

Study Population and Selection of Participants

This was carried out among all women of reproductive age within the community; those unable to participate due to ill health were excluded. Starting point was identified, the houses were visited consecutively, and one eligible woman was sampled from each house using simple random sampling by balloting (as there maybe more than one eligible woman per house).

Study Instrument

A pretested semi-structured interviewer-administered questionnaire was used, information on the respondent's socio-demographic characteristics, household characteristics and household food insecurity assessment using the United States Agency for International Development (USAID) Household Food Insecurity Access Scale (HFIAS) were elicited, HFIAS assesses experiences over the previous 30 days.[11]

Measurement of Variables and Data Analysis

The primary outcome variable was food insecurity which was measured on a scale of 0 – 27 with lower scores signifying better food security. The prevalence of food insecurity was computed as per Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access Indicator Guide and the syntax generated using ChatGPT programme.[11]The independent variables were: age, ethnic group, religion, marital status, ability to read and write in any language, average monthly

income in Naira, household size, ownership of livestock and farmland, and keeping a backyard garden. Women's empowerment was measured using proxy indicators; education, literacy, income, and nutrition education. Data was analysed using IBM® SPSS Version 26 with statistical significance set at p-value < 0.05. Test of association between the independent variables and HFIAS score was carried out using spearman's rank correlation where the independent variables were quantitative and a Mann-Whitney U or Kruskal Wallis test where the independent variable was categorical. Independent predictors of HFIAS Score were identified using a multiple linear regression analysis using the enter method for variables with p-value <0.1 at the bivariate analysis. Multicollinearity checks were carried out using the variance inflation factor (VIF) with values ranging from 1.019 to 1.666.

Ethical considerations

Ethical approval for the study was granted by the Health Research Ethics Committee (HREC/B40/2024); also, due to markedly low literacy rates among women in rural northern Nigeria, where female literacy rates are estimated to be substantially below the national average, verbal informed consent was obtained from each selected woman prior to enrolment into study and interview.

Results

The study enrolled 371 women with a mean age of 26.9 years (SD 7.3). [Table 1] Household characteristics show an average of 6 persons in each household, the mean (SD) HFIAS score was 3.7(4.8). The overall prevalence of food insecurity was 49.2% with 23.5% of the women experiencing severe food insecurity. A total of 126(34%) households kept a backyard garden, while 236(63.6%) owned farmlands. [Table 2] At the level of the household, number of persons in the household, having a backyard garden and owning a farmland were found to have significant association with HFIAS score. The tests at bivariate level were Spearman's coefficient (household size), and Mann-Whitney U (keeping a backyard garden and ownership of farmland) [Table 3] The domains of empowerment assessed in this study educational level, literacy, nutrition education and woman's income, only nutrition education was found not to

be statistically significant when tested on the bivariate level (Kruskal-Wallis test for educational level, Mann-Whitney U test for literacy and nutrition education, and Spearman's correlation coefficient for woman's income). [Table 4]

Table 1 Socio-demographic characteristics of women 15-49 years in Jaja, Nigeria.

| Characteristic | Frequency | Percent |
|---|-----------|---------|
| Age (years) | | |
| 15 – 19 | 49 | 13.2 |
| 20 – 24 | 95 | 25.6 |
| 25 – 29 | 84 | 22.6 |
| 30 – 34 | 60 | 16.2 |
| 35 – 39 | 50 | 13.5 |
| 40 – 44 | 22 | 5.9 |
| 45 – 49 | 11 | 3 |
| Mean (SD) | 26.9(7.3) | |
| Ethnic group | | |
| Hausa | 361 | 97.3 |
| Fulani | 10 | 2.7 |
| Religion | | |
| Christianity | 2 | 0.5 |
| Islam | 369 | 99.5 |
| Marital Status | | |
| Never married | 1 | 0.3 |
| Married | 360 | 97 |
| Separated/Divorced | 6 | 1.6 |
| Widowed | 4 | 1.1 |
| Educational level attained | | |
| None | 197 | 53.1 |
| Primary | 78 | 21 |
| Secondary | 94 | 25.3 |
| Tertiary | 2 | 0.5 |
| Ability to read or write in any language | | |
| No | 112 | 30.2 |
| Yes | 259 | 69.8 |
| Received health talk on nutrition | | |
| Yes | 292 | 78.7 |
| No | 79 | 21.3 |

Table 2 Household characteristics in Jaja, Nigeria.

| Characteristic | Frequency | Percent |
|--------------------------------------|-----------|---------|
| Household size | | |
| Mean(SD) | 6.2(3.5) | - |
| Median(IQR) | 5(4) | - |
| Range | 2-25 | - |
| HFIAS | | |
| Mean(SD) | 3.7(4.8) | - |
| Median(IQR) | 1(7) | - |
| Range | 0-21 | - |
| Prevalence of Food insecurity | | |
| Food Secure | 189 | 50.9 |
| Mildly Food Insecure | 31 | 8.4 |
| Moderately Food Insecure | 64 | 17.3 |
| Severely Food Insecure | 87 | 23.5 |
| Having a backyard garden | | |
| Yes | 126 | 34 |
| No | 245 | 66 |
| Ownership of livestock | | |
| Yes | 234 | 63.1 |
| No | 137 | 36.9 |
| Ownership of farmland | | |
| Yes | 236 | 63.6 |
| No | 135 | 36.4 |

Table 3 Household characteristics and food insecurity in Jaja Community, North-West Nigeria

| Household Characteristic(n=371) | Frequency (%) | HFIAS Score | | Test Statistic | p-value |
|---------------------------------|---------------|-------------|--------------|----------------------|---------|
| | | Mean (SD) | Median (IQR) | | |
| Household size | 371(100.0) | | | 0.205 [†] | <0.001* |
| Keep backyard garden | | | | | |
| Yes | 126(34.0) | 4.29(4.7) | 2(7.0) | 17650.0 [§] | 0.016* |
| No | 245(66.0) | 3.36(4.7) | 0(6.0) | | |
| Own livestock | | | | | |
| Yes | 234(63.1) | 3.56(4.6) | 1(7.0) | 15839.0 [§] | 0.839 |
| No | 137(36.9) | 3.87(5.0) | 0(7.5) | | |
| Own farmland | | | | | |
| Yes | 236(63.6) | 3.04(4.0) | 0(6.0) | 13360.5 [§] | 0.006* |
| No | 135(36.4) | 4.79(5.6) | 2(9.0) | | |

*Statistically significant †Spearman's correlation coefficient, §Mann-Whitney U test statistic, ¶ Kruskal-Wallis test statistic

Table 4 Food insecurity and characteristics of women in Jaja, Nigeria.

| Women's Characteristic(n=371) | Frequency (%) | HFIAS Score | | Test Statistic | p-value |
|---|---------------|----------------|--------------|----------------------|---------|
| | | Mean (SD) | Median (IQR) | | |
| Age in years | 371(100.0) | - | - | 0.229 [†] | <0.001* |
| Marital status | | | | | |
| Never Married | 1(0.3) | - | - | 5.794 [†] | 0.122 |
| Married | 360(97.0) | 3.59(4.69) | 1(7) | | |
| Separated/Divorced | 6(1.6) | 3.50(4.18) | 2(8.25) | | |
| Widowed | 4(1.1) | 11.25(8.42) | 11(16.25) | | |
| Educational level[‡] | | | | | |
| No Formal | 197(53.1) | 4.56(5.24) | 3(7.5) | 15.748 [†] | 0.001* |
| Primary | 78(21.0) | 3.77(4.94) | 1(7) | | |
| Secondary | 94(25.3) | 1.76(2.71) | 0(3) | | |
| Tertiary | 2(0.5) | 3(4.24) | 3(-) | | |
| Ability to read or write in any language[‡] | | | | | |
| Yes | 112(30.2) | 2.82(4.11) | 0(6) | 10464.5 [§] | <0.001* |
| No | 259(69.8) | 5.67(5.59) | 6(9.75) | | |
| Health education on nutrition[‡] | | | | | |
| Yes | 292(78.7) | 3.49(4.37) | 1(7) | 11429.5 [§] | 0.895 |
| No | 79(21.3) | 4.37(6.06) | 0(9) | | |
| Woman's income in Naira[†] | | | | | |
| Mean (SD) | 371(100.0) | 2368.3(3814.6) | | -0.104 [†] | 0.045* |
| Median (IQR) | | 500(2980) | | | |
| Range | | 0-30000 | | | |

*Statistically significant, ‡ domains of empowerment, †Spearman's correlation coefficient, §Mann-Whitney U test statistic, ¶ Kruskal-Wallis test statistic

Table 5 Predictors of Household Food Insecurity Access Scale score (HFIAS) among women 15-49 years in Jaja, Nigeria.

| Variable | Beta | p-value | 95% CI |
|---------------------------|--------|---------|-----------------|
| Age in years | 0.096 | 0.016 | 0.018 - 0.173 |
| Education – Primary | 0.407 | 0.545 | -0.914 - 1.728 |
| Education – Secondary | -1.152 | 0.096 | -2.51 - 0.205 |
| Education – Tertiary | -0.37 | 0.908 | -6.674 - 5.935 |
| Literacy | -1.977 | 0.001 | -3.168 - -0.786 |
| Household size | -0.042 | 0.607 | -0.204 - 0.119 |
| Keeping a backyard garden | 0.956 | 0.057 | -0.029 - 1.94 |
| Ownership of farmlands | -1.462 | 0.004 | -2.455 - -0.47 |

Model summary: F=7.451, p <0.001, R² = 0.141

Age, literacy and ownership of farmlands were found to be strongly associated with HFIAS score. Each additional unit increase in age is associated with an average increase of 0.096 points HFIAS score (Beta column), assuming other variables are constant. Persons who are literate have an average decrease in HFIAS score of -1.977 when compared with those without. Persons who own farmlands have an average decrease in HFIAS score by -1.462 when compared with those without. [Table 5]

Discussion

The goal of this study was to determine household food security and its association with women's empowerment among 371 women in a rural community in Northern Nigeria using level of education attained, literacy through ability to read and write in any language, nutrition education and income as proxies for women's empowerment.

The study population was agrarian, with average household size of six persons. The mean Household Food Insecurity Access Scale (HFIAS) score was 3.7(SD=4.8), with about half (49.2%) of the women studied experiencing some form of food insecurity. These figures are lower than findings obtained from a similar study.[12] A cross-sectional study in Assayita region of Ethiopia among women of reproductive age group found the mean HFIAS score was 7.0 (± 3.6 SD), with the overall prevalence of food insecurity being 70.4%, with possible reason being that Ethiopia is one of the countries where the three year average level of food insecurity for 2021-2023 was 59%.[3,12]

A cross-sectional study conducted in the Kayes region of Mali also found a high prevalence of food insecurity (63.4%) when compared to this study's findings.[13] Another study in Malawi reported as high as 93.9% food insecurity.[14] Though low when compared to other studies, the level of food insecurity is still high and may have grave implication for dietary diversity and ultimately, maternal and child health.

Several factors were significantly associated with HFIAS scores; these were age, household size, literacy, income, and farmland ownership. Among the empowerment domains assessed—educational level, literacy, nutrition education, and personal

income—all but nutrition education showed significant associations with food insecurity. These findings underscore the complex, multi-dimensional nature of food insecurity in rural settings and indicate how it intersects with gender, education, and agricultural livelihoods. This aligns with the findings in similar studies where food insecurity increased with age, decreased with increasing educational attainment and increasing physical capital empowerment.[7–9] Increased women empowerment has been shown to increase calorie availability and dietary diversity, a proxy for food security.[8] Women empowerment is directly related to food insecurity and closing the gender gap has been shown to be a solution to the food insecurity in sub-Saharan Africa, Nigeria inclusive.[15]

Despite the rural setting of the study, where nearly two-thirds (64%) of households owned farmland and over one-third (34%) maintained backyard gardens, food insecurity remains a prevalent concern. These findings align with other studies indicating that access to land alone does not fully mitigate food insecurity, especially in contexts marked by low literacy, income inequality, and large household sizes.[16] The positive association between household size and HFIAS scores in this study supports prior research suggesting that larger families may experience strain on food resources, becoming more food insecure, particularly where income or food production capacity is limited.[17] As seen in this study, where the median income of the women was found to be 500 Nigerian Naira per month which is grossly below the estimated cost of 646 Nigerian Naira for a healthy diet per day in the region.[18]

This is also in concordance with the findings of other researchers.[7,10] Even though it can be argued that a large family size means more labour, there is also the issue of more land fragmentation among household members, resulting in technical inefficiency.[10] Also, larger households have a higher total food consumption needs, and the increased numbers may be contributed by children that are dependents and are unlikely to make significant contributions to the household income.[15]

Further dissection using multivariate analysis revealed three significant predictors of food insecurity: age, literacy, and land ownership. This study reveals that each additional year of age was associated with a 0.096-point increase in HFIAS score, suggesting that older women may face greater challenges in accessing food. This finding is consistent with what Ujah et al. found,[19] where they noted higher food insecurity among older pregnant women in Nigeria; this may be likely due to their progressively declining income-generating capacity or increasing caregiving burdens. The results of this study also show that literate women experienced a significantly lower HFIAS score ($\beta = -1.977$), indicating that literacy may serve as a protective factor. This thus denotes that women who were able to read and write had increasing food security, a finding that supports broader literature highlighting the role of literacy in enhancing women's access to nutrition knowledge, financial literacy, and health services.[1] When women are empowered through schooling and ability to read and write, their contribution towards improving the household food security increases, this will result in reduction of hunger in the population and an overall achievement of an improved nutrition of the population. Given the low levels of tertiary education (0.5%) in the study population, this reinforces the importance of basic literacy as a practical empowerment tool in rural food security strategies, especially in low resource settings like Nigeria.

The significant association between owning of farmland and food insecurity in this study is not surprising. Women who owned farmland had a mean decrease in food insecurity score of -1.462, highlighting the protective role of land in food access. This is in line with evidence from Northern Nigeria showing that secure land tenure supports both food availability and economic stability.[1] Farmland ownership provides a source of food and nutrients, a stable source of income and a direct effect on food prices, food cultivation strongly relates to food security.[8] Although nutrition education was not significantly associated with HFIAS scores in this study, this may reflect limited quality, reach, or frequency of such programs in rural areas. Further investigation is needed to assess the content and delivery of nutrition education in

similar communities. Although at the multivariate level this study found no significant association with food security, keeping backyard gardens provide easy access to a variety of fresh and nutritious food for households and thereby serving as a strategy to enhance household food security.[16,20]

The study findings have direct implications for two critical Sustainable Development Goals. Regarding SDG 2 (Zero Hunger), the persistence of food insecurity despite engagement in rural agricultural activities highlights the need for policies that enhance women's access to productive resources, financial services and literacy, as these factors are closely linked to improved agricultural productivity and household food security.[21] The findings also support SDG 3 (Good Health and Well-being), as food insecurity and poor nutrition are well-established determinants of adverse health outcomes among women of reproductive age. Malnutrition increases the risk of maternal complications, low birth weight and child mortality, identified outcomes that SDG 3 explicitly seeks to reduce.[22] The empowerment of rural women through education, land access, and income generation is therefore not only a food security strategy but a public health imperative.

Conclusion

This study explored the association between selected proxies of women's empowerment and food security in a rural setting. Food insecurity remains a significant challenge to public health especially in rural Northern Nigeria; income and literacy among women are key predictors. This highlights the need to view food insecurity as an empowerment challenge, and not just a nutritional or agricultural issue. Empowerment drives food security, women with education and income-generating opportunities are strengthened in their ability to access and efficiently utilize food resources. Empowerment removes the gendered structural barrier and inequalities, and paves the way for food and nutrition security in Northern Nigeria. These study findings here will enrich the food security policy agenda, especially for integrated interventions that promote women's literacy and access to agricultural inputs, which will be pivotal in the efforts to achieve the Sustainable

Development Goals of ensuring food security and ending hunger. Future research designed longitudinally could attempt to examine changes about these predictors of food insecurity overtime. Also, qualitative research could enhance insight among women especially their perception of empowerment and food access.

The study is cross-sectional, limiting causal interpretations. Additionally, potential confounding factors such as household income variability, food price inflation, market access, and seasonal food availability were not directly assessed. The reliance on self-reported data for food security and empowerment indicators may also introduce response bias. Despite these limitations, this study is strengthened by the fact that a standardized questionnaire of universal applicability was adapted to the local context, and the study used the HFIAS which assesses experiences over the previous 30 days, it is less cumbersome for the respondent and also conforms to the recall time period used in many food and dietary assessment studies.

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