

Factors Associated with Maternal Food Insecurity Among Pregnant Women in a Rural District, Southwest Nigeria

Ajike S. O and Odegbami I. E.

Department of Public Health, School of Allied Health Sciences, Babcock University, Ilisan-Remo, Ogun State, Nigeria

*Corresponding author: ajikes@babcock.edu.ng

Phone number: +2349123261298

ABSTRACT

Background: Maternal food insecurity in rural Nigeria significantly impacts maternal and fetal health.

Objective: This study examined the factors associated with maternal food insecurity among pregnant women in a rural district of South-West Nigeria.

Methodology: A cross-sectional study was conducted among 317 pregnant women attending a primary health centre in Iberekodo, Abeokuta. Data were collected using a structured questionnaire comprising the Food Insecurity Experience Scale, the Multidimensional Scale of Perceived Social Support, and items on socio-demographic and socioeconomic characteristics. Data were analysed using descriptive statistics and binary logistic regression in IBM SPSS version 23 at a 5% significance level.

Results: Most (56.2%) were within 20-29 years, Christians (56.8%), had one child (47.9%), were in monogamous households (61.2%), and had a household size of four (42%). Overall, 62.1% experienced severe food insecurity. Age ($p = 0.008$), marital status ($p = 0.003$), family status ($p = 0.05$), spousal job ($p = 0.011$), and household income ($p = 0.053$) were significantly associated with maternal food insecurity, whereas social support was not. Increasing age was associated with lower odds of food insecurity (OR = 0.42, 95% CI: 0.22–0.80), while single women had higher odds (OR = 65.61, 95% CI: 4.04–1067.09). Women from monogamous families (OR = 0.35, 95% CI: 0.12–1.00) and those with employed spouses (OR = 0.22, 95% CI: 0.08–0.61) had lower odds of food insecurity.

Conclusion: Maternal food insecurity in this community is shaped by a mix of individual and socioeconomic factors, requiring a multi-pronged approach to reduce it.

Keywords: Pregnant women, rural areas, food insecurity, social determinants, Maternal health

Doi: <https://dx.doi.org/10.4314/njns.v47i2.3>

INTRODUCTION

Maternal food insecurity is a major public health concern with serious consequences for the health and well-being of pregnant women (1), who have higher nutritional needs to satisfy the nutrient demands of the growing baby (2). It is particularly concerning for women in Africa (3, 4) and Sub-Saharan Africa, where women are two percent more likely to experience some form of food insecurity than men (5) because of their cultural stance in society (4). Maternal food insecurity is impacted by several complex factors, including individual, family, sociocultural, economic, and political factors

(6), thus requiring a multifaceted approach to its resolution.

Pregnant women in regions faced with armed conflict, war, and severe economic hardship may be facing an even higher risk of severe food insecurity (7). Studies have reported rates of maternal food insecurity between 11% and 80%, with higher prevalence in high-poverty zones (8). Pregnant women from low-income households or marginalized groups are more likely to experience food insecurity and its consequences, thus tripling their burden (6, 9). They often lack resources to cater optimally to the increased nutritional needs, have

inappropriate access to healthcare facilities and poor food access, lack dietary diversity, and, in addition, are at risk of developing physical and mental ill health, affecting pregnant women and their children (10). They are at risk of maternity-related hypertension, anaemia, insufficient or excessive weight gain, depression, and anxiety. At the same time, the children are at risk of low birth weight, premature delivery, and developmental challenges (11).

In developing countries, food insecurity rates have reached 40% (12, 13). In Nigeria, where maternal food insecurity remains a significant challenge, a recent multilevel analysis reported an even higher rate of maternal food insecurity of up to 75%, with multiple influences across micro-, meso-, exo-, and macro-systems (6). Pregnant women in Nigeria frequently face multiple barriers to adequate and nutritious food, including economic, social, and cultural barriers (3). Other factors such as age, education, area of residence (rural versus urban), and social support (6, 14, 15) are also associated factors. In the rural areas of Nigeria, maternal food insecurity is a complicated and multifaceted issue with different variables contributing to its prevalence (16).

The 2030 Sustainable Development Goals (17) represent a global commitment to enhancing maternal and child nutrition across national boundaries. Supporting the short- and long-term health of women and children requires understanding the factors that jeopardize the food supply and nutritional sufficiency of pregnant women and carers of young children (18). Studies in the region, however, have been limited in investigating these factors among rural dwellers in Nigeria (19, 20, 21). Therefore, guided by the determinants of health model (22), which charts the connection among the person, their surroundings, and well-being, this study assessed the extent of maternal food insecurity and its associated factors in Iberekodo, Abeokuta, South-west Nigeria.

METHODS

Study Design

This study employed a cross-sectional design to identify predictors of maternal food insecurity in a sample of 317 pregnant women attending the Primary Healthcare Center in Iberekodo, Abeokuta, Nigeria, between January and March, 2025.

Study Setting

Iberekodo is located in Abeokuta North Local Government Area. The major food crops include cassava, cocoyam, plantains, maize, and vegetables, while palm produce and cocoa form the major

cash crops. The people are predominantly farmers, most of whom cultivate arable crops, while some raise livestock and fish. In recent times, however, the people of the area have engaged in the quarry business, artisan work, and handicrafts such as tie-and-dye making and pottery. The popular Adire fabrics are also produced in some areas of the local government. The Iberekodo Primary Health Centre (PHC) is a public hospital and is the only accessible health facility for pregnant women in that area.

Population and Sample Size

The population was pregnant women who accessed the Primary Healthcare Centre on antenatal days.

Inclusion and Exclusion Criteria

Those included in the study were those who specifically accessed the facility for antenatal services and gave consent, while those who were excluded were those who were at the health facility for other non-antenatal services and were medically unstable because of severe obstetric or medical complications.

Sampling Procedure and Sample Size

The final sample of 317 was determined, giving a proportion of 0.75 food-insecure pregnant women from a similar study. Consecutive sampling was used. Every pregnant woman who attended the antenatal clinic throughout the study period was evaluated for eligibility based on the study's inclusion and exclusion criteria. Women who qualified were approached one-on-one and explained the study's goals and methods. Those who gave informed consent were recruited and asked to complete the questionnaire. Recruitment was carried out successively at each antenatal appointment day until the desired sample size was reached.

Data Collection

A structured composite questionnaire comprising adapted content from similar studies (6, 23) and adopted scales – the Multidimensional Scale of Perceived Social Support (MSPSS) (24) and the Food Insecurity Experience Scale (FIES) (25), was used to collect data. The Food Insecurity FIES and the MSPSS were selected because they measure essential variables related to the study aims. The MSPSS evaluated perceived social support, a possible predictor of food security during pregnancy (15), while the FIES offered a validated measure of maternal food insecurity, which was the main outcome variable. The questionnaire was made available in both Yoruba and English and administered in the language preferred by each respondent. Two research assistants, who were nurses, assisted in

data collection. They received training sessions on the protocol and ethical considerations. The questionnaire was validated by experts in public health and nutrition, and necessary corrections were made, and then pre-tested for internal consistency by administering the instrument to 10% of the study sample (32 pregnant women) at another primary healthcare center in Abeokuta. Internal consistency ranged between 0.77 and 0.95, indicating the instrument's appropriateness for use in the study setting. At the end of each data entry period, the questionnaires were screened and stored. Verbal informed consent was obtained before administering the questionnaire.

Ethical Approval

The study was approved by the Babcock University Health Research Ethics Committee BUHREC 080/25. Additionally, the procedures followed were in accordance with the Helsinki Declaration of 1975. Permission was also sought from the health center's supervisor. Anonymity was maintained throughout the data collection period by excluding respondents' identifiable data. After each data collection, the lead researcher collated and securely stored the questionnaires in an enclosed folder.

Measurement of Variables

Maternal food insecurity

This study's dependent variable was maternal food insecurity. The Food Insecurity Experience Scale (FIES), an eight-item experience-based tool created by the Food and Agriculture Organization (FAO), was used to quantify it. Through questions that reflect varying degrees of food insecurity, from worrying about getting food to going an entire day without eating due to a lack of money or other resources, the scale evaluates respondents' access to sufficient food over the preceding 12 months. Responses were scored Yes (1) or No (0). The overall food insecurity level was determined based on the number of answers. The more "yes" responses, the higher the level of food insecurity. Food insecurity was first coded as Food secure (0-1), mild food insecurity (2-3), moderate food insecurity (4-6), and severe food insecurity (7-8). These were recoded into two categories: food insecure (1) and food secure (0).

Individual, Social, and General Socio-Economic Factors

The individual factors comprised age, religion, marital status, family status, number of children,

household size, and health insurance coverage. Age was collected as a continuous variable based on the last birthday and categorized for analysis. Other variables were measured using appropriate categorical response options. These variables were analysed descriptively and examined for their association with maternal food insecurity.

The perceived social Support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS). The MSPSS is a validated 12-item instrument that assesses an individual's perceived adequacy of support from three sources: family, friends, and significant others. Each source of support is represented by four items. Responses were rated on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Scores for each subscale were obtained by calculating the mean of the four corresponding items. The computed sub-categories were used in the analysis and examined for their relationship to food insecurity.

Data Analysis

Data were entered in IBM SPSS version 27 for analysis after coding. Before the final analysis, variables (education, marital status, employment, spouses' education, and spouses' job) were recoded to cut down on the number of categories and make the model more stable. Percentages, frequencies, and standard deviations were used to describe the independent and dependent variables. Binary logistic regression was used to determine the predictive power of the independent variables on maternal food insecurity. All hypotheses were tested at a 5% level of significance.

RESULTS

Demographic, Individual, and Socio-Economic Characteristics of Respondents

Table 1 showed that most respondents (56.8%) were Christians and had one child at the time of the study (47.9%). Most were also from monogamous homes (61.2%), and most (133, 42%) had a household size of four. Table 1 further describes the individual and socioeconomic factors. The majority (56.2%) were aged 20–29 years. Most respondents were married (78.2%), a higher proportion (39.8%) completed secondary education, and most (48.3%) were self-employed; employment was predominantly in the informal sector. The most common spousal occupation was farming (33.4%). Most households earned between ₦21,000 and ₦50,000 (37.9%) per month, and 65.0% of respondents lived in rented accommodation.

Table 1: Demographic, Individual, and Socioeconomic Characteristics

Category	Response/Group	Frequency (N = 317)	Percentage (%)
Religion	Christianity	180	56.8
	Islam	136	42.9
	Others	1	0.3
Ethnicity	Yoruba	260	82.0
	Igbo	21	6.6
	Hausa	15	4.7
	Others	21	6.6
Number of children	1	152	47.9
	2	101	31.9
	>2	64	20.2
Household size	1	4	1.3
	2	56	17.7
	3	103	32.5
	4	133	42.0
	5	13	4.1
	6	8	2.5
Family status	Monogamy	194	61.2
	Polygamy	123	38.8
Age of pregnant women (years)	18–19	58	18.3
	20–29	178	56.2
	30–39	65	20.5
	40–49	16	5.0
Marital status	Married	248	78.2
	Single	64	20.2
	Widow	1	0.3
	Divorced	4	1.3
Highest educational level	None	4	1.3
	Primary	100	31.5
	Secondary	126	39.8
Employment status	Employee	139	43.9
	Self-employed	153	48.3
	Housewife	25	7.8
Spouse education	Primary	139	43.8
	Secondary	107	33.8
	Tertiary	71	22.4
Spouse's job status	Employee	88	27.8
	Unemployed	23	7.2
	Self-employed	206	65.0
Spouse occupation	Artisan	69	21.8
	Farmer	106	33.4
	Technician	55	17.4
	Trader	35	11.0
	Driver	27	8.5
	Civil Servant	18	5.7
	Others	7	2.2
	≤20,000	52	16.4
Household income (₦)	21,000–50,000	120	37.9
	51,000–100,000	112	35.3
	>100,000	33	10.4
Housing status	Rented	206	65.0
	Owned	111	35.0

Social Factors Related to Maternal Food Insecurity

Table 2 showed that up to 67.2% strongly agreed that a special person is around when they are in need, and 69.7% strongly agreed that there is

someone to share their joys and sorrows. Partner support had a relatively high mean score of 3.37 ± 0.89 . Also, a high proportion of participants strongly agreed that their families try to help them (75.1%) and that they receive emotional help from

family members (70.0%). Furthermore, 79.2% strongly agreed that they can discuss problems with their families, while 74.4% noted that their families assist in decision-making. Family support had the highest mean score of 3.56 ± 0.72 (Figure 1). Furthermore, 36.0% of respondents strongly

agreed that friends try to help them or that they could share joys and sorrows with friends. Fewer respondents felt they could count on friends during crises (30.6%) or discuss problems with them (33.1%) (Table 2). Friend support had the lowest mean score of 2.65 ± 1.12 (Figure 1).

Table 2: Social Factors of Respondents (N= 317)

Social factor	Item	Strongly Agree Freq.(%)	Agree Freq.(%)	Disagree Freq.(%)	Strongly Disagree Freq.(%)
Partner support	There is a special person around when I am in need	213(67.2)	62(19.6)	12(3.8)	30(9.5)
	There is a special person with whom I can share my joys/sorrows	221(69.7)	54(17.0)	12(3.8)	30(9.5)
	I have a special person who is a real source of comfort to me	296(68.1)	51(18.6)	7(2.2)	35(11.0)
	Someone cares about my feelings	230(72.6)	50(15.8)	2(0.6)	35(11.0)
Family support	My family tries to help me	238(75.1)	55(17.4)	6(1.9)	18(5.7)
	I get the emotional help and support I need from family	222(70.0)	55(20.5)	11(3.5)	19(6.0)
	I can talk about my problems with my family	251(79.2)	43(13.6)	3(0.9)	20(6.3)
	My Family is willing to help me make decisions	236(74.4)	49(15.5)	14(4.4)	14(4.4)
Friend support	Friends try to help me	114(36.0)	71(22.4)	59(18.6)	73(23.0)
	I can count on friends when things go wrong	97(30.6)	73(23.0)	73(23.0)	74(23.3)
	I have Friends with whom I can share my joys and sorrows	114(36.0)	62(19.6)	72(22.7)	69(21.8)
	I can talk about my problems with friends	105(33.1)	65(20.5)	69(21.8)	78(24.6)

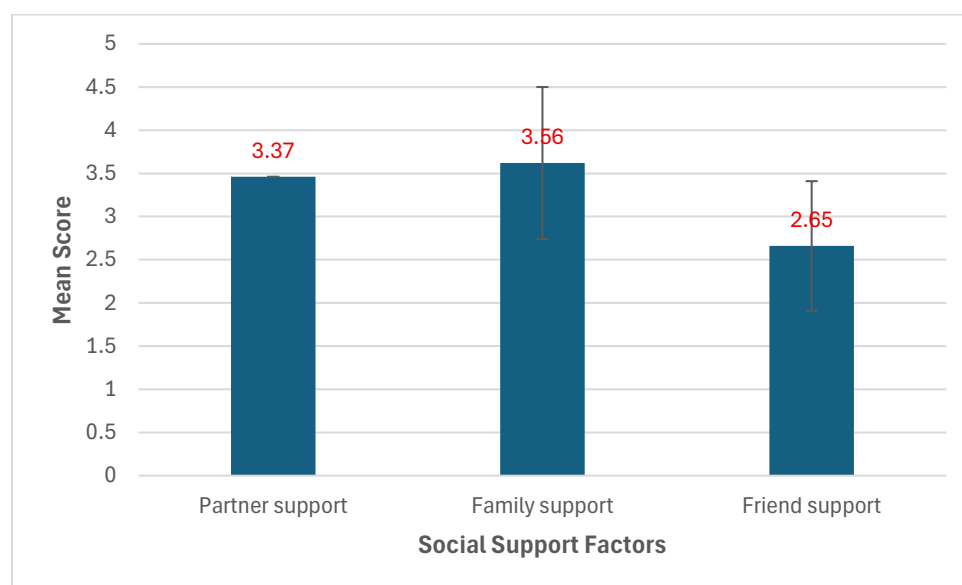


Figure 1: Mean Scores for Social Support Factors

Food Insecurity among Study Participants

Table 3 showed majority reported worrying about having enough food (86.1%), eating only a limited variety of foods (83.9%), eating smaller meals due to lack of resources (82.6%), and feeling hungry without eating because of insufficient resources

(85.5%). More than three-fifths (64.0%) reported not eating for a whole day due to food shortages, while 77.3% indicated that their household had run out of food and could not afford to purchase more. Figure 2 further showed that most pregnant women (62.1%) experienced severe food

insecurity, indicating widespread difficulty in accessing adequate nutrition. Additionally, 25.2% of respondents reported moderate food insecurity,

while only 7.9% of the women were classified as food secure.

Table 3: Food Insecurity Experience Scale (FIES) among Study Participants (N = 317)

Food Insecurity Experience Scale Item	Yes n (%)	No n (%)
Worried that the household would not have enough food to eat	273(86.1)	44(13.9)
Ate only a few kinds of foods because of lack of money or other resources	266(83.9)	51(16.1)
Ate a smaller meal than you felt you should because of lack of money or other resources	262(82.6)	55(17.4)
Skipped a meal because there was not enough money or other resources for food	190(59.9)	127(40.1)
Did not eat for a whole day because there was not enough money or other resources for food	203(64.0)	114(36.0)
Went without eating for a whole day because of lack of money or other resources for food	263(83.0)	54(17.0)
The household ran out of food and could not afford to buy more	245(77.3)	72(22.7)
Felt hungry but did not eat because of lack of money or other resources for food	271(85.5)	46(14.5)

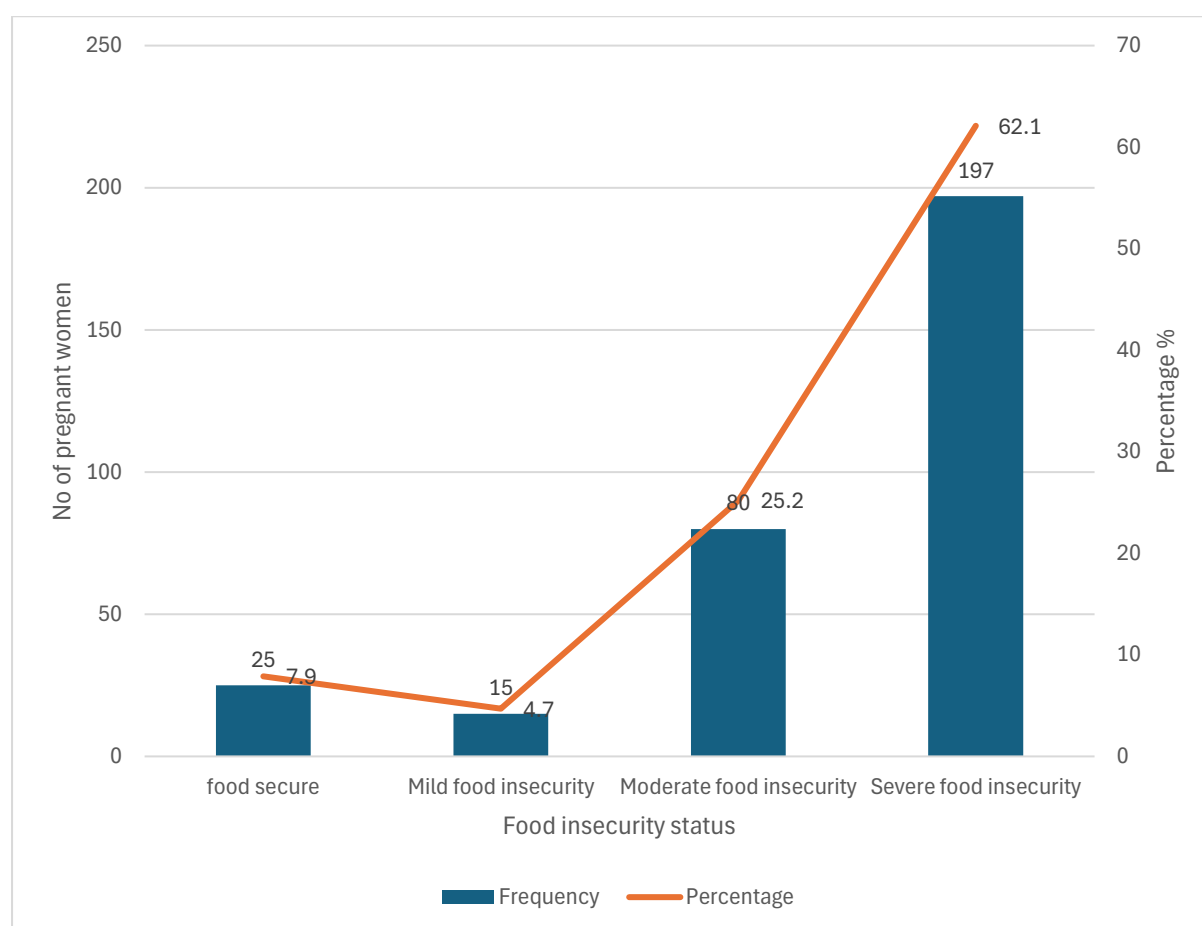


Figure 2: Food Insecurity Status of Respondents

Binary Logistic Regression Showing the Odds of Food Insecurity/Security by Individual, Socioeconomic, and Social Support Factors

Table 5 shows the multivariable binary logistic regression identifying the individual, general socioeconomic factors, and social support factors linked to food insecurity among respondents. Increasing age was significantly associated with reduced odds of food insecurity (aOR = 0.38; 95% CI: 0.22–

0.64; $p < 0.001$). Married respondents were also significantly less likely to experience food insecurity compared with those who were not married (aOR = 0.21; 95% CI: 0.08–0.58; $p = 0.003$). Education level, employment status, spouse-related characteristics, household income, housing status, and perceived social support from family, friends, and significant others were not independently associated with food insecurity in the adjusted model ($p > 0.05$).

Table 5: Binary Logistic Regression Showing the Odds of Food Insecurity/Security by Individual, Socioeconomic, and Social Support Factors

Predictor	Category / Scale	AOR (Exp(B))	95% CI	p-value
Age (years)	Continuous	0.38	0.22–0.64	<0.001 ¹
Marital status	Not married (ref)	1.00	–	–
	Married	0.21	0.08–0.58	0.003 ²
Education level	Low education (ref)	1.00	–	–
	High education	0.68	0.27–1.67	0.394
Employment status	Unemployed (ref)	1.00	–	–
	Employed	0.68	0.18–2.59	0.569
Spouse education	Low education (ref)	1.00	–	–
	High education	0.98	0.40–2.40	0.961
Spouse employment	Unemployed (ref)	1.00	–	–
	Employed	1.81	0.23–14.54	0.576
Household income	Continuous	1.00	1.00–1.00	0.162
Housing status	Rented (ref)	1.00	–	–
	Owner-occupied	1.12	0.45–2.77	0.805
Family support	Continuous	0.83	0.37–1.89	0.656
Friend's support	Continuous	1.25	0.84–1.87	0.273
Significant others support	Continuous	0.89	0.44–1.81	0.745

Notes: Adjusted odds ratios (AOR) obtained from binary logistic regression analysis. Outcome variable: food insecurity (1 = food insecure, 0 = food secure). Reference categories are indicated as (ref). Continuous variables were entered per unit increase. ^{1,2} Significant at < 0.005

DISCUSSION

This study found a very high prevalence of food insecurity among respondents, highlighting it as a major public health concern in the study setting. This age group, while typically associated with better health outcomes due to their young age, may still be vulnerable to food insecurity due to economic instability, limited autonomy, and social dependence, particularly in rural and peri-urban settings (26). The prevalence observed is consistent with findings from several Nigerian studies that have reported high prevalence of maternal food insecurity (6, 27, 28) in both urban and rural communities experiencing economic pressure, rising food prices, and unstable income sources. Ujah et al (6) reported an estimated 75% food insecurity prevalence among pregnant women in their study. In another study (27), up to 70% of pregnant women participating in a prenatal intervention programme were food insecure. A nationwide

study also found up to 45% prevalence of food insecurity among pregnant women, with increased likelihood among pregnant women in the north-east and south-east regions. High levels of food insecurity have been documented in Ethiopia and Indonesia with similar demographics (19, 29). Both reported prevalence rates of over 50%, with (29) reporting higher rates in rural areas. This aligns generally with this study's area, further confirming high prevalence in rural regions.

Age emerged as a significant protective factor against food insecurity, with older respondents having lower odds of being food insecure. This finding aligns with evidence from local Nigerian studies that reported significant associations between age and food insecurity among pregnant women (27). In this study (27), the prevalence of food insecurity was highest among the youngest age group, those under 25 years old. Younger adults, particularly those in the early stages of

economic independence, often face employment instability and lower incomes, which increases their vulnerability to food insecurity (30).

Marital status was also a significant predictor, with married respondents being less likely to experience food insecurity compared with those who were not married. This finding contrasts with others (28), who found that being married was associated with an increased likelihood of food insecurity (28). Even though (28) found an increased likelihood of food insecurity among the married participants, this relationship was also found for the widowed, divorced, or separated. However, studies elsewhere found associations between marital status and food insecurity; those who were married were less food insecure (31). Another study in Uganda also found that being married was protective of food insecurity (32). Generally, findings are mixed related to these associations and are more likely to depend on context.

Contrary to expectations, educational level, employment status, household income, housing status, spousal characteristics, and perceived social support were not independently associated with food insecurity in the adjusted model. Although education and employment are commonly identified as strong determinants of food security in both Nigerian and international studies (8, 18, 28, 31, 33), the lack of significant associations in this study may reflect homogeneity within the study population or limited variability across socioeconomic categories. Similar non-significant findings have been reported in a Nigerian study (21) where most respondents shared comparable socioeconomic characteristics.

The absence of a significant association between perceived social support and food insecurity contrasts with some international studies that highlight social support as a protective factor against food insecurity (15, 34, 35). Studies related to the social support role in food security in Nigeria are sparse, limiting local comparisons.

This study has its strengths and limitations. This study used a large sample size and standard analytical methodologies to give empirical information on the magnitude and drivers of food insecurity among pregnant women. The use of multivariable binary logistic regression enabled the adjustment of potential confounders, increasing the validity of the findings. Furthermore, the inclusion of a diverse set of variables provides a thorough assessment of the factors associated with food insecurity. The study also provides context-specific data that can be used to develop nutrition policies and

programmes in the area. However, some limitations include the cross-sectional design, which limits the demonstration of causal links between food insecurity and the identified risk factors. Food insecurity and social support data were self-reported, which may have been influenced by recall and social desirability bias. Furthermore, respondents' generally comparable socioeconomic characteristics may have reduced variability, making it difficult to find significant relationships for some factors. Also, conducting the study in a single health facility limits generalizability. Nonetheless, the study provides significant evidence on factors related to food insecurity in Iberekodo, Abeokuta.

CONCLUSION

In this study, most of the pregnant women experienced severe food insecurity, which was associated with several sociodemographic factors; only age and marital status independently predicted it. Given these findings, routine food insecurity screening and targeted nutrition support programmes for younger and unmarried pregnant women should be integrated into antenatal care services to improve maternal nutritional outcomes.

ACKNOWLEDGEMENTS

The authors would like to thank all respondents who participated in this study

REFERENCES

1. Myers, C. A. (2020). Food Insecurity and Psychological Distress: A Review of the Recent Literature. *Current Nutrition Reports*, 9(2), 107–118.
2. McKay, F. H., Spiteri, S., Zinga, J., Sulemani, K., Jacobs, S.E., Ranjan, N., Ralph, L., Raiburn, E., Threlfall, S., Bergmeier, M. L., & van der Pligt, P. (2022). Systematic Review of Interventions Addressing Food Insecurity in Pregnant Women and New Mothers. *Current Nutrition Reports*, 11(3), 486–499.
3. Awodele, A. O., & Olajide, O. A. (2020). The Link Between Maternal Health and Women's Food Security in Rural Communities: Case Study of Smallholder Farmers in Nigeria. *International Journal of Public Health*, 10(1), 109–123.
4. Odey, G. O., Adegbite, M. A., Denkyira, S. A., Alhaj, S. M., & Lucero-Prisno, D. E. (2022). Women and food security in Africa: The Double Burden in Addressing Gender Equality and Environmental Sustainability. *Advances in Food Security and Sustainability*, 7, 35–59.
5. Broussard, N. H. (2019). What Explains Gender Differences in Food Insecurity? *Food Policy*, 83, 180–194.

6. Ujah, O. I., Olaore, P., Ogbu, C. E., Okopi, J. A., & Kirby R. S. (2023). Prevalence and Determinants of Food Insecurity among Pregnant Women in Nigeria: A Multilevel Mixed Effects Analysis. *PLOS Global Public Health*, 3(10), e0002363.
7. Food and Agriculture Organization of the United Nations. (2022). The State of Food Security and Nutrition in the World 2022. <https://www.fao.org/publications/fao-flagship-publications/the-state-of-food-security-and-nutrition-in-the-world/en>. Retrieved November 11th, 2024.
8. Azevedo, F. M., Morais, N. S. S., Silva, D. L. F., Candido, A. C., Morais, D., Priore S. E., & Franceschini, S. C. (2023). Food Insecurity and its Socioeconomic and Health Determinants in Pregnant Women and Mothers of Children Under 2 Years of Age During The COVID-19 Pandemic: A Systematic Review and Meta-Analysis. *Frontiers in Public Health*, 11, 1087955.
9. Ujah, O. I., Olaore, P., Ogbu, C. E., Okopi, J. A., & Kirby, R. S. (2023). Prevalence and Determinants of Food Insecurity among Pregnant Women in Nigeria: A Multilevel Mixed Effects Analysis. *PLOS Global Public Health*, 3(10): e0002363.
10. Iqbal, S., & Ali, I. (2020). Maternal Food Insecurity in Low-Income Countries: Revisiting Its Causes and Consequences for Maternal and Neonatal Health. *Journal of Agriculture and Food Research*, 3, 100091.
11. Agho, K. E., & Van Der Pligt, P. (2023). BMC Pregnancy And Childbirth - 'Screening and Management of Food Insecurity in Pregnancy.' *BMC Pregnancy and Childbirth*, 23(1).
12. Arora, S., Nabi, T., Oberoi, S., & Awasthi, V. (2024). Prevalence of Household Food Security and Health-Related Quality of Life: Special Consideration on The Expectant Mothers In Punjab. *The Indian Economic Journal*, 72(3), 540-553.
13. Kazemi, F., Masoumi, S. Z., Shayan, A., & Yasaghi, S. Z. S. (2020). Prevalence of Food Insecurity in Pregnant Women and Its Association with Gestational Weight Gain Pattern, Neonatal Birth Weight, and Pregnancy Complications in Hamadan County, Iran, In 2018. *Agriculture & Food Security*, 9(1).
14. Akanbiemu, F., Fatiregun, A., & Adejugbagbe, A. (2016). Determinants Of Household Food Insecurity in Rural and Urban Districts of a Southwest State, Nigeria. *Asian Journal of Agricultural Extension Economics & Sociology*, 13(3), 1–11.
15. Sharifi, N., Dolatian, M., Mahmoodi, Z., & Mehrabi, Y. (2017). The Relationship Between Social Support and Food Insecurity in Pregnant Women: A Cross-Sectional Study. *Journal of Clinical and Diagnostic Research*, 11(11), IC01–IC06.
16. Idris, A., Otekunrin, O. A., Akinbode, S. O., & Otekunrin, A. O. (2020). Food Security in Nigeria: Impetus for Growth and Development. *Journal of Agriculture Economics and Rural Development*. 6(2): 800-813.
17. United Nations (2025). The 17 goals. <https://sdgs.un.org/goals>. Retrieved May 09, 2025
18. Bastian, A., Parks, C., Yaroch, A., McKay, F. H., Stern, K., van der Pligt, P., MacNoughton S. A., & Lindberg, R. (2022). Factors Associated with Food Insecurity among Pregnant Women and Caregivers of Children Aged 0–6 Years: A Scoping Review. *Nutrients*, 14(12), 2407.
19. Ashagidigbi, W. B., Afolabi O. A., & Adeoye I. B. (2017). Food Insecurity Status among Female Headed Households in Nigeria. *Management, Economic Engineering in Agriculture and Rural Development*, 17, 3, 69-74.
20. Elum A.A & Digitemie T. (2023). Assessment of Food Security Status of Rural Women in Bayelsa State, Nigeria. *Scientific African*, 21 (e01878).
21. Kayode, O. O., & Alabi, Q. K. (2025). Prevalence and Contributing Factors of Household Food Insecurity among Women in Akinyele Local Government, Ibadan, Oyo State, Nigeria. *The Pan African Medical Journal*, 52, 50.
22. Dahlgren, G., & Whitehead, M. (2021). The Dahlgren–Whitehead Model Of Health Determinants: 30 Years On and Still Chasing Rainbows. *BMJ Global Health*, 6(10), e005598.
23. Shreffler, K. M., Dressler, C. M., Ciciolla, L., Wetherill, M. S., & Croff, J. M. (2024). Maternal Periconception Food Insecurity and Postpartum Parenting Stress and Bonding Outcomes. *Frontiers in Nutrition*, 11.
24. Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*, 52(1), 30–41.
25. Food and Agriculture Organization of the United Nations. (2017). The Food Insecurity Experience Scale: Developing a Global Standard for Monitoring Hunger Worldwide. FAO. <https://www.fao.org/3/i7835e/i7835e.pdf>. Retrieved Sept 12th, 2024
26. Ogunniyi, A. I., Omotayo, A. O., Olagunju, K. O., Rufai, M. A., Salman, K. K., Omotayo, O.P., Oyediran, B., Adejoorin, M. V, Awotide, B.A & Aremu, A. O. (2024). Evaluating The Role Of

- Households' Food Security Status and Socioeconomic Determinants on Child Mortality in Nigeria. *Child Indicators Research*, 17(4), 1687–1714.
27. Nnakwe, E. N. (2018). The Prevalence of Food Insecurity among Pregnant Women in a Community-Based Intervention Program. *FASEB Journal*, 31(1_suppl), 791.11.
 28. Ogbuabor, D. C. (2024). Magnitude and Determinants of Food Insecurity among Pregnant Women in Nigeria: Evidence From a Nationwide Cross-Sectional Survey. *International Journal of Medicine and Health Development*, 29(3), 227–237.
 29. Azrimaidaliza, A., Resmiati, R., Islami, G. F., Farsrini, U. U., & Apriliani, A. D. (2025). Is Food Insecurity Higher among Pregnant Women in Rural Areas of Indonesia? *Gulhane Medical Journal*, 67(2), 108–115.
 30. Bhawra, J., Kirkpatrick, S. I., & Hammond, D. (2021). Food Insecurity among Canadian Youth and Young Adults: Insights From The Canada Food Study. *Canadian Journal of Public Health = Revue Canadienne de Sante Publique*, 112(4), 663–675.
 31. Areba, A. S., Akiso, D. E., Haile, A., Abire, B. G., Kanno, G. G., Tireore, L. L., & Abame D. E. (2024). Factors Associated with Food Insecurity among Pregnant Women in Gedeo Zone Public Hospitals, Southern Ethiopia. *Frontiers in Public Health*, 12, 1399185.
 32. Rutayisire, E., Habtu, M., Ngomi, N., Mochama, M., Mbayire, V., Ntihakose, C., & Muhire, P (2023). Magnitude and Determinants of Food Insecurity among Pregnant Women in Rwanda During The COVID-19 Pandemic. *Journal of Agriculture and Food Research*, 11, 100468.
 33. Razavinia, F., Ebrahimian, A., Abedi, P., Cheraghian, B., Jahanfar, S. (2025). Food Insecurity and Its Associated Factors among Pregnant Women in Southwest Iran. *Scientific Reports*, 15, 42378.
 34. Frongillo, E. A., Nguyen, H. T., Smith, M. D., & Coleman-Jensen, A. (2019). Food Insecurity Is More Strongly Associated With Poor Subjective Well-Being In More-Developed Countries Than In Less-Developed Countries. *The Journal of Nutrition*, 147(5), 879-885.
 35. Wemakor, A., Bukari, M., & Atariba, R. (2023). Household Food Insecurity, Low Maternal Social Support and Maternal Common Mental Disorders in East Mamprusi Municipality, Ghana. *BMC Public Health*, 23, 1255.