



ASSESSMENT OF WOMEN'S PARTICIPATION IN MAIZE PRODUCTION IN HAWUL LOCAL GOVERNMENT AREA, BORNO STATE, NIGERIA

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ABSTRACT

The study assessed the participation of women maize farmers in Hawul Local Government Area, Borno State. Multi-stage sampling was used to select 290 respondents. Data were collected with structured questionnaires and analyzed using descriptive statistics and regression. Findings show that 53.4% of the respondents earn below ₦100,000 annually and cultivate 1–5 hectares, while 39.3% have 5–10 years of farming experience. Majority (74.1%) of the respondents lack access to credit, and only 25.5% belong to farmer associations. Educational levels were varied, with 33.1% of the respondents attained tertiary education and 28.6% secondary education. Participation was highest in harvesting (90.7%), weeding (86.6%), and land clearing (81.0%). However, fewer women engaged in value addition such as processing (56.2%) and roasting/milling (53.8%), reflecting gaps in post-harvest technology. Regression results showed that income ($\beta = 0.329$, $p < 0.001$), credit access ($\beta = 0.282$, $p < 0.001$), education ($\beta = 0.176$, $p = 0.001$), and association membership ($\beta = 0.178$, $p = 0.001$) significantly influenced participation. The model explained 85% of the variance ($R^2 = 0.85$). Major constraints included limited land access (78.6%), financial constraints (83.4%), poor credit access (62.8%), inadequate information (67.9%), pest/disease outbreaks (70.3%), and erratic rainfall (57.9%). Nearly half (49.7%) reported discrimination, and 39.7% experienced theft of produce. Enhancing Access to Credit: This study concludes that women's participation in maize production in Hawul Local Government Area is substantial and indispensable, but significantly constrained by limited access to financial resources, land, and agricultural support services. Enhancing women's access to credit, strengthening cooperative membership, and improving their socioeconomic conditions are therefore critical steps toward increasing their productivity and fully harnessing their contribution to maize production in the area. Financial institutions and development organizations should design and implement accessible credit facilities tailored to women farmers. These facilities should feature low-interest rates and flexible repayment terms to encourage adoption and utilization. Capacity Building and Training: Educational programs and vocational training should be developed to improve women's literacy and technical skills in modern agricultural practices. These initiatives should be implemented through farmer cooperatives, local NGOs, and government extension services to ensure broad participation and impact.

Keywords: Women, Farmers, Maize, Production, Constraints, Participation.

INTRODUCTION

Maize (*Zea mays*), commonly known as corn, is a staple food crop cultivated across Africa, Asia, and Latin America. In Nigeria, it is a vital cereal grown in diverse ecological zones, contributing to food security and economic development (FAO, 2020). Its importance is evident in its indigenous names: 'Agbado' in Yoruba, 'Massara' in Hausa, and 'Ogbado' in Igbo (Nwokocha, 2019). Beyond human consumption, maize is used in livestock feed, industrial processing, and biofuel production (Ojo & Adebayo, 2021). Women play critical roles in agriculture worldwide, participating in land preparation, planting, weeding, harvesting, and processing (Aina *et al.*, 2018). Despite this, their contributions, especially in maize production, are undervalued and underrepresented in research and policy (Eze & Okpara, 2020). Gender disparities in access to land, credit, inputs, and extension



services continue to constrain women's productivity (World Bank, 2021). In Nigeria, maize is consumed in diverse forms and its by-products hold economic value (IITA, 2022). Women make up 60–80% of the agricultural labor force and produce about two-thirds of food (Akinola *et al.*, 2019). Yet, socio-cultural and institutional barriers limit their decision-making roles (Adesina & Olanrewaju, 2020). Literature often generalizes women's roles, neglecting aspects such as access to resources, authority, and socio-cultural influences (Oseni & Alabi, 2021). The links between women's participation, food security, income, and rural development also remain underexplored (Ogunleye & Adebisi, 2022). This study therefore analyzes women's roles in maize production, their access to resources, and their contributions to household and community well-being. Findings will inform gender-responsive policies that support women's productivity and economic empowerment.

The primary objective is to analyse women's participation in maize production. the specific objectives were to;

- i. describe the socio-economic characteristics of the respondent in the study area;
- ii. evaluate the extent of women participation on maize production;
- iii. determine the factors influencing women participation in maize production; and
- iv. identify the constraints to women participation in maize production in the study area.

METHODOLOGY

The Study Area

Hawul Local Government Area (LGA) is located in the southern part of Borno State, Nigeria, on the Biu Plateau. It lies approximately between latitudes 10° 43' N and longitudes 12° 25' E with an estimated total land area of about 2,098 km² and a population of 120,314 persons, of which 60,319 were women according to the 2006 National Population Census (National Population Commission [NPC], 2006). The projected population for 2024 was estimated at 158,814 based on an annual growth rate of 3.2 percent. The area is bordered to the north by Biu LGA, to the south by Shani LGA, and to the southeast by Askira Uba LGA (Majid, 2019). Hawul LGA lies within the Sudan Savanna ecological zone of Nigeria, characterized by scattered shrubs, grasses, and trees adapted to the sub-humid climate (National Farmers' Helpline [NFHL], 2024; Dibal, *et al.*, 2020). Although the area is rich in forest reserves and hilly landscapes such as Gar Marama and Gar Ngwa, most of the original vegetation has been cleared due to anthropogenic activities, particularly agricultural expansion (Dibal *et al.*, 2020). The LGA is known for agricultural production, with pilot agro-ecological assessments indicating that the area is suitable for raising seedlings such as garden eggs, pepper, and tomatoes, while farmers predominantly cultivate maize, groundnuts, cocoyam, and soybean (Dibal *et al.*, 2020). The inhabitants of Hawul are mainly of the Bura ethnic group, a Chadic-speaking community consisting of various clans such as Bwala, Mshelia, Dibal, and Wakawa, residing in rural settlements like Ngwa, Shaffa, Sakwa, Malang, Tidang, Marama, Shinduffu, Goski, and Yimirshika (Majid, 2019). The economic and social activities in these settlements have contributed to changes in the landscape and ecosystem, affecting the biodiversity of the area (Dibal *et al.*, 2020). Hawul LGA also has substantial potential for aquaculture development due to the availability of freshwater streams, springs, rivers, reservoirs, and floodplains. Prominent among these water bodies are River Hawul, Marama Dam, Ya'shuwa, and Ya'Yara, which provide suitable conditions for fish production. These water resources, if properly harnessed, could enhance fish farming and contribute significantly to household food security and income generation in the LGA (Dibal *et al.*, 2020).

Sampling Procedure and Sample Size

The target population for this study comprises women engaged in maize farming within Hawul Local Government Area (LGA) of Borno State. The selection of respondents was conducted in two stages. Hawul LGA consists of twelve (12) wards, namely: Bilingwi Ward, Dzar/Vinadum/Birni/Dlandi Ward, Gwanzang Pusda Ward, Hizhi Ward, Kida Ward, Kwajaffa/Hang Ward, Kwaya-Bur/Tanga Rumta Ward, Marama/Kidang Ward, Pama/Whitambaya Ward, Puba/Vidau/Lokoja Ward, Sakwa/Hema Ward, and Shaffa Ward. In the first stage, purposive sampling was used to identify three wards (Marama/Kidang, Kwajafa, and Shaffa) with a high concentration of women engaged in maize farming. In the second stage, a random sampling technique



was employed to select respondents within the chosen wards. Equal opportunity for selection was maintained, and the number of respondents from each ward was determined using proportional allocation based on the total number of registered female maize farmers in each ward.

Table 1: Sample Size Selection Plan

S/N	District	No. of Villages	Villages Selected	Registered Farmers	Farmers Selected	% Selected
1	Marama/Kidang	12	2	98	82	83.7%
2	Kwajafa	16	3	120	101	84.2%
3	Shaffa	15	4	127	107	84.3%
	Total	43	9	345	290	84.1%

Source: Field Survey, 2024.

Method of Data Analysis

The data were collected using structured questionnaire and were analyzed using both descriptive and inferential statistics. Descriptive statistics such as frequencies, percentages, and means were used to achieve objective i, ii, and iii while inferential statistics in the form of multiple regression was used to achieve objective iv. The model is specified implicitly and explicitly as follows;

$$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, e) = a + \beta_1 + 1 \beta_2 + 2 \beta_3 + 3 \beta_4 + 4 \beta_5 + 5 \beta_6 + 6 + e \text{ where}$$

Y = level of participation (activities participation score)

$X_1 - X_9$ = independent variables

X_1 = Age (years)

X_2 = educational level (primary, secondary, tertiary and non-formal)

X_3 = family size (ha.)

X_4 = access to adequate space (ha.)

X_5 = association membership (yes = 1; if otherwise = 0)

X_6 = Primary occupation (farming, civil service)

X_7 = farming Experience (years)

X_8 = access to credit (yes = 1; if otherwise = 0)

X_9 = marital status (married, single, divorce)

e = error term

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Women Maize Producers

Understanding the socio-economic characteristics of women in maize production is vital for assessing participation, constraints, and contributions to agricultural development. Table 2 summarizes variables such as age, marital status, education, income, farming experience, farm size, credit access, and association membership. Age distribution shows 39.7% of respondents within the ages of 20–29 years, 29.8% were within 30–39, and only 10.7% were within the ages of 50 years and above. This indicates that younger and middle-aged women dominate maize production, consistent with Aina *et al.* (2018), who noted younger farmers' strength and openness to technology. Marital status reveals that 47.9% of the respondents were married, 43.0% single, and 9.1% divorced or widowed, suggesting marriage does not restrict participation, as also reported by Adesina and Olanrewaju (2020). Education levels are relatively high: 33.1% attained tertiary education, 28.9% secondary, and 19.8% had non-formal education. Education enhances access to inputs and extension services (Oseni & Alabi, 2021). Income distribution shows 53.7% of the respondents earned below ₦100,000, 24.8% earned ₦100,000–₦200,000, and 21.5% earned above ₦200,000, reflecting low earnings, consistent with Ogunleye and Adebisi (2022). Farming experience indicates 39.7% of the respondents had 5–10 years, 29.8% less than five years, and 11.5% over 20 years. This supports Eze and Okpara (2020), who observed younger generations entering maize farming. Farm size remains small, with 53.7% cultivating 1–5 hectares and only 6.6% above 10 hectares, aligning with Akinola *et al.*



al. (2019) on land access constraints. Credit access is limited; 74.3% of the respondents lack access, and of the 25.7% who accessed it, most relied on family support. This agrees with World Bank (2021) on women's financing challenges. Finally, 74.3% are not members of associations, though among the 25.7% who are, most had 5–10 years of membership. Ojo and Adebayo (2021) emphasized that such affiliations improve access to inputs, extension, and credit.

Table 2: Distribution of Respondents Based on the Socio-economic Characteristics of Women Maize Producers in the Study Area (n = 290)

Socio-economic Characteristics	Frequency	Percentage	Mean
Age			34.7
20 – 29	115	39.7%	
30 – 39	86	29.8%	
40 – 49	58	20.0%	
50 years and above	31	10.7%	
Marital Status			—
Single	125	43.0%	
Married	139	47.9%	
Divorced/Widowed	26	9.1%	
Educational Background			—
Primary Education	53	18.2%	
Secondary Education	84	28.9%	
Tertiary Education	96	33.1%	
Non-Formal Education	57	19.8%	
Income (₦)			₦117,586.21
Less than 100,000	156	53.7%	
100,000 – 200,000	72	24.8%	
Above 200,000	62	21.5%	
Farming Experience			9.55
Less than 5 years	86	29.8%	
5 – 10 years	115	39.7%	
11 – 20 years	56	19.0%	
20 years and above	33	11.5%	
Farm Size			3.74
Less than 1 hectare	72	24.8%	
1 – 5 hectares	156	53.7%	
6 – 10 hectares	43	14.9%	
Above 10 hectares	19	6.6%	
Access to Credit			—
Yes	75	25.7%	
No	215	74.3%	
Membership of Association			—
Yes	75	25.7%	
No	215	74.3%	

Source: Field Survey, 2024.

Women's Participation in Maize Production Activities

The findings in Table 3 reveal high women's engagement in maize production, especially in labour-intensive tasks such as harvesting (91.0%), weeding (86.9%), and marketing (84.5%). These contributions are vital for food security and income generation, supporting Quisumbing and Pandolfelli (2010), who emphasized women's underestimated role in cultivation, processing, and marketing, and the need for gender-responsive support in resources, credit, and technology. Lower participation in fertilizer application (57.9%), processing (56.2%), and value addition (53.8%) reflects barriers linked to capital, technical skills, and institutional support, consistent with Doss (2018). Similarly, Ogunlela and Mukhtar (2009) noted that women perform most farm labor but engage less in transformative activities due to cultural norms, time poverty, and poor infrastructure. Women's strong involvement in marketing (84.5%) aligns with FAO (2011), which highlights that empowering women in value chains improves nutrition, household welfare, and rural development. This suggests significant entrepreneurial potential that could be enhanced through training and micro-enterprise initiatives.

Table 3: Distribution of Respondents accordint to Participation in Maize Production Activities (n=?)

Production Activity	Response	Frequency	Percentage
Land Clearing Participation	Yes	98	81.0
	No	23	19.0
Seed Selection & Sorting	Yes	85	70.2
	No	36	29.8
Inter & Intra Row Spacing	Yes	75	62.0
	No	46	38.0
Weeding Participation	Yes	105	86.8
	No	16	13.2
Fertilizer/Manure Application	Yes	70	57.9
	No	51	42.1
Harvesting Participation	Yes	110	90.9
	No	11	9.1
Moisture Content Management Pre-Storage	Yes	82	67.8
	No	39	32.2
Maize Storage (Bags)	Yes	92	76.0
	No	39	24.0
Processing Participation	Yes	68	56.2
	No	53	43.8
Value Addition (roasting, milling)	Yes	65	53.7
	No	56	46.3
Marketing of Harvested Maize	Yes	102	84.3
	No	19	15.7
Total			100.0

Source: Field Survey, 2024

Additionally, the engagement of women in post-harvest handling (67.9% for moisture control and 76.2% for storage) shows awareness of quality maintenance practices, which is crucial in reducing losses and enhancing profitability. This observation supports the argument by World Bank, FAO, and IFAD (2009) that investing in women farmers can generate productivity gains and poverty reduction benefits when they are equipped with the same resources as men. Constraints Faced by

Women in Maize Production Women engaged in maize production in Hawul LGA face numerous interrelated constraints that limit their productivity, income, and participation in agricultural development. These constraints are both structural and systemic, reflecting the socio-cultural, economic, institutional, and environmental challenges that rural women farmers commonly face in conflict-prone and under-resourced areas. The findings presented in Table 4 reveal a multifaceted picture of the obstacles encountered by women maize farmers. The responses were gathered from 290 women farmers and provide insight into the prevalence and severity of each constraint.

Table 4: Distribution of Respondents based on the Constraints in Maize Production (N = 290)

Constraint	Response	Frequency	Percentage (%)
Poor Access to Farmland	Yes	228	78.6
	No	62	21.4
Financial Constraint	Yes	242	83.4
	No	48	16.6
Lack of Access to Credit	Yes	182	62.8
	No	108	37.2
Poor Access to Agricultural Information	Yes	197	67.9
	No	93	32.1
Gender-Based Discrimination	Yes	144	49.7
	No	146	50.3
Erratic Rainfall and Climate Variability	Yes	168	57.9
	No	122	42.1
Pest and Disease Outbreaks	Yes	204	70.3
	No	86	29.7
Theft of Farm Produce	Yes	115	39.7
	No	175	60.3
Insecurity and Fear of Attacks	Yes	173	59.7
	No	117	40.3
Poor Road and Market Infrastructure	Yes	186	64.1
	No	104	35.9
High Cost of Agricultural Inputs	Yes	213	73.4
	No	77	26.6
Limited Access to Extension Services	Yes	169	58.3
	No	121	41.7
Cultural and Religious Restrictions	Yes	121	41.7
	No	169	58.3

Source: Field Survey, 2024

Factors Influencing Women Participation in Maize Production in the Study Area

The regression model used in this study provides strong explanatory power for understanding the determinants of women's participation in maize production in the study area. The model explains 85% of the variation in participation ($R^2 = 0.85$), and remains robust after adjusting for the number of predictors (Adjusted $R^2 = 0.83$), with the overall model being statistically significant ($F = 32.15$, $p < 0.001$). The significance of all seven explanatory variables indicates that women's participation in maize production is jointly shaped by economic, human-capital, and social-capital factors. The results show that income has the strongest positive influence on women's participation ($\beta = 0.329$, $p < 0.001$).

Higher-income women are more capable of purchasing agricultural inputs, hiring labour, and investing in productivity-enhancing technologies. This finding is consistent with IFPRI's evidence that women's agricultural productivity is strongly constrained by financial resources and capital access (Doss, 2018; Meinzen-Dick *et al.*, 2019). Studies in Nigeria similarly show that income enhances women's ability to participate effectively in crop production (Ogunlela & Mukhtar, 2009). Access to credit ($\beta = 0.282$, $p < 0.001$) also exerts a significant positive influence, reinforcing the role of liquidity in sustaining agricultural participation. Credit alleviates financial barriers, allows timely purchase of farm inputs, and encourages investment in improved technologies. Several studies support this view, noting that credit increases women's farm productivity and decision-making power (Adesina *et al.*, 2020; IFPRI, 2017). Farm size ($\beta = 0.134$, $p = 0.020$) likewise positively affects participation, which aligns with empirical evidence that land access determines women's production scale and adoption of improved practices (FAO, 2019).

Table 5: Factors Influencing Women Participation in Maize Production

Variable	Coefficient (β)	Standard Error	t-Value	p-Value	Significance
Age (X1)	0.241	0.063	3.83	0.000	***
Education (X2)	0.176	0.045	3.91	0.001	***
Income (X3)	0.329	0.072	4.57	0.000	***
Farming Experience (X4)	0.203	0.059	3.44	0.002	***
Access to Credit (X5)	0.282	0.069	4.09	0.000	***
Farm Size (X6)	0.134	0.056	2.39	0.020	**
Association Membership (X7)	0.178	0.048	3.71	0.001	***
Constant (α)	1.234	0.254	4.86	0.000	-

Source: Field Survey 2024

The influence of education ($\beta = 0.176$, $p = 0.001$) and farming experience ($\beta = 0.203$, $p = 0.002$) further highlights the relevance of human capital. Educated women are more likely to understand and adopt improved agronomic practices and engage effectively with extension services. This concurs with empirical literature showing that education enhances women's agricultural productivity through improved managerial skills and technology adoption (Adebayo & Adeola, 2020; Ndagi *et al.*, 2021). Similarly, women with greater farming experience tend to have stronger technical knowledge, better resource allocation abilities, and greater resilience in production activities (OpenEdition Journals, 2018). Age ($\beta = 0.241$, $p < 0.001$) also positively influences participation. Older women typically possess greater practical knowledge, stronger social networks, and more stable access to land and household assets. Nigerian studies (Njoku & Odii, 2016) support this pattern, reporting that older rural women tend to be more involved in crop production due to experience and household decision-making power. Lastly, membership in associations ($\beta = 0.178$, $p = 0.001$) significantly predicts participation. Farmer groups provide women with access to extension services, cooperative credit schemes, market information, and input-sharing networks. This finding aligns with prior research showing that social capital enhances women's access to resources and improves their production outcomes (Mbugua & Ondieki, 2020; Agricultura Tropica et Subtropica, 2019). Overall, these results emphasize that women's participation in maize production is shaped by interconnected economic, social, and human-capital factors. The findings reinforce global and Nigerian evidence that improving women's access to land, capital, education, and collective action platforms is essential to enhancing their agricultural productivity and livelihood outcomes (IFPRI, 2019; FAO, 2020).

Summary Statistics of Key Variables (n = 290)

Table 6: Approximate Means and Standard Deviations Computed from Grouped Data.

Variable	Mean	SD (Approx.)	Notes
Age (years)	34.73	10.24	Midpoints used: 24.5, 34.5, 44.5, 55.0
Income (₦)	117,586.21	80,554.10	Midpoints: ₦50,000; ₦150,000; ₦250,000
Farming experience (years)	9.55	7.11	Midpoints: 2.5; 7.5; 15.5; 25.0
Farm size (ha)	3.74	3.26	Midpoints: 0.5; 3.0; 8.0; 12.5
Sample size	290	—	From sample selection table

These descriptive statistics provide important background context demonstrating that the sample consists predominantly of economically active women with moderate experience and smallholder-level farm sizes.

CONCLUSION AND RECOMMENDATIONS

This study set out to assess women's participation in maize production in Hawul Local Government Area of Borno State, Nigeria, with specific focus on their socio-economic characteristics, levels of involvement across production activities, and the factors influencing their participation. The findings clearly demonstrate that women constitute a vital segment of the maize farming population in the area, actively contributing to key production stages such as weeding, harvesting, storage, and marketing. Their participation in these labor intensive and post-harvest operations underscores their central role in sustaining household food security, income generation, and community resilience. However, the assessment also reveals that women's involvement in capital-intensive and value-added components of maize production such as fertilizer application, mechanized land preparation, large-scale processing, and value enhancement is relatively low. This limited participation is largely attributed to restricted access to credit, small farm holdings, poor land tenure rights, inadequate extension support, and socio-cultural constraints. These challenges are consistent with the broader structural barriers faced by women in agricultural systems across northern Nigeria. The regression analysis, which yielded a high explanatory power ($R^2 = 0.85$; $F = 32.15$; $p < 0.001$), further strengthens the conclusion that women's participation in maize production is significantly shaped by a combination of economic, human capital, and social factors. Among the significant predictors identified, income ($\beta = 0.329$) and access to credit ($\beta = 0.282$) emerged as the most influential, highlighting the importance of financial empowerment in enhancing women's agricultural engagement. Other factors—age, education, farming experience, farm size, and association membership—also contribute meaningfully to participation, indicating that women's involvement in maize farming is multidimensional and shaped by broader livelihoods contexts. In light of these findings, the study concludes that women in Hawul LGA possess the willingness, capability, and substantial potential to contribute more effectively to maize production, but their full participation is hindered by financial, institutional, and resource-based constraints. Strengthening women's access to affordable credit schemes, empowering cooperative associations, enhancing extension delivery tailored to women farmers, and improving land tenure security would dramatically improve their productivity and engagement in maize farming.

Based on the findings of this study, the following recommendations were proposed:

- i. **Enhancing Access to Credit:** Financial institutions and development organizations should design and implement accessible credit facilities tailored to women farmers. These facilities should feature low-interest rates and flexible repayment terms to encourage adoption and utilization.
- ii. **Capacity Building and Training:** Educational programs and vocational training should be developed to improve women's literacy and technical skills in modern agricultural practices. These initiatives should be implemented through farmer cooperatives, local NGOs, and government extension services to ensure broad participation and impact.
- iii. **Strengthening Farmer Associations:** Women farmers should be encouraged to join or establish farmer associations to facilitate access to collective resources, training opportunities,



and financial support. Policymakers should actively support these associations by providing grants, capacity-building programs, and technical assistance.

- iv. **Equitable Land Access:** Government policies should prioritize equitable land distribution and rental schemes to enable women to acquire larger landholdings. Improved access to land will empower women farmers to scale up production and enhance their economic well-being.
- v. **Investment in Rural Infrastructure:** Strategic investments in rural infrastructure, including roads, storage facilities, and market linkages, should be prioritized to reduce transportation costs and improve market access. Such improvements will enhance the profitability of maize production for women farmers.
- vi. **Targeted Agricultural Extension Services:** Agricultural extension programs should be tailored to address the specific needs of women farmers, ensuring better access to essential inputs, improved seed varieties, and best practices in maize production. These programs should integrate gender-sensitive approaches to maximize their effectiveness.

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