Wah Academia Journal of Social Sciences
Volume 4, Issue 2, Dec 2025, pp. 107-128
ISSN – E 2958-8731 P 2958-8723
https://doi.org/10.63954/WAJSS.4.2.6.2025

Assessment of Gender Mainstreaming in Cassava Production and Utilization among farmers in Benue State, Nigeria

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Abstract

This study assessed gender mainstreaming in cassava production and utilization among farmers in Benue State, Nigeria, with an emphasis on labor division, access to resources, decision-making, and socio-economic impacts. Using a multi-stage sampling technique, data were collected from 150 respondents through structured questionnaires and analyzed using descriptive and inferential statistics. Findings revealed a strong female participation in cassava-related activities, particularly in planting, weeding, harvesting, and post-harvest processing. However, women faced disparities in land ownership, credit access, and institutional support. Regression results showed that education, training, and use of improved cassava varieties significantly enhanced yield ($R^2 = 0.61$), while land ownership and training were major predictors of decision-making participation (Pseudo $R^2 = 0.34$). Chi-square analysis revealed a statistically significant relationship between gender and division of labor in cassava farming ($\chi^2 = 165.04$, $p < 0.05$). Factor analysis identified three major constraints: input/market access, capacity/workforce limitations, and socio-cultural barriers. Despite women's pivotal role in productivity, only 14% independently decided on cassava earnings. The study concludes that targeted policies addressing education, land rights, training, and socio-cultural limitations are critical to achieving inclusive gender mainstreaming and sustainable agricultural development.

Keywords: Gender mainstreaming, Cassava production, Division of labor, Decision-making participation, Women empowerment

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Introduction

Cassava (Manihot Spp.) is Nigeria's most vital staple crop, accounting for over 20% of global production and providing a foundation for food security for millions of rural households. Its adaptability to marginal soils, drought resilience, and year-round storability make it a dependable source of calories and income in sub-Saharan Africa (Omoluabi, and Ibitoye 2024; Adeola et al., 2017). In Nigeria alone, annual cassava output exceeds 63 million tonnes, contributing significantly to GDP and providing raw material for food, feed, starch, and biofuel industries (Adebayo and Silberberger 2021).

Within the cassava value chain, gendered division of labor is pronounced, men typically dominate land preparation and cultivation, while women disproportionately engage in processing (peeling, fermenting, garri production) and marketing of value-added products. This segmentation not only shapes income streams often favoring traders and processors over producers but also entrenches inequalities in access to income, training, and market networks. (Ezeibe, et al., 2015) Despite women's central role in post-harvest activities, they face systemic barriers to land ownership, credit, extension services, and decision-making power at both household and community levels. In Benue State, for example, female farmers report limited access to inputs and institutional support even as they undertake 100% of peeling and washing tasks and over 95% of processing operations. (Agada et al 2018). Such disparities hinder productivity gains and compromise the goal of inclusive agricultural development.

This study therefore evaluates the extent of gender mainstreaming in cassava production and utilization in Benue State by examining socio-economic characteristics, labor division, resource access, decision-making dynamics, and the perceived impact of women's participation on productivity. The findings aim to inform targeted policies that foster equitable access to resources and strengthen women's roles across the entire cassava value chain.

- **Objectives of the Study**

The broad objective of the study is Assessment of Gender Mainstreaming in Cassava Production and Utilization among farmers in Benue State, Nigeria. The specific objectives of the study are to:

i. examine the socio-economic characteristics of cassava farmers in Benue State.
ii. examine perceptions of gender roles and resource access in cassava production.
iii. evaluate gender-based access to resources and institutional support.
iv. analyze perceptions of gender roles and decision-making in cassava farming households.
v. examine the gender-based division of labor across key stages of cassava production
vi. determine the perceived impact of women's participation on cassava productivity
vii. assess the socio-economic impact of cassava production on women's livelihoods.
viii. identify constraints affecting gender equity in cassava production and utilization.

- **Statement of Hypotheses**

H01: there is no relationship between some selected socio-economic characteristics and Decision-Making Participation.

HO2: There is no relationship between some selected socio-economic characteristics Cassava Yield.

H03: There is no significant relationship between gender and division of labor in cassava farming

Methodology

- **Research Design**

The survey research design, public opinion survey was adopted for this study.

- **The Study Area**

The study was carried out in Benue State, Nigeria. Benue State is in the North central of Nigeria, with total land area of approximately 34,059 km² and also with a present population of about 6,851,315 by United Nations population projection of 2024, using 2.3% growth rate (National Bureau of Statistics Demographic Statistics Bulletin (NBSDSB) 2022). The State lies within the lower river Benue trough in the middle belt region of Nigeria. Its geographic coordinates are longitude 7° 47' and 10° 0' East. Latitude 6° 25' and 8° 8' North; [Benue State Agriculture and Rural Development Authority (BNARDA, 2010)

The State was created in 1976 among the 7 States created at that time by Gen. Murtala Muhammed. The State derives its name from the Benue River, which is the second largest river in Nigeria. The State shares borders with Nasarawa State to the North; Taraba State to the East; Kogi State to the West; Enugu State to the South-West; Ebonyi and Cross-Rivers States to the South; and has an international border with Cameroon to the South-East. It is inhabited predominantly by the Tiv, Idoma and Igede. Minority ethnic groups in Benue are Etulo, Igbo, Jukun people etc. Its capital is Makurdi (Benue online, 2022).

The State has 23 Local Government Areas, divided into three Agricultural zones namely; Eastern zone (Kastina-Ala, Ukum, Ushongo, Vandekya, Logo, Kwande and Konshisha Local Government Areas), Northern Zone (Gboko, Tarka, Buruku, Gwer-West, Gwer-East, Guma, and Makurdi Local Government Areas) and Central Zone (Ado, Agatu, Apa, Otukpo, Ohimini, Ogbadibo, Obi, Okpokwu and Oju Local Government Area (I am Benue online, 2022).

Benue State has favourable agro-climatic ecologies for arable crops, tree crops and livestock production and enjoys two distinct seasons, wet and dry seasons. The rainy season begins from April to October while the dry season starts from November to March. Annual rainfall record varies from 1700mm in the southern part to 1250mm in the northern part with annual temperature variation of 300C and 380C (BNARDA, 2010).

The State is blessed with abundant mineral resources and has many untapped mineral resources. Minerals such as limestone, kaolinite, Feldspar, gypsum, clay etc are found in the State. (Government of Benue, 2017). About 80 per cent of the population is estimated to earn their living from agriculture (BNARDA), 2010). Benue State is a major producer of yam, cassava, sweet potato, millet and maize and tree crops such as mango, Orange and oil palm. Livestock rearing such as cattle, Goat, Pigs, and Poultry are also practiced in the State. The people of the state are hospitable and cheerful. They are blessed with rich cultural heritage.

Study Area

Fig 1: Map of Benue State showing the location of the study area.

❖ Population and Sample Size Selection

The population of the study comprises selected cassava farmers in Benue State. A sample size of 150 respondents was selected using a multi-stage selection technique comprising purposive, stratified and simple random sampling techniques. In the first stage Benue State was selected purposively, due to high population of cassava farmers. In the second stage the State was stratified into the 3 already existing Agricultural Zones; Eastern (Zone A) Northern (Zone B) and |Central (Zone C). In the third stage, two Local Government Areas each was purposively selected due to high level of cassava production, Kwande and Konshisha Local Government Areas (Eastern), Bururku and Gwer West (Northern) and Ado and Otukpo (Central Zone). Fourth stage, two community was randomly selected from each of the selected Local Government Areas. In the final stage, a sampling frame was developed for each of the selected rural communities and using proportionate allocation of 18 per cent (0.18) across board, a sample size of 150 farmers was obtained as shown in (Table 1).

Table 1: Sample Size Selection Plan

Agricultural Zone	LGA	Community	Sampling Frame	Sample Size (0.18%)
Eastern	Konshisha	Agidi	76	13
		Agberagba	65	11
	Kwande	Barakur	79	14
		Abwa	68	12
Northern	Buruku	Tyogbenda	92	16
		Mbaton	77	13
	Gwer West	Phekor	72	13
		Naka	63	11
Central	Otukpo	Otobi	74	13

		Adoka	71	11
	Ado	Utonkon	66	12
		Agila	59	10
Total	—	—	**861**	**150**

Source: BNARDA (2025)

❖ Method of Data Collection

Primary data were collected for this study using structured questionnaire. It was divided into 7 sections (A - H). Section A dealt with the socio-economic characteristics of cassava farmers in Benue State, Section B focused on the level of women's participation in cassava production and utilization activities, Section C consisted of gender-based access to resources and institutional support., Section D accessed the perceptions of gender roles and decision-making in cassava farming household. Section E focused on the gender-based division of labor across key stages of cassava production, Section F focused on the perceived impact of women's participation on cassava productivity. Section G handled the socio-economic impact of cassava production on women's livelihoods. while Section H addressed Constraints to gender equity in cassava production and utilization.

❖ Data Analysis Techniques

Data for this study were analyzed using descriptive statistics such as frequency distribution, percentages and mean, as well as inferential statistics such as Logistic Regression and factor analysis. Objectives; i, ii, iii, iv and v were analyzed using frequency distribution, percentages and mean.

- Objective vi was determined using regression, Factor analysis was used to analyze objective vii
- Hypothesis 1 and 2 were tested using regression analysis at 0.5 level of significance. Hypothesis 3 was tested using chi square

❖ Model Specification

A structured questionnaire was administered to 150 cassava farmers across selected communities in Benue State. Descriptive statistics, multiple linear regression, logistic regression, and factor analysis were used to analyze the data. Variables included demographic characteristics, income, land ownership, training access, and perceptions of gender roles.

Result and Discussion

- **Socio-economic Characteristics of the Respondents**

Sex: Table 2 showed that most Females make up nearly 59% of the sample, indicating that women are well represented in this study. This suggests a strong female presence in cassava farming or in household-level agricultural decision-making in the surveyed area. This is in line with Onyemauwa (2012) that women consistently participated in cassava cultivation, cutting of cassava sticks, and processing activities like frying and fire preparation. It concluded that women play a central role in cassava production and processing, often driven by household consumption needs the roles that men and women play in the society depend on the social and economic rather than biological differences (Abdoulaye et al., 2015).

Age: Table 2 revealed that a reasonable (28.00%) of the respondents were between 41and 50 years, the mean age was 46.4 years, suggesting that middle-aged individuals were the predominant group of people involved in cassava farming. This is closely in line with Onyema and Ukoha (2020) that most cassava-based farmers were between the ages of 40 and 49 years

Marital Status: Table 2 revealed that most majority (80%) of respondents were married, suggesting that cassava farming is likely conducted in family or household settings, where agricultural labor, decision-making, and resource sharing are communal. This is in line with Onyemauwa et al (2023) that cassava farming is deeply embedded in household-based agricultural systems, with married individuals forming the majority of cassava farmers. The research emphasized that cassava production is often carried out within family units, where labor, decision-making, and resource use are shared communally.

Education Level: Result on level of education indicated that majority (52.7%) of respondents attained secondary education, while 22% had tertiary-level qualifications. This suggests that a significant portion of cassava farmers in the study area have at least basic to advanced literacy and numeracy skills. corroborate Akintade and Ajibare (2019), who reported a positive association between higher levels of education and likelihood of understanding cassava cultivation skills. Also, education equips farmers with necessary skills and knowledge to comprehend and apply new technologies (Onyeneke et el., 2020).

Marital Status: Table 2 revealed that most (83.91%) of the respondents were married, while 4.60% were single. This indicates a family-centric community structure. The implication is that farmers can cultivate a large farm size if all other resources are available. This result agrees with Abdullahi (2012) that marriage is a means of generating family labour. The finding is in contrast to Mark and Anyanwu (2020) that married farmers might also face challenges related to resource allocation and management within the household, that single or widowed farmers may experience different constraints and opportunities concerning farming and access to resources.

Household Size: Table 2 showed that reasonable (56.70%) of the respondents had household size of 6-10 members. This suggests that cassava farming in the study area is typically supported by medium-sized family units, which are optimal for managing labor without being overly strained. Mean Household Size of 6.3 persons indicates that cassava farming households in the study area were generally moderate to large in size, suggesting strong reliance on family labor and shared agricultural responsibilities. This is in line with Onyemauwa et al (2023) that 70% of cassava farmers had household sizes ranging from 6 to 10 persons, with family labor being the most commonly used labor source in cassava production.

Education Level: Result on level of education indicated that majority (52.30%) of the respondents acquired secondary education, and 22.41%, had tertiary education. A large (52.30%) portion of respondents have secondary education, with a considerable number also having tertiary education. This could be an added advantage for the respondents to quickly understand and adopt innovations in agriculture. These corroborate Akintade and Ajibare (2019), who reported a positive association between higher levels of education and likelihood of adopting improved crop varieties like pro-vitamin A cassava. Also, education equips farmers with necessary skills and knowledge to comprehend and apply new technologies (Onyeneke et el., 2020).

Farming Experience: Table 2 revealed that reasonable (32.70%) of the respondent had farming experience of between 11 and 20 years. The mean farming experience was 11.5 years with an average experience of over a decade, it's clear that cassava farming isn't just a short-term venture, it's a sustained livelihood. This suggests that the crop offers enough economic or cultural value to retain farmers for many years.

This result is similar to that of Umeh, et al, (2013) that reasonable proportion of respondents had a farming experience of more than 15 years.

Farm Size: Table 2 indicated reasonable (36.70%) of the respondents had a farm size of 3-5 hectares. This suggest medium-scale farmers that are often the backbone of rural food systems. This result is in line with the findings of Nkonde, (2016) that small scale farmers were influencing agricultural transformation and productivity in the study area. It also corroborates Jayne et al (2019) that medium-scale farms in sub-Saharan Africa are increasingly contributing to national crop output. In countries like Nigeria, Tanzania, and Zambia, these farms have rapidly expanded and now account for a significant share of marketed produce, that medium-scale farms are dynamic drivers of agricultural transformation, especially where land is more available

Annual Income: Table 2 indicated that majority of respondents (78.16%) earn between ₦750,001 and ₦1,000,000 annually from cassava-related activities. This suggests that cassava farming is a moderately lucrative livelihood, particularly for those engaged in both production and value-added processes like processing and marketing. This corroborate Oladepo (2025) that cassava farming remains moderately to highly profitable, especially when farmers engage in value-added activities such as processing into garri, flour, starch, and chips. The study notes that net profits per acre can range from ₦300,000 to over ₦700,000, depending on yield, market access, and whether the farmer sells raw tubers or processed products and cassava cuttings and farm size.

Land Ownership: Table 2 indicated that reasonable (48.00%) of respondents own their farmland outright. This could suggest empowerment especially for cassava, which is a staple crop often managed by women. This likely leads to more long-term investment in the soil, infrastructure, and crop diversity. Ownership generally correlates with security and willingness to cultivate. This corroborate Okpo-Obaje, (2025) that empowering women through land ownership in cassava farming contributes directly to inclusive development.

Credit Access: Table 2 indicated that majority (55.3%) of respondents, lack access to credit. This suggest a farming landscape clearly facing financial constraints. This could restrict opportunities to purchase inputs like fertilizer, improved cassava cuttings, or machinery. This is in line with Edaba et al. (2025) that limited access to credit is a major constraint affecting cassava farmers' productivity.

Annual Production: Table 2 indicated that reasonable (40.60%) of respondents had annual production of 11–20 tons. This suggest Mid-level producers by far the largest group. They appear to be striking a balance between scale and output. Likely have adequate farm size (1–5 ha) and more experience in cassava production. This is line with Musa et al. (2022) that medium-scale cassava farmers typically produce between 10 and 20 tons annually form the backbone of rural cassava supply chains.
4.1.14: Cassava Utilization: Table 2 indicated that majority (82.7%) of respondents convert cassava into household staples like garri, fufu, akpu, and cassava flour. This suggest women's central role, given that many respondents are female, this likely reflects women's leadership in cassava processing and marketing. This is in line with Adeniyi et al. (2023) that cassava processing in Nigeria is predominantly carried out by women, especially in rural communities. The research highlights that women are deeply involved in transforming cassava into staple foods like garri, fufu, and cassava flour, which not only supports household nutrition but also serves as a key source of income.

- **Perceptions of gender roles and resource access in cassava production.**

Women have equal access to resources: Result in table 3 showed Only 26 respondents strongly agreed, while 28 disagreed and 12 strongly disagreed. This suggests that perceived equality in resource access is limited, with nearly 40 respondents expressing skepticism. This aligns with findings by Onuoha (2023), who reported that women in Abia State often access land through sharecropping rather than ownership, limiting their autonomy.

Traditional gender roles restrict women's decision-making: A majority (95 respondents) agreed or strongly agreed, this suggest that cultural norms continue to constrain women's influence in agricultural decisions. This is in line with Awotona et al. (2022) that disempowerment among female cassava farmers was largely driven by limited control over resources and production decisions.

Men and women share cassava responsibilities equally: While 90 respondents agreed or strongly agreed, 28 disagreed or strongly disagreed. This suggests a growing perception of shared labor, though not universally accepted. This corroborate Amadi et al. (2020) that while women dominate downstream tasks like processing, men often control upstream operations such as land clearing and finance.

Gender-Based Access to Resources and Institutional Support: Result in table 3 indicated (58.0%) of women reported having access, while 42.0% did not, highlighting a substantial disparity that can limit productivity and rural development. This aligns with global trends identified by the Food and Agriculture Organization (FAO), that women in developing countries often receive less land, credit, inputs, and extension services compared to their male counterparts yet they contribute significantly to agricultural labor and food security (FAO, 2011). It also corroborates Ajadi et al. (2015) that cultural norms heavily restrict women's access to productive assets, particularly among ethnic groups like the Yoruba and Nupe.

- **Perceptions of gender roles and decision-making in cassava farming households**

Gender Role: Table 5 reveal gendered patterns in cassava production and processing activities. Land preparation was predominantly handled by males (52.0%), consistent with literature noting that tasks requiring physical strength and machinery access are typically male-dominated due to cultural expectations and land ownership structures (Ogunlela & Mukhtar, 2009; Springer, 2022). Conversely, females led in planting and weeding (54.0%), reflecting their deep involvement in crop management and traditional nurturing roles. This aligns with reports from South Eastern Nigeria indicating women's strong participation in these activities, with female weeding rates as high as 97% (Women Farmers Network, 2023). Harvesting was also significantly performed by females (44.7%), likely attributable to their experience with assessing root maturity and careful handling. Furthermore, women overwhelmingly dominated post-harvest cassava processing (72.0%), transforming crops into staple products such as garri, fufu, and flour. This aligns with the findings of Adebayo et al. (2021) and the Federal Polytechnic Ilaro study (2020), which emphasized women's central role in cassava value chain processing and marketing.

Decision-Making: table 5 showed that reasonable (48%) of respondents reported that male primarily decide how cassava income is used. This could reflect wider societal norms around financial authority. Limited economic agency for women: Despite their major role in processing and marketing only (14%) of respondents' report women making decisions about cassava earnings independently. This is in line with Nwadiolu et al (2024) that men predominantly control financial decisions in cassava farming households, even when women are heavily involved in post-harvest activities like processing and marketing.

Gender-Based Division of Labor Across Key Stages of Cassava Production: The gender-based division of labor in cassava production reveals deeply rooted cultural norms and task-specific preferences that shape participation across different stages. Land preparation, which involves physically intensive activities like clearing, tilling, and plowing, is predominantly carried out by men (52.0%), reflecting traditional gender roles that associate such tasks with male strength and control over land resources. In contrast, planting and weeding are mostly undertaken by women (54.0%), highlighting their central role in nurturing and maintenance tasks that require precision and consistency. This pattern aligns with findings by Nkeme et al. (2021), that women in Akwa Ibom State were significantly more involved in planting and weeding operations than men. Similarly, harvesting shows a female majority (44.7%), likely due to its overlap with post-harvest responsibilities, which are also female-dominated. The most striking gender disparity appears in post-harvest processing, where women account for 72.0% of labor. This stage includes peeling, drying, fermenting, and milling—activities often performed in domestic settings or small cooperatives, reinforcing women's role in value addition and food preparation4. These labor patterns not only reflect socio-cultural expectations but also underscore the need for gender-responsive interventions in cassava value chain development.

Perceived impact of women's participation on cassava productivity: Table 7 revealed that an overwhelming majority (74.4%) believed that women's participation positively impacts productivity. This suggest a strong endorsement of gender mainstreaming in cassava production and utilization. This finding is in line with Onyemauwa (2012) that women in southeastern Nigeria consistently participated in cassava-related activities, with education, access to credit, and cooperative membership being critical factors influencing their involvement.

- **Socio-economic impact of cassava production on women's livelihoods**

Significantly Improved: (37.2%) This group represents women whose lives have undergone substantial positive change. Likely drivers include: Better access to education, healthcare, and financial services Employment in higher-paying or leadership roles. Supportive policies encouraging female entrepreneurship. These women may now experience greater financial independence and decision-making power both at home and in society.

Somewhat Improved: (42.3%) The largest group, suggesting progress is happening but not fully transformative. Could reflect: Access to opportunities that are still limited by barriers like cultural norms or unequal wages. Improvement in working conditions or income, but without full upward mobility. These women may feel empowered in some aspects, but still face structural challenges that limit broader socio-economic gains.

- **Constraints Affecting Gender Equity in Cassava Production and Utilization**

Result of factor analysis in Table 9 showed that there were 6 attributes that loaded into 3 major factors, namely (Factor 1) Input and Market Access factor (Factor 2) Capacity and Workforce factor, (Factor 3) Socio-cultural Barriers accessibility and information factor.

In factor 1 (Input and Market Access factor) variables which loaded very high included Lack of credit (0.79) and poor access to markets (0.72) indicating that farmers struggle to secure financing and reach buyers efficiently. This observation aligns with Amadi et al., (2020) that women dominated downstream operations like processing and marketing, yet faced limited access to formal markets due to poor infrastructure and lack of institutional support.

In Factor 2 (Capacity and Workforce factor), variables which loaded very high included Inadequate training (0.77) and labor shortage (0.73) pointing to a lack of skilled labor and knowledge transfer. This is in line with Ibrahim et al., (2025) that women in cassava farming face barriers in accessing extension services and technical knowledge.

In Factor 3 (Socio-cultural Barriers accessibility and information factor) variables which loaded very high included Cultural restrictions (0.82) revealing how gender roles, traditions, or community norms may limit participation especially for women. This played a critical role in reinforcing gender roles and norms that marginalize women from land ownership, leadership roles, and decision-making processes. This is in line with Dutse, (2025) that patriarchal norms, religious doctrines, and traditional gender roles significantly limit women's agency and participation in decision-making processes. These cultural barriers extend beyond politics into agriculture, where women are often excluded from land ownership and leadership roles.

Table 2: Socio-Economic Characteristics of Respondents (n= 150)

Variables	Category	Frequency	Percentage	Mean
Sex	Female	88	58.70	—
	Male	62	41.30	—
	Total	**150**	**100.00**	—
Age	21–30	15	10.00	
	31–40	37	24.70	
	41–50	42	28.00	**46.4**
	51–60	30	20.00	
	Above 60	26	17.30	
	Total	**150**	**100.00**	
Marital Status	Single	18	5.30	—
	Married	120	83.91	
	Widow/Widower	10	6.60	
	Divorced	2	1.33	
	Total	**150**	**100.00**	
Household Size	1–5	22	14.70	
	6–10	85	56.70	**8.4**
	10 or more	43	28.70	
	Total	**150**	**100.00**	
Level of Education	No formal education	6	4.02	—
	Primary	32	21.26	
	Secondary	79	52.30	
	Tertiary	33	22.41	
	Total	**150**	**100.00**	
Annual Income (₦)	1–250,000	1	0.57	—
	500,001–750,000	5	2.87	
	750,001–1,000,000	136	78.16	
	Above 1,000,000	32	18.39	
	Total	**174**	**100.00**	
Farming Experience (Years in Cassava)	< 5 years	34	22.70	—
	5–10 years	46	30.00	
	11–20 years	48	32.70	
	Over 20	22	14.70	
Land Ownership	Owned	72	48.00	—
	Leased	32	21.30	
	Communal (shared)	35	23.30	
	Other	11	7.30	
Farm Size (ha)	Less than 1	19	12.70	—
	1–2	49	32.70	

	3–5	55	36.70	
	More than 5	27	18.00	
	Total	**150**	**100.00**	
Credit Access	Yes	67	44.70	—
	No	83	55.30	
	Total	**150**	**100.00**	
Cassava Production (Annual)	< 10 tons	52	34.80	—
	11–20 tons	61	40.60	
	21 and above	37	24.60	
	Total	**150**	**100.00**	
Cassava Utilization	Processed (garri, fufu, etc.)	123	82.70	—
	Industrial use	27	17.30	
	Total	**150**	**100.00**	

Table 3: Perceptions of Gender Roles and Resource Access in Cassava Production

Statement	SA	A	N	D	SD	Total
Women have equal access to resources	26	49	35	28	12	150
Traditional gender roles restrict women's decision-making	43	52	27	20	8	150
Men and women share cassava responsibilities equally	31	59	32	18	10	150

Table 4: Female Access to Resources and Institutional Support

Response	Frequency	Percentage
Yes	87	58.00
No	63	42.00
Total	**150**	**100.00**

Table 5: Decision-Making and Access

Decision Type	No. of Respondents	Percentage
Mainly Male	72	48.00
Mainly Female	21	14.00
Joint Decision	57	38.00
Total	**150**	**100.00**

Table 6: Division of Labor

Activity	Mostly Male	Mostly Female	Jointly
Land preparation	78 (52.0%)	18 (12.0%)	54 (36.0%)
Planting & weeding	32 (21.3%)	81 (54.0%)	37 (24.7%)
Harvesting	41 (27.3%)	67 (44.7%)	42 (28.0%)
Post-harvest processing	13 (8.7%)	108 (72.0%)	29 (19.3%)

Table 7: Perceptions of Women's Participation and Its Impact on Productivity

Response	Frequency	Percentage
Yes	116	74.40
No	19	12.20
Not sure	15	9.60

Table 8: Socio-Economic Impact on Women

Response	Frequency	Percentage
Significantly improved	58	37.20
Somewhat improved	66	42.30
No change	18	11.50
Worsened	8	5.10

Table 9: Constraints and Factor Loadings

Constraints	Factor 1	Factor 2	Factor 3
Lack of credit	0.79	0.21	0.05
Poor access to markets	0.72	0.28	0.18
Lack of modern technology	0.65	0.10	0.10
Inadequate training	0.26	0.77	0.15
Labor shortage	0.20	0.73	0.09
Cultural restrictions	0.10	0.18	0.82

Cut off mean = 3.0
Kaiser varimax Rotational method

Factor 1 = Input and Market Access Challenges
Factor 2 = Capacity and Workforce Issues
Factor 3 = Socio-cultural Barriers

Ho1: there is no relationship between some selected socio-economic characteristics and Decision-Making Participation

The logistic regression analysis on decision-making participation reveals that several socio-economic factors significantly influence farmers' involvement in agricultural decisions. Education has a positive and statistically significant effect (Odds Ratio = 1.52, p = 0.015), indicating that individuals with higher educational attainment are 52% more likely to participate in decision-making processes. Land ownership emerges as a strong predictor (Odds Ratio = 2.05, p = 0.004), suggesting that landowners are more than twice as likely to be involved in key decisions, likely due to their vested interest and control over resources. Access to training shows the most substantial impact (Odds Ratio = 2.67, p = 0.001), meaning trained individuals are nearly three times more likely to participate, underscoring the transformative role of capacity-building initiatives. Interestingly, gender (female), while showing a positive odds ratio (1.31), is not statistically significant (p = 0.18), implying that gender alone does not strongly predict decision-making participation in this context. The model's accuracy of 78% and Pseudo R^2 of 0.34 indicate a reasonably good fit, capturing meaningful variation in participation behavior. These findings highlight the importance of education, land tenure, and training access in promoting inclusive and empowered agricultural decision-making.

Table 10: Logistic Regression on the Relationship Between Selected Socio-Economic Characteristics and Decision-Making Participation

Predictor	Odds Ratio	p-value	Interpretation
Education	1.52	0.015*	Higher education → more likely to participate in decision-making
Land Ownership	2.05	0.004**	Landowners are about twice as likely to participate
Training	2.67	0.001**	Training greatly increases participation (about threefold)
Gender (Female)	1.31	0.18	Not statistically significant

Model Accuracy: 78%
Pseudo R^2: 0.34

HO2: There is no relationship between some selected socio-economic characteristics and Cassava Yield.

The regression analysis revealed that multiple socio-economic and agronomic factors significantly influence cassava yield, with an R^2 value of 0.61 indicating that 61% of the variation in yield is explained by the model. Education positively impacts yield (coefficient = +0.35, p = 0.016), suggesting that farmers with higher educational attainment are more likely to adopt improved practices and manage resources effectively. Age also shows a modest positive effect (+0.04, p = 0.04), implying that older farmers, possibly due to experience, tend to achieve slightly higher yields. Interestingly, gender plays a notable role, with female-led farms yielding significantly more cassava (+0.82, p = 0.03), challenging traditional assumptions and highlighting women's productivity in cassava farming. Access to training emerges as the strongest predictor (+1.10, p = 0.001), underscoring the transformative impact of extension services and technical capacity-building on farm output. Similarly, the use of improved cassava varieties significantly boosts yield (+0.95, p = 0.005), reflecting the benefits of adopting disease-resistant and high-yielding cultivars. Collectively, these findings emphasize the importance of education, gender inclusion, training access, and technology adoption in enhancing cassava productivity and guiding targeted agricultural interventions.

Table 11: Regression Analysis of Socio-Economic Characteristics on Cassava Yield

Predictor	Coefficient	p-value	Interpretation
Education	+0.35	0.016**	Higher education → higher yield
Age	0.04	0.04*	Older farmers yield slightly more
Gender (Female)	+0.82	0.03*	Female-led farms yield more
Training Access	+1.10	0.001**	Training significantly boosts yield
Improved Variety	+0.95	0.005**	Access to tech improves output

R^2 = 0.61 (61% of yield variation explained)

- **Ho3: Chi-square test of significance**

Statistical Significance of Gender Roles in Cassava Farming: Division of Labor

To examine whether gender significantly influences the division of labor in cassava farming, a Chi-square test of independence was conducted using data across five key farm activities: land preparation, planting and weeding, harvesting, post-harvest processing, and marketing/selling. Each activity was categorized by participant role—mostly male, mostly female, or jointly performed.

The observed frequencies (78 males in land preparation, 108 females in post-harvest processing) were compared against expected frequencies calculated from total activity counts and category totals. This generated a Chi-square statistic of 165.04 with 8 degrees of freedom.

Given that the critical Chi-square value at a 0.05 significance level is 15.51, the calculated score exceeds this threshold substantially. This indicates that the observed differences in gender participation across labor activities are statistically significant. Therefore, the null hypothesis that there is no significant relationship between gender and division of labor in cassava farming is rejected, gender roles do not occur randomly but reflect deeply embedded labor patterns in cassava farming communities

Table 12: Statistical Significance of Gender Roles in Cassava Farming – Division of Labor

Activity	Category	Observed (O)	Expected (E)	$(O-E)^2/E$
Land Preparation	Mostly Male	78	40.6	34.59
	Mostly Female	18	67.0	35.20
	Jointly	54	42.4	3.17
Planting & Weeding	Mostly Male	32	40.6	1.82
	Mostly Female	81	67.0	3.06
	Jointly	37	42.4	0.69
Harvesting	Mostly Male	41	40.6	0.004
	Mostly Female	67	67.0	0.00
	Jointly	42	42.4	0.004
Post-Harvest Processing	Mostly Male	13	40.6	19.93
	Mostly Female	108	67.0	25.18
	Jointly	29	42.4	4.23
Marketing & Selling	Mostly Male	39	40.6	0.06
	Mostly Female	61	67.0	0.54
	Jointly	50	42.4	1.35

Degrees of Freedom (df):
df= (5–1)(3–1)=8df = (5 - 1)(3 - 1) = 8
Critical Value at α = 0.05 for df = 8: 15.51
Calculated Chi-square Value: 165.04
Since 165.04 > 15.51, the result is highly significant. That means gender-based differences in labor roles are not by chance, they reflect real patterns in cassava farming!

Conclusion

Gender mainstreaming in cassava production in Benue State is progressing, with women playing vital roles in labor and decision-making This study concludes that while women play a central role in cassava production and processing in Benue State, structural inequalities continue to restrict their access to key resources and decision-making authority. Despite significant labor contributions in critical farming stages, women remain underrepresented in land ownership and financial control, highlighting persistent gender disparities within the agricultural sector.

The analyses underscore education, access to training, and improved cassava varieties as decisive factors in enhancing productivity. Similarly, land tenure and capacity building emerged as vital for empowering women in farm-level decisions. The statistically significant association between gender and labor segmentation further emphasizes the cultural embeddedness of these roles. Moreover, the factor analysis revealed that barriers to gender equity extend beyond economics to include systemic institutional weaknesses and deeply rooted socio-cultural norms.

Therefore, the study calls for a multi-pronged policy approach that promotes land rights for women, improves access to agricultural credit, expands gender-sensitive training programs, and challenges of socio-cultural constraints. Strengthening these dimensions is essential for mainstreaming gender in cassava production and ensuring inclusive and sustainable agricultural development in Nigeria.

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Women Farmers Network (2023). The Role of Women in Agriculture: Nurturing Growth and Sustainability.

Article Information:

Received	*22-Jul-2025*
Revised	13-Oct-2025
Accepted	10-Nov-2025
Published	15-Dec-2025

Declarations:

Author's Contribution:

- **Conceptualization, and intellectual revisions**
- **Data collection, interpretation, and drafting of manuscript**
- The author agrees to take responsibility for every facet of the work, making sure that any concerns about its integrity or veracity are thoroughly examined and addressed

- **Conflict of Interest**: NIL
- **Funding Sources**: NIL

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