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Gender Participation in Groundnut Value Chain among USAID Groundnut Up-scaling Project's Participants and Non-Participating Households in Sokoto State, Nigeria

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ABSTRACT

The aim of the study was to analyze gender participation in Groundnut Value Chain among USAID Groundnut Up-Scaling Projects, participating and non-participating households in Sokoto State, Nigeria. The study specifically focused on comparing the quantity of groundnut handled by males and females GVC actors and identifying factors influencing participation in GVC. Multistage sampling technique comprising purposive, random and proportionate sampling was employed to select households engaged in GVC within the five GUP PLGAs in the state. The study population consisted of 294 households that were actively engaged in the USAID-GUP, alongside additional households within the study area that were also GVC actors but not affiliated with the GUP. A structured questionnaire was used to collect data for the study and the analytical techniques include descriptive and inferential statistics. The findings reveal that females in both PLGAs and NPLGAs produced and sold fewer quantities of groundnuts compared to males and significant difference exists in quantities of groundnut produced and processed by the genders in PLGAs at P<0.01. Significant gender differences were also observed in the determinants of participation in USAID-GUP for males and females at P<0.01 and P<0.05 levels respectively. The study concludes that higher level education, larger household and farm sizes are significant determinants of gender participation and positively correlate with participation for both genders while older age and farming experience tend to decrease participation, particularly among women. Finally, the study recommends that tailored interventions should be developed to target specific groups more effectively.

INTRODUCTION

Gender plays a pivotal role in agricultural value chains; influencing production, processing, marketing, and ultimately, the socio-economic outcomes of households (Umeukeje *et al.*, 2023; Nthane *et al.*, 2020; Ojemade *et al.*, 2018). This is because gender is one of the social barriers that differentiate human beings into males and females and assigns different roles to them (Umeukeje *et al.*, 2023; Uwajumogu *et al.*, 2020; Osuafor & Anarah, 2017). Therefore, the participation of both men and women in value chains is essential for enhancing agricultural productivity, rural livelihoods, and food security (Njiraini *et al.*, 2018). Understanding the dynamics of gender participation in agricultural value chains is thus crucial for designing effective interventions aimed at promoting equitable and inclusive development. Umeukeje *et al*., (2023) and Ejike *et al.* (2018) and Obianefo *et al*. (2021) argued that gender issues have taken a global dimension in recent times, especially in Nigeria because, since time immemorial, women have always been globally discriminated in multidimensional issues of gender inequality. This prompted the United Nations policy and the World Bank's commitment to invest in programmes that guarantees the full

participation of women (Abdulkarim, Agbara, and Abdulazeez, 2017) especially because scholars and international organizations have found gender equality and women empowerment to be the drivers of economic growth, poverty reduction and the achievement of Sustainable Development Goals (SDGs) (Pathania, 2017).

Gender equality refers to equality between men and women or boys and girls, in the power distribution, education, individual activities, financial autonomy, household responsibilities' and children sharing, and the absence of violence in personal and professional life (Umeukeje *et al.*, 2023 and Ekvall, 2014). Gender inequalities then represent the gender biases or discriminations observed against women in all these sectors. This means that the social position of both men and women can influence their participation in the agricultural sector (Gwandi & Adewuyi, 2022). Participation is all about involving a significant number of rural people (project beneficiaries) in one way or another in actions or situations that enhance their well-being (Ogbonna & Nwaobiala, 2015). It also refers to the process of harnessing the existing physical, economic, and social resources of rural people to attain the objectives of community development progress and projects (Jameel *et al.*, 2019). In recent years, an increased number of analysed projects have shown that participation by local people is one of the critical components of success in crops, livestock, agroforestry, and irrigation practices (Nwaobiala, 2014). It is in this regard that the United States Agency for International Development (USAID) supported a Groundnut Up-Scaling Project (GUP) in Sokoto State, Nigeria, to boost groundnut production and enhance the livelihoods of households engaged in groundnut farming.

Analyzing gender participation and factors that determine participation in groundnut value chain (GVC) by households in Sokoto State is important because groundnut is one of the important crops grown in the state and its production, processing and marketing are among the major activities of men and women in the State (Umeukeje *et al.*, 2011). The crop which has the highest oil content of all food crops; it is second only to soybean in terms of protein content (20-30%) among the food legumes. And as a legume crop, it plays a huge role in feeding the world's people and animals, particularly in the third world countries, where it meets as much as two thirds of human nutritional needs by serving as a valuable dietary protein component in the absence of meat. (Abdulrahaman *et al.*, 2014).

However, given the gender equality perspective opportunities for development, many studies were undertaken to investigate the gender inequalities' determinants. This gap was left by existing research in Bashir *et al.,* (2020) and Jaji *et al.,* (2023) who pooled the groundnut output of the respondents and they were not able to categorize the output based on gender contribution. Bashir *et al.* (2020) and Ajibade *et al.* (2023) identified some variables influencing gender participation in the agricultural sector, including age, marital status, household size and household income, level of education, farming experience, farm size, land ownership, and cooperative membership, among others. However, none of these variables were specifically surveyed under the Groundnut Value Chain (GVC) within the Groundnut Up-Scaling Project (GUP). Thus, the factors determining gender participation in the GVC under the GUP was not adequately explored which may hinder the development of targeted interventions to address barriers to participation. Hence, there remains a research gap in understanding gender parity in participation specifically within the GVC in Sokoto State, Nigeria, under the USAID-GUP. This study will contribute to filling this gap by generating new knowledge based on the study objectives.

While some analyses have focused on improvements within the value chain, few delved into detailed examination of gender participation in the GVC. Studying both participants and non-participating households is crucial for gaining a holistic understanding of gender participation in the GVC. Comparing the quantity of groundnut produced, processed, marketed and the constraints

faced by both groups would provide valuable insights into the factors that influence gender participation and it thus; will identify potential barriers that hinder targeted intervention from engaging in the project. Therefore, this study was conducted to address the following research questions: What are the factors that determine gender participation in GVC of the study area? What are the quantity of groundnut handled by male and female in households of GVC actors in PLGAs and NPLGAs in the study area? The objectives of the study were to: determine the factors influencing gender participation in GVC of the study and ascertain the quantity of groundnut handled by males and females in households of GVC actors in PLGAs and NPLGAs.

METHODOLOGY

The study was conducted in Sokoto State, Nigeria, which is geographically located in the North-western part of the country and lies between longitude 4^0 25' and 6^0 46' E and latitude 11^0 35' and 13^0 55' N. The state shares border with Niger Republic to the North, Zamfara State to the East, Kebbi State to the South-West and it has a total land area of 25,973km^2 and twenty-three (23) local government areas (Umeukeje *et al.,* 2023). The primary ethnic groups in Sokoto State are the Hausa and Fulani. The state has an estimated population of 6,391,000 with an annual growth rate of 3.5% (NPC 2022). Gender participation in economic activities among people in Sokoto State has not been encouraging perhaps due to religious beliefs and cultural norms that restricted the womenfolk to mainly economic activities that are conducted indoors. However, recent evidence has indicated that due to the increase in level of education and advancement in technology women now partakes in different economic activities. These economic activities include those that require skilled and unskilled labour. For instance groundnut production, processing and marketing has recently driven women to move from processing to marketing activities where young women are seen transporting their products from local markets to urban centers (SADP, 2021). Gender participation in economic activities therefore plays an important role in the economic life of the people especially in terms of local crafts such as blacksmithing, weaving, dyeing, carving and leather works (SADP, 2021). A multi-stage sampling technique comprising purposive, random and proportionate sampling was employed to select households engaged in GVC within the participating local government areas (PLGAs). In the first stage of the sampling, three (3) participating local government areas (PLGAs) were purposively selected out of the five (5) PLGAs where the USAID-GUP was implemented in the state. The PLGAs were Shagari, Tambuwal, Dange-shuni, Bondinga and Tangaza out of which Shagari, Tambuwal and Dange Shuni were selected. This selection was based on the PLGAs exhibiting a high number of participants involving men and women. In the second stage, five villages participating in the project were randomly selected from each of the selected PLGAs. In the next stage, one (1) association of GVC actors was randomly selected from each of the selected communities. Afterwards, 35% of the registered members of the selected associations were randomly sampled to obtain a total of 100 members out of a total of 294 members that constituted the sample frame. These selected members provided information on the nature of gender participation in GVC among members of their respective households. To arrive at the sample size of the GUP participants, a comprehensive list of the GVC associations in each participating community was obtained from the Sokoto Agricultural Development Project (SADP) under extension department, monitoring and evaluation unit. The list was the basis for establishing the sample frame and sample size of the study. The selected members of associations were used in the study to represent their households as the units of the study.

The second phase of the sampling procedure entailed the purposive selection of three (3) LGAs out of the seven (7) non-participating LGAs (NPLGAs) in the State where intensive groundnut production, processing and marketing were predominant. The NPLGAs were Yabo, Wurno, Kebbe, Binji, Sabon-birini, Isa and Rabah out of which Yabo, Wurno and Kebbe were selected. The next stage involved purposive selection of five (5) non-participating communities from each of the

selected NPLGAs based on high intensity of groundnut production, processing and marketing. Lastly, snowball sampling technique (SST) was used to select 100 non-participating households in the NPLGA communities since a list of the population of the non-participants was not available. These households served as another unit of analysis of the study that was used for comparison with the participating households; ensuring a balance that would allow comparison of the extent of gender participation in the GVC between the two sets of respondents. Descriptive and inferential statistics, such as frequency counts, percentages, means, logit regression and t-tests, were employed to analyze the data, fulfilling the study's objectives and hypotheses.

Model Specification

To achieve the objectives of the study, independent sample t-test model was used and the formula is given as:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{{\delta_1}^2}{n_1} + \frac{{\delta_2}^2}{n_2}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where:
t = t-test value
$\bar{X}_1$ = mean score for the gender of the PLGAs (quantity of groundnut handled)
$\bar{X}_2$ = mean score for the gender of the NPLGAs (quantity of groundnut handled)
${\delta_1}^2$ = standard deviation for the gender of the PLGAs (quantity of groundnut handled)
${\delta_2}^2$ = standard deviation for the gender of the NPLGAs (quantity of groundnut handled)
n_1 = number of observation of men (PLGAs and NPLGAs)
n_2 = number of observation of women (PLGAs and NPLGAs)

Logit regression equation was equally used and it's expressed as:

$$P_r(Y; 0,1) = \frac{\varepsilon^{\beta x}}{1 - \varepsilon^{\beta x}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

With the cumulative distribution function given by

$$F(\beta x) = \frac{1}{1 - \varepsilon^{\beta x}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where β represents the regression coefficient associated with the factor x

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots \beta_n X_n + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

Where:

Y = Participation or Non-participation in GVC, 1 if participating household; 0 if non-participating household
β_0 = constant (intercept)
β = regression coefficient.
β_1 to $\beta 13$ = regression coefficients or parameters to be estimated attached to the predictor 1-13
$X_1 - X_{13}$= vectors of explanatory variables
ε_i = error term.

The Explanatory Variables for the Analysis include:
X_1 = Age (years)
X_2 = Marital status (single =1, married=2, widow =3, divorced =4)
X_3 = Major occupation (farming = 1, processing = 2, civil servant = 3, artisan = 4)

X_4 = Household size (summing of total number of members)
X_5 = Level of education (none=0, qur'anic=1, primary=2, secondary =3, tertiary=4)
X_6= Household farm size (ha)
X_7 = Farming experience (years)
X_8 = Source of credit (informal sources=1, private commercial banks=2, agricultural banks=3, government loan scheme=4, non-governmental organization=5
X_9 =Extension contact (number of extension visits in a year)

Dependent variable: The dependent variable of this study is participation in GVC, expressed as a dummy variable where 1 implies participation and 0 implies non-participation. It is expected that the implementation of the USAID-GUP would impact on the economic and decision-making ability of males and females participating in the study.

Independent variables: The independent variables were the socio-economic characteristics of both the PLGAs and NPLGAs which were specified thus:

Age (X_1) was measured in years (years)
Marital status (X_2) as nominal variable (single =1, married=2, widow =3, divorced =4)
Main occupation (X_3) captured as dummy (farming = 1, processing = 2, civil servant= 3)
Household size (X_4) was measured as the number of people in a household
Level of education (X_5) was captured as none=0, Qur'anic=1, primary=2, secondary =3, tertiary=4
Household farm size (X_6) was measured in hectares (ha)
Farming experience (X_7) was measured in years
Source of credit (X_8) was denoted as informal sources=1, private commercial banks=2, agricultural banks=3, government loan scheme= 4, non-governmental organizations= 5
Extension contacts(X_9) was measured in terms of the number of visits in a year
The quantity of groundnut handled by the actors was measured in kilograms (kg).

RESULTS AND DISCUSSIONS

Socio-economic determinants of gender participation in GVC of the study

Table 1 presents the results of a logistic regression analysis of the factors influencing gender participation in the groundnut value chain (GVC) in the study area, disaggregated by gender (males and females). How the actors' decision to participate was influenced was checked through the logit regression. Diagnostically, the Omnibus test was significant at a probability level of 0.000 for both genders, indicating a well-fitted model. Additionally, the Scaled Pearson Chi-Square (130 for males and 50.0 for females), suggested adequacy of data for the logit model.

The intercept represents the estimated log odds of participation when all other predictors are zero. For males, the intercept was 26.353, while for females, it was -6.278. This indicates that holding all other variables constant, males were more likely to participate in the project compared to females.

The result further shows that age had a negative coefficient for males and a positive coefficient for females at a probability level of 0.000, suggesting that as age increases, the likelihood of participation in GVC decreases for men and increases for women. However, a unit increase in age will reduce men's log odds of participation by 61.9%, whereas an increase in age will increase the log odds of female participation by only 1.017%. Older men were therefore less involved in the

program in the State while the GVC targeted more of older women possibly due to their age-long dogmatic attitudes that needed to be transformed into modern practice.

Being married had a negative relationship and significant effect on participation for males at a probability level of 0.000, suggesting that married males are less likely to participate in the program. However, for females, marital status did to have a significant effect on participation. This indicates that participation in the project increases among single respondents.

For males, main occupation did not appear to have a significant effect on participation. However, for females it had a significant effect but being engaged in a main occupation other than processing substantially decreases the likelihood of female participation by 28.184. The result of the logistic regression therefore indicates significant gender differences in the determinants of participation. Factors like marital status and main occupation seemed to have different impact on males and females. For example, being married reduces the likelihood of participation for males, but not for females. Similarly, being engaged in a main occupation other than processing significantly decreases female participation.

The result further revealed that for both males and females, higher levels of education significantly increase the likelihood of participation at a probability level of 0.000 for males and 0.01 for females. The contribution of the predictor variables to the response variable was much stronger for the males (4.749) compared to females (1.799). This finding is in agreement with the study by Obianefo *et al.,* (2023) who noted that literate farmers are more likely to obey agricultural instructions and adopt innovative farming practices.

Larger household size positively affects participation for both males and females at a probability level of 0.000, but the effect was stronger for males (2.242) compared to females (0.871). Farmers with large household sizes tend to participate in agricultural programs as they need to care for the basic needs of large household members. This result is in agreement with Martey *et al.,* (2014) who found that household size was a positive and significant determinant of participation in their study.

Surprisingly, farming experience was found to reduce the likelihood of participation for both genders at a probability level of 0.000; but again, the effect was stronger for females (3.386) compared to males (1.960). This was contrary to a priori expectation since previous experience with other programs was expected to have spurred/incited participation in the USAID-GUP in Sokoto State.

Larger farm size was however, found to increase the likelihood of participation for both genders at a probability level of 0.000. However, the effect was much stronger for males (2.198) compared to females (0.213). Larger farm size aids commercialization and mechanization of farm operations because the more the farm size the more quantity of groundnut produced. Most programs' land development is, for example, done on contiguous land, which makes participation easy. Education, household size, farm size all emerged as significant predictors of participation for both genders. This suggests that individuals with more of these attributes were more likely to participate in the project. This finding is in agreement with Adesina and Favour (2016)**;** Nnaji *et al.,* (2020) and Nnaji (2022) who observed a positive and significant effect of farm size in determinants of participation in youth agricultural programme in the south western zone of Nigeria and determinants of risk perception of farmer-herder conflicts in rural Nigeria.

The coefficient of extension contact was negative and significant at a probability level of 0.000. Access to extension/advisory services was unexpectedly observed to decrease the likelihood of participation for both genders. However, the effect was stronger for females (2.353) compared to males (0.900). This result is in disagreement with Haile (2016) who found positive relationship

between extension contacts and farmers' participation in his study. Considering the location of the study, certain extension agents were not allowed to provide advisory services in some areas; particularly, male extension agents may not be allowed to interact with married women because of the purdah system. These are some of the factors that need to be considered during recruitment of extension workers.

Access to credit significantly increased the likelihood of participation for females at a probability level of 0.000. This implies that additional female respondents with access to formal credit will increase the log odds of participation by 15.020. Credit will also increase women's ability to travel for training and other project capacity building activities.

Understanding these determinants can help policymakers tailor interventions to target specific groups more effectively. For example, efforts could be made to provide support to enable married males to participate and provide resources to female farmers particularly those with lower levels of education, low farming experience, less extension contact and less access to credit.

Table 1: Socio-economic determinants of gender participation in GVC (N=200)

	Male				Female			
Parameter	**Coefficient**	**Std. Error**	**Sig.**	**Exp(B)**	**Coefficient**	**Std. Error**	**Sig.**	**Exp (B)**
(Intercept)	26.353	3.413	0.000		-6.278	4.720	0.184	
Age	-0.619	0.044	0.000	0.538	1.017	0.068	0.000	2.765
Marital status	-10.781	1.664	0.000	0.000	0.596	0.668	0.372^{NS}	1.815
Main occupation	0.098	0.195	0.617^{NS}	1.103	-28.184	0.801	0.000	0.000
Level of education	4.749	0.517	0.000	115.526	1.799	0.697	0.010	6.043
Household size	2.242	0.168	0.000	9.417	0.871	0.183	0.000	2.39
Farming experience	-1.960	0.092	0.000	0.141	-3.386	0.082	0.000	0.034
Farm size	2.198	0.103	0.000	9.009	0.213	0.052	0.000	1.237
Extension contact	-0.900	0.077	0.000	0.406	-2.353	0.102	0.000	0.095
Access to credit	1.843	1.283	0.151^{NS}	6.318	15.020	1.210	0.000	33.333
Diagnostic tools								
Omnibus Test			0.000				0.000	
Scaled Pearson Chi-Square			130.0				50.0	

Source: Field Survey Data, 2021. **, *** Significant @ 0.05, and 0.01 respectively

Determinants of Participation in USAID-GUP by Males and Females among Households in PLGAs and NPLGAs

Result of the test of determinants of gender participation in the groundnut up-scaling program of USAID is presented in Table 2. The result revealed that seven (7) variables i.e. age, marital status, level of education, household size, farming experience, farm size and extension contact were highly significant determinants of participation of males in the USAID-GUP at 1% level. Conversely, eight (8) variables i.e. age, major occupation, level of education, household size, farming experience, farm size, extension contact and access to credit were the significant determinants of participation of females in the project at 5% level. The implication of the result is that socio-

economic variables were significant determinants of participation and that the significant variables influenced males and females at 1% and 5% level of significance respectively. Null hypothesis I was thus rejected based on those variables that were significant. The study has however, revealed that factors that influenced the males to participate in the GUP slightly differed from those of the females. These variables should be carefully considered when designing program for farmers.

Table 2: Test of Determinants of Male and Female Participation in USAID-GUP among Households in PLGAs and NLGPAs (N=200)

Parameter	Male Sig.	Female Sig.
(Intercept)	0.000	0.184
Age	0.000	0.000
Marital status	0.000	0.372^{NS}
Main occupation	0.617^{NS}	0.000
Level of education	0.000	0.010
Household size	0.000	0.000
Farming experience	0.000	0.000
Farm size	0.000	0.000
Extension advisory	0.000	0.000
Access to credit	0.151^{NS}	0.000
Diagnostic tools		
Omnibus Test	0.000	0.000
Scaled Pearson Chi-Square	130.0	50.0

Source: Field Survey, 2021. ** and *** Significant @ 5% and 1% respectively

Quantity of Groundnut Handled by Males and Females among Households in PLGAs and NPLGAs

Table 3 shows the quantity of groundnut produced, processed, and marketed by gender among households of GVC actors in PLGAs and NPLGAs. However, for credibility of the study the percentage of groundnut handled was assessed based on the number of women and men that participated in the survey, due to consideration for gender equality and equity and the fact that there was no equal study representation among participants and non-participants. The result is presented and discussed below.

Quantity of Groundnut Produced

Result in Table 3 reveals the quantity of groundnut produced per household in the study area. Most of the males (46.4%) in PLGAs produced more than 1,500kg of groundnuts. However, a substantial number of females in PLGAs (36.4%) produced less than 500kg, indicating a wider range of production levels among genders. Both males and females in NPLGAs show similar trends in production, with some proportion of males (23.8%) producing more than 1,000kg. However, more than half of the females (56.3%) produced less than 500kg. The result further shows that males and females produced an average of 1,486.61kg and 682.95kg of groundnuts per household in the PLGAs respectively and the difference was statistically significant at 1% level. Conversely, in the NPLGAs males and females produced an average of 1,353.57kg and 990.63kg respectively and the difference between the two values was not statistically significant (Table 3).

Quantity of Groundnut Processed

The quantity of groundnut processed per household is shown in Table 3. The result shows that females predominantly processed more groundnuts than males, with majority (92.9%) of males processing less than 500kg compared to 36.4% of females. Again, females recorded higher average quantities in all processing categories compared to males. The result shows that males processed an average of 225.89kg while females processed 1,046.59kg of groundnut per household in the PLGAs and the difference was statistically significant at 1% level. However, in the NPLGAs males processed an average of 246.43kg while females processed 618.75kg and the difference between the two quantities was not statistically significant.

Quantity of Groundnut Sold

Majority of females (86.4%) sold less than 500kg of groundnuts, while males (33.9%) sold more diverse quantities (501 - 1,000kg). Similar trends were observed in NPLGAs with males (29.8%) having a wider range of quantities sold (501 - 1000kg) compared to females (62.5%). The result revealed that males sold an average of 1,171.43kg while the females sold 818.18kg of groundnuts per household in the PLGAs while in the NPLGAs males sold 1,076.79kg and females 1,153.13kg but the difference in the quantities for PLGA and NLPGA was not statistically significant.

The mean values show that females produced fewer (682.95kg in PLGAs and 990.63kg in NPLGAs), and sold fewer (818.18kg in PLGAs, and 1,153.13kg in NPLGAs quantities of groundnuts compared to males in both PLGAs (1486.61kg produced and 1,171.43kg sold) and NPLGAs (1,353.57kg produced and 1,076.79kg sold) respectively. However, females processed more (1,046.59kg in PLGAs and 618.75kg in NPLGAs) quantities of groundnuts compared to the males in both PLGAs (225.89kg) and NPLGAs (246.43kg).

This work is in collaboration with the findings of Olakojo (2017) that a greater proportion of male respondents were engaged in cultivation. It also confirms the findings of Umeukeje, (2014) who revealed that over 92% of women process within 20 plates of groundnut on a daily basis which yields up to 50kg of groundnut approximately and Chete (2018) that majority (90%) of female respondents processed up to 11-15 bags monthly which confirm their predilection for processing activities. This was contrary to the findings of Mroto (2015) where most of the processing activities were executed by the males. These findings also support the assertion by Chete (2018) that most of the adult males sold more than 20 bags in a month.

From the results, there is a clear gender disparity in groundnut production and sales, with males generally engaging in the production of larger quantities across all categories. But females, particularly in PLGAs, exhibited a wider range of processing quantities than their NPLGAs counterparts, indicating diverse processing practices among female actors. Furthermore, the lower quantities processed by males and sold by females may have economic implications, potentially indicating differences in access to markets or resources. These findings suggest a need for tailored support programs to address gender disparities in groundnut production and processing. Initiatives focusing on enhancing male and female participation and providing access to resources and markets could help bridge these gaps.

Table 3: Distribution of GVC Actors based on Quantity of Groundnut Produced, Processed and Marketed by Males and Females among Households in PLGAs and NPLGAs

Volume handled		PLGAs (N=100)				NPLGAs (N=100)			
		Male (n=56)		Female (n=44)		Male (n=84)		Female (n=16)	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
Quantity Produced (kg)	< 500kg	4	7.1	16	36.4	23	27.4	9	56.3
	501 - 1000kg	13	23.2	15	34.1	19	22.6	5	31.3
	1001 - 1500kg	13	23.2	13	29.5	20	23.8	1	6.3
	>1500kg and above	26	46.4	-	-	22	26.2	1	6.3
	Mean	1486.61		682.95		1353.57		990.63	
	6.98***					0.79			
Quantity processed	< 500kg	52	92.9	16	36.4	79	94	12	75
	501 - 1000kg	2	3.6	6	13.6	2	2.4	2	12.5
	1001 - 1500kg	-	-	12	27.3	-	-	1	6.3
	>1500kg and above	2	3.6	10	22.7	3	3.6	1	6.3
	Mean	225.89		1046.59		246.43		618.75	
	-6.10***					-1.17			
Quantity sold	< 500kg	9	16.1	38	86.4	31	36.9	10	62.5
	501 - 1000kg	19	33.9	2	4.5	25	29.8	4	25
	1001 - 1500kg	14	25	1	2.3	12	14.3	-	-
	>1500kg and above	14	25	3	6.8	16	19	2	12.5
	Mean	1171.43		818.18		1076.79		1153.13	
	0.62					-0.14			

Source: Field Survey Data, 2021. (***) Significant @ 1%

Gender Difference in the Quantity of Groundnut Handled in GVC among Households in PLGAs and NPLGAs

The result of the test for null hypothesis II is presented in Table 4. Two-sample unequal variance of t-test was used to the hypothesis. The null hypothesis assumed that there was no significant difference in the quantity of groundnut handled by males and females in PLGAs and NPLGAs. The result however, revealed that there was a significant difference in the quantity of groundnut handled by males and females at PLGAs in the categories of production (6.99***) and processing (6.10***). The difference in volume of groundnut sold was however, not significant among the PLGAs (0.62^{NS}), and NPLGAs (0.14^{NS}). Thus, the null hypothesis II was rejected based on the difference in quantity of groundnut produced and processed among the PLGAs. This result equally confirmed the need for the USAID-GUP to intensify its intervention to reduce the gender disparity witnessed among GVC operators in the study area.

Table 4: Test of Difference in Quantity of Groundnut Handled in the GVC by Males and Females among Households in PLGAs and NLGPAs

Volume of groundnut handled	PLGAs (N=100)		NPLGAs (N=100)	
	Male (n=56)	Female (n=44)	Male (n=84)	Female (n=16)
Quantity Produced (kg)				
Mean	1486.61	682.95	1353.57	990.63
Variance	525862.82	168714.32	1284685.89	3124739.58
Observations	56	44	84	16
Degree of freedom	90		17	
t Stat	6.98***		0.79^{NS}	
t Critical two-tail	1.99		2.11	
Quantity processed				
Mean	225.89	1046.59	246.43	618.75
Variance	133817.37	691790.43	395830.46	1532958.33
Observations	56	44	84	16
Degree of freedom	56		17	
t Stat	-6.10***		-1.17^{NS}	
t Critical two-tail	2.00		2.11	
Quantity sold				
Mean	1171.43	818.18	1076.79	1153.13
Variance	358259.74	358259.74	947436.53	4925156.25
Observations	56	44	84	16
Degree of freedom	45		16	
t Stat	0.62^{NS}		$-0{\cdot}14^{NS}$	
t Critical two-tail	2.01		2.12	

Source: Field Survey, 2021. ** and *** Significant @ 5% and 1% respectively

CONCLUSION AND RECOMMENDATIONS

The study observed significant gender disparities in activities within the GVC among Households involved in the project in Sokoto State, Nigeria. This revealed that the USAID-GUP has not fully intensified its intervention to reduce the gender biases witnessed among GVC participants to promote equitable participation across all stages of groundnut production and processing in the study area. This is evident as the project did not have any effect on gender inequality in both production and processing in the PLGAs because while male engage mostly in production her female partakes more in processing and this has brought out clearly the activities practiced by the different genders. It was therefore concluded that disparities in gender activities is one of the main factors that continually stifles agricultural growth and could be attributed to cultural and social rigidities in the study area. Thus, such rigidities should be taken into consideration for successful project implementation. Furthermore, the project has identified common socio-economic factors influencing gender participation in the value chain, emphasizing the need to closely tailor interventions that could reduce potential barriers preventing inclusive development for gender equity.

Based on the findings, the study recommended that:

1. Policy makers should tailor interventions to target specific group more effectively since gender inequality was observed as the main factor that continually stifles agricultural growth.
2. Intervention implementers should ensure that they focus on areas of thematic importance which include; education level, household size, farm size and extension contact as they are significantly influence with participation in GVC positively.
3. Tailored intervention should be implemented to target specific groups more effectively since potential barriers that prevent inclusive development were discovered in the project.
4. Understanding the determinants of gender participation can help policymakers tailor interventions to target specific groups more effectively.
5. Young farmers should be encouraged to participate in groundnut production to help increase groundnut seed production thereby strengthen the activities of other actors along the chain; this will boost the programme to function effectively and improve societal welfare since, age was found to be significant in the study.
6. The larger the household size the more available labour for the households involved in GVC since, household size was significant consequently unemployed youths should be keyed inn.
7. Extension services should be strengthened to provide equal and accessible support to both men and women since it was significant therefore more extension personnel should be involved to support productivity because the more the extension contact of the participant the more their full involvement, especially women.
8. This finding equally confirmed the need for the USAID-GUP to intensify its intervention to reduce the gender disparity witnessed among GVC operators in Sokoto State, Nigeria.

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