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EFFECT OF PARTICIPATION IN THE AGRO-PROCESSING PRODUCTIVITY ENHANCEMENT AND LIVELIHOOD SUPPORT (APPEALS) EMPOWERMENT PROGRAMME ON WOMEN'S HOUSEHOLD LIVELIHOODS IN KANO AND KADUNA STATES, NIGERIA

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ABSTRACT

This study examined the effect of women participation in the Agro-Processing, Productivity Enhancement and Livelihood Improvement Support (APPEALS) Programme on their household livelihoods in Kano and Kaduna States, Nigeria. Specifically, the study described the socio-economic characteristics of the participants, identified their livelihood activities, examined the effect of programme participation on their income, and identified constraints faced in the programme. Primary data were collected from 278 women beneficiaries, and descriptive statistics and a paired sample t-test were used to analyse changes in their income before and after programme participation. Results showed that women were largely young to middle-aged, socially integrated, and engaged in diverse livelihood activities, with farming (39.6%) and trading (23%) being most common. The paired t-test revealed a statistically significant increase in income across all livelihood categories, with mean income rising by ₦50,000 in farming, ₦56,500 in trading, ₦55,500 in processing, ₦46,000 in livestock, and ₦58,000 in artisan work ($p < 0.01$). Despite these gains, women faced constraints including poor market access (57.6%) and limited extension services (50.4%). The study concluded that APPEALS substantially improved women's economic outcomes and recommends strengthening market linkages and gender-responsive support services.

Key words: APPEALS, Empowerment programme, Livelihood, Women, Participation

INTRODUCTION

Women constitute a critical component of rural livelihood systems in Nigeria, contributing substantially to agricultural production, processing, and household welfare. Despite their central role, women productivity and livelihood outcomes are often constrained by limited access to critical resources such as land, credit, inputs, technology, markets, and extension services (FAO, 2023). These structural constraints reduce their capacity to generate income and enhance household resilience, thereby intensifying poverty and livelihood vulnerability (Kabeer, 2020). To address these challenges, empowerment programmes have become a major strategy for improving women economic opportunities and lifting households out of poverty.

In Nigeria, the Agro-Processing, Productivity Enhancement and Livelihood Improvement Support (APPEALS) Programme is one of the key interventions designed to strengthen rural livelihoods through support for agricultural production, processing, and value-chain participation. The programme prioritizes women and youth, offering training, inputs, grants, and enterprise support aimed at enhancing household income, food security, and overall welfare (World Bank, 2023). However, while earlier studies have examined participation patterns, fewer have investigated how women engagement in empowerment programmes translates into tangible household livelihood outcomes such as income improvement, food security, resilience, and asset accumulation (Adewuyi & Omotesho, 2020; Ibro et al., 2021).

Given the socio-economic diversity and cultural contexts of northern Nigeria, particularly Kano and Kaduna States,

understanding the livelihood effects of women involvement in the APPEALS Programme is crucial. Women in these states face strong cultural norms, heavy domestic burdens, and limited decision-making power, all of which shape their ability to benefit from livelihood support initiatives. Yet, they also make substantial contributions to farming, processing, trading, and rural enterprise development. Assessing whether APPEALS participation leads to measurable improvements in household livelihoods is therefore essential for informing programme redesign and ensuring equitable development outcomes.

This study therefore examines the effect of women's participation in the APPEALS Empowerment Programme on their household livelihoods in Kano and Kaduna States. Specifically, it describes the socio-economic characteristics of the women participants, identifies their livelihood activities, assesses how participation influences key livelihood outcomes, and identifies the constraints faced by women in the programme. The findings contribute to the growing evidence on women's empowerment and agricultural development, providing insights that can guide policy, strengthen programme targeting, and promote inclusive rural transformation.

METHODOLOGY

Description of the Study Area

The study was conducted in Kano and Kaduna States, both located in Northern Nigeria. Kano State is situated in the Sudan Savannah covering a land area of 20,760 sq km. It lies between latitude $10^{\circ} 30' N$ and $13^{\circ} N$ and longitude $7^{\circ} 40' E$ and $10^{\circ} 35' E$. It is the most populous state with 20,904,894 people from the projected 2006 census population of

8, 401, 288 reflecting an annual growth rate of approximately 4.8%. Kaduna State on the other hand is situated on Nigeria's northern high plain also within the Sudan Savannah vegetation zone, its landscape features scattered trees, shrubs, and grasses with most loamy to sandy soils. The state lies between latitude $9^{\circ}0' N$ and $11^{\circ}30' N$ and longitude $6^{\circ}0' E$ and $8^{\circ}00' E$. The annual rainfall is between 420mm-1,000mm and the temperature is averagely warm throughout the year (KNARDA, 2017). The wet season occurs between May to September while the dry season is from October to April. On the other hand, Kaduna State experiences a tropical climate consisting of two distinct seasons, the rainy season is from May to October while the dry season is from November to April. Annual rainfall ranges from 1,000mm to 1,500mm, while temperature varies between 15° during harmattan months up to 35° during peak dry periods.

Both states are characterised by intensive smallholder farming, processing, and trading activities in which women play an active role. Kano and Kaduna were selected due to their strong implementation of the Agro-Processing, Productivity Enhancement and Livelihood Improvement Support (APPEALS) Programme across multiple value chains, including rice, maize, ginger, tomato, aquaculture, and poultry. The area is dominated by rural communities with large household sizes, limited access to productive resources, and cultural norms that shape women's participation in economic activities (Federal Ministry of Agriculture and Rural Development [FMARD], 2020). The two states also host a high concentration of women beneficiaries of APPEALS, making them suitable environments for assessing the programme's livelihood effects.

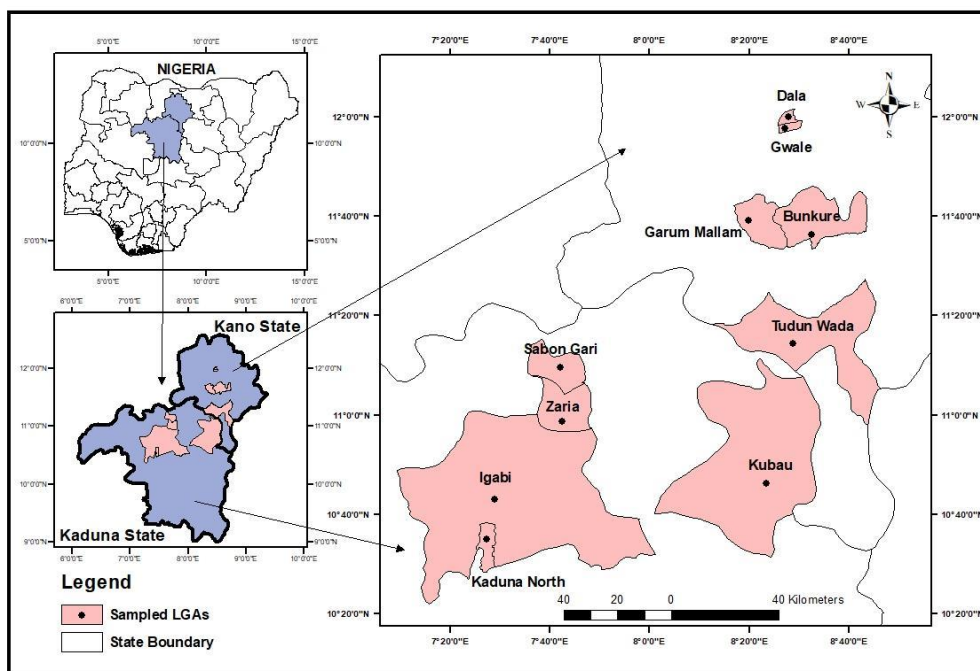


Fig 1: Map of Kano and Kaduna States Showing the Sampled Areas

Sampling Procedure and Sample Size

A multi-stage sampling technique was adopted for this study. The first stage involved purposively selecting programme-benefiting Local Government Areas (LGAs) from Kano and Kaduna States based on the prevalence of female participation in the APPEALS Programme. The second stage involved random selection of

communities participating in APPEALS livelihood activities such as farming, trading, processing, livestock, and artisan work. In the final stage, women beneficiaries were selected through simple random sampling from the programme register. A total of 278 women beneficiaries formed the sample size for the study.

Table 1: Sampling Procedure and Sample Size

States	LGAs	Total population	Sample size
Kano	Bunkure	50	14
	Dala	60	17
	Gwale	20	6
	Garum Malam	50	14
	Tudun Wada	50	14
Kaduna	Zaria	200	55
	Igabi	100	28
	Kaduna North	150	42
	Sabon Gari	200	55
	Kubau	120	33
Total		1,000	278

Source: Field Survey, 2024

Data Collection

Primary data were collected using a structured questionnaire administered through the Computer-Assisted Personal Interviewing (CAPI) method. Data collected covered socio-economic characteristics, participation levels, and income before and after participation in APPEALS.

Pretest of the Research Instrument

The instrument for data collection was pretested in a rural community in Kano and Kaduna States respectively with eight (8) respondents from Kano and 20 respondents from Kaduna making a total of 28 of the targeted respondents using rausoft, which is 10% of the total sample

Validity and Reliability of the Instrument

The instrument for data collection was subjected to face and content validity with the help of experts and researchers from the Faculty of Agriculture in Federal University Dutsin-Ma. Four academic staff, two each from the Department of Agricultural Extension and Agricultural Economics, perused the instrument. The split-half method of reliability was used for the study; the pretested instrument was analyzed to measure the consistency of their results using Spearman Brown Prophecy formular.

Measurement of Variables

Women’s participation in the APPEALS programme was measured based on their involvement in programme-supported livelihood activities, including farming, trading, processing, livestock production, and artisan work. Household livelihood outcome was measured using changes in income before and after programme participation. Income was captured in monetary terms for the 2019/2020 (before participation) and 2022/2023 (after participation) production periods.

Socioeconomic variables such as age, marital status, education, household size, years of residence, and association membership were measured using standard categorical and continuous scales. Constraints to participation were measured using multiple-response items, allowing respondents to identify all applicable challenges.

Data Analysis

Descriptive statistics which include frequencies, percentages, means, and standard deviations were used to summarise the socio-economic characteristics of respondents, describe the distribution of their livelihood activities and identify the constraints faced in participating in APPEALS empowerment programme. To assess the effect of programme participation on household livelihood outcomes, particularly income, the study employed a Paired Sample t-test, which is appropriate for comparing two related means measured from the same respondents over two time periods.

Paired Sample t-test

A paired sample t-test was used to determine the effect of participation in the APPEALS empowerment programme on the income of women beneficiaries before and after the intervention. The “before” income refers to earnings in the 2019/2020 period, while the “after” income represents earnings in 2022/2023 following programme participation. This test is suitable because the two income measurements are dependent, taken from the same individuals and the method increases statistical power by eliminating between-subject variability.

The paired sample t-test is expressed as:

$$t = \frac{\bar{D}}{S_D/\sqrt{n}}$$

Where: $\bar{D} = (M_{\text{after}} - M_{\text{before}})$ is the mean of the paired income differences; S_D is the standard deviation of the income differences and n is the number of paired observations.

Income differences were computed for five livelihood activities: Farming (X_1), Trading (X_2), Processing (X_3), Livestock Production (X_4) and Artisan Work (X_5)

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Women Participants of APPEALS Empowerment Programme

The findings revealed that the women participants were predominantly young to middle-aged, with a mean age of 34.1 years, indicating that they are within their

economically active and productive stage of life. This suggests that the APPEALS programme is engaging individuals who have the capacity to actively participate in livelihood activities and adopt innovations. Age plays a crucial role in determining productivity and participation in agricultural activities, as individuals within active age groups are more likely to engage in income-generating ventures. This finding supports the position of Naila Kabeer (2020), who noted that economically active women are more likely to benefit from empowerment programmes and contribute meaningfully to household livelihoods.

The study further showed that the respondents had moderately large household sizes, with an average of about 6–7 persons. This implies the availability of family labour, which can support farming and other livelihood activities, thereby reducing labour costs and enhancing productivity. However, large household size

may also increase dependency burden and strain household resources. This finding agrees with the report of the Food and Agriculture Organization (2023), which emphasized that household size in rural areas can both support labour availability and increase economic pressure on households.

In terms of education, the majority of the women had at least secondary education, indicating a moderate level of literacy among participants. This enhances their ability to understand training, adopt improved practices, and effectively utilize programme support. Education improves decision-making and access to information, thereby influencing participation in development programmes. This finding is in line with the work of F. Aremu and T. Reynolds (2024), who reported that education significantly enhances women’s participation and productivity in agricultural programmes.

Table 2: Distribution of Socio-economic Characteristics of Women Participants of APPEALS Empowerment Programme

Socio-economic Variables	Frequency	Percentage (%)
Age (years)		
18–27	85	30.6
28–37	103	37.1
38–47	56	20.1
≥48	34	12.2
Mean(SD)	34.1(10.23)	
Household Size		
2–4	78	28.1
5–7	116	41.7
8–10	48	17.3
≥11	36	12.9
Mean(SD)	7(4.81)	
Years of Residence		
5–13	111	39.9
14–22	80	28.7
23–31	49	17.6
32–40	38	13.8
Mean(SD)	22.1(10.22)	

The findings also revealed that a high proportion of respondents were married (60.1%), reflecting the typical household structure in northern Nigeria. This has implications for access to resources and decision-making, as socio-cultural norms may limit women’s control over productive assets. This finding corroborates the study of B. A. Okunade et al. (2023), who observed that gender norms and marital structures often restrict women’s access to productive resources in Nigeria.

Urban Exposure (years)		
1–4	96	34.5
5–8	101	36.3
9–12	55	19.8
13–16	26	9.4
Mean(SD)	6.6(4.85)	
Marital Status		
Single	68	24.5
Married	167	60.1
Divorced	25	9.0
Widow	18	6.4
Educational Status		
Primary	37	16.2
Secondary	122	42.5
Tertiary	54	23.8
Quranic	65	17.5
Membership of Association		
Member	210	75.4
Non-member	68	24.6
Social Participation		
Yes	250	90.0
No	28	10.0

Source: Field survey, 2024

Furthermore, the study found that most respondents were engaged in farming, trading, and other livelihood activities, indicating diversified income sources. This diversification enhances resilience to economic shocks and improves household welfare. However, limited access to markets and institutional support may constrain the benefits derived from such activities. This finding is consistent with the findings of A. Mukaila (2024), who noted that while livelihood diversification

improves resilience, market and institutional constraints limit women’s income potential.

Livelihood Activities of Rural Women in APPEALS Empowerment Programme

The result in Figure 1 shows the livelihood activities of women who participated in APPEALS empowerment programme. The result provides a valuable insight into the diverse livelihood strategies adopted by women empowered through the APPEALS programme. The result reveals that farming remains the primary income source for a substantial proportion of these women, accounting for 39.6% of the total women studied. This finding underscores the significance of agriculture in the livelihoods of women and the potential of agricultural interventions to empower them economically. The finding is consistent with that of Oluwatayo (2009), who found that farming was the primary livelihood activity for women in Mozambique.

While farming is a dominant activity, the result also highlights the diversification of livelihoods among women. Twenty three percent of them engage in trading activities, indicating a reliance on market-based strategies to supplement their income. This diversification can enhance their resilience to economic shocks and provide additional opportunities for income generation. The findings is also consistent with that of Oluwatayo (2009), who also found that trading was the secondary livelihood activity for women in Mozambique. Mukaila (2024), who also reported that rural women often combine farming with trading activities to improve income security and resilience.

Furthermore, 18% of the women who participated in the APPEALS empowerment programme were involved in the processing of agricultural products, indicating a growing interest in value addition and agro-processing. This development is particularly encouraging, as it has the potential to increase the value of farm produce, enhance product quality, and generate higher incomes for women farmers. Through agro-processing, participants can access niche markets, improve market competitiveness, and minimise post-harvest losses, thereby contributing significantly to sustainable livelihoods and the overall empowerment of women in the agricultural sector.

A smaller proportion (14.4%) of the women engage in livestock rearing, an activity that offers a steady source of income through the sale of livestock products. Additionally, only 4.7% were involved in artisanal activities, highlighting a potential for creative entrepreneurship and the development of unique products. These artisanal ventures can be particularly valuable in rural areas where formal employment opportunities are limited. These findings are consistent with recent research by Okoroafor, Ohagwu and Nwokike (2024), which examined women’s agricultural livelihoods in Southeast Nigeria. Their study revealed that women remain actively engaged in crop and livestock farming, trading, and processing of agricultural products, despite facing challenges such as gender-based violence and limited access to support systems.

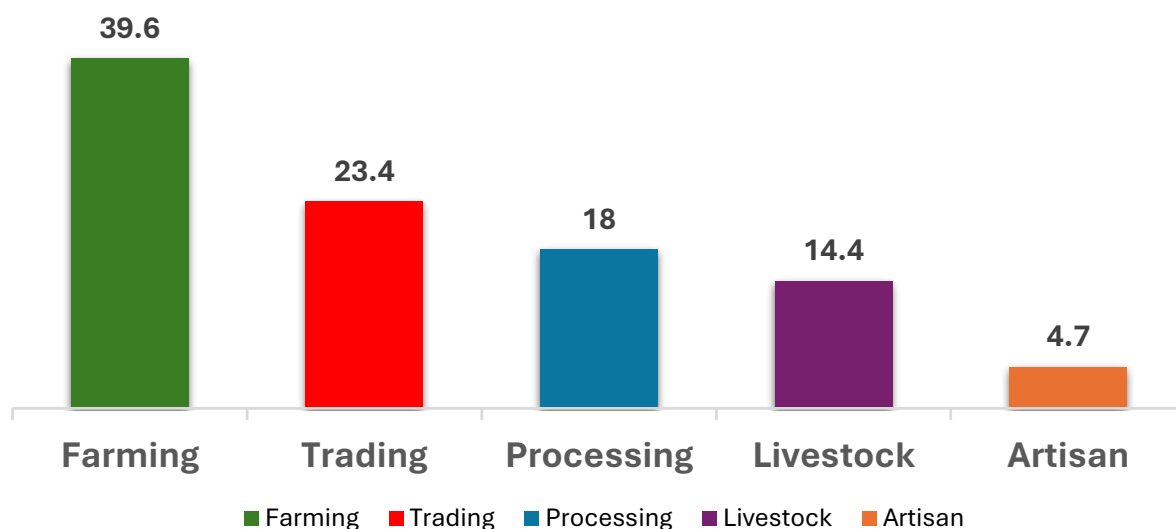


Figure 2: Distribution of the Women According to Livelihood Activities

Effect of Participation in APPEALS Programme on Women’s Household Livelihood

The result in table 3 revealed the effect of participation in the APPEALS programme. It showed a statistically significant increase in the income of women following their engagement in various programme components. Grouped by different activities they are involved in, in APPAELS programme, the analysis shows that all categories farming, trading, processing, livestock, and artisan recorded substantial increases in mean income after the intervention.

Specifically, women engaged in farming, (mixed cropping) who represented the largest share of respondents (39.6%), experienced a rise in mean income from ₦31,000 before the programme to ₦81,000 after. This increase of ₦50,000 was accompanied by a standard deviation of ₦14,800 and a highly significant t-statistic (6.42), indicating that the programme had a particularly strong effect on this group.

Similarly, women in trading, processing, livestock, and artisan also saw meaningful improvements, with mean income increases ranging from ₦32,000 to ₦89,000, ₦29,800 to ₦85,000, ₦30,000 to ₦76,000, and ₦33,000 to ₦91,000 respectively, and all groups showing statistically significant ρ value ($\rho < 0.01$). This strongly support the rejection of the null hypothesis confirming

that the APPEALS programme had a positive and significant effect on the economic outcomes of women livelihood household.

This significant rise in income can be attributed to several factors embedded in the programme: access to improved inputs, training in value addition and entrepreneurship, better market linkages, and overall capacity development. This empowerment elements likely enhanced productivity, improved income-generating capabilities, and enabled many women to expand their businesses and diversify their income sources.

The findings suggest that APPEALS empowerment programmes have strong potential to uplift women economically. The observed increases in income not only reflect improved individual livelihoods but also contribute to household welfare and broader community development. These results are consistent with recent studies such as Bot et al. (2024), who found that women participation in agricultural empowerment programmes significantly enhances their income and economic resilience. Similarly, Sasa, Adebayo, and Maurice (2023) emphasized that targeted interventions in agriculture and agribusiness can improve women’s financial stability and promote inclusive rural development.

Table 3: Paired Sample t-Test of Estimated Income before and After Participation in APPEALS Programme on Livelihood.

Livelihood Activity	Obs	Mean Income Before (₦)	Mean Income After (₦)	Mean Difference (₦)	Standard Error (₦)	t-stat	p-value
Farming	110	31,000	81,000	50,000	7,787.54	6.42	0.000***
Trading	65	32,500	89,000	56,500	10,366.97	5.45	0.000***
Processing	50	29,800	85,300	55,500	11,349.69	4.89	0.001***
Livestock	40	30,000	76,000	46,000	10,621.24	4.33	0.002***
Artisan	13	33,000	91,000	58,000	9,830.51	5.90	0.000***

*, **, *** indicate significant level at 10%, 5% and 1%, respectively

Source: Field Survey, 2024.

Constraints to Women’s Participation in the APPEALS Empowerment Programme

Table 4 shows the constraints faced by women who participated in the APPEALS empowerment programme. They faced multiple challenges that limit their participation in the APPEALS Empowerment Programme. The most frequently reported challenge was poor market access (57.6%), which restricted women’s ability to sell their produce, obtain inputs, and connect to profitable value chains. Participants explained that poor road networks, high transport costs, and inadequate

market information made marketing difficult. This aligns with Mukaila (2024), who reported that weak rural market systems significantly reduce women's ability to commercialize their agricultural activities.

Another major constraint was limited access to extension services (50.4%), which hindered women from receiving timely technical training, production advice, and updates on improved farming practices. Similarly, high cost of farm inputs (46.8%) such as fertilizers and seeds prevented many women from fully engaging in programme activities. These findings are consistent with Aremu & Reynolds (2024), who emphasized that inadequate extension contact and high input costs widen the gender productivity gap in agriculture. Cultural and gender norms also played a key role, with 41.4% of women reporting restrictions on mobility, land ownership, and decision-making. Such norms continue to hinder women's access to empowerment opportunities which is consistent with Okunade et al. (2023).

Additional barriers identified include inadequate training and capacity building (37.8%), poor rural infrastructure (32.4%), and time constraints due to household responsibilities (30.6%). Women noted that limited storage facilities, poor road conditions, and heavy domestic workloads reduced their ability to attend training sessions or fully benefit from programme activities. This reflects broader evidence that gendered labour burdens and weak rural infrastructure disproportionately affect women's agricultural involvement (Pierotti et al., 2022). These constraints demonstrate that overcoming women's participation barriers requires gender-responsive extension services, improved market linkages, subsidized inputs, and interventions that reduce women's time poverty.

Table 4: Distribution of Women Based on Constraints Faced in Participating in APPEALS Empowerment Programme

Constraints	Frequency	Percentage (%)	Ranks
Poor Market Access	160	57.6	1 st
Limited Extension Services	140	50.4	2 nd
High Cost of Farm Inputs	130	46.8	3 rd
Cultural and Gender Norms	115	41.4	4 th
Inadequate Training and Capacity Building	105	37.8	5 th
Poor Infrastructure (e.g., roads)	90	32.4	6 th
Time Constraints (Household Duties)	85	30.6	7 th

*Multiple responses allowed

Source: Field survey, 2024

CONCLUSION

This study concludes that participation in the APPEALS Empowerment Programme has had a strong and positive effect on women's household livelihoods in Kano and Kaduna States. The paired sample t-test results showed significant increases in income across all livelihood activities, with farming, trading, processing, livestock, and artisan work recording substantial income gains after programme participation. These findings indicate that APPEALS interventions such as improved inputs, training, and market linkages effectively enhanced productivity and household economic welfare. However, key constraints including poor market access (57.6%), limited extension services (50.4%), high input costs

(46.8%), cultural norms (41.4%), and infrastructure challenges (32.4%) continue to hinder full participation.

RECOMMENDATIONS

Based on the findings of the study, it is therefore recommended that the programme strengthens market linkages, expands gender-responsive extension services, subsidizes critical inputs, improves rural infrastructure, and implements culturally sensitive sensitization campaigns. Addressing these constraints will further enhance women's economic empowerment and consolidate the livelihood gains achieved through the APPEALS Programme.

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