Assessment of Women Participation in Rice Processing Value Chain in Cross River State, Nigeria

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Abstract
This study assessed women's participation in the rice processing value chain and identified the constraints limiting their engagement in Cross River State, Nigeria. Conducted across the three agricultural zones of the state, the research adopted a multi-stage sampling technique to select 284 women actively involved in rice value chain activities. Data were collected using a semi-structured questionnaire and analyzed using descriptive and inferential statistics, including frequencies, percentages, means, and rankings. The findings revealed that women played a significant role in all stages of rice processing, particularly in parboiling, drying, milling, and bagging, with over 80% involvement across these activities. Most of the women (97.3%) used locally fabricated machines, while only 2.7% had access to industrial machines, which were largely privately owned, reflecting limited accessibility due to high costs. Constraints identified included high cost of fuel (mean = 4.754) and epileptic power supply (mean = 4.567), both of which significantly hinder effective processing. These challenges, if not addressed, may undermine women's productivity and economic empowerment in the rice value chain. The study concluded that woman in Cross River State are highly active in rice processing value chain activities, particularly in parboiling, drying, milling, and bagging. The study recommends targeted interventions such as subsidized access to processing equipment, stable electricity supply, and enhanced support services to strengthen women's participation in the sector.

Keywords: Rice Processing, Women, Participation, Rice, Rice Value Chain

Introduction
Production of milled rice in Nigeria from 2010 to 2023 in 1,000 metric tons (Sasu, 2023) showed that the output of milled rice produced in Nigeria was estimated at 5.2 million metric tons per annum. This means that between 2010 and 2023, milled rice production in the country generally increased. The largest growth in output was registered in 2010, when the crop volume experienced a 26 percent increase compared to the previous year (Sasu, 2023; Aboh & Effiong, 2019a). Series of studies on the participation of women in rice value chain in Nigeria showed that women contribute in high percentage to processing, marketing and production of rice in their locality and Nigeria in general. A study on the participation of women in household rice value chain in Cross River State (Ben, 2015; Aboh & Effiong, 2019b), showed that women played a significant part in rice processing. In none of the sectors assessed did the women had significant difference in opinion compared to the hypotheses tested in relation to the participation of women as important actors in household rice value chain. The study included 2231 respondents of which 2021 were women, and 210 were agricultural extension agents. Similarly, a study on Analysis of Women Participation in Rice Processing under International Fund for Agricultural Development (IFAD) Value Chain Development Programme (VCDP) in Bida and Wushishi Local Government Areas of Niger State, Nigeria (Apata, 2019), showed that VCDP women participation was high and recommended that government should provide improved technologies for the women rice processors. Similarly, another study in the North West zone of Nigeria (NBS, 2014), revealed 47 percent of women participation in agricultural product processing and handling as against 22.5 percent for men. The women who were rice processors according to the study; predominantly contributed in rice parboiling, drying, milling, de-stoning, polishing, bagging, transportation and management of waste from rice paddy. Another study on State of Agro-wastes Management in Nigeria: Status, Implications and Way Forward (Toyese et al., 2023), highlighted that harvest season of crops (rice, maize, etc)

after successful cultivation generally leads to increased output across the entire Nigerian State. It stated further that during this period and a few months afterwards, a large volume of waste generation resulting from agricultural value chain processing activities occurs. The waste lead to environmental pollution from the burning of waste or fermentation of improperly disposed waste. This lead to increase in rodent and pest populations; in some cases posing a significant threat to health, safety and the environment ((Etim et al., 2022; Etim & Effiong, 2022; Ijioma, et al., 2014; Nkang & Effiong, 2015; Ntui et al., 2022). Hence the need for proper management of Agro waste even in rice value chain by women participating rice value chain programme.

Women of Africa in agriculture have one of the lowest social status and they are often expected to support themselves and the families virtually independently (Guterres. 2021). Women are disadvantaged and constrained in many ways (Baccarini, 2022; (Effiong & Aboh, 2018; Effiong & Aboh, 2019; Effiong & Aboh, 2024). Feed the Future, 2022 its study revealed that women own only 1 percent of the land (though this varies by culture and ethnicity especially in Nigeria), they also receive less than 7 percent of farm extension services, they receive less than 10 percent of farm credit given to small-scale entrepreneur, they are undernourished, illiterate and lack a voice in the key decisions affecting their lives as well as the agricultural programme they participate in. Even though the smallholder entrepreneurs in Nigeria are the heart of agricultural food production (Adedotun, 2022), it was likewise estimated that about 78 percent of smallholder entrepreneurs in Nigeria do not have access to financial services even though smallholder entrepreneurs (whose majority are women) produce about 90 percent of Nigeria's agricultural food (Akano et al., 2023; Effiong, 2013; Effiong, 2024a; Effiong, 2024b). This gender discrepancy in agricultural food production activities is also a crucial constraint to women in getting involved in rice value chain programme. Women are likewise constrained in accessing agricultural land in most developing Africa countries where land is predominantly owned by men and transferred inter-generationally to males (Effiong, & Effiong, 2012; Effiong, & Etim, 2024; Effiong, and Iheme, 2024; Effiong et al., 2023). Similar studies in Nigeria, Burkina Faso, Kenya and Zambia (Opawole, 2019), revealed that due to differential control over resources, when men and women carry out the same agricultural programme on individual plots, women were at a disadvantage; most inputs, such as labour and fertilizer, went more to the men's plots as women's concerns were regarded as subordinate (Opawole, 2019), quoted some experts to have estimated that if women had the same inputs as men, household agricultural output in Sub-Saharan Africa could increase between 10 to 20 percent in agricultural value chain across rice, maize, etc. Another area of constraints to the women in rice value chain is agricultural policies that if not adequately put in place hinder the effectiveness of their participation in a particular agricultural programme (Effiong & Asikong, 2013; Effiong, Etuk, & Iyamah, 2023; Effiong, Ijioma, & Effiong, 2016; Effiong, Aboh, & Aya, 2021). Assessment of women participation in rice processing value chain programme and the effects and influence on rice output and income has been bedeviled by several challenges in Cross River State like other states in Nigeria. This affected the participation of women in rice value chain programmes in the state. Series of studies have been carried out on women participation in rice value chain and the gender dimension in some parts of Cross River State as well as other states in Nigeria and the world at large, none of the studies focused on the assessment of women participation in rice processing value chain in this study area in Cross River State; hence, this study was conducted to fill the gap in literature by making the findings available to relevant stakeholders, through assessing the participation of women in rice processing value chain in Cross River State. The specific objectives of the study were to; assess the participation of women in rice processing; and to identify the constraints to women participation in rice processing value chain.

Materials and methods

This research was carried out in the three agricultural zones of Cross River State, located in the South-South region of Nigeria. Cross River State, which spans 20,156 square kilometers, is situated within the Niger Delta and lies along the Atlantic coastline. The state is bordered by Benue State to the north, Akwa Ibom State to the southwest, Ebonyi and Abia States to the west, and Cameroon to the east. Cross River is known as "the People's Paradise" and is located in the tropical rainforest belt, with an average temperature range of 15°C to 30°C. According to the National Bureau of Statistics (2023), the estimated population of Cross River State was over 3.8 million as of 2016. The study area includes the three agricultural zones where rice value chain activities are carried out, focusing specifically on women involved in these activities. The population for the study comprised women participating in the rice value chain program in Cross River State. A multi-stage sampling procedure was employed to ensure a representative sample. In the first stage, all three agricultural zones of the state were considered for inclusion due to their involvement in rice value chain activities. The second stage involved purposively selecting one block from each agricultural zone based on the level of rice value chain activities. In the third stage, purposive sampling was used again to select three cells from each block, with the selection based on the volume of rice value chain activities in those cells. This approach ensured that the most relevant areas for the study were included. In the final stage of sampling, a list of registered women groups involved in the rice

value chain activities was obtained from the Cross River Agricultural Development Programme (CRADP). Random sampling was then applied\ to select 40 percent of the women from each group in the chosen cells. This resulted in a total sample size of 284 respondents out of a population of 710 farmers used for the study. Also, from the number,186 respondents participated in rice processing activities in the study area .The multi-stage sampling procedure allowed for a detailed and targeted representation of women in the rice value chain across the three agricultural zones in Cross River State. A set of semi-structured questionnaire was used to elicit information from the women in rice value chain programme in the study area. Participation of women in rice value chain production activities: were analyzed using inferential and descriptive statistics such as frequencies, percentages, mean and ranking, while Constraints to women participation in rice value chain production activities was analyzed using mean and ranking. A list of constraints were obtained from literature and presented to the randomly selected women in rice value chain to rate their awareness on the challenges using a five-point Likert scale as follows: Strongly Agreed (SA) = 5, Agreed (A) = 4, Uncertain (UC) = 3, Disagreed (D) = 2, and Strongly Disagree (SD) = 1.

TABLE 1

Sampling procedure and Sample size

Zones	Selected Blocks	Selected Cells	No. of selected rural women group	No. of members in the group	40 percent Sample size
Calabar	Biase	Abini	3	65	26
		Apket 1	3	60	24
		Adim	3	75	30
Ikom	Obubra	Obubra Urban	3	90	36
		Obubra	3	80	32
		Ababene	3	75	30
Ogoja	Yala	Ugaga	3	80	32
		Ijegu	3	80	32
		Okpoma	3	105	42
Total	3	9	27	710	284

Source: Field Survey, 2023

Measurement of variables
Activities of women in rice processing value chain
Choice of methods used in processing: The women were asked to indicate the methods used in rice processing. This was scored as: Manual Tool =1, Fabricated Machine =2, Industrial Machine =3.
Ownership of equipment: The women were asked to indicate the ownership of the processing equipment as: Personal =1, Famers' group =2, Private individual =3, Government = 4.
Parboiling: The womenwere asked to indicate if they were involved in rice parboiling. This was measured as: Yes = 1, No = 2
Drying: The womenwere asked to indicate if they were involved in rice drying. This was measured thus: Yes = 1, No = 2
Milling: The womenwere asked to indicate if they were involved in rice milling. This was measured as: Yes = 1, No =
De-stoning: The womenwere asked to indicate if they were involved in rice de-stoning. This was measured thus: Yes = 1, No = 2

Polishing: The womenwere asked to indicate if they were involved in rice polishing. This was measured as: Yes = 1, No = 2

Bagging: The womenwere asked to indicate if they were involved in rice bagging. This was measured thus: Yes = 1, No = 2

Waste (husk) management: The womenwere asked to indicate if they were involved in recycling rice husk into any valuable product. This was measured as: Recycled =1, Not recycled =2.

Constraints to women participation in rice processing value chain activities

A list of constraints were obtained from literature and presented to the randomly selected women in rice value chain to rate their awareness on the challenges using a five-point Likert scale as follows: Strongly Agreed (SA) = 5, Agreed (A) = 4, Uncertain (UC) = 3, Disagreed (D) = 2, and Strongly Disagree (SD) = 1.

Results

TABLE 2

Participation of women in rice processing value chain

Variables	Frequency	Percentage
Choice of methods used in processing		
Manual tool	0	0.0
Fabricated Machine	181	97.3
Industrial Machine	5	2.7
Ownership of processing equipment*		
Personal	44	22.8
Farmers' group	8	4.1
Private individual	141	73.1
Government	0	0.0
Parboiling		
Yes	186	100.0
No	0	0.0
Drying		
Yes	186	100.0
No	0	0.0
Milling		
Yes	186	100.0
No	0	0.0
De-stoning		
Yes	161	86.6
No	25	13.4
Polishing		
Yes	165	88.7
No	21	11.3
Bagging		
Yes	186	100.0
No	0	0.0
Husk Management		
Recycled	99	53.2
Not recycled	87	46.8

*= Multiple response

Source: Field survey data, 2025

TABLE 3
Constraints to women participation in rice processing value chain

Variables	A (5)	U (4)	UC (3)	D (2)	SD (1)	Mean	Ranking
High cost of fuel	233	43	0	5	3	4.754	1st
Epileptic power supply	198	51	33	2	0	4.567	2nd
Poor access to credit facilities	189	77	3	8	7	4.525	3rd
Inadequate trainings on relevant skills	188	62	12	14	8	4.437	4th
Inadequate knowledge of post-harvest technology	148	86	9	34	7	4.176	5th
Inadequate storage facilities	134	71	13	43	23	3.880	6th
Poor implementation of policies on rice value chain programme	78	92	86	19	9	3.743	7th
Inadequate support from private and public sectors	69	88	85	30	12	3.606	8th
Effect of climate change	89	74	48	52	21	3.556	9th

n = 284, Weighted arithmetic mean (m) = 15/5 = 3.00, (m ≥ 3.00 = Very significant constraints, m < 3.00 = Insignificant constraints). Where SA = Strongly Agreed, A = Agreed, UC = Uncertain, D = Disagree, SD = Strongly Disagree
Source: Field survey data, 2025.

Discussion
Results in table 2 showed the frequency and percentage distribution of participation of women in rice processing value chain. The result showed that women were actively participating in all aspects of rice processing activities. Over 80 percent of the women were involved in parboiling, drying, milling and bagging processes. These findings were supported by one of International Fund for Agricultural Development (IFAD) Value Chain Development Programme (VCDP)'s study, which stated that women predominantly contributed in rice parboiling, drying, milling, de-stoning, polishing, bagging and transportation manually. Majority (97.3 percent) used fabricated machines while only 2.7 percent used industrial machine for rice processing. However the processing machines were predominantly owned by private individuals (73.1 percent), personal (22.8 percent) while none was owned by the government which was indicative of a possible high cost of processing. Sasu (2023); Effiong & Effiong (2015) had indicated that women played a significant part in rice processing.

Results in table 3 showed the mean rating and ranking of the constraints to women participation in rice processing value chain activities. The results of the constraints to women participation in rice processing showed that the identified constraints as shown table 3 were all significant as the mean values were all greater than the benchmark of 3.0. High cost of fuel also ranked highest (4.754); Epileptic power supply ranked 4.567. These two topmost constraints has relationship in their effects on rice procession activities and significantly acts as constraints to processors in their rice processing programme. Without regular access to electricity power supply; rice processing machines cannot be effectively used for milling to enable large scale output of processed rice. This finding is supported by (Effiong & Enenyi,2023) which reported the incessant increase in energy tariff cap for the period of 1st October 2021 to 31st March 2022 by 12 percent and a recent price rise by 13 percent in 15 March 2024.

Conclusion

The findings of this study reveal that women in Cross River State are highly active in rice processing value chain activities, particularly in parboiling, drying, milling, and bagging. Their participation plays a critical role in the overall performance of the rice value chain in the state. However, several significant constraints hinder their full and effective involvement, including the high cost of fuel, epileptic power supply, and limited access to modern processing equipment. The predominance of privately owned and fabricated machines further reflects the limited institutional support available to women in this sector. These constraints not only limit productivity but also reduce the economic benefits that women could derive from rice processing activities. The study therefore underscores the need for institutional, infrastructural, and policy-based interventions to empower women and enhance their contribution to the agricultural value chain.

Recommendations

Based on the findings, the following recommendations were put forward;

- Women association in rice value chain programme should collaborate and raise fund to acquire industrial machine for enhance quality rice output and increased income by participating in rice value chain processing.
- Gender-sensitive agricultural policies that prioritize women's participation and address structural constraints should be integrated into state agricultural development plans. Periodic training programs should be organized to build women's technical capacity in machine operation, maintenance, and rice value addition techniques.

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