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Research Article

Climate Change and Rural Women's Participation in Rice Processing: Challenges and Prospects in Wushishi, Niger State, Nigeria

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Abstract

Climate change poses significant threats to rural women's livelihoods in Niger State's Wushishi Local Government Area, where rice processing is a vital economic activity. This study examined the percentage of rural females involved in rice processing in the area, with a focus on their socioeconomic characteristics, participation levels, and challenges faced. A multistage random sampling technique was used to select 125 processors from five processing towns in the Wushishi local government area. The data was analyzed using Net Farm Income and descriptive statistics. The results indicate that 67.2% of the processors were between the ages of 30 and 50. However, climate change affects their participation in rice production, as they face increased labor burdens, reduced access to resources, and limited decision-making power. The study found that 78.4%, 64.0%, and 56.0% of participants declined to take part in the rice harvesting, threshing, and winnowing processes, respectively. In contrast, 66.4%, 96.0%, 93.6%, and 87.2% of the processors engaged in grinding, drying, parboiling, and storage. Each respondent's net farm income was ₦24,697.37, indicating the profit from rice processing in the Wushishi area. The primary obstacles faced by the participants included insufficient credit facilities, insufficient money, substandard storage facilities, unreliable transit routes, unstable electrical supplies, and lack of technical processing expertise, all of which are exacerbated by climate change. Policy considerations should prioritize making incentives available for upgrading processing technologies that will increase the rice processing process and provide better products with high market value and gain, thereby enhancing the resilience of rural women in the face of climate change. Additionally, respondents should establish cooperatives to strengthen their position in rice processing and advocate for improved access to credits, farm inputs, and climate-resilient agricultural practices.

Keywords: *Rural Women, Rice Processing, Climate Change, income, Women participation.*

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Introduction

Agriculture is crucial for developing countries, with rural producers supplying most of the nation's food. In West Africa, for instance, farmers grow rice, yam, and other staples (Ajake, 2003). Sustainable food production is essential for food security, and women are central to this process, contributing 70% of food processing and production (Eboh and Ogbazi, 1990). However, climate change poses significant challenges to women's participation in rice production. In

Nigeria, women handle seventy percent of domestic food storage, fifty percent of food production, hundred percent of food processing, fifty percent of animal husbandry, and sixty percent of agricultural marketing (Akingbule, 1992). However, climate change poses significant challenges to women's participation in rice production resulting to limited access to extension services and agricultural inputs, labor-intensive work with poor yields and high post-harvest waste.

Men typically handle land clearing and preparation, while women focus on processing, distribution, and trading of milled rice. However, women's productivity remains low due to inadequate technical support and cultural practices (Amaechina, 2002). Gender roles often restrict women to specific agricultural tasks, underscoring the need for better access to credit, agricultural inputs, and extension services. Women's contributions are vital for food security, poverty reduction, and rural development (Ogunlela and Muktar, 2009). Research by UNDP shows that women comprise 60-80% of Nigeria's agricultural labor force and produce over two-thirds of the food crops in rural areas (World Bank, 2003) despite this; many women still face difficulties in rice processing. This study aims to examine the socioeconomic characteristics of women involved in rice processing, their level of participation, associated costs and benefits, and the challenges they encounter in the research area.

Materials and Methods

The research study was carried out in Wushishi Local Government Area of Niger State, Nigeria, within the Guinea Savannah Zone. This region, characterized by an average annual temperature of 27 to 34 degrees Celsius and 1000 to 1200 millimeters of rainfall, is ideal for farming due to its fertile, arable land. The majority of the population in this area engages in agriculture, growing key crops such as rice, sorghum, maize, and millet.

A multi-stage sampling approach was employed: Wushishi was selected for its rice processors; five communities Wushishi, Maito, Gorji, Makunsidi, and Kodosoba were randomly chosen; and 25 rice processors from each community were selected, totaling 125 participants. Data were collected using a structured interview schedule with both open- and closed-ended questions.

Participation levels in rice processing were categorized into "Full participation," "Partial participation," and "No participation," and analyzed using descriptive statistics. Profitability was assessed by calculating Net Farm Income (NFI), defined as Gross Income (GI) minus Total Costs (TC), where TC includes Total Variable Costs (TVC) and Total Fixed Costs (TFC). Gross Margin Analysis was also used to evaluate

profitability, especially in small-scale agriculture where fixed costs are significant.

Results and Discussion

Classifying rural populations into specific groups based on socioeconomic characteristics could influence rice processing outcomes in the study area. Key socioeconomic factors analyzed include years of experience in rice processing, education level, and age. Age, in particular, is a crucial indicator of productivity potential. The study reveals that rural women in Wushishi face significant challenges in rice production due to climate change. Rising temperatures, changing rainfall patterns, and increased frequency of extreme weather events affect rice yields, processing, and marketing. Women's participation in rice production is critical, but climate change exacerbates existing gender inequalities (Akingbule, 1992). As noted by Amaechina (2002), women's participation in agricultural production in Nigeria is influenced by various factors, including access to credit, extension services, and technology.

Table 1 reveals that most women rice processors (52.8%) are young adults aged 21 to 40, who are physically capable of handling the demanding tasks of rice processing. This suggests that they are of working age, well-positioned to provide the necessary labor, and can potentially enhance their processing activities with adequate resources. However, climate change affects their ability to participate in rice production, as they face increased labor burdens, reduced access to resources, and limited decision-making power (Elizabeth, 2006). Regarding education, 31.2% have completed basic education, 19.2% have finished secondary education, 58.4% lack formal education, and only 2.4% have a university degree. The generally low educational attainment may hinder the adoption of new technologies, as higher levels of education are known to positively impact technology acceptance and implementation (Agwu, 2004). Table 1 also shows that 32.2% and 37.6% of respondents have 11 to 15 years and over 20 years of processing experience, respectively. This extensive experience indicates that women in the Wushishi area have developed significant expertise, which is likely to enhance their processing skills and efficiency.

Table 2 indicates the level of Rural Women's Participation in Rice Processing in Wushishi community. The rate at which rural women folks were actively involved in different steps of rice processing, including harvesting, threshing, winnowing, storing, parboiling, drying, milling, and bagging, was disclosed by their level of involvement in the process. The degree of engagement of the processors in difference rice processing operations in the wushishi area is shown in table 2 below. As clearly depicted from Table 2, 78.4%, 64.0%, and 56.0% of female processors did not take part in the rice harvesting, threshing, or winnowing processes in the research area. Climate change affects their participation in these processes, as they face increased risks of crop failure, reduced access to credit and inputs, and limited extension services (Mowbay, 1995). It can be as a result of their male counterpart taking an interest in these hobbies. The results also showed that the percentage of women processors who participated in the storage, parboiling, drying, and milling of rice in the study area was 66.4%, 96.0%, 93.6%, and 87.2%. Table 2 also showed that, while women process rice in practically all capacities, they are more active in milling, drying, and parboiling. The study supports the findings of Mowbay (1995), who said that the majority of labor related to rice harvest and postharvest activities is done by women. Essential components of the rice industry were women.

Table 3 displays Cost and Returns of Rice Processing in Wushishi Area. The average variable cost (AVC) was found to account for 79.70% of the overall total cost, while the average fixed cost was 20.30%. Climate change affects the profitability of rice processing, as women face increased costs, reduced yields, and limited market access (Ogunlela & Muktar, 2009). With a return on investment of 1.47 and net farm revenue of ₦24, 697.37 per processor, rice processing is profitable. This implies that for every naira invested, ₦1.47 is gained. In the research region, rice processing is a lucrative endeavor for rural women. Policy considerations should be made toward the provision of support services through the provision of incentives for better processing methods that will facilitate the process of rice processing and better product with high market

value and gain in order to give the rural women in the Wushishi area a better comparative advantage and more profit.

Table 4 shows the problems encountered by Women Rice Processors in the Study Area. Even when women have played crucial roles in the social and economic development of rural areas, many of these women have faced a number of obstacles that have limited their ability to participate fully in agricultural production. These circumstances lessen the role that women play in agriculture and other economic areas. Elizabeth (2006) found that while high input costs and inadequate supply, particularly in rural regions, are significant obstacles, having access to enough supplies could encourage more women to work in agriculture. In addition to dealing with far-off and subpar marketing facilities, rural women typically have restricted access to productive resources, which prolongs the monotony of their farming endeavors (Wilberforce, 2001).

Table 4 also shows that 80.8% and 65.6% of the respondents held insufficient capital and credit facilities, respectively, which exacerbates their vulnerability to climate-related shocks. This has an impact on the amount of rice that is processed, as climate change affects agricultural productivity and rice yields. Similarly, 72% of them experienced problems with insufficient energy, which limited the quantity of paddy rice that could be ground, further compounded by climate change-induced disruptions to energy supplies. Merely 51.2% of respondents said that the issue that most frustrated them was storage facilities, which are also vulnerable to climate-related stresses such as flooding and heat stress. Inadequate storage and air drying of paddy rice might cause it to shatter during milling and expose it to rodent attacks, which can be exacerbated by climate change.

A sizable portion of respondents (53.6% and 57.6%, respectively) also mentioned that their biggest obstacles were the high cost of energy and insufficient logistical methods for parboiling rice, both of which are affected by climate change. Furthermore, 48% and 44% of the rice processors indicate that no technical guidance was provided, leaving them ill-equipped to adapt to climate

change. This indicated that rice processors in the Wushishi area encounter a series of bottlenecks that limit their contribution to the supply of rice, which is one of the most consumed foods in Nigeria. The inadequacy of agricultural inputs, credit facilities, extension services, and poor marketing services will have a negative effect on the processing activities of rural women (Prakash, 2003), particularly in the face of climate change. This is because the availability of credit facilities would provide adequate income to take care of the cost involved in changing to climate-resilient practices of rice processing and expansion of quantum of the rice processed. More number of extension contacts with rice processors will enable them the forum to be advised and be knowledgeable on the various marketing strategies and advantages accrued to new climate-resilient technologies.

Conclusion

According to the research, the majority of rural women folks that process rice in the Wushishi area are middle aged, and as a result, they actively participate in nearly every aspect of rice processing. This region's rice processing industry was fairly profitable. A number of obstacles prevented the rice processors in the Wushishi area from fully engaging in agricultural production or making a significant impact on the social and economic advancement of the region. To address these challenges, policy considerations should prioritize: Climate-resilient agricultural practices and technologies, increased access to credit, inputs, and extension services for women, improved market access and price stability for rice producers, enhanced decision-making power and participation for women in rice production. By addressing these challenges, women's participation in rice production can be enhanced, and their resilience to climate change can be strengthened.

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Table 1: Socio-economic characteristics of respondents in the study area (n = 125)

Characteristics	Frequency	Percentage
Age (years)		
Less than 20	6	4.8
21 – 30	22	17.6
31 – 40	44	35.2
41 – 50	40	32.0
Greater than 50	13	10.4
Educational Status		
No formal education	73	58.4
Primary	39	31.2
Secondary	10	8.0
Tertiary	3	2.4
Years of processing experience		
1 – 5	13	10.4
6 – 10	24	19.2
10 – 15	47	37.6
>20	41	32.8

Source: Field survey, 2022

Table 2: Level of Participation of Women in Rice Processing (n = 125)

	Full participation		Partial participation		None participation	
Activities	Frequency*	%	Frequency*	%	Frequency*	%
Harvesting	0	0.0	27	21.6	98	78.4
Threshing	6	4.8	21.6	31.2	80	64.0
Winnowing	8	6.4	43	37.6	70	56.0
Storing	83	66.4	32	25.6	10	8.0
Parboiling	120	96.0	0	0.0	05	4.0
Drying	117	93.6	08	6.4	0	0.0

Milling	109	87.2	13	10.4	3	2.4
Bagging	46	36.8	16	12.8	63	50.4

*Multiple responses.

Source: Field survey, 2022.

Table 3: Cost and Returns of Rice Processing in Wushishi Area (n = 125).

Cost of Items and Revenue	Cost(₦/processor	Percentage of total cost
Average variable Cost		
Cost of bagging	220.50	0.42
Cost of transportation	820.64	1.57
Cost of milling	2,328.56	4.46
Cost of paddy rice	36, 239.69	69.46
Cost of water	175.32	0.34
Cost of fire wood	1,793.83	3.44
Average total variable cost	41,578.53	79.70
Average fixed cost (Depreciated)		
Cost of sacks	239.12	0.46
Cost of big pot	3283.35	6.29
Cost of small pot	2,656.81	5.09
Cost of drum	526.10	1.01
Cost of sieve	404.39	0.78
Cost of big basin	2,303.48	4.42
Cost of small bowl	803	1.54
Cost of tray	219.06	0.42
Cost of tripod stand	156.42	0.30
Average total fixed cost	10,591.73	20.30
Average total cost	52,170.26	
Gross income	76,867.63	
Net farm income	24,697.37	
Return on investment	1.47	

Source: Field survey, 2022.

Table 4: Challenges Faced by Women Rice Processors in the Wushishi Area of Niger State (n = 125).

Challenges	Frequency*	(%)
Insufficient capital	101	80.8
Poor storage facilities	64	51.2
Poor transport network	67	53.6
low market demand	49	39.2
Insufficient contact with extension agents	55	44.0
Inaccessibility of harvested products	42	33.6
poor quantity of output	36	28.8
High cost of energy for parboiling	72	57.6
Insufficient electricity supply	90	72.0
Lack information	49	39.2
Deterioration of farm products	41	32.8
unavailability of credit facilities	82	65.6
lack technical advice on rice processing	60	48.0

Source: Field survey, 2022.

*Multiple responses