



## ASSESSMENT OF ADOPTION OF IMPROVED POST-HARVEST TECHNOLOGIES FOR RICE (IPT4RP) PROCESSING ON THE LIVELIHOOD OF RICE PROCESSORS IN NIGER STATE, NIGERIA

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### ABSTRACT

The study assessed the adoption of improved post-harvest technologies for rice processing on the livelihoods of rice processors in Niger State, Nigeria. Multistage sampling was used in selecting 120 respondents. Data were analyzed using descriptive statistics. The result reveals that processor under Zone-1 were more aware of the improved post-harvest technologies for rice processing (IPhT4RP) than their counterpart under Zone-2 and Zone-3. The level of awareness varies across gender as female represent 63.64% and male represent 65.38%. However, the result under zone-3 shows that membership of an association (70%), access to credit (50%), access to market (50%), membership of a cooperative (58%), age (67%), level of education (64%), marital status (80%) and household size (50%) were the socio-economic factors influence adoption of improved post-harvest technologies for rice processing (IPhT4RP). The results also reveal that, constraints militating adoption of IPhT4RP in the study areas includes, lack of money lenders (1<sup>st</sup>) lack of quality paddy (2<sup>nd</sup>) and poor market for rice processed (3<sup>rd</sup>). The study concluded that more than 60% of processors in Zone-1 and Zone-2 were aware of the improved post-harvest technologies except for female (15.38%) in zone-3. Socio-economic factors such as marital status, membership to association, level of education and access to credit influence adoption of improved post-harvest technologies for rice processing (IPhT4RP). Thus, the study recommends for a continuous awareness, sensitization on the use and possession of improved rice processing technologies and create more linkages to credit facilities.

**Keywords:** Adoption, Harvest, Processing, Rice and Technologies

### INTRODUCTION

Rice is economically one of Nigeria's most important staples as in any other country among all classes as well as across different cultures. Rice processing is one of the major agricultural value chain activities in Niger State (Federal Ministry of Agriculture and Rural Development (FMARD), 2019). This is because the level of rice cultivation in the State, as well as the neighbouring States, is enormous as the cultivation of rice in both Rain-fed uplands, lowland, and irrigated rice. Nigeria is the largest producer of rice in Africa; however, rice is still not sufficient to meet the increase in consumption by the population (Ayoola, 2021; Okunlola *et al.*, 2020). The staple food like rice in Nigeria has risen to a position of prominence leading to considerable imports to meet this increasing demand for rice which stands at about 2,000,000 metric tons yearly (Organisation for Economic Co-operation and Development (OECD) and Food and Agriculture Organisation (FAO), 2021). Moreover, this is due to the poor quality of locally produced rice, which makes most consumers prefer imported rice from



other countries such as Thailand, Bangkok, and China to indigenous rice (National Bureau of Statistics, (NBS), 2021). This is because it is believed most rice processors in Nigeria lack the adequate technologies to enable them to meet international standards as locally processed rice contains a lot of stones and other impurities (Adisa *et al.*, 2020).

Although, different quality-enhancing improved post-harvest technologies for rice processing (IPhT4RP) have been developed and disseminated to rice processors across the States in Nigeria by various research institutes under different programmes such as the West African Rice Development Agency (WARDA), International Institute of Tropical Agriculture (IITA), and National Cereals Research Institute (NCRI). These technologies disseminated included improved post-harvest technologies and procedures for rice processing such as threshing, winnowing, drying, parboiling (steamer), milling, storage, and polishing of local rice to reduce wastage and improve the quality of the rice processed and reduce importation in Nigeria (Adisa *et al.*, 2020).

Notwithstanding, these strategic measures, there exists inadequate rice processing and the challenges associated with the acceptability of indigenous improved post-harvest technologies for rice processing (IPhT4RP) rice processed among Nigerians. The study, therefore, assessed the in Niger State, Nigeria. Specifically,

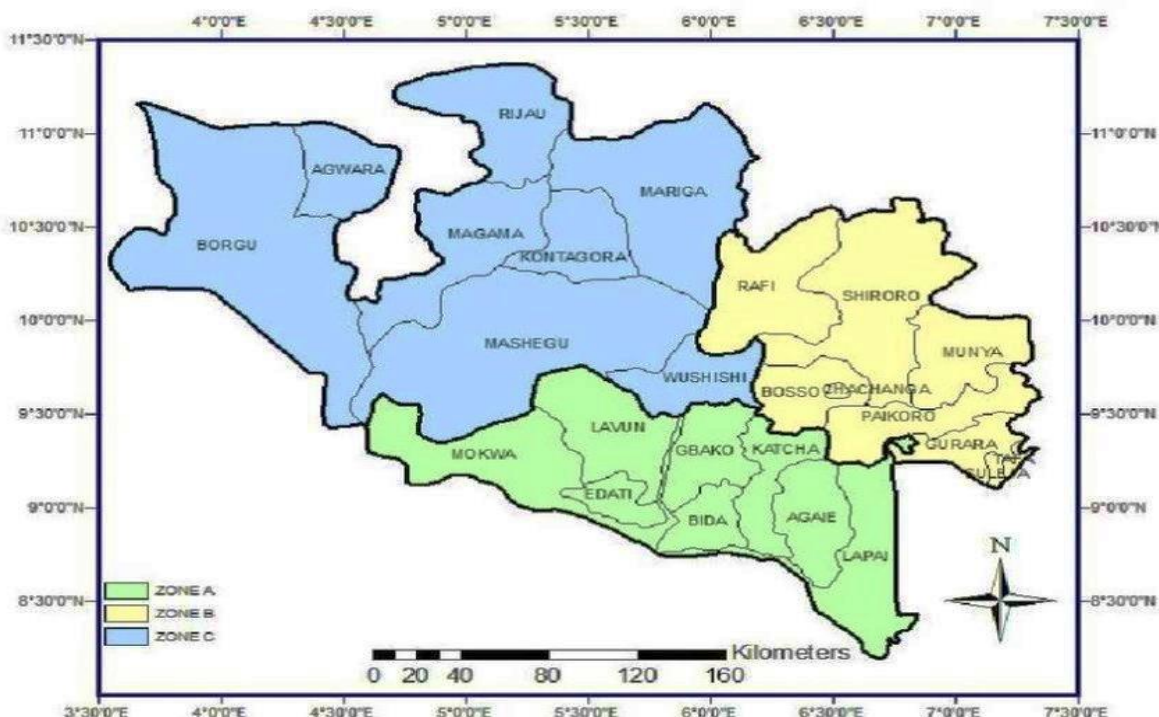
- i) describe the levels of processors' awareness of improved post-harvest technologies for rice processing (IPhT4RP);
- ii) identify the factors influencing the adoption of improved post-harvest technologies for rice processing (IPhT4RP); and
- iii) describe the constraints associated with adoption of improved post-harvest technologies for rice processing.

## **MATERIALS AND METHODS**

### **The Study Area**

The study was carried out in Niger State, Nigeria. It occupies about 76,363 square kilometers (29,484 sq Km) of land mass, with a projected population for 2020 at 24,206,644, as documented by the *National Population Commission* [NPC] and National Bureau of Statistics [NBS] Estimates Population Forecasts 2006 - 2016 (NPC/NBS, 2016), located in North-central bounded to the south by the Niger River. Niger State lies within approximately Latitudes 9.9° 30' and 9° N, and Longitudes 5.5° 98' and 3° E of the Equator. The State shares boundaries with Kebbi and Zamfara States to the north, Kaduna State to the north and northeast, Kogi State to the southeast, and Kwara State to the south. The Abuja Federal Capital Territory is on Niger state's eastern border, and the Republic of Benin is its western border.

The climate, vegetation, and soil of Niger State experience two distinct seasons the dry and wet seasons. The annual rainfall varies from about 1,600mm in the south to 1,200mm in the north. The duration of the rainy season ranges from 150 to 210 days or more from the north to the south. The mean maximum temperature remains high throughout the year; however, the lowest minimum temperatures occur usually between December and January when most parts of the state come under the influence of the tropical continental air mass which blows from the north. The Southern Guinea Savannah vegetation covers the entire landscape of the state. Agriculture is the mainstay of the economy of Niger State with about 80% of the people actively engaged in farming. Cash and food crops are cultivated and the product includes rice, yam, cotton, groundnut, tobacco, maize, beans, guinea corn, millet, ginger, and cassava. Paddy rice is widely grown as a cash crop in the floodplains of the Niger and Kaduna rivers, especially in the area around Bida (Ikusemoran *et al.*, 2014).



**Figure 1:** Map of Niger State showing the study area by zone A B C

### Sampling Procedure

A multistage sampling procedure was used to select one hundred and twenty (120) rice processors as sample frames from six rice processing cooperative societies across the State. The first stage involved a purposive selection of two LGAs each across the three zones (zone 1, 2, and 3) in Niger State, based on concentration of rice processors and rice processing cooperative societies. This gave a total of 6 LGAs. The second stage involved the purposive selection of five rice processing cooperative societies across the six selected LGAs based on the cooperative societies' activeness. This gave a total of 30 rice processing cooperative societies. The third stage involved the random selection of four members from the rice processing cooperative societies operating in the selected LGAs, giving a total of 120 respondents.

### Method of Data Collection and Analysis

Data for the study were collected using a structured interview schedule. In collecting data to determine the level of utilization of the IPHT4RP, this was categorized based on the interval of usage and was graded as Daily per hr (s), Weekly per hr (s), Fortnightly per hr (s), Monthly per hr (s), and occasionally per hr (s). Data collected were analyzed using descriptive statistics such as frequency, and percentage, to analyze the level of awareness and possession, utilization, and experience using the IPHT4RP. To assess the levels of experience using the IPHT4RP, a 2-point rating scale was employed. The experience was graded as: high ( $H > 50+$ ) = 2, and low ( $L < 0-49$ ) = 1.

## RESULTS AND DISCUSSION

### Level of awareness of improved post-harvest technologies for rice processing

The results in Table 1 show the level of awareness of the improved post-harvest technologies for rice processing (IPHT4RP) such as rice false bottom, de-stoner, stitching



machines, weighing slab, packaging materials, concrete drying slab, and tarpaulin across the three (1, 2, and 3) zones. The result under Zone-3 show that 84.62% and 57.14% of female and male were not aware of the improved post-harvest technologies for rice processing (IPhT4RP), while only 15.38% of female and 42.86% of male were aware of the improved post-harvest technologies for rice processing (IPhT4RP). However, the result under Zone-2 show that 60.00% of female and 62.16% of male were aware of the improved post-harvest technologies for rice processing (IPhT4RP), while about 40.00% of female and 37.84% of male were not aware of the technology. Furthermore, the result reveals that processor under Zone-1 were more aware of the improved post-harvest technologies for rice processing (IPhT4RP) than their counterpart under Zone-2 and Zone-3. The level of awareness varies across gender as female represent 63.64% and male represent 65.38%.

**Table 1: Level of awareness of improved post-harvest technologies for rice processing (IPhT4RP)**

Zone (n=120)	Female		Male	
	Frequency	Percentage	Frequency	Percentage
<b>Zone-3</b>				
Aware	18	15.38	51	42.86
Not aware	102	84.62	69	57.14
<b>Zone-2</b>				
Aware	72	60.00	75	62.16
Not Aware	48	40.00	45	37.84
<b>Zone-1</b>				
Aware	76	63.64	78	65.38
Not Aware	44	36.36	42	34.62

**Source:** Field Survey, 2023

### **Factors Influencing adoption of Improved Post-Harvest Technologies for Rice Processing**

The result in Table 2 shows socioeconomic/institutional factors influenced adoption of IPhT4RP technology per zone in Niger State. The result under zone-3 shows that membership of an association (70%), access to credit (50%), access to market (50%), membership of a cooperative (58%), age (67%), level of education (64%), marital status (80%) and household size (50%) were the socio-economic factors influence adoption of improved post-harvest technologies for rice processing (IPhT4RP). However, the result under zone-2 shows that extension contacts (50%), access to credit (58%) and experience in rice processing (42%) were the factors influencing adoption of improved post-harvest technologies for rice processing (IPhT4RP). While under zone-1 the results show that extension contacts (50%), access to credit (22%), experience in rice processing (33%) and household size (25%) were the major factors influencing adoption of improved post-harvest technologies for rice processing (IPhT4RP). Omeire (2016) cited by Amusa *et al.* (2022), stated that factors such as social, political, religious, and economic as discriminate against rural women and their access to education. Therefore, reducing their contributions to resource allocation activities and household decision-making.

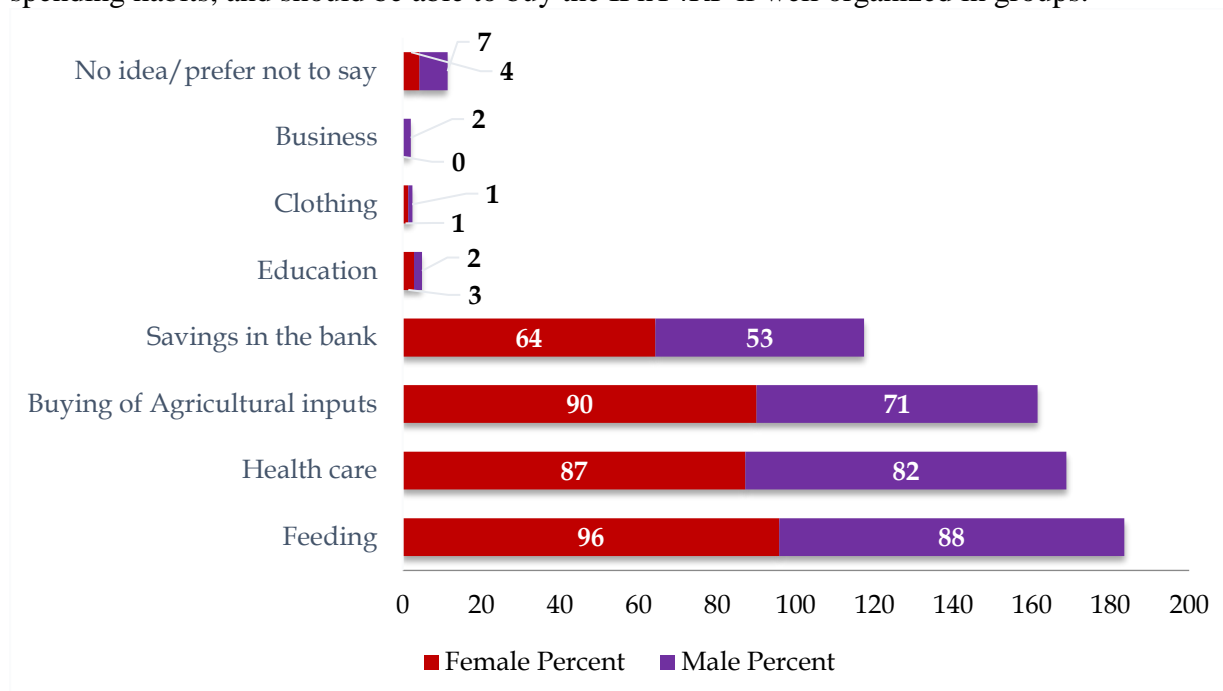
**Table 2: Percentage distribution of factors influencing adoption of the improved post-Harvest technologies across processing zones**

Socio-economic Factors (n=120)	Zone-1 (%)	Zone-2 (%)	Zone-3 (%)
Extension contacts	50	50	20
Membership to association	20	30	70
Access to credit	22	58	50
Access to market	17	33	50
Membership to cooperative	9	33	58
Age	8	25	67
Educational level	13	33	64
Marital status	8	9	83
Experience in rice processing	33	42	25
Household size	25	25	50

**Source:** Field Survey, 2023

### Income Spending

The result in Figure 1 shows that the majority 96% and 88% of their income is spent on feeding 90% and 71% on buying agricultural inputs respectively. Figure 2 reveals most of the respondents 87% and 82% spent on health care services, while fewer than half of the respondents sampled 64% and 53% saved in the bank respectively. Figure 2 further reveals that fewer of the respondents 3% and 2% spent on education, 2% on business activities, and 1% on clothing respectively. This implies that there are significant differences in their income and spending habits, and should be able to buy the IPHT4RP if well organized in groups.



**Figure 2: Distribution of respondents based on income and spending**

The result in Table 3 show that half (50.00%) of processors had less than one-year experience with the use of improved post-harvest technologies for rice processing. However, the result reveal 35.00% of processors had 1-5 years' experience with the use of improved post-harvest technologies for rice processing. While only 10.00% and 5.00% of processors had 6-10year and above experience with the use of improved post-harvest technologies for rice





processing respectively. It is concluded that, sensitization on the use of IPT4RP should be promoted through training on the improved processing procedures for a sustainable quality of rice processing for exportation.

**Table 3: Experience level with the use of improved post-harvest technologies for rice processing**

Year (n=120)	Frequency	Percentage
≤1	60	50.00
1-5	42	35.00
6-10	12	10.00
≥10	6	5.00

**Source:** Field Survey, 2023

### **Constraints to IPHT4RP Adoption by the Rice Processors**

The results in Table 4 show the constraints to the adoption of IPHT4RP by the rice processors in Niger State. The results reveal that the majority of the respondents' constraint were lack of money (97.14%), lack of quality paddy (81.43%) and poor market for processed rice (62.86%). Other constraint militating the adoption of IPHT4RP includes; inadequate training (57.14%), inadequate funding (54.29%), culture/ norms barriers (54.29%), low level of education (52.86%), inadequate rice processing center (34.29%) and inadequate extension contact (31.63%). This implies that processors' constraint might affect their livelihoods.

**Table 4: Constraints to IPT4RP Adoption**

Constraints	Frequency	Percentage	Rank
Lack of money	117	97.14	1 <sup>st</sup>
Lack of quality paddy	98	81.43	2 <sup>nd</sup>
The poor market for rice-processed	75	62.86	3 <sup>rd</sup>
Inadequate training	69	57.14	4 <sup>th</sup>
Cultural/ norms barriers	65	54.29	5 <sup>th</sup>
Inadequate of funding	65	54.29	5 <sup>th</sup>
Low level of education	63	52.86	7 <sup>th</sup>
Inadequate rice processing center	41	34.29	8 <sup>th</sup>
Inadequate extension contacts	38	31.43	9 <sup>th</sup>

**Source:** Field Survey, 2023

### **CONCLUSION AND RECOMMENDATIONS**

In conclusion, it was obvious that the women rice processors do not get involved significantly in a cooperative society. This could be attributed to socio-cultural backgrounds and paucity of funds which truncate the use and adoption of the IPHT4RP. In addition, it was realized the women do not possess the IPHT4RP individually in Zones 1, 2, and 3, but have acquaintances except for those in Zone 2. Based on the findings, the study recommends

- Established practicable opportunities and continuous awareness of the use and possession of IPHT4RP.
- Facilitate public-private partnerships linkages and access to credit facilities.
- Organize more training on improved rice processing techniques for quality, sustainable value addition, and exportation through cooperative society.



- iv. Develop Government and Non-government-regulated policies to stabilize the price of paddy.

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