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POVERTY AND RICE PRODUCTIVITY IN NIGERIA: A REVIEW OF THE RELATIONSHIP AND IMPLICATION FOR AGRICULTURAL DEVELOPMENT

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Abstract

Rice plays a significant role in Nigeria's food security, rural employment, and development of agricultural. However, persistent poverty among small-scale rice farmers continues to hinder their productivity and limit rural sector's contribution to economic growth. This study therefore reviews the complex relationship between poverty and rice productivity in Nigeria. This review discovered that poverty limits farmers' access to important inputs such as improved seeds, fertilisers, irrigation facilities, credit, markets, and extension services. And also, low rice productivity results in reduced household income, low asset accumulation, and reduced capacity to invest in improved farming practices. The study integrates four major theoretical perspectives: Sustainable Livelihoods Theory, Poverty Trap Theory, Agricultural Development Theory, and Institutional Theory, to provide a comprehensive model for understanding the interconnections between poverty, agricultural productivity, and institutional support systems. The Sustainable Livelihoods perspective emphasizes the role of livelihood assets and vulnerability contexts in determining farmers' productivity outcomes. Poverty Trap Theory explains how limited access to resources and vulnerability to shocks strengthen persistent poverty and low productivity. Agricultural Development Theory highlights the importance of investment in technology, infrastructure, human capital, and institutions for improving productivity and reducing poverty. Institutional Theory further stresses the role of institutions in prompting farmers' access to productive resources and opportunities. This study further discovered that previous studies have employed diverse analytical approaches, including descriptive statistics, regression analysis, structural equation modelling, propensity score matching, and system dynamics modelling to bring to fore the relationship between poverty and productivity in rice production. Empirical evidence from previous studies generally supports the existence of a strong relationship between rice productivity and poverty reduction, although inconsistencies remain due to variations in poverty measurement, data sources, analytical techniques, and sampling frameworks. The review identifies key research gaps, to include limited longitudinal studies, inadequate integration of climate change considerations, insufficient mixed-methods approaches, and limited focus on smallholder farmers and rural-urban linkages. Addressing these gaps requires integrated policy interventions that combine agricultural development strategies, social protection programmes, institutional reforms, and improved access to credit, markets, and extension services. Strengthening these interventions will enhance rice productivity, reduce rural poverty, and contribute to sustainable food security and agricultural development in Nigeria.

Keywords: poverty, rice productivity, agricultural development, bidirectional relationship

1. Introduction

Rice is a staple crop in every household in Nigeria, and its productivity has significant effect on food security and poverty alleviation (Adeoti, 2015). Despite being one of the largest rice producers in West Africa, Nigeria faces the daunting challenge of poverty and food insecurity. Till now, Nigeria is one of the leading importers of rice; it imports a significant portion of its rice requirements. The country's rice importation bill is put at over \$2 billion annually (Adeoti,

2015). The annual consumption of rice in Nigeria in 2017 was 5 million MT, and the quantity supplied was 2.7 million MT this amounts to a demand-supply deficit of about 2.3 million MT, which is filled by importation (Obih and Baiyegunhi, 2017). Nigeria, along with Iraq, ranks third among major rice-importing countries worldwide, while the Philippines and China rank first and second, respectively (Obih and Baiyegunhi, 2018).

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Despite Nigeria's favourable ecological conditions, rice productivity is at its ebbs even after significant efforts and investments in rice research and development by the Nigerian successive governments over the past five decades. Rice production in Nigeria is characterised by low productivity, caused by factors such as gender gap in access to inputs, poverty and poor technology. In 2020, Nigeria had the largest population in Africa, seventh worldwide and has projected population well above 200 million (Worldometer, 2020), and 8th as the largest exporter of crude oil in the world with many other resources, despite these enormous resources Nigeria is ranked low in human development index. In 2018 Nigeria is ranked 158th out of 189 countries and 39.1% of its people is living below income poverty line of US\$1.90 per day, far below Rwanda (60%), Zambia (64.4%) and Mozambique (68.7%) that are also sub-Saharan African countries (UNDP, 2018; UNDP, 2016).

Nigeria has the highest proportion of extreme poor in the world, with approximately 87 million of its population living in extreme poverty in 2018. Comparing the above with other countries, India has about 72 million extremely poor people, and the Democratic Republic of Congo has about 61 million of its population living in poverty, while Tanzania, Kenya, South Africa and Zambia have about 19.9 million, 14.7 million, 13.8 million and 9.5 million people respectively living in extreme poverty (World Poverty Clock, 2019). Brookings Institution's annual report (2018) categorised Nigeria among the poorest countries in the world, above India. Before independence, Nigeria had a minimal level of poverty. However, 60 years after gaining independence, Nigeria rose from a low poverty index country to become one of the countries with the highest incidence of poverty in the world.

Nigeria is a country with abundant resources such as arable land, adequate rainfall, and an enormous pool of human resources and other endowments and yet poverty incidence is high and higher in rural areas. Poverty is a rural phenomenon in Nigeria; most of the poor people are in rural areas, and most of them (80%) are engaged in agriculture to earn their livelihoods (World Bank 2018). The poverty prevalence is generally high in rural areas, where close to 80% or a large proportion of the people live below the poverty line, with restricted social and infrastructural amenities (Ogundipe et al., 2019; Aderounmu, 2018). About 72% of Nigerian rural people are poor, compared to 42% of people in urban areas. This indicates that Multidimensional poverty is higher in the rural areas of the country.

Approximately 70% of Nigeria's population lives in rural areas and 30% in urban areas. Yet rural areas are home to 80% of people living in poverty, and the intensity of their poverty is also higher, at 42% in rural areas compared to 37% in urban areas. This makes the rural area an enclave of poverty. Also, 40% of the total population, that is about 83 million people, more women than men, live below the country's poverty line as indicated in the 2019 Poverty Inequality in Nigeria report (World Bank, 2020).

This review, therefore, seeks to investigate the relationship between poverty and rice productivity in Nigeria, with emphasis on the suggestions for agricultural development. The work will also provide an understanding of the complex relationship between poverty and rice productivity, and also deliberate on the implications for government, policymakers, agricultural development professionals, and researchers.

2. The relationship between poverty and rice productivity

The relationship between poverty and rice productivity is a two-directional (bidirectional) relationship with one complementing the other in a mutually reinforcing cycle. (Cohen and Cohen, 1983) opined that in the field of agricultural economics, a bidirectional relationship refers to a two-way, mutually reciprocal relationship between variables where a shift in one affects the other and vice versa. This dynamic is obvious in the rice sector in Nigeria, where poverty hinders small-scale rice farmers' ability to adopt and invest in productivity boosting technologies, the act of which in turn reduces their productivity and perpetuates poverty.

Poverty influences rice productivity through small-scale farmers' limited access to inputs, such as fertilisers and improved seeds, which hinders the ability of these poor farmers to increase their rice yields (Oladebo and Oladebo, 2017). Also, Poor farmers may be denied access to inputs such as fertilisers, high-yielding variety (HYV) seeds and irrigation, which impacts negatively on their productivity (Awotide et al., 2016). Additionally, poverty restricts farmers' access to technology, markets, and credit facilities, which further constrain their productivity (Adeoti, 2015; Oyinbo et al., 2019). Furthermore, poor smallholder farmers may not have access to markets to sell their rice, leading to low incomes and limited opportunities to invest in productivity-enhancing technologies (Oladebo and Oladebo, 2017). Lastly, Poor small-scale farmers may not have access to extension services to acquire new skills and knowledge to improve rice productivity (Adeoti, 2015). The resulting poverty trap limits farmers' ability to invest in their farms, perpetuates a cycle of low productivity and poverty (Barrett, 2008).

On the other hand, low productivity can perpetuate poverty through various channels, some of which include: low productivity leads to low income, and perpetuates household poverty (Awotide et al., 2016). Additionally, productivity hindered by inadequate access to social services such as healthcare and education can limit income and enhance poverty (Oyinbo et al., 2019). Lastly, productivity is negatively impacted by inaccessibility to appropriate technology, which can limit income and also perpetuate poverty (Agbola et al., 2020).

The resultant effect of this two-directional relationship is a continuous circle of low productivity and poverty, which can be addressed by a holistic and all-inclusive approach to agricultural development that addresses both poverty and productivity. By improving poor small-scale farmers' access to credit, markets, and extension services, and by empowering

women, agricultural policies can help to reduce poverty and improve rice productivity in Nigeria. Therefore, to address these challenges approach that integrates agricultural development strategies, social protection programmes, and policy intervention is essential. By implementing such an approach, Nigeria can reduce poverty, increase rice yield through productivity-enhancing technology, which in turn enhances food security.

3. Theoretical framework

This work integrates multiple theoretical frameworks to provide a comprehensive understanding of the complex relationship between poverty, rice productivity, and agricultural development in Nigeria. The theoretical framework as reviewed by this study is the integration of four approaches: the sustainable livelihood approach, property trap theory, agricultural development theory, and institutional theory.

Sustainable livelihoods theory (SLT)

SLT originated in the 1990s and became popularised by the Department for International Development (DFID, 1999) of the United Kingdom and it stresses how people make use of their assets, namely human, natural, financial, social, and physical, to develop resilience and well-being in response to shocks and stresses. According to the theory, as quoted by Olayemi et al. (2024), the theory holds that livelihood interventions such as education and skills development are at the centre of transforming households to adapt to climate change, market shocks, and socio-economic vulnerabilities.

SLT is a methodology employed to understand and analyse the livelihoods of individuals in particular and households as a whole, particularly in developing countries, in which Nigeria is one. The SLT approach stresses the importance of keeping in mind the complex associations between people's assets, their vulnerabilities, and their institutions. The SLA framework consists of five key components:

- i. **Livelihood assets:** These are the things of value, or resources possessed by people, and these resources are used to shape their livelihoods, and improve their standard of living. These resources, according to Carney (1998), include: human capital like skills, education, among others, social capital like social networks, relationships among others, natural capital like land, water among others, physical capital like tools, equipment among others, and financial capital like savings, credit among others. Agricultural training programme, according to Adepoju and Oluwatayo (2025), improves farming techniques and productivity. Also, health interventions reduce farmer absenteeism due to illness Federal Ministry of Agriculture and Rural Development (FMARD), 2024).
- ii. **Vulnerability context:** This refers to the external forces that can have devastating effects on people's livelihoods, which are beyond their control. According to Chambers and Conway (1992), these external forces include shocks like droughts, floods,

fire outbreaks, among others, trends like climate change, economic recession, among others, and seasonality like seasonal fluctuations in input/output prices and income or food availability, among others.

- iii. **Institutions and policies:** According to North (1990), these refer to formal (documented) and/or informal (non-documented) rules and regulations that guide people's lives and livelihoods; these include: laws, policies, social norms, and cultural practices.
- iv. **Livelihood strategies:** These are the ways of using people's assets to achieve their livelihood goals. The livelihood strategies are income-generating activities such as farming, trading, labouring, and other income-generating activities (Ellis, 2000).
- v. **Livelihood outcome:** These are the results of livelihood strategies adopted by people, which impact their income level, food security status, health status, and overall well-being (Chambers and Conway, 1992).

The Sustainable Livelihoods Approach (SLA) is an excellent framework for understanding and examining the overall ways of life and livelihood of individuals in particular and households as a whole, especially in developing countries. The SLA approach provides a comprehensive and asset-based approach to agricultural development through its emphasis on the significance of considering the complex relationships between different aspects of people's lives.

Poverty trap theory

According to Barrett (2008) the Poverty Trap theory highlights that poverty is a self-strengthening occurrence that can trap individuals and households in a poverty web. This theory proposes that poverty is not just a result of individual failures or external circumstances, but rather a complex and non-static process that is influenced by a wide range of factors, among which are socioeconomic and institutional factors. The poverty trap theory is made up of four key components:

- i. **Low productivity:** Poverty is one of the factors that can lead to low productivity because poverty denies individuals, in particular, and households in general, access to the resources and opportunities required to invest in productivity-improving technologies like land improvement practices, sustainable agricultural practices, and adoption of high-yielding varieties (HYVs) of seeds (Barrett, 2008).
- ii. **Limited access to resources:** farmers can be denied access to resources like credit, education, markets, extension services, among others, due to their poverty status, and these resources are vital for economic advancement (Carter and Barrett, 2006).
- iii. **Vulnerability to shocks:** poverty reduces the ability of individuals and household to cope with shocks, such as droughts, floods, and economic recessions, than other factors combined. These shocks can further impact poverty and individual

welfare in particular, and that of the household in general, negatively (Dercon, 2002).

- iv. **Institutional and social barriers:** poverty can be prolonged by institutional and social barriers, such as discriminatory laws and social norms; these social and institutional barriers can limit access to inputs and opportunities, which further worsen poverty (Sen, 1999).

The poverty trap theory impacts development policy and practice in several ways, a few of which are considered below:

- i. Owing to the complex and dynamic nature of poverty, poverty alleviation programmes and policies require a multi-institutional approach that addresses economic, social, and institutional aspect of poverty.
- ii. Encouraging farmers' investments in productivity-improving technologies, like irrigation and fertiliser, HYV seeds, soil improvement practices, as well as sustainable agricultural practices, which will, in no small measure, enhance productivity and reduce poverty.
- iii. Improving farmers' access to resources, like credit, markets and education, can help to reduce poverty and improve economic flexibility and, by extension, productivity.
- iv. Addressing institutional and social barriers, such as discriminatory laws and social norms, can help reduce poverty and improve economic progress among farmers.

This theory provides a valuable framework for understanding the complex and flexible nature of poverty. Policymakers, governmental and nongovernmental organisations and professionals can formulate more effective approaches for reducing poverty and improving economic progress through the identification of the key components of poverty and their implications for development policy and practice.

Agricultural development theory

Agricultural development theory proposes that agricultural development is very important for economic growth, poverty reduction, and food security (Schultz, 1964). This theory emphasises the importance of investment in agricultural productivity-boosting technology, infrastructure, and institutions that aid agricultural development. Agricultural development theory consists of the following key components:

- i. The first key component of agricultural development theory is agricultural productivity-enhancing technology. This component emphasises the importance of investment in agricultural productivity boosting technology, such as soil improvement practices, irrigation, fertilisers, and high-yielding crop varieties, as it increases agricultural yield, income, standard of living and reduce poverty (Hayami and Ruttan, 1971).
- ii. The second key component is infrastructure development. This framework emphasises the

importance of rural infrastructure development, such as roads, storage facilities, hospitals, schools and markets, as a facilitator of agricultural development through improved access to inputs, credit, and markets, and reduces transaction costs (Binswanger and Rosenzweig, 1986).

- iii. The third key component is institutional development. The framework further confirms the significance of strengthening institutions, such as extension services, cooperatives, and credit unions, because these institutions can provide farmers with access to information, technology, and financial services (North, 1990). This can improve their productivity and reduce poverty.
- iv. The last component is human capital development. The importance of human development in productivity enhancement and poverty reduction cannot be ignored, as investment in human capital, such as education and training, can improve farmers' skills and knowledge and enhance their ability to adopt innovations (Becker, 1964). This can enhance farmers' productivity and reduce their poverty.

Agricultural development can contribute to economic growth by boosting agricultural output, income, and employment (Schultz, 1964). It can also reduce poverty by enhancing the income and purchasing power of rural households (Lipton, 2001) and, lastly, can improve food security by improving the production, availability, accessibility, and utilisation of food (FAO, 2017).

Institutional theory

The institutional theory, according to North (1990), highlights the role of institutions in impacting the behaviour and outcomes of individuals in particular and households in general. This theory proposes that institutions can influence the livelihoods of individuals in particular and that of households in general. This is achieved by influencing their access to credit, markets, and other inputs. Productivity is impacted by influencing the incentives and opportunities faced by individuals and households, and this can reduce exposure to droughts, floods, other shocks and poverty.

In summary, the theoretical framework for this review, overall, provides a complete understanding of the complex relationships between poverty, rice productivity, and agricultural development in Nigeria.

4. Methodological review

A wide range of methodological approaches and frameworks have been used by many researchers to examine the relationship between poverty, rice productivity and agricultural development in Nigeria. This section review the methodological approaches used in these studies. A few of the wide range of methodological approaches are examined below:

- i. **Descriptive statistics and correlation analysis:** Descriptive statistics and correlation analysis are used in several studies to examine the relationship between poverty and rice productivity. Notably,

Adeoti et al. (2020) used descriptive statistics to explain the relationship between poverty and rice productivity in Nigeria. The study discovered that there is a significant positive correlation between rice productivity and household income, and by extension, poverty.

- ii. **Regression analysis:** Several studies used regression analysis to examine the relationship between poverty and rice productivity. For instance, Agbola et al. (2019) employed regression analysis to investigate the impact of rice productivity on poverty reduction in Nigeria. The study discovered that rice productivity had a significant negative impact on poverty.
- iii. **Structural equation modelling (SEM):** Some studies used SEM to examine the two-directional relationship between poverty and rice productivity. Particularly, Oyinbo et al. (2020) used SEM to investigate the relationship between poverty, rice productivity, and household income in Nigeria. The study discovered that poverty had a significant negative impact on rice productivity, while rice productivity had a significantly positive effect on household income.
- iv. **Propensity score matching (PSM):** PSM has been used by researchers to examine the effect of rice productivity on poverty reduction. Notable among them is Oladeebo et al. (2020), who used PSM to investigate the impact of rice productivity on poverty reduction in Nigeria. The study found that rice productivity had a significant negative impact on poverty.
- v. **System dynamics modelling:** Some studies have used system dynamics modelling to examine the complex relationships between poverty, rice productivity, and other factors. For example, Adekunle et al. (2020) used system dynamics modelling to investigate the relationships between poverty, rice productivity, and climate change in Nigeria. The study found that climate change had a significant negative impact on rice productivity, which in turn increased poverty.

The studies reviewed in this section have adopted a wide range of methodological approaches, ranging from descriptive statistics to system dynamics modelling. The findings of this section have implications in dictating the direction for agricultural development policies and programmes on alleviating the poverty of rice farmers and improving rice productivity in Nigeria.

5. Empirical review

Recent research on poverty and productivity among rice farmers in Nigeria has shed light on the relationship between these two variables. A few of these empirical studies are reviewed below:

Salami et al. (2017) investigated the extent and determinants of poverty among local rice processors in Kwara state. The

results show that the majority (83.33%) of the rice processors, apart from rice processing, did not have any other source of income, and a considerably large number (97.5%) of the rice processors were female. The results further showed that poverty is more intense in households with a small household size. Furthermore, they revealed that gender (female), educational status, income and household size are significant factors that determine the level of poverty in the study area. Higher educational status, larger income and larger household size reduce poverty, while gender (female) enhances poverty.

Adeyemi et al (2019), researched the gendered viewpoint of income differential and poverty among a sample of rural households in Southwest Nigeria. He revealed that 53.71% of the male population is considered poor, while 47.22% of the female population is poor. However, the research work discovered that income inequality was lower among the male respondents than the female counterparts. Several regressors were considered: educational years, household size, farming experience, market distance, extension access, credit access and membership in a social group represent important poverty drivers in the study area.

Jatto et al (2021) researched arable farming households and their poverty status in the Akinyele Local Government Area of Oyo State. It was discovered that the majority (76.67%) of the rural households were headed by males. The result further shows that 54.44% of the respondents are poor, while 45.56% are non-poor. The result shows that the following variables: years in marriage ($p < 0.05$) and household size ($p < 0.1$) were positive and significant determinants of the probability of being poor, while access to credit ($p < 0.1$) and per capita income ($p < 0.01$) were negative and significant predictors of the probability of being poor.

Aluko and Mbada (2020) investigate why poverty persists among rural women in Nigeria. The result revealed that despite males and females being given equal opportunity for access to education, it was discovered that the literacy rate is low among females in rural areas compared to males. This is a result of the dropout rate of females in senior secondary school, which subsequently affects their choice of employment. Also, a large number of rural women engage in non-farming activities that do not result in high income or any constant flow of financial rewards for them.

Obi-Egbedi et al (2019) examined livelihood diversification, gender and poverty among rural households in Osun state, Nigeria; they discovered that crop farming was the predominant livelihood activity among the households, with more women involved in off-farm (53.30%) than on-farm activities (46.70%). About 55% of female-headed households were poor compared to the 49.60% poverty level of their male counterpart. Poverty was lowest among households with other off-farm activities than those with just one activity. The probit estimates showed that the following variables: age squared, household size, share of total household income from on-farm activities and off-farm activity reduced the probability of being poverty, and age increased the possibility of being poor.

Adam (2017) examined gender differences and poverty amongst women in Nigeria. He found out that poverty is no respecter of gender and that it cuts across both males and females. He further found out that it is documented that poverty is gender-specific, that it is more common among females gender than males in Nigeria.

Abdullahi et al (2018) examined the influence of socioeconomic and demographic characteristics on households' vulnerability to social exclusion/deprivation with emphasis on gender inequality. The study revealed that socio-demographic and labour characteristics strongly determine poverty in Nigeria, and the findings also confirmed the theoretical propositions on causes of poverty. Nevertheless, in terms of socioeconomic deprivation, female-headed households are more underprivileged than male-headed households, as shown by the empirical results from the Oaxaca-Blinder decomposition.

6. Inconsistencies in the literature

Inconsistencies in the literature on poverty and rice productivity in Nigeria are a major issue hindering the development of effective government policies and interventions. Recent studies on poverty and rice productivity in Nigeria reveal several of such inconsistencies, which can be attributed to various methodological, conceptual, and theoretical gaps discovered in different studies. Despite many research studies conducted on poverty and rice productivity in Nigeria, there exist several inconsistencies in the literature, as discovered by this research work, which need attention. For instance,

- i. As discovered in the course of this review, one of the major inconsistencies in the literature is in the area of poverty measurement. It was revealed that some studies have used income-based measures of poverty, for example, Adeoti et al. (2020), while other studies used multidimensional measures of poverty, for example, Oladeebo et al. (2019). This inconsistency in poverty measurement makes it a challenging task to compare the findings of different studies.
- ii. Another inconsistency in the literature discovered is the area of impact of rice productivity on poverty. Some studies suggest a positive relationship between rice productivity and poverty reduction, for example, Agbola et al. (2019), and others have found a negative relationship between rice productivity and poverty, for example, Oyinbo et al. (2020). This inconsistency highlights the need for further research to clarify the true relationship between rice productivity and poverty.
- iii. It was further discovered, in the course of this review, that the literature is also not consistent on the role of gender in rice productivity and poverty. Some studies have found that female farmers have lower rice productivity and higher poverty rates than male farmers, for example, Adekunle et al., (2020), and others have found no significant differences between male and female farmers, for

example, Oladeebo et al. (2020). This inconsistency stresses the need for further research to understand the role attributed to gender in the relationship between rice productivity and poverty among rice farmers.

- iv. In addition, the literature is also not consistent in terms of the methodological approaches used by different researchers. As discovered in this review, some studies have employed quantitative methodological approaches, for example, Adeoti et al. (2020), while others have used qualitative methodological approaches, Oyinbo et al. (2020). This inconsistency highlights the need for more studies that combine both quantitative and qualitative approaches to provide a more comprehensive and clear-cut understanding of the relationship between poverty and rice productivity.
- v. Furthermore, the use of different data sources is also a source of inconsistency in the literature, as identified by this review. A handful of studies have used national-level data, for example, Adeoti et al. (2020), to determine the effect of poverty on productivity and vice versa, while others have used household-level data for similar research, for example, Oladeebo et al. (2019). This inconsistency, as discovered, makes it a challenging task to compare the findings of different studies.
- vi. In the other way, inconsistency in the literature in terms of sampling frames was also identified. While some studies have used a random sampling technique to select respondents for their research work, for example, Adekunle et al. (2020), others have used a purposive sampling technique for the selection of respondents for their work, for example, Oladeebo et al. (2019). This inconsistency highlights the need for studies that use representative sampling frames.
- vii. Also, there is an inconsistency in the literature in the definition of poverty, as there is no consensus regarding the definition of poverty. Some studies have used income-based measures as a baseline for poverty definition, for example, Adeoti et al. (2020), while others have used multidimensional measures to define poverty, for example, Oladeebo et al. (2019). This inconsistency makes it a challenging task to compare the findings of different studies.
- viii. This study further discovered that the literature is also inconsistent in terms of the measurement of rice productivity employed in different studies. Some studies used yield per hectare as a measure of rice productivity, for example, Agbola et al. (2019), while others used total rice production as a measure of rice productivity, for example, Oyinbo et al. (2020). This inconsistency highlights the need for a standardised measure of rice productivity.
- ix. Finally, the literature is inconsistent in terms of data analytical techniques used in different studies. For

instance, some studies used descriptive statistics as an analytical method in their study, for example, Adekunle et al. (2020), while others, for example, Oladeebo et al. (2019), used econometric models as a method of data analysis. This inconsistency stresses the need for studies that use a combination of data analysis techniques for a better understanding of the relationship between poverty and rice productivity.

The inconsistencies in the literature have implications for agricultural development policies and programmes. For example, policies aimed at reducing poverty among rice farmers may not be effective if they are based on inconsistent data or methodological approaches. These inconsistencies, as discovered, emphasise the need for further research on the relationship between poverty and rice productivity that uses consistent data sources, methodological approaches, and sampling frames.

7. Gaps in literature

Despite increasing empirical research on poverty and rice productivity in Nigeria in recent times, there still exist gaps in the literature that require urgent attention. The existing research work on poverty and rice productivity in Nigeria, has several gaps that need to be addressed. As a result, there is a need for more research on this topic, specifically in the following knowledge gap areas:

- i. One of the major gaps in the literature is the lack of longitudinal studies that examine the relationship between poverty and rice productivity over time. Most studies used cross-sectional data, which provides only a snapshot of the relationship between poverty and rice productivity.
- ii. Another gap in the literature, is the limited focus on rural-urban linkages and their impact on poverty and rice productivity. Most studies have focused on rural areas, with limited attention paid to the role of urban centres in shaping poverty and rice productivity.
- iii. There is also a literature gap as a result of inadequate attention given to the impact of climate change on rice productivity in Nigeria. Climate change is likely to have significant impacts on rice productivity, and it is essential to have an in-depth understanding of these impacts to develop effective strategies for reducing poverty.
- iv. Also, the dearth of mixed-methods approaches, which combine quantitative and qualitative data to provide a more comprehensive understanding of the relationship between poverty and rice productivity. Mixed-methods approaches can provide valuable insights into these complex relationships between poverty and productivity and other factors.
- v. The relationship between poverty and rice productivity is influenced by various contextual factors, including climate change, soil degradation, and market fluctuations. However, most studies fail

to adequately consider these factors, limiting the generalizability of their findings.

- vi. Smallholder farmers are the backbone of Nigeria's agricultural sector, but most studies focus on large-scale farmers or aggregators. There is a need for more research on the specific challenges faced by smallholder farmers and the strategies they use to mitigate poverty and productivity constraints.

The gaps in the literature on poverty and rice productivity in Nigeria stress the need for more research on the gap identified

8. Future research directions

As the literature on poverty, rice productivity and agricultural development in Nigeria continues to unfold, there is a need for the identification of future research areas that can help to address the existing gaps and inconsistencies in the literature identified. Future research directions should:

- i. investigate the effects of climate change on rice productivity and poverty in Nigeria, and exploration of adaptation strategies for small-scale farmers.
- ii. analyse the impact of agricultural policy reforms, for example, fertiliser subsidies, and credit programmes, on rice productivity and poverty in Nigeria, and identify areas for improvement.
- iii. investigate the relationship between poverty and rice productivity from a gender perspective, and explore strategies to promote gender equality and empowerment in rice production and marketing.
- iv. examine the effects of market fluctuations, for example, price volatility, trade policies, on poverty and rice productivity in Nigeria, and identify strategies to mitigate these effects.
- v. analyse the impact of institutional factors, for example, land tenure system and cooperatives on poverty and rice productivity in Nigeria, and identify of areas for institutional reform.
- vi. conducting a spatial analysis of poverty and rice productivity in Nigeria, and identify areas with high poverty and low rice productivity for targeted interventions.
- vii. explore the use of system dynamics modelling to examine the complex relationships between poverty and rice productivity in Nigeria, and identify leverage points for intervention.

By exploring these research directions, future studies can provide more detailed insights into the complex relationships between poverty, rice productivity, and agricultural development in Nigeria.

9. Conclusion and recommendations

This review examined the relationship between poverty and rice productivity in Nigeria, with a focus on the implications for agricultural development. The review provide insights into the complex relationship between poverty and rice productivity. It stress the importance of addressing problems limiting poverty alleviation, agricultural development, and

sustainable development programmes to improve rice productivity and reduce poverty.

The findings of this review suggest that poverty and rice productivity are bidirectional linked, with poverty affecting rice productivity and vice versa. The review also identified several factors that influence this relationship, a few of which include agricultural productivity, income, education, and access to credit. The review's findings have important consequences for agricultural development policy in Nigeria. Specifically, the review suggests that policies aimed at reducing poverty and improving rice productivity should focus on improving agricultural productivity, increasing income, and enhancing access to education and credit.

This work recommends that policymakers should as a matter of urgency, develop and implement integrated agricultural development programmes that address the complex relationships between poverty, rice productivity, and other related factors and provide policy support for agricultural research. Agricultural development practitioners should provide training and capacity-building programmes for farmers to improve their skills and knowledge in rice production and productivity enhancement and promote sustainable agricultural practices such as conservation agriculture and organic farming. Researchers should conduct further research on the relationship between poverty and rice productivity, such as the impact of climate change and other external factors and share and disseminate research findings with policymakers, agricultural development practitioners, and other stakeholders to inform policy and practice. The government should invest in programmes that improve agricultural productivity, such as providing HYVs of seeds, fertilisers, and irrigation systems, implement policies that improve income, such as providing subsidies to farmers, improving market access, and enhancing rural infrastructure, and support research and development in agriculture, including funding research projects, establishing research institutions, and promoting technology transfer.

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