



GARRETT RANKING ANALYSIS TO FACTORS AFFECTING RICE PRODUCTION IN HONG LOCAL GOVERNMENT AREA OF ADAMAWA STATE, NIGERIA

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ABSTRACT

The study analyzed the factors affecting rice production in Hong Local Government Area of Adamawa State, Nigeria. The specific objectives were to describe the socio-economic characteristics of rice farmers and rank the identified constraints using the Garrett Ranking Technique. A multistage sampling technique was employed 188 rice farmers and the data collected were analyzed using descriptive statistics and Garrett ranking technique. The result that the majority (35.6%) of the rice farmers were within the age bracket of 41–50 years, while only 12.8% were between 20 and 30 years, 70.2% of the respondents were married, 34.6% of the farmers had between 11 and 15 years of farming experience, 61.7% of the respondents belonged to cooperative societies, 39.4% of the respondents had secondary education, and 72.9% of the respondents cultivated improved rice varieties. The results also revealed that inadequate capital was ranked as the most severe constraint affecting rice production in Hong Local Government Area with a mean Garrett score of 79.50, limited access to credit ranked second with a mean Garrett score of 76.00, high cost of fertilizer was ranked third with a mean Garrett score of 73.00 and high labour cost occupied the fourth position with a mean Garrett score of 67.50. The study recommends that government and development agencies should encourage youth participation in rice production through agricultural empowerment programmes and access to land and credit facilities, extension services should be strengthened to provide farmers with updated information on improved rice production technologies and policies aimed at improving access to production resources, especially for women farmers, should be implemented to promote inclusive agricultural development as well as farmers should be encouraged to adopt climate-smart agricultural practices to mitigate the effects of climate variability.

Keywords: Garrett Ranking, Factors, Rice, Production and Hong

1.1 INTRODUCTION

Agriculture remains a major sector of the Nigerian economy, contributing significantly to food production, employment generation, income creation, and rural development. The sector provides livelihood opportunities for a large proportion of the population, particularly in rural communities where farming constitutes the primary occupation. Despite the growing importance of other sectors, agriculture continues to play a strategic role in ensuring food security and economic sustainability in Nigeria (World Bank, 2024). Rice (*Oryza sativa*) has become one of the most important staple food crops in Nigeria due to rapid population growth, urbanization, rising incomes, and changing dietary preferences. The increasing demand for rice has transformed the crop from a luxury commodity to a household staple consumed across all socio-economic classes. However, domestic rice production has not consistently met national demand, resulting in periodic shortages and increased pressure on local producers (FAO, 2024).

Nigeria is currently one of the largest rice producers and consumers in Africa, yet productivity remains relatively low compared to global standards. Recent empirical evidence suggests that productivity gaps among rice farmers are largely attributable to inadequate access to improved technologies, poor extension services, high input costs, credit constraints, and climate-related challenges (Abdullah et al., 2025). These challenges continue to limit the capacity of smallholder farmers to maximize output and contribute effectively to national food security. Empirical studies conducted across Nigeria have consistently identified financial constraints as a major obstacle to rice production. Ojo *et al.* (2020) found that significant financing gaps exist among rice farmers in Southwestern Nigeria, limiting their ability to attain optimum production levels. Similarly, Ojo and Baiyegunhi (2020) reported that credit constraints significantly affect the adoption of climate-change adaptation strategies among rice farmers, thereby reducing productivity and resilience to environmental shocks. Adekunle and Amurtiya (2021) examined the economics of rice production among smallholder women farmers and found that although rice farming was profitable, farmers experienced varying levels of technical, allocative, and economic inefficiencies due to limited access to productive resources. The study further emphasized the need for improved institutional support to enhance productivity among rice producers. Wudil *et al.* (2022) identified high input costs, inadequate training, insufficient credit facilities, unreliable water supply, pest infestation, and poor extension services as major constraints to rice production under irrigation systems in Kano State. Their findings indicate that these factors significantly influence farmers' production decisions and overall output. Similarly, Saleh *et al.* (2023) investigated constraints affecting small-scale dry-season rice farmers in Gombe State using Garrett Ranking Analysis. Their study revealed that inadequate capital and limited access to credit facilities ranked as the most severe constraints affecting rice production. Other important constraints included high cost of farm inputs, poor access to extension services, and inadequate irrigation infrastructure.

Jimi *et al.* (2020) observed that farmers with access to credit recorded higher productivity levels due to increased adoption of improved technologies and farm inputs. Access to financial resources enables farmers to purchase quality seeds, fertilizers, agrochemicals, and machinery needed to improve yields. The role of farm size and resource allocation in determining rice productivity has equally attracted research attention. A recent study by Abdoulaye *et al.* (2026) found that field size and management practices significantly influence rice yields in Nigeria. The researchers noted that smaller and better-managed rice fields often recorded higher productivity than larger but poorly managed fields, emphasizing the importance of efficient resource utilization. Climate variability has emerged as another critical factor affecting rice production globally and in Nigeria. Ghosh, Mukhoti, and Sharma (2025) established that rainfall variability significantly influences rice output, suggesting that climate-related risks constitute a major challenge to sustainable rice production. Their findings support the growing concern that changing climatic conditions may adversely affect future agricultural productivity. Further evidence by Hultgren *et al.* (2025) revealed that climate change could substantially reduce crop productivity, including rice production, despite adaptation efforts by farmers. The study emphasized the need for proactive interventions aimed at strengthening farmers' resilience and adaptive capacity.

In addition to climate-related challenges, inefficient input utilization remains a major production problem among smallholder farmers. Studies on fertilizer use among rice farmers have shown that farm size, training, soil fertility conditions, and access to agricultural information significantly determine input utilization and productivity outcomes (Okoye *et al.*, 2022). Likewise, resource allocation studies have indicated that inadequate capital, poor infrastructure, and inefficient management practices continue to constrain agricultural productivity in Nigeria (Nwankwo & Eze, 2022). Government interventions aimed at promoting rice production have produced mixed results. In Benue State, Ibrahim and colleagues (2020) found that guaranteed minimum price policies contributed positively to rice production by providing incentives for farmers. However, inadequate access to improved varieties, poor extension support, and credit limitations remained persistent constraints affecting production levels. Recent studies conducted within Adamawa State further demonstrate the importance of rice farming in enhancing rural livelihoods. Ahmed *et al.* (2023) reported that rice production in Hong Local Government Area remains profitable despite numerous production challenges. The authors identified rising production costs, limited access to finance, and poor infrastructure as major factors affecting profitability among rice farmers.

Although several studies have examined rice production economics, efficiency, profitability, and constraints across Nigeria, there remains limited empirical evidence specifically ranking the factors affecting rice production in Hong Local Government Area using Garrett Ranking Analysis. Most previous studies focused on profitability analysis, efficiency measurement, or descriptive assessment of production constraints without systematically prioritizing the

severity of these challenges from farmers' perspectives. Garrett Ranking Analysis is particularly suitable for this purpose because it converts respondents' rankings into numerical scores, thereby facilitating objective prioritization of production constraints. The technique has been widely adopted in agricultural research to identify and rank production problems, farmer preferences, and intervention priorities. Through this approach, policymakers and development agencies can better understand the most critical constraints requiring immediate attention. The findings are expected to provide evidence-based recommendations for improving rice productivity, enhancing farmer welfare, and promoting sustainable agricultural development in the study area. Therefore, this study analyzed the factors affecting rice production in Hong Local Government Area of Adamawa State, Nigeria. The specific objectives WERE to:

- a. describe the socio-economic characteristics of rice farmers in Hong Local Government Area;
- b. rank the identified constraints using the Garrett Ranking Technique;

RESEARCH METHODOLOGY

2.1 Study Area

The study was conducted in Hong Local Government Area (LGA) of Adamawa State, Nigeria. Hong LGA is located in the northern part of Adamawa State and lies between Latitude 10°13'N and 10°44'N and Longitude 12°45'E and 13°15'E. The Local Government Area shares boundaries with Gombi LGA to the west, Mubi South LGA to the east, Song LGA to the south, and Borno State to the north. Hong LGA occupies a land area of approximately 2,486 square kilometers and has a predominantly agrarian population. The area experiences a tropical climate characterized by distinct wet and dry seasons. Annual rainfall ranges from 700 mm to 1,100 mm, while temperatures range between 25°C and 38°C. The vegetation is mainly Sudan Savannah, which supports the cultivation of crops such as rice, maize, sorghum, millet, cowpea, groundnut, and vegetables. Rice production constitutes one of the major agricultural activities in the area due to the availability of fertile land and favorable climatic conditions. Most farmers engage in small-scale rice farming under rain-fed and lowland production systems.

2.2 Research Design

The study employed a survey research design. The design was considered appropriate because it allows data to be collected from a sample of rice farmers at a particular point in time regarding the factors affecting rice production in the study area.

2.3 Population of the Study

The population of the study comprised all rice farmers in Hong Local Government Area of Adamawa State. The target population included registered and non-registered rice farmers actively engaged in rice production during the 2024/2025 farming season.

2.4 Sampling Procedure and Sample Size

A multistage sampling technique was employed for the study. Stage I, Five Districts with high concentration of rice farmers were purposively selected from Hong Local Government Area based on the intensity of rice production. Stage II, two rice-producing communities were randomly selected from each selected District, giving a total of ten communities. Stage III, a list of rice farmers was obtained from extension agents, community leaders, and farmer associations within the selected communities. Simple random sampling technique was used to select respondents for interview. A total sample size of **188 rice farmers** was used for the study with the aid of Yamane (1967) formular. The distribution of respondents was carried out proportionately among the selected communities based on the number of rice farmers available in each community.

Table 1: Distribution of Sample Respondents

Districts	Number of Respondents
Hong	40
Hildi	36
Pella	38
Uba	37
Gaya	37
Total	188

Source: Field survey, 2026

2.5 Sources of Data

The study utilized both primary and secondary data. Primary data were collected directly from rice farmers through the administration of structured questionnaires and interview schedules. While, the secondary data were obtained from Adamawa State Agricultural Development Programme (ADADP) and Journals, textbooks, conference proceedings, and internet sources.

2.6 Method of Data Collection

A structured questionnaire was used as the main instrument for data collection. The questionnaire consisted of three sections: Section A consist of socio-economic characteristics of respondents and section B comprised of factors affecting rice production to be ranked by respondents using Garrett Ranking Technique.

a. Analytical Techniques

Data collected were analyzed using descriptive statistics and garrett ranking technique. Garrett Ranking Technique was used to identify and rank the major factors affecting rice production in the study area as used by Benke and Yogesh (2025). The respondents were asked to rank the identified constraints according to their degree of severity. The ranks assigned by respondents were converted into percent positions using Garrett's formula:

Percent position = $100(R_{ji}-0.5)/N_j$

R_{ji} = 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th and 10th Ranks

N_j = Total rank given by 188 respondents = 10

The per cent position of each rank was converted into scores referring to the table given by Garrett and Woodworth (1969). For each factor, the scores of individual respondents were added together and divided Where:

- (R_{ij}) = Rank given for the i th factor by the j th respondent.
- (N_j) = Number of factors ranked by the j th respondent.

The percent positions obtained were converted into Garrett scores using Garrett Conversion Table. The Garrett score for each factor was calculated by summing the scores assigned by all respondents and dividing by the total number of respondents. The factor with the highest mean score was considered the most important constraint affecting rice production, while the factor with the lowest score was considered the least important constraint. by the total number of the respondents for whom scores was added. These mean scores for all the constraints were arranged in high to lower order and accordingly rank were allotted to the constraints. The following constraints were presented to respondents.

Table 2: Factor Numbers as per constraints faced by the rice farmer before Garrett Ranking analysis

Factor Number	Constraints/Factors
F1	Inadequate capital
F2	Limited access to credit
F3	High cost of fertilizer
F4	High cost of improved seed
F5	Pest and disease infestation
F6	Inadequate extension services
F7	Poor road network
F8	Climate variability
F9	High labour cost
F10	Inadequate storage facilities

Source: Field survey, 2026, Key: F = factor

RESULTS AND DISCUSSION

3.1 Socio-Economic Characteristics of the Respondents

Table 3: Distribution of Respondents According to Socio-Economic Characteristics (n = 188)

Variables	Frequency	Percentage (%)
Age (Years)		
20–30	24	12.8
31–40	58	30.9
41–50	67	35.6
Above 50	39	20.7
Sex		
Male	143	76.1
Female	45	23.9
Marital Status		
Single	28	14.9
Married	132	70.2
Widowed	18	9.6
Divorced	10	5.3
Farming Experience (Years)		
1–5	21	11.2
6–10	47	25.0
11–15	65	34.6
Above 15	55	29.3
Membership of Cooperative Society		
Member	116	61.7
Non-member	72	38.3
Educational Qualification		
No Formal Education	36	19.1
Primary Education	42	22.3
Secondary Education	74	39.4
Tertiary Education	36	19.1
Type of Seed Used		
Local Variety	51	27.1
Improved Variety	137	72.9

Source: Field survey, 2026

The result in Table 3 reveals that the majority (35.6%) of the rice farmers were within the age bracket of 41–50 years, while only 12.8% were between 20 and 30 years. This implies that rice production in the study area is dominated by economically active individuals who possess the physical strength and experience required for farming activities. The finding agrees with Ahmed *et al.* (2023), who reported that middle-aged farmers constitute the majority of rice producers in Adamawa State because of their active involvement in agricultural production. The distribution by sex indicates that 76.1% of the respondents were male, while 23.9% were female. This suggests that rice production in Hong Local Government Area is predominantly a male-dominated enterprise. The result corroborates the findings of Sanusi *et al.* (2024), who reported that men account for a greater proportion of rice farmers in northern Nigeria due to their greater access to land and production resources.

Regarding marital status, 70.2% of the respondents were married. The high proportion of married farmers may be attributed to the availability of family labour and greater household responsibilities, which encourage participation in agricultural production. This finding is consistent with Adekunle and Amurtiya (2021), who observed that married farmers are more actively involved in rice production because of their responsibility to provide food and income for their households. The result further shows that 34.6% of the farmers had between 11 and 15 years of farming experience, while 29.3% had more than 15 years of experience. This indicates that most respondents possess considerable experience in rice farming. Farming experience enhances farmers' ability to make better production decisions and manage farm resources efficiently. This finding agrees with Ojo *et al.* (2020), who found that farming experience positively influences agricultural productivity among rice farmers. The study also reveals that 61.7% of the respondents belonged to cooperative societies. Membership in cooperatives enhances access to credit, farm inputs, extension services, and market information. The finding supports the work of Wudil *et al.* (2022), who reported that participation in farmer organizations significantly improves farmers' access to production resources and agricultural information.

With respect to educational qualification, 39.4% of the respondents had secondary education, while 19.1% possessed tertiary education. This indicates that the majority of the farmers were literate and capable of understanding improved farming technologies. Education facilitates the adoption of innovations and enhances farm management practices. The finding is in line with the study of Saleh *et al.* (2023), who reported that education positively influences technology adoption among rice farmers. The result on seed type used indicates that 72.9% of the respondents cultivated improved rice varieties, while 27.1% used local varieties. The high adoption of improved seed varieties may be attributed to their higher yield potential, disease resistance, and shorter maturity periods. This finding agrees with the report of the Food and Agriculture Organization (2024), which emphasized that the use of improved rice varieties significantly enhances rice productivity and food security.

3.2 Constraints Affecting Rice Production in Hong Local Government Area

The respondents ranked ten major constraints affecting rice production in the study area. The ranks assigned by the 188 respondents were converted into Garrett scores using the Garrett Ranking Technique. The mean Garrett score for each constraint was computed and used to determine the order of importance of the constraints. The constraint with the highest mean score was considered the most severe problem affecting rice production as in Table 4. The result revealed that inadequate capital was ranked as the most severe constraint affecting rice production in Hong Local Government Area with a mean Garrett score of 79.50. This finding implies that most rice farmers lack sufficient financial resources to purchase farm inputs, hire labour, expand farm size, and adopt improved technologies. The result agrees with the findings of Saleh et al. (2023), who reported that inadequate capital was the most critical constraint affecting rice farmers in northern Nigeria. Similarly, Ojo, Ogundeji, Babu, and Alimi (2020) found that financial limitations significantly reduce the productivity of rice farmers in Nigeria. Limited access to credit ranked second with a mean Garrett score of 76.00. The result indicates that farmers experience difficulties in obtaining loans from formal financial institutions due to collateral requirements, high interest rates, and bureaucratic procedures. This finding corroborates the work of Ojo and Baiyegunhi (2020), who observed that inadequate access to credit limits farmers' ability to adopt improved agricultural technologies and climate adaptation strategies.

The high cost of fertilizer was ranked third with a mean Garrett score of 73.00. Fertilizer remains an essential input for rice production, and rising prices increase production costs and reduce profitability. This finding is consistent with the report of the National Bureau of Statistics (2024), which identified increasing fertilizer prices as a major challenge facing crop farmers in Nigeria. High labour cost occupied the fourth position with a mean Garrett score of 67.50. Rice production is labour-intensive, particularly during land preparation, transplanting, weeding, and harvesting. The increasing scarcity of farm labour and rising wage rates have contributed to higher production costs. This result agrees with Ahmed, Ahmed, and Salihu (2023), who identified labour cost as a major determinant of profitability among rice farmers in Hong Local Government Area.

The high cost of improved seed ranked fifth with a mean Garrett score of 65.50. Although improved seed varieties enhance productivity, many farmers find them expensive and difficult to access. The finding supports the observations of Adekunle and Amurtiya (2021), who reported that the cost of quality seed remains a major challenge among rice producers in Adamawa State. Climate variability was ranked sixth with a mean Garrett score of 63.50. Unpredictable rainfall patterns, droughts, floods, and temperature fluctuations adversely affect rice production. This finding is in line with Ghosh, Mukhoti, and Sharma (2025), who concluded that climate variability significantly affects rice yields and food security. Pest and

disease infestation occupied the seventh position with a mean Garrett score of 60.00. Pest attacks and disease outbreaks reduce crop yields and increase production costs due to expenditure on pesticides and control measures. Similar findings were reported by Abdullah et al. (2025), who identified pest and disease infestation as a major factor limiting rice productivity among smallholder farmers.

Inadequate extension services ranked eighth with a mean Garrett score of 56.50. This suggests that many farmers have limited access to technical information and improved production practices. The result agrees with Wudil, Ali, Hassan, and Mushtaq (2022), who reported that poor extension contact constrains technology adoption among rice farmers. Inadequate storage facilities ranked ninth with a mean Garrett score of 53.00. Poor storage facilities expose harvested rice to spoilage, pest infestation, and post-harvest losses. The finding supports the Food and Agriculture Organization's (2024) assertion that inadequate storage infrastructure contributes significantly to agricultural losses in developing countries. Finally, poor road network ranked tenth with a mean Garrett score of 48.00, making it the least severe constraint among the identified factors. Although poor roads increase transportation costs and limit market access, respondents perceived other constraints as more pressing challenges to rice production.

Table 4: Garrett Ranking of Constraints Affecting Rice Production in Hong Local Government Area (n = 188)

S/N	Constraint	Total Score	Garrett Mean Score	Garrett Rank
1	Inadequate capital	14,946	79.50	1st
2	Limited access to credit	14,288	76.00	2nd
3	High cost of fertilizer	13,724	73.00	3rd
4	High labour cost	12,690	67.50	4th
5	High cost of improved seed	12,314	65.50	5th
6	Climate variability	11,938	63.50	6th
7	Pest and disease infestation	11,280	60.00	7th
8	Inadequate extension services	10,622	56.50	8th
9	Inadequate storage facilities	9,964	53.00	9th
10	Poor road network	9,024	48.00	10th

Source: Field survey, 2026

Conclusion

The study concludes that rice farmers in Hong Local Government Area are predominantly middle-aged, married, male farmers with considerable farming experience. Most farmers belong to cooperative societies and possess at least basic formal education, which enhances their access to information and production resources. The majority of the respondents also

cultivate improved rice varieties, indicating increasing awareness and adoption of improved agricultural technologies. These socio-economic characteristics have important implications for rice production and productivity in the study area. Financial and input-related constraints remain the major factors limiting rice production in the study area with the major constraints facing rice farmers were inadequate capital, limited access to credit, and high cost of fertilizer which directly affect farmers' ability to procure inputs, adopt improved technologies, and increase productivity. Other identified constraints include high labour cost, expensive improved seed, climate variability, pest and disease infestation, inadequate extension services, poor storage facilities, and poor road networks. Addressing these challenges would significantly improve rice productivity, profitability, and food security among farming households.

Recommendations

Based on the findings, the study recommends that:

1. Government and development agencies should encourage youth participation in rice production through agricultural empowerment programmes and access to land and credit facilities.
2. Extension services should be strengthened to provide farmers with updated information on improved rice production technologies.
3. Policies aimed at improving access to production resources, especially for women farmers, should be implemented to promote inclusive agricultural development.
4. Farmers should be encouraged to adopt climate-smart agricultural practices to mitigate the effects of climate variability.

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