



Structure and Efficiency of Onion Marketing in Katsina State, Nigeria



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ABSTRACT

This research investigated the market structure and efficiency of onion marketing within Katsina State, Nigeria. A multi-stage sampling approach was utilized to gather primary data through structured questionnaires from 335 participants, including 112 producers, 91 wholesalers, and 132 retailers from six key markets: Ajiwa, Dan Nakola, Danja, Katsina, Daura, and Funtua. The analysis employed descriptive statistics, the Gini Coefficient, and Acharya's Marketing Efficiency model. Findings indicated that the onion marketing sector is predominantly male (88.0%), with participants mostly in the economically active 21-40 age range (70.4%), averaging 37.7 years old. Most respondents (89.0%) were married, possessed low formal education levels (71.3% with only informal or primary education), and had an average household size of nine. Gini Coefficient analysis revealed a moderate to high market concentration, with producers experiencing the highest concentration (Gini = 0.539), followed by retailers (Gini = 0.500), while wholesalers operated in a highly competitive environment (Gini = 0.276). The average Marketing Efficiency (MME) was 1.24, with Yar Kutungu (Katsina) identified as the most efficient market (MME = 1.32) and Dan Nakola as the least efficient (MME = 1.17). The study concludes that while onion marketing offers structural profitability for producers, considerable structural disparities remain. It recommends bolstering producer cooperatives, upgrading market infrastructure, and improving retailer capacity through specialized training.

Keywords:

Onion Marketing,
Market Structure,
Marketing
Efficiency,
Gini Coefficient
And Katsina State

INTRODUCTION

Onion (*Allium cepa* L.) is a vital global crop that underpins food security, nutrition, and economic development. The Food and Agriculture Organization (FAO) reports that global onion production reached about 115 million metric tons in 2024, with an estimated market value of \$26 billion. Nigeria is Africa's third-largest onion producer and ranks seventh worldwide (FAO, 2025).

In Nigeria, onion is a major cash crop and one of the top five most traded agricultural commodities. Annual dry onion output is estimated at 1.6–2.1 million metric tons, valued at roughly ₦1.17 trillion. The industry makes substantial contributions to government revenue, job creation, and GDP growth.

Katsina State, a leading onion-producing region, faces several sector-specific challenges. Post-harvest losses are high (30–40%) due to inadequate storage and poor handling practices. Marketing channels are inefficient,

often involving many intermediaries that raise transaction costs, while smallholder farmers struggle with limited market access. Seasonal price swings reduce farmer incomes, scarce market information impedes sound decision-making, and weak transport infrastructure increases logistics costs. Together, these problems lower earnings for producers, worsen food insecurity and poverty, and constrain broader economic progress. In response, this study aims to assess the structure and efficiency of onion marketing in Katsina State. Onion is globally recognized for its role in supporting livelihoods and nutrition, thriving in mild climates without extreme heat, cold, or excessive rain (Oyedipe et al., 2017; FAO, 2020). In Nigeria, it is a key cash crop that generates income, employment, and GDP contributions (CBN, 2020; Olajide et al., 2019). Onions are nutrient-dense—rich in fiber, vitamins, and minerals—and their consumption is linked to health benefits such as lower cardiovascular risk and possible anticancer properties (Adeoti et al., 2018; Olarinde et al., 2020).

Onion marketing warrants focused attention because it is a household dietary staple, is predominantly produced by smallholder irrigated farms that support low- and middle-income earners, and its marketing chain significantly shapes local and national economies. Yet the sector contends with persistent issues, including price instability, weak storage facilities, and inefficient supply chains, underscoring the need for research-driven solutions (Adebayo et al., 2019).

Katsina State experiences unique marketing constraints such as channel inefficiencies, price volatility, and restricted market access (Adeoye et al., 2015). Effective interventions require understanding marketers' socioeconomic characteristics, as factors like education, experience, and household size influence marketing behavior and performance (Kormawa et al., 2015; Olajide et al., 2016). The organization and structure of the marketing chain also affect efficiency and profitability (Olarinde et al., 2017). Marketing margins vary across participants, reflecting differences in market structure, competition, and transaction costs, and thereby impacting sustainability (Adebayo et al., 2016; Adeoye et al., 2015). Additional hurdles in Katsina include high transport costs, inadequate storage, and fluctuating prices (Oyedipe et al., 2017). Nigeria's onion marketing system is complex, involving producers, wholesalers, retailers, and consumers, and depends on effective coordination among these actors (Olajide et al., 2016; Olarinde et al., 2017). Consequently, this study examines the socioeconomic profiles of onion marketers, the organization and structure of marketing channels, marketing performance and efficiency, and the key constraints affecting the onion marketing system in Katsina State.

MATERIALS AND METHODS

The Study Area

Katsina State, located in Nigeria's North-Western zone, is the focal point of this research. The state covers roughly

24,192 square kilometers and shares borders with Zamfara, Kaduna, Kano states, and the Niger Republic. It is situated between latitudes 10°30'N and 13°00'N, and longitudes 6°30'E and 9°00'E. The terrain features gentle slopes and valleys, with an average elevation of 500 meters above sea level. The state has a population of about 7.3 million, growing at a rate of 3.2% annually. The climate is tropical savanna, characterized by a dry season (November to March) and a wet season (April to October), with annual rainfall between 600 mm and 1,000 mm. Economically, Katsina is largely agrarian, with agriculture accounting for approximately 70% of its GDP. Key crops include onions, tomatoes, maize, sorghum, and millet. Onion production is a vital economic activity, with areas like Daura, Kankia, and Funtua celebrated for their high-quality produce.

Sampling Procedure and Sample Size

A multi-stage sampling technique was adopted for this study. Initially, five local government areas (Katsina, Batagarwa, Daura, Funtua, and Danja) across the three zones of Katsina State, known for onion marketing, were purposively selected. In the second stage, six onion markets were chosen based on marketing activity and accessibility: three rural/supply markets (Ajiwa, Dan Nakola, and Danja) and three urban/receiving markets (Katsina, Daura, and Funtua). Finally, the Yamane (1967) formula and proportionate allocation method were used to select 112 producers, 91 wholesalers, and 132 retailers, totaling 335 respondents.

The sample size was determined using the following formula:

$$n = N / (1 + N(e^2))$$

Where: n = Sample size, N = Total population of producers, wholesalers, and retailers

e = Confidence level (0.05)

Table 1: Sampling Procedure for Respondents in the Study Areas

Market s Selecte d	Market Type	S F P	S S P	SF W	S S W	SF R	SS R
Katsina (Yarkut ungu)	Urban/Dem and	1 0	7	7	5	25	16
Daura Market	Urban/Dem and	1 5	1 0	15	1 1	15	10
Funtua Market	Urban/Dem and	3 0	2 1	25	1 9	30	20
Ajiwa Market	Rural/Suppl y	4 0	2 8	30	2 3	50	33
Danja Market	Rural/Suppl y	4 5	3 2	35	2 6	60	40
Dan Nakola	Rural/Suppl y	2 0	1 4	10	7	20	13

Total		1	1	12	9	200	132
		6	1	2	1		
		0	2				

Source: Field Survey, 2025

Survey Key

SFP – Sampling Frame of Producer, SSP – Sampling Size of Producer, SFW – Sampling Frame of Wholesaler, SSW – Sampling Size of Wholesaler, SFR – Sampling Frame of Retailer

SSR – Sampling Size of Retailer

by producers, MC is the marketing cost, and MM is the marketing margin. Acharya and Agarwal (2019) defined efficient marketing as minimizing the cost of achieving a desired objective without compromising customer satisfaction.

Data Collection and Analysis

Data for this research were gathered from primary sources using questionnaires. The analysis utilized descriptive statistics, the Gini Coefficient, and Acharya's marketing efficiency model.

The Gini coefficient was calculated by summing the product of the mean percentage of distributors and the mean cumulative percentage of sales revenue, then subtracting this sum from 1. The formula used was: $G.C. = 1 - \Sigma XY$. Where G.C is the Gini coefficient, X is the percentage share of onion market participants, Y is the cumulative percentage of onion purchases, and Σ represents the summation sign.

To assess market efficiency, the modified Acharya method was applied: $MME = FP / (MC + MM)$. Where MME is the modified measure of marketing efficiency, FP is the price received

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Onion Marketers

As detailed in Table 2, the majority of respondents involved in onion marketing were adults, with an average age of 37.7 years. Approximately 70.4% of the respondents were aged between 21 and 40, aligning with findings that young people in this age group are actively engaged in agricultural marketing. Furthermore, 89.0% of the respondents were married, while 11.0% were single. The results also indicated that most marketers had some form of education, with 37.3% having informal education and 34.0% having primary education. This educational background facilitates the adoption of improved marketing strategies.

Table 2: Socioeconomic Characteristics of Onion Marketers

Variables	Frequency	Percentage	Mean
Sex			
Male	295	88.0	
Female	40	12.0	
Age (years)			
10-20	42	12.5	
21-30	124	37.0	
31-40	112	33.4	37.7
41-50	44	13.1	
51-60	11	3.3	
61 and Above	2	0.6	
Marital status			
Married	298	89	
Single	37	11	
Educational level			
Informal	125	37.3	
Primary	114	34	
Secondary	55	16.4	
Tertiary	28	8.4	
No education	13	3.9	
Household size (number)			
Variables	33	9.9	
Sex	166	49.6	9
Male	103	30.7	

Female	33	9.9	
Marketing Experience (years)			
Variables	123	36.7	
Sex	147	43.9	9
Male	50	14.9	
Female	15	4.5	
Cooperative Membership			
Variables	51	15.2	
Sex	284	84.8	
Storage Ownership			
Yes	13	3.9	
No	322	96.1	

Source: Field Study, 2025

Market Structure

The Gini Coefficient was utilized to measure the market structure of onions in the study area. The results from table 3, indicated a concentration of market power among producers, wholesalers, and retailers. However, the concentration was more pronounced on the producer side compared to the wholesale side. This is evidenced by Gini coefficients of 0.539 for producers, 0.276 for wholesalers, and 0.500 for retailers. Consequently, onion production in the region exhibits monopolistic competition, whereas wholesaling operates under conditions of perfect competition. These findings are consistent with previous research by Danmusa et al. (2025), which reported similar market concentration patterns in the Jigawa rice markets. These patterns are reinforced by recent Nigerian studies. Abasilim et al. (2025) find that palm oil intermediaries in

Edo State exhibit very high upstream concentration—Gini coefficients of 0.87 for processors and 0.70 for wholesalers—while retailing is comparatively more competitive at 0.49. Similarly, Ujoh et al. (2024) report that for yellow pepper in Nsukka (Enugu), wholesaling is more concentrated (0.584) than retailing (0.524); by contrast, turmeric in Onitsha shows high concentration at both levels, with Gini values of 0.687 for wholesalers and 0.750 for retailers, suggesting imperfect competition and sales dominated by a few traders (Isibor & Nkamigbo, 2023). In Jigawa State, date palm markets display mixed but generally elevated concentration, with Gini coefficients ranging roughly from 0.66 to 0.78 across wholesalers and retailers depending on the specific market (Salihu et al., 2022).

Table : 3 Gini Coefficient result for Producers, Wholesalers, and Retailers.

Volume of Sales (₦)	Number of Marketers	Proportion of Marketers (x)	Total Income From Onion Sale (₦)	Proportion of Total Income From Onion Sales	Cumulative Proportion of Total Income From Onion Sale (y)	XY
Producers						
100,000 – 500,000	42	0.375	12,550,000	0.148	0.148	0.0555
500,001 – 1,000,000	35	0.313	24,329,100	0.287	0.435	0.1362
1,000,001 – 1,500,000	27	0.241	32,604,150	0.385	0.82	0.1976
1,500,001 and Above	8	0.071	15,175,000	0.179	1	0.071
Total	112	1	84,658,250	1	2.403	0.4603
Gini = $1 - \sum X_i Y_i$						0.539
Wholesalers						
100,000 – 500,000	1	0.010	450,000	0.001	0.001	0.00001
500,001 – 1,000,000	6	0.066	5,083,300	0.021	0.022	0.00145
1,000,001 – 1,500,000	21	0.231	26,575,000	0.110	0.132	0.03049
1,500,001 and Above	63	0.692	208,925,000	0.867	1	0.692
Total	91	1	241,033,300	1	1.153	0.72395
Gini = $1 - \sum X_i Y_i$						0.276
Retailers						
100,000 – 500,000	28	0.212	4,608,300	0.027	0.027	0.00572
500,001 – 1,000,000	27	0.204	21,804,160	0.126	0.153	0.03121

1,000,001 – 1,500,000	24	0.182	31,150,000	0.180	0.333	0.06060
1,500,001 and Above	53	0.402	115,145,830	0.666	1	0.402
Total	132	1	172,708,290	1	1.513	0.4995
Gini = $1 - \sum X_i Y_i$						0.500

Source: Field Study, 2025

Market Efficiency

The results presented in Table 4 demonstrate that marketing costs and infrastructure are the principal factors explaining differences in onion-market efficiency. Yar Kutungu was the most efficient market, recording a marketing margin efficiency of 1.32. Farmers in this market received the highest price, ₦74,900, while incurring the lowest marketing cost, ₦23,230. This combination suggests that the market's infrastructure and distribution arrangements support a more direct movement of onions from producers to consumers, thereby reducing transaction costs and allowing farmers to retain a greater share of the final value.

This finding is consistent with Adegbite and Adejobi (2018), who reported substantial differences in the efficiency of onion-market operators in Osun State. Their most efficient channels recorded efficiency levels of 149% for bulk merchants, 343% for wholesalers, and 275% for retailers. They identified transportation, transaction losses, wages, association dues, stall rent, and capital costs as important determinants of marketing efficiency. Similarly, the superior performance of Yar Kutungu can be associated with its lower marketing costs and more favourable infrastructure. In both studies, efficiency is not determined solely by the size of the marketing margin; it is also influenced by the costs required to move the product through the marketing chain.

The results also correspond with findings from Kano State. Abbas et al. (2018) reported an average marketing margin of 81.15% and marketing efficiency of 687.5% in major onion markets, but identified inadequate credit and storage facilities as important constraints. This comparison indicates that a market can be profitable while still experiencing structural inefficiencies. In the case of Yar Kutungu, lower costs and better infrastructure appear to convert marketing activity into higher efficiency. In contrast, the Kano findings show that high margins do not necessarily eliminate problems associated with storage, finance, or post-harvest losses.

Conversely, Dan Nakola was the least efficient market, with an MME of 1.17. Farmers there received the lowest price, ₦71,200, and incurred the highest marketing cost, ₦30,493.54—approximately ₦7,000 more than the cost recorded in Yar Kutungu. The lower performance of Dan Nakola may therefore reflect poor road conditions, higher fuel and transportation expenses, greater transaction losses, or a more complex chain of intermediaries. This interpretation is supported by Maharazu (2023), who found that transportation costs and agent commissions

significantly affected the margins of onion wholesalers in Kaduna and Katsina States. The study also showed that producers received 56% of the final consumer price, while wholesalers and retailers received 14% and 30%, respectively, demonstrating how intermediary costs influence value distribution.

The Dan Nakola result is also consistent with Ikudayisi and Rahji (2015), who found low short-run integration among spatially separated onion markets in Nigeria. They associated weak short-run price transmission with poor road networks and inadequate information flows. Thus, the higher costs in Dan Nakola may not only increase the financial burden of marketing but may also delay the transmission of price information between producers, traders, and consumers. In this respect, infrastructure affects both the cost efficiency and the informational efficiency of the market.

Furthermore, Bello and Yakubu (2023) found that onion losses occur during harvesting, transportation, and marketing, while the adoption of improved storage and post-harvest technologies remains limited. Their findings help explain why markets with poor transport and storage systems may record higher marketing costs and lower efficiency. If onions are damaged or spoiled during handling, traders must either absorb the loss, increase prices, or widen their marketing margins to compensate. Consequently, the relatively high cost recorded in Dan Nakola may reflect not only transportation expenses but also losses associated with inadequate storage and handling.

The overall average MME of 1.24 indicates that the onion-marketing system in the study area is generally efficient. However, the variation between Yar Kutungu and Dan Nakola shows that this efficiency is unevenly distributed. The difference in marketing costs—more than ₦7,000—is considerably greater than the difference in marketing margins, which is approximately ₦3,700. This suggests that cost conditions, rather than margin differences, are the main source of variation in market performance. The finding supports the principle associated with Acharya and Agarwal (2019) that an efficient marketing system should involve lower costs, effective price transmission, and minimal product losses. Overall, the evidence suggests that Yar Kutungu's superior performance is likely associated with better infrastructure, shorter or more organized marketing channels, lower transport costs, and reduced post-harvest losses. Dan Nakola, by contrast, requires improvements in rural roads, storage facilities, transport systems, market information, and the organization of marketing intermediaries. These interventions would reduce

marketing costs, improve the share of the consumer price received by farmers, and promote more balanced efficiency across the onion markets.

Table: 4 Market Efficiency

Market	FP (₦)	MC (₦)	MM (₦)	MME = FP/(MC + MM)
Yar Kutungu	74,900	23,230	33,600	1.32
Danja	74,500	24,269.12	33,200	1.29
Funtua	74,200	25,581.19	32,900	1.26
Ajiwa	73,500	28,094.64	32,200	1.21
Daura	72,600	29,239.65	31,300	1.19
Dan Nakola	71,200	30,493.54	29,900	1.17
Mean	73,480	26,818	32,183	1.24

Source: Field Study, 2025

CONCLUSION

Onion marketing in Katsina State is an important source of income and employment, but its organization and performance vary across markets. Market concentration is greater among producers and retailers than among wholesalers, indicating unequal access to supplies, customers, capital, and marketing opportunities.

Yar Kutungu was the most efficient market because farmers received higher prices and faced lower marketing costs, while Dan Nakola was the least efficient because of lower producer prices and higher costs. Although the overall marketing system was generally efficient, with an MME of 1.24, efficiency was uneven. The findings show that profitability alone does not guarantee fairness or effectiveness, since high margins may coexist with poor storage, limited credit, post-harvest losses, weak information systems, and unequal bargaining power.

The study recommends improving rural roads, transport, storage, post-harvest handling, credit facilities, market information, and cooperative organizations. It also emphasizes reducing unnecessary intermediary costs, promoting onion processing and value addition, upgrading rural-market infrastructure, supporting women and youth, and conducting further research across different seasons. These measures would reduce

marketing costs and losses, improve farmers' bargaining power, and promote a more balanced and efficient onion-marketing system.

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