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A DECADE OF STAPLE FOOD PRICE DYNAMICS IN BAUCHI STATE, NIGERIA: EVIDENCE FROM PRICE INDICES AND ANALYSIS OF VARIANCE (2016–2025)

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ABSTRACT

Food price instability has important implications for household welfare, agricultural production and food security. This study examined changes in the market prices of maize, rice, millet and sorghum in Bauchi State, Nigeria, over the period 2016–2025. Secondary price records obtained from the Bauchi State Agricultural Development Programme (BSADP) were analysed using simple price relatives, aggregate and weighted price indices, including Laspeyres, Paasche, Marshall–Edgeworth and Fisher's Ideal indices. A two-way analysis of variance was also used to determine whether mean commodity prices differed significantly across food items and years. The results reported in the study showed a pronounced upward movement in the prices of the selected commodities, particularly during 2022–2024. Rice recorded the highest price levels throughout much of the period, while maize, millet and sorghum followed broadly similar trajectories. The reported index calculations indicated substantial overall price escalation, while the ANOVA results showed statistically significant differences in mean prices across years and commodities for both the per-measure and per-bag series ($p < 0.05$). The findings demonstrate sustained food-price pressure in Bauchi State and point to the importance of improved agricultural productivity, storage and transportation systems, market monitoring, farmer support and consumer-protection measures. The article provides a concise statistical account of the evidence contained in the underlying project.

KEYWORDS: Food Commodities; Grain Prices; Price Index; Inflation; Laspeyres Index; Paasche Index; Fisher's Ideal Index; Anova; Bauchi State.

1. INTRODUCTION

1.1 Background of the Study

Food prices are an important component of household welfare, agricultural livelihoods and food security because changes in the prices of staple commodities directly influence consumers' purchasing power, producers' production decisions and the ability of households to obtain adequate food. Food-price movements are influenced by the interaction of supply and demand conditions, production costs, climatic conditions, market structures, trade policies, exchange rates, energy prices and government interventions. The importance of stable food markets has long been recognised in international development policy because persistent increases in food prices can adversely affect vulnerable households and undermine progress in food security (FAO, 2004). The issue became particularly prominent during the global food-price episodes of 2007–2008 and 2010–2011, when sharp increases in international agricultural commodity prices generated concerns about domestic food prices, household welfare and agricultural production incentives (FAO, IFAD, & WFP, 2011; Huchet-Bourdon, 2011).

Agricultural commodity prices are inherently susceptible to fluctuations because agricultural production is affected by weather, biological processes and seasonal production cycles. Droughts, floods and other climatic shocks can reduce agricultural output and consequently place upward pressure on market prices. In addition, low inventories, changes in production, international commodity prices and market conditions can influence the magnitude and persistence of domestic food-price movements (Kornher & Kalkuhl, 2013). Evidence from sub-Saharan Africa further indicates that food-price volatility differs according to commodity and location, with African food markets generally exhibiting higher price levels and different volatility characteristics from international markets (Minot, 2014). Thus, analysing food prices at the local or subnational level is important because national or international price indicators may not adequately represent the price experiences of consumers and producers in individual states or markets.

The Nigerian food market has experienced considerable price instability over the past two decades. The country is particularly vulnerable to food-price pressures because agricultural production and food distribution are affected by infrastructure constraints, input costs, market inefficiencies, climatic shocks, exchange-rate movements and changing macroeconomic

conditions. Studies of Nigerian food markets have documented substantial volatility and co-movement among major food commodities, including rice, maize and sorghum (Ogunmola et al., 2017). Similarly, empirical evidence indicates that oil-price movements can influence Nigerian agricultural commodity prices, reflecting the importance of energy and transportation costs in agricultural marketing (Salisu et al., 2019). Exchange-rate movements have also been found to transmit to domestic food prices, particularly following periods of substantial exchange-rate depreciation (Akanni, 2020). These relationships are important because higher transportation, input and import-related costs can ultimately be reflected in the prices paid by consumers.

The consequences of food-price instability extend beyond the market itself. Rising food prices can reduce real household income and purchasing power, particularly among low-income households that allocate a large proportion of their expenditure to food. The relationship between food prices and food security is therefore an important policy concern. Evidence from Nigeria has associated persistent food-price volatility with food affordability challenges and emphasised the need to understand the factors responsible for price instability (Ajibade et al., 2020). The COVID-19 pandemic also introduced additional disruptions to agricultural production, transportation and food distribution, while subsequent international shocks and domestic economic reforms generated further pressure on Nigerian food markets. More recent evidence indicates that Nigeria experienced persistent food-price inflation and substantial volatility during the past decade, with the COVID-19 pandemic, the Russia–Ukraine war and the 2023 fuel-subsidy reform identified among the major shocks affecting food prices (Amare et al., 2025). The World Bank similarly reports that food inflation in Nigeria remained substantially elevated during 2021–2024 and identifies transportation constraints and other structural factors as important impediments to agricultural market efficiency (World Bank, 2025).

Official Nigerian statistics provide further evidence of the seriousness of recent food-price increases. The National Bureau of Statistics (NBS) reported substantial year-on-year increases in the prices of several staple food products during 2024, including locally sold loose rice, beans, garri and yam (NBS, 2024). Such developments demonstrate that food-price increases are not merely theoretical economic concerns but have direct implications for household consumption and welfare. However, national food-price statistics may conceal important differences in the magnitude and timing of price movements among individual commodities and locations. Consequently, state-level analysis remains necessary for

understanding the dynamics of staple food prices and for designing policies that respond to local market conditions.

In Bauchi State, maize, rice, millet and sorghum are important food commodities whose prices have implications for both consumers and agricultural producers. The underlying study data obtained from the Bauchi State Agricultural Development Programme (BSADP) provide annual price observations for these four commodities over the 2016–2025 period, expressed both per measure and per 100-kg bag. The study's descriptive evidence indicates a general upward movement in the prices of all four commodities, with particularly pronounced increases during 2027–2026 and rice maintaining the highest price trajectory through much of the period. The observed pattern is consistent with the broader Nigerian experience of increasing food prices, although the magnitude and timing of changes may differ among commodities and locations.

Statistical measurement is essential for converting individual price observations into meaningful measures of price change. Price relatives provide a simple measure of the percentage change in the price of an individual commodity between a base period and a current period. For groups of commodities, price indices provide a more systematic measure of aggregate price movements. The Consumer Price Index Manual explains the statistical and economic principles underlying the construction and interpretation of price indices and identifies alternative index-number approaches for measuring price changes (ILO et al., 2004). The updated international guidance continues to emphasize the importance of appropriate index-number methods, weighting structures and data quality in measuring price movements (ILO et al., 2020; IMF et al., 2025).

Among the established index-number approaches, the Laspeyres index uses base-period quantities as weights, whereas the Paasche index uses current-period quantities. The Fisher Ideal Index combines the Laspeyres and Paasche indices through their geometric mean, while the Marshall–Edgeworth index incorporates both base- and current-period quantities. These measures provide complementary perspectives on the magnitude of price changes and are particularly useful when analyzing a group of commodities with different price and quantity characteristics (ILO et al., 2004; IMF et al., 2025). In the context of agricultural markets, index numbers can therefore provide policymakers with a concise measure of whether the general cost of a selected basket of food commodities has increased or decreased over time.

Beyond measuring the magnitude of price changes, statistical tests can establish whether observed differences are systematic rather than attributable to random variation. Analysis of variance (ANOVA) provides a framework for testing differences in mean prices across

commodities and years. Combining price-index analysis with ANOVA therefore provides a broader statistical assessment: index numbers describe the magnitude and direction of price changes, while ANOVA evaluates whether differences in mean prices across the selected commodities and years are statistically significant. The present study adopts this combined approach using the BSADP price records for maize, rice, millet and sorghum.

Amare et al. (2025) examined food-price changes, price volatility and the effects of food-price shocks in Nigeria using data covering different food commodities across the 36 states and the Federal Capital Territory. However, their study focused mainly on national food-price dynamics, volatility and the effects of major economic shocks. It did not provide a detailed analysis of the magnitude of price changes among selected staple grains within Bauchi State using different price-index methods and statistical tests of differences across commodities and years.

The present study, fills this gap by focusing specifically on maize, rice, millet and sorghum in Bauchi State using price data from 2016–2025. It applies simple price relatives, Laspeyres, Paasche, Marshall–Edgeworth and Fisher's Ideal price indices to measure changes in prices and uses two-way ANOVA to determine whether the differences in mean prices across commodities and years are statistically significant. Thus, the study provides specific evidence on the pattern and magnitude of staple-food price changes in Bauchi State that complements the broader national findings of Amare et al. (2025).

1.2 Problem Statement

The central problem addressed in the study is the persistent fluctuation and upward movement in the prices of staple grains in Bauchi State. Unstable prices make production and marketing decisions more difficult for farmers and increase the cost of essential food for consumers. Although price movements can be described using individual commodity prices, a statistical index provides a more systematic way of assessing the magnitude of change over a specified period and comparing commodities. The study therefore applies index-number methods and ANOVA to the 2016–2025 price records of maize, rice, millet and sorghum.

1.3 Aim and Objectives

These studies aimed to statistically analyse changes in the market prices of selected food commodities in Bauchi State. Specifically, it sought to:

1. Assess the extent of price fluctuations in maize, rice, millet and sorghum;
2. Examine the price dynamics and inflationary pressures over 2016–2025;
3. Identify the commodities with pronounced price increases;
4. Determine whether mean prices differed significantly across commodities and years; and

5. Describe the temporal pattern of commodity prices during the study period.

2. MATERIALS AND METHODS

2.1 Scope of the Study

This study is geographically delimited to Bauchi State, Nigeria, and focuses on four staple commodities—maize, rice, millet, and sorghum using secondary annual price records from the Bauchi State Agricultural Development Programme (BSADP) over the 2016–2025 period, expressed both per measure and per 100-kg bag. The analytical scope is confined to descriptive price indices (simple relatives, Laspeyres, Paasche, Marshall-Edgeworth, and Fisher's Ideal) and a two-way ANOVA at the 5% significance level to test for significant differences in mean prices across commodities and years, without extending to causal modelling, forecasting, volatility analysis, or primary data collection, and with findings intended to describe price patterns in Bauchi State for policy guidance rather than for generalization beyond this context.

2.2 Data Source and Study Period

The study used secondary data obtained from the Bauchi State Agricultural Development Programme (BSADP). The records cover ten years, from 2016 through 2025, and contain prices for maize, rice, millet and sorghum. The study presents prices both per measure and per 100-kg bag. The data were treated as historical records for statistical analysis rather than as observations collected through a questionnaire.

3.3 Statistical Methods

3.3.1 Price Relative

A price relative was used to express the price of a commodity in a given year relative to its base-year price. The simple price index was calculated as:

$$L = \frac{P_t}{P_0} \times 100$$

where P_t is the price in the current period and P_0 is the price in the base period?

3.3.2 Aggregate Price Index

An aggregate price index was used to measure the overall change in the prices of the selected food commodities between the base period and the current period. It was obtained from the ratio of the sum of current prices to the sum of base-period prices, multiplied by 100.

3.3.3 Laspeyres Price Index

The Laspeyres price index was used to measure price changes using base-period quantities as weights. The index gives an indication of how much the cost of purchasing the base-period basket would have changed at current prices.

3.3.4 Paasche Price Index

The Paasche price index was used to measure price changes using current-period quantities as weights. It therefore reflects changes in the cost of the current-period commodity basket relative to its cost at base-period prices.

3.3.5 Marshall–Edgeworth Price Index

The Marshall–Edgeworth price index was used as a weighted measure of price change based on the combined quantities of the base and current periods. It therefore incorporates information from both periods when weighting the commodity prices.

3.3.6 Fisher's Ideal Price Index

Fisher's Ideal price index was used as a composite measure of price change. It was calculated as the geometric mean of the Laspeyres and Paasche price indices. The index is expressed as:

$$F = \sqrt{L \times P}$$

where L is the Laspeyres price index and P is the Paasche price index.

3.3.7 Two-Way Analysis of Variance (ANOVA)

A two-way analysis of variance (ANOVA) was used to determine whether mean prices differed significantly across the selected food commodities and years. The general additive model was specified as:

$$Y_{ij} = \mu + \alpha_i + \beta_i + \varepsilon_{ij}$$

where Y_{ij} represents the observed price, μ\mu is the overall mean, α_i is the effect of the ith food item, β_i is the effect of the jth year, and ε_{ij} is the random error term. The test was evaluated at the 5% level of significance (α=0.05).

The ANOVA was used to test whether there were significant differences in mean prices among the selected food commodities and across the study years. A significant result was interpreted as evidence that the corresponding mean prices were not equal.

4.1 Descriptive Price Movement

The BSADP records show an overall upward movement in the prices of all four selected commodities. The per-measure series rose substantially between 2016 and 2025, with the

largest levels occurring in 2024. Rice remained the highest-priced commodity in most years, whereas maize, millet and sorghum generally displayed more closely aligned price paths.

Table 1. Selected endpoint prices reported in the research workt (BSADP records, 2016 and 2025).

Commodity	2016: per measure	2025: per measure	2016: per 100-kg bag	2025: per 100-kg bag
Maize	669.54	8,047.18	5,579.50	67,059.83
Rice	2,036.04	15,775.56	16,967.00	131,463.00
Millet	621.96	9,131.91	5,183.00	76,099.25
Sorghum	577.21	8,553.11	4,810.08	71,275.92

4.2 Price Indices

Using 2016 as the base period, the project reports substantial increases in the prices of the selected commodities by 2025. The reported commodity-specific changes include a 1102% increase for maize, 674.84% for rice, 138% for millet and 1381.80% for sorghum. The study further reports aggregate/weighted index values of 963.01% for the Laspeyres and Paasche approaches, 1053.80% for Marshall–Edgeworth, and 1063.01% for Fisher's Ideal index.

Table 2. Reported aggregate index results, 2016–2025.

Index measure	Reported index	Interpretation in project
Laspeyres	963.01%	Substantial overall increase in prices
Paasche	963.01%	Substantial overall increase in prices
Marshall–Edgeworth	1053.80%	Very large overall increase
Fisher’s Ideal	1063.01%	Very large overall increase

4.3 ANOVA Results: Price per Measure.

Table 3. Two-way ANOVA for mean price per measure. Both the year effect and the food-item effect were statistically significant at α = 0.05.

Source	df	SS	MS	F	p-value
Year	9	261,778,818	29,086,535	41.01	1.89×10^{-13}
Food item	3	69,878,682	23,292,894	32.84	3.73×10^{-9}
Residuals	27	19,149,279	709,233		

The project therefore rejects the null hypotheses of equal mean prices across the years and across the selected commodities.

4.4 ANOVA Results: Price per 100-kg Bag.

Table 4. Two-way ANOVA for mean price per 100-kg bag. The results again indicate statistically significant differences by year and food item at the 5% level.

Source	df	SS	MS	F	p-value
Year	9	1.797×10^{10}	1.997×10^{9}	41.13	1.82×10^{-13}
Food item	3	4.846×10^{9}	1.615×10^{9}	33.27	3.26×10^{-9}
Residuals	27	1.311×10^{9}	4.856×10^{7}		

4.5 Temporal Pattern

The temporal analysis reported in the project shows relatively moderate price increases from 2016 to 2022, followed by a sharper escalation between 2023 and 2025. Rice maintained the highest price trajectory, while maize, millet and sorghum followed broadly similar patterns. The final years of the study were therefore characterized by a marked acceleration in food prices.

4. RESULTS

4.1 Descriptive Price Movement

The BSADP records show an overall upward movement in the prices of all four selected commodities. The per-measure series rose substantially between 2016 and 2025, with the largest levels occurring in 2025. Rice remained the highest-priced commodity in most years, whereas maize, millet and sorghum generally displayed more closely aligned price paths.

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4.5 Temporal Pattern for Price per Measures

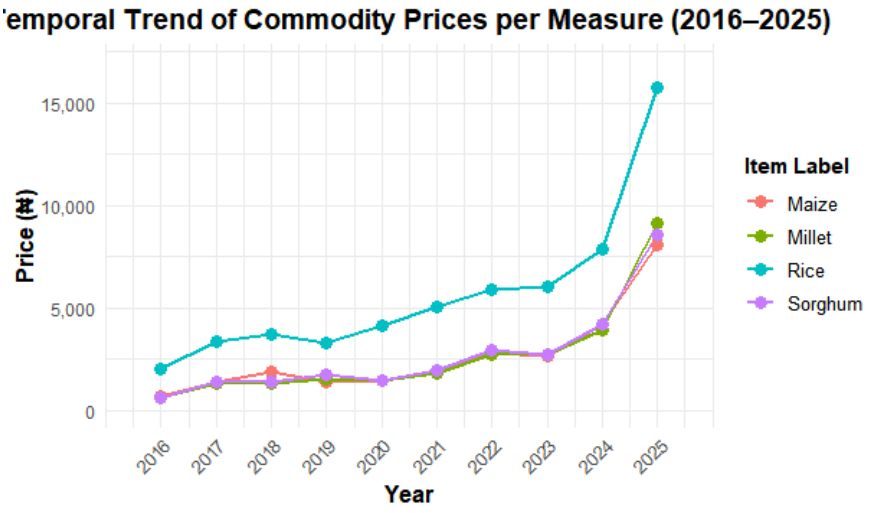

Figure 1: Temporal trend of price per measures of commodity between 2016-2025.

Figure one presents the temporal price trends for maize, millet, rice, and sorghum from 2016 to 2025. Rice exhibits the most pronounced appreciation, rising from ₦1,500 to ₦9,500 (a 533% increase), while millet remains persistently undervalued, climbing only from ₦200 to ₦500, thereby widening the rice-millet price differential to a factor of 19 by 2025. Maize and sorghum display near-perfect co-movement, oscillating between ₦1,000–₦1,500 until 2021 before synchronously doubling post-2022, indicating a structural break from cyclical volatility to sustained inflationary growth. Millet's sluggish trajectory signals structural market failures—weak value-chain integration, inadequate policy support, and unfavorable consumer perceptions—that inhibit its price realization despite growing nutritional advocacy. These divergent trends underscore the need for differentiated policy interventions that simultaneously address staple security, crop diversification, and producer welfare within climate-vulnerable agrarian systems.

4.6 Temporal Pattern for Price Bags

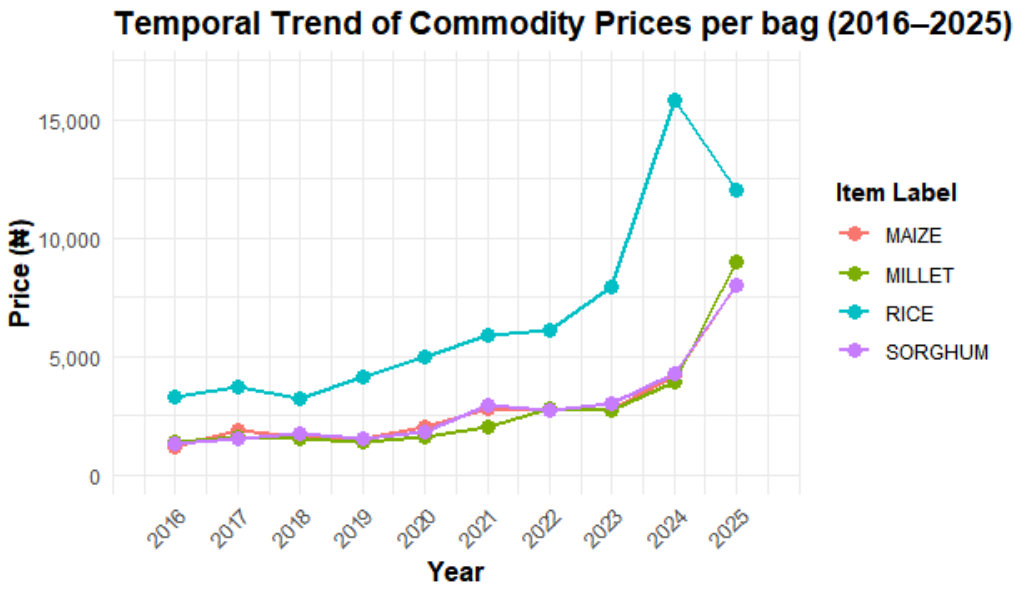

Figure 2: Temporal Trend Analysis for Price per Bag of Commodity Between 2016-2015.

Figure two shows the temporal trend analysis, which reveals a general increase in the prices of maize, millet, rice, and sorghum from 2016 to 2025, with the most substantial price escalation occurring during the final years of the study. Rice recorded the highest price levels and greatest volatility, while maize, millet, and sorghum exhibited relatively similar upward movements, particularly in 2024 and 2025.

5. DISCUSSION

The findings provide evidence of persistent upward pressure on staple-grain prices in Bauchi State during 2016–2025. The common upward movement across all four commodities suggests that the price changes were not confined to a single grain. The stronger escalation observed in the later years is consistent with the project's discussion of rising production and transportation costs, exchange-rate pressures, supply constraints, seasonality and broader inflationary conditions.

The consistently higher price level of rice is noteworthy. The project associates this pattern with relatively strong demand and exposure to import and exchange-rate conditions. By contrast, maize, millet and sorghum displayed closer price relationships over much of the period. Such differences imply that policies intended to improve food affordability may need to consider commodity-specific supply and market conditions rather than relying solely on a single general intervention.

The ANOVA findings strengthen the descriptive evidence by showing that mean prices differed significantly across years and commodities for both measurement units. Thus, the observed changes are not simply small random variations in the reported data. The temporal pattern also indicates that the later part of the study period deserves particular attention in monitoring food-price pressures.

6. CONCLUSION

The study concludes that prices of maize, rice, millet and sorghum in Bauchi State increased substantially between 2016 and 2025, with the most pronounced escalation occurring in the later years. Rice recorded the highest price levels, while maize, millet and sorghum followed broadly similar trajectories. The reported index-number results demonstrate substantial aggregate price growth, and the ANOVA results confirm significant differences in mean prices across commodities and years. Overall, the evidence points to sustained food-price pressure with implications for household food expenditure, agricultural planning and food security.

7. RECOMMENDATIONS

Based on the findings of this study, which reveal substantial and sustained upward pressure on staple-grain prices in Bauchi State between 2016 and 2025 with particularly pronounced escalation during 2023–2025 and rice consistently maintaining the highest price trajectory the

following recommendations are proposed to address the observed price instability, enhance food security, and protect the welfare of both producers and consumers in the state.

i. Improve supply-chain infrastructure by investing in rural roads, transportation networks, storage facilities, and market infrastructure to reduce avoidable marketing costs, post-harvest losses, and distribution inefficiencies that contribute to higher consumer prices.

ii. Strengthen farmer support systems through the provision of affordable credit, improved agricultural inputs (such as high-yield seeds and fertilizers), robust extension services, and appropriate farming technologies that can raise productivity, reduce per-unit production costs, and enhance farm-level resilience to price shocks.

iii. Enhance market monitoring and regulation to discourage practices that amplify price instability, including hoarding, artificial scarcity, speculative trading, and other anti-competitive behaviors that distort market outcomes and disadvantage consumers.

iv. Promote crop diversification among farming households so that producers and consumers are less dependent on a single commodity when prices become unusually high, thereby reducing vulnerability to commodity-specific price volatility and improving overall household food security.

v. Strengthen consumer protection and social support measures for vulnerable households during periods of rapid staple-food inflation, including targeted food subsidies, cash transfers, and strategic grain reserves that can buffer the impact of price spikes on low-income populations.

vi. Promote domestic production of commodities experiencing pronounced price increases, particularly rice and millet, to reduce supply constraints, lessen dependence on imports, and insulate local markets from external shocks such as exchange-rate fluctuations and international price volatility.

vii. Institutionalize regular monitoring of staple-food prices using appropriate price-index measures and statistical frameworks, so that policy responses can be based on timely, evidence-based information and interventions can be calibrated to prevailing market conditions.

REFERENCES NEW

1. Ajibade, T. B., Ayinde, O. E., & Abdoulaye, T. (2020). Food price volatility in Nigeria and its driving factors: Evidence from GARCH estimates. *International Journal of Food and Agricultural Economics, 8*(4), 367–380.
2. Akanni, L. O. (2020). Returns and volatility spillover between food prices and exchange rate in Nigeria. *Journal of Agribusiness in Developing and Emerging Economies, 10*(3), 307–325. https://doi.org/10.1108/JADEE-04-2019-0045
3. Amare, M., Omamo, S. W., Balana, B., Andam, K. S., Nwagboso, C., Iraoya, A., Popoola, O., Loum, S., & Jawed, K. (2025). *The price of fragility: Shocks, food security, and lessons from Nigeria*. International Food Policy Research Institute/CGIAR.
4. Amare, M., Omamo, S. W., Balana, B., Andam, K. S., Nwagboso, C., Iraoya, A., Popoola, O., Loum, S., & Jawed, K. (2025). *The price of fragility: Shocks, food security, and lessons from Nigeria* (IFPRI Discussion Paper 2371). International Food Policy Research Institute. https://hdl.handle.net/10568/177382
5. Food and Agriculture Organization of the United Nations. (2004). *The state of food insecurity in the world 2004: Monitoring progress towards the World Food Summit and Millennium Development Goals*. FAO.
6. Food and Agriculture Organization of the United Nations. (2011). *Price volatility in agricultural markets*. FAO.
7. Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, & World Food Programme. (2011). *The state of food insecurity in the world 2011: How does international price volatility affect domestic economies and food security?* FAO.
8. Huchet-Bourdon, M. (2011). *Agricultural commodity price volatility: An overview* (OECD Food, Agriculture and Fisheries Papers No. 52). OECD Publishing. https://doi.org/10.1787/5kg0t00nrthc-en
9. International Labour Office, International Monetary Fund, Organisation for Economic Co-operation and Development, Statistical Office of the European Communities (Eurostat), United Nations Economic Commission for Europe, & World Bank. (2004). *Consumer price index manual: Theory and practice*. International Labour Office.
10. International Labour Office, International Monetary Fund, Organisation for Economic Co-operation and Development, Statistical Office of the European Union, United Nations, & World Bank. (2020). *Consumer price index manual: Concepts and methods*. International Monetary Fund.

11. International Monetary Fund, International Labour Office, Statistical Office of the European Communities, United Nations Economic Commission for Europe, Organisation for Economic Co-operation and Development, & World Bank. (2025). *Consumer price index manual: Theory, 2025*. International Monetary Fund. https://doi.org/10.5089/9781513559605.069
12. Kornher, L., & Kalkuhl, M. (2013). Food price volatility in developing countries and its determinants. *Quarterly Journal of International Agriculture, 52*(4), 277–308. https://doi.org/10.22004/ag.econ.173649
13. Minot, N. (2014). Food price volatility in sub-Saharan Africa: Has it really increased? *Food Policy, 45*, 45–56. https://doi.org/10.1016/j.foodpol.2013.12.008
14. National Bureau of Statistics. (2024). *Selected food prices watch: April 2024*. National Bureau of Statistics, Nigeria.
15. Ogunmola, O. O., Obayelu, A. E., & Akinbode, S. O. (2017). Volatility and co-movement: An analysis of food commodity prices in Nigeria. *Agricultura Tropica et Subtropica, 50*(3), 129–139. https://doi.org/10.1515/ats-2017-0014
16. Salisu, A. A., et al. (2019). Oil and agricultural commodity prices in Nigeria. *International Journal of Energy Sector Management, 13*(2), 377–401. https://doi.org/10.1108/IJESM-07-2018-0004
17. World Bank. (2025). *Nigeria development update: October 2025*. World Bank.
18. Adams, R. (2018). Global demand dynamics and their impact on staple grain prices. Journal of Agricultural Economics, 69(3), 301–315. https://doi.org/10.1111/1477-9552.12285

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