

## Analysis of Food Price Indices and Inflation Rate in Nigeria

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### ABSTRACT

This study investigates the relationship between food price indices and inflation in Nigeria, highlighting the significant impact of food price volatility on inflation and economic stability. Annual data from 2008 to 2024 sourced from the Food and Agriculture Organization (FAO) and the Central Bank of Nigeria was used for the analysis. Descriptive analytical tools, multiple linear regression, and time series models were used for the findings. Results showed that the trend of food was upward from 2021, there was significant reduction in the consumption of meat and dairy as revealed by negative skewness of their price indices and the significant difference from the regression outcomes. The findings highlight the importance of addressing price fluctuations to enhance economic resilience and mitigate rising inflation, particularly in a predominantly agrarian economy like Nigeria.

**Keywords:** food price indices, trend, inflation rate, stationarity, arima

### 1.0 INTRODUCTION

Inflation remains a persistent economic challenge globally, with its impact particularly intense in Nigeria due to rapid population growth and economic instability. A key driver of inflation is the fluctuation in the prices of goods and essential services. Given that over half of Nigeria's population is engaged in agriculture and a significant portion of household expenditure is allocated to food, changes in food prices profoundly influence overall inflation. Understanding this relationship is crucial for formulating policies aimed at economic stability. Accordingly, global food price fluctuations and supply chain disruptions have been shown to influence domestic food prices, further exacerbating inflationary pressures (Gordon & Clark, 2023), hence the need for accurate inflation forecasting is essential for effective policymaking to mitigate inflationary pressures (Hernandab *et al.*, 2022). According to the National Bureau of Statistics (NBS), the food component of the Consumer Price Index (CPI) significantly influences inflation calculations. Nigeria's agrarian economy is highly vulnerable to fluctuations caused by weather patterns (Kakpo *et al.*, 2022), households farm income (Oukor and Odiwuor, 2023), and market inefficiencies (Ayinuola and Gumel, 2023). External factors such as exchange rate volatility (Shehu *et al.*, 2019, Umaimah and Umar, 2022) and global commodity price movements also contribute to domestic food price instability (Aye *et al.*, 2024).

Inflation is one of the most important economic variables that can distort economic activities of any country (Henry and Sabo, 2020). The causes of inflation can be demand-pull, cost-push or import-induced and it

is region dependent. Various factors contribute to rising inflation and food prices, making it essential to examine them to determine appropriate mitigation strategies. Cost-push inflation occurs when the total supply of goods and services decline due to rising production costs while demand-pull inflation initially benefits businesses by increasing revenue, enabling expansion and job creation but in the long term, erodes consumers' purchasing power and lowers their standard of living (Okon *et al.*, 2023).

Household budgets become constrained when food costs rise faster than income. Food prices are inherently volatile due to consistent demand and unstable agricultural production. However, food prices in Nigeria in recent years have surged, reaching an all-time high in history due to banditry, supply shortages and increased input and labour costs. Volatility, often defined as uncertainty or risk in price fluctuations, is a key characteristic of food price movements (Hayes, 2024). Agricultural prices fluctuate due to variations in production and consumption. Economists distinguish between predictable and unpredictable variability, with the latter often resulting from shocks driven by changes in production and consumption patterns typically influenced by weather changes (Liontakis, 2011).

The underlying drivers of high and volatile global food prices can be categorized into exogenous and endogenous factors. To better understand these price dynamics, researchers have classified the causes into root, intermediate, and immediate factors (Von Braun and Gebreyohanes, 2012). Exchange rate volatility has been shown to significantly impact agribusiness,



although Nigeria depends on food imports to meet its food demand (Ngassam, 2025) the extent to which exchange rate and money supply (Ezeanyeji, *et al.*, 2019) fluctuations affect food price movements remains a subject of debate.

Additionally, transaction costs such as transportation expenses and trade barriers, including tariffs and quotas, hinder price transmission. Existing research offers varying conclusions regarding the extent of price transmission, depending on domestic market conditions, crop types, and international reference prices (Kalkuhl *et al.*, 2016).

This study assess the trend and relationship of food price indices and inflation in Nigeria, forecast future food prices using Consumer Price Index (CPI) food data. Relationship between food prices and inflation in Nigeria is crucial for policymakers due to the pivotal role in household consumption. Additionally, as Africa’s most populous country, Nigeria’s food price-driven inflation has significant regional and global economic implications (Gilbert & Morgan, 2010).

**2.0 RESEARCH METHODOLOGY AND DATA**

**2.1 Methodology**

The data used for the analysis was collected from the Food and Agricultural Organization for United Nation and Central Bank of Nigeria from the year 2008 to the year 2024. The data collected are records of the Food Price Index, Meat Price Index, Oils Price Index, Cereal Price Index, Sugar Price Index, Dairy Price Index, and Inflation rate. They are the necessary records needed for the purpose of the study. Descriptive analysis, Multiple linear regression and Time series are the analysis types that were used in this research study.

**2.1.1 Trend Analysis**

Trend analysis is an analytical method that is commonly used to interpret any pattern in a set of data. It is widely used in the field of economics, finance, marketing, etc. In this method, analysts the direction and amount change that takes place to take informed decisions or make predictions.

**2.1.2 Stationarity Test**

**3.0 RESULTS**

**3.1 Descriptive Analysis**

A time series is stationary if there is no systematic change in mean (no trend), variances and strictly periodic variations have been removed. In other words, when the value of time origin, n is increased, the change will not affect the joint distribution which must depend on the interval.

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum \alpha \Delta m \ i=1 \ Y_{t-1} + \epsilon_t \dots\dots\dots 1$$

where  $\epsilon_t$  is a pure white noise error term and where  $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$ ,  $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$ , etc

**2.1.3 Forecasting**

Forecasting is the process of making predictions based on past and present data. Later these can be compared against what happens. A time series process formed from the combination of the Autoregressive process, AR, and Moving Average processes, MA called Autoregressive Moving average process of order p, q is called an ARIMA process if it contains (p) AR terminals, (d) differencing and (q) MA terminals. This is a fact that a stationary time series process may often be defined as an ARIMA process which involves fewer parameters than AR and MA. Stationary  $X_t$  satisfies the ARIMA process of order (p, d, q) abbreviated as ARIMA (p, d, q) if:

$$Y_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \beta_3 X_{t-3} + \dots + \beta_p X_{t-p} + \epsilon_t - \theta_1 \epsilon_{t-1} - \theta_2 \epsilon_{t-2} - \theta_3 \epsilon_{t-3} - \dots - \theta_q \epsilon_{t-q} \dots\dots\dots 2$$

**2.1.4 Regression Analysis**

**Model Specification**

In the model, Inflation Rate is the dependent variable while Food Price Index, Meat Price Index, Dairy Price Index, Cereal Price Index, Oil Price Index and Sugar Price index are the independent variables. The statistical formulation of the model can therefore be presented as follows:

The Multiple linear regression model used in this study is specified as follows:

$$IR = \beta_0 + \beta_1 FPI + \beta_2 MPI + \beta_3 DPI + \beta_4 CPI + \beta_5 OPI + \epsilon \dots\dots\dots 3$$

where: IR = Inflation Rate,  $\beta_0$  = Intercept,  $\beta_1 - \beta_5$  = Coefficient of the respective variables, FPI = Food Price Index, MPI = Meat Price Index, DPI = Dairy Price Index, CPI = Cereal Price Index, OPI = Oil Price Index,  $\epsilon$  = Error term

**Table 1: Descriptive Statistics of Inflation Rate and Food Variables**

Variables	n	Min	Max	Mean	Std. Dev	Skewness
Food Price Indices	17	91.6	144.7	111.3	16.2	0.336
Meat Price Indices	17	81.2	118.8	101.4	10.5	-0.009
Dairy Price Indices	17	82.6	149.5	115.0	18.8	-0.022
Cereals Price Indices	17	88.3	154.7	116.1	20.5	0.313



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Oils Price Indices	17	83.2	187.8	120.7	29.6	0.775
Sugar Price Indices	17	77.4	160.9	109.2	24.9	0.379
Inflation Rate	17	8.1%	32.2%	14.6%	6.1%	1.753

Table 1 shows food variables and inflation rate from 2008 to 2024. Oil price indices had the highest average of 120.7 with highest variability of 29.6 followed by cereals price indices. The negative skewness of meat price and dairy price indices showed that the consumption pattern for both have dropped significantly; indicating that people no longer see both as necessity but as a luxury. The moderate spread of 6.1% and highest skewness of 1.753 for inflation rate showed a steadily increasing outcome.

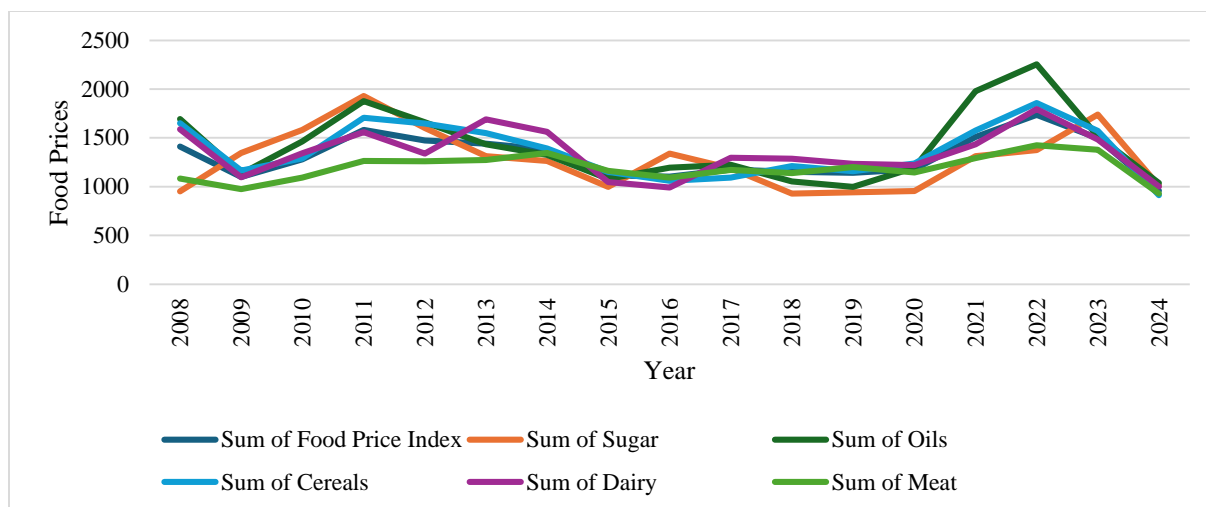


Fig. 1. Trend of various food price indices from 2008 to 2024

Figure 1 illustrates the trend for all food variables. The pattern showed a unique joint movement with highest values in 2022 for all food variables.

Table 2: Stationarity Test

Variables	Dickey-Fuller Test	P-Value
Food price	-2.9147	0.193
Meat price	-2.2095	0.488
Dairy price	-3.7738	0.022
Cereals price	-3.0613	0.132
Oils price	-3.2887	0.075
Sugar price	-2.9024	0.198

A stationarity test was carried out on food prices to check if a time series analysis can be carried out on them using the Dickey-Fuller Test at p-value 0.05(5%) in Table 2. Stationarity indicates that a series has consistent statistical properties over time, while non-stationarity implies changes in properties such as mean and variance. A p-value below 0.05 suggests stationarity, while a p-value above 0.05 indicates non-stationarity.

The results show that the dairy price series is stationary. This means its statistical properties remain consistent over time. Conversely, the food price, meat price, cereals price, oils price, and sugar price series all exhibit non-stationarity, with p-values above 0.05.

Table 3: Time Series Analysis

Variables	Model	RMSE	MAE	MAPE	AIC	BIC	Log Likelihood
Food Price	ARIMA 1,1,0	2.903	1.985	1.756	994.26	1000.8	-495.13



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Meat Price	ARIMA4,1,2 with drift	1.790	1.362	1.351	814.83	840.41	-399.03
Dairy Price	ARIMA 2,0,2	3.257	2.499	2.234	1056.27	1076.06	-522.13
Cereals Price	ARIMA 1,1,0	4.843	3.342	2.783	1197.7	1204.29	-596.85
Oils Price	ARIMA 1,1,0	7.924	5.188	4.103	1393.66	1400.25	-694.83
Sugar Price	ARIMA 0,1,1	7.714	5.482	5.003	1382.98	1389.57	-689.49

Table 3 showed the following findings:

1. The second column presents the different specifications of models that worked for each variable under this study.
  - i) ARIMA 1,1,0 implies 1 autoregressive term, 1 differential order and 0 moving average terms.
  - ii) ARIMA 4,1,2 with drift implies 4 autoregressive terms, 1 differential order and 2 moving average terms.
  - iii) ARIMA 2,0,2 also indicates 2 autoregressive terms, 0 differential order and 2 moving average terms.
  - iv) ARIMA 0,1,1 shows 0 autoregressive terms, 1 differential order and 1 moving average term.
2. RMSE, MAE, MAPE are all training set error measures, with values showing optimal performance.
3. AIC, BIC and LOG LIKELIHOOD are model fit statistics with reasonably low values showing better fit.

**Table 4: Regression Results**

Variables	Estimates	Std. Error	t value	Pr(> t )
Food Price	0.5764	3.3793	1.057	0.2918
Meat Price	0.0446	0.2073	2.781	0.0060
Cereals	0.3112	0.0866	0.515	0.6071
Oils	0.0195	0.0453	-0.431	0.6673
Dairy	-0.1069	0.0370	-2.886	0.0043

Intercept: -3.5725, R-Squared: 0.815, P-value: 1.51e-12

The R-square depicts that about 81.5% of the variation in the dependent variable is explained by the independent variables while the percentage of unexplained is due to the presence of stochastic error term. The p-value (1.51e-12) shows that the independent variables jointly affect inflation rate (the dependent variable). The effect of price of all the food variables on inflation rate are not significantly different except for meat and dairy prices.

#### 4.0 CONCLUSION

This study investigates the relationship between food prices and inflation in Nigeria from 2008 to 2024, emphasizing the critical role of food price fluctuations in shaping inflation trends. Through descriptive analysis, multiple linear regression, and time-series models, the findings showed that the trend of food was upward from 2021, there was significant reduction in the consumption of meat and dairy as shown by negative skewness of their price indices and the significant difference from the regression outcomes.

In an economy heavily dependent on rainfed agriculture, where food accounts for a significant portion of household expenses, price volatility presents serious challenges to economic stability and household

welfare. The findings highlight the importance of implementing focused strategies to stabilize food prices and reduce their impact on inflation and livelihoods. The focused strategies include but not limited to policy stability such as subsidies, irrigation investment and price stabilization measures; supply chain efficiency such as reduced transportation and enhanced price control; inflation control measures such as economy diversification and adjustment of monetary policies and data management that enhance monitoring and targeted interventions.

#### REFERENCES

Aye, G. C., Edoja, P. E., Enwa, S., Gupta, R. and Eshoforen, E. (2024). Role of Inflation and Exchange Rates in Shaping the Country's Food Security Landscape: Nigeria's Food Price Puzzle. *Journal of Applied Business Research*, 40, 87-100.

Ayinuola, T. F. (2023). Investigating the Impact of Inflation and Other Macroeconomic Variables on Stock Returns in Nigeria. *Asian Journal of Economics, Business and Accounting*, 23(14), 8-26, Article no. AJEBA.99927 ISSN: 2456-639X

Basu, K. (2011). Understanding inflation and controlling it. IAMR Occasional Paper No.



- 1/2011, (pp. 3-28). Ministry of Finance, Government of India.
- Central Bank of Nigeria. (n.d.). Database on inflation. Inflation | Central Bank of Nigeria
- Ezeanyej, C.I., Priscilla, I. C., and Frank, E. U. (2019). Public Debt and Inflation in Nigeria: An econometric analysis. *Int J Appl Res*, 5(3): 219-224
- Food and Agriculture Organization of the United Nations. (n.d.). FAO Food Price Index | Food and Agriculture Organization of the United Nations
- Gilbert, C. L., & Morgan, C. W. (2010). Food price volatility. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1554), 3023–3034.
- Gordon, M. V., & Clark, T. E. (2023). The impacts of supply chain disruptions on inflation. *Federal Reserve Bank Research*, 2023(08), 1-8.
- Gupta, S., Verhoeven, M., Gillingham, R., Schiller, C., Mansoor, A., & Cordoba, J. P. (2000). Equity and efficiency in the reform of price subsidies: A guide for policymakers. *International Monetary Fund*.
- Henry, A. E. and Sabo, A. M. (2020) "Impact of monetary policy on inflation rate in Nigeria: Vector Autoregressive Analysis," *Bullion*: 44 (4), 78-90. <https://dc.cbn.gov.ng/bullion/vol44/iss4/6>
- Hernandab, Y., Silfianic, M., & Salfinaa. (2022). Comparison of several univariate time series methods for inflation rate forecasting. *Journal of Economic Development*, 7, 82-88.
- International Food Policy Research Institute (IFPRI). (2016). How strong do global commodity prices influence domestic food prices in developing countries? A global price transmission and vulnerability mapping analysis.
- Kalkuhl, M., von Braun, J., and Torero, M. (2016). Volatile and Extreme Food Prices, Food Security, and Policy: An Overview. In: Kalkuhl, M., von Braun, J., Torero, M. (eds) *Food Price Volatility and Its Implications for Food Security and Policy*. Springer, Cham. [https://doi.org/10.1007/978-3-319-28201-5\\_1](https://doi.org/10.1007/978-3-319-28201-5_1)
- Rahmayani, Dwi & Oktavilia, Shanty & putri, phany. (2021). The Impact of Covid-19 Pandemic on Inflation in Indonesia. *Jurnal Ekonomi Pembangunan Kajian Masalah Ekonomi dan Pembangunan*. 22. 117-128. 10.23917/jep.v22i2.13861.
- Jerumeh, T. R. (2022). Nature, trends, and drivers of food price volatility in Nigeria. *European Journal of Agriculture and Food Sciences*, 4(6), 109-116.
- Kakpo, A., Mills, B. F. and Brunelin, S. (2022). Weather shocks and food price seasonality in Sub-Saharan Africa: Evidence from Niger, *Food Policy*, 112, Article 102347 <https://doi.org/10.1016/j.foodpol.2022.102347>
- Liontakis, A. (2012). Food price inflation rates in the Euro Zone: Distribution dynamics and convergence analysis. *Economics Research International*, 2012, Article ID 868216, (pp. 2-17).
- Ngassam, S. B., Douanla, S. G. and Asongu, S. A. (2025). Natural Resource and Food Import Dependence of Africa: Can Democracy Slowdown Dependence? *Sustainable Development*, 0:1–23. <https://doi.org/10.1002/sd.3326>
- Nweke, C. C., Obi, C. B., & Igweike, O. J. (2022). Russia-Ukraine war: Its impacts on food security in Africa. *Global Journal of Social Sciences Studies*, 8(2), 70-81.
- Okon, E. A., Eke, A. F., & Morgan, M. O. (2023). Inflation theory: A theoretical review of demand-pull and cost-push inflation effects on the Nigerian economy. *African Journal of Economics and Sustainable Development*, 6(3), 34-41.
- Ouko, K. O. and Odiwuor, M. O. (2023). Contributing factors to the looming food crisis insub-Saharan Africa: Opportunities for policy insight. *Cogent Social Sciences* 9: 2173716 <https://doi.org/10.1080/23311886.2023.2173716>
- Pettinger, T. (2016). Food inflation. *Economics Help*.
- Shehu, A., Abdullah, S. S., and Yau, N. A. (2019). Asymmetric Effect of Oil Shocks on Food Prices in Nigeria. A Non Linear Autoregressive Distributed Lags Analysis. *International Journal of Energy Economics and Policy*, 9(3), 128-134.
- Umamah A. U., and Umar, A. (2022). Effects of Exchange Rate on Food Inflation in Nigeria: A Non-Linear ARDL Approach. *Gusau International Journal of Management and Social Sciences*, 5 (1), 195-209
- von Braun, J., and Gebreyohanes, G. T. (2012). Global Food Price Volatility and Spikes: An Overview of Costs, Causes, and Solutions. ZEF- Discussion Papers on Development Policy No. 161, Available at SSRN: <https://ssrn.com/abstract=1992470>