

Food Inflation, Household Consumption Behaviour and Health Outcomes in Nigeria

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ABSTRACT: This study explores how rising food inflation and shifts in household consumption patterns affect health outcomes in Nigeria. Using data from the World Bank (1980–2023) and applying the Autoregressive Distributed Lag (ARDL) model, the research looks at both short- and long-term effects. Results from the unit root tests show a mix of integration levels, with GDP stationary at level, while inflation, consumption, and health outcomes become stationary after first differencing. The analysis confirms a long-run relationship between the variables. In the short term, inflation appears to slightly improve health outcomes (by 0.003%), but over time, particularly after a three-year lag; it begins to have a negative impact. Household consumption follows the opposite pattern, showing both immediate and delayed negative effects (0.005% and 0.05%). However, when food inflation and consumption patterns interact, their combined effect on health outcomes becomes more positive in the short run, 1.24%, 0.84%, and 0.44% over three years. The study also finds that changes in consumption behavior predict changes in health outcomes (Granger causality, $p = 0.0519$). These results suggest that managing food inflation and supporting better household consumption choices are vital steps toward improving public health in the long run.

KEYWORDS: Food Inflation, Household consumption Behaviour, Health Outcomes, Nigeria, ARDL model, Granger causality test, food Security, Economic Growth, Health Expenditure.

INTRODUCTION

General inflation refers to the overall rise in the price level of goods and services in an economy over a period of time. It is commonly measured by indices such as the Consumer Price Index (CPI) or the Producer Price Index (PPI). Food inflation, on the other hand, is the rate at which the prices of food items increase and is often considered a subset of general inflation (IMF, 2023). As of 2025, food inflation in Nigeria has started to ease but remains a significant concern for households across the country. For instance, the rate of food inflation declined from 39.84% in December 2024 to 23.51% in February 2025, a change largely attributed to the Central Bank of Nigeria's recent rebasing of the Consumer Price Index (Central Bank of Nigeria, 2025). Although, Nigeria has witnessed a decline in food inflation rates from highs of late 2024, the current rates still pose challenges for many households. Specifically, the country has experienced significant food price volatility from 2010 upwards until 2025. This is influenced by various economic reforms, climate events and global market dynamics. There has been moderate increase of about 10% to 15% in the level of food inflation between 2010 and 2015, whereas by the end of 2018, this rate increased to about 18%, subsequently impacting household food expenditure (National Bureau of Statistics, 2018).

In Nigeria, food expenditure accounts for around 50-60% of household spending, particularly among lower and middle-income groups (National Bureau of Statistics, 2020). This makes food inflation not only a key economic indicator but also a direct measure of the cost of living for the majority of the population. As such, spikes in food prices tend to have a disproportionate impact on both headline inflation and social welfare and particularly household consumption pattern.

Different income groups naturally have different household spending patterns. Food, housing, and clothing are among the basic necessities that are usually given priority in lower-income households. On the other hand, middle-class households are more likely to devote a larger percentage of their income to housing, healthcare, and education. In contrast, high-income households typically spend a disproportionate amount of money on luxury and non-essential items and services, like travel, entertainment, and high-end consumer goods (Chen et al., 2021; Deaton and Muellbauer, 1980). These discrepancies in consumption are caused by a number of

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factors, including variations in household income levels, dominant social and cultural norms, and general economic circumstances like inflation and instability (OECD, 2020). Furthermore, disparities in household spending are made worse by structural issues such as unequal access to financial services, on-going inflation that reduces real purchasing power, and systemic income inequality (World Bank, 2022).

One of the critical linkages is that increase in food inflation causes fall in households' capacity to purchase staple food while also reducing protein intakes. This leads to adoption of different consumption coping strategies such as postponing payment for immediate meal, dependence on fast foods, pastries and generally unhygienic road-side foods canteens which appear to be more accessible and cheaper. The aftermath of this behavior is the resultant health implications in the form of rising trend of non-communicable diseases such as stunting, obesity, cardio vascular diseases, cancer etc. (Ezeh, Nwachukwu, & Ajayi, 2023; Sadikeen, 2024) Another perspective is the rising level of malnutrition and its associate health risks among both adults and children (especially where households eat just anything readily affordable such as carbohydrate based food without getting required daily nutrients) which eventually exacerbate stress, causing mental health issues and diverse health challenges (Okafor and Adebayo, 2024).

Despite the numerous studies examining the separate relationship between food inflation and food insecurity (Olatunji, Ibrahim, & Bello 2023), food inflation and health consequences (Ezeh, et al., 2023; Sadikeen, et al 2024) and food inflation, food insecurity and economic growth (Bogmans, Pescatori and Prifti, 2024) the literature is still in dearth in Nigeria in relation to the combined interactive effect of food inflation and household consumption behaviour impacting on health outcomes. As far as we are aware and concerning Nigeria, no research has explicitly examined the interactive effect or the joint relationships between food inflation and consumption pattern on health outcomes in Nigeria. What seems related and tangential was a study on Somalia by Mohamed, Abdi & Mohamed (2024) which explored how different factors such as food price inflation, armed conflicts, and climate variability affect acute malnutrition in children. The researchers examined data from 2015 to 2022 to understand how these factors influence malnutrition both in the short and long term employing two main statistical approaches: Autoregressive Distributed Lag (ARDL) models to look at both short- and long-term effects, and a machine learning method called kernel-based regularized least squares to confirm their results. These methods allowed them to see how quickly and how strongly each factor affected malnutrition over time. In the short term, the researchers found that increases in food prices and armed conflict led to immediate rises in the number of children suffering from acute malnutrition. Sudden changes in rainfall also contributed significantly. In the long term, however, the effects became more pronounced. Food price inflation and armed conflict continued to have a lasting negative impact on child nutrition.

This study explores how food inflation and household consumption patterns together influence health outcomes in Nigeria, addressing a gap in existing research that tends to examine these issues in isolation. It makes five key contributions. First, it offers Nigeria-specific insights into how inflation has shaped food choices and health over the past four decades. Second, it expands the focus beyond undernutrition to include broader health outcomes such as obesity and chronic diseases like diabetes. Third, it highlights how households adapt to inflation—by cutting calories, switching to cheaper foods, or adjusting food baskets—offering a behavioral lens critical for policy planning. Fourth, the study covers a long historical period (1980–2022), capturing structural economic shifts, policy reforms, inflation cycles, and political changes in Nigeria. This long-term view helps reveal patterns and policy impacts that shorter studies may miss. Fifth, by applying Granger causality tests, the study provides evidence of how inflation drives changes in consumption and, over time, contributes to public health challenges. This approach complements short-term studies, such as those on conflict-related malnutrition in Somalia. Importantly, the research shows that a household's ability to adjust consumption during inflation depends heavily on income. Lower-income families, with less flexibility, face worse health outcomes, while higher-income households can adapt more easily—for instance, by cooking at home instead of eating out. These findings underscore the importance of supporting vulnerable households and designing timely, well-targeted health and food policies.

OBJECTIVES OF THE STUDY

In specific terms, the following are the set objectives for the study:

- i. To examine the dynamics of the relationship among food inflation, consumption pattern and health outcomes in Nigeria;
- ii. To investigate which of food inflation or consumption behaviour largely determines health outcomes in Nigeria and
- iii. To assess the interactive effect of food inflation and consumption pattern on health outcomes in Nigeria.
- iv. To determine whether changes in food inflation Granger-cause variations in household consumption patterns and health outcomes, and vice versa

Research Questions:

- i. What is the nature of the relationship among food inflation, household consumption patterns, and health outcomes in Nigeria?
- ii. Between food inflation and consumption behaviour, which has a greater influence on health outcomes in Nigeria?
- iii. How does the interaction between food inflation and household consumption patterns affect health outcomes in Nigeria?

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- iv. Do changes in food inflation Granger-cause variations in household consumption patterns and health outcomes, and is there evidence of causality in the reverse direction?

REVIEW OF LITERATURE

2.1 Theoretical literature

The Keynesian theory of inflation and Modern Theory of Inflation are reviewed.

2.1.1. The Keynesian theory of inflation

Keynesian theory of inflation could be considered as an extension and generalization of Wicksells view. Keynes argued that increase in aggregate demand could be as a result of an increase in real factors. According to Keynes (1936) there is inflationary gap which is the excess of planned expenditure over output available at full employment. This theory of inflation attributes rising prices mainly to excessive aggregate demand exceeding the economy's productive capacity. When demand outpaces supply, especially near full employment, prices rise, this is called demand-pull inflation. Inflation can also result from higher production costs, like wages, which firms pass on as cost-push inflation. Wage-price spirals, where rising wages and prices feed each other, further sustain inflation. Keynesians emphasize managing demand through fiscal policy to control inflation and maintain economic stability.

2.1.2. Modern theory of inflation

The modern approach to inflation on the other hand follows the Theory of Price Determination. The price theory tells us that in a competitive market, price of a commodity is determined by the market demand and the supply of the commodity and variation in the price of the commodity is caused by the variation in the demand and supply factors. Likewise, the aggregate price level is determined by the aggregate demand and aggregate supply and variation in the aggregate price level is caused by the variations in the aggregate demand and aggregate supply. The modern theory of inflation, according to Dornbusch, Fischer & Startz (2018) is, in fact, a synthesis of Classical and Keynesian Theories of Inflation. The modern analysis of inflation shows that inflation is caused by both demand-side and supply-side factors. Demand-side factors are called demand-pull factors, and supply-side factors are called supply-side or cost push factors. Accordingly, giving rise to two kinds of inflation namely: Demand-pull inflation and Cost-push inflation. The modern theory of inflation explains that inflation arises mainly when demand in the economy grows faster than supply, causing prices to rise, a concept known as demand-pull inflation. Inflation can also result from higher production costs, such as wages or raw materials, which businesses pass on to consumers, known as cost-push inflation. Expectations of future inflation play a crucial role: if people expect prices to rise, they adjust wages and prices accordingly, which can perpetuate inflation. Central banks influence inflation through monetary policy, if the money supply grows too quickly; it fuels inflation since more money chases the same goods. Ultimately, in the long run, inflation is a monetary phenomenon affecting prices but not real output. Therefore, managing inflation requires controlling money supply, aggregate demand, and inflation expectations to maintain price stability.

2.2 Empirical literature

Researchers in Nigeria have offered diverse perspectives on the causes, consequences, and dynamics of food inflation, drawing on recent data and projecting future trends. Kwode and Charity (2024), investigate the impact of food inflation on Nigeria's economy from 1990 to 2023, revealing a negative impact on economic growth and highlighting the role of foreign exchange rates, insecurity, and infrastructure in driving high food prices. They offer a strong foundation for understanding the macroeconomic dimensions of food inflation in Nigeria. Their work contributes empirical evidence on how key economic indicators such as inflation, exchange rate volatility, and GDP growth interact with food prices. Although, their work provides a thorough econometric treatment of food inflation's macroeconomic drivers from which our work benefit substantially particularly on how inflation interacts with policy instruments and structural weaknesses. The authors' acknowledgement that food inflation has affected household food choices especially the shift from protein-rich diets to cheaper, carbohydrate-based options aligns well with consumption behaviour and offers preliminary justification for studying these shifts in greater detail.

A great deal of effort has been devoted empirically in examining the impact of inflation on economic growth in Nigeria, very few studies to the best of our knowledge have attempted to examine the effect of inflation on households' consumption expenditure. Hence, in this present study, attempt was made to fill this gap by investigating the effect of inflation, households' consumption behaviour on health outcomes in Nigeria. Our study is related to empirical studies exploring the theoretical relationship among inflation expectations, consumer spending and health outcomes. The literature provides mixed evidence about this relationship. Using survey on the expenditure plan, Ichiue and Nishiguchi (2015) and Duca et al. (2018) show evidence supporting the predictions of the standard models: consumers expecting higher inflation tend to increase current spending. Ehrmann et al. (2017) and D'Acunto (2015) explore the relationship between inflation expectations and consumer attitudes to spending and show also results in line with the predictions of macroeconomic theory (Muth, (1961).

In a groundbreaking study, Headey and Ruel (2023) examined data from 1.27 million preschoolers in 44 developing nations. According to their research, children were at a 14% increased risk of severe wasting and a 9% increased risk of wasting for every 5% increase in real food prices. Significantly, the hazards were higher for younger children, suggesting that declining maternal

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nutrition during inflationary times may have prenatal consequences. A disproportionate number of vulnerable groups were impacted, namely male children and children from rural, low-income, landless homes. These results highlight the urgent need for focused measures to safeguard infants throughout the first 1,000 days of life, a vital time for development and growth.

A study conducted in Bangladesh by Sadikeen et al. (2024) looked at the connection between stunting in children under five and inflation in food prices. The researchers discovered a substantial adverse effect, with rising stunting rates being a result of rising food prices. This demonstrates how food inflation has wider effects on children's health and how crucial it is to take economic considerations into account when developing nutrition plans.

Ezeh et al. (2023) investigated the impact of food price inflation on child malnutrition using data from the Nigeria Demographic and Health Survey. According to their findings, there is a strong correlation between rising food prices and higher rates of child wasting and stunting, especially in rural areas. Food inflation, according to the authors, lowers household purchasing power, which results in a lower-quality and quantity diet, especially for vulnerable rural families who rely on market purchases for their food. During crucial stages of growth, this dietary deprivation increases vulnerability to infectious illnesses and causes long-term health problems.

In keeping with the current study's emphasis on health outcomes, this study offers insightful information about the direct effects of food inflation on child health outcomes.

Similarly, Okafor and Adebayo (2024) looked into the relationship between adult health outcomes in Nigeria and the volatility of food prices. Inflation-driven consumption of cheaper, energy-dense processed foods is linked to rising obesity rates, particularly among urban women, while higher prices of nutrient-dense foods like eggs, fish, and vegetables are associated with increased undernutrition, according to their study. However, the study did not examine economic trade-offs or household decision-making processes, nor did it analyze long-term inflationary pressures and geographical differences. This study examines behavioral responses to inflation (e.g., lowering food variety, skipping meals, and prioritizing calories over nutrition) and captures regional and socioeconomic disparities in both urban and rural households.

Numerous studies have submitted that dietary consumption and eating habits are significant predictors of non-communicable diseases (NCDs) such as obesity, cardiovascular diseases (CVD), diabetes, and cancer are among the NCDs that have been linked to dietary intakes such as fruits, vegetables, processed meat, and trans fat (Rosario, Duong and Fronteira, 2023). Again, there is a relationship between diet quality and healthy eating attitudes and behaviors. Improving diet quality, promoting healthy eating attitudes, and educating individuals on regulating eating behaviors may enhance success in diabetes treatment Qzkar, et- al (2025). Moreover, given the rapid changes in urbanization and economic development, especially in the era of Covid-19 pandemic, food consumption behaviors have changed remarkably.

Additionally, shocks like the pandemic are believed to have created financial instability that directly affects purchasing power, which in turn has led to a rise in the consumption of ultra-processed foods because of their high availability and cheaper price (Scimago Institutions Rankings, 2023). These elements have greatly exacerbated food insecurity, which has a detrimental impact on people's quality of life. In many instances, there is no correlation between increased food expenditure and improved health (Tumin, Tumin and Nau, 2012).

Consumption patterns contain a lot of information for analysing the welfare conditions of any populace. An expansion in consumption expenditure is often indicative of national economic prosperity while a contraction often indicates a recessive economy. It is therefore a good measure of national and household economic health status (Kolawole, 2024). For developing and low-income nations, the financial strain of health care costs is a major worry. According to studies, a few fundamental reasons why citizens in these nations bear a heavy financial burden are the low level of public investment in health, the absence of sufficient safety net mechanisms, and the subpar public health system. Poor people use a variety of alternate methods to make ends meet while they are ill. Reducing or reallocating the consumption bundle to cover medical expenses is one of the commonly used tactics. Out-of-pocket (OOP) medical expenses have a direct and immediate effect on consumer spending, particularly for the less fortunate segments of society.

Similarly, improved nutrition is thought to have impact on sustainable development to the extent that much like other low- and middle-income countries, achieving the SDGs in Nigeria is challenged by co-existence of under- nutrition, micro - nutrient deficiencies, and growing rates of overweight and obesity in the population (Mekonnen, Trijsburg, Arcterbosch, Brouwer, Kennedy, Linderhof, 2021). Recently consumption behaviours of households have tended to be impacted by shift in the dietary pattern between the urban and rural poor thus signaling what experts refers to as “nutritional transition”. As Nigeria undergoes rapid urbanization with a rapidly growing population, it follows therefore that urbanization, although an engine of growth, it is recently being seen as detrimental to health especially when carelessly managed.

The nexus described above also shapes food consumption patterns in both urban and rural areas, potentially widening the differences between the two. As food systems evolve, so too do the nutritional challenges and the types of interventions required. For instance, the urban poor rely more heavily on purchased food and often have more diverse diets than their rural counterparts. While this may suggest better access to quality nutrition, their market dependence also makes them more vulnerable to price fluctuations and other

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economic shocks, increasing their risk of under - nutrition (Mohiddin et al. 2012). People in cities are more likely to eat out and consume more processed foods than those in rural areas (de Brauw and Herskowitz, 2018). This puts them at greater risk of health problems linked to their diets (Kengne et al. 2017). Eating a lot of processed foods, along with not getting enough physical activity, has been linked to rising rates of overweight and obesity (FAO et al. 2017).

Even though urbanization is generally seen as the engine of growth and development, it may also lead to urban health crises when not managed carefully. Evidence shows that urbanization in Nigeria has created urban health crises of “inadequate safe water supply, squalor and shanty settlements, sanitation, solid waste management, double burden of diseases and inefficient, congested, and risky transport system” (Aliyu and Amadu, 2017). Hence, food safety is compromised in such circumstances. The complexity in food systems, for example due to urbanization, implies that any attempt at improving the multiple burden of food-health risk issues would require a systemic approach to identifying the risk factors and designing evidence-informed policies and interventions that account for spatial and socio-cultural issues that tend to exacerbate the risk level.

METHODOLOGY

To examine the joint interactive effect of food inflation and household consumption pattern on health outcomes, Autoregressive Distributed Lag (ARDL) model is employed. This is informed by its flexibility and ability to handle variables with different orders of integration and its potency in capturing short-run and long – run relationships between variables. This will foster informed understanding of the interaction between inflation, household consumption behaviour, and health outcomes. The Error correction mechanism that it possesses it will help understand the speed of adjustment towards long – run equilibrium. Another primary objective of this study is to examine the causal relationships among food inflation, household consumption expenditure, and health outcomes in Nigeria, hence we deployed the Granger Causality Test. Specifically, the study aims to determine whether changes in food inflation Granger-cause variations in household consumption patterns and health outcomes, and vice versa. By identifying the direction and nature of these relationships, the study seeks to provide empirical insights into the dynamic inter - linkages between economic conditions, consumer behavior, and public health, thereby informing targeted policy interventions in Nigeria.

The data set employed by the study is annual from 1980 to 2023 and variables used in our model are health outcomes (HO) proxy by Life expectancy at birth, total (years), household consumption pattern (COB) proxy by household and final consumption expenditure (% of GDP), food inflation (FINFL) proxy by consumer price index, interest rate (INT) proxy by interest payment (% of revenue) and real gross domestic product proxy by (GDP growth rate). The data set were sourced from the World Development Indication (2024). The sample period of 1980 covers the pre-structural adjustment period which is associated with preparation for austerity measures which had strong economic impact on the agricultural sector (specifically cost of food production and average prices of food item in the market) and caused a shift towards economic deregulation which offers more private sector - led involvement in economic management. Similarly, 2023 marked a period of significant spike in food prices owing to increase in general inflation and exchange rate control policies, causing higher food prices and change in consumption pattern of households as a coping strategy for the growing inflationary pressure on the family income.

Model Specification

The model for estimating the individual effect of food inflation and household consumption behaviour on health outcomes is stated as

$$HO = f(cob, f \inf l, int, gdp) \text{-----}(1)$$

The linear form of equation (1) from which the individual effect of food inflation and household consumption pattern can be estimated on health outcomes is stated as

$$dHO = \psi_0 + \psi_1 cob + \psi_2 f \inf l + \psi_3 int + \psi_4 gdp + \mu \text{-----}(2)$$

To investigate joint interactive effect of food inflation and household consumption pattern on health outcomes, equation (2) is restated as

$$dHO_t = \psi_0 + \psi_1 cob_t + \psi_2 f \inf l_t + \psi_3 int_t + \psi_4 gdp_t + \psi_5 (cob_t * f \inf l_t) + \mu_t \text{----}(3)$$

From equation (3) above, ψ_5 shows how joint interaction of food inflation and household consumption behaviour influence health outcomes in Nigeria. This is significant because it shows how the degree to which household are able to alter their consumption pattern during period of food inflation could affect health outcomes. Household who could not significantly alter their consumption pattern during period of food inflation due to low income suffer more health outcomes than household who could significantly alter their consumption pattern due to their relatively higher income level. To accommodate Pesaran et al. (2001) ARDL model for investigating the interactive effect, equation (3) above is re-specified as

$$\begin{aligned} \Delta dHO_t = & \kappa_0 + \kappa_1 dHO_{t-1} + \kappa_2 cob_{t-1} + \kappa_3 f \inf l_{t-1} + \kappa_4 \text{int}_{t-1} + \kappa_5 gdp_{t-1} \\ & + \kappa_6 (cob_{t-1} * f \inf l_{t-1}) + \sum_{i=1}^p \chi_i \Delta dHO_{t-i} + \sum_{i=0}^p \alpha_i \Delta cob_{t-i} + \sum_{i=0}^p \beta_i \Delta f \inf l_{t-i} \\ & + \sum_{i=0}^p \delta_i \Delta \text{int}_{t-i} + \sum_{i=0}^p \phi_i \Delta gdp_{t-i} + \sum_{i=0}^p \pi_i \Delta (cob_{t-i} * f \inf l_{t-i}) + \varepsilon_t \end{aligned} \quad (4)$$

Results and

DISCUSSION

All variables show their average and median values falls within their minimum and maximum values. Only food inflation shows positive skewness confirming the periods of high inflationary pressures and its volatility. Other variables are negatively skewed in their distributions. Their Kurtosis showed mixed results while food inflation, real gdp and household consumption pattern showed Kurtosis values that are lower than the Jarque-Bera, health outcomes and interest rate reflect higher Kurtosis than their Jarque-Bera values. However, the combined effect shows that the probability values greater than 0.05 suggest a normal distribution while values less than 0.05 deviates from normal distribution. The standard deviation suggests that food inflation and household consumption pattern have high variability from their mean values; hence, they exhibit high volatility over the sample period while other variables are moderate in their variability level.

Table 1: Descriptive Properties of Data set

	FINFL	GDP	DHO	INT	COB
Mean	19.07948	3.042141	0.155116	18.16763	56.19482
Median	13.00697	3.251681	0.144000	18.18417	59.48266
Maximum	72.83550	15.32916	0.957000	31.65000	81.53528
Minimum	5.388008	-13.12788	-0.614030	8.916667	9.834100
Std. Dev.	16.28122	5.255826	0.293983	4.643547	18.04886
Skewness	1.867414	-0.839215	-0.068115	-0.024906	-0.717206
Kurtosis	5.472970	4.845801	3.622627	3.814603	3.031770
Jarque-Bera	35.94894	11.15153	0.727817	1.193355	3.688234
Probability	0.000000	0.003789	0.694955	0.550638	0.158165
Sum	820.4177	130.8121	6.669970	781.2082	2416.377
Sum Sq. Dev.	11133.28	1160.196	3.629902	905.6263	13681.98
Observations	43	43	43	43	43

Source: Author's Computation, (2025)

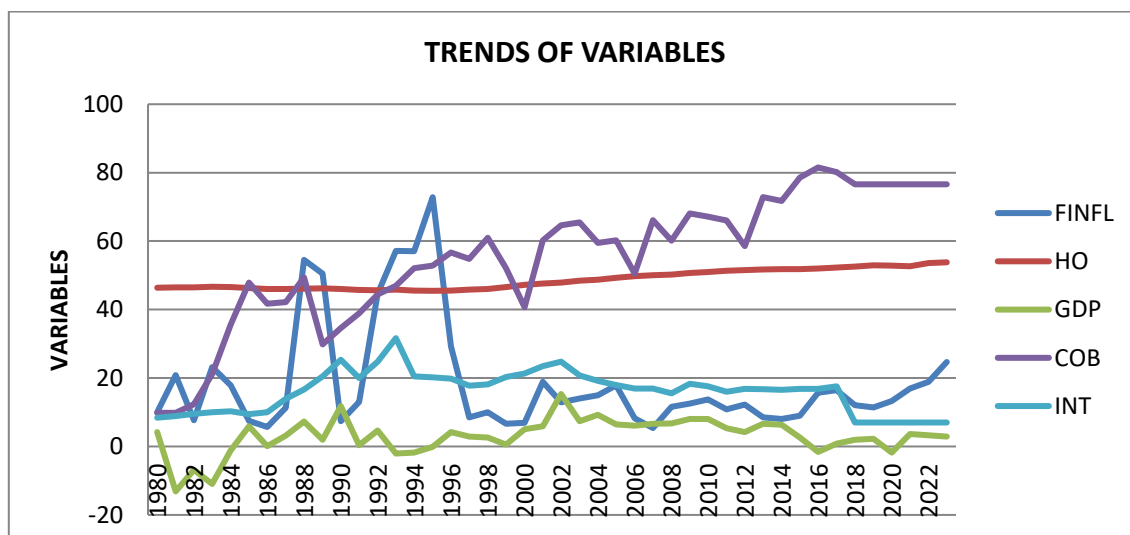


Figure 1: Trends of Variables

Author's Computation (2025)

The trend analysis from 1980 to 2022 reveals diverse patterns across the five key economic variables. Health Outcome (HO), shown by the red line, demonstrates a steady and gradual increase over the entire period. From 1980 to the early 1990s, HO remained

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relatively flat, indicating limited progress in health indicators during this period. However, from the mid-1990s onward, a consistent upward trend is observed, suggesting gradual improvement in health services, access, and outcomes. By 2022, HO reached its highest levels, likely due to sustained public health investment and awareness. But, Household Consumption Pattern (COB); proxied by final consumption expenditure as a percentage of GDP; showed significant volatility, especially between 1980 and 2000. It sharply rose in 1985 and 1994, fell in 1996, then rebounded strongly in the early 2000s. From 2010 to 2022, COB remained high and relatively stable; peaking around 80%, indicating that consumption has become a major component of GDP. Food Inflation (FINFL), measured via the Consumer Price Index, was highly erratic, with sharp increases in 1986, 1989, and particularly 1994, reflecting food price shocks and economic instability. A decline was observed in the early 2000s, but FINFL fluctuated and rose again between 2018 and 2022, indicating renewed inflationary pressures. Interest Rate (INT), proxied by interest payment as a percentage of revenue, showed unpredictable spikes, especially in 1986, 1993, and 2001, followed by moderate fluctuations through to 2022. This indicates periodic debt servicing challenges and interest rate volatility. Lastly, Real GDP Growth Rate (GDP), shown by the green line, experienced fluctuating growth. From 1980 to 1990, GDP showed both positive and negative swings. It improved slightly in the early 2000s but began declining again after 2015, with some of the lowest points appearing around 2020–2022, possibly due to the effect economic shocks like the COVID-19 pandemic.

Unit Root Results

From the unit root test results, mixed order integration exists among all variables. Only GDP is stationary at levels while FINFL, COB, INT and DHO are stationary after their first differencing. Therefore, GDP is I(0) and FINFL, INT, COB and DHO are I(1) variables. The combination of I(0) and I(1) variables justifies the adoption of ARDL technique of Pesaran et al. (2001) for estimating interactive effect of food inflation and household consumption pattern on health outcomes in Nigeria.

Table 2: Unit Root Properties of Variables

Variable	ADF AT LEVELS			ADF AT FIRST DIFFERENCE			
	ADF TEST	1%	5%	ADF TEST	1%	5%	REMARK
DHO'	3.521306	-2.619851	-1.948686	-7.484090	-2.624057	-1.949319	I(1)
INT	0.032561	-2.619851	-1.948686	-5.704380	-2.622585	-1.949097	I(1)
COB	0.822131	-2.621185	-1.948886	-7.613616	-2.621185	-1.948886	I(1)
FINFL	-1.191703	-2.622585	-1.949097	-6.198033	-2.621185	-1.948886	I(1)
GDP	-1.952148	-2.621185	-1.948886	-	-	-	I(0)

Source: Author's Computation, (2025)

Table 3: Result of Bound Test for Co-integration

Variables	F-statistics	Co-integration
F(DHO/FINFL, COB, GDP, INT)	4.9927	
Critical Values	Lower Bound	Upper Bound
1%	3.29	4.37
5%	2.56	3.49
10%	2.20	3.09
Variables	F-statistics	Co-integration
F(DHO/FINFL, COB, GDP, INT, FINFL*COB)	4.1836	
Critical Values	Lower Bound	Upper Bound
1%	3.06	4.15
5%	2.39	3.38
10%	2.08	3.00

Source: Author's Computation, (2025)

Table 4: Result of Short Run Model without Interactive Term

Variable	Coefficient	Standard Error	t-Statistic	Probability
D(FINFL)	-0.011060	0.003361	-3.290357	0.0046
D(FINFL(-1))	0.016786	0.002661	6.307567	0.0000
D(FINFL(-2))	-0.013884	0.003304	-4.201858	0.0007
D(GDP)	0.039445	0.008905	4.429671	0.0004
D(GDP(-1))	0.020759	0.007802	2.660716	0.0171
D(GDP(-2))	-0.035828	0.008700	-4.118136	0.0008
D(INT)	0.011030	0.010229	1.078261	0.2969
D(INT(-1))	-0.030730	0.011762	-2.612670	0.0188
D(INT(-2))	0.015403	0.017074	0.902118	0.3804

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D(INT(-3))	-0.083950	0.011229	-7.475994	0.0000
D(COB)	-0.004982	0.004046	-1.231137	0.2361
D(COB(-1))	-0.015190	0.003934	-3.860934	0.0014
D(COB(-2))	0.012305	0.003591	3.426903	0.0035
D(COB(-3))	0.017002	0.003470	4.900268	0.000
CointEq(-1)*	-1.323461	0.211066	-6.270380	0.0000

Source: Author's Computation, (2025)

Table 5: Result of Short Run Model with Interactive Term

Variable	Coefficient	Standard Error	t-Statistic	Probability
D(FINFL)	0.003375	0.006349	0.531560	0.6066
D(FINFL(-1))	-0.026931	0.006601	-4.079834	0.0022
D(FINFL(-2))	-0.042502	0.005904	-7.198332	0.0000
D(FINFL(-3))	-0.016681	0.004613	-3.616299	0.0047
D(GDP)	0.036056	0.008871	4.064274	0.0023
D(GDP(-1))	0.019669	0.008005	2.457267	0.0338
D(GDP(-2))	-0.022326	0.010016	-2.229136	0.0499
D(GDP(-3))	0.014117	0.007933	1.779404	0.1055
D(INT)	-0.017719	0.012462	-1.421833	0.1855
D(INT(-1))	-0.059950	0.016014	-3.743610	0.0038
D(INT(-2))	-0.018163	0.016947	-1.071781	0.3090
D(INT(-3))	-0.087922	0.013609	-6.460715	0.0001
D(COB)	-0.005755	0.004503	-1.277885	0.2302
D(COB(-1))	-0.054503	0.007136	-7.637679	0.0000
D(COB(-2))	-0.019559	0.006818	-2.868819	0.0167
D(LNFINFL COB)	-0.273758	0.143837	-1.903249	0.0862
D(LNFINFL COB(-1))	1.240532	0.172628	7.186156	0.0000
D(LNFINFL COB(-2))	0.843890	0.158646	5.319337	0.0003
D(LNFINFL COB(-3))	0.445539	0.085988	5.181413	0.0004
CointEq(-1)*	-1.386196	0.202507	-6.845190	0.0000

Source: Author's Computation, (2025)

Table 6: Result of Long Run Model without Interactive Term

Variable	Coefficient	Standard Error	t-Statistic	Probability
FINFL	-0.007223	0.004727	-1.528150	0.1460
GDP	0.033370	0.011508	2.899648	0.0104
INT	0.039100	0.013148	2.973799	0.0090
COB	0.002128	0.002472	0.860718	0.4021
C	-0.678804	0.412413	-1.645934	0.1193

Source: Author's Computation, (2025)

Table 7: Result of Long Run Model with Interactive Term

Variable	Coefficient	Standard Error	t-Statistic	Probability
FINFL	0.041312	0.035243	1.172225	0.2683
GDP	0.031205	0.013055	2.390226	0.0379
INT	0.044927	0.017622	2.549414	0.0289
COB	0.029023	0.018903	1.535352	0.1557
LNFINFL COB	-1.286116	0.827043	-1.555077	0.1510
C	5.399501	3.546608	1.522441	0.1589

Source: Author's Computation, (2025)

Table 3 above confirmed that there is a long run relationship among the variables in our model. The calculated F-statistics value of 4.1836 is greater than the upper critical value of Bound test and therefore shows long run relationship among the variables. Thus, both short and long run models in equation (4) above are estimated and the coefficients obtained in Table 5 show the immediate short run impact of food inflation and household consumption pattern on health outcomes is positive and negative respectively. A percent increase in inflation causes about 0.003 % immediate increase in health outcomes but the delayed effect of inflation is negative over a three-year lag period.

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This means that the effect of immediate increase in inflation does not adversely impact health outcomes until after a delayed period of one to three years. Similarly, household consumption pattern follows the reverse trend showing an immediate and delayed adverse effect of about 0.005% and 0.05% in health outcomes. However, the delayed effect of both inflation and household consumption pattern on health outcomes is stronger than the immediate effect across the period in the short run. This result corroborates the finding of Mohamed, Abdi and Mohamed, et al (2024) in the short run that armed conflicts and food price inflation exhibit positive associations with global acute malnutrition in Sudan indicating higher malnutrition rates in conflict-prone areas and during periods of inflation.

The combined short run effect of food inflation and household consumption pattern over three-year lagged periods shows positive association to health outcomes by 1.24%, 0.84% and 0.44% in the short run. This joint interactive effect is also stronger than the individual effect, suggesting that combination of food inflation with household consumption behaviour exerts stronger positive effect and contributes to increase in health outcomes in the country. This result contradicts the findings of Sadiqueen, Haque, Hossain and Uddin (2024) that inflation had a significant negative effect on malnutrition, an index for measuring health outcomes in Bangladesh.

Gross domestic product produces positive effect of about 0.04% increase in health outcomes, while its two-year lagged value shows 0.02% decrease, suggesting a non-linear or cyclical impact of gross domestic product on health outcomes over two-year lagged period in the short run. There was also a negative but significant effect of interest rate of about 0.06%, 0.02% and 0.09% on health outcomes in the first and third-year lagged periods respectively, upholding the contractionary effect of the policy rate on health outcomes. The model showed a slightly strong adjustment toward long run equilibrium of over 138% correction within a year.

The model of long run effect with interaction in Table 7 shows gross domestic product and interest rate with significant positive effect of 0.03% and 0.04% on health outcomes. Food inflation and household consumption pattern do not have significant individual and combined effect on health outcomes, except for their negative directional implications on health outcomes. Gross domestic product and interest rate are the long run determinants of pattern of change in the interaction of food inflation and household consumption pattern on health outcomes in Nigeria. The result of long run estimation does not corroborate the findings of Jallow and Hammadou (2024) that inflation and household consumption are significantly related in the long run.

Table 8: Heteroskedasticity Test

F-statistic	2.472686	Prob. F(21,18)	0.0285
Obs*R-squared	29.70346	Prob. Chi-Square(21)	0.0981
Scaled explained SS	13.84540	Prob. Chi-Square(21)	0.8761

Source: Author's Computation, (2025)

The heteroskedasticity test results in Table 8 present evidence that the Obs*R-squared ($p = 0.0981$) and Scaled explained SS ($p = 0.8761$) statistics both have p-values greater than 0.05, implying no significant evidence of heteroskedasticity.

Table 9: Ramsey RESET Test

	Value	df	Probability
t-statistic	0.010251	17	0.9919
F-statistic	0.000105	(1, 17)	0.9919

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	4.17E-06	1	4.17E-06
Restricted SSR	0.674969	18	0.037498
Unrestricted SSR	0.674965	17	0.039704

Source: Author's Computation, (2025)

The Ramsey RESET test in Table 9 assesses whether the functional form of the regression model is correctly specified. It test checks for omitted variable bias or incorrect model specification by introducing higher-order powers of the fitted values. the t-statistic is 0.010251 with a p-value of 0.9919, and the F-statistic is 0.000105 with the same p-value of 0.9919. Since this p-value is much greater than 0.05, we fail to reject the null hypothesis that the model is correctly specified. Therefore, the test shows that the model has no significant omitted variables or specification errors, and its functional form is appropriate.

Table 10: Causality Analysis

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Null Hypothesis:	Obs	F-Statistic	Prob.
COB does not Granger Cause HO HO does not Granger Cause COB	42	3.20844 2.29716	0.0519 0.1147
FINFL does not Granger Cause HO HO does not Granger Cause FINFL	42	0.93458 2.35236	0.4018 0.1092
INT does not Granger Cause HO HO does not Granger Cause INT	42	1.11030 2.48202	0.3402 0.0974
GDP does not Granger Cause HO HO does not Granger Cause GDP	42	0.98808 0.67003	0.3819 0.5178
FINFL does not Granger Cause COB COB does not Granger Cause FINFL	42	0.77755 0.70716	0.4669 0.4996
INT does not Granger Cause COB COB does not Granger Cause INT	42	0.01009 1.76304	0.9900 0.1856
GDP does not Granger Cause COB COB does not Granger Cause GDP	42	1.13646 0.04204	0.3319 0.9589
INT does not Granger Cause FINFL FINFL does not Granger Cause INT	42	1.26775 2.44797	0.2934 0.1004
GDP does not Granger Cause FINFL FINFL does not Granger Cause GDP	42	0.33165 0.17487	0.7198 0.8403
GDP does not Granger Cause INT INT does not Granger Cause GDP	42	0.61203 0.00686	0.5476 0.9932

Source: Author's Computation, (2025)

The Granger causality analysis in Table 10 examines whether past values of one variable can predict another. From the results, "COB Granger causes HO" at the 10% significance level, with an F-statistic of 3.20844 and a p-value of 0.0519, indicating a unidirectional causality from COB to HO. However, the reverse does not hold, as HO does not Granger cause COB ($p = 0.1147$). Also, there is no statistically significant Granger causality in either direction between FINFL and HO at conventional levels (5% or 10%). However, the p-value for HO through FINFL is close to the 10% threshold, suggesting a potential weak influence worth exploring further. The reverse however holds for all other variable pairs—including relationships involving FINFL (Financial Inflation), INT (Interest Rate), and GDP (Gross Domestic Product)—show p-values greater than 0.05 or 0.10, indicating no statistically significant Granger causality in either direction.

CONCLUSION AND POLICY RECOMMENDATION

The joint interaction of food inflation and household consumption pattern shows statistically significant positive short run effect on health outcomes but their long run effect is insignificant on health outcomes. Therefore, stabilizing food prices and improving the opportunities to quality household consumption pattern in the immediate period are crucial for sustainable and improved healthy living.

The adoption of a Targetted Subsidy for essential food items like grains and tuber including supports of the farmers for their cultivation will substantially help household maintain their consumption levels especially during inflation periods while also guarantteing a stable supply respectively. The implementation of price stabilization policies to reduce the impact of inflation on household consumption is also recommended. Again this paper also flies the kite for the launching of nutrition support programmes to ensure households have access to nutritious food, particularly during periods of inflation.

The study recommends that Nigeria's Government should institute a mix of macroeconomic policy method to stimulate and increase household consumption expenditure in order to help in achieving economic growth and development. In order to mitigate the long run devastating impact of inflation and household consumption behaviour, there is the need to enhance the distributional impact of the on – going cash transfer programs of the Nigerian government at least to ensure the transfer actually reaches the vulnerable individuls in the larger communities. Implementing policies to promote economic stability, and increase houdehold purchasing

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power will boost household consumption behaviour as well. A multi-faceted approach that addresses both short-run and long-run effects of inflation on health outcomes is sine-qua non. Finally, we recommend the adoption of unemployment and institution variables be considered in future studies

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