



The Impacts of Inflation on Food Security in Nigeria: A Review

**Chika U. Obiora ^{a*}, Mary C. Ezeh ^a, Chukwunonso I. George ^a,
Sylvester N. Orjiakor ^a, Chinenye B. Anigbogu ^a,
Chilota G. Nwabude ^a and Felix Omologbe ^a**

^a Nnamdi Azikiwe University, Awka, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Author CUO designed the topic, wrote abstract, introduction, Strategies for reducing the impacts of inflation on food security in Nigeria and conclusion. Author MCE wrote potential impacts of inflation on the nutritional status of poor households in Nigeria. Author CIG wrote food security implications of rising food prices in Nigeria. Authors SNO and CBA wrote Nigerian demographics. Author CGN wrote factors that influence food price inflation in Nigeria. Author FO wrote food price inflation. All authors read and approved the final manuscript.

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ABSTRACT

Food security is a critical global concern, with particular significance in developing countries like Nigeria. Adequate access to safe and nutritious food is essential for individual well-being, cognitive development, and overall human capital formation. In a broader context, food security plays a pivotal role in poverty reduction, rural development, and social stability. The impact of inflation on food prices has severely affected food security, particularly among rural farming households in Nigeria. Nigeria, a populous African nation, struggles with food security amidst recent high inflation levels. This article examined inflation's effects on Nigeria's food security, using comprehensive literature review to scrutinize their relationship. Analyzed inflation's multifaceted impacts on food security, the study focuses on its effects on food costs, purchasing power, production, distribution, and household

*Corresponding author: E-mail: uc.obiora@unizik.edu.ng;

consumption patterns in Nigeria. The research underscored that inflation escalates food prices, diminishing consumer purchasing power, especially among low-income individuals, resulting in inadequate nutrition and health issues. This article highlighted exacerbating factors, including low agricultural productivity, extreme weather patterns, exchange rate, transportation and distribution, government policies, insurgency, energy crises, Russian-Ukraine war, market competition and hoarding to inflation-induced food security issues. The study concluded by advocating comprehensive policy actions to counteract inflation's impact on food security, encompassing stabilizing inflation rates, enhancing agricultural productivity, improving infrastructure, reinforcing safety nets, and strengthening governance and policy implementation. Emphasizing interdisciplinary strategies involving economics, agriculture, nutrition, and other pertinent fields is crucial to holistically comprehend and address the intricate interplay between inflation and food security in Nigeria.

Keywords: Inflation; food security; Nigeria, food prices.

1. INTRODUCTION

Globally, inflation has been one of the most persistent economic challenges, especially in developing nations. Inflation refers to an economic situation which experience continuous rise in the prices of goods and services, as measured by the consumer price index or the implicit price deflator for Gross National Product [1]. Nyoni et al. [2], Nyoni and Bonga [3], described the history of high rate of inflation in Nigeria from the year 1974 to 2023. It was also reported that Nigeria has been experiencing inflation rate surge from 64.33% to 72.83% from 1993 to 2000. According to the national Bureau of Statistics, the inflation rate dropped to 15.37% [4]. Shittu et al. [5], reported that the Nigerian staple food market is complex and susceptible to various macroeconomic shocks. Food price inflation are affected by various factors such as pest and diseases infestation [6], weather [7], ongoing farmer-herder clash [8;7], high cost of production [9], post-harvest losses [10], high cost of importation and exchange rate [11;12]. Nigeria solely rely on crude oil exportation which necessitates for more than 75% of government revenue [13] and this has proven to become a major problems the country because during the global fall in price of crude oil in the year 2014, it led to a fall in the value of Nigerian currency (naira) as it puts pressure on the currency, this resulted to an increase in inflation from 8.5% in 2013 to 15.7% in 2016 which led the exchange rate to remain volatile [14; 15;16]. The country continued to experience a turbulent exchange rate, conflict and political instability, low agricultural productivity, instability in food prices, and abrupt policy changes [17;5]. This inflation in price of food commodities resulted to increase rate of under-nutrition, increased rate of poverty to about 45% of Nigerian population [18],

inefficiencies in production rate of local staple foods such as rice [19;20]. Fasanya and Olalepo [21], stated that Inflation in food commodity prices over the past few years has gained importance due to its negative effects on Nigerians that spends a large share of their income on food. In most developing countries of the world, this volatility in food prices has led to greater malnutrition and food insecurity among the poor, a negative impact on trade balances, low investment, and possible social unrest [22]. According to National Bureau of Statistics [23] the rate of inflation increased annually as it rose to 21.82% in January 2023 as compared to January 2022 which was 15.60%. According to this, on average, the general price level increased by 0.15% from December 2022 to January 2023. However, the percentage price index of food commodities on a class basis increased in the headline index include Bread and Cereal (21.67%), Potatoes, Yam and Tuber (6.06%), Vegetable (5.44%), and Meat (4.78%). Based on the average consumer price index for the twelve months ending January 2023, the percentage change over the previous twelve-month period was 19.36%, an increase of 2.49% over January 2022, when the measure increased by 16.87%.

Food security involves the idea of ensuring access to enough food commonly employed to assess the well-being of households, and efforts have been undertaken to make it practically applicable in the planning, execution, and assessment of various programs, projects, and policies [24;25]. According to FAO [24], the definition of food security was formulated and amended during the 1996 World Food Summit, with emphasis placed on the importance of diet quality for individuals, rather than just households. This modified definition was widely

recognized and included the phrase "at all times," which reinforced the fourth, less commonly recognized element of food security: the consistency of food security over time [26; 27;28]. Generally, when it comes to guaranteeing food security, the focus is typically only on evaluating the amount of calories consumed per individual, with little attention paid to the quality and diversity of the food. The issue of decreasing the number of individuals who are overweight is just as important as decreasing the number of individuals who are undernourished [29; 30;31]. Hence, it will be essential to offer the populace not only food items but also items that adhere to a nutritious diet, ensuring the well-being of the country and the safety of the nation [31]. The concept of food security comprises four critical aspects, namely food sufficiency, physical and economic access, security, and stability. Food sufficiency pertains to the availability and appropriate amount of food of acceptable quality. Physical and economic access concerns an individual's ability to obtain sufficient food. Security pertains to food utilization by the body, food safety, and the risks associated with consumption. Lastly, food stability relates to the time-bound aspect of food availability, access, and utilization [32]. These crucial variables have been widely recognized as the four fundamental components of food security, as identified by various scholars [33; 27;34;32]. Several researchers have studied the major causes of food insecurities in the world and in Nigeria. Food insecurity has often led to hunger, malnutrition and other nutrition-related illness in adults and children, such as kwashiorkor, diabetes, obesity and pulmonary heart diseases, etc. Hunger and malnutrition arise primarily from natural disasters, wars, population expansion, and poverty. The worldwide economic downturn has altered the poverty situation, making the difficulties of hunger more complicated [35;36;37;38;39;40;41;42;31]. Despite numerous attempts to enhance the quality and quantity of food production on a global scale, there is still a widespread issue of food insecurity where malnutrition has led to the death of numerous individuals in Nigeria [43]. Ensuring that people are well-nourished and healthy is crucial for achieving sustainable economic development in Nigeria and Africa as a whole. Neglecting food security has resulted in various social problems, including civil unrest and riots in many major cities across the globe [44;45;46]. Despite Nigeria's reputation as the "giant of Africa" due to its economy becoming the largest in 2014, poverty levels in the country are concerning [47].

As many as 70% of Nigerians live on less than one dollar a day, and the prevalence of food insecurity is high, particularly among low-income households in urban and rural areas, where rates stand at 79% and 71%, respectively [44;46]. Nigeria's discovery of oil in the 1970s led to the government neglecting the agriculture sector, which could not compete with the more lucrative oil industry [48]. Consequently, Nigeria became heavily reliant on food imports, leaving rural areas particularly vulnerable to malnutrition, erratic food supply, high food costs, poor quality foods, and sometimes complete lack of food. This problem is particularly acute in many parts of northern Nigeria [46;49]. This paper is intended to review the impacts of rising food prices on the occurrence of food insecurity in Nigeria. It aims to identify the underlying reasons for this phenomenon and to explore strategies that can help improve food security in the country.

2. NIGERIAN DEMOGRAPHICS

Nigeria is a country located in West Africa, with a population estimated at over 211 million people as of the year 2021, making it the most populous country in Africa and the seventh-most populous country in the world. Nigeria has a youthful population, with 44% of the population being under the age of 15 and large youth population can strain social services and infrastructure, indicating a potential demographic dividend [50]. The country is home to over 250 ethnic groups, with the largest being the Hausa-Fulani, Yoruba and Igbo. Nigeria has over 500 languages with English as the official language, Hausa, Yoruba, and Igbo are also widely spoken. Other major languages include Fulfulde, Kanuri, Tiv, and Edo [51]. Nigeria's population has been increasing steadily over the years, with an estimated population of over 211 million people as of 2021. According to world development indicator [52], the population growth rate is estimated at 2.6%, which is higher than the global average of 1.05%. The country's population density is also relatively high, with an average of 221 people per square kilometer [50]. The high population growth rate is a major challenge to Nigeria's development, as it puts pressure on the country's resources, infrastructure, and social services. In 1800, Malthus postulated that a nation's population growth may have significant effects on individuals' access to food and other resources. According to statistics from the United Nations Population Division [53], the population growth will result in a doubling of the global demand for

food by the year 2050. The importance of access to food and food security has been emphasized by the second Sustainability Development Goal (SDG) which aims to end hunger and achieve food security by 2030. Food and Agriculture Organization of the United Nations [54] defined food security as to exist when all people at all times have access to sufficient food to meet their dietary needs for a productive and healthy life. Since 2014, the number of hungry people has continuously increased and is expected to reach 841.4 million by 2030, with Africa accounting for 51.5 percent, biggest number of undernourished people globally [55]. In most places of Africa, population growth and food security have an inverse connection. Despite Africa's rapid population increase, particularly in Nigeria, the continent remains afflicted by hunger and food insecurity. Majority of the population migrates to urban areas leading to urbanization. Urbanization refers to the concentration of populations into discreet areas. Urban expansion has been substantially faster in today's developing countries with the advent of Industrial Revolution. In Nigeria, the National Population Commission puts the average annual urban growth rate at 6.5%. The continued expansion in urbanization, from 34.8% in 2000 to 49.5% by 2017, also has implications for food availability and affordability. The implication of an expanding urban population is that residents must increasingly depend on their available incomes, giving the limited opportunities for farming, in order to ensure their access to food [56]. The situation of generally low incomes, combined with rising food prices, has implications for the food security status of urban households. Income growth and urbanization tend to go hand in hand (Henderson,2010). In Nigeria, rapid urbanization poses several challenges, including inadequate infrastructure, urban poverty, and environmental degradation.

2.1 Food Price Inflation

To achieve food security, it is essential that a country's population has constant access to adequate, safe, and nutritious food that meets their dietary needs and preferences for a healthy and active lifestyle. This access should be physical and economic, as well as social in nature [57]. There has been an upsurge in food price around the world recently, which has left many households in a state of food insecurity [58]. Food price inflation has been a persistent problem in Nigeria in recent years, driven by several such as insecurity, climate change etc.

According to the National Bureau of Statistics [59], food inflation reached 22.95% in February 2021, ranged from 10.15% in the first quarter of 2013, the highest level in over a decade. Food price inflation has emerged as a major cause of concern for policymakers and the general public in many developing countries. This is because the upward movement and increasing volatility in the prices of agricultural commodities reduce purchasing power, particularly that of households, thereby depressing real income per capita [60]. The economy of Nigeria is presently dominated by the petroleum sector and prices of petroleum products have had a determining impact on the prices of goods and services. In a developing country like Nigeria, food price inflation is a critical economic problem posing threats to the low-income households that constitute the large proportion of the population. According to central bank of Nigeria, the average household in Nigeria spends about 73 percent of their income on food and beverage [61]. This situation is made worse in the light of recent economic deterioration which has placed Nigeria as the country with the largest number of extremely poor people, with about 87 million people living in extreme poverty and six people becoming extremely poor every minute [62]. Consequently, understanding the factors behind food price inflation and controlling the rise in food prices has become a major interest of policy-makers and government. However, Egwuna, et al., [60] suggested that food prices are driven by several factors including demand and supply factors [63;64;65] fluctuations in foreign exchange rates [66], clash between Fulani herdsmen, farmers and growing scarcity of viable agricultural land [67;68;69;70;71], the nature and structure of national food supply chain, hike in price of energy [72;60], government policies [73], extreme weather event [74], and lack of mechanization. Furthermore, the prices of staple foods have been on increase due to economic recession in Nigeria. This has been attributed to the poor state of the economy characterized by the reduction in the supply of food products, increase in energy prices, insecurity and to greater portion the devaluation of naira [60;72].

2.2 Factors that Affect the Food Price Inflation

The cost of food continued to rise steadily, particularly in major cities like Lagos, Abuja, and Awka [75], despite the efforts made by both government and non-governmental organizations to combat hunger in the country. The Global

Hunger Index [76], ranked Nigeria as 103rd out of 121 countries with available data, indicating a serious level of hunger with a score of 27.3. The prevalence of severe food insecurity in Nigeria has also increased from 10% in 2017 to 12.7% in 2020 inflation the price of food. They include below:

2.2.1 Agricultural productivity

The agricultural productivity in Nigeria has been reported to be very low (22.35% of the total GDP in the first quarter of 2021) due to several factors such as poor infrastructure [77] lack of funding [78], outdated farming techniques [79], and climate change [80]. Low agricultural productivity leads to a decrease in the amount of food available for consumption, which resulted to high-cost food products due to demand and supply dynamics. According to UNDP [81], low productivity led to poor yields of cash crops and staple foods. The reduced the quality and availability of the food products, high cost of food raw materials for production and the high price of the food items. The rate of increase in population has outpaced the growth of its agricultural productivity. It created a significant gap between the demand and supply of food as the increase in population had affected the agricultural productivity in Nigeria. Nigeria's population has grown rapidly from about 45 million in 1960 to over 211 million in 2021, with an average annual growth rate of more than 2.5%¹. This makes Nigeria the most populous country in Africa and the fourth most populous in the world. The high population growth rate is driven by population momentum, high birth rate, and cultural preference for large families, despite the lack of social amenities and infrastructure. Nigeria has not successfully implemented family planning programs to reduce and space births¹. The Nigerian government has tried to implement several policies to improve agricultural productivity such as providing access to funding for farmers [78], providing education on modern farming techniques [79], providing agricultural loan and subsidized farming materials [77] as well as providing equipment for mechanized farming [80]. However, this improvement had been affected by high rate of corruption of government officials and law makers who diverted funds made available to solve problems of low agricultural productivity [82].

2.2.2 Extreme weather patterns

The Nigeria ministry of Agriculture and Rural Development [83] reported that impacts of

droughts and floods has led to reduced yields of cash crops (cotton, sweet potatoes), damage to staple foods (maize, cassava, wheat), and increased in price of food products. The floods and droughts have affected the Nigerian population by displacing over 1.4 million people, killing over 600 people, and increasing the risk of hunger and malnutrition [84;85]. The Nigeria economy depended heavily on agriculture, and weather disaster has resulted to low crop yields and food production. For example, Benue state, which supplies 45% of major staple foods such as yam, potatoes, tomatoes, onions, maize to southern parts of the country, was severely affected by the floods in 2020 [82]. Anambra state, which comprised mostly rice, palm oil and cassava farmers that supply 30% of their farm produce across the nation, also suffered from the floods [84]. Cross river state, which have mostly palm oil, plantain and banana farmers that supply 80% of its farm produce across the nation including exportation, experienced both floods and droughts that damaged their crops. The flood destroyed crops, displaced farmers which led to a decrease in food production due to scarcity of raw materials, increase in price of staple foods, high rate of hunger and malnutrition among the populace. The Nigerian Meteorological Agency [86] recorded a decline in the rate of availability of staple foods, food production and an increase in food prices due to prolonged dry season caused by climate change. The Nigerian government has implemented several policies aimed at improving the resilience of the agricultural sector to changes in weather patterns, such as promoting the adoption of climate-smart agriculture, providing access to irrigation facilities, and improving the storage and transportation of food items [80]. The weather patterns play a critical role in determining food prices in Nigeria. Hence, it is essential to have climate-resilient policies in place to reduce the impact of weather patterns on food production and ensure that food prices remain affordable.

2.2.3 Exchange rates

Nigeria is heavily dependent on imports to meet its food demand, and changes in exchange rates can have a direct impact on the cost of imported food items, which can drive up food prices. Exchange rates play a significant role in influencing food price inflation in Nigeria as it depends heavily on importation of some staple foods, such as wheat, sorghum, sugar, coconut for commercial production and food products such as margarine, all-purpose flours, sugar, milk

and beverages for consumption [87]. As the value of the naira weakened compared to dollar in international trade, the price of imported food rises. Consequently, consumers experience higher prices for these imported goods [88]. When the value of the Nigerian currency, the naira, depreciates against foreign currencies such as the dollar, it becomes more expensive to import food items. This can lead to a decrease in the supply of food items in the country, which drives up food prices. Similarly, when the naira appreciates, it becomes cheaper to import food items, leading to an increase in the supply of food items and a decrease in food prices [89]. In addition to the direct impact on the cost of imported food items, exchange rate fluctuations can also affect the cost of local production inputs, such as fertilizer and seeds, which can also drive-up food prices. The Nigerian government has implemented several policies to stabilize the exchange rate such as the establishment of a foreign exchange market, the introduction of import restrictions, and the promotion of local food production [90]. However, the effectiveness of these policies has been limited by external shocks and structural constraints and exchange rate fluctuations remain a significant challenge for the Nigerian economy, particularly the agricultural sector. Inflation affects food prices in Nigeria by increasing the cost of production and transportation of food items. When the cost of inputs such as fertilizers, pesticides, and labor increases due to inflation, it led to an increase in the cost of production of food items, which ultimately translates to an increase in food prices. Similarly, inflation leads to a rise in the cost of transportation, which increases the cost of distribution of food items, leading to an increase in food prices [87]. Currency devaluation affects food prices in Nigeria by increasing the cost of imported inputs and food items. When the value of the Naira declines relative to other currencies, it increases the cost of imported inputs and food items, leading to an increase in food prices due to limited availability and higher costs of production [88]. Moreover, inflation and currency devaluation increase the cost of living in Nigeria, which reduces consumers' purchasing power. As a result, consumers are unable to afford the high food prices, leading to a decrease in demand for food items, which can further drive up food prices due to limited supply [89].

2.2.4 Transportation and distribution

Nigeria is recorded with high number of poor road infrastructures, heavy check points by

armed forces, lack of efficient transportation systems and inadequate storage facilities [91]. Bad roads filled with potholes and erosion from the point of harvest (farm) to the point of sale (market) made difficult for farmers to transport their cash crops. The problem has resulted to drivers charging high transport fares and most of them decline to use their vehicles for fear of damage leading to an increase in food prices due to supply chain inefficiencies [92]. Most markets in Nigeria lack warehouse and storage facilities such as electricity, refrigerators, deep freezers where farm produce can be stored which led to food spoilage, waste and drove up food prices which made the marketers imposing high cost in food prices to recover profits and expenditure especially in perishable foods [91]. Insecurity and other forms of disruptions such as strikes, roadblocks, and other forms of civil unrest can affect the transportation and distribution of food items, leading to a decrease in food supply and a corresponding increase in food prices. The Nigerian government has implemented several policies aimed at improving transportation and distribution infrastructure such as approved budgets for construction of new roads, railways, and waterways but they are yet to be implemented as at the year 2023. The government also encouraged private investment in the transportation sector and implemented measures to reduce insecurity and disruptions to the transportation of food items [93;94] but there is still high cost of food products due to high cost of exchange rate in purchasing vehicle parts, heavy extortion of drivers conveying farm produce by armed forces (police, civil defense corps, army and custom) check points and accidents cause buy bad roads. However, despite these efforts, transportation and distribution remain a significant challenge for the Nigerian economy, particularly the agricultural sector, leading to high food prices.

2.2.5 Government policies

The government's policies on agriculture, trade, and foreign exchange impact the cost of food production, supply, and distribution, which ultimately affected food prices in the country. Harsh policies by the Nigerian government policies such as heavy and unnecessary taxes, service charges, and trade restrictions can affect food prices. For example, the government's decision to ban the importation of some food items in the past has led to shortages and increased prices of those items [95]. One of the most notable government policies that influence

food price inflation in Nigeria is the subsidy program on petroleum products. The government heavily subsidizes the cost of petroleum products, including diesel and gasoline, which are crucial for the transportation and distribution of food items. When the cost of petroleum products increases due to fluctuations in the global oil market, the government's subsidy program is stretched, leading to an increase in the cost of transportation and distribution of food items, which in turn drives up food prices [96]. Additionally, government policies on trade and import tariffs affect the availability and cost of imported food items. When the government imposes high tariffs on imported food items, it limits the supply of food items in the country, leading to an increase in food prices due to limited availability. On the other hand, when the government lowers tariffs on imported food items, it leads to an increase in supply and a decrease in food prices [95]. Government policies on agriculture, including subsidies, support for research and development, and extension services, can affect the cost of production and supply of food items, ultimately influencing food prices. For instance, subsidies can lower the cost of inputs such as fertilizers and seeds for farmers, leading to an increase in production and supply of food items. Research and development can improve crop varieties and yields, leading to an increase in production and supply of food items. Extension services can provide farmers with information and training on best practices and technologies, leading to an increase in production and supply of food items [96].

2.2.6 Market competition and hoarding

Market competition and hoarding were significant factors that influence food price inflation in Nigeria. Hoarding occurs when traders or farmers store large quantities of food items in anticipation of future price increases. Hoarding of food products by traders have been reported to lead to artificial shortages and drive up prices in the price of food products that experience high in demand [97;98]. Market competition among traders and farmers can increase the availability and supply of food items, leading to a decrease in food prices. However, when there is limited competition, traders and farmers can hoard food items, leading to a decrease in supply and an increase in food prices [98]. This reduces the supply of food items in the market, leading to an increase in food prices due to limited availability. Hoarding can also occur during times of food

shortages or when there is a perception of an impending food crisis [97]. Market competition can be defined as the degree of rivalry among sellers or buyers of a product or service in a market. Market competition can be influenced by factors such as the number and size of market participants, the degree of product differentiation, the ease of entry and exit, and the availability of information [99]. Market competition can be limited due to inadequate infrastructure, transportation, and distribution networks, leading to an increase in food prices due to high transaction costs. This is particularly common in rural areas, where farmers have limited access to markets and are unable to negotiate favorable prices for their produce [99].

2.2.7 Energy Crisis (fuel scarcity)

Since February 2022, Nigeria has experienced a scarcity and increase in prices of premium motor spirit (fuel), diesel in most states of the country. The whole issue started in the year 2021 as a result of government's plans to remove fuel subsidies and worsened when the federal government reportedly said its agents had imported substandard fuel [100]. The scarcity contributed to the rise in the cost food prices it affected the cost of transportation of foodstuffs, food processing, production, distribution and storage across the country increased. For instance, Abuja (Nyanya) to Minna (Niger state) is N2500 as compared to N1500 collected last December. Niger state is one of the major producers of rice, millet, maize, beans, and cassava in Nigeria [96] and Nigeria's electricity grid had collapsed at least five times since the beginning of 2022. According to research [101], the recent collapses can be attributed to insufficiently trained personnel, deficiency in local manufacturing, poor utility performance, theft of grid equipment, weather, gas supply, insufficient funding and the age of grid infrastructure. In the agricultural sector, constant and sustainable electricity is needed to preserve processed and harvested food products to minimize post-harvest losses. But with the recent grid collapse, both consumers and producers had to settle for another means of preserving food to prevent food loss at the various Agricultural Value Chains [94].

2.2.8 Russia-Ukraine war

Since the invasion of Russia on Ukraine, Nigeria is still on the receiving end as it imports some agricultural products from both countries and

depends on the imports from these countries. Recently, Russia and Ukraine have engaged each other in a serious war tussle after Ukraine's decision to forge closer ties with the European Union (EU) and the North Atlantic Treaty Organization (NATO) [102]. Russia considers the decision a threat to their personality as a nation having shared powerful social and cultural ties together far back to the Middle Ages. Nigeria consumes a large portion of wheat products but only produces about one or two per cent of about six (6) million metric tons of wheat consumed annually, while relying heavily on importation to meet demands, data from the United State Department of Agriculture (USDA) confirmed [103]. Also, data from the Nigeria Bureau of Statistics [104] confirms that Nigeria imported wheat worth over N128.1billion in the nine-month period of 2021, while it recorded an N144.14 billion durum wheat import in 2020. Durum wheat is the third-highest consumed grain in the country as it is used in making a number of other foods like bread, pasta, noodles, biscuits and other food.

2.2.9 Insurgency

The glaring insecurity issues in the country have led to an acute rise in food prices due to the substantial reduction in food production. From July 2020 to date, basic food items like beans, sugar, yam and tomatoes have seen a 253% and 123% price increase respectively [104], thus putting millions of people at the edge of starvation. In the last five years, ethnic conflicts, banditry, and Boko Haram across Nigeria especially in the North-East and North-Central have been on the rise and about 77,000 farmers have been killed and 2.6 million displaced in the past five years [105]. The gruesome activities of herdsmen, kidnapers, bandits and Boko Haram have displaced farming communities, disrupted markets and limited agricultural production as most farmers deserted their farmlands and escaped to other regions for safety. Farmers now have restricted access to regional markets in these affected regions and find it difficult to go to their farms due to fear of being kidnapped or even killed [96]. Between 2011 and 2021, Boko Haram was responsible for 32.8 thousand deaths in Borno state alone which is the country's largest wheat-producing state. While Borno state production used to account for 30% of the national wheat production, it now contributes almost nothing to the total of about 420,000 tonnes, which is 4.5million tonnes short of national consumption.

2.3 Potential Impacts of Inflation on the Nutritional Status of Poor Households in Nigeria

In a high rate of inflation situation what is obtainable, is the major part of individual or households' income are spent on food, when prices of food increases as to the increase in the country's inflation rate, the poor which dominate the entire populace tend to decrease the value of food the consume base on quantities and quality of what they eat as a result of not having access to the food as they use to due to their present status. [106]. Jolliffe et al. [107], reported that rise in price due to inflation and a rapid increase in prices of food, gives rise to food scarcity as major effect that is during inflation which reflects the world's economic status tends to decrease and increase on the price of the global agricultural system. When the increase in price remains constant it brings about unbearable privation to the poor [108]. Food securities among families rely solely on accessibility and availability of food, in terms of financial, physical and social aspects. Inflation on the price of food commodities may result to application of certain survival mechanism by people in order to remain food secure [109]. In Obayelu [110], data was collected from 396 households in North Central Nigeria, along with secondary data from various sources, to investigate how the severity of food price increases affected the nutritional status of Nigerians. The findings revealed that many people had to resort to suboptimal living practices, such as reducing their nutritional intake, prioritizing carbohydrate-rich foods over protein, making school children work, and selling productive assets to cope with the situation [111].

2.3.1 Urbanization; Its effect on price of food commodities

Inflation has been a major concern for Nigeria's economy for several years, and its effects on the price of food commodities in urban areas have been significant. Nigeria has been experiencing persistent inflation since the year two thousand and sixteen (2016), with the annual inflation rate reaching a peak of 18.17% in March 2021 which was described as the highest in four years [112]. This high inflation rate has led to a significant increase in the price of food commodities, making it difficult for many urban dwellers to afford adequate nutrition. The urban population in Nigeria has been growing rapidly, and as a result, the demand for food has increased, leading to an increase in the price of food items.

This has affected the standard of living of urban residents, especially those with low and fixed incomes. The impact of inflation on food prices is particularly severe in urban areas where food markets are more integrated and have less supply capacity to absorb price shocks. As a result, inflation has been driving up the cost of living, especially for low-income households who spend a significant portion of their income on food. According to the National Bureau of Statistics (NBS), the urban inflation rate in Nigeria was 18.76% in March 2021, which was higher than the rural inflation rate of 17.6%. The urban areas have a higher cost of living compared to rural areas due to the higher cost of housing, transportation, and other services. The high inflation rate in urban areas has further exacerbated the situation, leading to higher prices for food commodities. According to the Food and Agriculture Organization of the United Nations [80], the food price index in Nigeria has been increasing steadily since the year two thousand and sixteen (2016), with a sharp increase in 2020 due to the COVID-19 pandemic and other factors. The price of staple foods such as rice, maize, and beans has been rising steadily, while the price of vegetables, fruits, and livestock products has been more volatile. Supply chain disruptions, climate change, and insecurity have contributed to the rise in food prices in Nigeria. The COVID-19 pandemic has also exacerbated the situation, leading to disruptions in food supply chains, increased transportation costs, and reduced access to markets. To mitigate the impact of inflation on food prices, the Nigerian government has implemented various policy measures such as increasing the production of food crops, providing support to farmers, and strengthening food security programs [113]. However, these measures have not been sufficient to fully address the problem, and more needs to be done to reduce inflation and improve access to affordable food in urban areas. The rising cost of food has made it difficult for low-income households to afford adequate nutrition, leading to food insecurity and malnutrition. Addressing inflation and its effects on food prices will require a multifaceted approach that includes policies to improve agricultural productivity, strengthen food security programs, and address other factors that contribute to food price volatility.

2.3.2 Portion size; its effect on price of food commodities

Inflation in Nigeria has been a significant issue in recent years, and it has had a considerable

impact on the price of food commodities for households. The inflation rate in Nigeria has been rising steadily since 2015, reaching a peak of 18.17% in March 2021, In May 2023, Nigeria experienced a food price inflation rate of 24.82%. During this period, there were significant increases in the prices of oil/fat, yam, bread/cereals, fish, and vegetables [59;23]. The high inflation rate has led to a significant increase in the cost of living, particularly for low-income households that spend a higher percentage of their income on food. The rise in inflation has had a significant effect on the price of food commodities, particularly staple foods such as rice, maize, and wheat. The cost of these commodities has increased due to the rising costs of production, transportation, and storage. Additionally, the devaluation of the Nigerian currency, the naira, has made it more expensive to import food commodities, leading to a decrease in supply and further increasing prices [114]. The effect of high food prices on households has been severe, particularly for low-income households. According to a report by the World Bank, Nigeria has one of the highest rates of food insecurity in the world, with over 82 million people being food insecure [115]. The high cost of food has made it difficult for households to access a sufficient and nutritious diet, leading to malnutrition and other health problems. In Nigeria, inflation has been a major concern for policymakers and households in recent times. One of the major effects of inflation on households is the increase in the price of food commodities. This is because food constitutes a large percentage of household expenditure, especially for low-income households and which has led to a decline in the standard of living and an increase in poverty levels. The high food prices have also led to food insecurity, as many households struggle to afford basic food items. The Nigerian government has implemented various measures to address the issue of inflation, including the introduction of various economic policies such as the Anchor Borrowers Program and the National Food Security Council. However, the impact of these policies is yet to be felt by households as food prices continue to rise. Furthermore, the COVID-19 pandemic has further exacerbated the issue of food insecurity in Nigeria. Lockdowns and movement restrictions have disrupted supply chains and caused a shortage of food commodities, leading to a further increase in prices [80]. In conclusion, inflation in Nigeria has had a significant effect on the price of food commodities, particularly for low-income households. The high cost of food

has led to food insecurity, malnutrition, and other health problems. The Nigerian government needs to take urgent measures to address the issue of inflation and ensure that households have access to affordable and nutritious food.

2.3.3 Nutrient intake; Its impact on health status of adult and children

Inflation can have significant effects on the prices of food commodities, which can in turn impact the nutrient intake and health status of adults and children. Nigeria has experienced high rates of inflation in recent years, which has had a significant impact on food prices and availability. In Nigeria, inflation has been a persistent problem over the years, with the annual inflation rate reaching 18.17% in March 2021 [116]. This high inflation rate has resulted in an increase in the prices of food commodities, which, in turn, affects the nutrient intake of adults and children, ultimately leading to negative health outcomes. The impact of inflation on food prices can be seen in the rising cost of staple foods such as rice, maize, and beans, which are the main sources of carbohydrates in Nigeria. These price increases can lead to reduced consumption of these foods, which can affect the intake of essential nutrients, such as vitamins, minerals, and fiber. The high cost of food commodities due to inflation has made it difficult for individuals and households to afford nutritious foods, which can lead to poor diet quality and malnutrition. According to a study conducted by Adeyemo et al. [117], the high cost of food commodities due to inflation has led to a reduction in the consumption of nutrient-dense foods, such as fruits, vegetables, and animal-source proteins, which are essential for maintaining good health. The negative impact of inflation on the nutrient intake of adults and children is evident in the high prevalence of malnutrition in Nigeria. According to the Global Nutrition Report [118], Nigeria has a high burden of malnutrition, with 37% of children under the age of 5 being stunted, 7.6% wasted, and 22% underweight. Malnutrition, which is caused by inadequate nutrient intake, can result in impaired physical and cognitive development, increased susceptibility to infections, and an increased risk of mortality. Furthermore, the impact of inflation on food prices can also affect the availability and affordability of other food groups, such as fruits, vegetables, and protein sources, which can further affect the nutrient intake of individuals. Reduced nutrient intake can lead to malnutrition, which can have long-term health consequences,

particularly for children. Owino et al., [118] reported that inflation can have a significant impact on the health status of children. For example, a study conducted in Nigeria found that high food prices due to inflation were associated with reduced dietary diversity and increased risk of malnutrition among children under five years old [119;120]. Arku et al. [121] reported that inflation was associated with increased child mortality, which was partly attributed to the impact of inflation on food prices and nutrition. Inflation can also have significant health implications for adults. For example, reduced nutrient intake due to high food prices can lead to chronic diseases such as obesity, diabetes, and hypertension [122]. According to World Economic Forum [123], the number of people with diabetes increased significantly from 108 million between the year 1980 and 2014 to 422 million, with a higher occurrence observed in low and middle-income countries compared to high-income countries. This indicates that individuals with lower incomes are more vulnerable to diet-related disorders. This can be attributed to their dietary habits which primarily consist of staple foods high in carbohydrates but lacking in other essential nutrients. Christian [124] argued that rising food prices can negatively impact infant and child mortality rates by contributing to issues such as childhood wasting, stunting, intrauterine growth restriction, and deficiencies in essential micronutrients like vitamin A, iron, and zinc [125]. Similarly, Darnton-Hill and Cogill [126] emphasized that food price shocks primarily affect nutrition, particularly the nutritional status of mothers and children, by reducing dietary quality and increasing the risk of micronutrient deficiencies, which in turn can lead to higher rates of infectious disease morbidity and mortality [125].

2.3.4 Income

Onyewuchi, [61] reported that Nigeria has the most common households that utilized about 73% of their earnings in purchase of food and beverages and 58.9% of common household in Nigeria uses their daily income and salary on food [127]. This puts Nigeria on the highest rate of poverty when compared to the other part of the world. These reports have shown that Nigerian economy sinking thereby placed her citizens in an abject poverty on about eighty-one (81) Million of its entire population and equally deduce that in every minute of the day, that six people are thrown in to the class of abject poverty [128]. Due to the prevailing poverty

conditions, it becomes challenging for individuals in this socioeconomic status to implement effective strategies to mitigate inflation, particularly concerning agricultural commodities. As a consequence, this situation can lead to inefficiency and malnutrition [129]. Derek and Marie [120], Ani and Mapamile [130] reported that post COVID-19 financial crises resulted in nutrient-poor diets of Nigerian households as there were significant decline in the demand of essential micronutrients sources such as vegetables, fruits, and animal-sourced foods due to high cost of processing and storage of these perishables thereby placing them in out of reach categories.

2.4 Food Security Implications of Rising Food Prices in Nigeria

Food security is a critical issue that affects the socio-economic wellbeing of individuals, families, and entire nations. In Nigeria, rising food prices have far-reaching implications for the country's food security. The increasing prices of food items have led to reduced access to food, malnutrition, and poverty, especially among the vulnerable population [131]. The impact of rising food prices is felt most by households with low income, as they spend a significant proportion of their income on food. For instance, NBS [116] reported that the food inflation rate in Nigeria rose to 23.14% in February 2021, which indicated that the cost of food has increased significantly over the past year. Many impoverished households, which faced extreme poverty, lacked the financial means to acquire or create food. These households were characterized by both low income and a large number of dependents. Consequently, they became vulnerable to economic shocks. This increase in food prices has led to reduced food consumption and increased levels of food insecurity [131]. Adewumi and Awokuse, [132] found that rising food prices have a significant negative impact on household welfare, as it reduces access to food, leading to malnutrition, poverty, and food insecurity. Another study by Simeon and Babatunde, [133] found that rising food prices in Nigeria have led to a significant increase in food insecurity, particularly among the poor and vulnerable households. The effects of rising food prices on food security in Nigeria have also been highlighted in various reports. A report by the Food and Agricultural Organization [80], of the United Nations revealed that Nigeria is among the countries in Africa most affected by high food prices, with food insecurity affecting

about 11 million people. The report noted that the primary drivers of rising food prices in Nigeria are the lack of investment in agriculture, poor infrastructure, and insecurity. According to Adewumi and Oyinbo [134] the implications of rising food prices in Nigeria are far-reaching. Firstly, it affects the affordability of food, particularly for low-income households who spend a significant proportion of their income on food. As food prices rise, these households are forced to reduce the quantity and quality of their food intake, leading to malnutrition and poor health outcomes. The rising food prices have led to food inflation, which has a ripple effect on other sectors of the economy. Higher food prices lead to higher production costs, which eventually leads to higher prices for other goods and services. This creates a domino effect that affects the entire economy, including businesses and consumers. Thirdly, rising food prices in Nigeria could lead to social unrest, particularly in urban areas. As the cost of living increases, people become increasingly frustrated and may resort to violent protests to demand government intervention. The rising food prices in Nigeria have significant implications for food production and agricultural development. Farmers face a difficult choice between producing for the domestic market or exporting their products to earn foreign exchange. In many cases, farmers opt for exports, leaving the domestic market under supplied. The COVID-19 pandemic had a significant negative effect on food security, particularly among rural farming households, with 78% experiencing food insecurity. Before the pandemic, households spent an estimated \$245.35 per week on food, which decreased to \$75.60 during the pandemic [135]. Prior to COVID-19, 47% of households were unable to meet the daily recommended caloric intake, while during the pandemic, this figure rose to 78%. Additionally, 18.4% and 27.1% of households were below the poverty line before and during the pandemic, respectively. These challenges were attributed to income reduction or loss, restricted market access due to travel restrictions, and low purchasing power, worldwide inflation [136;135]. The impact of unexpected price increases on household food security varies depending on the wealth level and livelihood activities of the household. According to Engel's law, as household income increases, the proportion of the budget allocated to food decreases. This relationship is more pronounced among less wealthy households compared to wealthy households [137]. This suggests that a sudden rise in the price of essential goods would

have a greater impact on the food budget of a less wealthy household compared to a wealthy household. Similarly, Bennett's law states that wealthier households have a more diverse diet compared to less wealthy households. The specific implications for different wealth levels are a matter of empirical investigation. Hoddinott et al. [138] mentioned that as incomes rise, the quantity and quality of diets improve which means that the demand for higher quality foods is more elastic among non-poor households than among poor households. Consequently, the diets of the poor may be less vulnerable to price shocks for staple foods compared to the diets of the non-poor. The Nigerian government has taken several steps to address the issue of rising food prices and food insecurity in the country. For example, the government launched the National Livestock Transformation Plan (NLTP), aimed at increasing livestock production, improving food security, and reducing farmer-herder conflicts [139]. Additionally, the government has implemented several programs to support smallholder farmers and improve their access to finance, inputs, and markets, such as the Anchor Borrowers' Program and the Growth Enhancement Support Scheme [140].

2.5 Strategies for Reducing the Impacts of Food Price Inflation on Food Security in Nigeria

Ensuring food security in Nigeria is a major challenge due to the country's growing population and the rising food prices caused by inflation. This inflation not only affects consumers by reducing their purchasing power but also impacts producers' profitability. According to the World Bank [140], many low- and middle-income countries, including Nigeria, are facing high domestic food price inflation, with double-digit rates being common. The causes of this inflation are diverse and include factors such as global supply chain disruptions caused by the COVID-19 pandemic, climate change effects on agricultural production, increased fertilizer prices, and geopolitical tensions [141;140]. These factors pose a threat to global food security, which refers to ensuring that all people have sufficient access to safe, nutritious food to meet their dietary needs for a healthy and active life [142]. To mitigate the impact of food price inflation on food security in Nigeria, various strategies can be implemented at different levels. At the macro level, the government can enact policies aimed at stabilizing food prices, such as

reducing tariffs and taxes on food imports, providing subsidies for food production and consumption, establishing strategic food reserves, and promoting regional trade and cooperation [115]. The private sector can invest in improving food supply chains, reducing post-harvest losses, and enhancing value addition and processing methods. To reduce the impacts of food price inflation on food security, Nigeria needs to adopt a combination of strategies that address both the supply and demand sides of the food system. Nigeria can invest more in agricultural research and development, extension services, irrigation infrastructure, climate-smart technologies, and crop diversification to boost its domestic food production and reduce its dependence on food importation. This would also help mitigate the effects of climate change, which is a major driver of food price volatility [143]. Enhancing social protection and safety nets: Nigeria can expand its coverage and adequacy of social protection programs, such as cash transfers, food vouchers, school feeding, and public works, to protect the most vulnerable households from food insecurity and malnutrition. These programs can also stimulate local food demand and production, creating a virtuous cycle of food security [144]. Nigeria can leverage its membership in the African Continental Free Trade Area (AfCFTA) to facilitate regional trade and integration of food markets. This would help lower trade barriers, reduce transport costs, increase market access, and improve food availability and affordability across the continent. Regional trade can also buffer against domestic shocks and stabilize food prices [141]. Nigeria can improve its capacity to monitor and analyze food price trends and drivers at national and subnational levels. This would help inform evidence-based policy decisions and interventions to address food price inflation and its impacts on food security. It would also enhance transparency and accountability in the food system [145-147].

3. CONCLUSION

Food price inflation poses significant challenges to food security in Nigeria. It undermines the purchasing power of households, increases food prices, and reduces dietary diversity. Addressing these challenges requires a comprehensive approach that combines efforts to enhance agricultural productivity, promote diversification of food systems, strengthen market systems, implement social safety nets, and ensure policy coherence and good governance. To mitigate the

impact of inflation on food security, it is imperative to prioritize the needs of the most vulnerable, including small-scale farmers, low-income households, and marginalized communities. The synergy of these strategies can contribute to a more resilient and sustainable food system, ensuring that all Nigerians have access to affordable, nutritious, and culturally appropriate food. Policymakers, stakeholders, and communities must work collaboratively to implement these strategies and create an enabling environment for long-term food security in Nigeria. The government, in collaboration with relevant stakeholders, should prioritize the development and implementation of evidence-based policies and programs to address the root causes of inflation and safeguard food security. By taking proactive measures, Nigeria can create a more inclusive, sustainable, and resilient food system that ensures the availability, accessibility, and affordability of nutritious food for all its citizens. Furthermore, investing in long-term solutions that promote sustainable agriculture, improve market infrastructure, and empower local food systems will contribute to building resilience and reducing dependence on external factors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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