Trend Analysis Of Consumer Price Of Rice In Nigeria: 2000 – 2020

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Abstract
This study analyzed the trends in consumer price of rice in Nigeria from 2000 to 2020. Secondary data obtained from Food and Agriculture Organization (FAO), National Bureau of statistics (NBS), statistica, USDA and WHO were used for this study. The data were analyzed using trend analysis indicating trend graph and forecasting as well as multiple regression analysis. The result showed that; consumers price of rice increased from #2,500 in year 2000 to #26,0000 in 2020 with a trend model represented as y = 1024.6x - 2E+06, consumers rice price will increase by 0.0002x - 28269 at any given population (x), the price index of food rose from 29.6 in the year 2000 to 302.9 by 2020 with a trend model of y = 67.35x + 1377.6, consumers rice price (y) will increase by y = 5.1843x- 6032.2 at rice production rate (x). The multiple regression revealed high R^2 (0.996) for factors affecting consumers price of rice and showed increasing price of rice since 2000 to 2020 at increasing rate of inflation, consumer price index of food, rice production, population growth rate, exchange rate, imported rice and population growth. It is therefore recommended to increase production of rice and exportation as well as stabilization on price index of food, exchange rate and inflation.
Keywords: *Trend, consumer, price, Nigeria*

I. Introduction

Sustainable food production, hunger and poverty reduction are important targets in the United Nations Sustainable Development Goals (SDGs) to be achieved by 2030 (SDG. "2030). Unfortunately, the achievement of the target so far in many countries is not encouraging with about six (6) years remaining (Schmidt-Traub *et al.*, 2013; Osendarp *et al.*, 2021). The incessant increase in food price over the recent years has increasingly been disturbing as a result of the negative outcomes, especially on the poor who spend a large share of their income on food (Fasanya and Olawepo, 2018). This has increased malnutrition and food insecurity among the poor, negatively impacted trade balance, led to low investment and social unrest among most developing countries of the world (Banerjee and Duflo, 2007). Over the past few years, studies have observed that the relationship existing between factors such as exchange rate, lending rate, money supply, real GDP per capita, stocks, and oil price among others and food price has been volatile (Irz *et al.*, 2013; Nazlioglu *et al.*, 2013; Ahmadi *et al.*, 2016).

Food prices refers to the global and cross-country average price of particular food commody (Saliu, 2021). These are caused by some of the factors outlined above and others such as high interest charges on loans for agricultural production, importation of agrochemicals, low investment in agriculture by private sectors due to increasing cost of farm input and a low profitability in farm enterprises in Nigeria (Olukunle, 2013). The implication is continuous increase in food prices especially as food production, which is below the Nigeria ever increasing population, have heightened food importation and declining levels of national food self-sufficiency (Aday and Aday, 2020).

Since the early 90s food prices have been on increase and the major course of this increase has been under researched. FAO, food price index showed that food price index have risen from 67.4 in 2005 to as high as 157.4 in June 2022, with cereals recording 166.3 index in 2022 (FAO, 2023). In 2010 and 2011, there was another high increase in the price of food due to the increase in the price of petrol which transmited to the domestic economy leading to a rise in transportation cost while depreciation of Nigerian naira to dollar led to a large increase in food price in August 2016. In December 2022, food inflation on a year-on-year basis was highest in Kwara (27.90%), Imo (26.94%) and Ebonyi (26.28%), while Sokoto (20.90%), Taraba (21.59%) and Cross River (21.71%) recorded the slowest rise in year-on-year food inflation. (NBS, 2022). According to Statistica (2023) Nigeria recorded one of the highest food inflation rates in the world at around 17 percent in 2023.

Rice is one of the most important staple grains in Nigeria. Its cultivation and consumption is a source of food and income to millions of people around the world, particularly in developing countries like Nigeria (Jerumeh, 2022). Nigeria's annual rice demand is estimated at above 5 million tonnes out of which only about 2.2 million tonnes are produced locally while annual rice supply gap of about 2.8 million tonnes (or 56% of demand) is bridged by importation (Mafimisebi et al., 2014). Like other food products/produce, the prices of rice have been on increase as exacerbated by border closure, high cost of input, seasonality of production, natural shocks such as flood, pests, diseases, and inappropriate response by farmers to price signals, ((Jacob, 2024). In addition, the incidence of COVID-19, which has disrupted the global and national food supply chain, has added to the list of contributing factors to food insecurity and hunger and increased rice cost especially in low- to middle-income countries where consumption of staple foods such as rice, maize and cassava is very high (Trollman et al., 2021, Ene-Obong et al., 2013). Higher levels of agricultural productivity manages the prices of food products and at the same time, decrease the overall inflation rate (Aras, 2020). Sadly, food prices have continued to soar while the inflation rate in the country is equally high. Between 1981 and 2021, food prices have increased steadily from an index of 48 in 1981 to 129 in 2021 (FAO, 2023).

The capacity of Nigeria's Agriculture to provide food to meet domestic requirements of the teeming population has declined (Effiong and Eze, 2010). This means that inadequate diets will increase people's vulnerability to diseases and parasites, reduce strength, increase poverty (Effiong and Eze, 2010 and Effiong, 2005) if not mitigated. Several related studies have been conducted on rice and price relationship in Nigeria. Eze et al. (2011) studied the consumer influence on retail prices of rice in Imo state of Nigeria; Obayelu et al.(2022) studied Households' Rice Demand Response to Changes in Price, Income and Coping Strategies during Food Inflation in Nigeria: Evidence from Oyo State; Udemezue, (2018) studied the analysis of Rice Production and Consumption Trends in Nigeria; Bamidele *et al.* (2010) studied the economic Analysis of Rice Consumption Patterns in Nigeria while Tiamiyu *et al.* (2014) studied the Trend analysis of milled rice consumption in Nigeria. However, there are still paucity of information on the detailed trends of consumer price of rice in Nigeria over two decades. It is therefore needful to evaluate the trend and cause of increasing consumers price of rice in Nigeria. The broad objective of the study was to analyze the trends in consumer price of rice in Nigeria from 2000 to 2020. Specifically, the study determine the trends in consumers price of rice in Nigeria from 2000 to 2020; determine the factors that influenced the trends in consumers price of rice in Nigeria (2000-2020); Predicted the future trends in the consumer price of rice in Nigeria.

II.   Literature

Food price volatility in Nigeria: Food price volatility refers to a long-term fluctuations in the trend of food prices (Food Monitor, 2020). It is a significant and persistent change in the direction and weight of food prices (FAO, 2011). Food price volatility may not be problematic, mainly when the variation follows a known trend and market conditions. Changes in food prices become an issue of worry when there are distortions in the trend. Such worrisome distortions affect the farmers, value chain actors, and households. Food price is an essential variable in household income and consumption decisions. Price levels and fluctuations in the price levels of food commodities affect household income and consumption (Diaz-Bonilla, 2016). Food price changes affect economic decisions both at the micro and macro levels. At the macro and micro levels, the agribusiness firms and industry consider the price of food commodities before taking input, demand, and output supply decisions. Agribusiness households are against low food prices that may affect their welfare when income becomes too low to cater for production factors and take care of the households (FAO *et al*., 2011).

Prior to 2007, food prices have remained at historic lows for years, after which the international and domestic food prices soared multiple times and remained volatile ever since. Nigeria, like most developing countries, is experiencing staggering levels of food prices. For example, NBS (2020) report reveals that food inflation increased from 14.5% in January 2020 to about 17.4% in October 2020. The report also shows that food price index increased from 95.8 points in 2009 to 109.9 points in 2010, averaged 148.9 points (10%) between 2011 to 2015 and up by 15% in 2016 (base period 2009=100). The most remarkable increase in food prices was recorded in 2017 where composite food price index rose by almost 20% over that of the year 2016. However, 2018 witnessed significant improvement in CPI as it decreased by 14%, a change which persisted till 2019. More recently, the index increased by 20.57% in January 2021 compared to an increase of 19.56 % in December, 2020(NBS 2021).

Available evidence shows that food prices have increased continuously over the years. Apparently, food prices have remained high without corresponding increase in disposable personal income, the growth of which has stagnated at less than 1% since 2009 (NBS, 2020), or adequate protective policies or subsidies to shield the producers. In the past few years, many studies have been carried out to investigate the causes of and solutions to soaring food prices (Abbot *et al*., 2009; Gilbert, 2010). They have examined and identified a set of drivers of food price upsurges including biofuel demand, speculation in commodity future markets, countries'

aggressive stockpiling policies, trade restrictions, exchange rate and economic growth. But none of these studies considered insecurity and climatic factors a critical factor to food price volatility.

In a developing economy like Nigeria, where export price fluctuates as a result of currency devaluation which is expected to be an incentive for export growth, the primary concern is the nature and magnitude of risk introduced by the price and exchange rate movements in agricultural exports. Many researchers who conducted researches on the effects of price and exchange rate movements on agricultural tradable products had inconclusive results, leaving a gap in this area. For instance, Kargbo (2006) found that prices, real exchange rates, domestic production capacity, and real incomes have significant impacts on the agricultural export.

Study by DeGrauwe (1988) show that exchange rate variability causes fluctuations in export revenue. While there is a certain consensus regarding the effects of weather, biofuel production and export restrictions on food prices, the problem is far from settled. In spite of the government effort to improve export, the agricultural sector is yet to respond to such policy signals. Instead, the performance of the agricultural exports remains dismal and discouraging. Of the massive documents on the effects of exchange rate volatility on macroeconomic variables, only very few have attempted to identify the role of third world countries' exchange rate volatility on domestic macroeconomic variables (Clark, 2004). Most empirical studies focus primarily on granger causality tests to explain the role of speculation in price volatility (Irwin *et al*., 2009; Gilbert, 2010).

Trend of Rice prices in Nigeria

An important determinant of the quantity purchased of any good is its price. To understand the demand for rice, it is therefore necessary to discuss changes in the real prices of rice over time in Nigeria. Generally, the real price of all rice-imported and different varieties of local rice-trended downward over the period, although the rate of decline was not smooth; prices tended to fluctuate from one year to the next even though the downward trend is clear. The domestic price of imported rice and the prices of local rice moved in the same direction as international prices. The large spike in the domestic price of rice in 2008 tracks the rise in international prices resulting from the 2008 global food crisis. It appears that trends in the domestic market price for rice are related to changes in the price of rice in the international market, exchange rate, and rice trade policies in Nigeria.

Generally, imported long-grain rice and other long-grain rice have consistently commanded higher prices than those of local rice, even though all prices move in the same direction. While the price of local rice is usually lower by a healthy margin than that of imported rice, the prices of some local niche rice, such as ofada, are closer to imported rice. Indeed, in some zones of Nigeria such as the South West, the price of ofada rice exceeds that of imported rice. Prices for ofada rice (though only available since 2008) have also been consistently higher than prices of other local rice varieties, indicating that ofada is premium rice. This suggests that Nigerian consumers are willing to pay higher prices for local rice if it meets their quality and taste standards. The policy implication is that there should be increased emphasis on processing in order to increase the quality oflocal rice to attract the Nigerian consumer, especially those with higher incomes.

There have been no studies chat track and explain the observed trends in real prices of rice in Nigeria over the 2002-2012 period. However, it is likely that Nigerian real rice prices are mostly driven by demand-side factors combined with (1) changes in the world price of rice and (2) exchange rate and trade policies. As discussed earlier, both per capita and aggregate demand for rice in Nigeria have been increasing at a rapid rate. Without an aggregate increase in domestic rice production to meet demand, real prices are likely to be more susceptible to global price changes and to exchange rates and trade policies as imports rise.
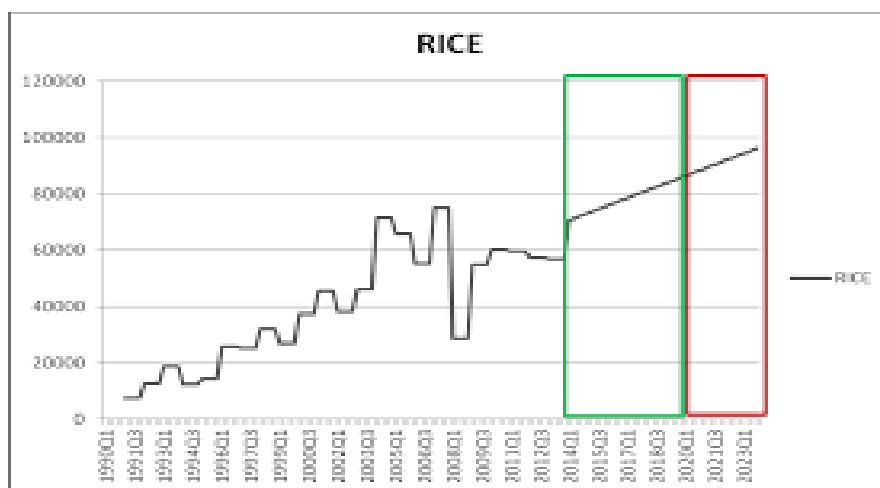

Figure 1: Trend in rice price in Nigeria
Source: FAO, 2020

Akande & Akpokodje, (2003) observed that rice availability and accessibility had become a significant welfare determinant for poor households in Nigeria, especially as government increase emphasis on local rice consumption and ban in the importation of foreign rice; and this makes the price of rice very important. Aina, Ayinde and Folola (2015) reported that the price of rice has been fluctuating from 1995 to 2008 before decreasing significantly in 2011, this is contrary to the report that the price of rice had a positive trend (Mark *et al.*, 2015).

To curb the price increase in 2008, the government introduced the policy of buying up excess rice produced by the farmers to hedge against a sharp rise or fall in the price of rice (Codoni & Angleccu, 2013). Another policy of the federal government aimed at stopping the importation of rice and smuggling of rice into the country (Udumezue, 2018), to encourage the local production of rice and its value chain development yielded a positive result in terms of increased production and processing capacity. However, there was a hike in the price of rice from 2015 to 2018. We estimated the price of rice at N80, 000 per ton in 2018, and it may increase closer to N100, 000 per ton by 2023. Nevertheless, Okafor (2019) reported a distinct figure which showed that the actual price of rice in Nigeria was N140, 000 per metric ton in 2019.

III.   Methodology
The study area is Nigeria. Nigeria is situated in the Gulf of Guinea in sub-Saharan Africa. The country lies 4° and 14° north of the equator and between longitude 3° and 15° east of Greenwich and bounded by Niger Republic in the North, Benin Republic in the West, and Chad in the north-east, Cameroon in the East and the Atlantic Ocean in the South. It is one of the biggest countries in West Africa in terms of land mass and population.

Types and Source of Data
Secondary data were used for the study. The study covered a period of 20 years (2000 – 2020). Data on consumer price of rice in Nigeria from 2000-2020; trend in population growth and importation was mainly sourced from Food and Agriculture Organization (FAO) and National Bureau of statistics (NBS) and used for this study.

Data Analysis: Objective i and iii was achieved using descriptive statistics (Trend Analysis) indicating trend graph and forecasting; objective ii was achieved using multiple regression analysis

Model for trend analysis and forecasting
Trend analysis and forcasting tool was used to evaluate the consumer price of rice from 2000-2020.
The model: $Yit=exp^{(\beta0+\beta1+ei)}$ eq.1
Linearized and applied by (Duong and Izumida, 2002) and (Nnamerenwa, 2012) as follows:
$LnYit=\beta o+\beta 1T+ei$ eq.2
where: Ln= Natural logarithm;
Yit= consumers price of rice in period
ei: = error term.
T = value of year to be forecasted
The year to be forecasted is substituted into the equation or model with the highest coefficient of determination (R^2) and a least standard error of estimate to obtain the forecast price of rice for the year.

Model for multiple regression analysis
This was used to determine the factors that influences the trends in consumer price of rice in Nigeria within the period under study.
Explicitly the model is shown as:
$Y = \beta0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + …+ \mu t$
Where: Y = consumer prices of rice (N)
$\beta0$ = constant
$\beta_1 – \beta_2$ = coefficient of estimation
X_1 =   production of rice in years
X_2 =   consumer price index.
X_3 = import in years
X_4 = exchange rate in years
X_5 = inflation rate in years
X_6 = population growth
X_7 = growth rate
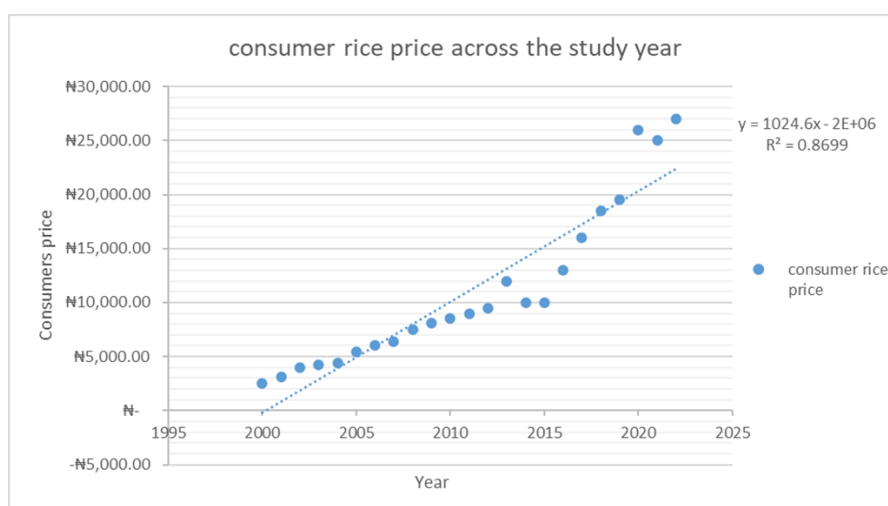μt =   stochastic error term

IV.   Results And Discussion

Trend Analysis Of Consumers Price Of Rice In Nigeria

The relationship between consumers price over the study years (2000-2022) was evaluated and the trend represented in Table 1.

Table 1: Consumers Price of Rice from 2000-2022

year	consumer rice price/50kg (₦)
2000	2,500.00
2001	3,100.00
2002	4,000.00
2003	4,200.00
2004	4,400.00
2005	5,400.00
2006	6,000.00
2007	6,400.00
2008	7,500.00
2009	8,100.00
2010	8,500.00
2011	9,000.00
2012	9,500.00
2013	12,000.00
2014	10,000.00
2015	10,000.00
2016	13,000.00
2017	16,000.00
2018	18,500.00
2019	19,500.00
2020	26,000.00
2021	25,000.00
2022	27,000.00

Source: USDA, FAO, statistica, others
Fig 2: trend analysis of price of rice from 2000-2020.

The graph presented in Fig 2 reveals the trends of consumer prices of rice from 2000-2020. The result showed that consumers price of rice increased from #2,500 in year 2000 to #26,0000 in 2020. The trend model was represented as y = 1024.6x - 2E+06. Hence, from the trend model, consumer's price of 50kg rice grain by 2025 is estimated to sell at #74,800. The ever increasing prices of food could be as a result of ever increasing

inflation, insecurity, exchange rates, population surge, and increase in general consumer's price index, rice production rate and importation into the country (Effiong and Eze, 2010). This is in line with the findings of world rice statistics (USDA, 2010) which reported that yields in Nigeria decreased from 1.820 to 1.519 for the respective periods. Also, FAO, (2022) reports that rice production area was increased to gain an average yield of 5,273,000Mt from 2009 to 2022 however, was accompanied with higher demand for food as population increased and rice gradually gaining grounds in dietary patterns of Nigeria (FAO, 2022).

Statistics of rice production in Nigeria shows a 5% increase every year with a corresponding import rates also increasing to 5,850 from 4,800 during the same period of time. This is because Nigeria is only capable to supply only 49% of domestic demand with only six major states producing rice (Anambra, Nassarawa, Ebonyi, Kaduna, Niger, Kano Kaduna and Benue) (Udemezue, 2018).

Table 2: Consumers price of rice and population growth

Year	Nigeria population	Growth rate	Consumer price of rice (₦)
2000	122851984.00	2.5	2,500.00
2001	126152678.00	2.5	3,100.00
2002	129583026.00	2.6	4,000.00
2003	133119801.00	2.6	4,200.00
2004	136756848.00	2.6	4,400.00
2005	140490722.00	2.6	5,400.00
2006	144329764.00	2.6	6,000.00
2007	148294028.00	2.7	6,400.00
2008	152382506.00	2.7	7,500.00
2009	156595758.00	2.7	8,100.00
2010	160952853.00	2.7	8,500.00
2011	165463745.00	2.7	9,000.00
2012	179075932.00	2.7	9,500.00
2013	174726123.00	2.7	12,000.00
2014	179379016.00	2.7	10,000.00
2015	183995785.00	2.7	10,000.00
2016	188666931.00	2.7	13,000.00
2017	193495907.00	2.6	16,000.00
2018	198387623.00	2.6	18,500.00
2019	203304492.00	2.6	19,500.00
2020	208327405.00	2.58	26,000.00
2021	213401232.00	2.55	25,000.00
2022	218541212.00	2.53	27,000.00

Source: World Bank statistics, FAO, WHO
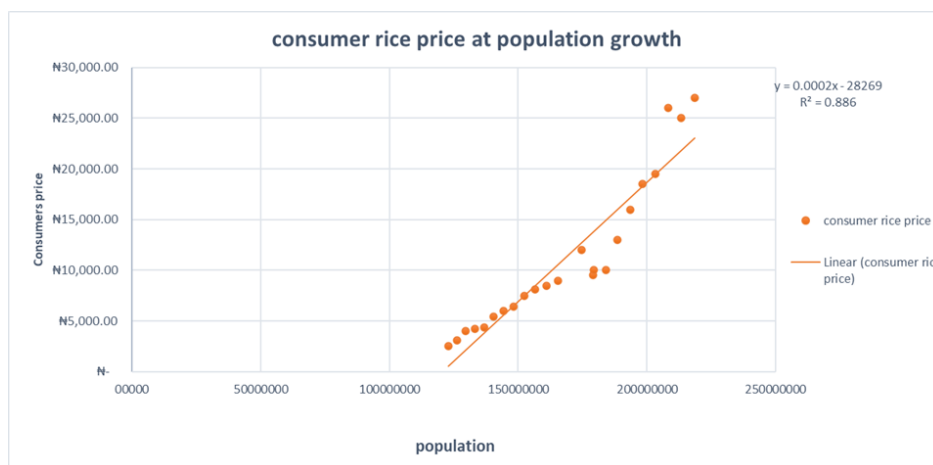
Source: USDA, FAO,statistica, National Bureau of Statistics others
Fig 3: consumers price of rice and population growth

The result in Fig 3 revealed the trend relationship of consumer price of rice and Nigeria's population. The result revealed strong R^2 (0.886) and a model y = 0.0002x - 28269. Hence consumer's rice price will increase by 0.0002x - 28269 at any given rise in population (x). The population of Nigeria is expected to increase from 206 million people in 2020 to 263 million in 2030, 401 million in 2040, and a massive 733 million in 2050 (NBS, 2024). From the trend analysis consumers' price of rice will sell at # 51,931 and # 118,331 in 2050 (FAO, 2022). The current price of rice in the Nigeria market however did not agree with the trend analysis with rice selling as high as #60,000-#75,000. This upsurge could be as a result of high inflation, high exchange rate, insecurity and unstable economy of Nigeria (NBS, 2024).

Rice is one of the most consumed staples in Nigeria, with a consumption per capita of 32kg (PWC, 2024). In the past decade, consumption has increased by 4.7%, almost four times the global consumption growth, and reached 6.4 million tonnes in 2017, accounting for 20% of Africa's consumption (USDA, 2014). In 2018, the FAO placed the country's rice production at 5.6 million metric tonnes. While the consumption was at 6.9 million metric tonnes according to the data from KPMG, indicating that consumption surpassed production.

According to FOA, Nigeria's rice production climbed to 5.63 million metric tonnes in 2019, and in 2020, rice production dropped to 5.45 million tonnes, while it is predicted that consumption figures increased considering that Nigeria's population increase from 201 million in 2019 to 206 million in 2020 (Dataphyte, 2022).

Table 3: Consumers price of rice and consumer price index of food

Year	Consumer price index	Consumer price of rice (₦)
2000	29.6	2,500.00
2001	35.2	3,100.00
2002	39.7	4,000.00
2003	45.3	4,200.00
2004	52.1	4,400.00
2005	61.4	5,400.00
2006	66.4	6,000.00
2007	70.0	6,400.00
2008	78.1	7,500.00
2009	87.9	8,100.00
2010	100	8,500.00
2011	110.8	9,000.00
2012	124.4	9,500.00
2013	134.9	12,000.00
2014	145.8	10,000.00
2015	158.9	10,000.00
2016	183.9	13,000.00
2017	214.2	16,000.00
2018	240.1	18,500.00
2019	267.5	19,500.00
2020	302.9	26,000.00
2021	354.3	25,000.00
2022	421.1	27,000.00

Source: World Bank statistics, FAO, WHO, NBS (2021,2022)
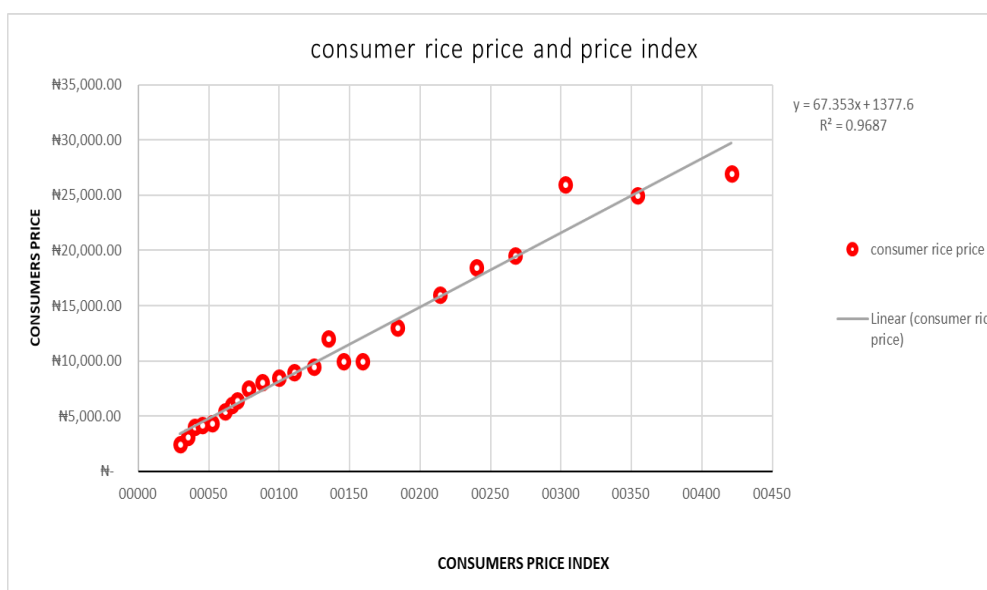
Source: USDA, FAO,statistica,National Bureau of Statistics, others
Fig 4: consumers price of rice and general food price index

The result in fig. 3 shows that consumers price of rice increased with general price index of food commodities over the study years. The price index of food rose from 29.6 in the year 2000 to 302.9 by 2020. This upsurge influenced the prices of rice as indicated by the high R^2 of 0.968. The consumer rice price equation in relation with consumer price index was shown as y = 67.35x + 1377.6, where y= consumer price of rice and x price index of food. From the model, price of rice could be projected or forecasted for years ahead. Consumer Price Index CPI in Nigeria increased to 660.80 points in January, 2023 from 643.80 points in December of 2023. Applying the model, consumer price of rice (y) = 67.35 (660.80) + 13776.6.
Y = #58,227.6 for 2024.

The Consumer Price Index (CPI) is a measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services. Rice is one of the most consumed grains in Nigeria. The rising interest in rice was a function of increased government intervention programmes in rice through increased land for production and provision of inputs to enhance production (Okonkwo, Ukaogo, Kenechukwu, Nwanshindu, & Okeagu 2021). The closure of the border against rice importation and the increase in tariff of rice coming into Nigeria by 70% was in the interest of the nation's economy, however, production deficiency, corruption and other factors have continued to keep price of rice on the high (Okonkwo *et al*., 2021).

The surge in prices of consumables upsets the nutrition of the impoverished by forcing them to go for less exorbitant, low value, and less micronutrient-dense foods (Anriquez, Daidone and Mane, 2013). Price of food like rice in markets is having an adverse effect on the livelihood of countries' residents in achieving economic growth and healthy living (Adam & Paice, 2017). It is among the most pressing food and economic problems before policy makers in Africa (Uduji *et al,* 2019). The consistent rise in cost of rice over the years reveals that rice is the primary food product in Nigeria. This result is consistent with that of Onyeneke *et al.* (2020) and Zhou *et al.* (2015) who posited that most primary food products such as rice are necessities to every household.

Consumers Price Of Rice And Rice Production

The study also assessed the relationship between consumers price of rice and rice production and the result presented in table 4.

Table 4: Consumers price of rice and rice production

year	consumer rice price/50kg (₦)
2000	2,500.00
2001	3,100.00
2002	4,000.00
2003	4,200.00
2004	4,400.00
2005	5,400.00

2006	6,000.00
2007	6,400.00
2008	7,500.00
2009	8,100.00
2010	8,500.00
2011	9,000.00
2012	9,500.00
2013	12,000.00
2014	10,000.00
2015	10,000.00
2016	13,000.00
2017	16,000.00
2018	18,500.00
2019	19,500.00
2020	26,000.00
2021	25,000.00
2022	27,000.00

Source: World Bank statistics, FAO, WHO, NBS (2021,2022)

Source: USDA, FAO, statistica, world data bank, National Bureau of Statistics, others
Fig 4: consumers rice price and production

The trend relationship between consumer's prices of rice and rice production is presented in Fig 4. The result revealed that change in production of paddy rice over the year influenced the consumer price of rice. The model for predicting the trend was presented as y = 5.1843x-6032.2 with an R^2 of 0.866. Although there is high potential for rice land area expansion over the years, the relatively stable national average yields of less than 2 tonnes per hectare in the last decades is a pointer to declining productivity (FAO, 2013). Rice yield could surpass the current record because Nigeria farmers are yet to tap fully the potential of the available rice technologies so far released to Nigeria farmers leading to low productivity compared to neighbouring countries (Tiamiyu, *et al.*, 2009; Cardoni and Angelucci, 2013). Therefore there is need to improve productivity of rice through intensive promotion of adoption of improved rice production technologies among farmers, if Nigeria is to meet the potential demand this is in line with the study of Usman, *et al.*, (2014) who reported the need to improve production through the use of improved technologies.

Multiple Regression Analysis Of Factors Influencing Consumers Price Of Rice In Nigeria
The result of the regression analysis of the consumers price of rice in relation to influencing factors is presented in Table 5 and 6.

Table 5: Goodness of Fit Statistics	
Observations	21
Sum of weights	21
DF	14
R²	0.996
Adjusted R²	0.994
MSE	766235.035
RMSE	875.349
MAPE	7.200
AIC	290.019
AICC	298.635
SBC	297.331
PC	0.008

Table 6: Multiple regression analysis summary and model parameter

Variable	Obs	Min	Max	Mean	Std. dev	values	Std. error	P value
Rice production in 1000 MT	21	1621.	5314.0	3116.905	1237.023	-2.122	0.828	*
Nig. population	21	1.2×10^7	2.08×10^8	163158711	26951747.7	-8.49E-05	0.000	°
consumer price index	21	29.600	302.900	121.386	80.327	130.467	26.058	***
Exchange rate ($ to #)	21	101.7	358.810	178.564	77.537	1.687	15.195	°
milled rice import (1000Mt)	21	1250.0	3200.00	2010.476	535.257	0.477	0.568	°
Growth rate	21	2.500	2.700	2.637	0.068	5077.570	2928.962	°
Inflation Rate (%)	21	0.054	0.189	0.121	0.036	-2645.768	7194.912	°

*Signification codes: 0 < *** < 0.001 < ** < 0.01 < * < 0.05 < . < 0.1 < ° < 1*

Equation of the model (consumer rice price) could be represented as; consumer rice price = -2.12*Rice production-8.49E-05*Nig. Population+130.47*consumer price index +1.687*exchange rate +0.477*milled rice export (1000Mt) +5077.7*Growth rate -2645.77*Inflation Rate

The result showed high value of R square and adjusted R square. This indicated high significance level of influence on price of rice. Consumers prices of rice will increase at increasing consumer price index, inflation, population growth, insecurity, importation, exchange rate and population growth rate. The high adjusted R^2 shows goodness of fit of a regression model. Hence there is need to check inflation, consumer price of goods, increase production while managing population growth if increasing consumer price of rice is to be managed (Okonkwo *et al*., 2021). According to the Food and Agriculture Organization, in 2000, a 50kg bag of rice averaged #2,500. In 2014, according to the National Bureau of Statistics, a 50kg bag of rice averaged N10,000 while at the end of June 2020, a 50kg bag of rice went for an average of N26,000. This were as a result of increasing levels of the aforementioned contributing factors.

V.   Conclusion

The research concludes based on the findings that consumer's price of rice increased from #2,500 in year 2000 to #26,0000 in 2020. The trend model was represented as y = 1024.6x - 2E+06. Hence, from the trend model, consumer's price of 50kg rice grain by 2025 is estimated to sell at #74,800. Noting that Consumer's prices of rice will increase at increasing consumer price index, inflation, population growth, insecurity, importation, exchange rate and population growth. Also, that change in production of paddy rice over the years influenced the consumer price of rice. Although there is high potential for rice land area expansion over the years, the relatively stable national average yields of less than 2 tonnes per hectare in the last decades is a pointer to declining productivity.

VI.   Recommendations

From the findings, the study therefore recommend that:
i.   There is need to improve productivity of rice through intensive promotion of adoption of improved rice production technologies among farmers, if Nigeria is to meet the potential demand through better government

programmes, like access to grants, subsidies and infrastructural developments in rural areas where these agricultural activities take place

ii. Government has to review the macroeconomic policies to promote economic growth through domestic production, farmers and farm security and reduce high inflation.

iii. Effort to manage the high exchange rate should be addressed through increased rice production, improved exportation, regulations to check hoarding and artificial scarcity.

iv. Improving grain stocks and enacting regulatory measures to curb excessive speculation in agricultural commodities which in-turn create artificial scarcity, increase in prices of food and imbalance in demand-supply of food by government price regulatory agencies so as to control food price index and inflation.