Original Research Article

Impact of Housing Supply, Income Levels and Macroeconomic Factors on Housing Prices in Nigeria

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Abstract: Housing affordability remains a critical challenge in Nigeria, driven by rapid urbanization, inadequate housing supply, economic disparities, and fluctuating macroeconomic conditions. This study investigates the impact of housing supply, income levels, and key macroeconomic factors, specifically inflation, interest rates, and GDP growth, on housing prices in Nigeria. Using a quantitative research design, secondary data from the Central Bank of Nigeria, the National Bureau of Statistics, and the World Bank were analyzed over the period from 2013 to 2023. Statistical analyses, including trend analysis, correlation, multiple regression, and Granger causality tests, were conducted to determine the relationships between housing prices, housing supply, income levels, and macroeconomic indicators. Findings indicate that increased housing supply plays a stabilizing role in moderating housing prices, while rising income levels drive demand elevates prices. Inflation is identified as a key driver of housing costs, primarily due to escalating construction expenses, while interest rates show minimal impact on housing prices due to limited mortgage accessibility in Nigeria. The study among others recommends policies to increase the affordable housing supply, including incentives for developers and streamlined regulatory processes. Income support measures and affordable mortgage options tailored for low- and middle-income earners are also recommended to improve housing accessibility. To mitigate the impact of inflation, strategies to stabilize construction costs are proposed, along with broader monetary policies to promote economic stability. This study underscores the need for an integrated housing policy framework in Nigeria that addresses supply expansion, income growth, and inflation control to enhance housing affordability in the nation's urban centers.

Keywords: Housing Supply, Income Levels, Macroeconomic Factors, Housing Prices, Nigeria.

INTRODUCTION
Housing is a fundamental human need, and access to adequate housing remains a global challenge. Across the world, rapidly increasing urban populations, coupled with a growing middle class and fluctuating macroeconomic conditions, have put immense pressure on housing markets. Nigeria,

Africa's largest economy and most populous country, is no exception to these dynamics. The interplay between housing supply, income levels, and macroeconomic factors such as inflation, interest rates, and gross domestic product (GDP) has significantly influenced housing prices, exacerbating affordability challenges and contributing to a

widening housing deficit. The global housing market has experienced significant fluctuations over the past decade, largely driven by urbanization, economic cycles, and macroeconomic variables (Huchzermeyer, 2011). Rising housing demand and limited supply have led to increased prices in many regions, with macroeconomic factors such as inflation and interest rates playing critical roles. According to a study by Mian *et al*., (2020), macroeconomic factors like income levels, inflation, and mortgage interest rates heavily influence housing affordability and market volatility on a global scale. In developed economies, government intervention in the form of subsidies and affordable housing programs has mitigated some of the pressures, but affordability remains a pressing issue, particularly in urban centers (Mian *et al*., 2020).

In Africa, the housing sector faces even more severe constraints due to a combination of rapid population growth, inadequate urban planning, and underdeveloped financial markets. According to the African Development Bank (AfDB), Africa's housing deficit exceeds 50 million units, with Nigeria accounting for nearly 20% of that figure (World Bank, 2020). Housing affordability remains a significant challenge for most African countries, where the majority of the population lives below the poverty line and lacks access to mortgage financing (AfDB, 2021). In Kenya, for instance, government-led affordable housing projects have made some progress, yet a wide gap persists between housing supply and demand (World Bank, 2021). Similarly, South Africa has attempted to address its housing deficit through large-scale government housing programs, but the gap remains substantial due to economic and social inequalities (Huchzermeyer, 2011).

In Nigeria specifically, housing market faces similar challenges, compounded by the country's macroeconomic instability and weak regulatory frameworks. According to a report by the World Bank (2020), Nigeria's housing deficit stands at around 17 million units, with the majority of the population living in informal settlements or substandard housing. The growing demand for housing, particularly in urban areas like Lagos and Abuja, has driven property prices to unsustainable levels for most Nigerians, with only the wealthiest segments of society able to afford homeownership. Housing supply in Nigeria remains grossly inadequate to meet the rising demand. The underdeveloped nature of Nigeria's construction industry, high land acquisition costs, and cumbersome property registration processes have hindered the supply of affordable housing (Olokesusi, 2021). Despite several initiatives aimed at increasing the housing supply, such as the Federal Government's National Housing Program,

private sector involvement remains limited, and most housing developments cater to the high-income market.

Research has shown that income levels play a crucial role in determining housing affordability (Egbu and Kalu, 2022). In Nigeria, the disparity between housing prices and average income levels is significant, particularly among low- and middle-income earners, as shown in Egbu and Kalu (2022) who highlights that more than 90% of Nigerians cannot afford to purchase a home without financial assistance due to the vast gap between incomes and rising housing prices. Macroeconomic variables such as inflation, interest rates, and GDP growth have a direct impact on housing prices in Nigeria as Olokesusi (2021) argues that inflation increases the cost of building materials and construction labor, leading to higher property prices. Additionally, Nigeria's high interest rates, often above 20%, make mortgage financing inaccessible for most citizens (Egbu & Kalu, 2022). When coupled with low GDP growth and a high unemployment rate, these factors lead to a weak housing market, limiting both housing demand and supply. The devaluation of the Naira has further exacerbated these issues by increasing the cost of imported building materials, thereby driving up construction costs and housing prices.

Therefore, while the housing market is influenced by a complex set of factors, including supply-demand dynamics, income levels, and macroeconomic conditions globally, African countries, including Nigeria, face additional challenges stemming from underdeveloped financial markets, economic instability, and inadequate infrastructure. In Nigeria, the combination of rapid population growth, a significant housing deficit, and macroeconomic pressures such as inflation and high interest rates has created a perfect storm for housing affordability.

Nigeria is facing a significant housing crisis, characterized by an estimated deficit of over 17 million housing units, primarily driven by rapid urbanization and population growth (World Bank, 2020). The country's population exceeds 200 million, with a high rate of rural-urban migration, which has created an increasing demand for housing, particularly in urban areas like Lagos and Abuja. However, the supply of affordable housing has not kept pace with this growing demand. This mismatch between demand and supply exacerbates housing shortages, contributing to overcrowding and informal settlements (African Development Bank [AfDB], 2021). Housing affordability remains one of the most pressing challenges in Nigeria. More than 90% of Nigerians, particularly low- and middle-income earners, are unable to afford homeownership

without some form of financial assistance or government intervention (Egbu & Kalu, 2022). High construction costs, lack of affordable financing options, and income inequality further limit access to affordable housing. The private sector's involvement in housing development has largely focused on high-end, luxury properties, which cater to wealthier individuals, while low-cost housing remains severely underdeveloped (AfDB, 2021).

Furthermore, several macroeconomic factors, such as inflation, interest rates, and the devaluation of the Naira, significantly affect housing prices in Nigeria. Inflation drives up the cost of building materials and labor, while high interest rates (often exceeding 20%) limit access to affordable mortgage financing, effectively pricing many Nigerians out of the housing market (Olokesusi, 2021). The persistent devaluation of the Naira increases the cost of imported building materials, further raising construction costs and housing prices (World Bank, 2020). In addition, Nigeria's overall economic instability, characterized by fluctuating GDP growth and reliance on oil exports, has a direct impact on household incomes and borrowing capacity. During periods of economic downturn, reduced household incomes further limit housing demand and affordability (AfDB, 2021). These macroeconomic pressures have created a housing market that is largely inaccessible to the majority of Nigerians, particularly in urban areas. This study aims to explore the interplay between housing supply, income levels, and macroeconomic factors such as inflation, interest rates, and GDP growth, to understand their collective impact on housing prices in Nigeria. Understanding these dynamics is critical for developing effective policy interventions to address Nigeria's housing crisis. Therefore, the study shall seek answers to the following research questions:

1. How does the supply of housing affect housing prices in Nigeria?
2. What is the impact of income levels on housing affordability in Nigeria?
3. How do macroeconomic factors such as inflation, interest rates, and GDP growth influence housing prices in Nigeria?

REVIEW OF RELATED LITERATURES
Housing Prices and Determining Factors in Nigeria

Housing prices in Nigeria have undergone significant fluctuations, driven by a variety of economic, social, and demographic factors. The Nigerian housing market is characterized by a substantial housing deficit, especially in urban centers like Lagos and Abuja, where rapid urbanization has exacerbated the demand-supply imbalance. In agreement with the World Bank (2020)

estimate of Nigeria's housing deficit of over 17 million units, Fapohunda and Oroge (2019) have argued that housing prices in Nigeria have outpaced income growth, making homeownership unaffordable for most Nigerians, especially in urban areas. High rates of rural-to-urban migration have further intensified the demand for housing in cities like Lagos, resulting in increased prices and a concentration of high-end housing developments that cater to the wealthy. This is also reflected in the work of Gbadamosi and Solanke (2019), who argue that developers often focus on luxury housing due to the higher returns on investment, neglecting the middle- and low-income segments.

A major determinant of housing prices in Nigeria is the disparity between income levels and housing costs. Research by Egbu and Kalu (2022) suggests that over 90% of Nigerians cannot afford to purchase homes without financial assistance, particularly low- and middle-income earners. The widening gap between property prices and household income has made housing largely unaffordable in major urban areas. Ajanlekoko (2020) further emphasizes that housing affordability in Nigeria is disproportionately skewed in favor of high-income earners, while the majority of Nigerians are left to contend with either informal housing or inadequate mortgage financing. This growing disparity, coupled with the lack of affordable housing finance, has worsened the housing affordability crisis. Also, several macroeconomic factors contribute significantly to housing prices in Nigeria. Olokesusi (2021) examines the role of inflation and interest rates, finding that inflation increases the cost of building materials, while high interest rates make mortgages less affordable. This is compounded by Nigeria's exchange rate volatility, which affects the cost of imported construction materials, as noted by Olanrewaju, *et al.,* (2020). Egbu and Kalu (2022) also highlight that high interest rates, often exceeding 20%, make mortgage financing inaccessible to most Nigerians, which reduces housing affordability and demand. Meanwhile, inflation drives up construction costs, leading to higher prices in the property market, further deepening the affordability crisis.

Housing supply constraints are another key factor influencing prices, as Olawale and Akinwunmi (2018) argue that the sluggish response of housing supply to increased demand has resulted in persistent housing shortages, driving up prices, particularly in urban areas. They identify regulatory bottlenecks, high land acquisition costs, and inefficiencies in property registration as key obstacles to increasing housing supply. Similarly, Ademiluyi and Raji (2020) argue that the housing supply in Nigeria is constrained by bureaucratic delays, high construction costs, and inadequate

infrastructure, which limit the availability of affordable housing. These supply-side constraints are especially pronounced in urban centers, where demand outstrips supply, leading to higher housing prices. Furthermore, government policies also play a crucial role in determining housing prices, as Ojo and Iweka (2019) critique the ineffectiveness of Nigeria's housing policies, noting that despite various initiatives aimed at improving housing affordability, such as the National Housing Program, poor implementation and coordination have limited their impact. They argue that without significant regulatory reforms, housing prices will continue to rise, driven by inefficiencies in land acquisition, property registration, and housing finance systems.

Empirical Literature

Nigeria's housing market has been shaped by several interrelated factors, including urbanization, macroeconomic conditions, income levels, inflation, and access to housing finance. These elements have led to significant housing affordability challenges, particularly for low- and middle-income earners. This review provide a comprehensive analysis of the factors affecting housing supply, prices, and affordability in Nigeria. Urbanization has been a significant force behind the demand for housing in Nigeria, particularly in cities like Lagos. Opoko and Oluwatayo (2014) conducted a qualitative study using secondary data to explore the impact of urban growth on housing for low-income earners in Lagos. They found that rapid urbanization, without corresponding housing development, has led to a severe housing shortage. They concluded that more robust urban planning policies, specifically targeting low-income housing, are necessary to prevent the housing crisis from worsening.

Similarly, Oni-Jimoh, *et al*., (2018) examined the broader urbanization-housing affordability gap. Their case study showed that urbanization has driven up housing prices, outpacing income growth and leaving low-income earners unable to afford housing in urban areas. They called for policy interventions that increase the supply of affordable housing in rapidly urbanizing areas. While Adeoye (2016) focused on the impact of urbanization on housing quality in Akure. He found that while high-income earners improve their housing through modifications, low-income households often face deteriorating conditions, emphasizing the need for government policies that ensure housing quality improvements for low-income residents.

Inflation on the other hand, is a significant factor affecting housing affordability in Nigeria. Amassoma and Sunday (2018) analyzed the relationship between inflation and housing prices. Their quantitative study demonstrated that increasing money supply drives inflation, which subsequently raises housing prices. They concluded that tighter monetary policies are necessary to curb inflation and stabilize housing costs, especially for low-income earners. Makinde (2014) also studied the impact of macroeconomic conditions, particularly inflation, on housing delivery. He found that high inflation rates drive up construction costs, making it difficult for developers to supply affordable housing. Additionally, low-income levels further restrict housing access for many Nigerians. The study concluded that economic reforms are essential to support housing supply and affordability. Also, Moore (2019) examined the government's response to macroeconomic challenges, particularly regarding the housing deficit. While government interventions exist, Moore argued they have not been sufficient to meet the demand for affordable housing, particularly in a high-inflation environment. He recommended stronger policies to address inflation's impact on housing prices.

Income levels are a crucial determinant of housing affordability and property values, as Abbas (2018) proved through a survey-based econometric analysis in Zaria, finding that property values are closely tied to local economic activities and income levels. Areas with higher incomes saw rising property values, making housing increasingly unaffordable for lower-income groups. Abbas concluded that local economic development could help stabilize housing markets, though income disparities may widen the affordability gap. Similarly, Yap and Ng (2018) used a mixed-methods approach to study housing affordability and found that income levels, along with housing supply and inflation, were major factors affecting housing prices. They emphasized the need for integrated policies to address income disparities and stabilize housing prices in urban areas. Adegoke (2014) examined rental values in Ibadan's residential market and similarly found that income levels and interest rates were key factors affecting rental prices. His study argued that improving income levels could help stabilize rental markets and reduce housing market volatility.

Furthermore, access to mortgage financing remains a significant barrier to homeownership in Nigeria which is shown in Usman and Lizam's (2016) quantitative study in Bauchi to assess the factors influencing mortgage uptake. Their findings indicated that high interest rates and low incomes make mortgages unaffordable for most Nigerians. They recommended revising mortgage policies to increase accessibility for middle- and low-income earners. Then Nwuba *et al.,* (2015) explored the broader determinants of housing affordability in urban markets. They found that land accessibility, building costs, and non-housing expenditures were

critical barriers to affordable homeownership. Like Usman and Lizam, they emphasized the need for financial support and better mortgage options for low-income households. In Abuja, Ezennia and Hoskara (2019) conducted a quantitative study to identify the most severe factors affecting housing choices. They found that house prices relative to income and building material costs were the most significant barriers. They concluded that enhancing income growth and improving mortgage access would help bridge the affordability gap.

Nevertheless, studies also showed that socio-cultural factors also play a significant role in shaping housing satisfaction, particularly in low-income housing estates. For instance, Makinde (2015) studied socio-cultural experiences in the Ikorodu low-cost housing estate in Lagos. His survey found that income levels and socio-cultural factors such as family structures and community ties greatly influenced residents' satisfaction. He concluded that housing policies should integrate both economic and socio-cultural considerations to improve satisfaction levels in low-income housing projects. Also, Ibem, *et al*., (2019) conducted a similar study on residential satisfaction in government-subsidized housing estates in Ogun State. Their survey-based analysis found that ownership status, tenure security, and housing quality were key determinants of satisfaction. Residents with secure tenure and better housing conditions reported higher levels of satisfaction, reinforcing the importance of integrating socio-cultural and economic policies in housing development.

THEORETICAL FRAMEWORK
The General Equilibrium Theory
General Equilibrium Theory (GET) was originally developed by Léon Walras, a French economist, in his 1874 work Éléments d'économie politique pure (Walras, 1874). Walras introduced the concept of equilibrium in multiple interconnected markets simultaneously, building upon the classical economic idea of supply and demand equilibrium but extending it to an entire economy. Later, economists such as Kenneth Arrow and Gérard Debreu formalized and expanded the theory in the 20th century, most notably in their 1954 paper that provided a rigorous mathematical proof of the existence of a general equilibrium in a competitive economy (Arrow & Debreu, 1954).

General Equilibrium Theory posits that all markets in an economy are interdependent, and prices adjust until supply equals demand across all markets simultaneously. The theory is based on several key assumptions which include interconnected markets which is the believe that every market in an economy affects and is affected by other markets; price flexibility, which says that prices adjust freely to ensure that supply and demand reach equilibrium in each market; rational agents, explaining that consumers and producers are assumed to be rational and utility-maximizing, making decisions based on available information to achieve the best possible outcomes; and perfect competition, which explains that in its most idealized form, the theory assumes perfect competition where no single buyer or seller has the power to influence prices, and information is available to all participants.

The theory can serve as a robust theoretical framework for understanding between the independent variables of this study and housing prices. The theory provides a lens to examine the complex interactions between different markets and how changes in macroeconomic conditions lead to price adjustments across these markets. In the context of GET, inflation increases the cost of building materials and labor, which affects the supply side of the housing market. Liao and Huang (2021) examined the relationship between inflation and housing prices in the U.S., using a general equilibrium model to show that rising inflation leads to an increase in real estate prices through cost-push and demand-pull mechanisms. Also, in an economy-wide equilibrium framework, a change in interest rates affects both the demand for housing and other markets such as financial assets. Glaeser and Nathanson (2017) provided empirical evidence linking low interest rates to higher housing prices, arguing that reduced borrowing costs increase demand, which leads to price inflation in competitive housing markets. On the other hand, exchange rate movements directly influence foreign demand for housing, particularly in open economies. Yiu *et al*., (2016) studied the impact of exchange rates on housing prices in Hong Kong and demonstrated that a weaker local currency increases foreign demand for housing, leading to higher prices in equilibrium.

METHODOLOGY
This study adopts a quantitative research design to examine the relationships between housing supply, income levels, and macroeconomic factors (inflation, interest rates, and GDP growth) on housing prices in Nigeria. This design is appropriate because it enables the use of statistical tools to establish and quantify relationships between multiple variables. The analysis focuses on Nigeria, a country characterized by a growing population, increasing housing demand, and macroeconomic fluctuations that affect both the housing market and affordability. This study uses secondary data from reputable sources such as the Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS), and the World Bank, ensuring reliability and accuracy. Data will be collected for the period from 2013 to 2023, allowing

for a comprehensive analysis of changes over time in the key variables.

The Housing Prices (HP) which is the dependent variable, is measured by the Housing Price Index (HPI), which tracks the changes in the price of residential properties over time in Nigeria, while the independent variables include: Housing Supply (HS), measured by the number of new housing units made available annually, reflecting the availability of housing in the market; Income Levels (IL), represented by real per capita income, adjusted for inflation, indicating the average income of individuals and their capacity to afford housing; Inflation (INFL), measured by the annual percentage change in the Consumer Price Index (CPI), representing the overall price level in the economy; Interest Rates (INT), which a representation of the monetary policy rate (MPR), set by the CBN as a representation of the cost of borrowing; and GDP Growth (GDPG), measured by the annual GDP growth rate, indicating the overall economic performance of Nigeria.

To answer the research questions, the study employs both descriptive and inferential statistical methods. Each research question is addressed through appropriate statistical analyses which include Trend Analysis used to describe patterns in housing prices, housing supply, income levels, and macroeconomic indicators (inflation, interest rates, GDP growth) over time, providing an overview of changes in these variables from 2013 to 2023. Correlation Analysis: The Pearson correlation coefficient will be applied to measure the strength and direction of the relationships between housing supply, income levels, and macroeconomic factors (inflation, interest rates, GDP growth) with housing prices.

Multiple Linear Regression Analysis:
A multiple linear regression model will be employed to quantify the impact of each independent variable on housing prices while controlling for other factors. This approach allows the study to isolate the effect of housing supply, income levels, and macroeconomic factors on housing prices. These statistical analysis will be conducted using EViews 12, which is suitable for handling time series data and econometric modeling. EViews allows for the application of multiple regression, Granger causality, and other relevant statistical methods.

Model Specification:

$$\text{HousingPricest}_t = \propto \sum_{i=1}^{p} \beta_1 \text{HousingPrices}_{t-i} + \sum_{i=1}^{q} \lambda_i (\text{IndependentVariables}_{t-i}) + \varepsilon_t$$

Where:

$\text{IndependentVariables}_{t-i}$ *refers to housing supply, income levels, or macroeconomic factors (inflation, interest rates, GDP growth) lagged by i periods*

To address the three research questions, the following econometric models are specified:

Model 1: Impact of Housing Supply on Housing Prices
This model is designed to analyze the effect of housing supply on housing prices in Nigeria. The relationship is captured through a simple linear regression model, where housing prices are regressed on housing supply:

$$\text{HousingPrices}_t = \beta_0 + \beta_1(\text{Housing Supply}_t) + \varepsilon_t$$

Where:
(HousingPrices_t) is the Housing Price Index at time_t,
(HousingSupply_t) is the Housing units supplied at time_t,

β_0 *is the intercept*, β_1 *is the coefficeint for housing supply, and* ε_t *is the error term*

Model 2: Impact of Income Levels on Housing Affordability
This model examines how income levels affect housing affordability in Nigeria. A simple linear regression model is used to explore the relationship between income levels and housing prices:

$$\text{HousingPrices}_t = \beta_0 + \beta_1(\text{IncomeLevels}_t) + \varepsilon_t$$

Where:
IncomeLevels_t) is real per capita income at time_t,
Other terms are as previously defined

Model 3: Impact of Macroeconomic Factors on Housing Prices
This model is a multiple linear regression model designed to investigate how macroeconomic factors (inflation, interest rates, and GDP growth) influence housing prices:

$$\text{HousingPrices}_t = \beta_0 + \beta_1(\text{Inflation}_t)$$
$$+ \beta_2(\text{InterestRates}_t)$$
$$+ \beta_3(\text{GDPGrowth}_t) + \varepsilon_t$$

Where:
Inflation_t is the Consumer Price Index (CPI) at time_t,
InterestRates_t is the monetary policy rate (MPR) at time_t,

GDPGrowth_t) is the annual GDP growth rate at time_t,

$\beta_1, \beta_2,$ *and* β_3 *are the respective coefficients for the macroecnomic variables*

Granger Causality Test: Causal Relationships between Variables
To examine whether changes in housing supply, income levels, and macroeconomic factors (inflation, interest rates, and GDP growth) predict future changes in housing prices, a Granger causality test will be used. The general form of the Granger causality test for each variable is:

RESULTS AND DISCUSSION OF FINDINGS

The data used for empirical analysis of impact of housing supply, income levels and macroeconomics factors on housing prices in Nigeria is presented in the appendices section under appendix A.

The data in Table 1 provides the summary statistics for the variables GDP, HS, HP, INF, INT_RATE, and PCI based on data from 2014 to 2023.

Table 1: Summary Statistics of data from 2014-2023

	GDP	HS	HP	INF	INT__RATE	PCI
Mean	2.025000	26.56713	249.6550	12.85738	5.677000	360451.6
Median	2.430000	26.47500	241.8063	13.15938	5.580000	355774.5
Maximum	6.310000	28.31375	351.4375	17.35750	13.60000	466543.6
Minimum	-1.790000	25.28750	147.9875	7.967500	0.920000	254289.5
Std. Dev.	2.425605	1.037262	72.73831	3.223946	4.214652	75820.47
Skewness	-0.165014	0.346707	0.124278	-0.144418	0.620893	0.051055
Kurtosis	2.630327	1.888991	1.587160	1.859829	2.457419	1.620275
Jarque-Bera	0.102324	0.714651	0.857457	0.576423	0.765177	0.797529
Probability	0.950125	0.699545	0.651337	0.749603	0.682093	0.671149
Sum	20.25000	265.6713	2496.550	128.5737	56.77000	3604516.
Sum Sq. Dev.	52.95205	9.683219	47617.75	93.54446	159.8696	5.17E+10
Observations	10	10	10	10	10	10

Source: E-views 12

The variables' mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque-Bera, and probability values were calculated using E-Views Software, Version 10.0. According to the descriptive statistics, all six variables have an equal number of observations (10 each). The mean GDP is 2.025%, with a median of 2.43%, and values ranging from -1.79% to 6.31%, indicating some variability in economic growth. The housing supply (HS) shows a mean of 26.57, with low variability, as shown by a small standard deviation of 1.04 and values ranging from 25.29 to 28.31. Housing prices (HP) display greater fluctuation, with a mean of 249.66, a standard deviation of 72.74, and values between 147.99 and 351.44. Inflation (INF) averages 12.86%, with a maximum of 17.36% and a minimum of 7.97%, indicating moderate inflation stability over the period. The interest rate (INT_RATE) has a mean of 5.68%, with a high of 13.6% and a low of 0.92%, showing some variation. Per capita income (PCI) has a mean of 360,451.6, with a range from 254,289.5 to 466,543.6 and the highest standard deviation at 75,820.47, indicating more substantial variability. The skewness and kurtosis values suggest the distributions of the variables are close to normal. Additionally, the Jarque-Bera test indicates that all variables are normally distributed, as their probability values exceed 0.05, confirming the normality assumption according to the Jarque-Bera estimates.

Trend Analysis

The trend analysis illustrated in Figure 1 displays the behavior of each variable over the period from 2014 to 2023, with each variable exhibiting unique patterns and fluctuations influenced by various economic factors. The GDP graph shows fluctuations throughout the period. It initially declines sharply, reaching a low point around 2017. Following this, GDP recovers slightly with some volatility, peaking around 2021 before stabilizing at a lower level by 2023. This pattern suggests that GDP was influenced by both economic downturns and recoveries within the period under review. For HS, rate initially shows a downward trend, hitting its lowest point around 2018. Afterward, it reverses, with an upward trend beginning in 2019 and continuing consistently through 2023. This steady increase may reflect favorable conditions for home ownership, possibly driven by housing policies or improved affordability in later years.

HP (Housing Prices) demonstrates a steady increase from 2014, reaching a peak around 2021, before experiencing a significant decline by 2023. This trend suggests that housing prices were on the rise for most of the period, potentially due to increased demand or inflationary pressures, before a sharp correction took place in the last few years. The INF (Inflation) variable displays an irregular trend. It rises sharply to a peak around 2015, then decreases before showing further fluctuations.
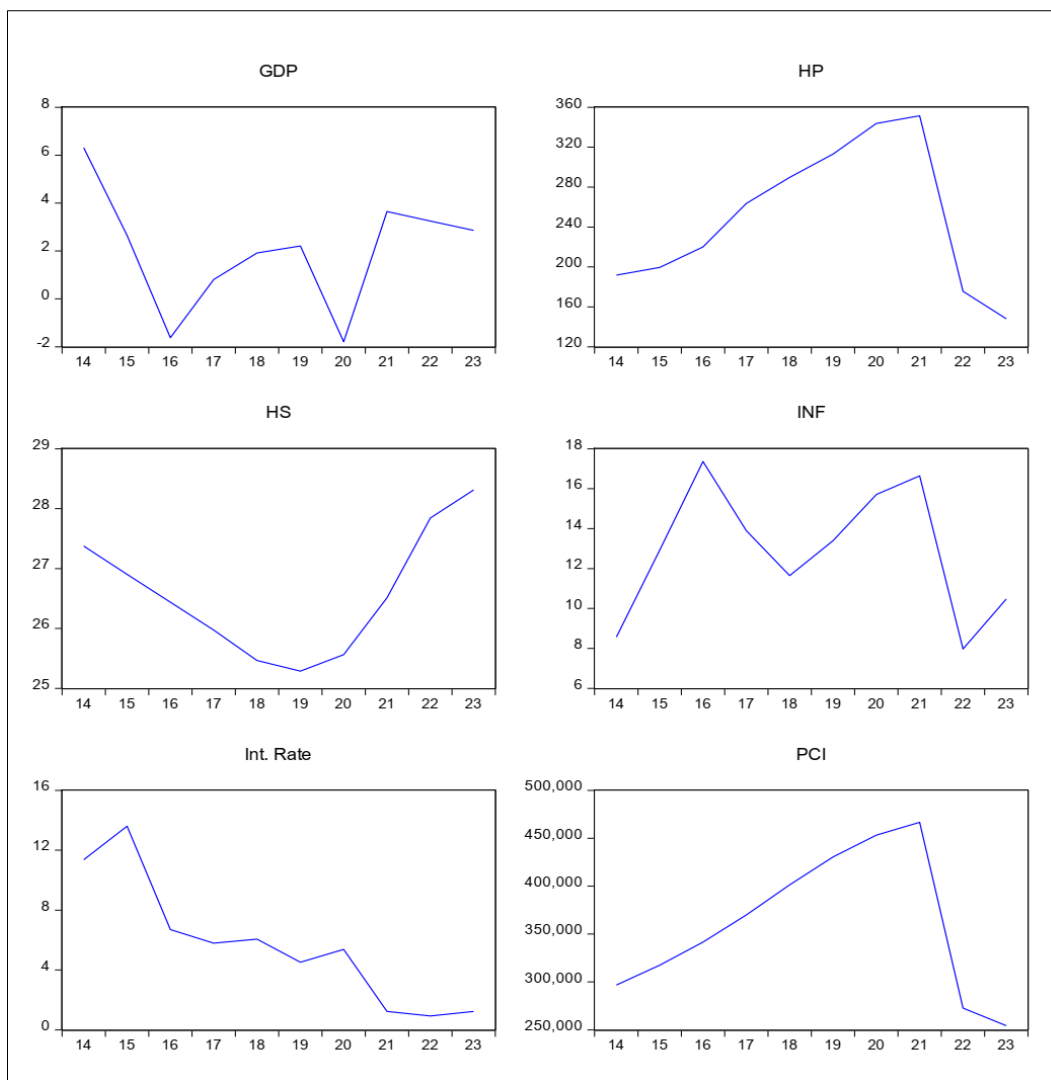
Figure 1: Trend Analysis

Another peak occurs around 2021, followed by a decline by 2023. This variability in inflation may be attributed to external economic factors, as well as changing monetary policies, affecting inflation rates at different points in time. Interest Rate exhibits a consistent downward trend over the entire period, starting from a relatively high point in 2014 and reaching a low in 2023. This continuous decline might reflect a trend in monetary policy aimed at lowering interest rates to stimulate economic growth over time. Finally, PCI (Per Capita Income) shows a general upward trend, reflecting steady growth in income from 2014 until it peaks around 2021. Following this peak, per capita income declines slightly by 2023. This growth in PCI indicates economic improvement over much of the period, though the recent decline might suggest challenges to income growth due to economic constraints.

Table 2: Correlations between study variables

	GDP	HOR	HP	INF	INT__RATE	PCI
GDP	1.000000	0.508112	-0.346386	-0.688591	0.104598	-0.369458
HOR	0.508112	1.000000	-0.833135	-0.580011	-0.131619	-0.847907
HP	-0.346386	-0.833135	1.000000	0.648700	-0.177876	0.995852
INF	-0.688591	-0.580011	0.648700	1.000000	-0.033506	0.696015
INT__RATE	0.104598	-0.131619	-0.177876	-0.033506	1.000000	-0.137704
PCI	-0.369458	-0.847907	0.995852	0.696015	-0.137704	1.000000

Source: E-views 12

The key relationships include the strong link between Per Capita Income and Housing Prices, indicating that income levels play a significant role in determining housing affordability and demand.

Additionally, the stabilizing effect of GDP on inflation suggests that economic growth can help control price levels. The relationships involving Interest Rates tend to be weak, suggesting limited interaction with other variables, possibly due to stable monetary policies or external influences. These insights provide a framework for understanding the dynamics between economic growth, inflation, housing markets, and individual income levels in this dataset.

Table 3: Housing supply and Housing price

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HS	9.304222	0.963442	9.657274	0.0000
R-squared	-0.239964	Mean dependent var		249.6550
Adjusted R-squared	-0.239964	S.D. dependent var		72.73831
S.E. of regression	80.99679	Akaike info criterion		11.72134
Sum squared resid	59044.32	Schwarz criterion		11.75159
Log likelihood	-57.60668	Hannan-Quinn criter.		11.68814
Durbin-Watson stat	0.709127			

Source: E-views 12

The regression analysis was conducted to examine the relationship between Housing Supply (HS) and Housing Price (HP) using a least squares estimation method over the sample period from 2014 to 2023. The results are summarized below. The coefficient for HS (Housing Supply) was found to be 9.3042 with a standard error of 0.9634. This positive coefficient suggests that for each additional unit increase in home ownership rate, housing prices (HP) tend to increase by approximately 9.30 units, holding other factors constant. The associated t-statistic of 9.6573 is highly significant with a p-value of 0.0000, indicating a statistically strong positive relationship between housing supply and housing prices in this sample. However, despite this significant relationship, the model's R-squared value is -0.2399. This negative R-squared value is unusual and suggests that the model does not explain the variance in housing prices effectively. A negative R-squared can indicate potential issues with model fit, such as omitted variables or an insufficient number of observations (only 10 in this case). Additionally, the Adjusted R-squared is also -0.2399, reinforcing that the model fails to capture the variability in housing prices accurately. The standard error of regression is 80.9968, indicating a relatively high degree of variability in housing prices not accounted for by the model. In summary, although there is a statistically significant association between HS and HP, the negative R-squared value and low Durbin-Watson statistic imply that the model does not fit the data well. This limited fit suggests that additional variables or a more complex model might be needed to better explain housing price fluctuations over the period studied.

Table 4: Income level and Housing price

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PCI	0.000703	1.77E-05	39.59510	0.0000
R-squared	0.919581	Mean dependent var		249.6550
Adjusted R-squared	0.919581	S.D. dependent var		72.73831
S.E. of regression	20.62731	Akaike info criterion		8.985748
Sum squared resid	3829.372	Schwarz criterion		9.016006
Log likelihood	-43.92874	Hannan-Quinn criter.		8.952554
Durbin-Watson stat	0.693136			

Source: E-views 12

The regression analysis was conducted to explore the relationship between Income Level (PCI) and Housing Price (HP) over the sample period from 2014 to 2023, using the least squares estimation method. The findings are presented below. The coefficient for PCI (Per Capita Income) was estimated at 0.000703, meaning that for each additional unit increase in income, housing prices are expected to increase by approximately 0.000703 units, all else being equal. This relationship is highly significant, as indicated by the t-statistic of 39.5951 and an associated p-value of 0.0000, which reflects a very strong statistical association between income levels and housing prices in this sample. The model's R-squared value is 0.9196, indicating that approximately 91.96% of the variation in housing prices is explained by changes in income levels. This high R-squared suggests that the model fits the data well, with a large portion of the variability in housing prices accounted for by the changes in per capita income. The Adjusted R-squared is also 0.9196, affirming the strong explanatory power of the model.

The Standard Error of Regression is 20.6273, indicating that the actual housing prices deviate from the model's predicted values by around 20.63 units on average. This relatively low standard error reinforces the model's reliability in estimating housing prices based on per capita income. In summary, the analysis indicates a significant and strong positive relationship between Income Level (PCI) and Housing Price (HP), with the model explaining a large proportion of the variance in housing prices. However, the low Durbin-Watson statistic suggests some issues with autocorrelation, which may need to be addressed in further analysis or model adjustments.

Multivariate Regression

Here two models are applied, and in examining the two regression models for Housing Prices (HP), we can observe and compare how HP's relationship with different macroeconomic variables varies between a limited model and a more comprehensive model (***See both models' data in appendix***). The primary metrics to interpret include each variable's coefficient, t-statistic, p-value, and the R-squared values for the models, which collectively offer insight into the statistical significance and explanatory power of each predictor. In the first regression model, Housing Prices (HP) are analyzed in relation to GDP, Inflation (INF), and Interest Rate (INT_RATE). Here, GDP shows a positive but statistically insignificant relationship with HP (coefficient = 8.065, p = 0.3306), indicating it is not a significant driver of housing prices in this model. INF exhibits a strong positive and statistically significant relationship with HP (coefficient = 19.380, p = 0.0001), suggesting inflation pressures significantly elevate housing prices. Conversely, INT_RATE has a negative but insignificant relationship with HP (coefficient = -2.880, p = 0.563), implying a limited effect of interest rates on housing prices in this limited context. The model explains only 46.7% of HP's variation (R-squared = 0.467), indicating moderate explanatory power.

In the second model, which includes GDP, Housing Supply (HS), INF, INT_RATE, and Per Capita Income (PCI) as predictors, more comprehensive insights emerge. GDP now has a weak negative and statistically insignificant impact on HP (coefficient = -0.270, p = 0.8338), confirming GDP's minimal role in housing prices when more variables are added. HS has a significant negative effect on HP (coefficient = -2.642, p = 0.0020), suggesting that increased housing supply strongly suppresses prices. The effect of INF reverses to a weak, negative, and statistically insignificant coefficient (-1.985, p = 0.1497), likely because HS and PCI absorb much of the inflationary influence. INT_RATE continues to show an insignificant effect (coefficient = -0.792, p = 0.1567), while PCI reveals a strong, statistically significant positive relationship with HP (coefficient = 0.000972, p = 0.0000), underscoring income as a major housing price driver. The second model's fit is much stronger, with 99.6% of HP's variation explained (R-squared = 0.996). This high explanatory power suggests that housing prices are more accurately predicted when HS and PCI are included. Overall, the first model highlights Inflation as a key driver, but the second model shows that Housing Supply and Per Capita Income become the dominant factors, diminishing the significance of inflation. This shift underscores the direct impacts of income levels and housing availability on housing prices, with a more comprehensive model providing a fuller, nuanced understanding of HP determinants.

Granger Causality

The Granger causality test results (***See appendix for data***) provide insights into how Housing Supply (HS), Housing Prices (HP), and Per Capita Income (PCI) interact and predict each other over time. The analysis reveals that past values of Housing Supply significantly predict future changes in Housing Prices. This indicates that fluctuations in housing supply directly impact housing prices, likely because changes in supply affect overall market dynamics, influencing price levels due to variations in availability. The results also show that Housing Supply significantly predicts future Per Capita Income. This relationship may reflect the economic impact of housing market conditions on household wealth and disposable income, suggesting that changes in housing availability influence individuals' economic well-being. No significant predictive relationship was found between Housing Prices and Per Capita Income in either direction, indicating that housing prices and individual income levels do not significantly forecast one another. This suggests that, within this dataset, housing price changes do not impact personal income levels in a manner that can be forecasted, and vice versa. These findings highlight Housing Supply as a critical factor influencing both Housing Prices and Per Capita Income. The ability of housing supply to predict changes in housing prices underscores the role of supply-side factors in housing market pricing.

Appendices

Data on Study's Variables

Years	GDP(%)	Int. Rate	INF	HP	PCI	HOR
2014	6.31	11.36	8.56875	191.7625	296810.7	27.37375
2015	2.65	13.60	12.925	199.4375	317510.1	26.90375
2016	-1.62	6.69	17.3575	219.9875	341673.4	26.4375
2017	0.81	5.79	13.89625	263.625	369875.6	25.97375
2018	1.92	6.06	11.6425	289.7625	401416.3	25.4625
2019	2.21	4.52	13.39375	313.1125	430437.8	25.2875
2020	-1.79	5.37	15.705	343.7875	453224.3	25.5625
2021	3.65	1.23	16.645	351.4375	466543.6	26.5125
2022	3.25	0.92	7.9675	175.65	272734.6	27.84375
2023	2.86	1.23	10.4725	147.9875	254289.5	28.31375

Limited Model ($HP = \beta_0 + \beta_1.GDP + \beta_2.INF + \beta_3.INT.RATE + \varepsilon$)

Dependent Variable: HP				
Method: Least Squares				
Date: 11/05/24 Time: 15:49				
Sample: 2014 2023				
Included observations: 10				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	8.065175	7.715937	1.045262	0.3306
INF	19.37954	2.371173	8.172974	0.0001
INT__RATE	-2.880048	4.744086	-0.607082	0.5630
R-squared	0.467351	Mean dependent var		249.6550
Adjusted R-squared	0.315165	S.D. dependent var		72.73831
S.E. of regression	60.19440	Akaike info criterion		11.27636
Sum squared resid	25363.56	Schwarz criterion		11.36714
Log likelihood	-53.38180	Hannan-Quinn criter.		11.17678
Durbin-Watson stat	1.034831			

Comprehensive Model ($HP = \beta_0 + \beta_1.GDP + \beta_2.HS + \beta_3.INF + \beta_4.INT.RATE + \beta_5.PCI + \varepsilon$)

Dependent Variable: HP				
Method: Least Squares				
Date: 11/05/24 Time: 13:12				
Sample: 2014 2023				
Included observations: 10				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	-0.269532	1.219429	-0.221031	0.8338
HS	-2.641867	0.447959	-5.897563	0.0020
INF	-1.985176	1.167232	-1.700756	0.1497
INT__RATE	-0.791935	0.475539	-1.665339	0.1567
PCI	0.000972	3.65E-05	26.64449	0.0000
R-squared	0.996308	Mean dependent var		249.6550
Adjusted R-squared	0.993355	S.D. dependent var		72.73831
S.E. of regression	5.929425	Akaike info criterion		6.704584
Sum squared resid	175.7904	Schwarz criterion		6.855877
Log likelihood	-28.52292	Hannan-Quinn criter.		6.538617
Durbin-Watson stat	2.242462			

Table 5: Granger Causality

Pairwise Granger Causality Tests			
Date: 11/05/24 Time: 16:55			
Sample: 2014 2023			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.

HS does not Granger Cause HP	8	13.9550	0.0302
HP does not Granger Cause HS		2.95427	0.1954
PCI does not Granger Cause HP	8	0.21585	0.8174
HP does not Granger Cause PCI		0.36632	0.7205
PCI does not Granger Cause HS	8	4.69808	0.1191
HS does not Granger Cause PCI		14.6335	0.0283

Source: E-views 12

DISCUSSION OF FINDINGS

The findings of this analysis offer a rich exploration of how housing supply, income levels, and macroeconomic factors intersect to shape housing prices in Nigeria, painting a complex picture of affordability and accessibility. This exploration reveals dynamic relationships between these variables, suggesting that while each factor independently contributes to housing price trends, their combined impact provides a deeper understanding of the housing market.

One of the key findings of the analysis is the significant influence that housing supply has on housing prices in Nigeria. As supply increases, there is a noticeable effect in stabilizing or even reducing housing prices. This suggests that expanding the housing stock could be an effective strategy to alleviate the high demand pressures characteristic of urban areas, particularly in rapidly growing cities like Lagos. The inverse relationship between supply and prices highlights that, within Nigeria's housing market, an increased availability of housing units potentially curtails price inflation. This finding implies that housing supply policies focused on increasing the volume of available homes might alleviate affordability challenges, especially in high-density areas where the demand-supply imbalance is most acute. However, this observation must be placed within the context of Nigeria's unique urban dynamics. Rapid urbanization has brought about heightened demand for housing, often without a commensurate increase in supply. Consequently, the findings reinforce the idea that addressing housing affordability requires not only expanding housing supply but also targeting it effectively to meet the demands of low- and middle-income earners. This observation resonates with previous research by Oni-Jimoh *et al*., (2018), who emphasized the need for affordable housing in urban centers as an essential element in mitigating the pressures of urbanization on housing costs.

Income levels emerge as a critical determinant of housing prices, underscoring that as income levels rise, demand for housing increases, which drives prices upward. This relationship highlights a nuanced picture: while rising incomes might empower higher-income groups to afford housing, they also inadvertently push prices beyond the reach of low-income earners, thus exacerbating the affordability gap. In Nigeria, income disparities are significant, and this uneven distribution implies that even as aggregate income levels rise, the benefits are not uniformly felt across different income groups. Thus, a rise in average income levels may not necessarily translate to improved affordability for the majority, as it could also fuel greater competition for housing, thereby increasing prices and restricting access for those with lower incomes. This finding aligns with research by Abbas (2018) and Yap and Ng (2018), who suggested that higher incomes are associated with increased housing demand and, consequently, higher property values. However, the Nigerian context adds a layer of complexity; rising incomes may create demand pressures that drive prices up without necessarily benefiting the most vulnerable segments of the population. This suggests that in addition to income growth, policies targeting income redistribution and support for low-income earners could play a crucial role in making housing more affordable and accessible.

Macroeconomic factors, including inflation and interest rates, also play significant roles in influencing housing prices, though the relationship is less straightforward. Inflation, in particular, has a marked impact on housing costs, likely due to the rising cost of construction materials and labor. As inflation increases, so do the expenses associated with building and maintaining housing, which in turn translates into higher prices for homebuyers and renters alike. This effect is particularly pronounced in Nigeria, where economic volatility often amplifies inflationary pressures, making it challenging for developers to provide affordable housing options. Yet, the findings suggests that when supply and income variables are factored in, the impact of inflation on housing prices becomes less dominant. This finding underscores the possibility that inflationary pressures on housing prices can be mitigated if housing supply is increased and income levels are improved.

In line with General Equilibrium Theory, which posits that interdependent markets balance one another out, this observation suggests that robust supply-side policies and income support could dampen the impact of inflation on housing prices, creating a more balanced and accessible market. In contrast, the influence of interest rates on housing prices appears minimal. Given Nigeria's limited

mortgage uptake and the high cost of borrowing, interest rates may not have as direct an impact on housing prices as they would in economies with more accessible mortgage financing. This differs from findings by Glaeser and Nathanson (2017), who noted that lower interest rates stimulate housing demand in mortgage-driven markets. In Nigeria, where most transactions are not mortgage-financed, interest rates seem to exert less influence on price trends, pointing to the need for alternative financing solutions tailored to the unique structure of the housing market.

The findings reinforce some of the primary insights from existing literature while also adding new dimensions. For instance, the importance of housing supply in stabilizing prices corroborates Oni-Jimoh *et al*., (2018) and Opoko and Oluwatayo (2014), who emphasized that targeted housing development could mitigate the affordability crisis in Nigeria's urban areas. By establishing housing supply as a significant price determinant, this study validates these earlier claims and emphasizes the need for supply-side policies tailored to address the urban housing shortage. In exploring the role of income, the study extends the observations made by Abbas (2018) and Adegoke (2014) by demonstrating that income growth, while beneficial, does not automatically translate into improved affordability. Rising income levels, especially among higher-income groups, may actually drive prices higher, inadvertently restricting access for lower-income individuals. This reinforces the argument for redistributive policies that address the affordability gap, echoing previous research while highlighting the need for a more inclusive approach to income growth. Finally, the analysis challenges the applicability of interest rate findings from studies conducted in mortgage-driven markets, like Glaeser and Nathanson (2017), by demonstrating that interest rate fluctuations have a limited effect on Nigeria's housing prices. This discrepancy underscores the contextual specificity of Nigeria's housing market, suggesting that while interest rates influence price dynamics in many developed economies, Nigeria's reliance on non-mortgage transactions requires different policy approaches to address affordability.

This analysis offers a valuable contribution to the literature on housing affordability in Nigeria by providing empirical evidence that supports a balanced approach to housing policy. It shows that while macroeconomic factors like inflation and interest rates impact housing, supply-side factors and income levels are more direct and influential determinants. This nuanced understanding highlights the importance of targeted policies, those that not only expand housing supply but also address income disparities, to create a more inclusive housing market. There, the findings highlight that tackling Nigeria's housing affordability challenges requires a multifaceted strategy, with a focus on enhancing housing supply, supporting income growth for lower-income groups, and carefully managing inflationary pressures. This approach provides a comprehensive foundation for policymakers to consider, allowing for policies that address the root causes of affordability challenges in a rapidly urbanizing Nigerian context.

CONCLUSION AND RECOMMENDATIONS

This study analyzed the impact of housing supply, income levels, and macroeconomic factors (inflation, interest rates, and GDP growth) on housing prices in Nigeria using a quantitative research approach. By utilizing secondary data from 2013 to 2023, we examined the relationships between these variables through trend analysis, correlation, regression, and Granger causality tests. The analysis demonstrates that increased housing supply has a stabilizing effect on housing prices, suggesting that policies aimed at expanding the housing stock could mitigate affordability challenges in urban areas.

Income levels were found to be positively associated with housing prices, indicating that while higher incomes increase demand, they also contribute to rising prices, which may further limit access for low-income groups. Among the macroeconomic factors, inflation emerged as a significant driver of housing prices, likely due to the rising costs of building materials and construction. Interest rates, however, showed minimal impact, reflecting limited mortgage accessibility in Nigeria. These findings underscore the need for an integrated approach to housing policy in Nigeria—one that simultaneously addresses supply constraints, income disparities, and inflationary pressures. This study highlights the importance of targeted housing and income support policies to enhance housing affordability in Nigeria's rapidly urbanizing regions.

From the findings of the study as discussed above, the following recommendations are made:
1. To address the housing affordability crisis in Nigeria, it is crucial to increase the housing supply, particularly in high-demand urban areas. The government and private developers should prioritize policies and incentives that support the construction of affordable housing units. This could include subsidized land prices, tax incentives for affordable housing projects, and streamlined approval processes to encourage more rapid development. Additionally, adopting innovative construction methods and materials can help reduce costs, making it feasible to expand housing availability without compromising affordability.

2. Given the positive correlation between rising income levels and housing prices, it is essential to implement income support measures targeted at low- and middle-income earners. Policymakers should consider programs that support income growth in sectors with a large proportion of lower-income workers, as well as direct subsidies for housing costs. Providing affordable mortgage options tailored to these income groups could improve accessibility to housing. Furthermore, urban economic development initiatives should focus on reducing income disparities, ensuring that as incomes rise, lower-income households are not left behind in terms of housing affordability.

3. To mitigate the impact of inflation on housing costs, the government should adopt policies that stabilize prices in the construction sector, such as bulk purchasing of essential materials and negotiating lower tariffs on imported building materials. Additionally, introducing monetary policies to curb inflation and stabilize the economy will indirectly benefit the housing market. Given the limited influence of interest rates on housing prices due to low mortgage uptake, there is an opportunity to enhance the mortgage market. Developing more accessible and affordable mortgage products, supported by reduced interest rates or government-backed guarantees, could encourage greater homeownership and spread housing demand across various economic segments.

4. To holistically address housing affordability, Nigeria requires a coordinated approach that brings together housing supply expansion, income growth initiatives, and macroeconomic stability. Establishing a national housing strategy that involves collaboration between federal, state, and local governments, along with private sector involvement, could better synchronize efforts to provide affordable housing across all income levels and geographic areas.

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