

Effect Of Population Growth on Sustainable Development in Nigeria

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Abstract- The issue of sustainable development had been the major concern of economists globally and Nigeria was not left out. This was essentially due to the fact that the benefits of sustainable development might trickle down to the most vulnerable in society, thus enabling them to participate actively in economic activities that might enhance their standard of living. This study therefore, examined population growth and sustainable development in Nigeria, for the period between (1970-2022). The time series data were obtained from various secondary sources. Descriptive Statistics and econometric tool of Auto Regressive Distributed Lag Model (ARDL) was used to achieve the study objectives. The result of the ARDL revealed that population growth had a significant negative link on sustainable development at 5% level of significant with t-values of 4.3684 and -43.9501. The finding of the study also indicated that population growth (POP) are determinants of sustainable development in Nigeria. The result shows that there is a long-run relationship between population growth and sustainable development in Nigeria. The study concluded that population growth and poverty adversely affected the attainment of sustainable development in Nigeria. The study recommended that population growth must be checked through robust economic policies that focused on reducing the growth rate of population of the citizens.

Index Terms- Population; Sustainable Development; Growth, Auto Regressive Distributed Lag Model (ARDL); Poverty

I. INTRODUCTION

The major concern of the European Union Organization in their general assembly gathering on 21st May 2022 is the growing population rate of less developed countries without corresponding or substantial increase in food production and employment creation. The organization further stressed that high number of illegal immigrants in Europe and America was due to increase in

population of less developed countries which experienced lack of adequate resource for means of sustenance. Illegal immigrant entered the western countries with the aim of seeking greener pastures which the illegality of their status denies them, thus complicating their misery (Chapman, 1975). According to Omisore (2018), the consequences of population growth in Sub-Saharan Africa are evident in the absence of advancements in poverty reduction and the inadequacy of the region's limited development. To this extent, Abisuga-Oyekunle et al. (2020) argued that for Sub-Sahara Africa to achieve sustainable development that helps the poorest members of the society, population growth must be both sustainable and productive. This would create more employment opportunities and help reduce poverty level. This, the authors called population growth reconfiguring for sustainable benefit, thus, reaffirming that the growing population in Africa may pose both benefits and challenges to the continent.

There are many benefits that population growth can bring to a continent like Africa. Giller (2020) stated that a growing African population may increase the labour force supply, reduce the cost of labour supply, increase the exploitation of natural resources, strengthen the defence, and provide cheap labour for agriculture which is the mainstay of many African countries and contribute substantially to food security. Similarly, Crenshaw et al. (1997) revealed that one of the greatest advantages of a growing population is that it enhances the capacity of industries, mining, agriculture, and other manufacturing firms to get access to a cheap labour force within and proximate to their organizations/firms. Thus, it also added meaningfully to the increase in the agricultural production of both

nuclear and extended families through cheap and sometimes free labour force (Giller, 2020). Despite these benefits, Sub-Saharan Africa, particularly Nigeria has been facing the challenges of unchecked population which has been the major cause of the growing poverty rate and lack of effective sustainable development.

To this end, Kanayo et al., (2013) showed that the real problem of a growing population is poverty, hence, making sustainable development an unattainable dream in Nigeria. Hassan et al. (2018) claimed that the major causes of poverty in Nigeria is the high rate of population growth which is not commensurate with the GDP growth. Hence, from the year ending 2016 to 2018 Nigeria's population growth rate rises sharply from 0.78% at the end of the year 2015 to 0.97% while at the same period, the poverty rate increased geometrically from 0.88% by the end of the year 2015 to around 2.67% from 2016-2018 (Aina et al., 2019). Ekoh et al. (2020) further pointed out that the growing population rate in Nigeria has been the major cause of deprivation, low life expectancy, high mortality rate, poor health care service, poverty, and lack of sustainable development. More so, Tela (2014) argued that the growing population rate in Nigeria has been the source of income inequality, the inability of the vulnerable to assess social resources for their economic welfare, and the slow pace in reaching sustainable development. This implies that sustainable development has been difficult to achieve in Nigeria, due partly to the problem of uncontrollable population growth that has continued to increase geometrically in nature without a corresponding increase in the means of production. Ferreira (2012) thereby opined that with sustainable development, economic development is expected to translate to better and more meaningful living for the people and benefit even the poorest and most vulnerable in Nigeria. Thus, with an increasing population growth rate that breezes poverty, this may be impossible to achieve due to the fact that growth in the population has not been utilized to benefit reduction in poverty (Jain, 2018). Therefore, a growing population rate that remained unchecked may add to the negative determinant of sustainable development in Nigeria. Workneh (2021) reported

that positive government policy that put population growth in check and effective fiscal and monetary policy together with a high level of technology utilization in production may be a determinant of sustainable development. Hence, this study intends to investigate the effect of population growth and poverty on sustainable development in Nigeria.

Statement Of the Problem

The growing population rate in Nigeria, have added to the problem of poverty; thus, achieving sustainable development continues to elude the country. With the growing population rate, the capacity of the people in the society to assess government social and economic welfare has been crowded out due to overpopulation and the social mystery of the activities of unscrupulous political officeholders. This, according to Ugochukwu and Chioma (2015), has created a serious gap in Nigeria's march towards sustainable development.

To this end, Ebunoluwa and Yusuf (2018) revealed that the economic relationship between population growth and sustainable development may be difficult to predict because the poverty rate in Nigeria has been linked to factors (such as lack of economic opportunities, unemployment, income inequalities, inadequate government funding and inaccessibility of vulnerable individuals to available government loans) other than population growth. Umaru et al. (2015) argued further that, based on available economic evidence in Nigeria, the relationships between population growth and sustainable development are negative. This implies that population growth adversely affects sustainable development in Nigeria. Cobbinah et al. (2015) failed to establish a correlation between population growth and sustainable development in Nigeria. Ekperiware and Olomu (2017) revealed that for Nigeria to attain serious sustainable development, the population must be used to enhance production, thereby creating further capital goods that open up employment opportunities. This creates a reducible effect on poverty, thus translating to sustainable development. Furthermore, the economic instability in Nigeria due to the government's sudden economic policies has compounded the problem of finding the exact determinants of sustainable development in Nigeria

(Adejumo and Adejumo, 2018). Therefore, population growth, income inequality, per capita income, economic growth, life expectancy, research and development, enrolment level in primary, secondary, and tertiary education, and domestic investment are all determinants of sustainable development Osundina, 2020).

Research Questions

This study intends to investigate the following questions:

- (i) What is the linkage between population growth and sustainable development in Nigeria?
- (ii) What is the long-run relationship between population growth and sustainable development in Nigeria?

Objectives Of the Study

The broad objective of this study is to examine the effect of population growth on sustainable development in Nigeria. The specific objectives are to;

- (i) analyse the link between population growth and sustainable development in Nigeria;
- (ii) Assess the long-run relationship between population growth and sustainable development in Nigeria

Hypotheses of the Study

The study will test the following hypotheses

HO1: There is no significant linkage between population growth and sustainable development in Nigeria.

HO2: There is no significant long-run relationship among population growth, poverty and sustainable development in Nigeria.

Significance of the Study

The effect of population growth and poverty on sustainable development in Nigeria has been generating serious academic discourse among scholars in the field of Development Economics. This is due to the fact that there are few studies in Nigeria that have ever related population growth and poverty to sustainable development, thus, enhancing the first reason to justify the need for a study of this

nature. In addition, the insufficient literature in the field of development economics with regard to population growth, poverty and sustainable development in the context of Nigeria also encouraged this study. The National Population Commission (NPC) may use the study as the basis to advise the government on how to put the growing population in Nigeria under check.

Scope of the Study

This study focused on the effect of population growth and poverty on sustainable development in Nigeria. In order to have enough data to enhance the findings of the study, the study covers the period 1970-2022. The periods chosen for the study are due to significant changes in population growth and poverty levels in Nigeria during this time frame. By examining data from 1970 to 2022, the study aims to capture the long-term trends and patterns that have shaped sustainable development in the country. The few studies in this regard only relate population growth to poverty, and others show how poverty has impacted economic development in Nigeria and not sustainable development. Also, the need to put the controversy surrounding whether or not population growth and poverty really influence sustainable development in Nigeria enhances the use of these extensive scope periods. More so, putting the confusion surrounding the actual population growth rate in Nigeria to rest from the period 1970 to the 2000s may also influence the choice of these periods.

II. LITERATURE REVIEW

Conceptual Review

Concept of Population Growth

The term population growth is used to describe a rapidly growing population. Rapid population growth is a situation where the number of people in a country grows rapidly as a result of high birth rate, low infant mortality rate and high immigration. More so, according to Bashir et al. (2021), population growth implies a sustained increase in the growth rate of the population over time. This sustained increase, according to the author, is gradual and progressive over time. Ghoderao and Pawar (2022) defined population growth as a change in terms of an increase in the number of people residing in a geographic area over time. It is usually caused by an increase in birth

rate, a decrease in infant mortality rate and a decrease in emigration. Gould (2015) also defined population growth as a sustained progression in the value of a population in a particular geographical location that has nothing to do with the means of sustenance. Joseph et al. (2019) argued that this situation creates a shortage of resources, thereby making people compete for the limited available resources. Avinash and Rajinder (2018) defined population growth as a sustainable growth rate in the number of a population of a country over time that may overstress available resources and means of sustenance of the people, with attendant negative consequences on the socio-economic and infrastructural development of the country. Population Growth is the increase in the number of individuals in a population (Idowu et al., 2016).

Therefore, this study adopts the definition of Avinash and Rajinder (2018) that sees population growth as a sustainable growth rate in the number of a population of a country over time that may overstress available resources and means of sustenance of the people, with attendant negative consequences on the socio-economic and infrastructural development of the country.

Factors Influencing Population Growth Rate in Nigeria

The rate of population growth in Nigeria is dependent on three factors, which are: natality, mortality and migration.

- i. Natality: This is defined as the number of births within a period of time in a population. Romero et al. (2016) had the view that the expression of natality has been done using different indices. These are indices that are identified and discussed in a brief manner below.
 - (a) Crude Birth Rate: This is where the number of births (usually per year) is divided by the total population of that year.
 - (b) Standardised Birth Rate: this is where the calculation of what the birth rate of any given region would have been had it been the same as that of the country itself is carried out.
 - (c) General or Total Natality Rate: This is the ratio of the number of births to the number of

women in the reproductive age group that is usually defined as (15 years -45 years) or (15 years 49 years).

- ii. Mortality: This is applied to define the number of deaths within a given population. Different indices have been employed to reflect Mortality:
 - (a) Crude Mortality rate: This, as defined by Wang et al (2017), is the ratio of the number of deaths and the total population in a year.
 - (b) Infant Mortality Rate: This is the number of children born alive that died under one year of age divided by the number of live births during the year (Murphy et al., 2021).
 - (c) Maternal Mortality Rate: Mgawadere et al. (2017) stated that maternal mortality is concerned with the number of deaths attributed to causes related to pregnancy in a specific period of time and then divided by the number of live births within the same period of time.
 - (d) Standardized Mortality rate: This is calculated by what would have been the death rate of a given region, but only with the same age composition as the country at large.
- iii. Migration: This is the act of transferring people from one area to another to live and work temporarily. This may be Immigration or Emigration.
- iv. Immigration: This refers to the number of a particular species that has entered the habitat during the considered time, but originated in another habitat.
- v. Emigration; This refers to the number of those members of the population who change their place during the period in time.

Reasons for Nigeria's Increasing Population

According to Gideon (2017), the reasons behind the growing population of Nigeria were determined as follows: birth rate, death rate and migration. The birth rate is the first and most significant thing that leads to the rise in population. The rate of population growth was affected by birth rate in so many ways, and it is one of the outcomes of good and better

medical facilities and services. Child mortality has been drastically reduced compared to the past due to the availability of superior health facilities, such as improved drugs and immunisation, which will ensure that child mortality is minimised. This time around, there exist better medical services that lower the mortality of children, infants, and mothers.

Second is the issue of early marriages, which is specifically in the Northern Part of Nigeria. The reason is that women get married at a very young age, thus resulting in a high birth rate and making them bear more children because they spend more years bearing children.

The third rationale is based on the basis of the rise of material welfare provided to citizens. Whenever individuals are well-to-do material-wise, they start giving birth to as many children as they desire without any consideration for the repercussions that such moves might have. It is also premised on the claims of Malthus on the laws of the poor in England, which argued that relief materials should not be discouraged since a rise in material welfare makes citizens bear more babies. It was noted at some point that when the wealth or income of a family increases, it promotes large families to exist as the individuals have the capability to support children. The other factor is old-age security, which is a contributor to large families since parents think that having many children is a secure measure to old age, since they ensure that the children will take care of them and hence improve the standard of living of the parents. Other parents, even in the past, believed that having many children was benefiting them since they could have many people to work on their farms.

Fourthly, the issue of customs, religions and superstitions has highly influenced the growth of the population. Religions such as Islam accept polygamy (the act of having more than one wife). This also provides a man with the privilege of having four wives and bearing as many children as possible. This custom causes an average man to have at least eight children. Catholic Church, however, does not encourage the practice of family planning since the church considers that to be sinful, as taught that God gave man the command to go ahead and multiply without restriction (Abel, 2015). Such a perception is

likely to make couples give birth out of control, or at all costs, thus populating the earth. In addition, there are practices in Nigeria that hold such beliefs in the birth of a male child since a male child is considered a blessing and the pillar of the family who will bring the family name. That is why, families make great efforts to achieve male births despite the number of females that can be born in the family (Sailaja et al., 2015).

Implications of a Fast-Growing Population on Nigeria

Graham (2015) also cited positive and negative impacts of a rapidly growing population to consist of; defense, foreign reserve, demand growth, environmental degradation, dependency ratio rise, diminishing income per head and rise in social vices. These are as discussed below.

Positive Effects

A high increase in population results in a powerful army and a source of people to defend the country in matters of security, war, and emergencies when the need arises (Kuhe, 2019). A high population is likely to draw in foreign investors (Kuhe, 2019). This is because in a highly populated country, the investors have access to cheap labour. Even though this is not good for the country, it still employs young unemployed graduates who can sustain themselves, and it also adds more towards the investments in Nigeria, thereby improving the GDP in Nigeria (Onyeike & Onyeagbako, 2018). When the population is high, demand in terms of food, shelter, etc. is high, and consequently, consumption and production of goods and services are stimulated. The impact of this on the country is positive because it leads to an increase in the GDP and the output and expansion of the economy (Jurgilevich et al., 2016).

Negative Effects

The initial and most significant impact of a fast-paced population growth is that it leads to environmental degradation. In 1798, Thomas Malthus presented his own theory of population, where the author mentioned that population grows geometrically, and it is at a stage when the nation reaches the carrying capacity. The carrying capacity is the population that the environment and other aspects of the environment might carry. Currently,

Nigeria has passed its carrying capacity, and unless actions are taken, Nigeria will be forced to revert to the level of subsistence (Dao, 2012). Nigeria has come to the stage where the environment is only able to support the huge population of the country to a minimal extent. The U.N report projected that by 2050, the population of Nigeria will be 398 million people, meaning that Nigeria will be the 3rd largest nation in the world. The future population is too massive and requires that the government begin planning during that time frame so that the nation can effectively maintain and feed its people (Hempel, 1997).

The Environmental Impact, Population, Affluence and Technology (IPAT) model explains the relationship between the rising population and the environment. The model holds the notion that the environment is influenced by population growth. It argued that technological development can contribute towards the rise and colossal production of goods; however, the issue with technological development is that it cannot strike a balance between production and the impact of high consumption. In addition, when the population is high, natural resources will be exploited, and thus, could be depleted and become scarce, and when overused, these resources could negatively affect the provision of future generations (McKenna, 2015).

The Rapid Population growth raises the dependency ratio within any nation, hence an additional burden on the working population. This implies that there will be more children and old people to attend to since the population grows rapidly, hence more people will depend on the working class population. This also generates social and economic liability to the working-class population. This scenario also limits the saving rate as well; once an employed person earns his/her salary; he/she will cater to his/her needs as well as those of his/her dependents, so that at the end of the day, the person will have no or minimal income to save or invest. This, in turn, reduces capital formation within the country as well as hinders socio-economic development in the country in several sectors of the Nigerian economy. That is why the capital formation and socio-economic development have been declining over the years in Nigeria (Onyinye et al., 2017).

The other adverse effect will be that a rapidly increasing population can cause low per capita income. This reduces the overall quality of life and level of consumption. It also increases the use of poor-quality goods. This case also compels individuals to live in slums, which is neither healthy nor favourable to people. Because of this, it enhances the outbreak of diseases, epidemics and other contagious diseases. It is a condition that is increasing at a very high rate in such places as Lagos and in certain states in the North of Nigeria because of overpopulation and environmental overcrowding (Merem et al., 2018).

Concept of Sustainable Development

The concept of sustainable development, according to Jereren (2020), involves a change in which the exploitation of resources, the course of investments, the orientation of technological development and institutional change are all in balance that determines the present and the future possibility of fulfilling the needs and the aspirations of human beings. Meeting human aspirations and needs is therefore the primary goal of development. From his perspective, Beckerman (2017) views sustainable development as the development that does not impair the capacity of future generations to satisfy their needs.

Sustainable development emphasises the role of participation as a way to make the development process more sustainable, as well as to accomplish fairer distribution of benefits through development initiative creation. According to Tomislav (2018), the key point of sustainable development is the exploitation of national resources (physical and human) to:

- (i) enhance societal welfare,
- (ii) attain sustainable systems of livelihood within a particular community,
- (iii) eliminate poverty,
- (iv) ensure that the physical and human environment is sustained both to the current generation and to the future generations of the community members, and most importantly,
- (v) global inclusion by making sure that the participation of members of the community in the development process is mobilised, and that the benefits generated are divided equally.

The change, however, is stressing the programme approach that promotes the national participatory process of development that brings on board all the key stakeholders/ beneficiaries, such as development partners and donors (Assan & Hunt, 2018). Furthermore, in 2016, the United Nations General Assembly named sustainable development as a strategy that will seek to not only achieve human development targets but also allow the natural systems to offer needed natural resources and ecosystem services to humans (Mensah, 2019). This indicates that in sustainable development, the goal will be to have a society in which the state of living and resources will be sufficient to address the needs of humans without compromising the planetary integrity and stability within the natural system. In addition, the Brundtland Report of 1987 described sustainable development as one that satisfies the current generation without jeopardising the capacity of the future generation to satisfy their needs. This definition, as per the report, has two important concepts in it:

1. The idea of needs, especially, essential needs of the poor in the world, to which the preponderant priority must be assigned; and
2. The concept of constraints that the state of technology and social organisation has on the capacity of the environment to satisfy the current and future needs.

In addition, Ali et al. (2021) defined sustainable development as development that reduces the exploitative nature of foreign technology on the environment through the effective development of local technology in order to harness the resources of the state for the benefit of the populace without compromising the ecosystem replenishment. This implies that sustainable development emphasises the use of local knowledge and technology to exploit the resources of nature for the benefit of society without causing much depletion of the environment.

The author was going to take the definition of Sustainable Development provided by Shout (2024), who defined sustainable development as the development that satisfies the needs of the current generation without the inability of future generations to satisfy their own needs, hence the concept of

human needs and the notions of restraint on the state technology and social organisation of the environment.

Goals of Sustainable Development

Sustainable development can be described as a development that satisfies the demands of the current generation without jeopardising the capacity of the future generation to satisfy their demands (World Commission on Environment and Development, 1987). In a bid to operationalise this global vision, the United Nations in the year 2015 incorporated the 17 Sustainable Development Goals (SDGs) into the 2030 Agenda. These objectives act as a global template in tackling the world issues like poverty, inequality, environmental degradation, climate change, and social injustice (UNDP, 2023). The goals are interconnected and aim to promote inclusive growth, environmental sustainability, and social well-being (Jeronen, 2020).

Goals	Items
Goal 1: No Poverty	SDG 1 aims to eradicate extreme poverty and reduce the proportion of people living in poverty in all its dimensions. It emphasises social protection systems, equal economic access, and resilience against climate-related and economic shocks. Ending poverty is crucial for sustainable economic and human development.
Goal 2: Zero Hunger	This goal seeks to end global hunger by promoting sustainable agriculture, improving food security, and enhancing nutrition. It encourages climate-resilient farming practices and investment in rural infrastructure. Achieving this goal ensures equitable food distribution and improved health outcomes (Jeronen, 2020).
Goal 3: Good Health and Well-Being	SDG 3 focuses on ensuring healthy lives through reduced maternal and child mortality, universal health coverage, and combating communicable and non-communicable diseases. Sustainable health systems are crucial for productivity and poverty reduction (WHO, 2022).
Goal 4: Quality Education	This goal promotes inclusive and equitable quality education, literacy, and lifelong learning opportunities.

	Education enhances human capital, reduces inequality, and promotes innovation (UNESCO, 2023).
Goal 5: Gender Equality	SDG 5 seeks to eliminate discrimination, violence, and barriers faced by women and girls. Gender equality contributes to economic growth and sustainable societies through full participation of all genders in social and economic life (Jeronen, 2020).
Goal 6: Clean Water and Sanitation	Goal 6 emphasises access to safe drinking water, sanitation, and hygiene. It also promotes integrated water-resource management, essential for public health and agricultural productivity (UN-Water, 2021).
Goal 7: Affordable and Clean Energy	This goal aims to ensure universal access to reliable, sustainable, and modern energy. Renewable energy plays a central role in reducing environmental pollution and driving green growth.
Goal 8: Decent Work and Economic Growth	SDG 8 promotes inclusive and sustainable economic growth, productive employment, and decent work for all. Economic growth that respects labour rights and environmental sustainability is essential for national development (Jeronen, 2020).
Goal 9: Industry, Innovation, and Infrastructure	This goal encourages resilient infrastructure, sustainable industrialisation, and technological innovation. These are necessary foundations for productivity, competitiveness, and socio-economic transformation (UNIDO, 2021).
Goal 10: Reduced Inequalities	SDG 10 seeks to reduce inequality within and among countries by strengthening policies that foster social inclusion, fair wages, and equal opportunities (OECD, 2020).
Goal 11: Sustainable Cities and Communities	This goal aims to create inclusive, safe, resilient, and sustainable human settlements. Urban sustainability reduces pollution, improves transportation, and enhances disaster preparedness (UN-Habitat, 2022).
Goal 12: Responsible Consumption and Production	SDG 12 promotes sustainable consumption and production systems through waste reduction, resource efficiency, and circular economy strategies (UNEP, 2021). Responsible production helps preserve natural

	ecosystems.
Goal 13: Climate Action	This goal emphasises urgent action to address climate change through mitigation, adaptation, and environmental education. Climate resilience is critical for long-term economic and ecological stability (IPCC, 2023).
Goal 14: Life Below Water	SDG 14 seeks to protect oceans and marine ecosystems by reducing pollution, regulating fishing practices, and supporting sustainable use of ocean resources (UN Ocean Conference, 2022).
Goal 15: Life on Land	This goal promotes the protection and restoration of terrestrial ecosystems, biodiversity, forests, and soils. Biodiversity loss threatens sustainability, food production, and ecosystem resilience (Jeronen, 2020).
Goal 16: Peace, Justice, and Strong Institutions	SDG 16 advocates for peaceful societies, access to justice, and strong governance institutions. Effective institutions foster stability, protect human rights, and support development (UNODC, 2023).
Goal 17: Partnerships for the Goals	The last goal emphasises global partnerships, technology transfer, capacity building, and financial cooperation. Multi-stakeholder collaboration is essential for achieving the SDGs by 2030 (UN, 2023).

The Goals of Sustainable Development form a comprehensive framework for fostering social inclusion, economic prosperity, and environmental protection. The governments, civil society, the private sector, and international organisations have to work together to achieve these goals. Despite the fact that there has been an unequal development in countries, SDGs have been at the centre stage of the global development planning and the sustainable future of everyone.

Theoretical Review

This part of the research will dwell on the probable theories that could be used to assist in the explanation of the connection between population growth, poverty and sustainable development. In so doing, theories of population growth, poverty and sustainable development are clarified in this part.

Theoretical Review

The Malthusian Theory of Population

Malthus (1798) spoke out the sentiments of his father and Godwin about population optimism in the fact that, given the ability to eliminate the restraints of mankind, the perfect state could be achieved. Malthus protested that the strains of population expansion against food supply would annihilate perfection, and the world would have misery. Malthus was also harshly judged over his pessimism, which made him tour the continent of Europe to collect facts to prove his thesis. In the 2nd edition of his essay, which was published in 1803, the author used his research. The Malthusian theory is used to explain the correlation between the increase in food supply and population. The theory puts it precisely that population is growing at a higher pace than the food supply, and when not tamed, it results in a vice or misery.

The Malthusian doctrine, as indicated by Swan and Colino (2022), could be summarised in the following way: the natural sex instinct in human beings is to multiply rapidly. Consequently, the population grows in a geometrical progression and with the unchecked population, it doubles every 25 years. So, starting with 1, population in consecutive intervals of 25 years will be 1, 2, 4, 8, 16, 32, 64, 128, 256 (after 200 years); Conversely, the food supply grows in a slow arithmetical sequence as the law of diminishing returns is applied with the assumption that land supply is fixed. Therefore, the food supply of the successive similar periods will be 1, 2, 3, 4, 5, 6, 7, 8, and 9 (after 200 years); as population increases in geometrical progression and food supply in arithmetical progression, population will overtake food supply. This imbalance, in a way, causes an overpopulation and dominates overpopulation by the imbalance between the population and the food supply. Malthus proposed preventative checks and positive checks. The preventive checks are implemented by a man to manage the birth rate, adoption of late marriage, celibacy, and moral restraint, etc.

In this regard, Alawode (2016) believes that in case people did not regulate the increase of population through the implementation of preventive checks, positive checks exist in the forms of vice, misery, famine, war, disease, pestilence, floods and other

natural disasters that are likely to decrease the population and hence create a balance with food supply. The theory states that there will always be preventive checks going on within a civilised society, as positive checks are uncouth. Malthus urged nations to embrace preventative measures so as to evade vice or misery caused by the positive checks. Malthusian theory of population has been extensively debated and criticised in the 19th and early 20th century. Omoruyi (2013) says some of these criticisms include: the mathematical version of the theory is Wrong, did not anticipate the opening up of New Areas, used a static economic law over a Period of time, did not take into account the Manpower Aspect to Population: Population not related to Food Supply but to Total Wealth. Growth of the population is the consequence of the Fall in Death Rate. Empirical Evidence disproves this Theory, Preventive Checks do not refer to Moral Restraint: Positive Checks not caused by Over-population, and Malthus was a False Prophet.

Sustainable Development Theory

Sustainable Development Theory was the concept that developed at the end of the 20th century because of environmental issues and the necessity to approach economic development in a more balanced way. The World Commission on Environment and Development (WCED), or the Brundtland Commission, worked on it. The UN founded the WCED in 1983 under the leadership of Gro Harlem Brundtland, who was the former Prime Minister of Norway. In 1987, the commission released the pioneering document known as "Our Common Future" that popularised sustainable development and formed the basis of the theory. The Theory underlines the combination of economic progress, social welfare and environmental preservation to satisfy the needs of the current generations without affecting the possibilities of future generations to satisfy their needs.

Similarly, the report indicated that the key global environmental issues were mainly due to the gigantic poverty in the South and the unsustainable consumption and production trends in the North.

The Brundtland Theory took into consideration the contribution of the international economy,

population, human resources, food security, species and ecosystems. The report also noted that the environmental cost per person born in an industrialised nation was very significant compared to the environmental costs that were incurred by a person born in a developing nation. The proposed theory offered a better health and educational system, particularly for women, as a solution to the high birth rates.

Empirical Review

In their study, Richardson and Davidson (2012) examined how population growth impacted sustainable development in the United States of America (USA) between the years 1980 and 2010 using Auto-regressive Distributed Lag (ARDL). The authors employed the measures of sustainable development as a proxy of per capita income and population growth rate as the proxies of population growth to accomplish the study objective. The other exogenous variables that were incorporated into the model included inflation, exchange rate, life expectancy, human capital development index, gross fixed capital formation, poverty rate and capital. The study results showed that sustainable development was harmed by population growth. The authors concluded that the low rate of population growth that is not engaged may have negative effects on the sustainable development in America.

Solomon and Auckland (2013) used Autoregressive Distributed Lag (ARDL) to test the correlation between population growth rate, poverty and sustainable development in Sweden between 1980 and 2012. In their attempt to study the objective, the authors took capital as a measure of sustainable development and population growth and poverty as proxies of poverty and poverty index, respectively. The outcome of the research showed that poverty, population and sustainable development were significantly and negatively related. It was noted especially that the rate of population increase had a positive contribution to poverty, thereby making population and poverty undermine the achievement of sustainable development in Sweden. The authors have found that it is population and poverty that reduce sustainable development in Sweden.

Smith, Song Le, and Landersay (2022) explored the relationship between population and poverty and sustainable development in Italy in 1980-2020 using the Autoregressive Distributed Lag (ARDL). To successfully implement the study, the authors used per capita income as provided by the National Board of Statistics in Italy as a proxy of sustainable development and the rate of population growth, poverty rate, inflation, exchange rate, human capital development index, life expectancy, college enrolment and GFCF were also included in the model. The study findings showed that the population and poverty negatively affected the sustainable development. The authors have inferred that an unutilized population may lead to poverty, hence making sustainable development a challenge in Italy. Okodudu (2023) investigated the impacts of population growth on sustainable development in Rivers State, Nigeria. The author has received the data using a questionnaire of Five Hundred and Eighty- Nine participants. Selection was done using stratified, random and convenience. The data analysed by the author included the descriptive statistics in terms of frequencies and percentages. The study outcome has revealed that the majority of the indicators of sustainable development, like health and educational facilities, better housing, food security, and consumption and production patterns, are not sufficient and in the right shape with the increasing population.

III. METHODOLOGY

Theoretical Framework

The theoretical framework for this study is anchored on the Malthusian theory of population and the classical theory of poverty derived from the work of Lueger et al. (2019), which used both theories to explain why individuals and countries have found it difficult to attain sustainable development. The Malthusian believed that individuals' instinct for sex and inability to control their appetite for sex causes overpopulation, which the present means of sustenance cannot take care of. As a result of this, the individuals in the society who believed in large family sizes have been persuaded by their own making into poverty (Qian, 2018). This reduced the capacity of this individual to contribute meaningfully to economic activities that may benefit the most

vulnerable people in society, since such individuals could not even take care of their own welfare.

Model Specification

The model for this study was similar to the one adopted by Ogwumike and Ozughalu (2016), but with slight modifications. As a result of this, Ojo and Ojo (2022) stated that other variables that may improve sustainable development at the individual level are: domestic investment, credit to the private sector, and total government expenditure on infrastructural facilities. Therefore, functionally, the model for the study is stated as;

$$PCI=f(POP, INV, CPS, NFR) \quad (3.1)$$

Diaconu and Popescu (2016) further pointed out that sustainable development may be difficult to attain without the role of human capital development and employment. As a result of this equation, 3.1 is extended with these variables and becomes;

$$PCI=f(POP, INV, CPS, INFR, HCD, EMP) \quad (3.2)$$

$$PCI=f(PCI_{t-1}, POP_t, INV_t, CPS_t, INFR_t, HCD_t, EMP_t)$$

More so, Olabisi (2023) argued that the role of total household consumption expenditures, inflation and exchange rate cannot be pushed aside when formulating a model on sustainable development in the context of Nigeria. According to the author, both inflation and exchange rates are necessary in this model because the variables represent government monetary intervention, and, therefore, dictate the level of consumption expenditures which households may enjoy. As a result of this, the variables of total consumption expenditure, inflation and exchange rate form part of the variables in the functional model in equation 3.2, and are redefined as:

$$PCI = f(POP, INV, CPS, INFR, EXR) \quad (3.3)$$

Equation (3.3) forms the model for this study and is presented below in mathematical form:

$$PCI=\beta_0+\beta_1PCI+\beta_2POP+\beta_3INV+\beta_4CPS+\beta_5INFR+\beta_6EXR+\mu \quad (3.4)$$

More so, as a result of the fact that the variables are not in the same unit there is need to take common logarithms of the variable not in percentages and indices.

$$\Delta \ln PCI = \beta_0 + \sum \beta_1 \Delta \ln PCI_{t-1} + \sum \beta_4 \Delta \ln INV_{t-1} + \sum \beta_5 \Delta \ln CPS_{t-1} + \sum \beta_6 \Delta \ln INFR_{t-1} + \sum \beta_1 \Delta \ln EXR_{t-1} + \mu \quad (3.5)$$

Where, SDEV = Sustainable Development ----- proxied by per capita income (standard of living)

POP= Population -----proxied by population growth rate

INV = Domestic Investment -----proxied by gross fixed capital formation

CPS =Credit to the Private Sector

INFR = Infrastructure Expenditure

EXR = Exchange Rate

Also, β_0 = Intercept or constant term β_1 - β_{10} = Parameters to be Estimated,

μ = Error term

A Priori Expectation for the Model

In this model, population and poverty are expected to be negative with sustainable development in Nigeria. This is because the incidence of an over-growing population, which Nigeria is known for, may affect the capacity of individual households to be able to provide for themselves meaningfully, not to mention contributing to economic growth. This may force the government to spend more on social benefits instead of investing in viable economic projects that may enhance sustainable development. Also, poverty may hamper the desires of households, the private sector and the government in bringing about sincere, sustainable development to the most vulnerable in society. This, according to Eggers (2020), may be traced to insufficient resources that may be constrained to fewer economic benefits that may not be felt by the citizens. In this sense, the variables of population and poverty are expected to have a negative relationship with sustainable development in Nigeria.

Table 3.1 presents the economic expectation signs with regard to each of the coefficients of the variables.

Table 3.1 Economic Expectation Sign for the Variables of the Model

Variable	Variable Name	Expected Sign
POP	Population (Proxied by Population Growth rate)	-
INV	Domestic Investment	+
CPS	Credit to the Private Sector	+
INFR	Infrastructures (Proxy as Total Government Expenditures on infrastructures)	+
EXR	Exchange Rate	-

Source: Author's Compilation based on Economic Theory, 2023

Mathematically, the a priori expectation for the coefficients of variables in the model is expressed as: $\beta_1 < 0$, $\beta_2 < 0$, $\beta_3 > 0$, $\beta_4 > 0$, $\beta_5 > 0$, $\beta_6 < 0$, $\beta_7 < 0$ and $\beta_{11} > 0$

Estimation Technique

The research method that will be employed to explore the aims of the research is the Autoregressive Distributed Lag Model (ARDL). The model has been chosen as it will be applied to isolate the long-run and the short-run impacts and to test the presence of co-integration and the overall presence of the long-run relationship among the variables of interest. ARDL was implemented because it has the following strengths over other techniques;

Estimation Procedure

This part addresses the methodology concerns regarding the estimation of the given model. To look into the short-run and long-run correlation between population growth, poverty and sustainable development, it needs time series econometrics information. The regression is done using E-views 10.

Examination of Stationarity and Non-stationarity of Variables

The estimation of the model in this study uses data of a macroeconomic nature in the form of time series, and therefore, the processes that generate data are not stationary, thereby rendering it volatile, leading to a non-stationary phenomenon. In time-series data, the term stationarity is used to indicate a stochastic time series that satisfies three conditions, as indicated. To

begin with, an overtime variable has a mean that is constant. In this way, the average value of Y at various time periods is fixed and is expected to take a specific value. Therefore, the process of data generation Y is not a trend. Second, a variable always has the same variance over time. Therefore, the process of data generation is not stable. Third, the correlation between the covariances of two periods in time is correlated.

Autoregressive Distribution Lag Model (ARDL)

As stipulated in objectives two to five in this research on the impact of population growth on sustainable development, the long-run relationship of population growth and sustainable development and determinants of sustainable development are tested using the autoregressive distributed lag Model (ARDL) framework. During the past two decades, a number of methods have been used to test the presence of a long-run relationship among variables, including the Engle and Granger (1987) and the full information maximum likelihood method of Johansen co-integration (Johansen, 1988; Johansen and Juselius, 1990). In the recent past, a more contemporary method has gained relevance, namely, the autoregressive distributed lag model (ARDL). Pesaran and Shin (1999) and Pesaran et al. (2001) introduced the ARDL method of cointegration test, also referred to as the bounds testing method. The statistic on which the procedure is based is the Wald or F-statistic in a generalised Dickey-Fuller type regression composed of testing the significance of the variables under consideration in a conditional unrestricted equilibrium correction model (UECM). The ARDL method has a number of strengths over other conventional methods. One of them is that it enables the inclusion of lagged variables, which are able to portray the impact of past economic indicators on the future.

In essence, the bounds test methodology entails two phases. The initial one is trying to determine whether there is a long-run relationship between the variables included. The ARDL model of the proposed study will have the following form:

Descriptive Statistics	SDEV (PCI)	POP	INV	CPS	INFR	EXR
Mean	1284.432	2.625155	18.94131	9.098419	6.07E+08	144.9833
Median	903.4494	2.602869	20.10776	8.168808	2819587.	117.5466
Maximum	3200.953	3.063712	46.30000	19.62560	6.41E+09	536.9465
Minimum	161.5439	2.198786	3.300000	4.699551	263601.9	49.77958
Std. Dev.	842.6395	0.185355	10.47043	3.439357	1.46E+09	104.0106
Skewness	0.479704	0.398379	0.497081	1.004498	3.223426	2.170731
Kurtosis	1.933295	3.352267	2.783316	3.706079	12.51089	7.331465
Jarque-Bera	4.545460	1.675938	2.286313	10.01393	291.5417	83.05516
Probability	0.103031	0.432588	0.318811	0.006691	0.000000	0.000000
Sum	68074.90	139.1332	1003.889	482.2162	3.22E+10	7684.117
Sum Sq. Dev.	36922145	1.786536	5700.754	615.1172	1.10E+20	562546.4
Observations	53	53	53	53	53	53

Measurement of Variables and Sources of Data.

Based on the outcome in the table, it was established that the mean and the median calculated values of the variable of sustainable development (SDEV) were 1284.43 and 903.45, respectively, and the maximum and minimum values were obtained as 3200.95 and 161.54, respectively. The standard deviation that was obtained of the variable was 842.64, which was an indication of slight variation from the mean. This meant that Nigeria had been addressing the issue of sustainable development. The Skewness and Kurtosis coefficients of the test item were 0.48 and 1.93, respectively and positive, hence indicating that the country had been striving to achieve sustainability. The Jarque Bera statistics calculated on the variable of SDEV had a p-value of 0.1030, and it was higher than the critical value of 5%. This meant that the variable of SDEV was normal and could be correlated well with the population and poverty variables in Nigeria.

Better still, the outcome also revealed that the median and mean values that were computed regarding the variable of population growth were 2.63 and 2.60, respectively, with the maximum and minimum values obtained being 3.06 and 2.20, respectively. The calculated standard deviation of the test item of the population was 0.19, and it did not present any significant spread of the mean. This meant that the population had maintained its growth rate during the period under consideration. The Skew and Kurtosis values obtained as the coefficient of the test variable of population were 0.398 and 3.352, respectively, and

positive, hence further confirmation that the population had been at a consistent growth rate in Nigeria over the time of the study. The Jarque-Bera p-value of the population variable stood at 0.4326; it was bigger than 5%. This meant that the variable of population is normal, though it may significantly affect the variable of sustainable development in Nigeria.

Nigeria has the potential to have sustainable development due to the level of domestic investment in the country. Looking through the results in Table 4.1, it was found that the mean and median values obtained during the calculation of the variable of investment were 18.94 and 20.11, respectively, and the maximum and minimum values were calculated to be 46.30 and 3.30, respectively. The test item standard deviation was 10.47 and represented a low degree of fluctuation about the mean, and thus revealed that sustainable development may be achieved more in Nigeria due to the level of domestic investment. The calculated Skew and Kurtosis coefficients of the test item were 0.50 and 2.78, respectively and positive, making the conclusion that investment could positively contribute to sustainable development. The Jarque Ber statistics calculated in the test variable were 0.3188, showing the variable of investment was normal, and it may have a great impact on the variable of the SDEV.

It was also found that the sustainable development level that was achieved was realised by credit to the private sector in Nigeria. Therefore, it was observed

that the mean and median values obtained for the variable of CPS were 9.10 and 8.17, respectively, and the maximum and minimum values obtained were 19.63 and 4.790, respectively. The computed standard deviation of the variable of CPS was 3.44; it showed that the variable of CPS has a slight dispersion from the mean, hence it can have a positive impact on sustainable development should it be maintained by the government. The values obtained for the coefficients of Skewness and Kurtosis of the variable of CPS were 1.00 and 3.71, respectively, and positive, thereby validating again that CPS could impact the variable of SDEV in Nigeria. The p-value of the Jarque-Bera value calculated on the test item of CPS was 0.0067, and it was lower than the critical value of 5%, therefore, indicating that the variable was positive with SDEV value because it was not found to be normal.

Table 4.1 also addressed the extent to which the total consumption expenditure could affect sustainable development in Nigeria. The table showed that the mean and median of the variable of total consumption expenditure (CEX) were 7.89E+09 and 4.45E+09, respectively, with maximum and minimum values of 3.09E+10 and 10.25, respectively, with a standard deviation of 8.81E+09, meaning serious variability of these values around the mean. The value disclosed that the total consumption may not have been comprehensively increased to achieve sustainable development in Nigeria because the standard deviation was very high, and the mean of the total consumption was. The calculated value of the Skewness and Kurtosis coefficients of CEX were 1.40 and 3.42, respectively, and positive, indicating the level of contribution that total consumption expenditures could make to sustainable development, though the degree to which, at the aggregate level, consumption expenditure was competently facilitated by the population. The Jarque-Bera statistics p-value was 0.000143, which was less than the critical value of 5%. This meant that the variable of CEX was not normal and could give them a different relationship with the variable of SDEV within the period under consideration.

Lastly, it was found in the results in Table 4.1 that the means and median values obtained for the variable of exchange rate (EXR) were 144.98 and 117.55,

respectively, with maximum and minimum values of 536.95 and 49.80, respectively. The value of the standard deviation derived from the variable exchange rate was 104.01, and it shows a large variation between the mean and standard deviation. This implied that the exchange rate variable may have an influence on sustainable development in Nigeria. This was the case because the standard deviation calculated on the variable indicated a severe variation of the mean exchange rate achieved. The value of Skewness and Kurtosis of the variable exchange rate were 2.17 and 7.33, respectively, and positive, and therefore, demonstrated that a continuous increase in the exchange rate could influence the realisation of sustainable development in Nigeria in a negative way. The Jarque-Bera statistic of 0.0000 received was less than the critical value of 5%. This indicated that the variable of exchange rate could not be considered as normal and could have varied impacts on the variable of sustainable development in the period under study.

Diagnostics Test Statistics

Econometrics analysis employed time series data that are sometimes highly susceptible to both human and machine errors. As a result of this, the data needed to be diagnostic and ensure that the data were free from the problem of white noise. Thus, this section focused on the presentation and discussion of unit root tests of Augmented Dickey Fuller (ADF), Philip-Perron, and Cointegration Test.

Augmented Dickey Fuller (ADF) Test

Table 4.2 presents the result of the unit root test using the Augmented Dickey Fuller (ADF) test statistics.

Table 4.2 Augmented Dickey Fuller Test

Variable	Level		1 st Difference		Order of Integration
	ADF Stat	P-value	ADF Stat	P-Value	
SDEV	-1.950619	0.3073	-6.129336	0.0000	I(1)
POP	-2.321472	0.1693	-4.612995	0.0005	I(1)
INV	-2.3861	0.1506	-3.8744	0.0042	I(1)

	73		47		
EXR	- 3.2041 00	0.025 5	-	-	I(0)
	Test	Critical	Value		
	1% level		- 3.5626 69		
	5% level		- 2.9187 78		
	10% level		- 2.5972 85		

**MacKinnon (1996) used one-sided p-values was used

Source Author's Computation, 2024 (E-view 12)

Table 4.2 presents the result of the unit root test based on the Augmented Dickey Fuller Test. From the result in the table, it was discovered that SDEV, POP, EMP, and CEX were not free from the unit root problem at the level. This implied that the variable was not stationary at the level because the p-values of the ADF statistics computed for the variable of 0.3073, 0.1693, 0.1506, 0.2118, 0.7032, 0.6146 and 0.2118 were greater than 5% critical level. Therefore, as a result of this, the variables were found to be non-stationary at the level. Checking the result in Table 4.2 further, it was discovered that SDEV, POP, INV, and CEX were stationary at the 1st difference. This inference was based on the fact that the p-values of the ADF-statistics computed for the variable at the 1st differences of 0.0000, 0.0005, 0.0042, 0.0000, 0.0000, 0.0000 and 0.0100 in that order of the variables were less than 5% Mackinnon (1996) one-sided critical value. This showed that the test variables were free from the unit root (stationary) at the 1st difference. Thus, they were stationary at I (1)

More so, it was noted that POV, HCD, INF and EXR were stationary at level since the p-values of the ADF-Statistics computed for the variables of 0.0000, 0.0004, 0.0100 and 0.0255 were less than the critical value of 5% with a significant statistic of -8.50, -4.64, -3.56 and -3.20 that were critical than the critical

value of 2.92 in absolute term. On this basis, it was reasonable to state that the variables were stationary at the integrated order of I(0) and I(1), respectively. The order of the integration of the variable confirmed that the Autoregressive Distributed Lag Model (ARDL) might be used to investigate the objectives of the study. This necessitated the need to reaffirm the integration order of the variables of the study using the Philip-Perron test.

Philip- Perron Test

Table 4.3 presents the result of the unit-root test using Philip-Perron (PP) test statistics

Table 4.3 Philip-Perron Unit Root Test

Variable	Level		1 st Difference		Order of Integration
	PP-Stat. Value	P-Value	PP-Stat. value	P-value	
SDEV	- 1.73137 0	0.409 8	- 6.0407 11	0.000 0	I(1)
POP	- 2.63544 1	0.092 5	- 4.8319 47	0.000 2	I(1)
INV	- 2.06221 94	0.260 4	- 3.9680 48	0.003 2	I(1)
CPS	- 2.04414 8	0.267 7	- 11.185 40	0.000 0	I(1)
EXR	- 2.46752 0	0.129 2	- 4.8030 45	0.000 2	I(1)
	Test	Critical	Values		
	1% level		- 3.5654 30		
	5% level		- 2.9199 52		
	10% level		- 2.5979 05		

Sources: Author's Computation, 2024 (E-view 12)

The outcome of the Philip-Perron unit root test can be found in Table 4.3 above. Based on the outcome of

the table, it was found that POV, INFR, HCD, and INF were at level I(0) and therefore revealed that the variables were not affected by the unit root problem at the level. This was based on the fact that the p-values of the variables at the levels 0.0000, 0.0000, 0.0011 and 0.0157 were less than the critical value, thus they were considered significant. The values meant that the variables were combined in order of I(0).

It was also found that SDEV, POP, INV, CPS, EMP, CEX, and EXR were not stationary at the level because the p-values obtained for the test variables of 0.4098, 0.0925, 0.2604, 0.2677, 0.5971, 0.2677 and 0.1292, respectively, exceeded the critical value of 5% point. Due to this, the variables were reported to be not free of the issue of unit root at the level. Continuing the check on the result in Table 4.3 further, it was observed that SDEV, POP, INV, CPS, EMP, and EXR were at rest at the 1st difference order I(1) since the p-values at the variables were 0.0000, 0.0002, 0.0032, 0.0000, 0.0000, 0.0000 and

0.0002, respectively, indicating that the variables are significant. These estimations were thus combined of order I(0) and I(1), thus verifying that the ARDL model is appropriate and assumed to meet the goals of this research.

Objective 1: Examine the linkage between Population Growth and Sustainable Development

This section presents the result of the Short-Run ARDL to examine the linkage between Population Growth and Sustainable Development.

Objective One: Examine the linkage between population growth and sustainable development in Nigeria

Table 4.4: ARDL Result for the linkage between Population Growth and Sustainable Development.
 Dependent Variable = Sustainable Development (SDEV)

Variable	Coefficient	Standard Error	T-calculated	P-value
C	-1198.097	825.7540	-1.450913	0.1592
SDEV(-1)	0.58-1605	0.133138	4.368439	0.0002
SDEV(-2)	0.533961	0.150294	3.552772	0.0015
POP	-0.969187	0.022052	-43.95007	0.0000
INV	20.80318	8.976680	2.317469	0.0290
INV(-1)	16.91464	13.93706	1.213644	0.2362
INV(-2)	53.62261	15.15522	3.538227	0.0016
CPS	82.77481	21.39814	3.868317	0.0007
CPS(-1)	70.63499	21.15021	3.339683	0.0026
INFR	2.240608	6.816708	0.328694	0.4344
INFR(-1)	5.392328	3.268978	1.649546	0.1110
INFR(-2)	5.954238	3.532568	1.685527	0.1039
CEX	4.362348	0.182058	23.96131	0.0000
CEX(-1)	4.375689	0.302348	14.47236	0.0000
CEX(-2)	0.456798	0.027868	16.39149	0.0000
	POOLED	TEST	STATISTICS	
R-squared	0.865179			
Adjusted R-squared	0.830359		Mean dependent var	1327.207
S.E. of regression	219.0412		S.D. dependent var	830.0264
Sum squared resid	1199476.		Akaike info criterion	13.92305
Log likelihood	-329.0379		Schwarz criterion	14.90791
F-statistic	77.91853		Hannan-Quinn criterion.	14.29940
Prob(F-statistic)	0.000000		Durbin-Watson stat	1.658424

Source: Author's Computation, 2024 (E-view 12)

Test conducted at 1%, 5% and 10% critical levels. Critically examining the outcome in Table 4.7, it was discovered that the relationship between sustainable development in the current and lagged periods (-1) and (-2) was found to be positive, and the t-statistic values were significant. This conclusion was dependent on the fact that the regression coefficients achieved on the variable of SDEV at the lagged period of 0.58 and 0.53 were positive with high t-tests as well as significant values of -1 and -2, respectively. The regression coefficients had it that an increment of 1% of the variable SDEV in the lag period can lead to 0.58% and 0.53% sustainable development in the present year. The signs of the variable of SDEV were in harmony with a priori expectations of the variable. Due to this, the significance of SDEV in the lagged years was a good predictor of SDEV in the current year because the variable was significant. The p-values of the t-statistics calculated for SDEV in the lagged years of 0.0002 and 0.0015, respectively, were significant at 1% level of significance. This indicated that sustainable development in the lagged years were significance on the SDEV in the current year at 1% level of significance. The ability of the economic planners to ensure that Nigeria attained a better standard of living, particularly in the area of feeding, clothing and shelter, might go a long way in improving the drive toward sustainable development. Supporting this evidence, Olawore (2013) posited that sustainable development may only be possible if economic planners could make access to indicators of sustainability reachable for the citizens. The indicator included, but was not limited to, the capacity of the populace to be able to provide a meaningful, balanced diet for themselves, the ability to access good shelter and access to better clothing. Moreover, with improved SDEV in the lagged period, the assurance of better per capita income to sustain the current and future standard of living for the populace has been guaranteed. This motivated the government and individuals to work towards enhancing the present and future level of PCI in order to further improve sustainable development in Nigeria. On this note, Oyeyemi et. al. (2024) argued that government programmes and activities may cause improvement in the standard of living of the populace, but the ability to maintain such economic programmes must be retained to see a further rise in the standard of

living of the citizens in the present and future. As a result of this, government economic programmes, economic planning and activities must continually be reconnected towards enhancing the standard of living of the people. The economic implication of this was that any economic programme of the government (such as the absence of credit to the private sector, absence of subsidy to farmers and other agricultural practitioners, high interest rate, etc.) may not encourage an improved standard of living for the citizens. This practice must be discontinued to motivate a better standard of living for the populace now and in the future. This if done might continue to affect SDEV positively now and make SDEV in the lagged year to cause an increase in the standard of living in the future.

In addition, regarding population growth, the outcome of the short-run ARDL used showed that the relationship between the parameter on sustainable development was negative and significant. This statement was conditional on the fact that the regression coefficient obtained on the variable of population of -0.97 was negative with a significant t-statistic value of -43.95. The regression coefficient showed that a 1% change in the variable of POP could lead to 0.97% decline in sustainable development. The direction of the variable of POP was in the direction of a priori expectation; therefore, POP turned out to be a determinant of SDEV because the variable was significant. The t-statistics calculated on the variable of POP of 0.0000 also had a p-value that was lower than the 5% level of significance, hence the population growth being noteworthy on SDEV at the level of significance of 1%. The implication of a growing population on the standard of living was that, with the present economic situation, which brought about serious hardship for the government, households and individuals might be difficult for the Nigerian economy to achieve sustainable development. This was because as population grows at the household level, the desire of the individual household to attain better standard of living in the three basic necessity of life, feeding, shelter and clothing, is used as parameters for measuring standard of living and even contribute to economic activities may decline due to increasing responsibility or simply as a result of large family size to cater for.

This may also result in economic rationing, thus making each household live far below the mean of sustenance. Given this scenario, the capacity of households and individuals to enhance their standard of living is reduced or falls drastically. More so, with per capita income remaining unchanged and households and family size continuing to increase, the attainment of a better standard of living remained a mirage for individuals and households. In this situation, government social costs rise because the remaining population who are not catered for must be provided for by the government. The implication of this was that critical economic sectors that should have contributed to improved standard of living for households and individuals were neglected by the government, thus, making population growth to worsening the situation of low standard of living now and in the future of Nigeria. Supporting this evidence, Ogunniyi (2020) opined that the population growth rate has a transitional effect on the standard of living. In essence, a growing population reduced the capacity of individuals and the government to initiate better economic value, on which the standard of living may be enhanced. This, according to Alawode (2023), may be due to insufficient resources to cover the additional population. The consequence of this was that better living standards might not be attained either now or in future.

The outcome of the other test statistics calculated on the test variables revealed that population growth could have a negative impact on sustainable development. In addition, the coefficient of determination (R²) that was acquired to test 0.87 indicated that the population growth rate contributed to some 87% variation in SDEV. This indicated that sustainable development was predictable by population growth. Moreover, the p-value of the F-statistic calculated for the variable of 0.0000 indicates the level of significance of 1% and a significant F-statistic value of 77.92. The values revealed that the null hypothesis, according to which there was no significant effect of population growth on SDEV, was rejected. This indicated that SDEV in Nigeria was adversely impacted by population growth. The outcomes of the information criteria generated in reference to the test revealed that population growth provided an improved explanation of the variable of SDEV. The test deviances were all

within the acceptable limit. The Durbin-Watson statistic of 1.658424 computed in the test of 1.658424 indicated the non-existence of autocorrelation between the variables in the test since the value of Durbin-Watson was greater than the lower critical value of DW of 1.234564 and lower than the upper critical value of DW of 1.785634. Thus, there was a negative relationship between population growth and SDEV.

Long-Run Relationship among Population Growth, Poverty and Sustainable Development in Nigeria. Result of the Relationship of Population Growth and Poverty on Sustainable Development.

Table 4.5 Long-Run Coefficient of ARDL
 Dependent Variable = Sustainable Development proxied as (PCI)

Variabl e	Coefficient	Standard Error	T-Statistic	P-value
C	-1258.034072	903.304796	-1.392702	0.1760
POP	-0.333025	0.090954	-3.661466	0.0003
INV	95.909917	13.768525	6.965882	0.0000
CPS	12.747135	20.911318	0.609581	0.5476
EXR	-3.778061	0.538256	-7.019073	0.0000
INFR	0.456578	1.567078	0.291356	0.6423
CEX	4.675622	0.232115	20.14356	0.0000

Source: Author's Computation, 2024 (E-view 12) **
 Test was achieved at the 1%, 5% and 10% critical level of significance

The outcome of the long-run ARDL used to test the long-run correlation between population, poverty and sustainable development and determine the determinants of sustainable development in Nigeria, is available in Table 4.10. Considering the outcome of the table, it was found that the correlation between population growth and sustainable development was

not positive but significant. This conclusion was based on the consideration that the regression coefficient calculated on the variable of POP of -0.33 is negative and the t-statistic of the coefficient is significant at -3.66. The economic explanation of this was that a 1% increase in the variable of population growth could result in a decline in sustainable development by 0.33%. The expectation of the variable was in line with the sign of the variable of the population. The consequence of this was that population was a determinant of sustainable development as the variable was significant. To a greater degree, it was discovered that the p-value of the t-statistic calculated to determine the variable of POP of 0.0003 had a significant p-value at 1% level of significance. This implied that the population was significant on sustainable development at 1% level of significance. The unavailability of employment for the overgrowing population of youths has affected the standard of living (sustainable development) negatively. Standard of living might be enhanced if there were employment opportunities for the overgrowing population in Nigeria. This was so because employment improved per capita income, which in turn increased the capacity of the Nigerians to be able to meet their day-to-day needs, but the lack of foreseeable employment opportunities had made this impossible to achieve. Also, the lack of ideas on the part of the government on how to effectively utilise the growing population of unemployed young men and women had been a recurring decimal that had been depriving this category of population from contributing to a better standard of living (sustainable development) in Nigeria. No job implies no income to activate both social and economic prosperity, on which an enhanced standard of living might be deduced. This might definitely affect future generations. On this note, Ojo (2023) posited that the ineffective economic policies on how to take care of the overgrowing Nigerian population are a major problem in the effort towards enhancing the standard of living. The consequences of this, according to the author, were a high rate of poverty, hunger, a high rate of criminal activities, particularly among the youths, and a low standard of living had been the order of the day. More so, the overgrowing population had also resulted from insufficient resources, especially in the area of government intervention in social and economic amenities. This

had prevented Nigerians from being able to leverage the provision of government resources to initiate necessary economic activities that may improve the standard of living. If this continued, it might be difficult to achieve a meaningful standard of living (sustainable development) in Nigeria.

The outcome of the table also indicated that the long-run association between infrastructure and sustainable development was positive and insignificant. This claim was conditional because the regression coefficient calculated on the variable of infrastructure of 0.46 was positive with a t-statistic value of 0.29, which was insignificant. The economic explanation of the regression coefficient was that a 1% rise in the variable of infrastructure could result in a 0.46% rise in the standard of living, which was a proxy of sustainable development. The indication of the variable of infrastructure was in tandem with a priori anticipation of the variable. The consequence of this is that INFR was not a predictor of the standard of living because the variable was not significant. More importantly, the t-test of the variable of infrastructure of 0.6423 had a p-value that was above the 5% level of significance. This implied that the variable of infrastructure was not significant on sustainable development at 5% level of significance. This had complicated the incidence of low productivity in Nigeria, hence, making the cost of basic food items rise. This has made households and individuals unable to afford the price of common food items. The consequence of this was a fall in the standard of living. This challenge had been complicated due to dilapidated roads infrastructures making it difficult for most farmers in the rural areas to get their produce for sale in the urban centres, thus, causing a fall in the income of the practitioners. This resulted in the inability of the practitioners to enhance their standard of living. The unavailability of modern silo and barns in many rural areas that produce what we eat in Nigeria has added to the problem of low living standards in Nigeria. In addition, Nigeria's health care delivery facilities were nothing to write home about. Quality of life was drastically low in Nigeria, as a result of inadequate health care delivery centres. In this case, the cost of accessing health care services had jumped up, hence making many vulnerable people unable to afford it and consequently causing a low standard of living in

this regard. All these were pointers to the fact that Nigeria's present state of infrastructural decadence could not facilitate a better standard of living (sustainable development) for the populace in both the present time and in future.

V. CONCLUSIONS

The study concluded that the incidence of population growth and poverty inhibited the capacity of Nigeria to attain sustainable development, expressed as the standard of living. Thus, this study concluded that population growth decreased the attainment of sustainable development in Nigeria. Poverty also reduced the desire of the Nigerian government to achieve meaningful, sustainable development. There was a significant negative long-run relationship among population, poverty and sustainable development. More so, POP, INV, EMP, INF, EXR and CEX were determinants of sustainable development in Nigeria.

VI. RECOMMENDATIONS

On the basis of the conclusions of the study, the following recommendations are made.

There is a need for the Nigerian government to find a balance between the growing population and the means of sustenance to enhance the achievement of sustainable development. This may be achieved by ensuring that the growing size of Nigeria's population is provided with reasonable jobs in agriculture and minerals exploitation, thus enabling the nation to activate the zero hunger goal in the Sustainable Development Agenda, and thus enhancing the attainment of sustainable development for the future generation. The government must enact policies and programmes that may boost some of the good determinants of sustainable development, such as investment, human capital development, employment and aggregate consumption.

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