



(RESEARCH ARTICLE)



Population Growth and Impacts on Ecosystem and Resources: Nigeria on the Verge of a Precipice That Needs Urgent Heed—A systematic review

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Abstract

Purpose—This study aims to investigate population growth and its impacts on Nigeria's economy, ecosystems and resources. The dangers and seriousness of population growth in Nigeria, and its negative implications for the economy, resources, and ecosystems, are analysed.

Design/methodology/approach—Founded on a systematic review strategy, this study assesses how population growth impacts the ecosystem and resources in Nigeria. This study examines how population growth and its impacts on resources and ecosystems are explored in published studies and identifies key gaps in current studies. Fourteen articles were systematically chosen and reviewed (published between 2010 and 2025).

Findings: The results demonstrate that uncontrolled population growth has negative implications for Nigeria's economy and the environment, including the depletion of non-renewable resources such as coal and crude oil, improper waste disposal, and land degradation. Uncontrolled population growth also leads to changes in the weather, desertification, drought, and rapid urbanisation. It also results in air, soil, and water pollution.

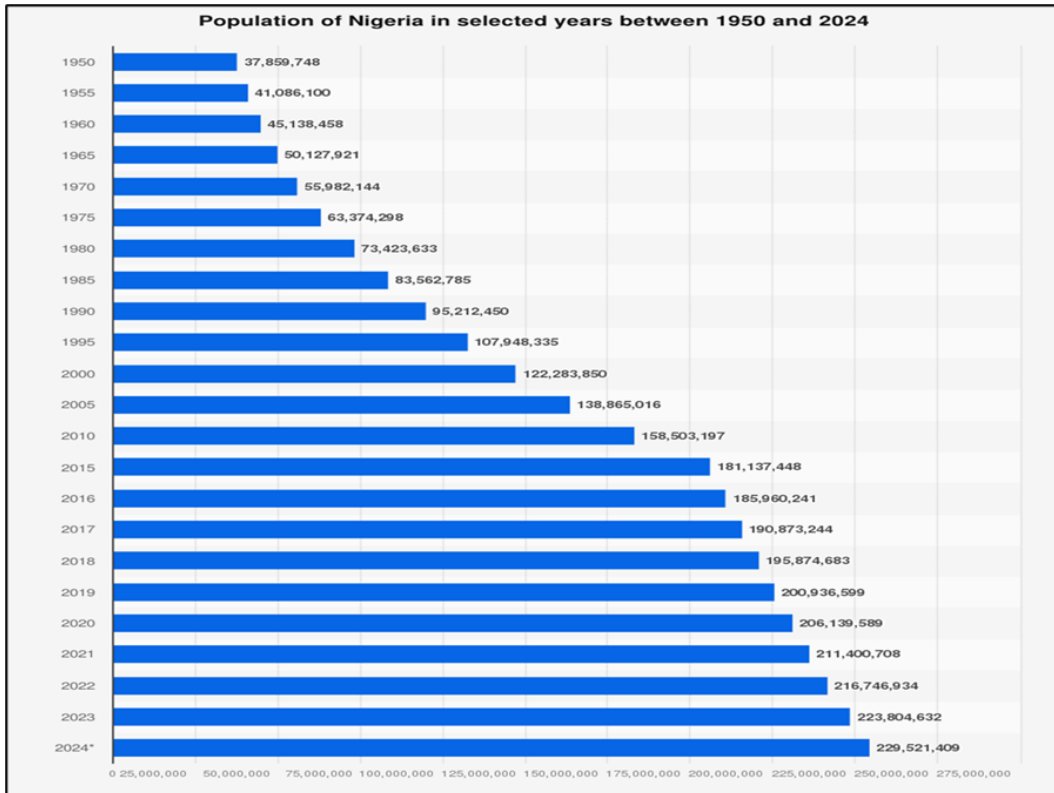
Keywords: High Fertility; Economy; Ecosystem; Population Growth and Resources

1. Introduction

Population growth is the increase in the number of individuals within a population over a specific time, driven by births, immigration, and decreased mortality. The factors contributing to population growth are primarily an increase in the birth rate and immigration (Coale and Hoover, 2015). Nigeria's approximate population in 2024 is 229,520,409 million, according to Sasu (2024), with Macrotrend (2025) putting it at 234,573,603, demonstrating a 2.37% increase from 2024. (See Figures 1 and 2).

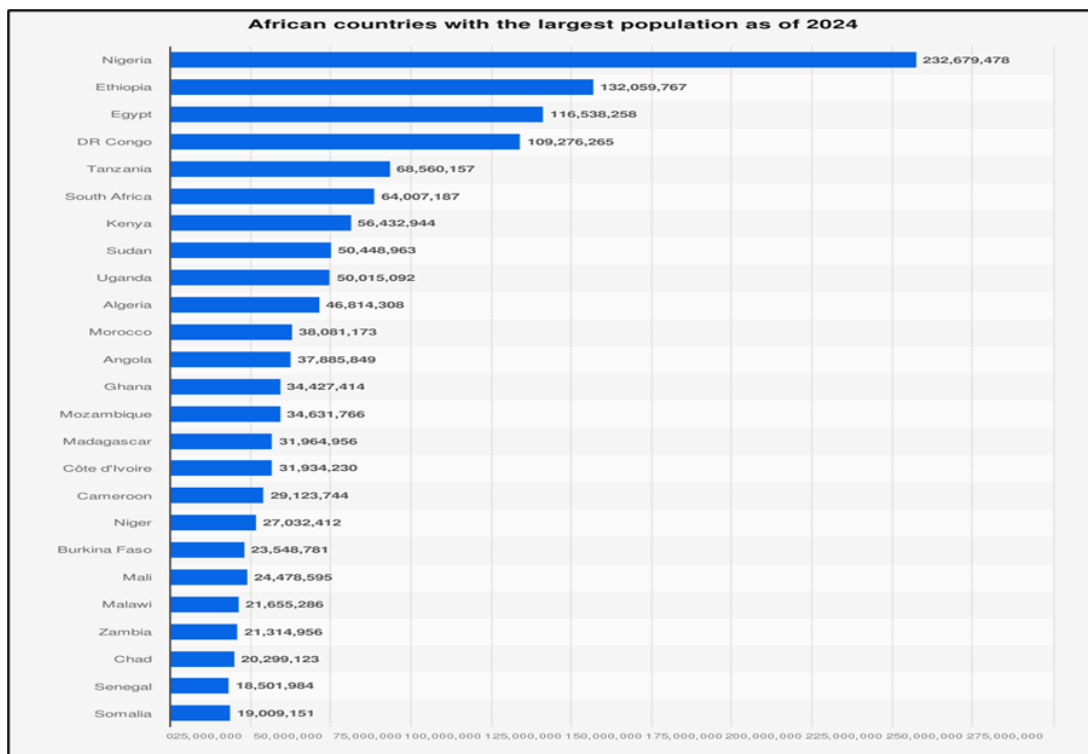
If we examined figures 1 and 2, it would be evident that Nigeria has the fastest-growing population in Africa. Nigeria's population growth rate has been approximately 2.4% over the past few years, and the population is forecast to double in approximately 29 years (Macrotrends.net, 2025). Rapid population growth, particularly in developing nations, places excessive strain on the environment. Nigeria is on the verge of a precipice that demands urgent attention due to its environmental implications. Population growth leads to the consumption and degradation of non-renewable resources such as coal and crude oil. It also leads to waste disposal, land degradation, and climate change. In addition, population growth leads to rapid urbanisation, drought, and desertification. It also pollutes the air, soil, and water. Moreover, population growth leads to rapid deforestation, nutrient exhaustion, soil erosion, and other issues that leave the land unsuitable for agriculture (Adeosun and Popogbe, 2021). Sex education and family planning should be an integral component of the curriculum.

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Source: Sasu, 2024 (Statista).

Figure 1 Population in Nigeria in selected years between 1950 and 2024



Source: Galal, 2025 (Statista)

Figure 2 African countries with the largest population as of 2024

This study examines how population growth negatively impacts resources and ecosystems, frames the current literature, and identifies gaps. The research adds to the discussion by identifying gaps in the literature on population growth and its impacts on resources and ecosystems in Nigeria. A systematic literature review was conducted to understand the scope of the current academic literature and identify knowledge gaps to establish a research agenda on population growth. Two noteworthy review papers offered a solid basis for this endeavour. First, Adesola et al. (2024) conducted a comprehensive analysis of the multifactorial effects of Nigeria's population growth. The research focused on Omran's epidemiological model, which emphasises the complex ways the patterns of illness and health are transitioning, the relationships between them, and the economic, demographic, and sociological factors influencing them. The article highlights the urgent need for a range of interventions to mitigate the adverse effects of population growth in Nigeria. The second key paper reviewed was by Adeosun and Popogbe (2021), who argued that population growth has persisted as a major challenge for developing nations worldwide.

In contrast, developed countries experience negative or declining population growth, while nations in sub-Saharan Africa, such as Nigeria, experience population growth that exceeds economic growth. The current research conducted a systematic review of the literature from 2015 to 2025. This research aims to comprehend how the published literature has outlined how population growth impacts ecosystems and resources. This study identifies the major gaps in the current literature and proposes a research agenda for future studies.

The following section outlines the systematic review strategy and discusses the methods for journal article search, selection, review, and analysis. The results of this study are presented later. Finally, a conclusion is drawn by identifying research gaps, addressing study limitations, and outlining a research agenda.

2. Methodology

A systematic review approach has been adopted for this study, as it provides a comprehensive review of the evidence on a significant topic, necessary for guiding future research efforts. Systematic reviews reduce the bias common in traditional reviews, even though it is challenging to eliminate researcher bias during results synthesis and interpretation (Greenhalgh, Thorne, and Malterud, 2018). Additionally, the systematic review reduces bias by identifying, evaluating, and synthesising all relevant research to answer specific questions about a given topic (Pollock and Berge, 2018). Furthermore, systematic reviews successfully answer the research question and determine the knowledge gaps and the focus for future research (Baako, Alhassan, and Gidisu, 2022). The systematic review approach has been integrated following the methodology established by Berrang-Ford, Ford, and Paterson (2011), which demonstrated measurable outcomes in environmental field studies. The systematic process followed four steps: article search, selection, review, and analysis.

3. Article Search

To clearly understand this field of study, the researcher conducted a thorough literature review to identify published literature on the impacts of population growth on resources and ecosystems. The search identified sixteen keywords that are prevalent in the literature and commonly used in article searches. The database used was ProQuest, which was utilised in consultation with a skilled librarian to identify relevant articles for this research. The literature search was undertaken in April 2025, utilising key thesaurus terms, illustrated in Table 1. Then, all keywords were individually searched in the publication's abstract and title. The study includes only peer-reviewed English-language publications published from 2015 to 2025.

4. Article selection

The primary role of article selection was to guarantee the selection of suitable literature articles to promote further analysis. We applied the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), (see Figure 3), which is an effective evaluation tool that was also applied by Sarkis-Onofre et al. (2021) to ensure that all vital information is reported to provide the readers with a full image of the literature search. In the initial stage of the article selection process, we counted 160 articles based on the search criteria. In phase two, 122 duplicates and 37 literature articles were excluded for further assessment. In the third phase of the comprehensive evaluation of each article, we identified an additional 11 articles that were irrelevant to our research but appeared in the search results because the search terms were mentioned concisely in the abstract or title, without further detail. An additional 13 papers were excluded due to poor outcome measures (n=5) and descriptive studies (n=8). As these publications did not align with the content and aim of this study, they were excluded, and the final 14 publications were selected. Appendix A comprises lists of the included studies.

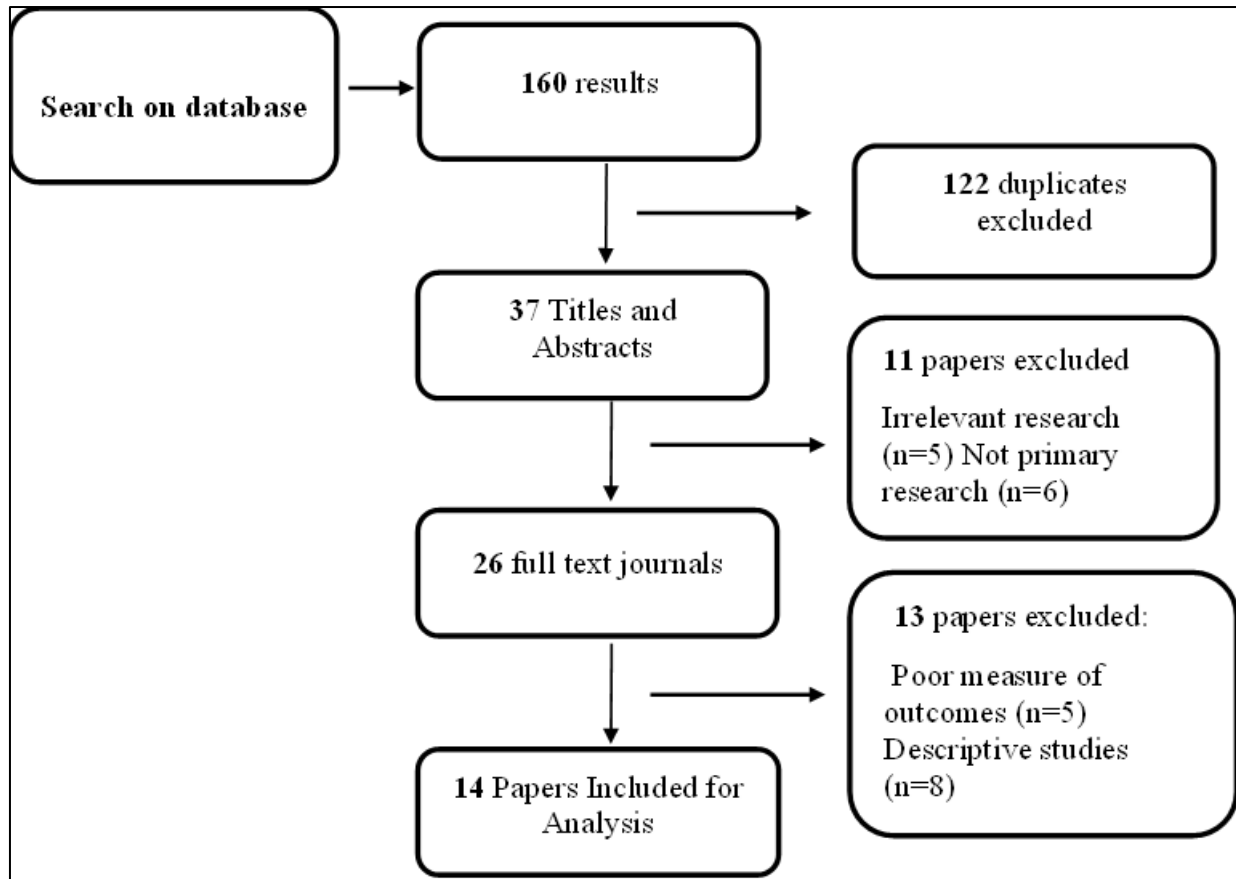


Figure 3 PRISMA Flowchart. Source: (Author).

5. Article review

All the articles selected in Table 1 were reviewed in detail to achieve the study's purpose.

Table 1 Keywords used for article search and quantity. Source: (Author).

No	Keywords used for the search	Number of publications
1	Carrying capacity	2
2	Biodiversity	37
3	Extinction	30
4	Mass extinction	8
5	Water resources	15
6	Agriculture	7
7	Resources depletion	17
8	Ecosystem	5
9	Habitat loss	6
10	High fertility	1
11	Birth rate	5
12	Death rate	5
13	Migration	3

14	Unintentional pregnancy	1
15	Unsatisfied family planning needs	9
16	Population growth	4
17	Population pyramid	5
Total publications appeared during the search		160

The article review and analysis primarily aimed to establish and evaluate how population growth has impacted resources and ecosystems in Nigeria. Every article review was detailed to respond to the individual aspects identified in the purpose of this systematic review. General information (content, discipline, journal, publication year, author name and article title), methodological approach (quantitative, qualitative, and mixed), focused study regions (country), and impacts of population growth (deforestation, resource depletion, land degradation, and non-renewable resource depletion) were also considered in the article analysis.

Relevant information for every parameter was analysed and summarised. The references were compiled using Mendeley Desktop.

6. Methodological approaches

The researchers delved into quantitative and qualitative research design literature for the selected articles for this systematic review. A total of 8% of reviewed articles applied quantitative methods, and approximately 82% of the articles reviewed utilised qualitative methodologies. Additionally, 9% of the review articles employed mixed strategies in population growth research. Of those who applied qualitative studies, approximately 86% were review-based. Only approximately 14% of the qualitative research utilised focus group discourse (1%), case studies (6%), and interview methods (7%). The data sources documented within the literature review for quantitative research comprised survey data (7%), remote sensing data (7%), historical data (13%), and secondary data (73%).

7. Results

In this section, the publication dates of reviewed articles were used to identify the establishment of academic discourse in population growth studies between 2010 and 2025. The findings demonstrate the growing academic attention to this research topic during that timeframe.

7.1. Reviewed study areas

In the 14 reviewed articles, the study documented that the research focused on a specific location, Nigeria, to assess population growth and its impacts on the economy, ecosystems, and access to resources.

7.2. High fertility rates in Nigeria

High-fertility countries such as Nigeria lag behind many development indicators, as reflected in their progress toward achieving the Millennium Development Goals (MDGs). Nigeria has also received less development assistance for population and reproductive health than countries further along in their transitions to lower fertility, and the assistance it did receive increased only marginally from 1995 to 2007 (The World Bank, 2010).

In Nigeria, children from large families attain less schooling. Also, successively larger birth cohorts—a feature of high-fertility societies—detract from the quality of education by diluting per-pupil expenditure. High fertility (and the resulting population growth) is a direct and proximate cause of Nigeria's looming shortages of basic amenities. Population growth has also contributed to global warming in Nigeria. The World Bank (2010) stated that, to develop policies and programs to reduce fertility in the remaining high-fertility societies, one can reasonably argue that, while the amount of knowledge about fertility determinants is extensive, it is undifferentiated. It is challenging to distil a few key lessons from this overwhelming body of research. Thus, this research paper also focuses on providing information germane to formulating strategies to reduce fertility in contemporary high-fertility societies such as Nigeria.

7.3. Impacts of Population Growth on Ecosystems and Resources

The reviewed articles demonstrated various impacts of population growth on the resources and the ecosystem. This study revealed sixteen implications of population growth on ecosystems and resources. We merged these impacts into

four categories: population reduces the rate of capital formation; a higher population requires more investment; population growth and land degradation; and climate change. Population growth implies an increase in the number of individuals within a nation, negatively impacting resource consumption and leading to their strain and depletion (Muhammad, 2023; Mason, Lee, and NTA Network, 2022). Population growth is a key limiting factor for economic growth and development due to its detrimental effects on ecosystems and resources (Jie et al., 2023; Adejumo, 2020; Tartiyus, Dauda, and Peter, 2015; Maja and Ayano, 2021; Adeosun and Popogbe, 2021). Moreover, the review shows that population growth leads to rapid deforestation, nutrient depletion, soil erosion, and other issues that render the land unsuitable for agriculture (Hossain et al., 2020; Gomiero, 2016; Hatcher, 2019).

7.4. Population Reduces the Rate of Capital Formation

The reviewed articles illustrated that capital formation refers to the growth of the real capital stock in the economy, including infrastructure, factories, tools, and machinery through investments, and is significant for promoting economic growth and productivity (Nweke, Odo, and Anoke, 2017; Adarov and Stehrer, 2021). Population growth may decrease capital formation through intensified consumption demand, capital dilution, excessive strain on public resources, and a higher dependency ratio (Shi and Xu, 2023; Chen et al., 2023). Population growth intensifies demand for resources and the ecosystem, as a larger population necessitates more accommodation, clothing, and food, leading to a greater proportion of income being spent rather than saved. Lower-income savings lead to reduced investment and sluggish capital formation (Ganivet, 2020). According to Bucci et al. (2019), population growth leads to capital dilution, in which capital grows gradually relative to the population, resulting in each worker having less capital and thereby decreasing per capita income and productivity.

Furthermore, population growth places excessive strain on public resources, as more individuals increase demand for government expenditures on welfare, education, and health. This shifts finances from investment projects such as industrial development and infrastructure (Adesiyani, 2017). Furthermore, in line with Ayano's (2022) postulation, the review illustrates that population growth leads to greater dependency ratios. If a rise in birth rates causes population growth, the greater population might be children or a non-working population, decreasing the economy's saving potential.

7.5. Higher Rate of Population Requires More Investment in Nigeria

The review shows that population growth leads to higher investment rates because of greater demand for infrastructure, as more individuals need public services, utilities, transportation, and housing. The lack of proportional investment impairs infrastructure development, straining resources (Lawanson, 2016). Moreover, population growth strains healthcare and education systems, as an increasing population, particularly the young, requires more healthcare practitioners, hospitals, teachers, and schools, necessitating higher investment rates (Jaiyeoba, 2015; Ingiabuna and Uzobo, 2016; Dimnwobi et al., 2021). Likewise, publications show that an increasing population implies a larger labour force, thereby increasing job creation requirements. Insufficient industry investment to create jobs leads to underemployment and unemployment rates (Osewa, 2020; Uchegbue and Ifedi, 2023). Also, the growing population necessitates water and food security, as more individuals' hydration and food provision require agricultural expansion and water supply, which in turn require capital investments (Wichelns, 2015). The publication acknowledges that population growth promotes urban expansion, as inadequate investment leads to unplanned settlements and slums (Dimnwobi et al., 2021). Additionally, larger numbers strain environmental resources, requiring greater investment in environmental conservation, clean energy approaches, and appropriate waste management to promote environmental sustainability (Umeh et al., 2023; Ayodele et al., 2018). Accordingly, a rapidly growing population intensifies the need to invest across all economic sectors to promote better living standards and economic growth.

7.6. Population Growth and Land Degradation in Nigeria

The review demonstrates that population growth impacts agriculture because greater food demand from more individuals promotes innovation and higher agricultural production (Tomich et al., 2019; Ajayi, Mokryani, and Edun, 2022). However, population growth strains agricultural land by subdividing small plots among more individuals, resulting in smaller plots and less efficient agricultural production (Gleave and White, 2023; Akpan and Ebong, 2021). Additionally, population growth results in deforestation and the cultivation of marginal land, degrading the ecosystems (Adesola et al., 2024; Oyetunji et al., 2020; Sambe, Adeofun, and Dachung, 2018). In addition, population growth leads to soil overuse and degradation since the high population has high food demands, which pressures the farmers to land overuse without its replenishment, resulting in low-quality soils and lower agricultural yields (Fajobi et al., 2023; Usman, Ibrahim, et al., 2018), buttressed by (Effiong, 2025; Ahmad and Haie, 2018), elucidating that population growth results in greater demand for water, degrading the water systems, particularly in areas that rely on irrigation for agriculture (Effiong, 2025; Ahmad and Haie, 2018). Expanding towns and urban areas destroy fertile land, reducing

agricultural land (Lasisi et al., 2017; Matemilola, 2017; Hemathilake and Gunathilake, 2022). Consequently, population growth poses serious challenges, including land overuse, food insecurity, and resource depletion.

7.7. Population Growth and Climate Change

The review illustrates that population growth leads to high rates of cultivation to clear land for settlement and for agriculture to meet the increasing demands for food, which could lead to climate change, which negatively impacts agriculture through floods, droughts, and unstable weather changes (Aroyehun, 2023; Raimi, Vivien, and Oluwatoyin, 2021; Molotoks, Smith, and Dawson, 2021). Furthermore, population growth intensifies demand for resources such as land, water, and food, overburdening and depleting them (Dada et al., 2022; Ogwu, Iyiola, and Izah, 2023).

Population growth increases human activities and heightens greenhouse gas emissions, particularly in agriculture, which emits nitrous oxide and methane. Excessive waste production from a high population leads to methane emissions from landfills, causing air, water, and soil pollution (Dioha and Kumar, 2020). Accordingly, population growth contributes to climate change and its detrimental effects (Sobere and Ihua-Madunenyi, 2019).

In the 14 publications, the authors stated the various impacts of population growth on ecosystems and resources, including resource depletion and land degradation. (5) of these publications delve into population growth as one of the causes of climate change as a result of its impact on ecosystems and resources, especially non-renewable resources such as coal and crude oil (3) air pollution, soil pollution and water pollution (2), rapid urbanisation (1), waste disposal and land degradation (1) drought and desertification and (1) on high fertility rate. In the remaining publications, the researchers outlined various impacts of population growth on the ecosystem and resources. Based on these publications, the findings illustrate that climate change due to human activities was the most prevalently cited impact. Also, it is recognised that a larger population requires more food, water, energy, and raw materials, placing immense strain on the planet's finite resources.

8. Results and Discussion

The review showed that population growth intensifies demand for resources—water, agricultural land, forest products (such as timber), minerals and fossil fuels, and energy and food. Resource overexploitation can lead to resource degradation, as nature cannot quickly replenish them (Oribhabor, 2016). The detrimental implications of population growth on ecosystems and resources are neither new (Numbere and Maduiké, 2022) nor hypothetical; they are a present reality (Nwosu, 2024; Eriogun, Echebiri and Ebukiba, 2020). This review offers a comprehensive analysis of how the field of study is discussed in the current literature. The academic discussion on the impacts of population growth on ecosystems and resources underscores the long-lasting nature of this relationship, which requires interventions such as incorporating sex education into the curriculum.

Additionally, the government should actively participate in family planning interventions, particularly by raising awareness among rural women about family planning to address population growth and its negative impacts (Starbird, Norton, and Marcus, 2016; May 2017). The review has discussed some fundamental questions that are vital for guiding future research in the field. For instance, what are the key impacts of population growth on the ecosystem and resources?

This study focuses on population growth and its impacts on resources and ecosystems, particularly in Nigeria, which is on the precipice and requires urgent attention. The rapidly growing population strains Nigeria's resources and environment in various ways, including deforestation, soil degradation, water scarcity, challenges of urbanisation, and climate change (Ahmed and Aliyu, 2019). Additionally, population growth results in deforestation, or the cutting down of forests, to satisfy increasing demands for housing and agriculture. The high deforestation reduces biodiversity and causes habitat loss (Sims, 2021; Sobere, 2024; Ibrahim et al., 2022). Also, excessive population growth results in soil degradation, as inappropriate land use and over-cultivation lead to soil erosion and reduced land fertility, compromising agricultural productivity (Esut, 2022; Pontianus and Oruonye, 2021). Similarly, population growth results in water scarcity, as intensified water demands for agricultural and domestic use strain current water resources, leading to water shortages (Olalekan et al., 2019; Onanuga, Eludoyin, and Ofoezie, 2022). In the same vein, population growth's footprint expands deforestation, overfishing, food shortages, pollution, and solid waste. Rapid population growth leads to an increase in urban populations without the necessary infrastructure, resulting in overcrowded urban settings and pollution (Aliyu and Amadu, 2017). Population growth contributes to climate change, as dense populations lead to extreme weather conditions (Garba and Abdourahmane, 2023; Kojo and Paschal, 2018). Uncontrolled population growth in Nigeria will undermine ambitious climate goals. Reducing emissions of a growing population in Nigeria requires significant planning and investment.

9.0 Limitations and Future Research

9.1 Limitations of This Study

The systematic review has various limitations. Firstly, the systematic review utilised ProQuest as the sole database; future work might broaden the scope to include additional key databases. Secondly, the study integrated literature only in English. Yet other relevant publications in languages linked to population growth and its impacts on ecosystems and resources were not integrated into this analysis. Thirdly, the study focused on publications between 2010 and 2025. However, incorporating earlier studies might yield more exciting results and offer more enlightening literature.

10. Conclusion

This study examined the various impacts of population growth on ecosystems and resources in Nigeria. It identified gaps in the current literature to inform future research topics. Population growth has various impacts, such as high cultivation rates to clear land for settlement and agriculture. This could lead to climate change, impacting agriculture through floods, droughts, and other weather-related events. Also, the study's findings show that continuous population growth militates against economic growth by inducing poverty, reducing access to medical care/services, and worsening environmental degradation, thereby worsening resource scarcity in areas where a substantial proportion of the population already relies on natural resource-based livelihoods. This study argued that high population growth is a problem in itself for Nigeria if not adequately managed and that it is associated with constraints, such as corruption, inadequate planning, inappropriate implementation of development plans, poor budgetary and implementation practices, and complacency in developing human capital. Since independence, the Nigerian state has continued to battle these issues, which, if left unchecked, have made it a seemingly failing state. This study identifies the need for significant interventions, such as the incorporation of sex education in the curriculum and active government involvement in family planning programs, to ensure effective population control. Thus, this review contributes to research on the impacts of future population growth. Policies must focus on the future in preparation for Nigeria's rapidly growing population. The study concludes that addressing existing knowledge gaps will improve strategies to mitigate the negative implications of population growth, which requires urgent attention to ensure environmental sustainability.

11. Recommendations

Uncontrolled population growth is a complex issue that requires both attention and action. By understanding its causes and consequences and implementing practical solutions, Nigeria can mitigate the impact of population growth. Addressing overpopulation requires a multi-faceted approach that involves cooperation and the implementation of practical solutions. Based on the study's findings, there is a need to develop a sound policy framework and programmes that drive target-oriented education, training, and health care, which must be sustained.

- **High Fertility Rates**

High fertility rates in Nigeria are a driver of current population growth, and there must be firm policies and programmes in place to address this. The first order of business in Nigeria's high fertility is implementing policies that reduce the demand for children. In such settings, improved access to reproductive health services may be insufficient; instead, there must also be multisectoral interventions that will, among other outcomes, reduce the demand for children.

- **Support Education for Women and Girls**

There is a need for a direct, significant link between improved education for women and girls and lower fertility rates. Improved secondary education for females offers hope for the future. Supporting women's education to at least the secondary school level has a definitive impact on reducing birth rates. It also improves the spacing between children and improves the health and quality of life for those children.

- **Support Initiatives that Provide Education and Access to Family Planning**

Accurate, factual and unbiased education for children, adolescents and adults about reproduction, sexual health and consent is essential to reduce the number of unintentional births that occur each year. Easy, affordable, and reliable access to contraceptives and birth control is a significant factor in preventing unplanned births and is one of the strongest overpopulation solutions. Improved education improves the use and efficacy, but they must be available and accessible.

- **Invest in and Support Responsible and Innovative Agriculture**

There is a need to continue producing enough food to feed Nigeria's booming population. We need to start thinking differently about food production to cater for the growing population; for instance, vertical farming in urban areas can feed local populations by using controlled indoor growing conditions to grow food as efficiently and rapidly as possible. This will reduce the physical footprint, allowing more food to be produced on less land and negating habitat loss and deforestation caused by agriculture.

- **Consume Less, Consume Better and Choose Sustainable Sources**

Overconsumption is a major driver of the depletion of natural resources at unsustainable rates. Overpopulation solutions must go hand in hand with overconsumption solutions to be effective at all.

- **Choose Renewable Energy Resources**

One of the most significant sources of environmental degradation and pollution is the production of energy from fossil fuels. Overpopulation solutions are lacking and incomplete if they do not include changes to energy production.

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Appendix A: Fourteen papers that could be utilised in the systematic review

1.	Adarov, A., and Stehrer, R. (2021). Implications of foreign direct investment, capital formation and its structure for global value chains. <i>The World Economy</i> , 44(11), pp.3246-3299.
2.	Adeosun, O., T., and Popogbe, O., O. (2021). Population growth and human resource utilisation nexus in Nigeria. <i>Journal of Humanities and Applied Social Sciences</i> , 3(4), pp.281-298.
3.	Adesiyun, O. C. (2017). The impact of public spending on education in Nigeria.

4.	Adesola, R., O., Opuni, E., Idris, I., Okesanya, O., J., Igwe, O., Abdulazeez, M., D., and Lucero-Prisno III, D., E. (2024). Navigating Nigeria's health landscape: population growth and its health implications. <i>Environmental health insights</i> , 18, 11786302241250211.
5.	Ayano, D., A. (2022). Impacts of population dynamics on health in Nigeria economy. <i>IOSR J Math (IOSR-JM)</i> , 18(2), pp.9-22.
6.	Bucci, A., Eraydin, L., and Müller, M. (2019). Dilution effects, population growth and economic growth under human capital accumulation and endogenous technological change. <i>Journal of Macroeconomics</i> , 62, p.103050.
7.	Chen, F., Xu, J., Zhang, W., Wei, B., and Li, T. (2023). Capital formation and natural resources extraction: A source of sustainable development or a curse for the economy? <i>Resources Policy</i> , 85, p.103964.
8.	Ganivet, E. (2020). Growth in the human population and consumption both need to be addressed to reach an ecologically sustainable future. <i>Environment, Development and Sustainability</i> , 22(6), pp.4979-4998.
9.	Jaiyeoba, S., V. (2015). Human capital investment and economic growth in Nigeria. <i>African Research Review</i> , 9(1), pp.30-46.
10.	Lawanson, O. I. (2016). Rapid population growth and economic development in Nigeria.
11.	Nweke, G., O., Odo, S., I., and Anoke, C., I. (2017). Effect of capital formation on economic growth in Nigeria. <i>Asian Journal of Economics, Business and Accounting</i> , 5(1), pp.1-16.
12.	Olalekan, R., M., Adedoyin, O., O., Ayibatobira, A., Anu, B., Emmanuel, O. O., and Sanchez, N., D. (2019). Digging deeper" evidence on water crisis and its solution in Nigeria for Bayelsa state: a study of the current scenario. <i>International Journal of Hydrology</i> , 3(4), 244-257.
13.	Raimi, M., O., Vivien, O., T., and Oluwatoyin, O., A. (2021). Creating the healthiest nation: Climate change and environmental health impacts in Nigeria: A narrative review. <i>Morufu Olalekan Raimi, Tonye Vivien Odubo and Adedoyin Oluwatoyin Omidiji (2021). Creating the Healthiest Nation: Climate Change and Environmental Health Impacts in Nigeria: A Narrative Review. Scholink Sustainability in Environment. ISSN.</i>
14.	The World Bank, (2010). Determinants and Consequences of High Fertility: <i>A Synopsis of the Evidence.</i>