



Assessing the Impact of Population Dynamics in Kenya: A Need for Policy Implementation

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ABSTRACT

Population dynamics significantly influence various aspects of a country's development, including economic growth, social progress, and environmental sustainability. In Kenya, population dynamics have been a critical factor shaping the country's development agenda. This abstract aims to assess the impact of population dynamics in Kenya and the need for policy implementation. The relationship between population growth and economic development is complex and multifaceted. While an increasing population may fuel economic growth through a larger workforce, it simultaneously exerts pressure on essential resources and services. This paper examines the trends and implications of population growth in Kenya, a country characterized by a high fertility rate, and assesses its impact on economic dynamics. By analyzing the challenges posed by this demographic trend, the study elucidates the significant influence of population on Kenya's economy. Furthermore, it delves into the strategies implemented by the Kenyan government to mitigate adverse effects and proposes additional measures for sustainable development. Through this investigation, the paper aims to provide a comprehensive understanding of the interplay between population growth and economic stability in Kenya, highlighting the necessity for effective policy interventions.

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1. INTRODUCTION

Kenya, located in East Africa, has experienced significant population dynamics over the years. Understanding and assessing the impact of these population changes is crucial for effective policy implementation to address various social, economic, and environmental challenges facing the country. The country is divided into 47 counties and 302 sub-counties, as depicted in Fig. 1. Kenya's journey to independence culminated in December 1963, following a protracted resistance against British colonial rule, including a brief but intense guerrilla war. Kenya's population has been rapidly growing, with estimates indicating a population of over 50 million people. The distribution of this population is uneven, with high concentrations in urban areas like Nairobi and Mombasa, leading to

challenges such as overcrowding, inadequate infrastructure, and limited access to services.

The increasing population puts pressure on the healthcare system in Kenya. Issues such as limited healthcare facilities, shortages of medical personnel, and unequal access to healthcare services highlight the need for targeted policies to address these challenges and ensure the well-being of all citizens.

Population dynamics also impact education and employment opportunities in Kenya. The growing youth population presents both opportunities for economic growth and challenges in providing quality education and sufficient job opportunities. Addressing these issues requires strategic policies that focus on skill development, job creation, and promoting entrepreneurship.

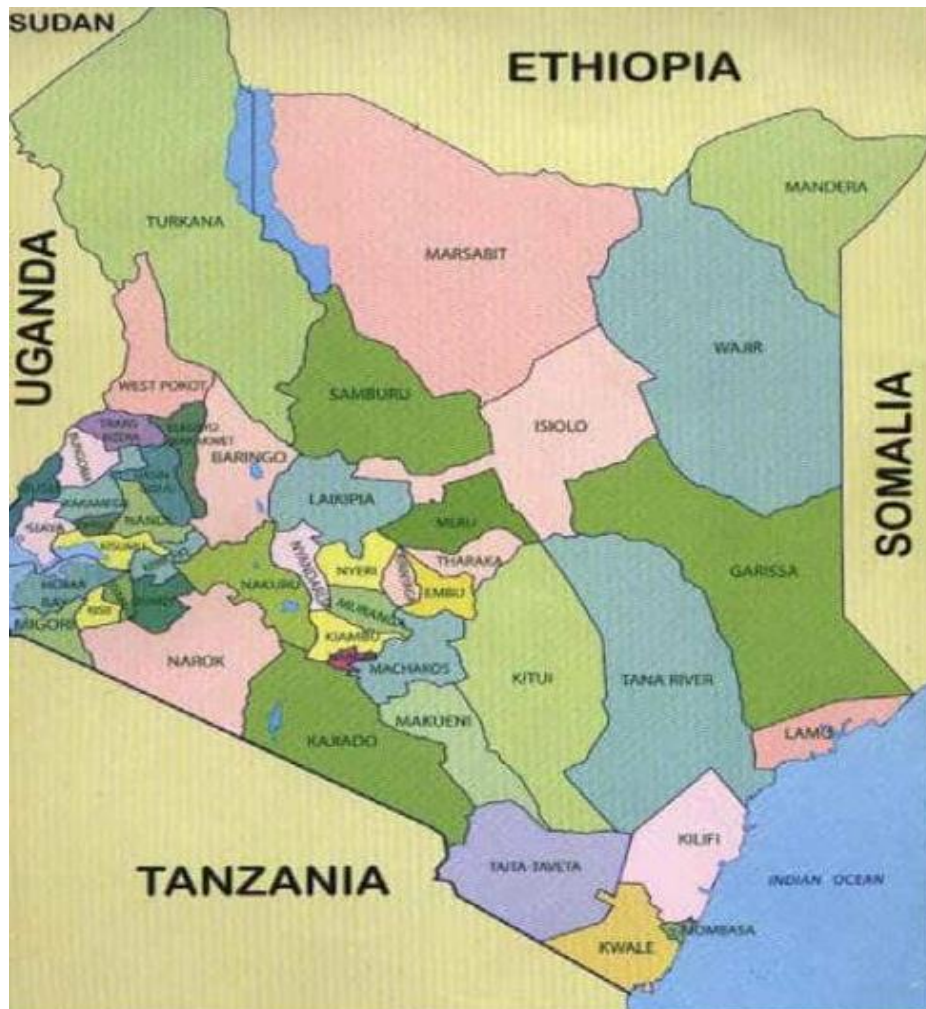


Fig. 1. Map of Kenya and the counties

The expanding population in Kenya contributes to environmental degradation through deforestation, pollution, and unsustainable resource use. Implementing policies that promote sustainable practices, conservation efforts, and renewable energy sources is essential to mitigate the negative impact of population dynamics on the environment.

Since independence, Kenya has navigated through various political landscapes, embracing a multi-party democratic system that, until March 2013, was governed by a coalition government. This shift in governance was a response to the controversial general elections of 2007.

The promulgation of a new constitution in 2010 marked a significant transition to a republican system, featuring a bicameral Parliament with a tenure of five years. This constitution established 47 autonomous county governments, designed to be both distinct from and interdependent with the national government. Each county, governed by an elected governor and county assembly, is tasked with local legislation and oversight of the governor's executive committee, replacing the earlier provincial and district structures [1-2].

Geographically, Kenya covers an area of 582,646 square kilometers, with 571,466 square kilometers being land. The country's terrain is

predominantly arid or semi-arid, constituting 80% of the land area, making it unsuitable for agriculture but ideal for wildlife conservation and pastoralism. The remaining land is arable, supporting agriculture. Kenya's landscape is divided into highlands, flanking the Rift Valley, and lowlands, which include the coastal and lake regions. The climate varies significantly across the country, influenced by the Indian Ocean and elevation. The coastal lowlands enjoy a tropical climate, with higher temperatures and rainfall compared to the rest of Kenya [3].

2. POPULATION DYNAMICS IN KENYA

2.1 Population growth and density

Kenya, situated in the eastern region of Africa, shares its borders with Ethiopia, Tanzania, Uganda, Somalia, and Sudan [4]. The country is administratively divided into 47 counties and 302 sub-counties, a structure illustrated in Fig. 1. Achieving independence from Britain in December 1963 after enduring a brief but intense guerrilla warfare, Kenya transitioned to a multi-party democratic system. The governance of the country saw the establishment of a coalition government system persisting until March 2013, a change precipitated by the contentious general elections held in 2007.

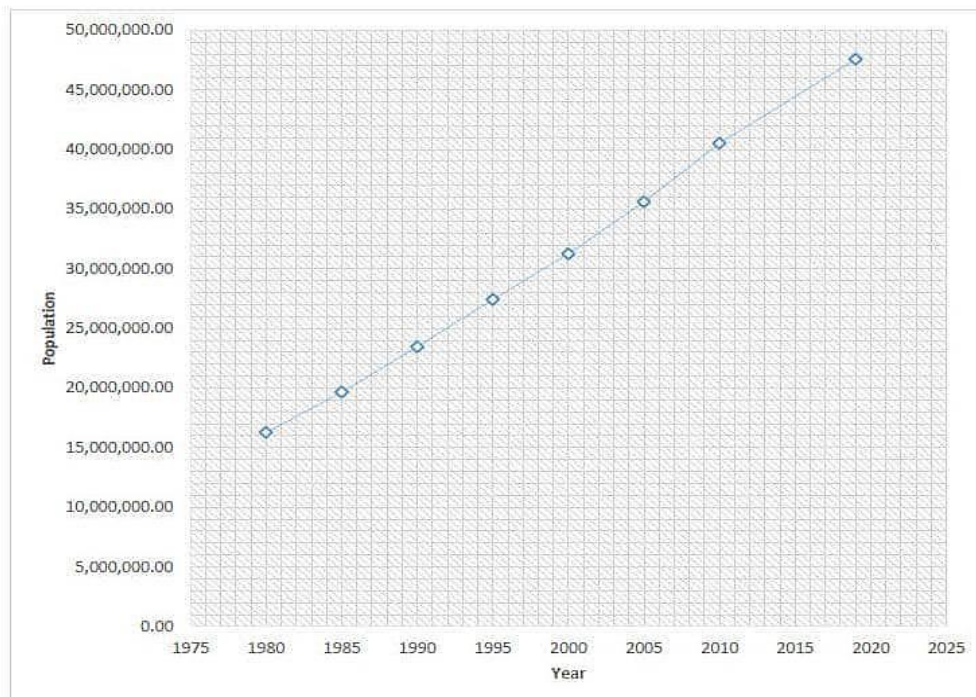


Fig. 2. Population growth in Kenya between 1980 to 2019 [5]

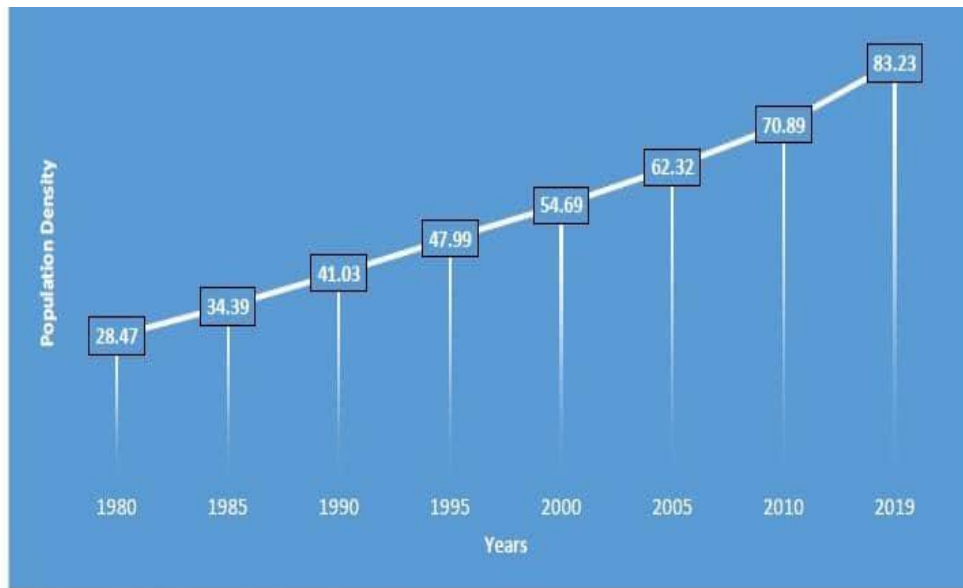


Fig. 3. Trends in population density in Kenya between 1980 to 2019 [5]

Kenya faces significant development and demographic challenges due to its rapidly growing population, which has led to an increased young dependency ratio. This demographic dynamic pressures the government to provide sufficient support and employment opportunities. Despite efforts to reduce the total fertility rate from 4.5 births per woman to the replacement level of approximately 2.2 births per woman, the youthful demographic ensures continued population growth. While Kenya's population growth rate is not the highest in East Africa, its population size exceeds that of many countries in the global north. Notably, Kenya boasts the lowest death rate in East Africa and a lower rate of natural increase at 2.2%, distinguishing it from other regions with higher crude death rates, such as Africa's average of 50% compared to the global average [6].

In rural areas like Kakamega, Kiambu, Kisii, Vihiga, and Kisumu counties, population growth has significantly increased densities, exceeding 500 persons per square kilometer. The 2009 population and housing census revealed that just under one-third of Kenya's population resided in urban areas, marking a substantial increase from 19.3% in the 1999 census. This swift urbanization has strained existing infrastructure and led to the proliferation of informal settlements, exacerbating overcrowding issues. The lack of basic infrastructure in these areas is likely to further entrench poverty and increase delinquency rates [6]. As of 2018, Kenya's population density was estimated at 85.3

individuals per square kilometer, with a total population of 50.8 million, as depicted in Fig. 3.

Despite the Kenyan government's unwavering efforts to implement policies affecting demographic trends, the nation's population, presently estimated at 42 million, is projected to soar to nearly 60 million by 2030 and 77 million by 2050. By then, it is anticipated that the average fertility rate per woman will have decreased to below 3 births, alongside a reduction in the infant mortality rate [7].

Kenya's population structure and growth rate, currently at an annual average of 2.5%, pose significant challenges. The fertility rate has recently surged to over 3.5%, and the crude death rate among adults exceeds 5.0%, primarily due to disease-related fatalities. Concurrently, the proportion of the working-age population has seen a rapid increase, leading to an expanding pool of potential labor force. This surge underscores the urgency of tackling the scarcity of both formal and informal employment opportunities. Despite the looming increase in population size, Kenya stands to gain from the demographic transition it has been experiencing since the late 1980s. This shift could yield a demographic dividend, where a sizeable segment of the working-age population becomes adequately productive to sustain the dependents, including children and the elderly.

Between 2021 and 2023, Kenya's population expanded by 2,107,948 individuals, marking a 3.8% growth rate, which positions Kenya within

the moderate spectrum of population growth rates in Africa. This demographic trend has been partially attributed to the enhanced access to contraception and family planning methods, a result of both governmental initiatives and international support [8]. Simon [9] posited that population growth in Kenya acts as a catalyst for technological advancements and innovation, arguing that it fosters a competitive business environment and expands the potential market as the population increases. Conversely, Peterson [10] highlighted the multifaceted impacts of population growth, including shifts in age distribution, migration patterns, economic disparities, and workforce size. Despite the economic benefits, population growth imposes stress on essential resources, potentially jeopardizing natural resource preservation, food production, and the development of savings, foreign exchange, and human capital. The resulting increase in food demand diminishes natural resources, contributing to poverty, famine, and disease by complicating infrastructure, education, and healthcare provision.

Kenya's demographic expansion has historically strained land and other resources. The 1970s and 1980s saw one of the highest population growth rates globally due to high fertility rates and declining child mortality [11]. From independence, the population surged from approximately 10 million to 15 million by 1978. This growth, coupled with economic challenges, led to family planning initiatives aimed at reducing fertility rates, positioning Kenya as one of the pioneering African nations to adopt policies aimed at curbing population growth [11].

A recent address by the Principal Secretary of the State Department for Economic Planning at the 2023 State of the World and Kenya Population Report launch outlined the current demographic shifts in Kenya, marked by changing fertility, mortality, and migration rates. These changes have altered the population structure, evidenced by a decline in the proportion of children under 15 years from 43% in 2009 to 39% in 2019, and a significant growth in the youth and working-age populations. The number of older adults is also on the rise, showcasing an increase in life expectancy from 2009 to 2019, with older individuals becoming the fastest-growing demographic segment [12].

This paper aims to thoroughly examine the implications of Kenya's population growth,

enabling the formulation and implementation of policies to mitigate the adverse effects of this rapid increase. It specifically delves into the dynamics of fertility, mortality, and migration to provide a comprehensive understanding of the demographic challenges facing Kenya.

2.2 Fertility

The Demographic and Health Surveys (DHS) program, initiated in the 1980s, prioritizes the collection of data on fertility rates, trends, and differentials. In Kenya, ongoing collection of data through birth records and other mechanisms has been crucial in recognizing the significant role of fertility in mitigating the nation's population growth. Since 1967, fertility reduction has been a central goal of Kenya's population policy, reflecting the government's concerted efforts to diminish fertility and population growth rates.

The total fertility rate (TFR) serves as a precise metric for assessing fertility. Examination of Kenya's fertility trends from 1977 to 2003 reveals a significant decline in TFR over the last two decades of the 20th century. The rate decreased from 8.1 children per woman in the late 1970s to 6.7 in the late 1980s, and further to 4.7 in the latter half of the 1990s. However, from 1998 onwards, fertility rates began to show a slight increase, reaching a TFR of 4.9 children per woman in the period from mid-2000 to mid-2003. This rise in fertility rates has predominantly impacted women aged 25-39. Fig. 4 illustrates the fertility trends in Kenya from 1977 to 2003, highlighting these changes [13].

The Demographic and Health Surveys (DHS) program, since its initiation in the 1980s, has emphasized the collection of data on fertility rates, trends, and differentials, recognizing fertility's role in influencing Kenya's population growth. The government's focus on reducing fertility and population growth rates since 1967 has seen various initiatives, including the promotion of contraceptive use among married women. This effort has yielded positive results over the years, with contraceptive prevalence rates among married women increasing from 9.7% in 1984 to 46% in 2008-09, and further to 58% in 2014 [14]. Despite these gains, the total fertility rate (TFR) experienced a notable decline from 8.1 children per woman in the late 1970s to 4.7 in the late 1990s, before marginally increasing to 4.9 children per woman between mid-2000 and mid-2003, particularly affecting women aged 25-39 [13].

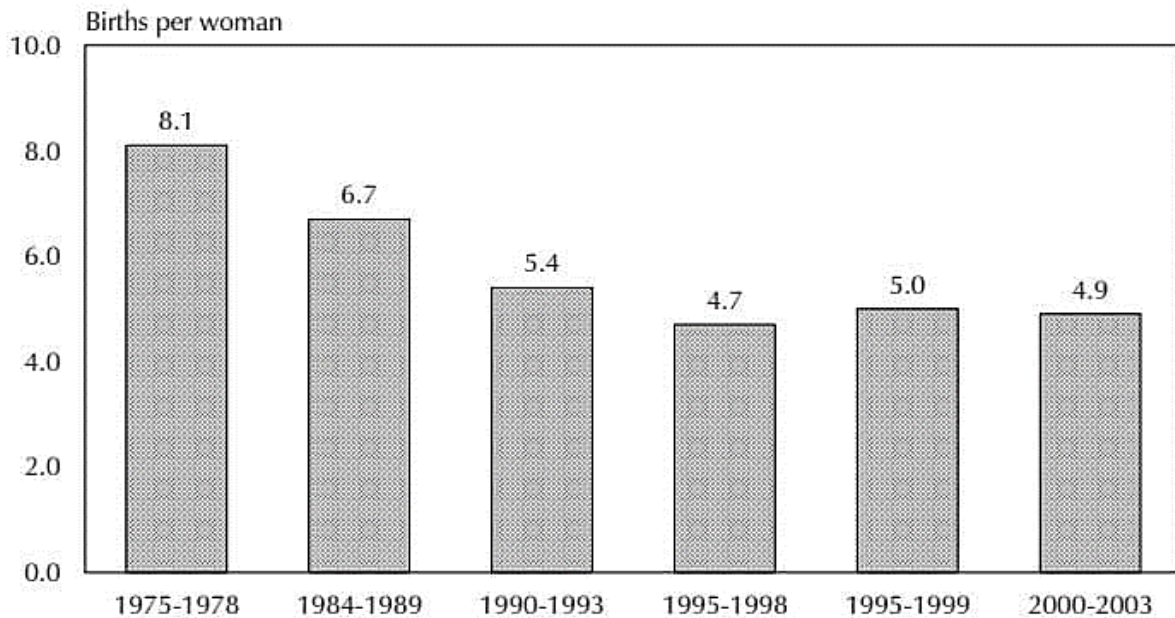


Fig. 4. Fertility (TFR) trend of Kenya between 1977 to 2003

Simultaneously, studies such as those by Kamuyango et al. [15] have observed that changes in women's characteristics have minimally impacted the upward trend in contraceptive use, suggesting that other factors, possibly related to policy or societal changes, play a more significant role. The 2003 Kenya Demographic and Health Survey (KDHS) highlighted that nearly half of unmarried women aged 15–19 and 45% of married women considered their pregnancies mistimed or unwanted, revealing considerable gaps in effective contraceptive use and family planning [16]. Chikandiwa et al. [17] further explored the prevalence of contraceptive use and its risk factors, underlining the critical need to understand the determinants of contraceptive behaviors among Kenyan women.

Moreover, the interplay between marital status and health outcomes has been explored, with studies like Mkuu et al. [18] indicating that married women or those living with a partner have higher odds of being overweight. Clark [19] presented data from Kisumu, Kenya, showing higher HIV infection rates among married girls aged 15-19 compared to their unmarried counterparts, pointing to the complex risks associated with marriage.

In summary, while the prevalence of contraceptive use among married women in Kenya has increased, indicating a positive trend towards controlled fertility, challenges such as

unintended pregnancies, health risks related to marital status, including overweight and HIV infection, persist. These observations underscore the necessity for ongoing research and interventions aimed at addressing the multifaceted factors influencing contraceptive use and improving the health outcomes of married women in Kenya, alongside the broader demographic efforts to manage population growth effectively.

2.3 Mortality

Kenya has been actively working to enhance its health systems to effectively address the health challenges faced by its population. From 2020 to 2022, the country reported a total of 340,431 positive COVID-19 cases and 5,680 fatalities. Additionally, in 2021, AIDS-related illnesses claimed the lives of 3,138 children aged 0-14, with 60 percent of these deaths occurring in children under five years of age.

The Kenya Mortality and Cause of Death Report 2021 highlighted that esophageal cancer was the leading cause of cancer-related deaths, accounting for 16 percent, followed by cervical and breast cancers at 10 percent each, and liver cancer at 9 percent. Furthermore, data from the National Safety and Transport Authority (NTSA) indicated a significant rise in the number of individuals involved in accidents, from 11,215 in 2017 to 21,760 in 2022. Despite a general decline in mortality rates, the country has

observed an uptick in deaths attributed to non-communicable diseases, accidents, and injuries, underscoring the evolving health challenges that Kenya faces [20].

Kenya's commitment to strengthening its health systems has been crucial in addressing various health complications, including those related to maternal and child health. Despite efforts to enhance healthcare delivery, the country continues to grapple with significant challenges in maternal and infant mortality rates. Maternal mortality remains alarmingly high, with rates fluctuating between 342 and 488 deaths per 100,000 live births, with the prevalence notably higher in rural areas where access to healthcare is often limited [21-26]. Neonatal mortality also presents a major concern, with rates reported between 19.6 and 27 deaths per 1000 live births, underscoring the urgent need for improved infant health services [27-29].

The high maternal and infant mortality rates in Kenya can be attributed to several factors, including inadequate healthcare access, delays in seeking obstetric care, and the prevalence of preventable conditions such as gestational urinary tract infections and unsafe abortions [30-33]. The COVID-19 pandemic has further exacerbated these challenges, potentially increasing mortality rates among mothers and newborns [34-35].

Initiatives to reduce maternal mortality have included the provision of free maternal health care and the deployment of Community Health Workers (CHWs) to promote maternal health services [36]. Despite these efforts, obstacles such as disrespectful maternity care and inadequate birth preparedness continue to impede progress [25,37-38]. Additionally, while declining mortality rates, especially in maternal and neonatal health, contribute to population growth, it is imperative to balance these improvements with effective family planning measures to ensure sustainable population management [39].

In summary, while Kenya has made strides in addressing the health needs of its population, including the reduction of COVID-19 cases, AIDS-related child deaths, and cancer fatalities, the persistently high rates of maternal and neonatal mortality highlight the ongoing health challenges. Addressing these issues requires a multifaceted approach that improves access to healthcare, increases awareness, and

implements targeted interventions to enhance maternal and child health outcomes, ultimately contributing to the overall well-being and sustainable growth of the Kenyan population.

2.4 Migration

The migration process is often overlooked in studies of population dynamics, being overshadowed by other components such as fertility and mortality. Despite this, migration plays a crucial role in shaping demographic trends and has been acknowledged within the demographic field as a significant area warranting comprehensive study [40]. As of 2005, it was estimated that nearly one in seven individuals globally were migrants, with a majority being internal migrants, indicating substantial movement within countries.

Recent data from the 2022 Kenya Demographic and Health Survey (DHS) reveal that internal migration is prevalent among Kenyan women, with 55% reporting they were born outside their current place of residence within Kenya and an additional 2% born outside the country. Comparatively, a smaller proportion of Kenyan men have migrated, with 36% born outside their current residence within Kenya and 1% internationally. Migration patterns primarily consist of rural to urban movement, reflecting Kenya's rapid urbanization, which saw the urban population increase from 5.3% of the total population in 1948 to 31.2%, or 14.8 million people, by 2019. Additionally, the number of urban centers has expanded from 47 in 1969 to 372 in 2019.

Migration is often associated with stress due to the loss of social support networks, leading to challenges such as anxiety, depression, social marginalization, and disruption of family life. Expectations of sending remittances back home and the stress of acculturation can exacerbate these challenges for migrants as they adjust to new social environments and lifestyles. The surge in rural-urban migration in Kenya contributes to social issues in urban areas, including homelessness, squalor, increased crime rates, the proliferation of informal settlements, overcrowding, substandard housing, inadequate sanitation, poverty, child malnutrition, and other social ills [41].

Furthermore, migration trends in Kenya have a differential impact on fertility rates, patterns, and overall reproductive behavior. Out-migration,

particularly from economically dynamic areas resulting in spousal separation, can lead to higher sex ratios (a lower ratio of women to men) and subsequently lower fertility rates. Conversely, in less developed or peripheral areas, migration tends to encourage higher fertility by affecting key determinants and behaviors related to fertility. This intricate relationship between migration and fertility, observed not only in Kenya but across Africa, underscores the importance of understanding how migration influences demographic changes. Migration significantly influences population dynamics in Kenya, not only through the movement of people but also by impacting fertility rates through various channels. The Demographic and Health Surveys (DHS) program has highlighted the prevalence of internal migration, with a substantial proportion of Kenyan women and men migrating within the country, primarily from rural to urban areas. This trend is reflective of Kenya's rapid urbanization and has profound implications for population growth rates by altering fertility patterns and behaviors.

Internal migration affects fertility rates by influencing factors such as contraceptive use, access to healthcare, socio-political changes, and economic aspirations. Studies have shown variations in contraceptive use among internal migrants in Kenya, suggesting that migration may lead to changes in access to and utilization of family planning services [42]. This is further supported by evidence indicating that rural to urban migrants exhibit higher fertility rates than their urban counterparts, contributing to the overall population growth [43]. Such findings underscore the importance of understanding how migration from rural to urban areas, often in search of better economic opportunities, can inadvertently lead to increased fertility rates.

Research utilizing Kenya Demographic and Health Surveys (KDHS) data has explored the nuanced relationship between migration and fertility, revealing how migration patterns shape fertility behaviors [44-45]. Moreover, studies highlighting health disparities among migrants in Nairobi, including higher rates of maternal, child, and infant mortality, suggest that migration is associated with specific health outcomes that could influence fertility rates [46]. These health disparities among migrants compared to other population subgroups, including rural residents, point to the broader social and health challenges faced by migrants, which could have ripple

effects on fertility patterns and overall population growth.

Additionally, the economic motivations behind migration play a critical role in fertility decisions. Migrants originating from economically prosperous areas tend to experience a decline in fertility rates, while those from regions with higher fertility rates and economic challenges might see migration as an opportunity to improve their living conditions, potentially sustaining higher fertility rates through remittances and improved economic status [47].

The intricate relationship between migration and fertility in Kenya illustrates how migration, through its influence on contraceptive use, health outcomes, and economic aspirations, contributes to shaping the country's population growth rates. Understanding this complex interplay is essential for developing targeted policies and interventions aimed at managing population growth sustainably, particularly in the context of Kenya's rapid urbanization and demographic transition.

3. IMPACTS OF POPULATION DYNAMICS ON DEVELOPMENT

3.1 Growth Domestic Product

Debates on the relationship between population growth and economic development are prevalent worldwide, including in Kenya, where opinions diverge. Some argue that population growth fosters economic growth and development, while others contend that rapid population increase and high fertility rates hinder economic progress. A third viewpoint suggests that high population growth and fertility contribute to lower per capita gross national product, decreased per capita food consumption, diminished land quality, increased dependency ratios, urban congestion, and strained health systems.

In Kenya, there is a notable inclination towards the perspective that population growth is a catalyst for economic advancement [48]. Economic growth, as measured by changes in Gross Domestic Product (GDP), can be broken down into population and economic components, indicating that economic expansion is the sum of population growth and growth in per capita GDP [10].

The demographic increase has been instrumental in bolstering Kenya's workforce,

both in industries and agriculture, and in driving innovation, particularly in the informal sector, which absorbs workers unable to secure formal employment. The Boda Boda (motorcycle taxi) sector exemplifies this, creating approximately one million direct jobs and indirectly supporting six million others—nearly 10% of the Kenyan population. This sector's contribution to the GDP is significant, closely paralleling the education sector's output, and generating substantial tax revenue for the government through fuel taxes. With 1.2 million riders, the majority of whom are engaged in commercial activities, this industry not only highlights the economic potential of population growth but also underscores the entrepreneurial spirit within the Kenyan economy, offering insights into the dynamic interplay between demographic trends and economic opportunities [49].

The interplay between population quality, particularly education, and economic growth in Kenya underscores the multifaceted drivers of economic development. Research indicates that financial development, characterized by the ratio of money supply (M2) to GDP, significantly influences economic growth both in the short and long term [50]. The role of institutional quality as a pivotal factor in the finance-growth nexus further highlights the critical need for a robust institutional framework to underpin economic expansion [51]. Investment in education, as evidenced by the positive impact of education expenditure on economic growth [52], and government spending on infrastructure and education [53] are identified as key determinants of Kenya's economic trajectory. These studies suggest that strategic allocation and utilization of resources in education and infrastructure are essential for catalyzing economic growth.

Moreover, the advocacy for free public health and education, funded through progressive taxation to enhance human capital and equitable development, underscores the significance of access to education and healthcare in fostering economic growth and social equity [54]. The demographic component, including the influence of population growth on labor supply and employment, reveals the profound impact of demographic dynamics on Kenya's economic landscape [55]. Leonard [56] further emphasizes the necessity for Kenya to capitalize on its labor force and market opportunities presented by its population to achieve higher economic growth, highlighting the potential benefits of leveraging demographic factors.

Integrating these insights with the discussion on the role of population growth, particularly through sectors like the Boda Boda industry, illustrates a broader narrative. Population growth, combined with strategic investments in education and the nurturing of a conducive institutional environment, not only contributes to the workforce and spurs innovation but also necessitates effective governance and resource allocation to harness the full potential of Kenya's demographic and economic assets. Thus, the quality of the population, through education, institutional integrity, and demographic advantages, plays a pivotal role in shaping Kenya's economic growth, pointing towards the necessity for comprehensive strategies that encompass financial development, educational investment, and demographic management to drive sustainable economic development.

3.2 Housing

Nairobi, Kenya's capital, serves as a prime example when examining the interplay between population growth and housing challenges. As one of the largest cities globally harboring extensive slums, Nairobi's current population stands at approximately 5,118,844, spread across an area of 696 square kilometers (269 square miles). This results in a population density of around 4,850 residents per square kilometer (12,600 people per square mile), highlighting the city's dense urban environment. The economic growth spurred by population increase in urban centers like Nairobi is shadowed by a critical demand for housing. This demand is largely fueled by rural-urban migration, as individuals move to cities in pursuit of better opportunities. Over the past two decades (2002 – 2022), Nairobi has witnessed a rapid escalation in population density, with informal settlements becoming focal points of this growth. These settlements accentuate the strain on the housing sector, driven by the soaring demand for accommodation, thereby presenting significant challenges to urban development and planning [48].

3.3 Education

The education sector in Kenya is significantly impacted by the country's rapid population growth, facing increased demand for schools and educational infrastructure. This challenge, often overshadowed by other societal issues, is exacerbated by cultural beliefs among some segments of the population. There exists a

notion, particularly prevalent among poorer and less educated communities, that a larger number of offspring enhances the family's chances of economic upliftment, with the hope that at least one child will succeed and alleviate the family's poverty.

Early marriage contributes to this cycle of poverty and educational strain, leading to large families without adequate planning for their future, including access to quality education. By the time parents are in their 40s and 50s, they often find themselves with numerous children but without the means to secure good employment opportunities for themselves or ensure a quality education for their children. This situation underscores the need for focused interventions to address the social implications of unchecked population growth, which places a considerable burden on social amenities, particularly in the education sector.

In Kenya, the repercussions of population pressures on education manifest in overcrowded classrooms and diluted quality of instruction, particularly in public schools. It is not uncommon for schools to operate with a student-to-teacher ratio of 200:1, severely affecting the quality of education provided. This situation is especially dire in slum areas, where families often opt for low-cost private schools over government-funded ones, highlighting the desperate need for solutions to improve educational access and quality amidst rising population challenges [57].

3.4 Food Shortage

Rapid population growth in Kenya has led to a significant portion of the population, approximately one in three Kenyans or 18,626,415 individuals, suffering from chronic food shortages and poor nutrition annually. This accounts for about 34% of the total population. Furthermore, around 29% of the population, or 16,204,881 individuals, fail to meet the minimum dietary requirements necessary for maintaining a healthy and productive lifestyle [49]. The Kenya National Economic Survey highlights the direct correlation between food scarcity and poverty, which affects nearly 46% of the population, underscoring the impact of Kenya's burgeoning population on food accessibility [58].

The relationship between population growth and food security is starkly evident in regions that should theoretically have high food security levels due to their natural advantages. For

example, Kisii Central in Kisii County, despite being endowed with rich natural resources, favorable weather, ample rainfall, and fertile land, reported that only 77.5% of households were food secure, while 22.5% faced food insecurity [59]. This disparity highlights the challenges of translating natural resource wealth into food security, especially in areas that, by all accounts, should achieve much higher levels of food security given their productive capacities.

3.5 Agriculture

The agricultural sector in Kenya plays a significant role in the country's economy, contributing approximately 33% to the Gross Domestic Product (GDP) and employing over 40% of the total population, with 70% of the rural population engaged in this sector [60]. The World Bank estimates that the agriculture sector contributes 51% of Kenya's GDP annually, with 26% directly and 25% indirectly, and accounts for 60% of employment and 65% of exports [61]. However, agricultural productivity has stagnated in recent years, partly due to urbanization of rural areas and the high demand for housing driven by population growth [62]. This urbanization has led to a need for the development of a structural model to estimate the impact of population density on input and output prices, farm size, and smallholder behavior, which is crucial for strengthening the agricultural sector [62].

Climate variability and change also pose significant challenges to agricultural production in Kenya. Studies have highlighted the harmful effects of rising temperatures and increasing rainfall uncertainty on small-scale farmers in Kenya, emphasizing the need to rethink strategies to mitigate these effects [63]. Additionally, climate change poses a threat to nutrition and food security in specific regions such as Kilifi County, Kenya, which has been evaluated through community rotations and focus group discussions with community members and healthcare stakeholders [64].

Furthermore, gender disparities in access to agricultural productive resources have been identified as a limiting factor in agricultural productivity in Kenya. Women farmers in Kenya face challenges such as limited access to productive resources, extension and advisory services, and participation in income-generating activities, which ultimately affect agricultural productivity [65]. Additionally, the role of urban-based agriculture in enhancing food security has

been studied, with findings indicating that participation in urban and rural agriculture improves households' food security and contributes to household income [66].

The inefficient use of water resources and the need for water conservation in agriculture have also been highlighted as critical issues in Kenya. A shift towards virtual water import has been suggested as a potential policy to address water scarcity in the agricultural sector, considering that the majority of the population relies on agriculture for their livelihood in Kenya [67].

Moreover, the role of agricultural extension services and training in improving agricultural productivity among smallholder farmers has been emphasized. Studies have shown that the type, relevance, frequency, and modes of training services significantly influence agricultural productivity, particularly in potato production [68]. Additionally, the adoption of information and communication technology-based market information services has been linked to improved smallholder farm input use and productivity in Kenya, indicating the potential of technology in enhancing agricultural productivity [62]. The agricultural sector in Kenya faces various challenges related to climate change, gender disparities, water conservation, and the need for technological advancements. Addressing these challenges is crucial for enhancing agricultural productivity and ensuring food security in Kenya.

3.6 Land

The issue of growing human population in Kenya has been identified as a significant factor contributing to increased developmental needs and posing a threat to land resources. This problem is particularly evident in high-potential areas of the country, where a large population seeks to fully exploit the land resources for their livelihoods and welfare. The demand for meeting local food production has led to the expansion of farmlands at the expense of natural forests and grasslands in the Ethiopian highlands [69]. Additionally, research in the northern Ethiopian highlands has shown that population growth, market access, agricultural credit and technical assistance programs, land policies, and livelihood strategies have had significant impacts on changes in land management, natural resource conditions, and human welfare indicators [70]. Furthermore, studies in the Gelda catchment, Lake Tana watershed, Ethiopia, have utilized key informant interviews and focus group

discussions to identify the driving forces linked to land use/cover changes and their impact on natural resources [71].

Moreover, the increase in population has been found to exert pressure on agricultural land due to land conversion in the suburbs of Yogyakarta, indicating that the need for agricultural land to increase production aligns with the growing population's food needs [72]. Similarly, in the Ethiopian highlands, competition for land resources has been observed, with population growth being a driving force with consequences in crop-livestock production systems [73]. Additionally, population growth has been identified as a significant contributor to increases in surface runoff generation, water yield, and evapotranspiration in the Olifants Basin, South Africa, highlighting the impact of population dynamics on land use/cover changes and hydrological responses [74].

Furthermore, the growth of human populations and their resource needs has been noted to stress the conservation of natural land resources, as evidenced by the push and pull of land use policy in the context of development and conservation land acquisition [75]. The phenomenon of water reduction, land degradation, and desertification has been attributed to the conditions of the environment affecting the social and political stability of populations, emphasizing the impact of population growth on environmental degradation [76]. Additionally, the pressures of the human population on land resources have been found to increase land-use change with negative effects on soil properties, indicating the far-reaching consequences of population pressure on land resources [77]. Literature shows substantial evidence of the impact of population growth on land resources, particularly in the context of agricultural land use, land cover changes, and natural resource conservation. The studies highlight the complex interactions between population dynamics, land use/cover changes, and environmental sustainability, emphasizing the need for comprehensive strategies to address the challenges posed by growing human populations in relation to land resources.

4. GOVERNMENTAL POLICIES

Kenya's Vision 2030 development blueprint acknowledges the potential of rapid population growth to impede the nation's progress towards achieving a high quality of life for all its citizens,

sustainable within the scope of its resources. The National Council for Population and Development (NCPD), operating under the Ministry of Planning, National Development, and Vision 2030, has embarked on a series of consultations aimed at formulating a population policy aligned with these developmental goals [78]. The burgeoning population exerts substantial pressure on critical sectors such as education, agriculture, food security, land, and housing, necessitating the implementation of strategic policies to manage these challenges effectively. Land policies, in particular, require a focus on enhancing land tenure security in densely populated areas, advocating for both immediate and long-term strategies that encourage land conservation and community engagement [79].

To mitigate school overcrowding caused by population growth, the Kenyan government has introduced measures and policies designed to alleviate congestion within educational institutions. However, there is a recognized need for Kenya to draw lessons from nations that have successfully addressed similar challenges, potentially through innovative solutions like the adoption of a double-shift system for schools in densely populated regions. Additionally, the enforcement and monitoring of safety standards in schools are imperative to safeguard students from risks, necessitating stronger collaboration between the government, school administrators, and communities to tailor solutions to local needs and contexts.

In the agricultural sector, enhancing productivity is key to eradicating poverty and reducing hunger, a global challenge affecting millions living in poverty [80]. Nonetheless, land degradation poses a significant threat to agricultural productivity and the achievement of these objectives [81]. Policy recommendations include evolving land markets and governance, adjusting to changes in local power dynamics, responding to rural-urban multiplier effects from agricultural productivity, innovating service provision and technology along value chains, and addressing land scarcity for smallholders [82].

The rapid urbanization experienced in Kenya, characterized by an uncontrolled influx into urban areas, has resulted in significant population increases in cities, underscoring the urgent need for comprehensive urban planning and active county government involvement. The national government's commitment to housing affordability for low-income earners through

budget allocations and the incorporation of institutions like the housing finance corporation is crucial. Such initiatives aim to promote accessible housing solutions for those in dire need [83].

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study highlights the varied perspectives regarding the impact of population growth on a country's economic landscape, particularly within the context of Kenya, where economists are divided into three distinct camps. The first posits that population growth acts as a catalyst for economic development, enhancing the nation's economic performance. The second, drawing upon the theories of Robert Malthus, argues that population growth detrimentally affects a country's economy due to the strain it places on limited resources. The third perspective maintains that population growth has a neutral effect on economic growth.

Through a thorough examination of Kenya's population trends from independence to the present day, this paper aims to inform the Kenyan Government's policy-making process, addressing the need for strategies to manage population growth effectively. It delves into the consequences of demographic expansion across critical sectors including the economy, agriculture, education, and the overall wellbeing of citizens. In summary, while embracing the notion that population growth can stimulate economic development, it is imperative for Kenya to adopt comprehensive measures to mitigate the challenges posed by demographic increase to housing, land, agriculture, food security, and education, among other areas.

5.2 Recommendations

This study highlights several critical outcomes of overpopulation and overurbanization, including cultural, social, and physical dissatisfaction. It is imperative for governments, particularly the Kenyan Government, to develop or enforce existing policies and strategies to address these challenges effectively. Despite the positive economic growth observed in Kenya amidst rising population figures, adverse effects on land, housing, agriculture, and education are evident. To mitigate these issues, Kenya urgently requires a comprehensive national development

plan encompassing urban planning, employment, and investment strategies. Addressing urban challenges necessitates strengthening urban-rural economic linkages and promoting the development of secondary towns, which will demand significant collaboration between local authorities and the central government.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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