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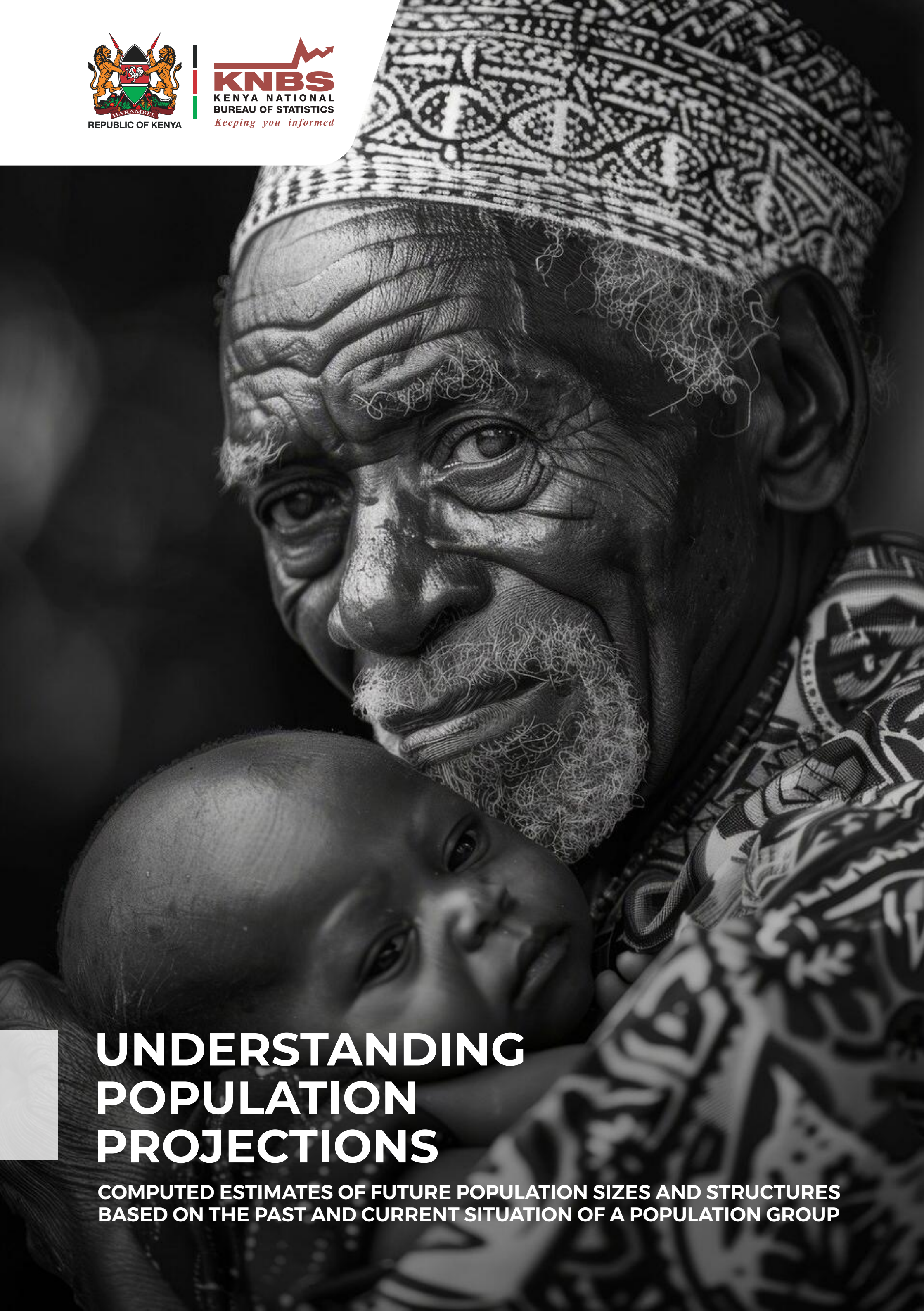

UNDERSTANDING POPULATION PROJECTIONS

COMPUTED ESTIMATES OF FUTURE POPULATION SIZES AND STRUCTURES BASED ON THE PAST AND CURRENT SITUATION OF A POPULATION GROUP

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Understanding Population Projections

Introduction: What are population projections?

Population projections are computed estimates of future population sizes and structures based on the past and current situation of a population group.

Policymakers and planners use these projections to estimate future resource and service needs of the population and plan accordingly. Researchers need these estimates to undertake research activities in various fields.

In coming up with population projections, assumptions about future fertility, mortality, and migration levels are used. Many users of these projections need help in understanding the assumptions and limitations involved in coming up with estimates of future population sizes and structures. For better and effective utilization of the projections, it is crucial for users to grasp these assumptions.

Uses of Population Projections

Population projections are essential for guiding policy formulation, planning and decision making. They help anticipate future food, water, healthcare, education, housing, and public service needs. For example, estimating future healthcare demands allows the government to plan for more facilities and health workers to address possible health issues.

Similarly, in education, projections help in planning the number of schools, teachers and infrastructure needed as the population of school-going children grows, ensuring that education policies are effectively implemented.

As life expectancy increases, the projections help estimate the future needs for elderly care services. For children, projections guide the planning of early childhood education, healthcare, and child

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protection services. Economic forecasting in Kenya benefits greatly from population projections. These projections help predict changes in the labour market, which can affect employment rates, wages, and economic growth.

This information is crucial for addressing youth unemployment and planning vocational training programs. Additionally, understanding shifts in population size and age distribution helps businesses anticipate consumer behaviour and demand, aiding in long-term investment decisions in sectors like agriculture, manufacturing, and services.

Environmental planning in Kenya is closely linked to population projections. Urban planners use projections to develop sustainable cities and communities, particularly in rapidly growing urban areas like Nairobi, Mombasa and Kisumu.

Key Components of Population Projections

Production of population projections involves several steps: collecting and checking data, making necessary adjustments, developing projection assumptions, entering data into projection software, calculating projections, and reviewing the outputs. The key inputs needed to produce population projections include:

- **Base Population:** The starting point, typically derived from the most recent census.
- **Fertility Rates:** Usually expressed as Total Fertility Rate (TFR), representing the average number of children a woman is expected to have in her lifetime.
- **Mortality Rates:** Includes life expectancy and death rates by age and sex.
- **Migration:** The movement of people across regions and countries.

The difference between the number of births and deaths results in either a natural increase or decrease of the population size. The difference between in-migration and out-migration is known as net migration which can either be positive or negative net migration.

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Types of Population

There are two types of populations, namely closed and open populations. These are described as follows;

- **Closed Population:** A population where immigration and emigration are zero, such as the global population, with growth dependent solely on natural increase (births minus deaths).
- **Open Population:** A population that includes migration (both international and internal), with growth determined by natural increase and net migration.

The Demographic Balancing Equation

This equation is fundamental to understanding population change:
Population Change=(Births−Deaths) +(Immigrants−Emigrants)
Expressed as:

$$P_t=P_0+(B-D)+(I-E)$$

Where P_0 is the initial population (base population), P_t is the population after time **t, B** is births, **D** is deaths, **I** is immigrants, and **E** is emigrants.

Methodologies for Population Projections

There are two primary methods for projecting population sizes:

1. **Extrapolation Method (Ratio Method):** This simpler method is used when comprehensive data on births, deaths and migration are unavailable. It assumes a constant growth rate between the base year and the target year.
2. **Cohort-Component Method:** This detailed method examines the separate components of population change namely, fertility, mortality and migration. It requires the following specific data
   - **Fertility Data:** Total Fertility Rates (TFR), Age-Specific Fertility Rates (ASFR), and sex ratios at birth.
   - **Mortality Data:** Age-Specific Death Rates (ASDR), life expectancies at birth, and survival ratios.
   - **Migration Data:** Net migration rates by age and sex.

The cohort-component method groups the base population by age and sex. Each age-sex cohort is projected forward by applying assumptions about fertility, mortality, and migration. This method accounts for internal migration, which is particularly significant at the sub-national level.

Projections are updated by applying survival ratios and migration rates, followed by calculating births using ASFRs and sex ratios at birth. The cohort-component method is more accurate in predicting future population sizes compared to the extrapolation method.

Population Projections Based on the 2019 Census

Projections produced using the 2019 census results used the cohort-component method. The projection process itself involved three steps. In step one, national-level projections were created using established methods that consider national fertility and mortality data.

The assumption was zero net international migration at the national level. This initial projection set the stage for the next step.

Step two focused on county-level projections. Here, county-specific data on fertility, mortality, and net migration were incorporated. Age groups were conveniently categorized into 5-year intervals for easier analysis.

A unique "projection frame was then created for each county. This frame included details like the initial age and sex distribution of the population, mortality rates, fertility rates, estimated

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70 Years

Maximum life expectancy for males assumed by the logistic function, and 75 years for females

The accuracy of these projections hinged on the quality of data on fertility, mortality, and migration. Unexpected events like pandemics or economic crises can significantly impact these rates, making long-term projections less precise

net migration, and the calculated number of births, deaths, and net migrants based on these parameters. The final step refined the county projections to ensure consistency with the national picture. Adjustments were made to the projected county births and deaths to align them with the national totals. Net migration estimates were also carefully reviewed to achieve consistency across counties.

This ensured that the number of people moving into a county(in-migrants) balances out with the number moving out (out-migrants). The final county projections provided a more nuanced picture, reflecting national trends while acknowledging the unique dynamics of each county based on fertility, mortality, and migration patterns.

It's important to remember that the accuracy of these projections hinged on the quality of data on fertility, mortality, and migration. Unexpected events like pandemics or economic crises can significantly impact these rates, making long-term projections less precise. However, the cohort-component method remains a valuable tool for planning purposes, offering policymakers and businesses valuable insights into future population trends.

Assumptions made for 2019 KPHC projections

Kenya's population projections relied on specific assumptions about future trends in fertility, mortality, and migration. Fertility projections were based on historical data from four past national censuses (2019, 2009, 1999 and 1989) and utilized a logistic function (PASEX TFR_ProjLogistic) to predict a continued decline in Total Fertility Rate (TFR) until 2045.

This function is bounded by a minimum TFR of 2.1 (replacement level) and a maximum of 8.0 (historically observed national maximum). A similar logistic function approach was used at the county level to estimate future TFRs for individual counties. Mortality projections also employed a logistic function, but with a focus on life expectancy. The function assumes a gradual increase in life expectancy for both males and females, reaching a maximum of 70 years for males and 75 years for females. Migration patterns are a more complex factor. Unlike fertility and mortality, migration can occur multiple times throughout a person's life. The projections assumed negligible net international migration, essentially balancing immigration and emigration.

However, internal migration within Kenya was considered by incorporating average net migration figures from past censuses at the county level. These average net migration rates were assumed to remain constant throughout the projection period.

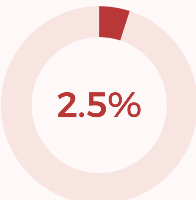
Peak into Kenya's Future Population Size

Kenya's population is projected to grow steadily, with estimates suggesting it will reach 57.8 million by 2030. This represents an intercensal growth rate of 1.69% compared to the 48.8 million people recorded in 2020. The intercensal growth rate, calculated using the formula shown below provides a snapshot of population change between census periods. An analysis at the county level reveals significant variations in growth rates.

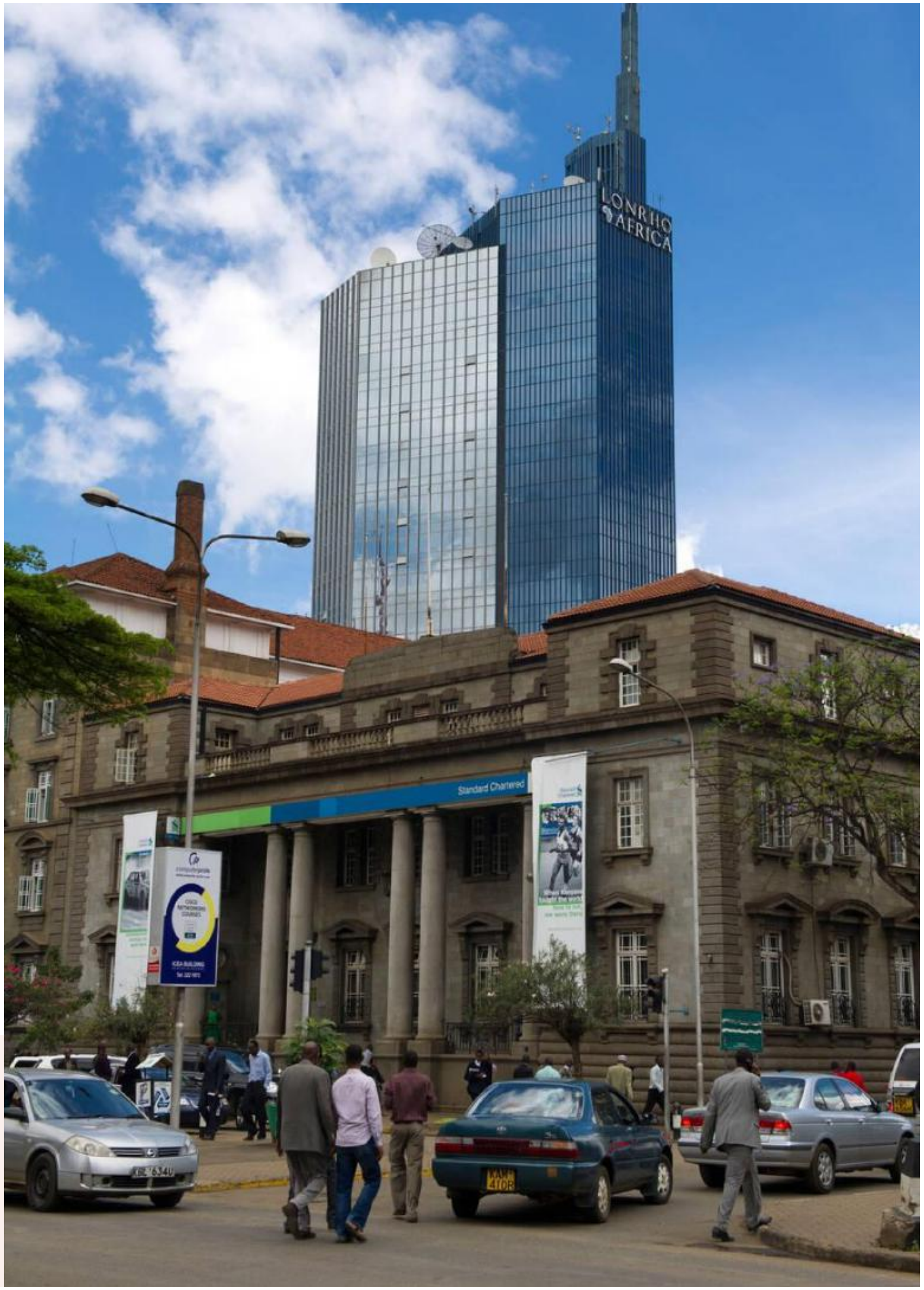
Narok, Samburu, and Wajir counties are expected to experience the highest growth, with projected intercensal rates exceeding 2.5%. This translates to potential population increases by 2030, reaching 1.55 million, 0.42 million, and 1.04 million respectively.

Mombasa, Nakuru, Kisumu, and Nairobi City also show moderate growth projections, with rates ranging from 1.5% to 2%. This could lead to populations of 1.50 million, 2.69 million, 1.39 million, and 5.26 million in these counties by 2030.

Conversely, Nyamira, Vihiga, and Kirinyaga counties exhibit the slowest growth trends, with intercensal rates falling below 1%. Their projected populations by 2030 are estimated to be 0.682 million, 0.660 million, and 0.690 million, respectively.



Projected intercensal rates in Narok, Samburu, and Wajir counties, which are expected to experience the highest growth. This translates to potential population increases by 2030, reaching 1.55 million, 0.42 million, and 1.04 million respectively



	County	2020	2030	Population Growth Rate(%)
	Kenya	48,817,537	57,811,161	1.69
1	Narok	1,177,718	1,546,071	2.72
2	Samburu	320,308	419,849	2.71
3	Wajir	803,882	1,037,827	2.55
4	Tana River	325,873	420,374	2.55
5	Turkana	946,464	1,216,202	2.51
6	Mandera	887,280	1,139,779	2.50
7	Lamu	154,774	198,455	2.49
8	Kwale	879,076	1,112,022	2.35
9	Marsabit	479,579	604,075	2.31
10	Migori	1,147,197	1,444,465	2.30
11	West Pokot	631,122	791,958	2.27
12	Isiolo	294,104	368,938	2.27
13	Kajiado	1,178,759	1,475,089	2.24
14	Garissa	861,201	1,075,926	2.23
15	Mombasa	1,228,079	1,504,530	2.03
16	Baringo	686,717	840,367	2.02
17	Nakuru	2,201,828	2,689,907	2.00
18	Laikipia	528,509	639,451	1.91
19	Uasin-Gishu	1,183,030	1,428,167	1.88
20	Homa-Bay	1,161,873	1,401,509	1.88
21	Kiambu	2,500,990	3,006,176	1.84
22	Kilifi	1,488,572	1,785,800	1.82
23	Busia	913,595	1,095,354	1.81

	County	2020	2030	Population Growth Rate(%)
24	Siaya	1,002,932	1,195,671	1.76
25	Nyandarua	657,159	783,354	1.76
26	Trans-Nzoia	1,010,265	1,198,602	1.71
27	Kakamega	1,897,240	2,237,189	1.65
28	Kisumu	1,186,160	1,389,489	1.58
29	Nairobi	4,515,607	5,264,721	1.53
30	Nandi	905,629	1,054,270	1.52
31	Bungoma	1,700,411	1,969,526	1.47
32	Elgeyo-Marakwet	474,419	541,933	1.33
33	Bomet	901,539	1,021,371	1.25
34	Kericho	917,217	1,037,078	1.23
35	Meru	1,565,421	1,765,151	1.20
36	Taita Taveta	350,614	394,539	1.18
37	Kitui	1,186,046	1,327,464	1.13
38	Makueni	1,007,527	1,121,214	1.07
39	Murang'a	1,076,540	1,193,960	1.04
40	Tharaka-Nithi	403,102	445,537	1.00
41	Nyeri	809,599	894,578	1.00
42	Embu	628,527	692,132	0.96
43	Machakos	1,441,719	1,584,422	0.94
44	Kisii	1,306,711	1,423,487	0.86
45	Kirinyaga	637,139	690,207	0.80
46	Vihiga	609,926	660,333	0.79
47	Nyamira	645,541	682,625	0.56

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