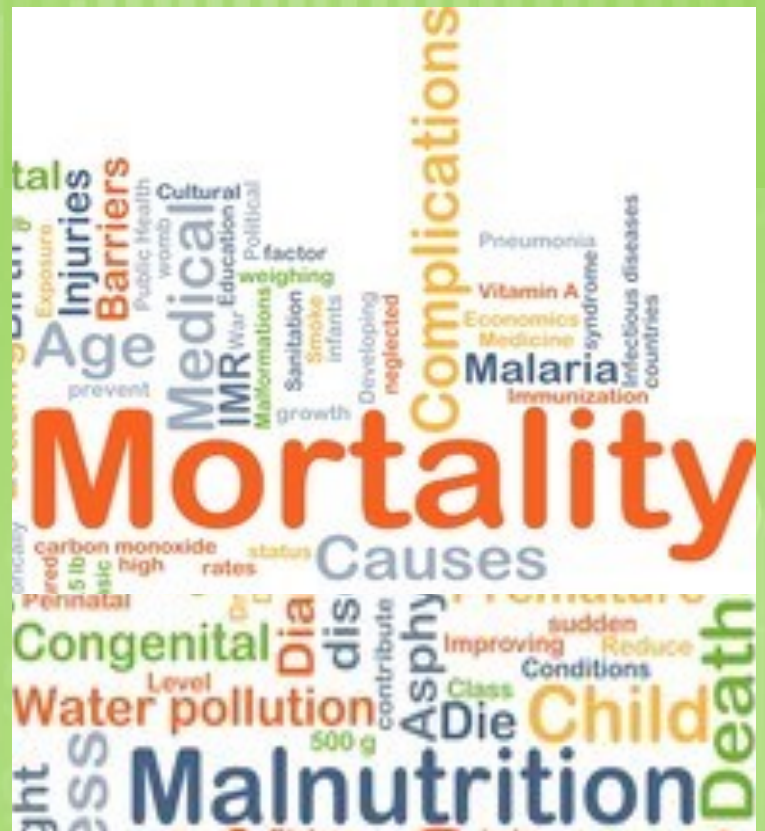




Volume VII



April, 2022



2019 Kenya Population and Housing Census

“Counting Our People for Sustainable Development
and Devolution of Services”

Analytical Report on Mortality

Volume VII



April 2022

Published by:
Kenya National Bureau of Statistics
Real Towers, Upper Hill
P.O. Box 30266 - 00100 Nairobi, Kenya
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ISBN: 978-9914-9986-1-0

Published 2022

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Abbreviations

AADs	Average Annual Deaths
AAPYL	Annual Average Person-Years Lived
AICS	Italian Agency for Development Cooperation
AIDS	Acquired Immune Deficiency Syndrome
AfDB	African Development Bank
ASAL	Arid and Semi-Arid Lands
ASDR	Age Specific Death Rate
ASDRSF	Age Specific Death Rates Female
ASDRSM	Age Specific Death Rates Male
CAPI	Computer Assisted Personal Interview
CD	Children Dead
CDR	Crude Death Rate
CEB	Children Ever Born
CSPro	Census and Survey Processing System
EA	Enumeration Area
GFR	General Fertility Rate
GGB	Generalized Growth Balance
GIS	Geographic Information System
GPS	Global Positioning System
HIV	Human Immunodeficiency Virus
ICD	International Classification of Diseases
ICT	Information and Communication Technology
IGME	Inter-Agency Group for Child Mortality Estimation
IMCI	Integrated Management of Childhood Illnesses
IMR	Infant Mortality Rate
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureau of Statistics
KPHC	Kenya Population and Housing Census
LTR	Lifetime Risk
MMR	Maternal Mortality Ratio
MMRate	Maternal Mortality Rate
NCPD	National Council for Population and Development
NCSC	National Census Steering Committee
NGOs	Non – Governmental Organizations
NPPSD	National Population Policy for Sustainable Development
ONS-UK	Office of the National Statistics United Kingdom
PMDF	Proportion of Maternal deaths to Female Deaths
PMTCT	Prevention from Mother to Child Transmission
PoA	Plan of Action
PRD	Pregnancy Related Deaths

SDGs	Sustainable Development Goals
SEG	Synthetic Extinct Generations
SPSS	Statistical Package for the Social Sciences
SRB	Sex Ratio at Birth
SSA	Sub –Saharan Africa
TFR	Total Fertility Rate
TWC	Technical Working Committee
U5M	Under-5 Mortality
U5MR	Under Five Mortality Rate
UN	United Nations
UNDP	United Nations Development Programme
UNPR	United Nations Principle and Recommendations
UNECA	United Nations Economic Commission for Africa
UNFPA	United Nations Population Fund
UNICEF	United Nations Children Fund
UNRCO	United Nations Resident Coordinator’s Office
UNSD	United Nations Statistical Division
WHO	World Health Organization

Foreword

The 2019 Kenya Population and Housing Census (KPHC) was conducted from the night of 24th/25th to 31st August 2019 and followed the United Nations principles and recommendations for conducting the 2020 round of censuses. The theme of the Census was “Counting Our People for Sustainable Development and Devolution of Services”. This resonated very well with Kenya’s development agenda -*Vision 2030* and the Big Four, as well as other regional and international development initiatives such as the Sustainable Development Goals (SDGs) and the African Union Agenda 2063. The main objective was to provide the Government and other stakeholders with essential information for evaluating policies and easing planning and budgeting processes.

The first set of the census reports (basic volumes I-IV) were released in a record 6 months after enumeration. The second set of the census reports covers the thematic areas of: Fertility and Nuptiality; Mortality; Migration; Education and Training; Youth and Adolescents; Information and Communication Technology; Housing Conditions, Amenities and Household Assets; Gender Dimensions; Older and Vulnerable Population; Urbanization; Disability; Household and Family Dynamics; Labour Force Dynamics; Agriculture; Population Dynamics and Population Projections.

This monograph presents information on levels, trends and patterns in mortality and health from the 2019 Census data. Analysis of the data reveals that mortality has continued to decline since 2009, with disparities across counties. Childhood mortality is higher in some Lake region counties and among ASAL counties compared with the rest of the counties. Life expectancy at birth has improved for both males and females compared to the 2009 Census. This can be attributed to the gains in reduced childhood mortality. Maternal mortality is still high across all counties apart from Nyeri County which has achieved the target for having below 70 maternal deaths per 100,000 live births.

The information in this monograph provides valuable programmatic evidence to policymakers for use in the formulation of policies and plans explicitly intended to achieve SDG targets. The report not only adds knowledge but also serves as a foundation for assessment, reporting and eventually monitoring achievement of SDGs by 2030, *Vision 2030*, formulation of MTP IV, County Integrated Development Plans, and other sector-specific plans. Specifically, the evidence is expected to contribute immensely towards measuring and monitoring SDG number 3 that measures the achievement of health programmes in the country and also provide valuable information to policy makers.

On behalf of the Government, I wish to thank the staff, management and Board of Directors of the Kenya National Bureau of Statistics as well as the authors for their contribution towards the preparation of this report. I further wish to extend special thanks to our development partners, especially UNFPA, UNICEF, UN-Women, WHO and UNDP under the coordination of UN Resident Coordinators’ Office and all the other stakeholders who were involved in the process for their technical and financial support.



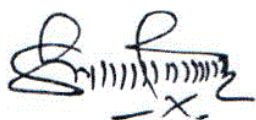
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Acknowledgement

The 2019 Kenya Population and Housing Census (KPHC) was implemented under the provisions of the Constitution of Kenya, 2010 and the Statistics Act, 2006. The census was the sixth to be conducted in Kenya since independence and the first that was fully digitized, where the latest technology was embraced. This monograph is among the set of 16 such reports, addressing various topical areas regarding the demographic, social, and economic profiles of the Kenyan population.

The 2019 KPHC implementation process was accomplished through a concerted effort of various government ministries, departments, agencies, International and local organizations and individuals who assisted during preparation, collection, compilation, processing, analyzing and publishing the results. Kenya National Bureau of Statistics (KNBS), on behalf of the Government, takes this opportunity to sincerely thank all those who participated in the preparation of this report.

The Bureau is indebted to all the organs of government, the private sector, and the general public for the overwhelming support and participation that led to the successful implementation of the 2019 Census. Special gratitude goes to United Nations Population Fund (UNFPA); United Nations Entity for Gender Equality and the Empowerment of Women (UN Women); United Nations Children's Fund (UNICEF); United Nations Economic Commission for Africa (UNECA); United Nations Economic Commission for Africa (UNECA); World Health Organization (WHO); and United Nations Development Programme (UNDP) under the coordination of UN Resident Coordinators' Office (UNRCO); African Development Bank (AfDB); Statistics Sweden; Office of National Statistics, United Kingdom (ONS-UK) and Italian Agency for Development Cooperation (AICS) for their immense support. I also recognize the census personnel (coordinators, content and ICT supervisors, enumerators, village elders and security) for the role they played in the overall success of the 2019 KPHC.



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Table 0: Mortality at a Glance, 2019

RESIDENCE	IMR	USMR	Life Expectancy		Adult Mortality				MMR	CDR	% of Deaths Registered (Notified)
COUNTY	(Per 1,000 Live Births)		Males	Females	(Probability of dying between Age 15 and 60) per 1,000 population		(Probability of dying between Age 60 and 80) per 1,000 population		(per 100,000 live births)	(Per 1,000 Population)	
					Male	Female	Male	Female			
Kenya	35.5	52	60.6	66.5	0.341	0.212	0.739	0.609	355	10.5	85.6
Rural	35.7	52	60.3	66.2	0.356	0.223	0.726	0.581	374	10	84.7
Urban	35.8	50	63	68.6	0.289	0.178	0.691	0.548	317	6.5	88.4
Mombasa	30.5	49.2	65.7	71.1	0.212	0.139	0.58	0.47	190	9.7	86.3
Kwale	35.7	55.5	58.2	60.7	0.4	0.352	0.744	0.642	464	8.2	76.9
Kilifi	40	62.5	57.8	59.2	0.397	0.373	0.742	0.653	532	10.2	86.9
Tana River	47.5	73.5	56.2	58.6	0.407	0.377	0.746	0.657	586	12.9	54.3
Lamu	37.5	60.2	64.1	68.9	0.214	0.171	0.582	0.523	306	7	83
Taita Taveta	26.3	42.4	61.2	69.2	0.322	0.179	0.676	0.534	257	13.6	96
Garissa	42.1	64.6	57.4	60.5	0.393	0.348	0.741	0.643	641	6.5	35.8
Wajir	41.9	63.5	56.7	62	0.4	0.331	0.744	0.631	403	11.6	39.1
Mandera	41.3	63.5	57.3	60.5	0.396	0.353	0.742	0.643	385	9.1	35.5
Marsabit	26.4	42.5	57.9	62.6	0.397	0.312	0.719	0.664	321	12.9	44.8
Isiolo	35.1	56.6	60.1	59.6	0.32	0.357	0.675	0.693	451	10.6	57.6
Meru	33.4	53.9	62.2	68.2	0.278	0.181	0.643	0.536	291	8.2	94.7
Tharaka-Nithi	18.5	29.8	63.8	70.3	0.29	0.175	0.653	0.528	332	10.6	92.2
Embu	26.3	42.4	58.7	70.1	0.381	0.162	0.711	0.509	244	7.5	96.6
Kitui	24.9	40.1	55.7	68.8	0.453	0.19	0.744	0.548	253	7.4	92
Machakos	28.5	44	57.9	63.9	0.429	0.302	0.755	0.614	398	7.4	96
Makueni	30.9	48	58.1	62.4	0.418	0.327	0.751	0.628	479	5.5	95.8
Nyandarua	30.1	46.5	58	63.2	0.42	0.314	0.751	0.62	466	11.6	97
Nyeri	28.3	41.5	66.4	75.8	0.224	0.077	0.653	0.363	67	10.2	97.8
Kirinyaga	24.1	39	59.9	71.1	0.365	0.146	0.702	0.483	248	10	97
Murang'a	30.6	46.5	58.1	64.7	0.409	0.289	0.747	0.606	469	10.8	97.3
Kiambu	19.3	31.2	60.8	72.8	0.356	0.132	0.697	0.457	171	8.8	95.1
Turkana	39.8	64.2	55.9	60	0.41	0.33	0.725	0.677	381	6.2	47.8
West Pokot	38	58.5	57.6	61.1	0.399	0.346	0.743	0.639	473	12	47.6
Samburu	24.1	39	58.5	67.4	0.399	0.209	0.72	0.571	275	11.2	53.3
Trans Nzoia	31.6	51.1	64.4	67.9	0.241	0.185	0.611	0.542	287	8.9	88.6
Uasin Gishu	24.7	39.8	63.6	71.7	0.274	0.14	0.64	0.473	204	11.5	92.8
Elgeyo Marakwet	32.7	50.5	57.9	62.5	0.412	0.325	0.748	0.627	435	8.1	90.1
Nandi	26.4	42.6	60	70.4	0.352	0.155	0.695	0.498	264	12.8	90.2
Baringo	26.4	42.4	65.4	68.9	0.227	0.188	0.596	0.545	274	6.9	68.9
Laikipia	17.3	27.9	59.2	71.9	0.397	0.152	0.719	0.492	182	11.6	90.7
Nakuru	32.8	52.9	58.3	69.1	0.374	0.163	0.707	0.511	261	9.5	92.6
Narok	37.2	57	57.8	61.9	0.395	0.335	0.742	0.633	522	14.1	78
Kajiado	29.4	45.5	57.8	63.5	0.428	0.31	0.754	0.618	495	8.1	86.4
Kericho	31.1	48	58.1	62.9	0.414	0.319	0.749	0.623	543	13	91.7
Bomet	33.2	50.5	58.1	63.6	0.4	0.307	0.744	0.617	554	12.9	92
Kakamega	37.3	60.2	63.4	66.1	0.243	0.209	0.612	0.572	279	13.9	94.1
Vihiga	45.4	73.4	59.8	62.1	0.314	0.255	0.671	0.619	393	9.4	94.4
Bungoma	30.5	49.2	65.5	68.2	0.219	0.185	0.588	0.541	238	10.2	91.3
Busia	40.9	65.9	62.3	66.2	0.257	0.199	0.625	0.559	273	9.2	90.8
Siaya	41.8	67.4	53.4	61.6	0.464	0.293	0.749	0.65	424	15.5	89.8
Kisumu	39.1	63.1	54	63.1	0.459	0.263	0.747	0.626	343	7	88.3
Homa Bay	57.5	92.2	50.5	60.2	0.492	0.284	0.759	0.644	516	8.7	75.5
Migori	67.2	107.2	50.5	60.6	0.458	0.257	0.746	0.62	412	12.3	74.8
Kisii	25.9	41.7	56.1	66.9	0.443	0.221	0.74	0.585	325	9.8	92.3
Nyamira	27.1	43.8	55.3	66.2	0.461	0.23	0.748	0.594	349	7.6	93
Nairobi	35.7	57.7	62.6	65.2	0.266	0.23	0.633	0.594	326	9.2	90.8

Executive Summary

This report presents the mortality situation in Kenya based on the 2019 Kenya Population and Housing Census. It focuses on infant mortality, under-five mortality, adult mortality, life tables and maternal mortality, and their differentials by place of residence and across counties. Mortality is an important indicator for measuring the health and socio-economic development of a country. It helps identify the country's current and future demographic status, the category of population that is supposed to be considered for special government programmes such as social protection and health and to monitor and evaluate the success or failure of programmes already in place. Adult mortality which affects the economically active population is related to other variables like fertility and labour productivity.

The monograph is divided into eight chapters. Chapter 1 presents the general introduction providing the census background, objectives, overview of mortality and health, general trends, methodology of the census data collection and analysis and definition of key terms and concepts. Chapter 2 presents findings on reported deaths in the households 12 months prior to census date and an assessment of data quality. Chapter 3 presents information on childhood mortality, whose components include neonatal, post neonatal, infant and child mortality. However, only Infant and Under 5 mortality measures are presented in this monograph. Chapter 4 presents findings on adult mortality. Two indicators namely probability of dying between age 15 and 60 having reached age 15 ($_{45}q_{15}$) which measures premature adult mortality and probability of dying between age 60 and 80 having reached age 60 ($_{20}q_{60}$) which measures old age mortality, have been used. Chapter 5 presents information Life Tables. Results show declines in both childhood and early adult mortality rates which have resulted in the increasing life expectancy at birth. In Chapter 6, findings on Maternal Mortality are presented while findings on deaths registration and external causes of deaths are presented in chapter 7. Chapter 8 gives the summary, conclusions, and recommendations for the findings in the monograph. Summary findings and progress made to achieve the anticipated targets are presented here.

The population policy for national development whose principal objective is to provide a Framework to guide national population programmes as described in the Sessional Paper No. 3 of 2012 outlines the Government goal of attaining high quality life for the people of Kenya by managing population growth to a level that can be sustained with the available resources (NCPD, 2012). The Government through the policy has committed to reduce the following demographic targets among others by 2030: Infant mortality rate from 52 in 2009 to 25 deaths per 1,000 live births; Under-five mortality rate from 74 in 2009 to 48 deaths per 1,000 live births; Maternal mortality rate from 488 in 2009 to 200 deaths per 100,000 live births; Crude death rate from 13 in 2010 to 8 deaths per 1000 people and improve life expectancy at birth for both sexes from 57 in 2009 to 64 years.

Infant mortality has decreased from 54 deaths per 1,000 live births in 2009 to 36 deaths per 1,000 live births in 2019 over the 10-year period.

Overall, for every 1, 000 males who attain age 15, about 341 do not celebrate their 60th birth day. Similarly, for every 1, 000 females who attain age 15, roughly 212 will not reach age 60. There have been improvements in adult mortality nationally from 2009 period, which was 348 male and 313 female deaths per 1, 000 male and females respectively. And for every 1,000 males and females reaching age 60, about 739 and 609 do not celebrate their 80th birthday respectively.

Nationally, life expectancy at birth has increased marginally for both men and women from 58 and 61 years to 61 and 67 years respectively. At older ages, women have a higher life expectancy after attaining age 60 and 70 years. Life expectancy at age 60 is 14.2 years for men and 17.2 years for women. The average number of years a male and a female is expected to live after attaining 70 years is 9.3 and 10.8 years respectively. The gap in life expectancy at age 60 is narrow when compared to the life expectancy at birth.

Chapter 1: Introduction

1.0 Background Information

A population census is the total process of collecting, compiling, evaluating, analyzing and publishing or otherwise disseminating demographic, economic, and social data pertaining, at a specified time, to all persons in a country or in a well delimited part of a country. It is vital for effective national development planning because it provides detailed bench-mark data on all population characteristics.

The first known population census in Kenya was conducted in 1897 and was basically a headcount. This was followed by the 1948 census that focused on non-natives. A complete census that enumerated 8.6 million persons was conducted in 1962 and was used to set up political and administrative structures. The first post-independence census was undertaken in 1969 and enumerated 10.9 million persons. Since then, the country has conducted decennial population and housing censuses on a *de facto* basis with the midnight of 24th/25th August as the reference point. The censuses have been implemented in accordance with the United Nations (UN) Principles and Recommendations for conducting population and housing censuses. Table 1.1 presents census results since 1897.

Table 1.1: Summary of Census Counts in Kenya

Year	Population (millions)
1897	2.5
1948	5.4
1962	8.6
1969	10.9
1979	15.3
1989	21.4
1999	28.5
2009	37.7
2019	47.6

The 2019 Kenya Population and Housing Census was conducted under the provisions of the Constitution of Kenya, 2010 (Fourth Schedule Part 1 Item 11), the Statistics (Amendment) Act, 2019 and the Statistics (Census of Population) Order, 2018 - Legal Notice No. 205 and the Cabinet Memorandum of May 2017 on the implementation of the 2019 population and housing census process. The theme for the census was “*Counting Our People for Sustainable Development and Devolution of Services*”.

1.1 Objectives of the 2019 Census

The main objective of the 2019 KPHC was to collect information on the size, composition, distribution and socio-economic characteristics of the population. The specific objectives were to ascertain:

- Population size, composition, and spatial distribution;
- Levels of fertility, mortality and migration;
- Educational attainment;
- Household composition;
- Rate and pattern of urbanization;
- Size and deployment of labour force;
- Distribution of persons with disability;
- Housing conditions and availability of household amenities; and
- Agricultural indicators to inform the creation of an agriculture sampling frame.

This information will be used in planning, budgeting and programming for important services; future policy formulation, resource allocation; creation of administrative and political units; monitoring and evaluation of programmes and projects; research; development of a master household sampling frame; development of geo-spatial database; and benchmark for agricultural censuses/surveys.

1.2 Overview of Mortality and Health Monograph

The objective of this monograph is to estimate levels and patterns of childhood, adult and maternal Mortality using the 2019 Kenya Population and Housing Census. It also analyses the differentials by place of residence (rural-urban) and counties.

The Government in collaboration with WHO and UNICEF implemented Integrated Management of Childhood Illnesses (IMCI) Strategy in the mid 90's in an effort to improve child health by combining nutrition, immunization, maternal health, and other health programmes in the management of childhood illness. SDG Goal 3 explicitly deals with promotion of well-being and health problems for children and mothers. Target 1 aims to reduce the global Maternal Mortality Ratio(MMR) to less than 70 per 100 000 live births. At national level, MMR is expected to reduce by at least two thirds of its 2010 baseline level by 2030. Further, no country should have an MMR greater than 140/100 000 live births (a number twice the global target) by 2030. Target 2 commits to reduce neonatal mortality to as low as at least 12 per 1,000 live births and under-five mortality to at least as low as 25 per 1,000 live births by year 2030.

The population policy for national development whose principal objective is to provide a Framework to guide national population programmes as described in the Sessional Paper No. 3 of 2012, outlines the Government goal of attaining high quality life for the people of Kenya by

managing population growth to a level that can be sustained with the available resources. In general, the policy seeks to reduce fertility and mortality rates among others.

Mortality contributes directly to population decline and is one of the three dynamics of population change in addition to fertility and migration. It is used as an input in the computation of life-tables and population projections.

1.3 General Trends in Mortality

In general, mortality and specifically childhood mortality measures are used as indicators for social wellbeing. This monograph presents mortality, with highlights on infant mortality rate, childhood mortality rate, adult mortality, maternal mortality and life expectancy. Mortality rates across different categories have continued to decline over the years.

According to the 2019 KPHC, childhood mortality has remained at the same level as in 2014 Kenya Demographic and Health Survey (2014 KDHS) at 52 deaths per 1,000 live births. This translates to about 1 in every 20 children does not survive to their fifth birthday.

Adult mortality has declined for both males and females from 2009 to 2019. The decline is more pronounced with female deaths going down from 313 to 212 deaths per 1,000 females. Adult mortality for males dropped slightly by 7 deaths to 341 deaths per 1,000 males in 2019.

Maternal mortality ratio has declined from 495 deaths per 100,000 live births in 2009 to 355 deaths per 100,000 live births in 2019. Although there has been a decline, this is five times more than the anticipated target of less than 70 per 100 000 live births set in the SDGs by 2030.

1.4 Methodology

1.4.1 Use of Technology

Kenya adopted the use of mobile technology to collect data during the 2019 Census as recommended by the UN for the 2020 round of censuses. This was the first census in Kenya's history to use mobile technology in the capture and transmission of data for both cartographic mapping and enumeration. During mapping, the GPS coordinates for homesteads, households and other points of interests within the locality were collected using the mobile devices with an accuracy of plus or minus 5 Meters. The enumeration area (EA) maps were developed using Arc GIS Software on a background of aerial photographs and satellite imageries that were not more than six months old from the date of the field cartographic data collection. The EA maps were then uploaded into the tablets assembled by two local universities to facilitate the 2019 Census enumeration exercise

1.4.2 Recruitment and Training

Recruitment of census personnel who included supervisors (both content and ICT) and enumerators was undertaken by the County and Sub-County Census Committees through a competitive process. The training of these personnel was conducted in a cascaded manner from the training of trainers to the training of enumerators. The training for various cadres was conducted for seven days for each cadre. These trainings were sequentially conducted between 14th July and 20th August 2019.

1.4.3 Enumeration

The census enumeration was preceded by enumeration area (EA) boundary identification and pre-enumeration listing of households in each EA for two days prior to the census night. The pre-enumeration listing exercise helped in gauging the expected workload during the seven days of enumeration and also in monitoring the level of coverage as enumeration progressed.

The actual enumeration took place from the night of 24th/25th August 2019 and ended on 31st August 2019. A mop-up exercise was conducted on 1st and 2nd September 2019. Special populations were strictly enumerated on the night of 24th/25th August 2019. The 2019 Census adopted the de facto approach where all persons within the boundaries of Kenya were enumerated depending on where they spent (or were found on) the census night. The canvasser method of enumeration, where information for each individual or household is collected and recorded by a trained census official designated to perform the tasks in the assigned area, was used.

1.4.4 Data Transmission and Storage

Data collected by enumerators using mobile devices (tablets) were subsequently transmitted to a central server. The data were encrypted prior to transmission and backed up in off-site locations.

1.4.5 Data Processing

Editing of the census data was guided by the United Nations Handbook on Population and Housing Census Editing. The data were processed using CSPro, Stata and SPSS softwares. In addition, validation checks were done to ensure that all EAs, aligned to administrative boundaries, were accounted for in the dataset. Outputs were generated based on administrative and geo-political units.

1.4.6 Quality Assurance

Quality assurance was integrated in all phases of the census process. Comprehensive guidelines were developed and shared with census personnel. Field supervision followed a three-tier structure to ensure adequate support, real-time response to emerging issues, and feedback during data collection. In addition, enumeration reporting schedules and control forms were used to facilitate monitoring of activities. Field monitoring teams oversaw technical, logistical and administrative aspects of enumeration in each region. Further, independent observers, drawn from the international community and national statistics offices across Africa, monitored and observed the 2019 census enumeration process.

1.5 Data quality

Data evaluation or appraisal is one of the steps in census process for quality assurance. According to the United Nations, good census practice requires a careful consideration, and an evaluation of the completeness and accuracy of census results. Evaluation techniques are often necessary to determine whether the data collection was correctly done and assess the quality of the data.

A census, being a massive data collection exercise involving thousands of field interviewers, errors are inevitable in data collection and processing. Errors are classified in two broad categories, that is, coverage and content errors. Coverage errors are errors arise due to omissions or duplications

of persons or housing units during enumeration. Content errors are errors arise from misreporting or wrong recording of the characteristics of persons, households and housing.

Population data in developing countries are often subject to age misreporting. Irregularities in the age distribution may be a result of a respondent's incorrect age declaration or the interviewer who estimates the age of a respondent who does not know his or her age. It is, therefore, important to evaluate the accuracy of the age distribution and correct for deficiencies wherever necessary. Various techniques have been applied for checking for such inconsistencies

1.6 Coverage errors

There are two types of coverage errors. Population under-coverage refers to the error of excluding someone who should have been enumerated. Population over-coverage refers to the error of either enumerating someone more than once or including someone who should not have been enumerated. The latter error is considered negligible. Under-coverage is more common than over-coverage.

Coverage errors are one of the most important types of error since they affect not only the accuracy of the counts of the various census universes but also the accuracy of all of the census data describing the characteristics of these universes.

Coverage errors may occur in various forms, namely: omitting a unit that should have been included; including a unit more than once; or including a unit that should not have been included. In spite of the fact that massive efforts are made in providing good training and up-to-date cartographic maps to the field staff, as well as introducing checks and controls throughout the fieldwork, such errors still occur. Consequently, any census data should be always checked for any inconsistencies as a result of such errors. Various techniques have been developed for checking for such inconsistencies.

1.7 Content errors

These types of errors occur when an attribute of an enumerated individual is misreported or not reported at all. One common content error occurs in the reporting of the age of an individual which is one of the basic but vital information provided by a census of a population.

Population data in developing countries are often subject to age misreporting. Irregularities in the age distribution may be a result of a respondent's incorrect age declaration or the interviewer who estimates the age of a respondent who does not know his or her age. It is, therefore, important to evaluate the accuracy of the age distribution and correct for deficiencies wherever necessary.

1.8 Comparison of 2019 Census and Previous Censuses

This part compares the enumerated population at the 2019 census with the past censuses in terms of absolute size as well as intercensal growth rates. The method is referred to as an external consistency check.

Table 1.2 presents population distribution by age in absolute numbers since 1979. The number of persons enumerated during the 2019 Population and Housing Census was 47,564,299 representing an increase of 26.1 per cent from the 2009 census.

Table 1. 1: Trends in Population Count by age group, 1979-2019

Age	1979	1989	1999	2009	2019
0-4	2,843,406	3,801,066	4,353,530	5,803,130	5,993,267
5-9	2,491,840	3,470,201	3,952,376	5,469,372	6,202,643
10-14	2,074,771	2,990,730	4,009,455	4,919,417	6,346,072
15-19	1,741,845	2,379,439	3,417,064	4,073,944	5,285,857
20-24	1,327,404	1,903,130	2,852,320	3,688,548	4,447,674
25-29	1,055,712	1,629,771	2,351,866	3,127,829	3,854,555
30-34	818,076	1,159,526	1,705,604	2,461,739	3,570,719
35-39	615,594	918,923	1,435,730	1,962,578	2,650,116
40-44	535,182	732,126	1,045,913	1,442,324	2,259,231
45-49	440,879	574,416	848,224	1,243,564	1,786,256
50-54	373,930	476,495	692,376	934,282	1,308,610
55-59	275,311	360,190	464,877	695,629	1,118,094
60-64	217,228	318,451	413,292	580,164	870,022
65-69	183,127	230,712	304,123	381,804	658,178
70-74	128,908	174,221	256,720	331,522	514,539
75+	174,363	303,467	347,916	588,402	697,776
Age NS	29,485	20,772	34,483	20,603	690
Total	15,327,061	21,443,636	28,485,869	37,724,850	47,564,299

Table 1.3 shows trends in intercensal growth rates. The rate of growth declined from 3.4 per cent in the 1979-89 intercensal period to about 2.8 per cent in the 1989-99. The rate of growth however, remained unchanged during 1999-2009 period, which was against the expectation that the rate would decline faster given the observed declines in both birth and death rates from the various surveys conducted in the intercensal period. Between 2009-2019 intercensal period, the growth rate declined to 2.3 per cent.

On inspection of the age-specific growth rates in the 2009-2019 intercensal period has the indication of slight undercount for age groups 0-4 and 5-9. This observation is similar to the period 1989-1999.

Table 1. 2: Age specific growth rates, Kenya, 1979-2019

Age	1979-1989	1989-1999	1999-2009	2009-2019
0-4	0.029	0.014	0.029	0.003
5-9	0.033	0.013	0.032	0.013
10-14	0.037	0.029	0.020	0.025
15-19	0.031	0.036	0.018	0.026
20-24	0.036	0.040	0.026	0.019
25-29	0.043	0.037	0.029	0.021
30-34	0.035	0.039	0.037	0.037
35-39	0.040	0.045	0.031	0.030
40-44	0.031	0.036	0.032	0.045
45-49	0.026	0.039	0.038	0.036
50-54	0.024	0.037	0.030	0.034
55-59	0.027	0.026	0.040	0.047
60-64	0.038	0.026	0.034	0.041
65-69	0.023	0.028	0.023	0.054
70-74	0.030	0.039	0.026	0.044
75+	0.055	0.014	0.053	0.017
Overall growth rate (% p.a.)	3.36	2.84	2.81	2.32

1.9 Age-Sex Structure

The age-sex data is a map of a population's demographic history. Persons of the same age structure constitute a cohort born in the same year and have been exposed to similar historical events and conditions.

1.10 Age- Sex Ratio

Although all modern censuses collect information on the age and sex of the population, the data often contain errors because some people do not know their true age and others do not report their age accurately. The distribution of a population by age and sex is one of the most basic types of information needed for future planning. Given the importance of the age structure concerning social and economic characteristics, it is imperative that the information on the population by age and sex be as accurate as possible. For this reason, it becomes critical to evaluate the reported age and sex composition.

1.11 Sex Ratio at Birth

Sex ratios at birth (SRB) are an analytical tool and are calculated by dividing the male population in a given age group by the female population in the same age group, multiplied by 100. The larger the abrupt departure of this ratio from values close to 100, the larger the possibility of errors in the data. All populations have more male than female births at birth, and so the sex ratio at the early ages is expected to be slightly over 100. However, since mortality is usually higher for males than females, the sex ratio is reduced continuously up to the oldest ages. Sex Ratios at infancy below 100 denote under-coverage while those above 100 would imply double counting.

In a systematic study of several countries using DHS, Chao et al 2019¹ show that, SRB range from 103.1 [102.7; 103.6] in sub-Saharan Africa to 106.3 [105.5; 107.2] in southeastern Asia, 106.3 [105.4; 107.2] in eastern Asia, and 106.7 [105.8; 107.7] in Oceania. The UN assumes 105 for all countries in their estimation. Thus there is a regularity in Male bias at birth. Over decades, SRB has consistently been between 102 males per 100 females to 108 males per 100 females for several decades. In Kenya, all the post-colonial censuses (1969-2009), show that at the national level, SRB has been constant at 104 males per 100 females.

Table 1.4 shows the sex ratios at birth for all the counties based on births 12 months before the national census. Thirty-seven counties out of 47 have their sex ratios at birth consistent with past historical norms (SRB between 102 and 107). In Isiolo, Tana River, Wajir, Turkana and Samburu, there appears to be a possible over-reporting of male births. SRB is close to those observed in South East Asian countries with well-known sex-selective abortion. Under-reporting of male births may have occurred in Vihiga County.

Table 1. 3: Sex ratios at birth by County

	County	Sex ratio at birth		County	Sex ratio at birth
1	Vihiga	99.7	25	Makueni	103.6
2	Kakamega	100.8	26	Mombasa	103.8
3	Busia	100.9	27	Kilifi	103.8
4	Bungoma	101.4	28	Migori	103.9
5	Tharaka-Nithi	101.6	29	West Pokot	104.0
6	Nyamira	102.1	30	Nakuru	104.0
7	Trans-Nzoia	102.2	31	Homabay	104.1
8	Uasin Gishu	102.4	32	Kwale	104.3
9	Nyeri	102.5	33	Kajiado	104.3
10	Kiambu	102.5	34	Kericho	104.3
11	Meru	102.6	35	Laikipia	104.5
12	Nandi	102.6	36	Bomet	104.5
13	Nairobi City	102.6	37	Mandera	105.0
14	Kirinyaga	102.7	38	Narok	105.9
15	Embu	102.8	39	Lamu	106.3
16	Elgeyo-Marakwet	102.8	40	Baringo	106.6
17	Kisii	102.8	41	Garissa	107.0
18	Taita-Taveta	102.9	42	Marsabit	107.0
19	Siaya	103.0	43	Isiolo	108.0
20	Kitui	103.1	44	Tana River	108.8
21	Murang'a	103.1	45	Wajir	109.0
22	Kisumu	103.1	46	Turkana	109.0
23	Machakos	103.3	47	Samburu	109.0
24	Nyandarua	103.5			

¹ Chao Fengqing Patrick Gerlandb, Alex R. Cookc, and Leontine Alkema 2019. Systematic assessment of the sex ratio at birth for all countries and estimation of national imbalances and regional reference levels

1.12 Definitions of Key Terms and Concepts

Adult mortality rate: Probability of dying between 15 and 60 years per 1,000 population

Age-Specific Death Rate (ASDR): The total number of deaths per year per 1000 people of a given age or age group.

Age-specific Mortality Rate: A mortality rate limited to a particular age group. The numerator is the number of deaths in that age group; the denominator is the number of persons in that age group in the population.

Child Mortality (4q1): The probability of dying between the first and fifth birthday

Childhood Mortality: This term is used in this monograph interchangeably with the term Under-Five Mortality (Under-5 Mortality) and refers to all those live births that die before exact age five. (Components include neonatal, post neonatal, infant and child mortality). However, only Infant and Under 5 mortality measures are presented in this monograph.

Children Ever Born (CEB): Refers to the life-time fertility experience of women 12 years and above. It is the total number of children a woman has given birth to in her lifetime.

Crude Death Rate (per 1000 population): is the annual number of deaths occurring per thousand mid-year populations.

Fertility: Fertility refers to the actual number of live births a woman has had by the end of her reproductive life span (15 – 49 years).

Household: Is a person or a group of persons who reside in the same homestead or compound but not necessarily in the same dwelling unit. They have same cooking arrangement, and are answerable to the same household head.

Household Head: Is the most responsible member of a household who makes key decisions of the household on a day-to-day basis and whose authority is recognized by all members of the household. It could be the father, mother or a child, or any other responsible member within the household.

Infant Mortality: Deaths of newborns before attaining exact age 1.

Infant Mortality Rate (IMR): The probability of dying between birth and exact age 1.

Life Expectancy: The average number of additional years a person could expect to live if current mortality trends were to continue for the rest of that person's life. Most commonly cited as life expectancy at birth.

Life expectancy at birth: The average number of years that a newborn could expect to live, if he or she were to pass through life exposed to the sex- and age-specific death rates prevailing at the time of his or her birth, for a specific year, in a given country, territory, or geographic area.

Life expectancy at age 60 : The average number of years that a person of 60 years old could expect to live, if he or she were to pass through life exposed to the sex- and age-specific death rates prevailing at the time of his or her at age 60;

Life expectancy at age 70 : The average number of years that a person of 70 years old could expect to live, if he or she were to pass through life exposed to the sex- and age-specific death rates;

Life Table: A tabular display of life expectancy and the probability of dying at each age (or age group) for a given population, according to the age-specific death rates prevailing at that time. The life table gives an organized, complete picture of a population's mortality.

Maternal Death: The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Maternal Mortality Ratio (MMR): The number of women who die as a result of pregnancy and childbirth complications per 100,000 live births in a given year.

Maternal Mortality Rate (MMRate): The quotient between the number of maternal deaths in a given year and the number of women in the child bearing age, expressed per 100,000, for a given country.

Mortality: Mortality is the demographic study of death in human populations. There are several measures of mortality, namely childhood mortality, adult mortality (including maternal) and life expectancy at specific ages

Old Age Mortality: Number of deaths among older adults per 100 000 population.

Proportion Father/Mother Alive: The number of respondents with father/mother alive to the total number of respondents interviewed.

Rural: This is a large and isolated part of an open or agricultural country with relatively low population concentrations and whose predominant economic activity is agricultural.

Sex Ratio: The number of males per 100 females in a population

Sex Ratio at Birth (SRB): Number of male births per one female birth.

Under-5 Mortality (U5M): Deaths occurring before exact age 5

Under-5 Mortality Rate (U5MR): This is an approximation of the probability of dying before the age of 5. It is the number of children who die before reaching 5 years of age (numerator), divided by the total number of live births in the given 1-year period (denominator), multiplied by 1,000.

Chapter 2: Reported Household Deaths

2.1 Introduction

This chapter presents information collected on the deaths that occurred in the household within twelve months prior to the census. This information provides indicators for direct estimation of recent mortality. The respondents were asked whether any death had occurred in the household in the one-year period before the census date that is between 24/08/2018 and 24/08/2019 including the, name, age and the sex of the dead member. Direct questions on mortality were obtained from responses to questions on Section H-11, H-12, H-14 and H-15 respectively as shown below:

H11: How many deaths occurred in this household between 24/08/2018 and 24/08/2019 (last 12 months)?

H12: Please provide the names of the household members who died

H12a: What was the relationship of the deceased to the head of this household?

H14: Where did the death occur?

H15: Was this death notified?

2.2 Deaths reported in the household by age and sex

Table 2.1 presents the distribution of deaths in the household by age and sex. These reported deaths can provide information on age patterns of mortality. Out of a total of 152,051, reported deaths nearly one in four deaths occurred before age 1. If all ages were considered, the median age at death was 34.2 years (Male -35.2 and females - 32.9). However, when the computation for median age at death was restricted from age 15² and above, the median age was 48.7 years (Males - 48, Females - 55). The sex differences in median age at death reversed when the total population was considered.

² Age 15 is used because it is the age at which the risk of mortality is lowest.

Table 2.1: Distribution of Deaths in the household by Age and Sex

Age Group	Deaths in the Household		
	Total	Male	Female
0	37,907	21,306	16,601
1-4	8,878	4,816	4,062
5 - 9	3,692	2,079	1,613
10 -14	3,360	2,084	1,276
15 - 19	3,799	2,262	1,537
20 - 24	5,322	3,273	2,049
25 - 29	6,042	3,630	2,412
30 - 34	7,416	4,328	3,088
35 - 39	7,321	4,409	2,912
40 - 44	7,486	4,603	2,883
45 - 49	6,379	4,044	2,335
50 - 54	6,309	3,920	2,389
55 - 59	5,937	3,648	2,289
TOTAL	152,051	88,809	63,242

2.3 Data quality of reported deaths by age;

- 1) A simple measure for interrogating data quality by age is to examine the ratio of deaths age 60+ to age 75+ and age 75+ to age 90 +. At national level these ratios were 0.5 and 0.3 respectively indicating substantial age exaggeration at older ages.
- 2) Comparison with reported deaths in the previous census is indicated in Table 2.2 below. The share of those under age one and age 1 to 4 declined for both sexes substantially. The share of those age 65 and above increased substantially for both sexes. The least shares in 2009 was age 15-19 for males 10 to 14 for females. In 2009, deaths under age one was 68.7 per cent for males and 65 per cent for females to the total births under age 5. In 2019 this share increased to 82 and 80 per cent for males and females respectively. This increase could reflect problems with reporting of age of infants.

Table 2.2(a): Per centage Reported Deaths by Age Groups and Sex, 2009 & 2019

Regions/ Age Groups	2009		2019	
	Males	Females	Males	Females
KENYA	129,610	95,613	88,809	63,242
0	31.9	30.7	24	26.2
1-4	14.6	16.5	5.4	6.4
5-9	5.1	5.5	2.3	2.6
10-14	3.3	3.6	2.3	2
15-19	3	4	2.5	2.4
20-24	3.9	5.6	3.7	3.2
25-29	4.5	6.1	4.1	3.8
30-34	5.2	6.2	4.9	4.9
35-39	4.8	5	5	4.6
40-44	4.3	3.7	5.2	4.6
45-49	3.7	2.9	4.6	3.7
50-54	3.4	2.2	4.4	3.8
55-59	2.7	1.6	4.1	3.6
60-64	2.8	1.8	4.2	3.5
65+	6.8	4.6	23.2	24.7
RURAL	96,579	67,326	71,921	46,498
0	27.7	1.5	27.0	1.7
1-4	13.9	16.1	15.8	18.4
5-9	5.0	7.8	5.3	8.8
10-14	3.3	4.1	3.6	4.1
15-19	2.9	2.8	4.0	2.8
20-24	3.7	4.2	5.3	3.9
25-29	4.2	4.5	5.8	4.1
30-34	5.0	5.1	5.8	5.0
35-39	4.6	5.0	4.8	4.6
40-44	4.1	5.2	3.6	4.6
45-49	3.6	4.6	2.7	3.8
50-54	3.3	4.4	2.1	3.8
55-59	2.7	4.2	1.6	3.8
60-64	2.9	4.4	1.8	3.7
65+	13.1	26.1	37.9	27.1
URBAN	40,319	21,483	29,302	16,744
0	36.3	3.8	34.0	3.6
1-4	13.6	24.0	15.0	24.3
5-9	4.3	11.0	4.8	12.4
10-14	2.7	4.7	2.9	4.6
15-19	2.7	2.8	3.2	2.4
20-24	3.8	4.3	5.0	3.7
25-29	4.3	4.1	5.8	3.8
30-34	4.7	4.6	5.8	5.0
35-39	4.5	5.0	4.6	4.5
40-44	4.0	5.0	3.5	4.5
45-49	3.4	4.5	2.7	3.5
50-54	2.9	4.4	2.1	3.7
55-59	2.2	3.8	1.4	3.2
60-64	2.2	3.6	1.5	2.9
65+	8.5	14.4	7.8	18.0

Table 2.2(b): Per centage Reported Deaths by Age Groups and Sex, 2009 & 2019

Regions/ Age Groups	2009		2019	
	Males	Females	Males	Females
CENTRAL	14,546	12,089	9,734	8,559
0	24.8	1.1	21.1	1.2
1 - 4	8.1	10.9	9.5	11.9
5 - 9	3.7	5.2	4.0	6.7
10 - 14	2.4	2.8	2.8	2.9
15-19	2.7	2.4	3.0	2.2
20-24	3.5	4.0	4.7	3.5
25-29	4.7	4.7	6.5	3.8
30-34	5.5	5.3	7.3	5.2
35-39	5.5	5.8	6.2	5.4
40-44	4.8	5.7	5.0	5.3
45-49	4.3	5.3	3.7	4.1
50-54	4.1	4.9	2.7	3.9
55-59	3.6	5.1	2.2	4.1
60-64	3.3	5.1	2.5	3.8
65+	19.2	31.5	18.7	36.0
RIFT VALLEY	32,769	19,419	24,527	14,238
0	33.1	2.2	32.6	2.2
1 - 4	13.6	19.1	15.0	20.3
5 - 9	6.0	9.0	6.5	10.0
10 - 14	4.1	4.3	4.6	4.2
15-19	3.6	2.9	4.1	3.0
20-24	3.8	4.5	4.7	4.0
25-29	3.7	4.7	4.9	4.0
30-34	4.3	5.0	4.8	4.8
35-39	3.9	4.7	4.0	4.4
40-44	3.5	5.0	3.0	4.6
45-49	3.1	4.5	2.6	3.8
50-54	2.7	4.4	1.8	3.7
55-59	2.0	3.8	1.4	3.6
60-64	2.3	4.1	1.4	3.4
65+	10.2	21.8	8.7	24.0
WESTERN	15,746	11,102	11,500	7,585
0	27.1	1.6	26.6	1.5
1 - 4	19.1	16.3	22.1	20.2
5 - 9	5.2	7.9	6.1	9.5
10 - 14	2.6	4.1	3.0	4.2
15-19	2.2	3.0	3.1	2.8
20-24	2.9	4.0	4.3	4.3
25-29	3.5	3.9	4.4	4.2
30-34	4.1	5.1	4.9	5.0
35-39	4.4	4.7	4.6	4.4
40-44	3.9	5.5	3.1	4.6
45-49	3.7	4.7	2.7	3.8
50-54	3.5	4.3	2.3	4.0
55-59	2.9	4.6	1.8	3.8
60-64	2.7	5.0	1.6	3.9
65+	12.2	25.2	9.4	23.6

Table 2.2(b): Per centage Reported Deaths by Age Groups and Sex, 2009 & 2019

Regions/ Age Groups	2009		2019	
	Males	Females	Males	Females
COAST	9,013	7,376	7,102	5,889
0	36.9	3.2	32.9	2.7
1 - 4	13.8	21.7	14.5	21.6
5 - 9	4.1	9.3	4.1	9.8
10 - 14	2.5	3.9	2.2	3.9
15-19	2.3	2.8	2.3	2.2
20-24	2.7	2.9	4.1	3.0
25-29	2.9	2.6	4.8	3.5
30-34	3.3	3.0	5.2	4.5
35-39	3.3	3.6	4.4	3.8
40-44	3.2	4.0	3.3	4.2
45-49	3.0	4.0	2.5	3.2
50-54	3.0	4.7	2.7	3.6
55-59	2.8	4.4	1.9	3.4
60-64	3.0	4.7	2.4	4.3
65+	13.0	25.2	12.7	26.3
NORTH EASTERN	8,254	5,468	7,805	3,289
0	30.1	1.4	24.2	1.2
1 - 4	16.9	31.6	14.2	35.4
5 - 9	8.5	20.5	6.7	19.8
10 - 14	7.2	10.8	5.5	9.2
15-19	4.9	4.8	8.0	4.3
20-24	4.3	6.2	9.5	5.4
25-29	2.7	4.7	8.1	4.9
30-34	2.6	2.9	7.1	4.0
35-39	2.4	2.0	5.6	3.6
40-44	3.0	2.5	3.8	2.7
45-49	2.7	1.8	1.3	1.7
50-54	3.0	2.5	0.9	1.6
55-59	1.9	1.4	0.5	0.9
60-64	2.4	1.5	1.2	0.9
65+	7.6	5.3	3.4	4.6
EASTERN	17,720	13,338	12,682	9,462
0	24.8	1.1	21.1	1.2
1 - 4	8.1	10.9	9.5	11.9
5 - 9	3.7	5.2	4.0	6.7
10 - 14	2.4	2.8	2.8	2.9
15-19	2.7	2.4	3.0	2.2
20-24	3.5	4.0	4.7	3.5
25-29	4.7	4.7	6.5	3.8
30-34	5.5	5.3	7.3	5.2
35-39	5.5	5.8	6.2	5.4
40-44	4.8	5.7	5.0	5.3
45-49	4.3	5.3	3.7	4.1
50-54	4.1	4.9	2.7	3.9
55-59	3.6	5.1	2.2	4.1
60-64	3.3	5.1	2.5	3.8
65+	19.2	31.5	18.7	36.0

Table 2.2(b): Per centage Reported Deaths by Age Groups and Sex, 2009 &2019

Regions/ Age Groups	2009		2019	
	Males	Females	Males	Females
30-34	5.5	5.3	7.3	5.2
35-39	5.5	5.8	6.2	5.4
40-44	4.8	5.7	5.0	5.3
45-49	4.3	5.3	3.7	4.1
50-54	4.1	4.9	2.7	3.9
55-59	3.6	5.1	2.2	4.1
60-64	3.3	5.1	2.5	3.8
65+	19.2	31.5	18.7	36.0
NYANZA	28,764	14,311	21,075	9,530
0	29.6	2.1	30.5	2.9
1 - 4	17.6	19.8	20.8	23.6
5 - 9	4.3	8.8	4.7	10.8
10 - 14	2.7	4.3	3.1	4.8
15-19	2.5	2.8	3.9	3.4
20-24	3.7	4.6	6.4	4.5
25-29	5.1	5.3	6.9	5.3
30-34	6.2	5.9	5.7	5.9
35-39	5.2	5.8	3.9	4.8
40-44	4.1	5.6	2.8	3.9
45-49	3.6	4.7	2.3	3.4
50-54	3.0	3.6	1.8	3.2
55-59	2.4	3.5	1.2	3.3
60-64	2.3	3.6	1.1	3.3
65+	7.8	19.7	4.9	16.8
NAIROBI	10,086	5,706	6,798	4,690
0	44.5	4.8	40.0	3.9
1 - 4	13.1	26.0	15.8	27.0
5 - 9	4.3	11.5	4.6	13.0
10 - 14	2.5	5.3	2.8	4.9
15-19	2.6	2.9	3.0	2.4
20-24	3.7	4.9	4.5	3.7
25-29	4.0	4.0	5.4	4.0
30-34	3.8	4.9	5.1	5.2
35-39	3.9	4.8	4.1	4.6
40-44	3.7	4.7	3.0	4.2
45-49	2.8	4.3	2.1	3.5
50-54	2.5	4.0	1.7	3.4
55-59	1.7	3.3	1.1	2.8
60-64	1.7	3.2	1.5	2.8
65+	5.2	11.3	5.2	14.7

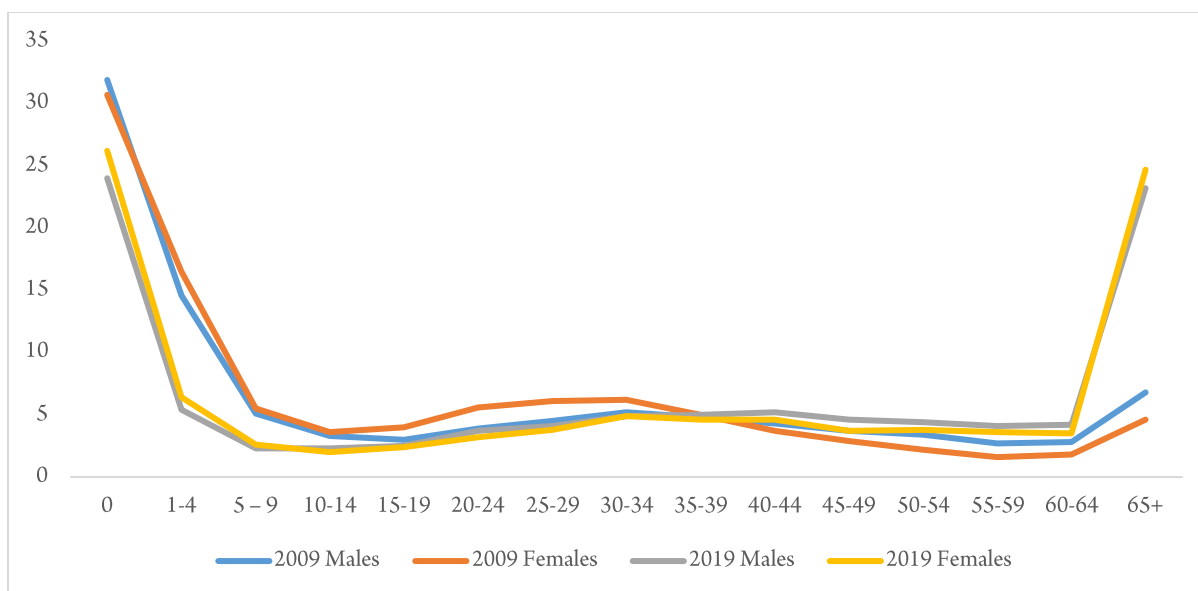


Figure 2.1: Per centage of Total Deaths by Age, 2009 & 2019

In rural Kenya, the share of those under age one declined for both sexes significantly to become the least shares. In 2009, the share for males was 27.7 and females was 27.0 while in 2019 it was 1.5 and 1.7 respectively. Notably, there was a slight increase in both sexes share across most of the age groups compared to the previous census. However, the share of those age 65 and above doubled for males from 13.1 in 2009 to 26.1 in 2019 while it declined for females from 37.9 to 27.1 respectively.

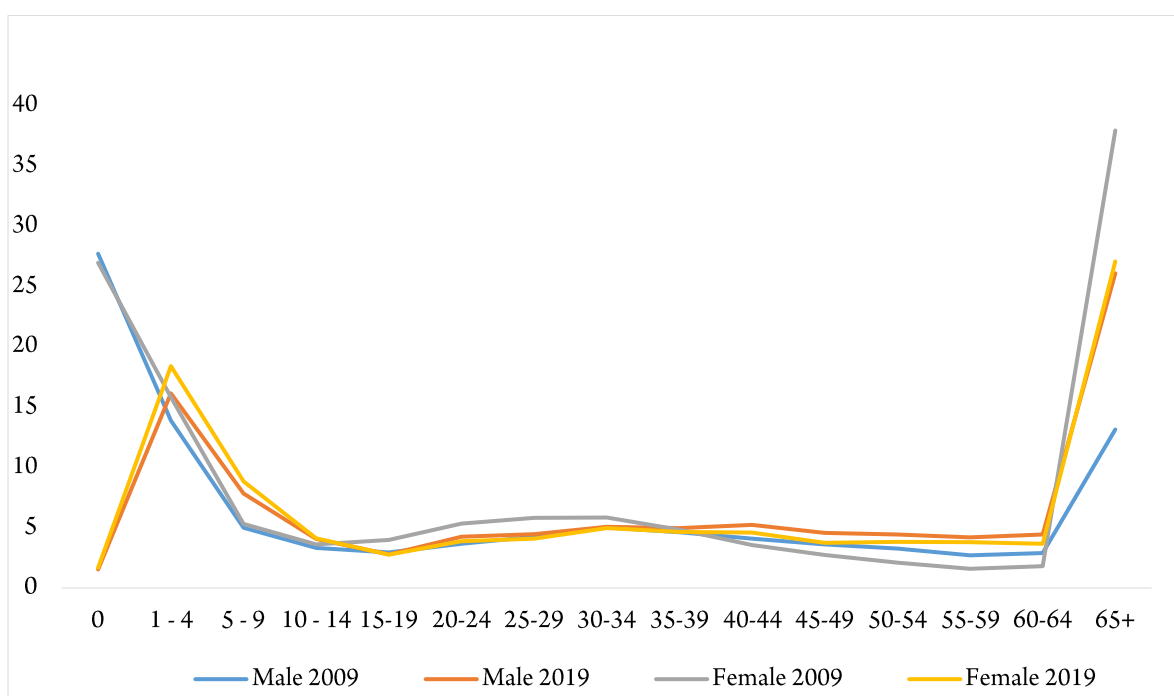


Figure 2.2: Rural Per centage of Total Deaths by Age, 2009 & 2019

In Urban Kenya, the share of those under age one declined for both sexes significantly from 36.3 in 2009 to 3.8 in 2019 for males and from 34.0 to 3.6 for females respectively. Notably, there was a slight increase in both sexes share across most of the age groups compared to the previous census.

A slight decrease is observed at 25 - 29 and 30 – 34 age groups for both sexes. However, the share of those age 65 and above almost doubled for males from 8.5 in 2009 to 14.4 in 2019 while it more than doubled for females from 7.8 to 18.0 respectively.

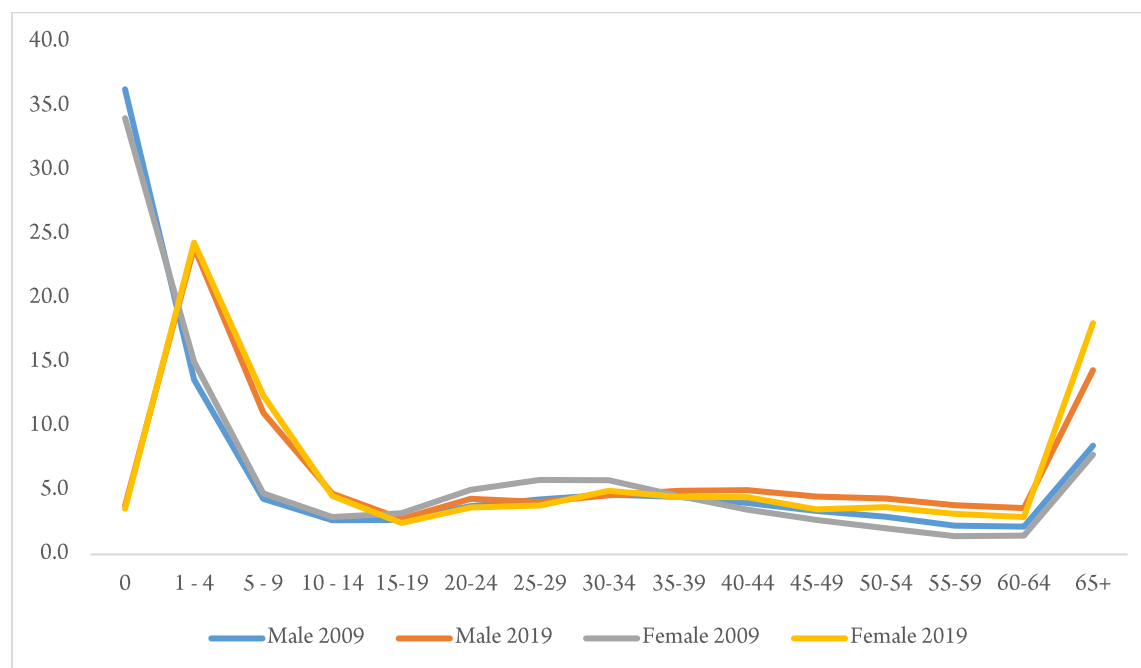


Figure 2.3: Urban Percentage of Total Deaths by Age, 2009 & 2019

Across the country's regions, the share of those under age one declined for both sexes significantly. Notably, there was a slight increase in both sexes share across most of the age groups compared to the previous census. Considerably, the share of those in the 1 – 4 age group has doubled in the Coast, North Eastern, and Nairobi regions while the Western region has decreased minimally. Nairobi, Nyanza and North Eastern Regions recorded a two times increase in the share for the age group 5 – 9. However, the share of those age 65 and above more than doubled for all the regions from 2009 to 2019 for both sexes apart from the males in the North Eastern region where the share declined from 7.6 to 5.3 respectively.

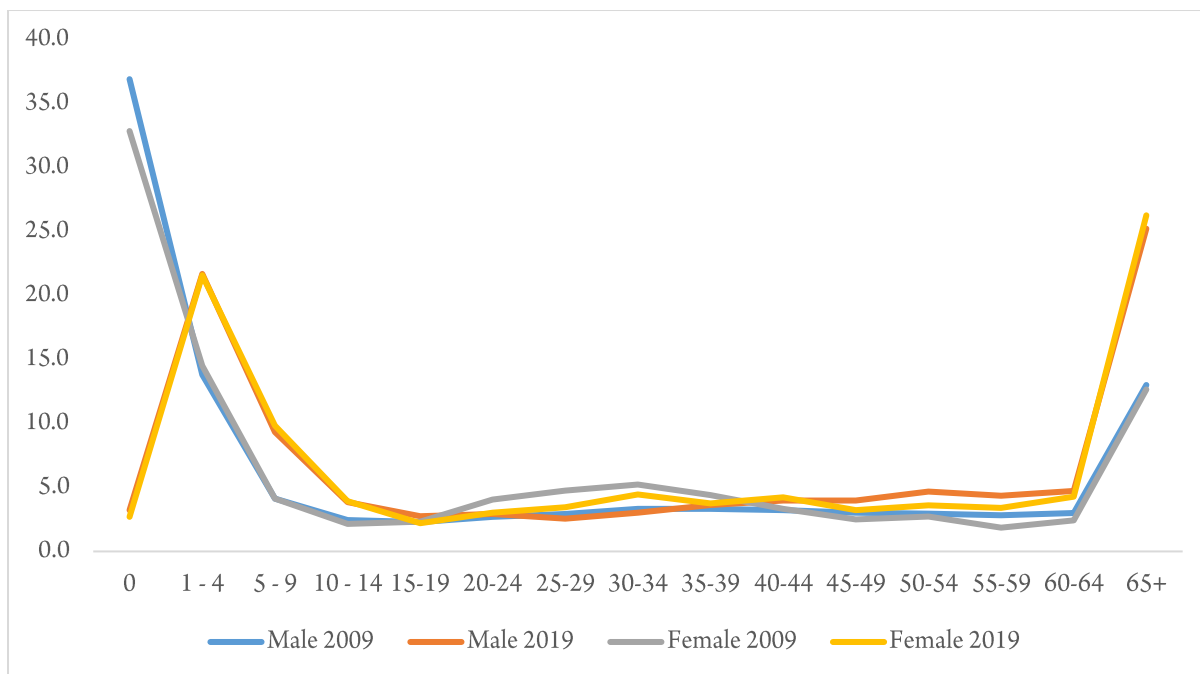


Figure 2.4: Coast Region Per centage of Total Deaths by Age, 2009 & 2019

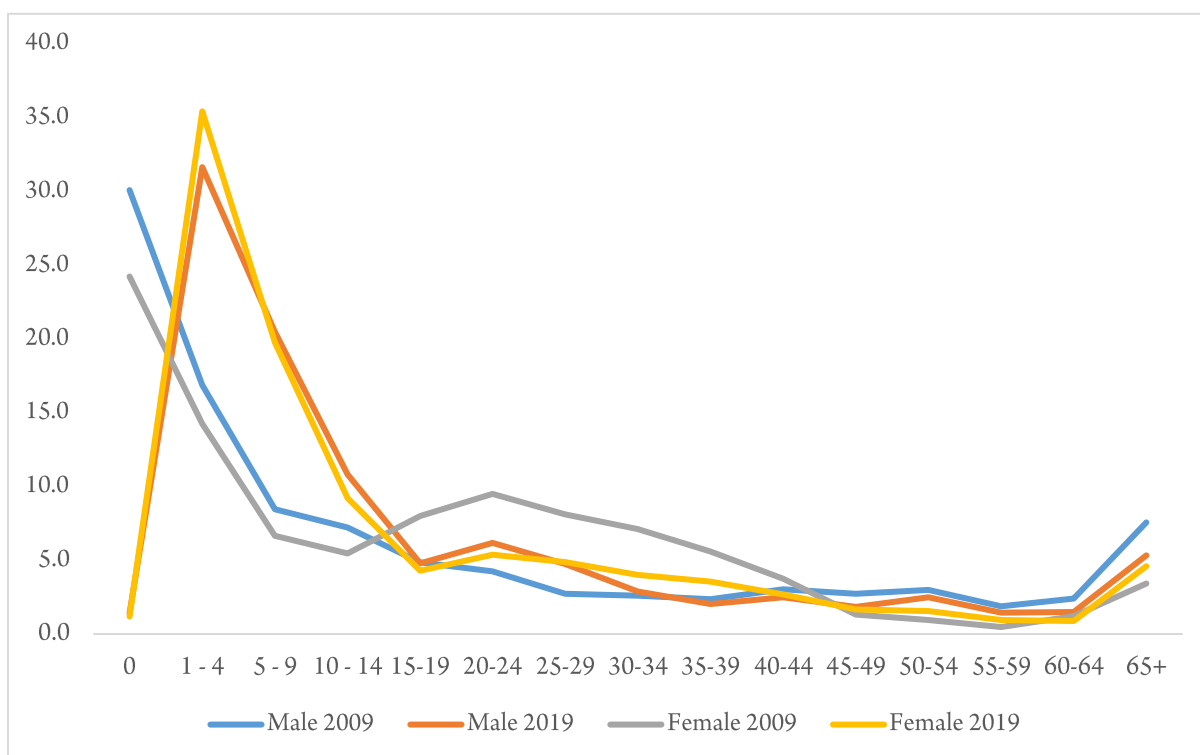


Figure 2.5: North Eastern Region Per centage of Total Deaths by Age, 2009 & 2019

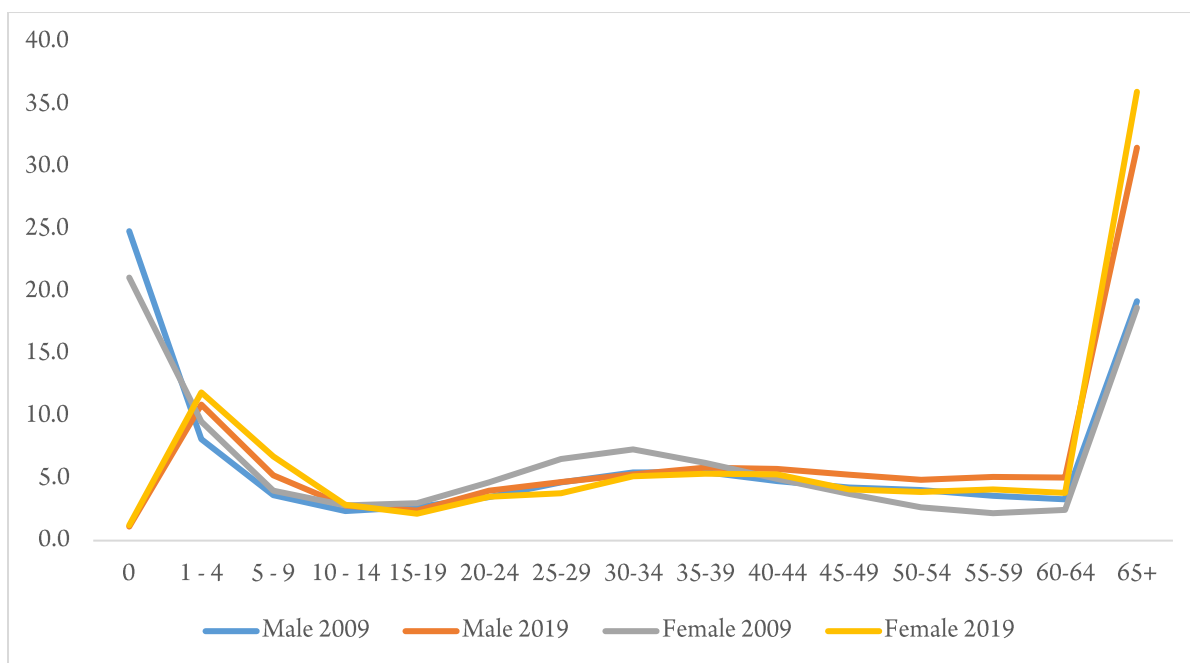


Figure 2.6: Eastern Region Per centage of Total Deaths by Age, 2009 &2019

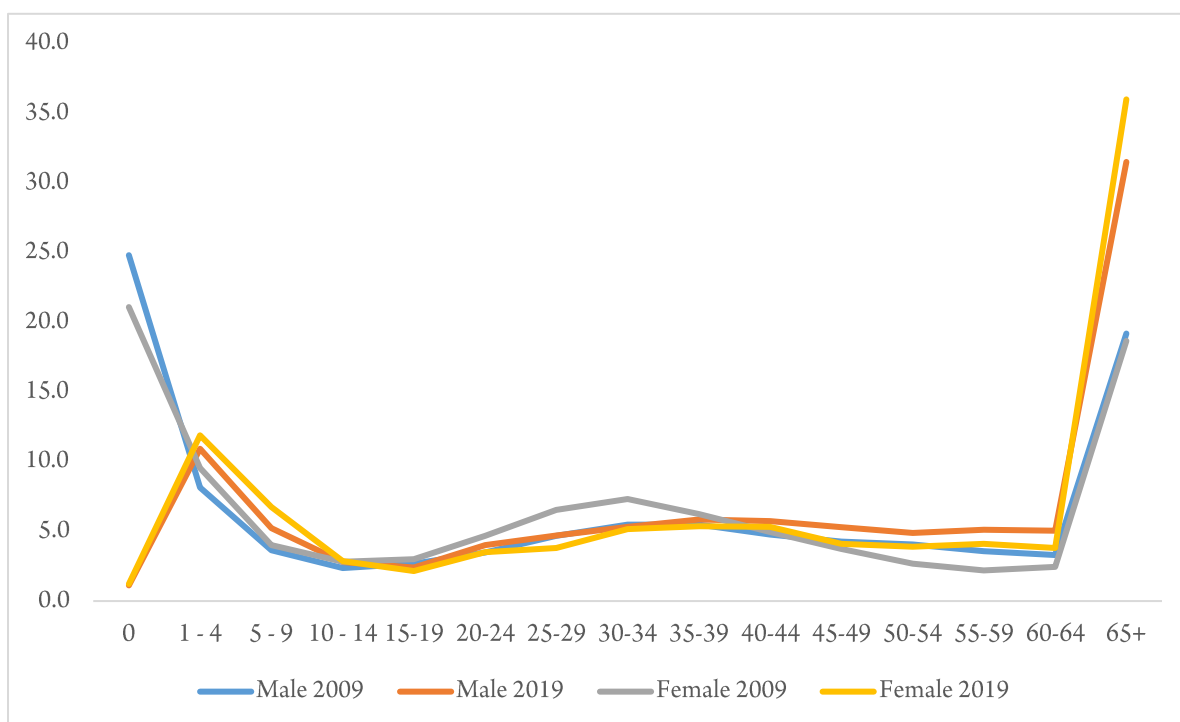


Figure 2.7: Central Region Per centage of Total Deaths by Age, 2009 &2019

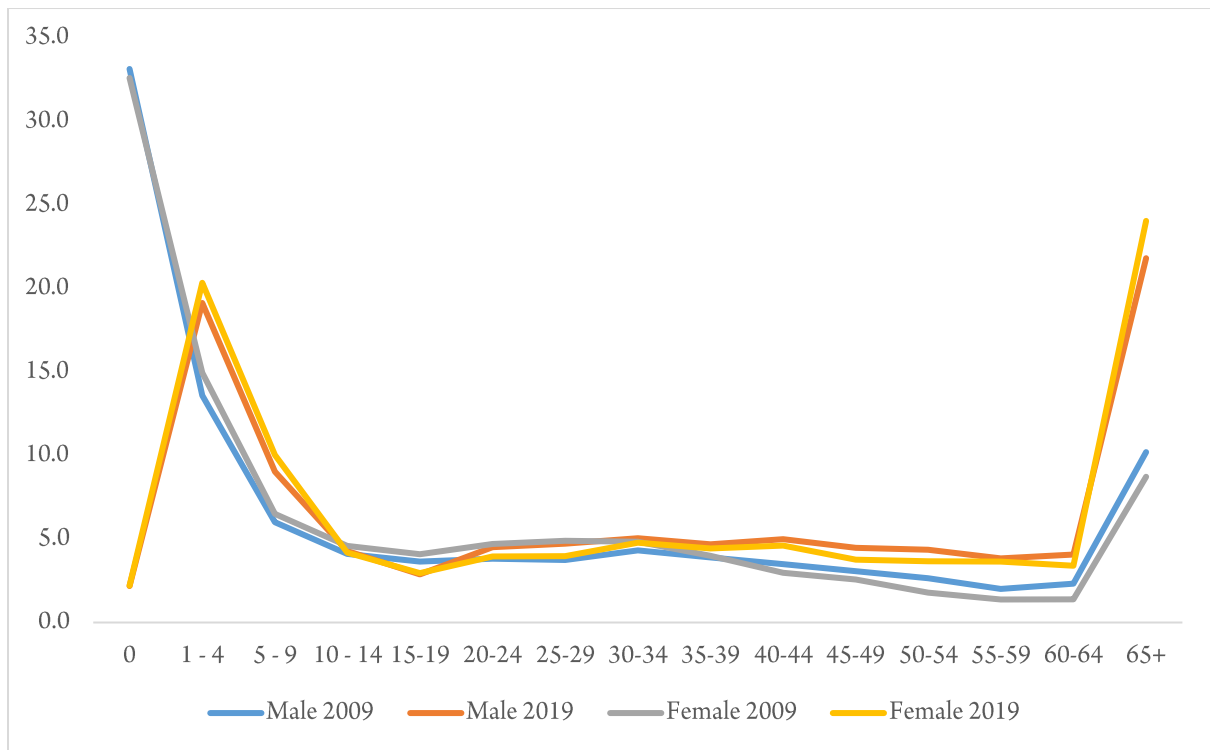


Figure 2.8: Rift Valley Region Per centage of Total Deaths by Age, 2009 &2019

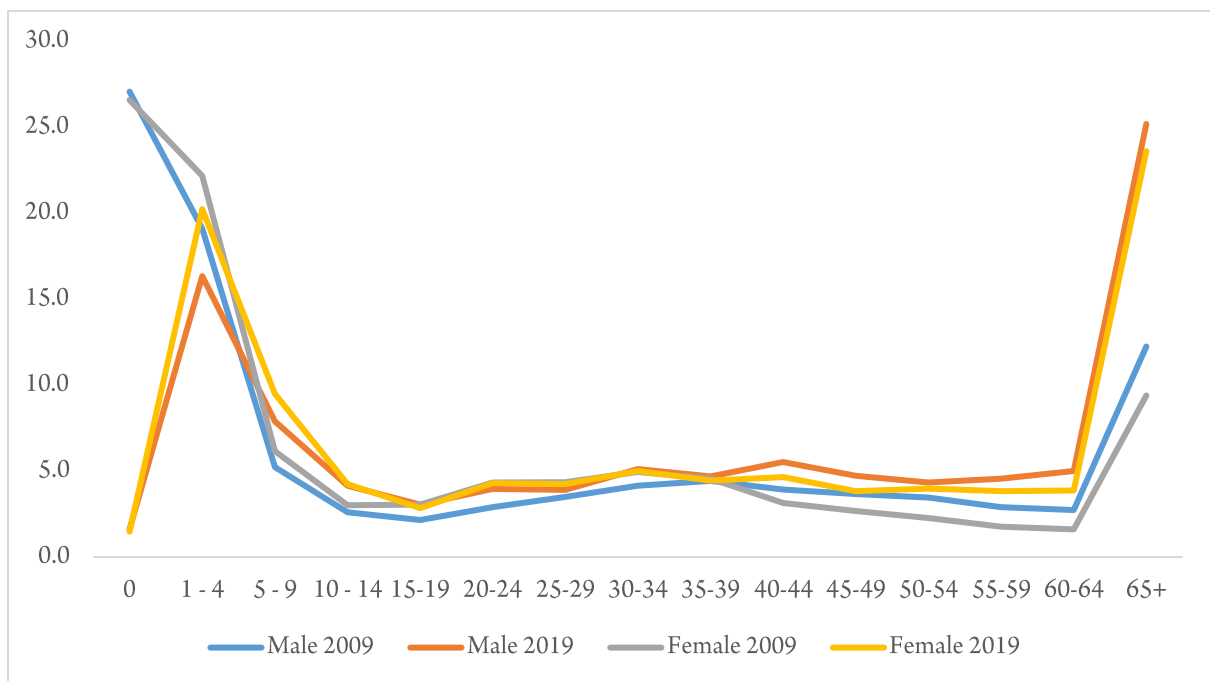


Figure 2.9: Western Region Per centage of Total Deaths by Age, 2009 &2019

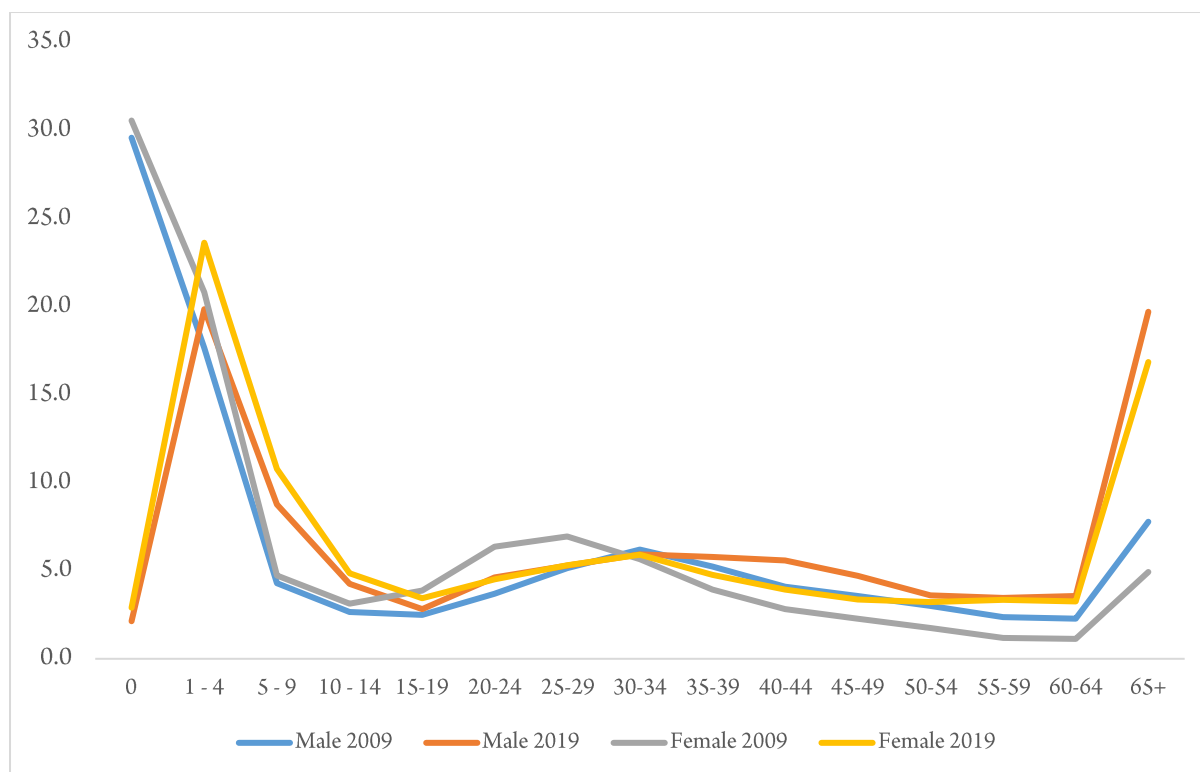


Figure 2.10: Nyanza Region Per centage of Total Deaths by Age, 2009 &2019

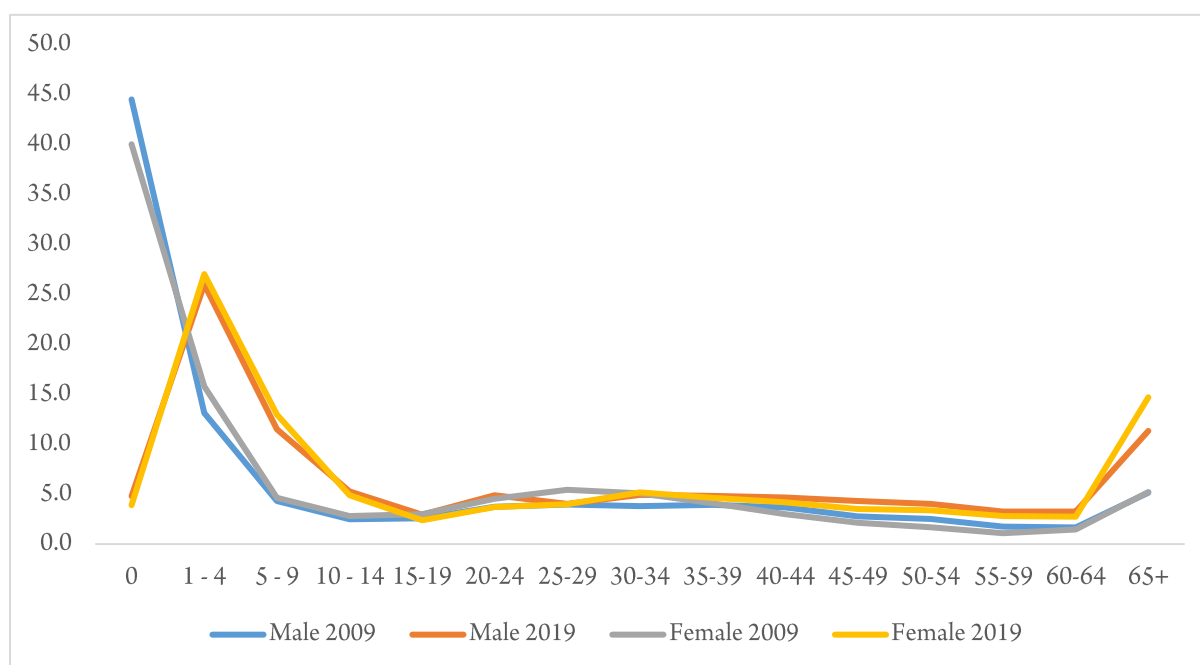


Figure 2.11: Nairobi Region Per centage of Total Deaths by Age, 2009 &2019

2.4 Brass Growth Balance Method

Another way to examine the data quality is Brass Growth Balance method. The method makes the assumption that if there is constant birth, death and growth rates in a stable population for data on the age distribution of deaths from the census, the numbers of deaths recorded can be evaluated for completeness and, if necessary (and if the necessary assumptions appear to have been met), adjusted.

The demographic balancing equation states that in any population, population change over a defined time period is equal to the balance between entries into the population and exits from it. The same is true of rates of change, so the growth rate (r) is equal to the difference between the entry rate and the exit rate. If there is no migration, entries will be births, and exits will be deaths, so the birth rate (b) is equal to the death rate (d) plus the growth rate. This balance applies not only to the whole population, but also to open-ended age segments of the population (that is, the population aged x and above).

In a stable population, the entry rate into each open-ended age segment (if entries are regarded as “birthdays” at the lower boundary of the age segment) is equal to the true death rate for that segment plus the constant growth rate. If deaths are incompletely reported, the true death rate will be equal to the observed death rate multiplied by an unknown factor, the inverse of the completeness of death recording (assumed to be a constant c). This relationship can be expressed by the following equation:

$$b(x) = r + (1/c) * d^{obs}(x+) \quad \text{where:}$$

- i. $b(x)$ is the entry rate into the population segment age x and above
- ii. $d^{obs}(x+)$ is the observed death rate in the population segment age x and above.
- iii. r is the growth rate

The equation indicates that there is a straight line relationship between the entry rates and the death rates, with intercept r and slope $(1/c)$. This equation is applied if there is only one census data, however, if there two censuses, then there are two methods that can be applied - one a generalization of the Brass growth balance method, called the General Growth Balance (GGB), and the other, an approach that uses age-specific growth rates to adjust the observed age distribution of deaths to approximate the distribution in a stationary population called Synthetic Extinct Generations (SEG). (See appendix 3). Neither requires an assumption that the population being studied is demographically stable (constant growth rates at all ages). However, the application of these two methods still require the following assumptions.

- the population is little affected by migration;
- the recording of deaths and population does not vary with age (at least over age 5 years);
- reporting of ages is reasonably accurate
- the deaths as recorded have the same age pattern as did deaths during the entire intercensal period; (under this assumption, estimated “coverage” is estimated relative to the average death

rates during the intercensal period)³. Only if mortality is not changing will the estimate reflect actual coverage in the census reference period.

Concluding remarks for reported deaths in the household

Coverage of reported household deaths is shown in table 2.3. Coverage is equal to 1 divided by the slope for GGB.

Table 2.3: Coverage of Reported deaths

	Age Range	Males GGB	SEG	SEG-Adj	Females GGB	SEG
Slope	5+ to 65+	1.53			2.17	
Intersection		0			0	
K1:k2		1.05			1.04	
Coverage		0.65	0.53	0.65	0.46	0.33
Final Coverage		0.61			0.39	
Slope	30+ to 65+	1.64			2.26	
Intersection		0			0	
K1:k2		1.02			1.03	
Coverage		0.61	0.53	0.64	0.44	0.33
Final Coverage		0.59			0.39	

Whereas the death rates by age may have declined, there was substantial under reporting especially at infancy. The age distribution of death presents the expected pattern, but may substantially under estimate the death rates by age. Application of the growth balance method and other improved methodologies revealed the following results.

- 1) Male coverage was about 61 per cent while female coverage was just about 39 per cent if data is considered from age 5 to 65. When age range was narrowed to cover 30 to 60, coverage for male was slightly lower at 59 per cent while the female remained the same. The implication is that if reported deaths in the household were utilized to estimate mortality levels by sex, the female death rate would be under estimated by as much as 60 per cent for the age range 5 to 65 while death rates would be under estimated by 40 per cent thus exaggerating male female differences in mortality.
- 2) If the assumptions are met, then the reported deaths need to be adjusted more so for female data than male data.

The implication of this evaluation suggests that estimation of mortality indicators should be derived from alternative methods where applicable. Use of reported deaths in the household should also be interpreted with caution since the differential under or over reporting at sub national levels is not known because of the mediating effect of migration.

³ Detailed mathematical and procedures can be found in Moultrie TA, RE Dorrington, AG Hill, K Hill, IM Timæus and B Zaba (eds).

2013. Tools for Demographic Estimation. Paris: International Union for the Scientific Study of Population.

demographicestimation.iussp.org.

Chapter 3: Childhood Mortality

3.1. Introduction

Childhood mortality is one of the key indicators used in determining both the general and national socio-economic development. Goal 3 of the Sustainable Development Goals (SDGs) is concerned with the reduction of neonatal mortality to 12 deaths per 1000 live births. It also aims to reduce childhood mortality to less than 25 per 1000 live births. Childhood mortality varies across the globe, but it is highest in sub-Saharan Africa and South Asia (Heckmann, 2015). For instance, more than 50 per cent of childhood deaths occurred in sub-Saharan Africa in 2017. United Nations Inter-Agency Group for Child Mortality Estimation (UNIGME) (2018) indicates that 38 per cent of all childhood deaths occur in countries listed among the least developed.

This chapter focuses on the proportions of children dead and measures of infant and under-five mortality. Responses were obtained from questions P26/ 27 and P32/33 for boys and girls respectively as shown below:

P26/27: How many children have you ever borne alive?

P32/33: How many children have you borne alive who have died?

Data on children ever born (CEB) and children dead (CD) by age of the mother (in the reproductive age 15-49) was used to calculate the proportions of children dead. These were then compared to those obtained from earlier censuses to show the trends over the years.

3.2. Trends in Childhood Mortality, 1989 – 2019

The results in figure 3.1 indicate that there was a steady decline in childhood mortality between 1962 and 1989 censuses. The 1989-1999 inter-censal periods this trend was reversed which was attributed to the HIV/AIDS pandemic. Estimates from the 2009 census indicate a drastic decline which we attribute to issues of data. In the 2009-2019 period there was a further decline in the level of childhood mortality.

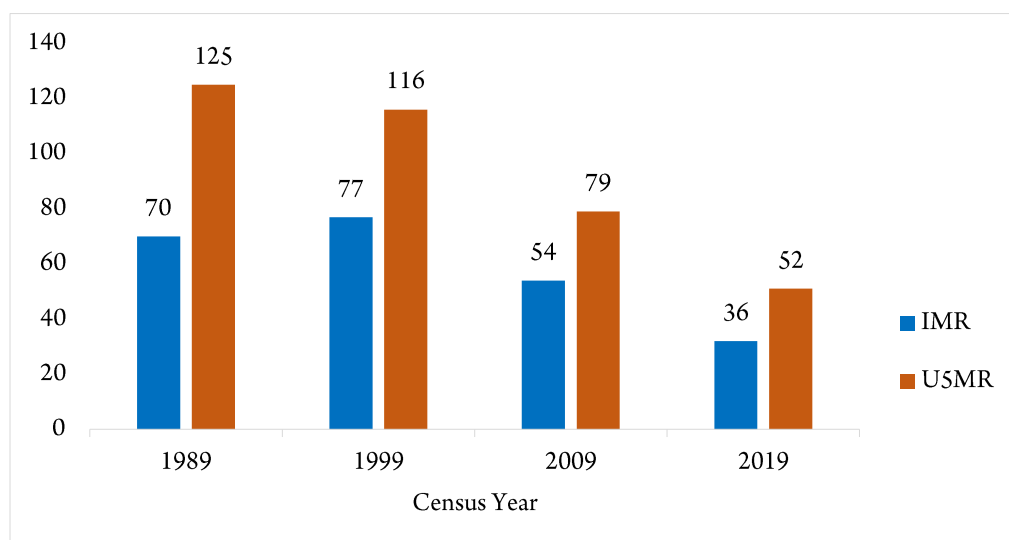


Figure 3.1: Trends in Childhood Mortality, 1989-2019

3.3. Trends Proportions of Children Dead at National level

Table 3.1 shows the proportions of dead children by the age group of the mother from the 2009 census, together with the corresponding proportions from the Kenya censuses since 1962.

Table 3.1: Proportion of Children Dead by age of mother and per cent Change 1962-2019 Censuses

Age Group of Mother	Proportion Dead							Percent Change					
	1962	1969	1979	1989	1999	2009	2019	62-69	69-79	79-89	89-99	99-09	09-19
15-19	0.146	0.128	0.116	0.111	0.117	0.047	0.020	-12.3	-9.4	-4.3	5.4	-59.8	-57.8
20-24	0.170	0.147	0.125	0.104	0.108	0.052	0.021	-13.5	-15.0	-16.8	3.8	-51.9	-58.9
25-29	0.205	0.174	0.141	0.108	0.099	0.054	0.024	-15.1	-19.0	-23.4	-8.3	-45.5	-55.7
30-34	0.238	0.205	0.166	0.126	0.110	0.063	0.030	-13.9	-19.0	-24.1	-12.7	-42.7	-51.7
35-39	0.269	0.238	0.185	0.139	0.118	0.070	0.035	-11.5	-22.3	-24.9	-15.1	-40.7	-50.2
40-44	0.308	0.263	0.217	0.165	0.139	0.086	0.047	-14.6	-17.5	-24.0	-15.8	-38.1	-45.0
45-49	0.338	0.304	0.253	0.186	0.156	0.102	0.058	-10.1	-16.8	-26.5	-16.1	-34.6	-43.0
Average								-13.0	-17.0	-20.6	-8.4	-44.8	-51.8

The period 2009-2019 shows a decline in childhood mortality from the period 1999-2009. There were indications of declines across all age groups except in the 15- 19 age group where the reverse is noted. The proportions were calculated on the basis of information on children ever born (CEB) and children dead by the age of the mother (in the reproductive age range). These were then compared to those obtained from earlier censuses to show the trend over the years. Estimates from the 2019 census like the previous census indicate a drastic decline in the proportion of children dead.

Table 3.2 shows the proportions dead among male and female children compared with those from the 1979, 1989, 1999 and 2009 censuses (prior to 1979, information on the sex of the children was not collected).

Table 3.2 Proportions of Male and Female Children Dead, 1979 - 2019 Censuses

Age Group of Mother	Males					Females				
	1979	1989	1999	2009	2019	1979	1989	1999	2009	2019
15-19	0.123	0.113	0.117	0.051	0.022	0.109	0.109	0.117	0.044	0.017
20-24	0.129	0.107	0.106	0.055	0.024	0.120	0.100	0.110	0.049	0.018
25-29	0.148	0.112	0.099	0.056	0.027	0.134	0.104	0.100	0.051	0.020
30-34	0.173	0.135	0.106	0.066	0.035	0.159	0.123	0.115	0.061	0.026
35-39	0.192	0.144	0.115	0.074	0.039	0.177	0.133	0.122	0.067	0.030
40-44	0.225	0.171	0.137	0.088	0.053	0.210	0.158	0.141	0.084	0.041
45-49	0.263	0.194	0.155	0.105	0.065	0.243	0.178	0.157	0.121	0.051

Results indicate that there was higher mortality among males than females. Also noticeable is that the proportions dead in 2019 are much lower relative to 2009.

3.4. Differentials in Proportions of Children Dead by Place of Residence of Mother

Table 3.3 presents differentials in proportions of children dead by place of residence and age of mother from 1979 to 2019. The figures indicate that during a 10-year period 1979 and 1989, there was a steady decline in the proportions of children dead in rural and urban. However, during the 1989 – 1999 periods, the tempo of the decline in the proportion of dead children by place of residence declined drastically. The period 1999 – 2009 and 2009 – 2019 indicate substantial declines in the proportion of dead children both for rural and urban. However, these results should be interpreted with caution.

Table 3.3: Proportions of Children Dead by Place of Residence and mother's age group, 1979, 1989, 1999, 2009 and 2019 Censuses

Year	Place of Residence	Age Groups							Average
		15-19	20-24	25-29	30-34	35-39	40-44	45-49	
1979	Urban	0.109	0.109	0.117	0.135	0.155	0.188	0.22	0.148
	Rural	0.117	0.128	0.146	0.170	0.188	0.220	0.256	0.175
1989	Urban	0.106	0.098	0.096	0.107	0.113	0.138	0.160	0.117
	Rural	0.112	0.105	0.111	0.133	0.142	0.167	0.188	0.137
1999	Urban	0.119	0.106	0.088	0.095	0.101	0.115	0.127	0.107
	Rural	0.117	0.109	0.102	0.114	0.121	0.142	0.159	0.123
2009	Urban	0.047	0.053	0.050	0.056	0.061	0.074	0.087	0.061
	Rural	0.047	0.052	0.055	0.066	0.073	0.090	0.065	0.070
2019	Rural	0.019	0.021	0.024	0.032	0.036	0.050	0.061	0.035
	Urban	0.023	0.023	0.024	0.028	0.032	0.040	0.048	0.031

3.5. Regional Differentials in Proportions of Children Dead 2019 Census

The figures in Table 3.4 indicate the proportions of children dead by regions. There are substantially low proportions of children dead in the North Eastern Region across all the age groups compared to the rest of the regions.

Table 3.4: Regional Differentials in Proportions of Children Dead 2019 Census

REGION	Age Groups							Average
	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	
Nairobi	0.026	0.024	0.025	0.028	0.032	0.039	0.048	0.032
Central	0.026	0.024	0.023	0.024	0.025	0.029	0.033	0.026
Coast	0.026	0.026	0.030	0.037	0.045	0.061	0.074	0.043
Eastern	0.016	0.016	0.016	0.019	0.022	0.029	0.039	0.022
North Eastern	0.009	0.008	0.008	0.009	0.009	0.013	0.016	0.010
Nyanza	0.025	0.032	0.041	0.060	0.077	0.106	0.127	0.067
Rift Valley	0.016	0.016	0.017	0.019	0.022	0.028	0.035	0.022
Western	0.025	0.026	0.031	0.042	0.052	0.072	0.090	0.048

The level of under-five child mortality can be reflected by the proportion of dead children born to women by age. Table 3.5 indicates differentials in proportions of children dead between and within regions and counties. There is a substantive reduction in proportion of children dead across the counties and regions. Averagely, Migori, Kisumu and Siaya Counties in the Nyanza region had the biggest change compared to the other counties. Nyeri, Kirinyanga and Embu Counties reported the least change in the proportion of children dead.

The values for North Eastern region show that there were exceptionally low estimates of proportion dead among women across all age groups. This is evident among the three counties within the region. Given cultural practices of early marriage in some of these counties, this is not plausible. There is therefore suspicion that there was under-reporting of dead children in these counties.

Table 3.5: Regional Differentials in proportions of children dead by age of mother, region and county, 2009 & 2019

Regions/ County	2009							Average
	Age Group of Mother							
	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	
Kenya	0.047	0.052	0.054	0.063	0.07	0.086	0.102	0.068
Coast	0.046	0.05	0.057	0.072	0.082	0.102	0.123	0.076
Mombasa	0.047	0.049	0.052	0.06	0.064	0.076	0.088	0.062
Kwale	0.048	0.057	0.071	0.087	0.099	0.124	0.149	0.091
Kilifi	0.038	0.045	0.054	0.072	0.085	0.109	0.134	0.077
Tana River	0.059	0.063	0.066	0.084	0.098	0.122	0.144	0.091
Lamu	0.05	0.059	0.057	0.068	0.079	0.1	0.111	0.075
Taita Taveta	0.034	0.038	0.041	0.051	0.059	0.067	0.087	0.054
North Eastern	0.054	0.041	0.033	0.039	0.039	0.052	0.057	0.045
Garissa	0.043	0.045	0.044	0.056	0.06	0.077	0.084	0.058
Wajir	0.051	0.044	0.035	0.039	0.038	0.053	0.057	0.045
Mandera	0.067	0.035	0.025	0.028	0.029	0.038	0.045	0.038
Eastern	0.03	0.031	0.033	0.042	0.051	0.061	0.074	0.046
Marsabit	0.039	0.033	0.031	0.04	0.048	0.063	0.072	0.047
Isiolo	0.041	0.041	0.043	0.054	0.066	0.091	0.106	0.063
Meru	0.021	0.018	0.018	0.023	0.028	0.034	0.042	0.026
Tharaka-Nithi	0.023	0.031	0.036	0.045	0.059	0.067	0.08	0.049
Embu	0.047	0.03	0.03	0.034	0.042	0.046	0.056	0.041
Kitui	0.037	0.041	0.05	0.069	0.082	0.097	0.119	0.071
Machakos	0.03	0.033	0.032	0.038	0.044	0.054	0.069	0.043
Makueni	0.027	0.035	0.036	0.042	0.051	0.062	0.074	0.047
Central	0.033	0.049	0.037	0.036	0.035	0.039	0.048	0.04
Nyandarua	0.032	0.037	0.035	0.032	0.032	0.037	0.045	0.036
Nyeri	0.032	0.032	0.03	0.03	0.028	0.031	0.036	0.031
Kirinyaga	0.053	0.041	0.035	0.036	0.036	0.037	0.05	0.041
Murang'a	0.026	0.051	0.039	0.04	0.038	0.043	0.053	0.042
Kiambu	0.031	0.059	0.04	0.038	0.038	0.041	0.05	0.042
Rift Valley	0.032	0.032	0.034	0.04	0.045	0.056	0.07	0.044
Turkana	0.047	0.039	0.041	0.047	0.053	0.065	0.08	0.053
West Pokot	0.04	0.044	0.05	0.062	0.074	0.092	0.121	0.069
Samburu	0.023	0.022	0.025	0.032	0.039	0.054	0.064	0.037
Trans-Nzoia	0.03	0.033	0.036	0.045	0.054	0.07	0.082	0.05
Uasin Gishu	0.036	0.038	0.039	0.046	0.053	0.066	0.082	0.051
Elgeyo marakwet	0.033	0.035	0.034	0.037	0.039	0.051	0.059	0.041
Nandi	0.032	0.028	0.026	0.028	0.035	0.047	0.059	0.036
Baringo	0.036	0.039	0.04	0.05	0.059	0.068	0.085	0.054
Laikipia	0.023	0.024	0.025	0.03	0.03	0.035	0.045	0.03
Nakuru	0.044	0.036	0.036	0.038	0.041	0.048	0.061	0.043
Narok	0.023	0.024	0.026	0.034	0.039	0.046	0.064	0.037
Kajiado	0.019	0.022	0.024	0.026	0.03	0.038	0.049	0.03
Kericho	0.038	0.033	0.037	0.044	0.052	0.064	0.08	0.05
Bomet	0.026	0.026	0.027	0.031	0.036	0.044	0.055	0.035
Western	0.056	0.063	0.076	0.098	0.112	0.135	0.156	0.099
Kakamega	0.059	0.067	0.082	0.105	0.119	0.144	0.166	0.106
Vihiga	0.046	0.054	0.068	0.085	0.101	0.125	0.146	0.089
Bungoma	0.047	0.05	0.058	0.08	0.095	0.113	0.133	0.082
Busia	0.067	0.08	0.1	0.123	0.136	0.161	0.182	0.121
Nyanza	0.068	0.088	0.105	0.131	0.144	0.175	0.193	0.129
Siaya	0.097	0.124	0.148	0.178	0.195	0.218	0.246	0.172
Kisumu	0.072	0.097	0.118	0.145	0.164	0.201	0.227	0.146
Homa Bay	0.085	0.11	0.135	0.164	0.179	0.208	0.235	0.159
Migori	0.08	0.114	0.141	0.171	0.192	0.219	0.25	0.167
Kisii	0.029	0.033	0.04	0.059	0.075	0.098	0.112	0.064
Nyamira	0.02	0.029	0.031	0.04	0.047	0.063	0.074	0.043
Nairobi	0.043	0.054	0.047	0.049	0.051	0.056	0.064	0.052
Nairobi	0.043	0.054	0.047	0.049	0.051	0.056	0.064	0.052

Table 3.5: Regional Differentials in proportions of children dead by age of mother, region and county, 2009 & 2019 Contd'

Regions/ County	2019							
	Age Group of Mother							Average
	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	
Kenya	0.02	0.021	0.024	0.03	0.035	0.047	0.058	0.034
Coast	0.026	0.026	0.03	0.037	0.045	0.061	0.074	0.043
Mombasa	0.027	0.028	0.032	0.037	0.045	0.055	0.066	0.041
Kwale	0.027	0.028	0.031	0.041	0.051	0.072	0.085	0.048
Kilifi	0.021	0.023	0.025	0.035	0.044	0.061	0.076	0.041
Tana River	0.038	0.032	0.034	0.04	0.045	0.062	0.078	0.047
Lamu	0.029	0.027	0.033	0.04	0.049	0.06	0.073	0.044
Taita Taveta	0.025	0.025	0.029	0.033	0.038	0.044	0.055	0.036
North Eastern	0.009	0.008	0.008	0.009	0.009	0.013	0.016	0.01
Garissa	0.008	0.009	0.009	0.01	0.011	0.016	0.02	0.012
Wajir	0.007	0.007	0.007	0.007	0.008	0.01	0.012	0.008
Mandera	0.01	0.007	0.008	0.009	0.009	0.013	0.016	0.01
Eastern	0.016	0.016	0.016	0.019	0.022	0.029	0.039	0.022
Marsabit	0.007	0.008	0.007	0.008	0.008	0.014	0.015	0.01
Isiolo	0.011	0.012	0.013	0.015	0.015	0.022	0.032	0.017
Meru	0.01	0.01	0.01	0.012	0.014	0.019	0.027	0.014
Tharaka-Nithi	0.021	0.018	0.02	0.022	0.026	0.034	0.047	0.027
Embu	0.029	0.025	0.023	0.025	0.028	0.035	0.043	0.03
Kitui	0.022	0.022	0.022	0.028	0.032	0.045	0.061	0.033
Machakos	0.022	0.018	0.018	0.019	0.021	0.027	0.033	0.023
Makueni	0.017	0.018	0.019	0.021	0.025	0.03	0.04	0.024
Central	0.026	0.024	0.023	0.024	0.025	0.029	0.033	0.026
Nyandarua	0.024	0.025	0.025	0.024	0.024	0.027	0.03	0.026
Nyeri	0.03	0.02	0.018	0.018	0.019	0.023	0.026	0.022
Kirinyaga	0.029	0.024	0.023	0.025	0.027	0.031	0.039	0.028
Murang'a	0.024	0.022	0.021	0.023	0.024	0.029	0.035	0.025
Kiambu	0.025	0.025	0.024	0.025	0.026	0.032	0.035	0.027
Rift Valley	0.016	0.016	0.017	0.019	0.022	0.028	0.035	0.022
Turkana	0.013	0.013	0.013	0.016	0.019	0.028	0.036	0.02
West Pokot	0.019	0.019	0.022	0.025	0.029	0.04	0.05	0.029
Samburu	0.013	0.008	0.01	0.012	0.014	0.019	0.02	0.014
Trans-Nzoia	0.021	0.022	0.021	0.024	0.029	0.038	0.048	0.029
Uasin Gishu	0.016	0.016	0.016	0.018	0.02	0.025	0.032	0.02
Elgeyo marakwet	0.012	0.01	0.01	0.013	0.014	0.017	0.021	0.014
Nandi	0.014	0.016	0.017	0.021	0.025	0.032	0.041	0.024
Baringo	0.016	0.013	0.014	0.017	0.018	0.024	0.033	0.019
Laikipia	0.012	0.016	0.014	0.015	0.018	0.02	0.026	0.017
Nakuru	0.025	0.024	0.023	0.026	0.028	0.033	0.037	0.028
Narok	0.013	0.012	0.013	0.015	0.017	0.022	0.03	0.017
Kajiado	0.013	0.015	0.015	0.016	0.019	0.021	0.027	0.018
Kericho	0.016	0.018	0.018	0.02	0.022	0.028	0.036	0.022
Bomet	0.016	0.014	0.016	0.017	0.019	0.022	0.028	0.019
Western	0.025	0.026	0.031	0.042	0.052	0.072	0.09	0.048
Kakamega	0.03	0.028	0.035	0.047	0.058	0.078	0.098	0.053
Vihiga	0.028	0.03	0.033	0.042	0.052	0.071	0.087	0.049
Bungoma	0.02	0.019	0.023	0.03	0.037	0.053	0.069	0.036
Busia	0.027	0.032	0.037	0.053	0.067	0.092	0.111	0.06
Nyanza	0.025	0.032	0.041	0.06	0.077	0.106	0.127	0.067
Siaya	0.034	0.042	0.055	0.082	0.106	0.143	0.17	0.09
Kisumu	0.027	0.033	0.042	0.066	0.083	0.117	0.144	0.073
Homa Bay	0.026	0.038	0.051	0.077	0.095	0.132	0.162	0.083
Migori	0.028	0.036	0.051	0.074	0.095	0.128	0.157	0.081
Kisii	0.017	0.018	0.021	0.029	0.035	0.051	0.073	0.035
Nyamira	0.015	0.012	0.016	0.02	0.024	0.034	0.043	0.024
Nairobi	0.026	0.024	0.025	0.028	0.032	0.039	0.048	0.032
Nairobi	0.026	0.024	0.025	0.028	0.032	0.039	0.048	0.032

3.6. Estimates of Childhood Mortality: Indirect Methods

Indirect methods aid in evaluating data and computing demographic indicators. The Brass technique uses data on children ever born and children dead or surviving reported by women to derive estimates of childhood mortality (infant and under-5). Application of this technique to the 2019 census data gave estimates of Infant Mortality Rate(IMR) and Under 5 Mortality Rates(U5MR) that were not plausible. For instance, at the subnational level, estimates of childhood mortality using this approach gave implausible results especially for counties like Wajir with IMR of 8.3 and U5MR of 12.1 and Mandera with IMR of 7.5 and U5MR of 10.8 per 1000 live births respectively.

The implausible results may be as a result of some known factors experienced in censuses. The indirect estimates tend to smooth out rapid change in mortality, and therefore underestimate the rapid change in mortality. This may be attributed to incomplete enumeration of the actual population of women aged between 15 and 49 years' old, errors resulting from deaths not reported or migration of mother, recall lapse that results in non-reporting of a live birth (Som, 1970; Pullum and Stokes, 1997); errors resulting from a mother dying before the time of the census among others.

3.7. Estimation of Childhood Mortality

The input for under five mortality data was obtained from the published information from Godwin Jessica, Jon Wakefield, and Sam Clark Estimation of Under-Five Mortality in Kenya at the Sub-National Level. A series of Kenya DHS from 1989 – 2014 were used to obtain small area estimates of under-five mortality at county level⁴. The under-five mortality was regressed on factors associated with child mortality for consistency – education, fertility, poverty. Best fitting model – regression of under-five mortality with education and fertility, the fitted model was checked for deviations between the observed and predicted under five mortality. Where the residuals were varying, the under-five mortality for the county was replaced with fitted value – this was done only for five counties. The best predicting model is shown in Table 3.6.

⁴ See also Li Z, Hsiao Y, Godwin J, Martin BD, Wakefield J, Clark SJ, et al. (2019) Changes in the spatial distribution of the under-five mortality rate: Small-area analysis of 122 DHS surveys in 262 subregions of 35 countries in Africa. PLoS ONE 14(1): e0210645. <https://doi.org/10.1371/journal.pone.0210645>

Table 3.6: Under-Five Mortality Predicting Model

Parameter Estimates							
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	-41.268	42.6765	-124.91	42.376	0.935	1	0.334
TFR	42.273	14.7445	13.374	71.171	8.22	1	0.004
EDUCATION (Percentage of women 15-49 with sec+ level of education)	-0.245	0.3041	-0.841	0.351	0.65	1	0.42
TFR * TFR	-4.279	1.3874	-6.998	-1.559	9.511	1	0.002
(Scale)	185.188 ^a	37.0376	125.133	274.065			

Dependent Variable: U5M

Model: (Intercept), TFR, EDUCATION, TFR * TFR

a. Maximum likelihood estimate.

b. The method used was the generalized linear model

Omnibus Test comparing the fitted model with intercept only		
Likelihood Ratio Chi-Square	df	Sig.
13.713	3	0.003

Further consistency checks done to evaluate the plausibility of estimated age/sex patterns of mortality included:

- the infant fraction (defined as the ratio of the probability of death between ages 0 and 1 to the probability of death between ages 0 and 5, that is ${}_1q_0 / {}_5q_0$)
- the adult-child mortality quotient (defined as the ratio of the probability of death between ages 15 and 60 to the probability of death between ages 0 and 5, that is ${}_{45}q_{15} / {}_5q_0$).

The final under-five mortality was then used together with ${}_{45}q_{15}$ to generate lifetables for each county by sex. For national, rural and urban place of residence, the input data was the reported under-five mortality.

The rationale used was that, ${}_{45}q_{15}$ obtained from the use of parental survival (orphanhood data) pertains to about 5 years prior to the time of enumeration, which is closer to U5M estimates generated from DHS 2014 and not the reported deaths in the household 12 months before the census date. The infant mortality rates used in this report were from the life tables thus generated.

Table 3.7 presents infant and under five mortality rates per 1,000 live births. The estimates show that at national level infant mortality is 36 deaths per 1,000 live births while under-five mortality is 52 deaths per 1,000 live births. Migori, Homabay, Tana River and Vihiga counties recorded the highest infant and under five mortality rates. Migori recorded 97.2 infant deaths and 107.2 under-five deaths per 1,000 live births which was the highest in the country. The lowest infant and under five mortality rates were recorded in Laikipia, Tharaka-Nithi, Kiambu and Kirinyaga counties. Laikipia county had the lowest levels recording 17.3 infant deaths and 27.9 under-five deaths per 1,000 live births which.

Figure 3.3 and 3.4 display infant and under five mortality differentials by county.

Table 3.7: Infant and Under Five Mortality Rates by Residence and County, 2019

RESIDENCE/COUNTY	IMR (Per 1,000 Live Births)	U5MR (Per 1,000 Live Births)	COUNTY	IMR (Per 1,000 Live Births)	U5MR (Per 1,000 Live Births)
Kenya	36	52	Turkana	40	64
Rural	36	52	West Pokot	38	59
Urban	36	50	Samburu	24	39
Mombasa	31	49	Trans Nzoia	32	51
Kwale	36	57	Uasin Gishu	25	40
Kilifi	40	62	Elgeyo Marakwet	33	51
Tana River	48	73	Nandi	26	43
Lamu	38	60	Baringo	26	42
Taita Taveta	26	42	Laikipia	17	28
Garissa	42	65	Nakuru	33	53
Wajir	42	64	Narok	37	57
Mandera	41	64	Kajiado	29	46
Marsabit	26	43	Kericho	31	48
Isiolo	35	57	Bomet	33	51
Meru	33	54	Kakamega	37	60
Tharaka-Nithi	19	30	Vihiga	45	73
Embu	26	42	Bungoma	31	49
Kitui	25	40	Busia	41	66
Machakos	29	44	Siaya	42	67
Makueni	31	48	Kisumu	39	63
Nyandarua	30	47	Homa Bay	58	92
Nyeri	28	42	Migori	67	107
Kirinyaga	24	39	Kisii	26	42
Murang'a	31	47	Nyamira	27	44
Kiambu	19	31	Nairobi	36	58

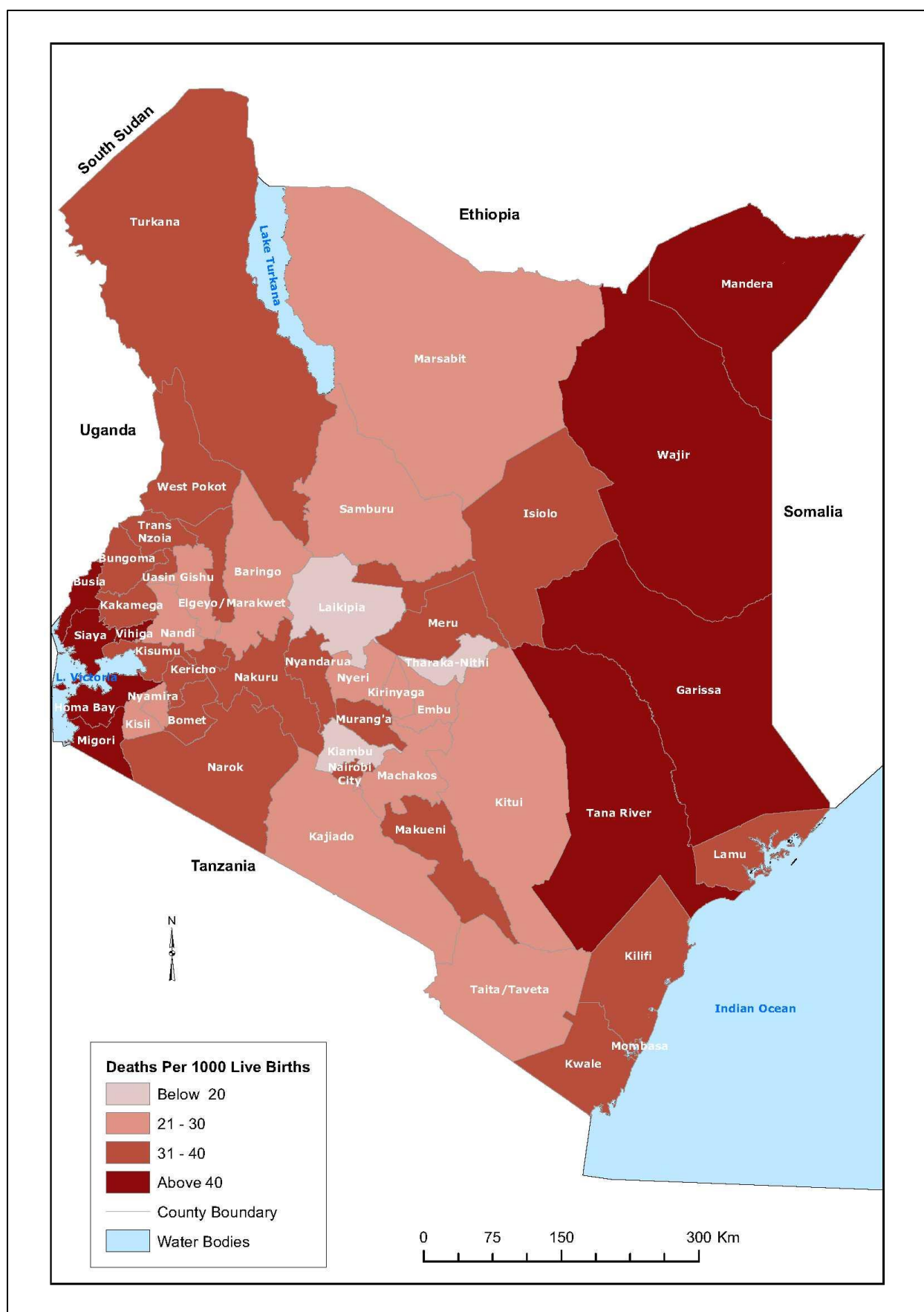


Figure 3.3: Differentials in Infant Mortality by County, 2019

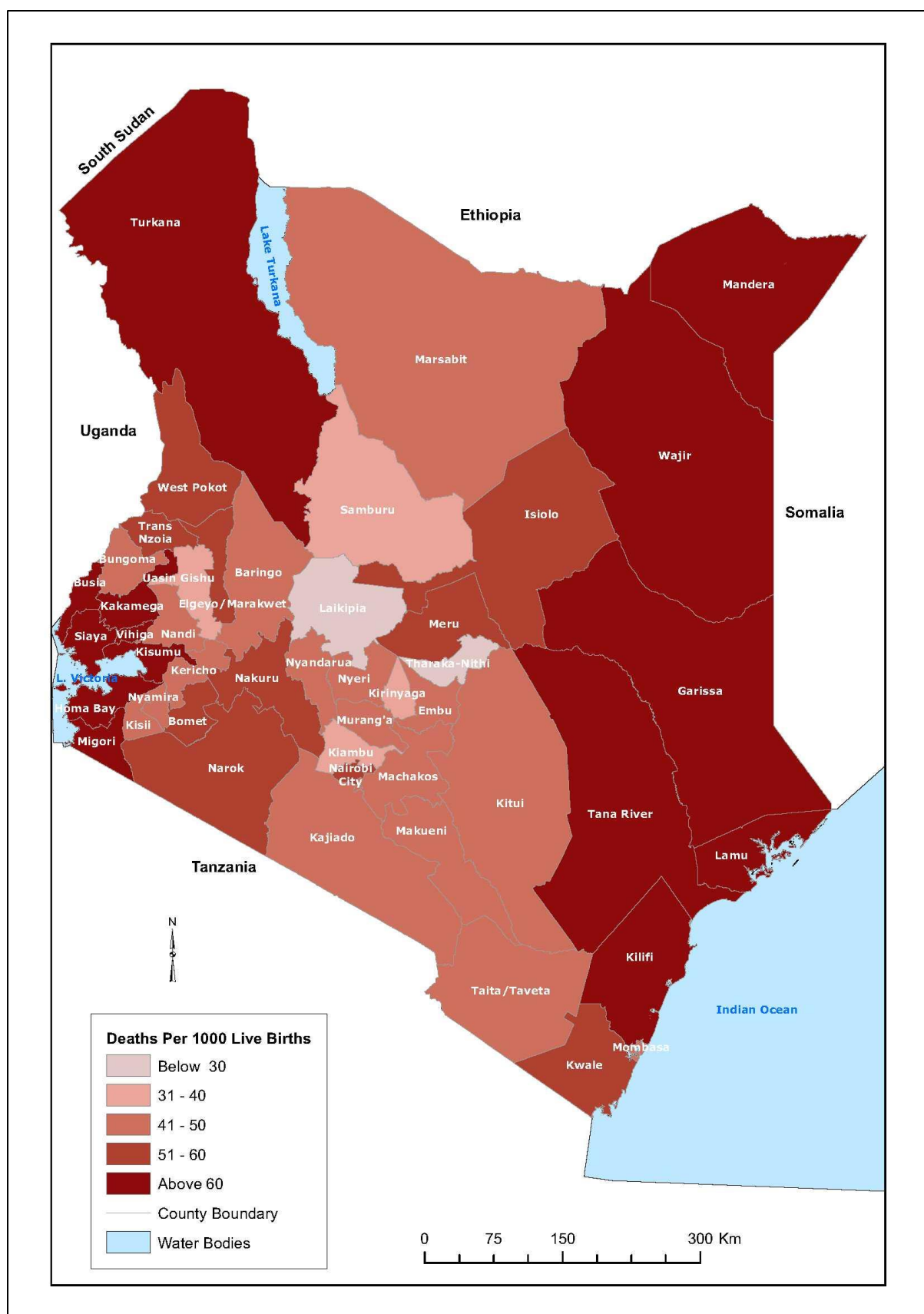


Figure 3.4: Differential in Under-Five Mortality by County, 2019

3.8. Life Expectancy at Birth, 2019

The expectation of life at birth, like infant mortality, is an indicator of well-being as a result of improvements in health status and general standards of living. It varies between males and females with that of females being slightly higher than that of males.

Table 3.6 presents the expectation of life at birth denoted by e_0 and it represent mortality at adulthood and old age. The estimates from the 2019 census gives the life expectancy at birth as 60.0 for males and 66.3 for females at national level; 60.3 for males and 66.2 for females in rural Kenya and 63.0 for males and 68.6 for females in urban Kenya. In general, females live longer than males. However, in Isiolo county, the results indicate that males within the county live longer than the females. Compared to 2009 census, all the counties recorded higher life expectancies and were above 50 years for both sexes. The lowest life expectancies at birth for males was in Homabay and Migori counties with 50.5 years while for females was in Tana River, Kilifi and Isiolo with 58.6, 59.2 and 59.6 years, respectively. Females in Nyeri, Kiambu and Laikipia, Uasin Gishu and Mombasa counties had the highest life expectancies of 75.8, 72.8, and 71.9 years respectively.

Table 3.8: Life Expectancy at Birth, 2019

COUNTY/ RESIDEN CE	LIFE EXPECTAN CY (Male)- (Years)	LIFE EXPECTAN CY (Female)- (Years)	Ratio Male to Fema le	COUNTY	LIFE EXPECTAN CY (Male)- (Years)	LIFE EXPECTAN CY (Female)- (Years)	Ratio Male to Fema le
Kenya	60.6	66.5	90.6	Turkana	56.0	60.1	93.2
Rural	60.3	66.2	91.1	West Pokot	57.6	61.1	94.3
Urban	63.0	68.6	91.8	Samburu	58.5	67.4	86.8
Mombasa	65.7	71.1	92.4	Trans Nzoia	64.4	67.9	94.8
Kwale	58.2	60.7	95.9	Uasin Gishu	63.6	71.7	88.7
Kilifi	57.8	59.2	97.6	Elgeyo	57.9	62.5	92.6
Tana River	56.2	58.6	95.9	Marakwet	60.0	70.4	85.2
Lamu	64.1	68.9	93.1	Nandi	65.4	68.9	94.9
Taita				Baringo			
Taveta	61.2	69.2	88.6	Laikipia	59.2	71.9	82.3
Garissa	57.4	60.5	94.9	Nakuru	58.3	69.1	84.3
Wajir	56.7	62.0	91.5	Narok	57.8	61.9	93.4
Mandera	57.3	60.5	94.7	Kajiado	57.8	63.5	91.0
Marsabit	58.0	62.6	92.7	Kericho	58.1	62.9	92.4
Isiolo	60.1	59.6	100.9	Bomet	58.1	63.6	91.4
Meru	62.2	68.2	91.1	Kakamega	63.4	66.1	95.8
Tharaka-				Vihiga	59.8	62.1	96.2
Nithi	63.8	70.3	90.7	Bungoma	65.5	68.2	96.0
Embu	58.7	70.1	83.7	Busia	62.3	66.2	94.1
Kitui	55.7	68.8	81.0	Siaya	53.4	61.6	86.7
Machakos	57.9	63.9	90.6	Kisumu	54.0	63.2	85.4
Makueni	58.1	62.4	93.1	Homa Bay	50.5	60.2	83.8
Nyandarua	58.0	63.2	91.8	Migori	50.5	60.6	83.3
Nyeri	66.4	75.8	87.6	Kisii	56.1	66.9	83.8
Kirinyaga	59.9	71.1	84.3	Nyamira	55.3	66.2	83.6
Murang'a	58.1	64.6	89.9	Nairobi	62.6	65.2	96.0
Kiambu	60.8	72.8	83.5				

Chapter 4: Adult Mortality

4.1. Introduction

The launch of the 17 Sustainable Development Goals (SDGs) in 2016 introduced a new era for the global health and development community. The new goals, which apply to all countries and run to 2030, include one health goal, SDG 3 — to “ensure healthy lives and promote wellbeing for all at all ages”. Adult mortality is an important development and public health issue. In the last decade the disease burden from non-communicable diseases among adults - the most economically productive age span has been rapidly increasing in developing countries due to ageing and health transitions. The level of adult mortality is also an important indicator for the comprehensive assessment of the mortality pattern in a population. Thus comprehensive and reliable information on adult mortality is required to improve policies implementation, monitoring and evaluation of national programmes of a country.

Adult mortality can be estimated using either questions on household deaths in the recent past, usually last 12 months or questions on the survival status of parents of respondents. However, as reported in chapter two, on household deaths in the last 12 months prior to the census, it was noted that household deaths were under reported. This chapter therefore presents levels and differentials in adult mortality using parental survival often referred to as the orphanhood method.

4.2. Orphanhood Method

The orphanhood method which was first proposed by Brass and Hill (1973) is one of the techniques used for indirect estimation of adult mortality in developing countries. In Kenya, the method has been used since 1989 census. The method is based on reported proportions of respondents whose mothers and fathers are still alive based on the fact that the respondent's mother or father must have been alive at the time of birth of the respondent. The orphanhood method offers an important opportunity to estimate adult mortality because questions about parental survival are well understood by respondents and are answered accurately (Timæus 1991a). The method does not require detailed information on the ages and dates at which people died. The orphanhood method can be used in much smaller samples unlike questions about household deaths which require unusually large surveys can capture information on household deaths in a year to yield reliable mortality estimates. The method is also based on reliable information that is simple to collect from two questions on the survivorship of the respondent's biological mother and father. The 2019 KPHC, like the previous censuses, asked questions on the survival status of every respondent's biological mother and father to estimate adult mortality.

It measures the life table survivorship using weighting factors whose values depend on the mean age of childbearing (United Nations, 1983) by relating the proportion of respondents with living mothers or fathers in two adjacent age groups. The duration over which they have been exposed to the risk of dying approximates the age of the respondents. Using the mean age at which the mothers gave birth to control for variations in duration of exposure to the risk of dying by age, it is possible to estimate the life table survivorship probability from age 25 to age 25 plus the number of years (n) (i.e $25+n$) based on the age group of the respondents (i.e l_{25+n}/l_{25}) from the proportion of respondents in each age group whose mother is alive. Similarly, by adjusting for the mean age at which fathers have children, one can predict life table survivorship probabilities of adult males from the proportions of respondents with living fathers. Since males tend to be older

than their female counterparts at the time of birth of their children, their survivorship is measured between a base age of 35 and 35+n, where n is again linked to the age of the respondents. If mortality has changed over time, the estimated survivorship probabilities reflect the mortality rates that prevailed at a range of ages and dates.

The input data required for the orphanhood method include number of respondents with mother/father alive classified by a 5-year age group and by sex, number of respondents who stated that they don't know whether their mother or father was alive by 5-year age group by sex, and total number of respondents classified by 5-year age group by sex. The proportion of respondents who stated that they don't know whether their mother or father was alive should be excluded from the analysis.

Since respondents' mothers must have been alive when the respondents were born, their risk of dying is equal to the duration over which the respondents have been exposed which is their age. Hence, the survivorship of mothers is computed by considering the mean age at which the mothers gave birth in the concerned population to predict life table survivorship probabilities from age 25 to 25+n based on the age group of the respondents using the following equation (United Nations 1983):

$$l_{25+n}/l_{25} = W(n) (S_{n-5}) + (1-W(n)) S(n)$$

where $S(n)$ is the proportion of respondents aged from n to $n + 4$ who declared that their mothers were alive at the time of the interview; and $W(n)$ is the weighting factor. The weighting factors ($W(n)$) are obtained by linear interpolation after locating the computed mean age for the mother from the tables of weighting factors for conversion of proportions of respondents with mother alive into survivorship probabilities (United Nations, 1983).

Similarly, the survivorship of fathers is computed by adjusting the mean age at which fathers have children from age 25 to 35 because men are usually older than women at the birth of their children (United Nations 1983). So their survivorship is measured between a base age of 35 and age 35+n in the equation,

$$l_{35+n}/l_{35} = W(n) (S_{n-5}) + (1-W(n)) S(n),$$

where n is linked to the age group of the respondents.

Input data for

a) Maternal

- i. Proportion of respondents whose mother was alive by five-year age groups excluding those who did not know or did not declare their mother's survival status.
- ii. The number of births in the last 12 months by five-year age groups.
- iii. The mean age at childbearing of females denoted as M^f .

b) Paternal

- i. Proportion of respondents whose father was alive by five-year age groups excluding those who did not know or did not declare their father's survival status.

- ii. The mean age of childbearing for males is estimated by adding an index of the difference between the ages of males and females who are having children to the mean age of childbearing of women. This is denoted as $M^m = M^f + d$.

These conditional survivorship ratios are converted to estimates of the level of mortality for males and females separately. The orphan hood method yields the estimates that are, on average, most consistent with the life table estimates of $_{45}q_{15}$ (the probability of surviving between age 15 and 60 having reached age 15). The levels of adult mortality were estimated using, the excel spread sheets described in <http://demographicestimation.iussp.org/content/indirect-estimation-orphanhood-multiple-inquiries>. The version of one census method was used at national level, rural and urban residence and for all the counties except for Nyeri County where the version of two censuses, i.e. 2009 and 2019, to compute parental survivorship was used.

4.2.1 Assumptions of the orphanhood method

The following assumptions are made when computing adult mortality using the orphanhood data:

- i. Orphanhood status is accurately reported by respondents;
- ii. The survival of a parent is assumed to be independent of the survival of their children;
- iii. The age distribution of parents is assumed to be approximately stable;
- iv. The age pattern of mortality for the population being studied can be approximated by standard model life tables.
- v. The probability of a parent's survival status being reported by a single surviving child is independent of the number of children the parent is survived by, and
- vi. The survivorship statistics can be accurately located in calendar time (Timaeus et al., 2001).

4.2.2 Limitations of the orphanhood method

Data on parents' survival can only be collected from their children who are alive themselves. "Survivorship bias effects" associated with the orphanhood method occur as the survival of adults who have no living children is unrepresented in the reported proportions of parents alive (Hill and Trussell, 1977). Furthermore, parents who have more than one surviving child are over-represented compared to those with one surviving child. Thus, the method only produces unbiased results if the mortality of parents is unrelated to how many of their children are alive at the time that the data are collected. There is also a possibility of the respondents not knowing the survivorship of their parents.

Reporting adopting parents as biological parents (whether consciously or not), tends to introduce an upward bias of the estimated survivorship of parents. The orphanhood method can only provide broad measures of the overall levels of adult mortality since it is unable to detect short term trends or abnormal age patterns of mortality within adulthood (Timæus, 1991a; 2013c).

The method also yields mortality estimates that refer to dates before the census or survey was conducted. Therefore, orphanhood method estimates of adult mortality represent averages of mortality experienced over the period that parents of respondents were exposed to the risk of dying. The method produces measures that refer further back in time compared to direct measures. It assumes a broad trend of mortality over approximately 10 to 15 years preceding the survey or census.

4.3. Adult Mortality

The estimated results are presented in Table 4.1 for males and Table 4.2 for females. Two indicators are used namely probability of dying between age 15 and 45 having reached age 15 (45q15) and probability of dying between age 60 and 80 having reached age 60 (20q60). The indicator 45q15 measures premature adult mortality. Premature adult mortality is an important indicator because the death of an individual in early and middle adulthood is an untimely event whose tragic effects are experienced by the parents, siblings, partners, children 1-3 and friends of the deceased individual. The indicator 20q60 measure old age mortality.

For every 1, 000 males reaching age 15, about 341 do not reach their 60th birthday. Similarly, for every 1000 females reaching age 15, 212 do not reach age 60. For every 1, 000 males age 60, 739 are expected not to reach age 80 whereas females age 60, about 609 do not reach their 80th birthday. The results are consistent with the fact that men have a higher mortality than females in adulthood.

There are high discrepancies of adult mortality across the counties. Counties with highest adult mortality for men are; Homa Bay, Narok, Siaya, Nyamira, and Kisumu whereas counties with lowest adult mortality are; Mombasa, Lamu, Bungoma, Nyeri and Baringo.

Caution should be taken for the high male adult mortality in central Kenya. This may be due to the high number of respondents from single mothers who reported their fathers to be dead and that was not so or reported not to know whether the father is alive or not. Similarly, caution should be taken for counties with higher female than male adult mortality which may be an indication of errors in reporting by age. They include Isiolo, Tana River, Garissa, Wajir and Mandera.

Table 4.1(a): Adult and Old Age Mortality for Males by Residence and County, 2019

County	q(15,45)	q(60,20)	County	q(15,45)	q(60,20)
Kenya	340.7	739.3	Turkana	408.9	724.9
Rural	356.4	725.6	West Pokot	399.0	743.1
Urban	288.5	690.9	Samburu	398.8	720.0
Mombasa	212.2	580.2	Trans-Nzoia	240.9	610.5
Kwale	400.3	743.6	Uasin Gishu	273.9	640.1
Kilifi	397.2	742.4	Elgeyo marakwet	412.2	748.1
Tana River	407.3	746.5	Nandi	351.5	694.4
Lamu	213.5	581.7	Baringo	226.5	595.9
Taita Taveta	321.2	675.4	Laikipia	396.8	719.0
Garissa	393.4	741.1	Nakuru	373.9	707.1
Wajir	400.3	743.9	Narok	490.9	758.9
Mandera	396.4	742.2	Kajiado	428.2	754.2
Marsabit	396.5	718.9	Kericho	414.2	749.0
Isiolo	319.7	674.3	Bomet	400.5	743.6
Meru	277.6	643.1	Kakamega	242.6	612.1
Tharaka-Nithi	289.8	652.8	Vihiga	314.0	670.5
Embu	380.8	710.9	Bungoma	219.2	587.9
Kitui	452.6	744.2	Busia	256.7	625.2
Machakos	429.3	754.7	Siaya	462.9	748.3
Makueni	418.3	750.6	Kisumu	457.9	746.3
Nyandarua	420.3	751.3	Homa Bay	490.9	758.9
Nyeri	464.7	749.0	Migori	457.4	746.1
Kirinyaga	364.4	701.9	Kisii	442.2	739.8
Murang'a	409.4	747.1	Nyamira	460.4	747.3
Kiambu	356.0	697.1	Nairobi	265.8	633.2

Table 4.1b: Adult and Old Age Mortality for Females by Residence and County, 2019

County	q(15,45)	q(60,20)	County	q(15,45)	q(60,20)
Kenya	211.7	608.5	Turkana	329.6	676.3
Rural	223.1	581.3	West Pokot	346.5	638.9
Urban	178.3	548.2	Samburu	208.7	571.0
Mombasa	138.8	470.1	Trans-Nzoia	185.3	541.8
Kwale	352.5	642.3	Uasin Gishu	140.4	473.0
Kili?	373.4	653.1	Elgeyo marakwet	324.7	627.2
Tana River	377.5	579.6	Nandi	155.3	498.1
Lamu	171.2	522.4	Baringo	188.0	545.4
Taita Taveta	179.3	533.8	Laikipia	151.7	492.3
Garissa	347.5	642.9	Nakuru	163.2	510.4
Wajir	330.7	631.0	Narok	334.6	632.5
Mandera	352.6	643.4	Kajiado	309.6	617.9
Marsabit	311.2	663.9	Kericho	318.6	623.3
Isiolo	356.5	692.9	Bomet	306.7	616.7
Meru	180.7	535.7	Kakamega	209.1	571.5
Tharaka-Nithi	175.3	528.3	Vihiga	254.6	618.3
Embu	162.1	508.8	Bungoma	184.8	541.3
Kitui	190.0	548.1	Busia	198.5	558.7
Machakos	301.7	613.6	Siaya	292.5	650.1
Makueni	326.6	628.1	Kisumu	262.8	625.7
Nyandarua	313.7	620.5	Homa Bay	283.9	643.4
Nyeri	77.0	496.6	Migori	256.5	620.1
Kirinyaga	146.2	483.0	Kisii	221.2	585.1
Murang'a	288.7	605.8	Nyamira	229.9	594.4
Kiambu	131.7	457.1	Nairobi	229.9	594.4

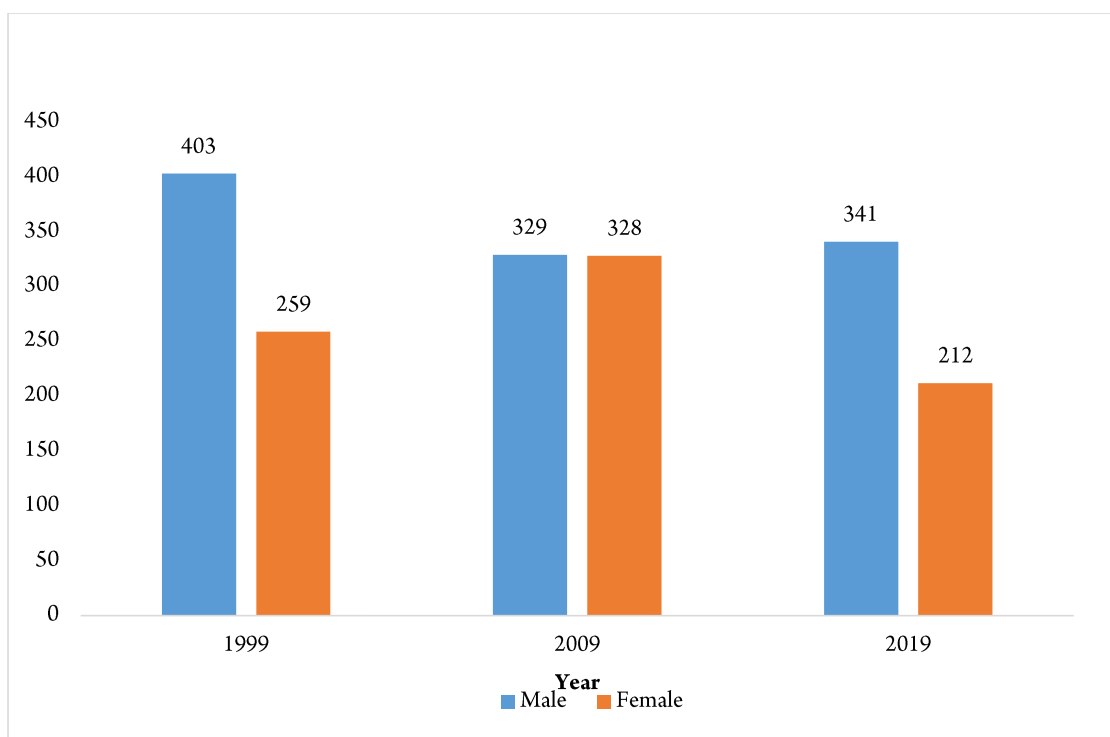


Figure 4.1: Levels of Adult Mortality Rate by Sex, 1999 – 2019

The estimates of adult mortality for the period 1999–2019 are compared in figure 4.1. This reveals rising levels of male adult mortality in 2019 after experiencing a decline in 2009. On the contrary, female adult mortality was high in 2009 but declined in 2019.

4.4. Expectation of life at age 60 and 70 years

Another indicator that summarizes adult mortality levels is expectation of life at age 60 and 70. Expectation of life at these ages is the average number of years that a person who has attained age 60/70 is expected to live, assuming that age-specific mortality levels remain constant.

The number of survivors and the length of survival at old ages has increased due to improved living conditions. The formal age for retirement and access to social protection funds for the elderly in Kenya is 60 and 70 years respectively. Therefore, increase in expectation of life has implications on Government expenditure on pensioners, health care services and social protection funds for the elderly.

Nationally, females have a higher expectation of life after attaining age 60 and 70 years. Expectation of life at age 60 is 14.2 years for males and 17.2 years for females. The average number of years a male and a female is expected to live after attaining 70 years is 9.3 and 10.8 years respectively. The gap in expectation of life at age 60 is narrow when compared to that at birth.

The difference in survivorship after attaining age 60 for males and females living in rural and urban areas is about one year. However, after attaining age 70, the gap widens by almost five years for males and six years for females in favour of those residing in rural areas.

As shown in Table 4.2, expectation of life at age 60 for males was highest in Mombasa, Lamu, Bungoma, Baringo Kakamega and Trans Nzoia counties and lowest in Machakos, Homa Bay, Kajiado, Makueni and Nyandarua. For females, Nyeri, Kiambu, Mombasa, Uasin Gishu, Kirinyaga, Nandi and Laikipia counties have the highest expectation of life at age 60; while Isiolo,

Turkana, Kilifi and Tana River have the lowest. The difference between the county with the highest and lowest life expectancy at age 60 among males and females is 4.0 and 6.8 years respectively. Across the counties, males are expected to live for 9 to 10 years while females are expected to live for 11 to 12 years after attaining age 70.

Table 4.2: Life Expectancy at Ages 60 and 70 by Sex, Residence and County, 2019

County	e60		e70		County	e60		e70	
	Male	Female	Male	Female		Male	Female	Male	Female
Kenya	14.2	17.2	9.3	10.8	Turkana	14.5	15.7	9.3	9.9
Rural	14.5	17.7	9.3	11.2	West Pokot	14.1	16.3	9.0	10.6
Urban	15.3	18.4	9.7	11.6	Samburu	14.7	18.0	9.4	11.1
Mombasa	17.7	20.0	11.0	12.4	Trans-Nzoia	17.1	18.6	10.6	11.5
Kwale	14.0	16.2	9.0	10.6	Uasin Gishu	16.5	19.9	10.3	12.3
Kilifi	14.1	15.9	9.0	10.4	Elgeyo marakwet	13.9	16.5	9.0	10.8
Tana River	14.0	15.9	8.9	10.4	Nandi	15.3	19.4	9.6	12.0
Lamu	17.7	18.9	10.9	11.7	Baringo	17.4	18.5	10.8	11.4
Taita Taveta	15.7	18.7	9.9	11.6	Laikipia	14.7	19.5	9.3	12.1
Garissa	14.1	16.2	9.0	10.6	Nakuru	15.0	19.2	9.5	11.9
Wajir	14.1	16.4	9.0	10.7	Narok	14.1	16.4	9.0	10.7
Mandera	14.1	16.2	9.0	10.6	Kajiado	13.7	16.7	8.9	10.9
Marsabit	14.7	16.0	9.4	10.0	Kericho	13.9	16.6	9.0	10.9
Isiolo	15.7	15.4	9.9	9.7	Bomet	14.0	16.8	9.0	11.0
Meru	16.4	18.7	10.2	11.5	Kakamega	17.1	18.0	10.6	11.1
Tharaka-Nithi	16.2	18.8	10.1	11.6	Vihiga	15.8	17.0	9.9	10.6
Embu	14.9	19.2	9.5	11.9	Bungoma	17.6	18.6	10.9	11.5
Kitui	14.1	18.4	9.1	11.4	Busia	16.8	18.2	10.4	11.3
Machakos	13.7	16.8	8.9	11.0	Siaya	13.9	16.3	9.0	10.2
Makueni	13.8	16.5	9.0	10.8	Kisumu	14.0	16.8	9.1	10.5
Nyandarua	13.8	16.6	9.0	10.9	Homa Bay	13.7	16.5	8.9	10.3
Nyeri	16.3	22.2	10.3	14.0	Migori	14.0	17.0	9.1	10.5
Kirinyaga	15.1	19.7	9.6	12.2	Kisii	14.2	17.7	9.1	10.9
Murang'a	13.9	17.0	9.0	11.0	Nyamira	14.0	17.5	9.0	10.8
Kiambu	15.2	20.2	9.6	12.5	Nairobi	16.6	17.5	10.3	10.8

Table 4.3 shows the population that is above 60 and 70 years and above. The information will help the Government with the number of persons who are eligible to benefit from the pension and social protection for the elderly to shield them from poverty, economic hardship and social exclusion. Nationally, a total of 2,740,040 persons aged above 60 is expected to live for about 14.2 and 17.2 years for male and female, respectively. Similarly, a total population of 1,212,151 that is aged 70 years is expected to live for about 9.3 and 10.8 years for man and women, respectively. A significant proportion of the population aged above 60 years (83.6 per cent) and above 70 years (86.6 per cent) live in rural areas.

Table 4.3: Population above 60 and 70 years

County	Population 60+			Population 70+			County	Population 60+			Population 70+		
	Total	Male	Female	Total	Male	Female		Total	Male	Female	Total	Male	Female
Kenya	2,740,040	5.3	6.2	1,212,151	2.2	2.9	Turkana	35,011	3.2	4.3	15,117	1.4	1.9
Rural	2,289,405	6.3	7.7	1,049,212	2.7	3.7	West Pokot	26,100	3.7	4.7	11,108	1.5	2.0
Urban	450,635	3.0	3.0	162,939	1.0	1.2	Samburu	13,895	4.1	4.9	6,484	1.9	2.3
Mombasa	38,916	3.2	3.2	12,647	0.9	1.2	Trans Nzoia	52,250	5.0	5.5	21,687	2.0	2.4
Kwale	49,989	5.4	6.1	20,177	2.1	2.5	Uasin Gishu	51,573	4.2	4.6	21,955	1.7	2.1
Kilifi	85,457	5.1	6.6	34,543	2.0	2.7	Elgeyo-Marakwet	27,298	5.6	6.4	12,585	2.4	3.2
Tana River	15,400	4.8	5.0	6,185	1.9	2.0	Nandi	51,996	5.6	6.1	23,313	2.4	2.8
Lamu	8,680	5.8	6.2	3,507	2.3	2.6	Baringo	36,976	5.2	5.9	16,848	2.2	2.8
Taita-Taveta	28,803	7.7	9.3	12,502	3.0	4.3	Laikipia	35,799	6.4	7.4	16,670	2.9	3.5
Garissa	23,798	3.0	2.6	9,583	1.2	1.1	Nakuru	107,340	4.7	5.2	46,953	1.9	2.4
Wajir	19,671	3.0	2.0	7,886	1.1	0.9	Narok	42,425	3.5	3.8	18,411	1.5	1.7
Mandera	20,455	2.8	2.0	8,822	1.2	0.9	Kajiado	37,658	3.3	3.4	15,012	1.2	1.5
Marsabit	20,487	4.4	4.5	9,873	2.1	2.2	Kericho	48,807	5.2	5.6	21,116	2.1	2.6
Isiolo	12,511	4.7	4.6	5,500	1.9	2.2	Bomet	45,940	4.8	5.7	21,149	2.0	2.8
Meru	122,623	7.2	8.7	57,267	3.1	4.3	Kakamega	128,210	6.3	7.3	54,199	2.6	3.2
Tharaka-Nithi	39,016	9.1	10.7	18,718	4.0	5.5	Vihiga	62,277	9.8	11.3	29,192	4.4	5.4
Embu	53,940	7.8	9.9	25,415	3.3	5.1	Bungoma	90,886	5.0	5.9	38,402	2.0	2.6
Kitui	96,759	7.6	9.4	49,134	3.6	5.0	Busia	56,431	5.6	7.0	25,105	2.4	3.2
Machakos	116,238	7.3	9.1	51,435	2.9	4.3	Siaya	83,174	6.8	9.8	39,085	3.1	4.7
Makueni	93,504	8.3	10.6	43,687	3.6	5.2	Kisumu	66,268	5.1	6.4	28,013	2.1	2.8
Nyandarua	49,968	7.1	8.5	24,598	3.2	4.5	Homabay	71,166	5.4	7.1	32,025	2.3	3.3
Nyeri	81,959	9.7	11.9	42,273	4.6	6.5	Migori	53,210	4.1	5.3	23,152	1.7	2.4
Kirinyaga	55,541	8.1	10.1	26,244	3.3	5.2	Kisii	88,126	6.5	7.4	35,892	2.5	3.1
Murang'a	120,050	10.1	12.6	61,403	4.7	6.9	Nyamira	46,371	7.4	7.9	19,492	3.0	3.4
Kiambu	125,002	4.8	5.5	56,052	1.9	2.7	Nairobi City	102,086	2.5	2.2	31,735	0.7	0.8

Chapter 5: Life Tables

5.1. Introduction

A life table provides a summary measure of the lifetime mortality experience of a population from the birth of a cohort till its end. It gives a snapshot of mortality indicators from childhood to adulthood. These measures include infant and under five mortality, probability of dying between ages 15 and 60 (or between any given ages) and life expectancies at birth, age 15, age 60, age 80 etc.

Based on observations made on the data quality and level of completeness in deaths reporting in chapter 2 and the implausible mortality estimates obtained from both direct and indirect methods, it became necessary to use an alternative method to estimate mortality indicators from the 2019 census data. However, to produce the life table requires input from both child mortality and adult mortality. Even though indirect methods gave implausible results especially for childhood mortality, indirect methods used to estimate adult mortality were found to be reasonable. We thus, used these estimates together with childhood mortality estimates (USMR) from other sources to generate life tables.

5.2. Methodology

There are four methods for fitting model life tables to a pair of estimates of childhood mortality (${}_5q_0$) and adult mortality (${}_{45}q_{15}$) for males and females in both cases respectively. The methods are the splicing method, the Brass-logit method, the modified logit and the Log-quadratic method. The modified logit method was employed in this analysis at national, and for some 19 counties, while the splicing technique was applied for rural, urban and the remaining 28 county levels.

After assessing the models that best fits the mortality pattern for Kenya, the Princeton North model from the Coale-Demeny Life Tables was found to be the most suitable for most counties and the UN for a few of the counties. Inputs for generating life tables were obtained by using both the splicing and modified logit methods. These provided age-specific mortality rates that were run on the mortpak package from which summary measures of mortality were derived. This was occasioned by one, poor data quality and underreporting of deaths assessed from the deaths data on recent deaths and secondly, by the implausible results so obtained. The final results were extracted from the life tables constructed at national, rural/urban and county levels.

Table 5.1 shows a summary by sex, of mortality indicators generated from the 2019 census data using the four methods, at national level

Table 5.1: Mortality Summary Indicators

Summary indicators								
	Males					Females		
	Splicing	Brass logit	Modified logit	Log-quadratic		Splicing	Brass logit	Modified logit
e_0	61	63.2	61.3	60.6		67.6	69.1	68.3
${}_1q_0$	0.0351	0.032	0.0355	0.0388		0.0264	0.0244	0.0269
$l(15)$	0.945	0.9427	0.9429	0.9408		0.9536	0.9523	0.9512
${}_{20}q_{60}$	0.7416	0.7922	0.7198	0.7467		0.6005	0.6106	0.5583
								0.5834

For males, life expectancy at birth (e_0) ranges from 60.6 years and 63.2 years, while for females it lies between 67.5 and 69.1 years. These figures were comparable with those in the WHO Kenya Life Table Report, for 2016 and 2017. Similar comparisons were made for infant mortality (IMR), showing reasonable agreement.

In this report, both the splicing and modified logit methods were adopted to generate central death rate values (${}_nM_x$) used as part of inputs for generating life tables for males and females.

5.2.1 The Splicing method

The Splicing method is the simplest of the four methods. It fits a single life table to the estimates of child and adult mortality provided as inputs using an appropriately-selected standard life table. The method combines two different 1-parameter model life tables, one for children that exactly fits the observed measure of under-five mortality (${}_5q_0$) and one for adults that exactly fits the observed index of conditional survivorship in adulthood (e.g., ${}_{45}q_{15}$ or ${}_{35}q_{15}$).

The model life tables for adults and children are spliced together at a boundary age of 15 years. This age is close to the age at which mortality reaches its minimum in most life tables. Thus, each of the two models represents one arm of the age-specific mortality schedule. Moreover, exact age 15 is conventionally taken to represent the dividing point between child and adult mortality

From these Life Tables, mortality indicators: - IMR, e_0 , ${}_{45}q_{15}$, ${}_{20}q_{60}$ were extracted as presented in chapters 3 and 4. Further details of the Life Tables produced for Kenya, rural, urban and the 47 counties are presented in Appendix the appendices of this report. The estimates are then presented at national, rural, urban and County levels.

5.2.2 Mortality Indicators from Other Sources

A comparison of mortality indicators IMR, USMR, e_0 and ${}_{20}q_{60}$ at national level estimated from other external sources and internal surveys is presented in the recent past is presented in Table 5.2.

Table 5.2: Summary Mortality Indicators from other Sources

	Males							Females							2014 KDHS (Both Sexes)
	2009 Cens us	WH O (201 7)	IGM E (201 8)	Splici ng	Brass logit	Modifie d logit	Log- quadrat ic	2009 Cens us	WH O (201 7)	IGM E (201 8)	Splici ng	Brass logit	Modifi ed logit	Log- quadratic	
IMR	60.0	39.5	33.7	35.1	32.0	35.5	38.8	48.0	33.0	27.4	26.4	24.4	26.9	31.8	39.0
US MR	87.0	54.4	44.7	48.0	48.0	48.0	48.0	79.0	46.8	37.4	40.0	40.0	40.0	40.0	52.0
e_0	58.0	64.6		61.0	63.2	61.3	60.6	61.0	69.1		67.6	69.1	68.3	67.5	
CD R															

5.3. Summary Indicators Derived from Life Tables

Table 5.3a summarizes key mortality indicators derived from the life tables for Kenya, by sex and place of residence. These are the life expectancy at birth, probability of dying between ages 15 and 60, ages 60 and 80 and the crude deaths rates at national, rural and urban levels.

Table 5.3a: Summary Indicators from the Life Table National, Rural and Urban by Sex

COUNTRY/ RURAL/ URBAN	LIFE EXPECTANCY (Male)-(Years)	LIFE EXPECTANCY (Female)- (Years)	ADULT MORTALITY - MALE (Probability of Dying between ages 15 and 60) per 1000	ADULT MORTALITY - FEMALE (Probability of Dying between ages 15 and 60) per 1000	ADULT MORTALITY - MALE (Probability of Dying between ages 60 and 80) per 1000	ADULT MORTALITY - FEMALE (Probability of Dying between ages 60 and 80) per 1000	CDR (Per 1,000)
Kenya	60.6	66.5	341	212	739	609	10.5
Rural	60.3	66.2	356	223	726	581	10
Urban	63	68.6	289	178	691	548	6.5

Table 5.3b shows probabilities of dying between exact ages 0 and 5, 15 and 35, 15 and 50, 30 to 70; and 60 and 80 by sex for Kenya and rural-urban areas of residence, derived from the life tables. Generally, the probabilities of dying are higher for males than females at all ages.

Table 5.3b Summary Indicators from the Life Table National, Rural and Urban by Sex

	Male					
	q(0,5)	q(15,20)	q(15,35)	q(15,45)	q(30,40)	q(60,20)
Kenya	0.0530	0.0715	0.1869	0.3407	0.5562	0.7393
Rural	0.0522	0.1130	0.2292	0.3569	0.5165	0.6976
Urban	0.0502	0.0852	0.1787	0.2887	0.4442	0.6520
	Female					
	q(0,5)	q(15,20)	q(15,35)	q(15,45)	q(30,40)	q(60,20)
Kenya	0.0493	0.0472	0.1170	0.2119	0.3767	0.6087
Rural	0.0504	0.6276	0.1381	0.2232	0.3615	0.5873
Urban	0.0484	0.0481	0.1079	0.1783	0.3018	0.5323

5.3.1 Life Expectancy (at Birth)

As shown in Table 5.3a, nationally females have a higher life expectancy than males at 67 years compared 61 years for males. However, for both sexes, this is an improvement from the levels observed 10 years ago, in the 2009 KPHC. The top ten counties with the highest and lowest life expectancies at birth, for both sexes, are shown in tables 5.4a and 5.4b respectively. Nyeri County is leading with an average life expectancy of 71 years while Homa Bay has the least with a life expectancy of 55 years. Table 5.4c shows the male female differentials in life expectancy for Kenya, rural-urban residence and by county.

Table 5.4a: Counties with Highest Life expectancies at birth (in years)

COUNTY	Both Sexes
Nyeri	71.1
Mombasa	68.4
Uasin Gishu	67.7
Baringo	67.2
Tharaka-Nithi	67.1
Bungoma	66.9
Kiambu	66.8
Lamu	66.5
Trans Nzoia	66.2
Laikipia	65.6

Table 5.4b: Counties with Lowest life expectancies at birth (in years)

COUNTY	Both Sexes
Homa Bay	55.4
Migori	55.6
Tana River	57.4
Siaya	57.5
Turkana	58.0
Kilifi	58.5
Kisumu	58.6
Mandera	58.9
Garissa	59.0
Wajir	59.4

Table 5.4c: Life Expectancy at Birth by Sex and County, 2019

COUNTY/RURAL/ URBAN	LIFE EXPECTANCY (Male)-(Years)	LIFE EXPECTANCY (Female)- (Years)	COUNTY/RURAL/ URBAN	LIFE EXPECTANCY (Male)-(Years)	LIFE EXPECTANCY (Female)- (Years)
Kenya	60.6	66.5	Turkana	55.9	60
Rural	60.3	66.2	West Pokot	57.6	61.1
Urban	63	68.6	Samburu	58.5	67.4
Mombasa	65.7	71.1	Trans Nzoia	64.4	67.9
Kwale	58.2	60.7	Uasin Gishu	63.6	71.7
Kilifi	57.8	59.2	Elgeyo Marakwet	57.9	62.5
Tana River	56.2	58.6	Nandi	60	70.4
Lamu	64.1	68.9	Baringo	65.4	68.9
Taita Taveta	61.2	69.2	Laikipia	59.2	71.9
Garissa	57.4	60.5	Nakuru	58.3	69.1
Wajir	56.7	62	Narok	57.8	61.9
Mandera	57.3	60.5	Kajiado	57.8	63.5
Marsabit	57.9	62.6	Kericho	58.1	62.9
Isiolo	60.1	59.6	Bomet	58.1	63.6
Meru	62.2	68.2	Kakamega	63.4	66.1
Tharaka-Nithi	63.8	70.3	Vihiga	59.8	62.1
Embu	58.7	70.1	Bungoma	65.5	68.2
Kitui	55.7	68.8	Busia	62.3	66.2
Machakos	57.9	63.9	Siaya	53.4	61.6
Makueni	58.1	62.4	Kisumu	54	63.1
Nyandarua	58	63.2	Homa Bay	50.5	60.2
Nyeri	66.4	75.8	Migori	50.5	60.6
Kirinyaga	59.9	71.1	Kisii	56.1	66.9
Murang'a	58.1	64.7	Nyamira	55.3	66.2
Kiambu	60.8	72.8	Nairobi	62.6	65.2

5.3.2 Life Table for Kenya, 2019

The probabilities of dying and life expectancy at exact ages zero to 100 years by 5-year age groups for Kenya is given in table 5.5.

Table 5.5: Life Table, Kenya, 2019

KENYA								
Age (x)	MALE				FEMALE			
	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0399	0.0385	100,000	60.6	0.0333	0.0324	100,000	66.5
1	0.0038	0.015	96,145	62	0.0044	0.0174	96,762	67.7
5	0.001	0.0049	94,705	58.9	0.001	0.0052	95,074	64.9
10	0.0007	0.0033	94,237	54.2	0.0006	0.0031	94,581	60.2
15	0.0025	0.0123	93,922	49.4	0.0016	0.008	94,283	55.4
20	0.0035	0.0175	92,768	44.9	0.0022	0.0109	93,532	50.8
25	0.004	0.02	91,145	40.7	0.0027	0.0132	92,508	46.4
30	0.0048	0.0237	89,321	36.5	0.0032	0.0159	91,290	41.9
35	0.0062	0.0306	87,207	32.3	0.0039	0.0194	89,837	37.6
40	0.0084	0.0414	84,539	28.2	0.0049	0.024	88,092	33.3
45	0.0119	0.0577	81,041	24.3	0.0064	0.0317	85,976	29
50	0.0171	0.0823	76,367	20.7	0.0091	0.0447	83,250	24.9
55	0.0247	0.1164	70,083	17.3	0.0135	0.0656	79,526	20.9
60	0.0362	0.1662	61,927	14.2	0.0207	0.0985	74,308	17.2
65	0.0525	0.2323	51,634	11.5	0.0324	0.1505	66,986	13.8
70	0.0743	0.313	39,640	9.3	0.0514	0.2287	56,902	10.8
75	0.1031	0.4072	27,233	7.3	0.0811	0.3375	43,887	8.2
80	0.1419	0.5154	16,143	5.7	0.1257	0.4745	29,075	6.2
85	0.2027	0.6484	7,822	4.3	0.1911	0.6275	15,278	4.5
90	0.2853	0.7748	2,750	3.3	0.2753	0.7626	5,691	3.4
95	0.4083	0.8844	619	2.4	0.3926	0.8749	1,351	2.5
100	0.5021	...	72	2	0.5591	...	169	1.8

5.3.3 Probability of Dying between Age 15 and 60 Years (per 1,000 population)

The probability of dying between age 15 and 60($_{45}q_{15}$), having reached age 15, is a measure of premature adult mortality.

Overall, for every 1,000 males who attains age 15, about 341 do not celebrate their 60th birthday. Similarly, for every 1,000 females who attains age 15, about 212 do not reach age 60.

There has been a decline in adult mortality nationally from 348 male and 313 female deaths per 1,000 male and females, respectively in 2009. Tables 5.6a and 5.6b show rankings of 10 counties with the highest and lowest early adult mortality probabilities per 1,000 population, respectively.

Table 5.6: Adult Mortality (Probability of dying between Age 15 and 60 years)

COUNTY/ RURAL/URBAN	Adult Mortality		COUNTY/ RURAL/URBAN	Adult Mortality	
	<i>(Probability of dying between Age 15 and 60) per 1,000 population</i>			<i>(Probability of dying between Age 15 and 60) per 1,000 population</i>	
	Male	Female		Male	Female
Kenya	0.341	0.212	Turkana	0.41	0.33
Rural	0.356	0.223	West Pokot	0.399	0.346
Urban	0.289	0.178	Samburu	0.399	0.209
Mombasa	0.212	0.139	Trans Nzoia	0.241	0.185
Kwale	0.4	0.352	Uasin Gishu	0.274	0.14
Kilifi	0.397	0.373	Elgeyo Marakwet	0.412	0.325
Tana River	0.407	0.377	Nandi	0.352	0.155
Lamu	0.214	0.171	Baringo	0.227	0.188
Taita Taveta	0.322	0.179	Laikipia	0.397	0.152
Garissa	0.393	0.348	Nakuru	0.374	0.163
Wajir	0.4	0.331	Narok	0.395	0.335
Mandera	0.396	0.353	Kajiado	0.428	0.31
Marsabit	0.397	0.312	Kericho	0.414	0.319
Isiolo	0.32	0.357	Bomet	0.4	0.307
Meru	0.278	0.181	Kakamega	0.243	0.209
Tharaka-Nithi	0.29	0.175	Vihiga	0.314	0.255
Embu	0.381	0.162	Bungoma	0.219	0.185
Kitui	0.453	0.19	Busia	0.257	0.199
Machakos	0.429	0.302	Siaya	0.464	0.293
Makueni	0.418	0.327	Kisumu	0.459	0.263
Nyandarua	0.42	0.314	Homa Bay	0.492	0.284
Nyeri	0.224	0.077	Migori	0.458	0.257
Kirinyaga	0.365	0.146	Kisii	0.443	0.221
Murang'a	0.409	0.289	Nyamira	0.461	0.23
Kiambu	0.356	0.132	Nairobi	0.266	0.23

Table 5.6a: Probability of dying between ages 15 and 60 per 1,000 population (Highest 10 Counties)

County	Both Sexes <i>(per 1,000 population)</i>
Tana River	0.392
Homa Bay	0.388
Kilifi	0.385
Siaya	0.378
Kwale	0.376
Mandera	0.375
Makueni	0.373
West Pokot	0.373
Garissa	0.371
Turkana	0.37

Table 5.6b: Probability of dying between ages 15 and 60 per 1,000 population (Lowest 10 Counties)

County	Both Sexes (per 1,000 population)
Mombasa	0.176
Lamu	0.192
Bungoma	0.202
Uasin Gishu	0.207
Baringo	0.207
Trans Nzoia	0.213
Kakamega	0.226
Busia	0.228
Meru	0.229
Tharaka-Nithi	0.233

Note: Summary Life Tables, (males and females), for Kenya, Rural, urban and the 47 Counties are presented in **Appendix 2**.

5.4. Crude Death Rate (CDR)

Data from the recent deaths in the household was used to produce estimates of crude death rates (CDR). Adjusted CDR are presented in Table 5.7 and shows that the CDR was 10.5 deaths per 1,000 mid-year population for Kenya in 2019.

Table 5.7: Crude Death Rates by County

COUNTY /RURAL/URBAN	CDR (Per 1,000)	COUNTY /RURAL/URBAN	CDR (Per 1,000)
Kenya	10.5	Turkana	6.2
Rural	10.0	West Pokot	12.0
Urban	6.5	Samburu	11.2
Mombasa	9.7	Trans Nzoia	8.9
Kwale	8.2	Uasin Gishu	11.5
Kilifi	10.2	Elgeyo Marakwet	8.1
Tana River	12.9	Nandi	12.8
Lamu	7.0	Baringo	6.9
Taita Taveta	13.6	Laikipia	11.6
Garissa	6.5	Nakuru	9.5
Wajir	11.6	Narok	14.1
Mandera	9.1	Kajiado	8.1
Marsabit	12.9	Kericho	13.0
Isiolo	10.6	Bomet	12.9
Meru	8.2	Kakamega	13.9
Tharaka-Nithi	10.6	Vihiga	9.4
Embu	7.5	Bungoma	10.2
Kitui	7.4	Busia	9.2
Machakos	7.4	Siaya	15.5
Makueni	5.5	Kisumu	7.0
Nyandarua	11.6	Homa Bay	8.7
Nyeri	10.2	Migori	12.3
Kirinyaga	10.0	Kisii	9.8
Murang'a	10.8	Nyamira	7.6
Kiambu	8.8	Nairobi	9.2

Chapter 6: Maternal Mortality

6.1. Introduction

Maternal mortality as a global health issue has gained increased recognition over the past two decades, due to its inclusion as a key target indicator in a number of international conferences beginning from the 1990 World Summit for Children, the 1994 International Conference on Population and Development and the 1995 World Conference for Women.

SDG Goal 3 explicitly deals with ensuring healthy lives and promotion of well-being for all ages especially for children and mothers. **Target 1** of this goal aims to reduce the global maternal mortality ratio (Indicator 3.1.1) to less than 70 per 100,000 live births. At national level, MMR is expected to reduce by at least two thirds of its 2010 baseline level by 2030 ie from 473 to 200 maternal deaths per 100,000 live birth. And no country should have an MMR greater than 140/100,000 live births (a number twice the global target) by 2030. The MMR obtained from the 2009 census was 495 while the 2014 KDHS reported a MMR of 362, which are still way above the expected SDG targets.

6.2. Maternal Mortality Definitions

The International Classification of Diseases (ICD), Revision 10, provides three different definitions related to maternal mortality (8).

- **Maternal death:** a maternal death is the death of a woman while pregnant or within 42 days of the termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental causes.
- **Pregnancy-related death:** a pregnancy-related death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of cause.
- **Late pregnancy-related death:** a late pregnancy-related death is the death of a woman while pregnant or within 12 months of termination of pregnancy, irrespective of cause.

A true maternal death therefore requires specific cause-of-death information. This is distinguished from pregnancy-related and late pregnancy-related deaths, which are determined solely by the timing of death relative to pregnancy, childbirth and the postpartum period. True maternal deaths exclude deaths from accidents or violence, pregnancy-related deaths include such deaths if they occur within the specified time range.

6.3. Data and Methods

6.3.1 Methodology for Maternal Mortality Indicators

There are four indicators developed for measurement of maternal mortality: - Maternal Mortality Ratio (MMR), Maternal Mortality Rate (MMRate), Proportion of maternal deaths among all deaths of females of reproductive age (PMDF) and the Lifetime Risk of Maternal Death (LTR). The commonly used indicator is the maternal mortality ratio, which refers to the number of maternal deaths per live birth in the same period, multiplied by a conventional factor of 100 000. The MMRatio expresses the obstetric risk of death and is obtained as follows.

$$\text{MMR} = \frac{\text{Number of maternal deaths}}{\text{Number of Live births in same period}} \times 100,000$$

Maternal mortality rate (MMRate) provides an indication of the risk of maternal death in the adult female population but conceals the effect of differing levels of fertility in comparisons.

MMratio = (MMrate divided by General Fertility Rate)

Proportion of maternal deaths among all deaths of females of reproductive age (PMDF), This expresses the salience of maternal deaths relative to other causes of death among women of reproductive age. The lifetime risk of maternal death (LTR). The LTR reflects the chances of a woman dying from maternal causes over the course of her 35-year reproductive lifespan. This indicator takes into account the probability of a death due to maternal causes each time a woman becomes pregnant. Formulae for the estimation of the other three maternal mortality indicators are presented in **Appendix 3**.

6.3.2 Quality of reported deaths in the household

Data on reported deaths in the household were analyzed in chapter two and it was found that there were several anomalies in reported death data. One of the difficulties encountered was under reporting of deaths and this also affected the reported pregnancy related deaths. Therefore, adjustment had to be made in order to improve the estimates.

Using life table estimates produced using indirect methods in chapter 4, the adjusted deaths were obtained for each age group of women of reproductive age (15-49). The proportion of reported deaths due to maternal causes was applied to the adjusted deaths subject to a maximum of 17 per cent. That is in counties where the proportion of pregnancy related deaths was higher than 17 per cent, it was reduced to 17 per cent. This was fixed for two reasons, the average proportion of pregnancy related deaths for counties with good data ranged between 6 per cent to 12 per cent giving an average of 11 per cent. Secondly, the risk of developing severe complications in pregnancy is generally around 15 per cent. In a normal population, 15 per cent of pregnancies are likely to be high risk.

The maternal mortality indicators presented in this report were directly estimated from the cleaned data set and then adjusted. The key indicators are Maternal Mortality Ratio (MMR) and Maternal Mortality Rate (MMRate). These are presented at national, rural-urban and county levels.

6.4. Results

Table 6.1a presents the reported and adjusted maternal mortality indicators at national and by place of residence. The adjusted maternal related deaths were 4, 680 about giving and maternal mortality ratio of 355 per 100,000 live births at national level. This is within the range estimated by WHO of 342 deaths per 100,000.

Table 6.1a: Maternal Mortality Measures, National

Age group	Number of women	Number of female deaths	Adjusted number of female deaths	Reported number of pregnancy related deaths(maternal)	Adjusted number of maternal deaths	Births in the last 12 months	Maternal mortality Ratio
15-19	2,585,125	1,537	4,418	220	632	136,200	464
20-24	2,316,271	2,049	5,061	436	1,079	391,662	275
25-29	1,999,654	2,412	5,095	468	1,005	350,144	287
30-34	1,859,889	3,088	5,593	489	902	261,744	345
35-39	1,293,038	2,912	4,867	321	553	126,849	436
40-44	1,095,662	2,883	5,249	187	356	45,315	786
45-49	865,089	2,335	5,515	65	154	6,940	2,219
Total	12,014,728	17,216	35,799	2,186	4,680	1,318,855	355

Tables 6.1b and 6.1c shows the estimates by place of residence. The estimated maternal mortality ratio is close meaning that risk of maternal deaths may be similar. The national, rural and urban estimates all follow the expected J shape where risk of maternal deaths are higher at younger and older ages and lower at the middle ages.

Table 6.1b: Maternal Mortality Measures, Rural

Age group	Number of women	Number of female deaths	Adjusted number of female deaths	Reported number of pregnancy related deaths(maternal)	Adjusted number of maternal deaths	Births in the last 12 months	Maternal mortality
15-19	1,879,450	1,177	3,212	180	509	109,539	465
20-24	1,349,929	1,545	3,172	327	690	262,457	263
25-29	1,108,609	1,810	3,137	354	632	215,870	293
30-34	1,115,562	2,268	3,818	351	609	165,707	367
35-39	787,106	2,160	3,280	252	401	81,988	489
40-44	726,668	2,136	3,752	147	276	32,513	850
45-49	612,464	1,746	4,184	55	150	5,582	2,684
Total	7,579,788	12,842	3,212	1,666	3,267	873,657	374

Table 6.1c: Maternal Mortality Measures, Urban

Age group	Number of women	Number of female deaths	Adjusted number of female deaths	Reported number of pregnancy related deaths(maternal)	Adjusted number of maternal deaths	Births in the last 12 months	Maternal mortality
15-19	705,675	360	912	40	101	26,660	380
20-24	966,342	504	1,721	109	372	129,205	288
25-29	891,045	602	1,917	114	363	134,274	270
30-34	744,327	820	1,944	138	327	96,037	341
35-39	505,932	752	1,616	69	148	44,861	331
40-44	368,994	747	1,468	40	79	12,802	614
45-49	252,625	589	1,339	10	23	1,358	1,674
Total	4,434,940	4,374	10,917	520	1,413	445,198	317

Table 6.2 show the adjusted estimates of maternal mortality by county. The highest rates are in Garissa, Tana River, Bomet, Kericho, Kilifi, Narok and Homabay where maternal mortality ratio is over 500 deaths per 100,000 live births. The high ration in Bomet and kericho is rather supprising and may be due to reporting errors. The lowest rate is in Nyeri where the ratio is below 70 per 100,000 and below the target for SDG. The results are shown graphically in Figure 6.1.

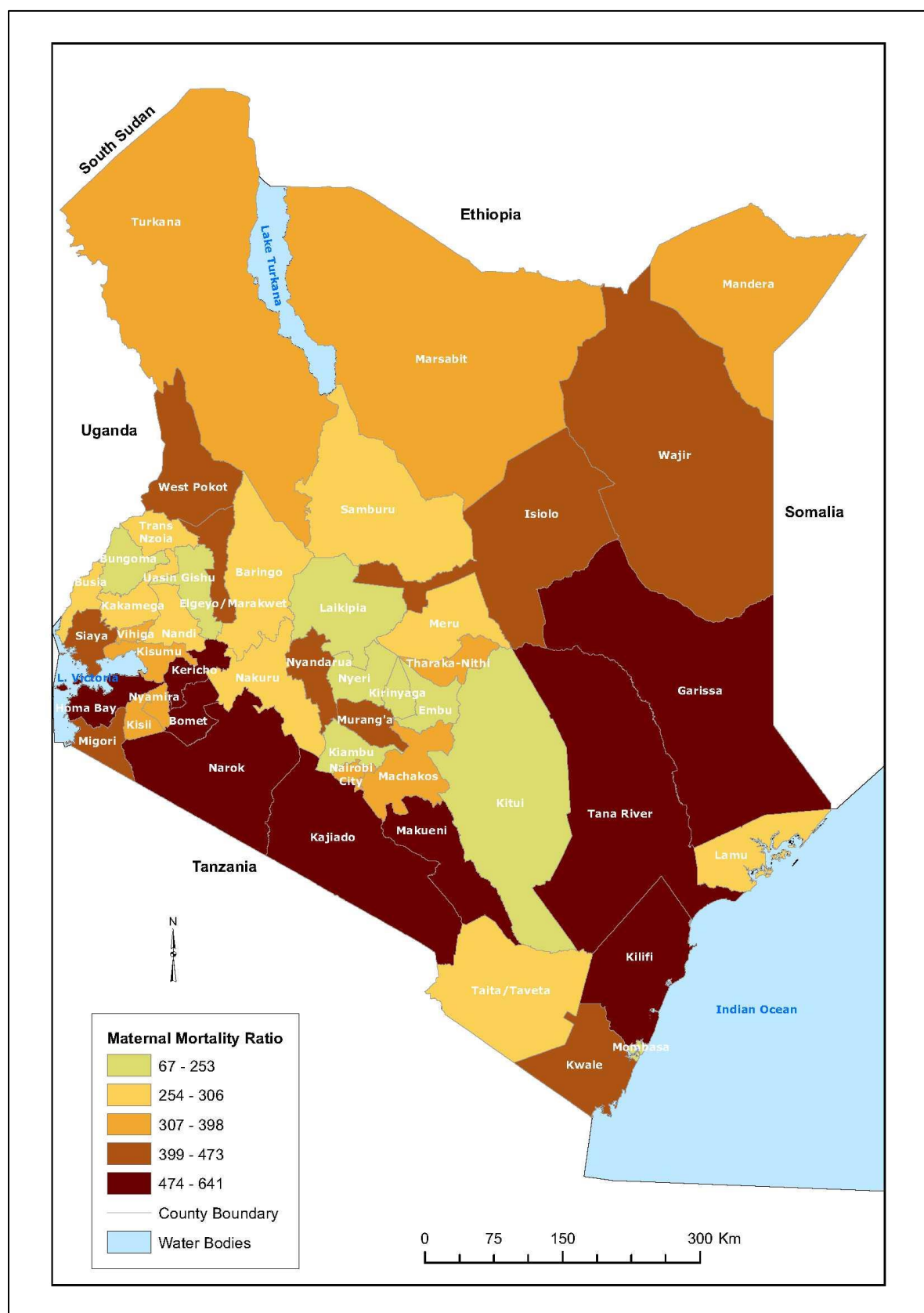


Figure 6.1: Graphical Representation of Maternal Mortality Ratios by County, 2019

Table 6.2: Maternal Mortality Ratios by County, 2019

County	Adjusted MMRatio	County	Adjusted MMRatio
Mombasa	190	Samburu	275
Kwale	464	Trans Nzoia	287
Kilifi	532	Uasin Gishu	204
Tana River	586	Elgeyo-Marakwet	435
Lamu	306	Nandi	264
Taita-Taveta	257	Baringo	274
Garissa	641	Laikipia	182
Wajir	403	Nakuru	261
Mandera	385	Narok	522
Marsabit	321	Kajiado	495
Isiolo	451	Kericho	543
Meru	291	Bomet	554
Tharaka-Nithi	332	Kakamega	279
Embu	244	Vihiga	393
Kitui	253	Bungoma	238
Machakos	398	Busia	273
Makueni	479	Siaya	424
Nyandarua	466	Kisumu	343
Nyeri	67	Homabay	516
Kirinyaga	248	Migori	412
Murang'a	469	Kisii	325
Kiambu	171	Nyamira	349
Turkana	381	Nairobi City	326
West Pokot	473		

Chapter 7: Death Registration and External Causes of Deaths

7.1.1 Census Questions

The 2019 KPHC collected data on deaths at household level. Data for analysis of maternal mortality was drawn from the set of questions on annual live births and annual deaths collected at household level in the census questionnaire; and as recommended in the UN PR and the 2020 round of population censuses

This referred to the births and deaths that occurred in the household one year prior to the census date (between 24th August, 2018 and 24th August, 2019). The questions were: -

- *Births: How many live births have occurred in this household between 24/8/2018 and 24/8/2019?*
- *Deaths: "How many deaths occurred in this household between 24/8/2018 and 24/8/2019?"*
- *"Where did the death occur?"*
- *Was this death notified?*
- *How old was <NAME> at his/her death?*
- *What was sex of <NAME>?*
- *Was the death of <NAME> due to accident, violence or homicide?*
- *Did the death of <NAME> (for Females age 12-54) occur*
 - *During Pregnancy*
 - *During Delivery*
 - *Within 6 weeks/42 days after delivery?*

From the above questions, raw data on, the number of deaths over the reference period by age and sex; the number of deaths among women aged 15–49 years - dying during pregnancy, delivery or in the 6 weeks after the end of a pregnancy; the number of births over the same reference period and data the enumerated population by age and sex was used for the estimation of maternal mortality indicators.

7.1 Introduction

The leading section on household deaths in the 2019 census had questions on causes of deaths and if the deaths that occurred were notified or not. Results on these two areas are presented in this chapter.

7.2 Death Notification and Place of Occurrence

The 2019 Census collected information on death registration coverage and place of occurrence. Questions were asked on recent deaths at household level, in question H-11. This was followed further by question H-13 on whether the death was notified or not, which aimed at determining the level of death registration in the country.

Nationally, 59 per cent out of these deaths occurred in a health facility, 40 per cent occurred in a non-health facility while 1 per cent were unknown. The data shows that 56 in every 100 deaths in rural areas occurred in a health facility while in urban areas it was 68 in every 100 deaths. Nyamira, Nairobi City, Kisii and Embu, counties recorded the highest number of deaths in health facilities with 72.7, 72.6, 70.2, and 69.1 per cent respectively while Turkana, Garissa, Marsabit, Wajir and Mandera counties reported the least number of deaths occurring in health facilities with 39.8, 33.3, 28.7, 26.0 and 23.8 per cent respectively.

Table 7.1: Deaths by Place of Occurrence, 2019

Residence/ County	Total Deaths	Proportions Of Deaths In A Health Facility	Proportions Of Deaths In A Non- Health Facility	Don't Know	County	Total Deaths	Proportions Of Deaths In A Health Facility	Proportions Of Deaths In A Non- Health Facility	Don't Know
Kenya	152,051	59	40	1.0	Turkana	2,624	39.8	55.4	4.8
Rural	113,824	56	42.9	1.1	West Pokot	1,463	40.6	57	2.4
Urban	38,227	67.9	31.2	0.9	Samburu	615	42.9	56.1	1.0
Mombasa	3,427	64.3	35.1	0.5	Trans Nzoia	3,042	58.4	40.9	0.7
Kwale	2,711	49.8	49.8	0.4	Uasin Gishu	3,070	64	35.6	0.4
Kilifi	4,072	54.2	45.4	0.4	Elgeyo-Marakwet	1,217	63	36.6	0.4
Tana River	1,006	40.4	58.9	0.7	Nandi	2,716	57	42.8	0.3
Lamu	489	49.5	49.9	0.6	Baringo	2,031	49.4	48.9	1.7
Taita-Taveta	1,560	52.9	46.9	0.1	Laikipia	1,477	60.5	39.2	0.3
Garissa	3,054	33.3	56.6	10.1	Nakuru	6,777	63.1	36.1	0.7
Wajir	2,522	26	68.8	5.2	Narok	1,899	57	41.7	1.3
Mandera	3,181	23.8	69.6	6.6	Kajiado	2,090	67	30.9	2.1
Marsabit	811	28.7	69.8	1.5	Kericho	2,387	67.4	32.2	0.4
Isiolo	627	41.5	57.3	1.3	Bomet	2,249	68.6	31	0.4
Meru	4,765	66	33.3	0.7	Kakamega	7,180	52.2	47.3	0.5
Tharaka-Nithi	1,336	67.5	32.3	0.1	Vihiga	3,598	44.7	54.6	0.7
Embu	2,345	69.1	30.5	0.3	Bungoma	4,685	61.5	38	0.5
Kitui	3,995	58.6	40.5	1.0	Busia	3,224	58.4	40.9	0.7
Machakos	4,989	61.7	38	0.3	Siaya	4,888	56.5	43.4	0.2
Makueni	3,932	62.2	37.2	0.6	Kisumu	4,437	63.4	36.1	0.5
Nyandarua	2,446	63	36.8	0.1	Homabay	4,258	61.5	37.9	0.5
Nyeri	3,470	68.7	31	0.3	Migori	3,799	63.1	36.2	0.7
Kirinyaga	2,424	68.7	31.2	0.1	Kisii	4,400	70.2	29.3	0.5
Murang'a	4,959	60.3	39.6	0.2	Nyamira	2,059	72.7	27.1	0.2
Kiambu	7,349	65	34.4	0.6	Nairobi City	10,397	72.6	26.8	0.6

In the period August, 2018 and August, 2019; 152,051 deaths were recorded as shown in Table 7.2, of these, 113,824 deaths were registered in Rural and 38,228 in Urban areas. The majority of deaths occurred in Nairobi City, Kiambu, Kakamega, Nakuru, Machakos counties totalling 10,397; 7,349; 7,180; 6,777 and 4,989, respectively. The least number of registered deaths were in Tana River, Marsabit, Isiolo, Samburu and Lamu counties with 1,006; 811; 627; 615 and 489 deaths respectively.

Table 7.2: Proportion of Notified Deaths by County, 2019

RESIDENCE/ COUNTY	TOTAL DEATHS	Proportion of notified deaths	COUNTY	TOTAL DEATHS	Proportion of notified deaths
KENYA	152,051	85.6	Turkana	2,624	47.8
Rural	113,824	84.7	West Pokot	1,463	47.6
Urban	38,227	88.4	Samburu	615	53.3
Mombasa	3,427	86.3	Trans Nzoia	3,042	88.6
Kwale	2,711	76.9	Uasin Gishu	3,070	92.8
Kilifi	4,072	86.9	Elgeyo-Marakwet	1,217	90.1
Tana River	1,006	54.3	Nandi	2,716	90.2
Lamu	489	83.0	Baringo	2,031	68.9
Taita-Taveta	1,560	96.0	Laikipia	1,477	90.7
Garissa	3,054	35.8	Nakuru	6,777	92.6
Wajir	2,522	39.1	Narok	1,899	78.0
Mandera	3,181	35.5	Kajiado	2,090	86.4
Marsabit	811	44.8	Kericho	2,387	91.7
Isiolo	627	57.6	Bomet	2,249	92.0
Meru	4,765	94.7	Kakamega	7,180	94.1
Tharaka-Nithi	1,336	92.2	Vihiga	3,598	94.4
Embu	2,345	96.6	Bungoma	4,685	91.3
Kitui	3,995	92.0	Busia	3,224	90.8
Machakos	4,989	96.0	Siaya	4,888	89.8
Makueni	3,932	95.8	Kisumu	4,437	88.3
Nyandarua	2,446	97.0	Homabay	4,258	75.5
Nyeri	3,470	97.8	Migori	3,799	74.8
Kirinyaga	2,424	97.0	Kisii	4,400	92.3
Murang'a	4,959	97.3	Nyamira	2,059	93.0
Kiambu	7,349	95.1	Nairobi City	10,397	90.8

7.3 Deaths Registration of Children Under Age Five by Sex

Deaths of male children are 25 per cent more likely to be registered than girls nationally, irrespective of place of residence (rural or urban). The same pattern is replicated across all counties except in Vihiga County where more female children deaths are registered than the males.

7.31 County Differentials in Deaths Registration of Children Under Age 5, by Sex

The differentials in registration of deaths between male and female is illustrated in **Figure 7.1**. Deaths registration is twice as likely for men/boys than women/girls in the counties of Lamu, Bomet, Garissa, West Pokot, Murang'a and Narok. Male death registration is dominant across all counties.

Table 7.3: Deaths Registration of Children Under Age Five by Sex

County	Male	Female	M/F Ratio	Both Sexes Notified	County	Male	Female	M/F Ratio	Both Sexes Notified
Kenya	12,844	10,259	1.25	31,409	Turkana	166	144	1.15	685
Rural	8,007	6,396	1.25	20,919	West Pokot	128	86	1.49	550
Urban	4,837	3,863	1.25	10,490	Samburu	38	32	1.19	146
Mombasa	496	361	1.37	1,062	Trans Nzoia	252	212	1.19	622
Kwale	250	203	1.23	651	Uasin Gishu	238	189	1.26	506
Kilifi	347	279	1.24	810	Elgeyo Marakwet	82	62	1.32	190
Tana River	102	87	1.17	368	Nandi	156	129	1.21	373
Lamu	56	31	1.81	113	Baringo	136	94	1.45	477
Taita Taveta	103	81	1.27	210	Laikipia	102	79	1.29	227
Garissa	211	139	1.52	1,146	Nakuru	697	584	1.19	1,495
Wajir	170	112	1.52	772	Narok	231	158	1.46	574
Mandera	217	161	1.35	989	Kajiado	249	201	1.24	561
Marsabit	46	36	1.28	206	Kericho	178	135	1.32	418
Isiolo	42	30	1.4	128	Bomet	209	134	1.56	415
Meru	224	159	1.41	454	Kakamega	680	534	1.27	1,397
Tharaka-Nithi	59	56	1.05	142	Vihiga	163	182	0.9	409
Embu	172	135	1.27	334	Bungoma	457	386	1.18	1,032
Kitui	263	212	1.24	592	Busia	341	272	1.25	760
Machakos	285	231	1.23	579	Siaya	499	380	1.31	1,100
Makueni	194	156	1.24	381	Kisumu	470	384	1.22	1,095
Nyandarua	179	139	1.29	339	Homa Bay	408	333	1.23	1,243
Nyeri	133	128	1.04	286	Migori	456	332	1.37	1,240
Kirinyaga	137	124	1.1	292	Kisii	311	257	1.21	688
Murang'a	232	158	1.47	449	Nyamira	117	95	1.23	253
Kiambu	711	596	1.19	1,465	Nairobi	1,451	1,251	1.16	3,185

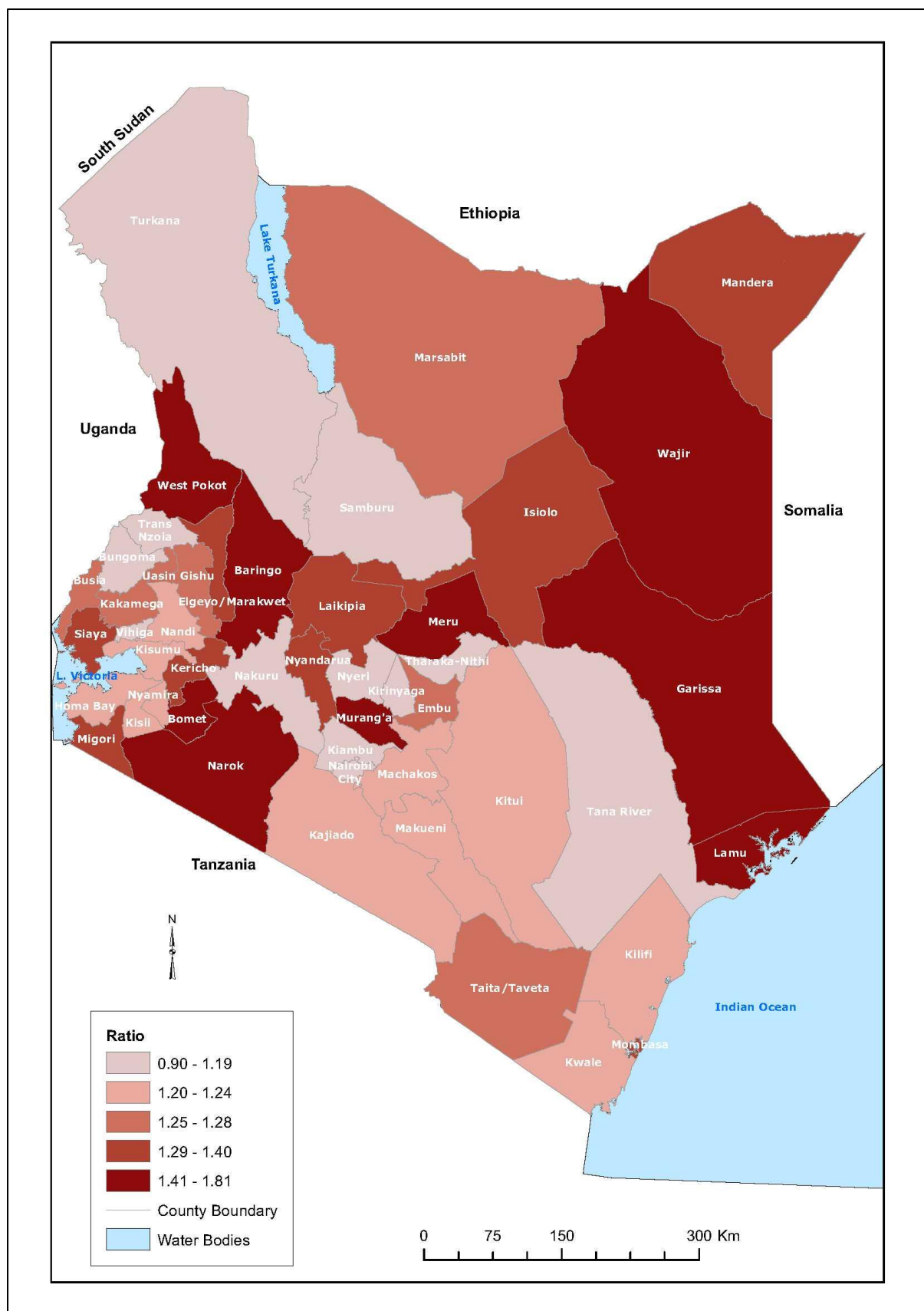


Figure 7.1: Male/Female Ratios of Deaths Registration of Children Under Age 5 by County, 2019

7.4 Deaths from External Causes

7.4.1 External Causes of Deaths (Homicide/Suicide and Accidents)

The census questionnaire had questions on household deaths 12 months prior to the census date. These were followed by questions on whether the deaths were due to homicide, suicide or accidents. Deaths under this category are referred to as deaths due to *external causes* in this report. SDG Target 3.4 aims to reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being by 2030. This is measured through indicator 3.4.2 on Suicide mortality rate. Census data cannot measure this, however, a proxy in form of a combination of homicide, suicide and accidents has been used to determine gender deaths-gaps between men and women in this report.

Table 7.4 presents causes of deaths as reported in the 2019 KPHC for population age 15 years and above by age and sex. At the national level, there are three male deaths for every female death, due to external causes. This shows a high propensity for men to die of external causes compared to women. The gender gap is highest among deaths occurring between ages 20 to 49. This can be attributed to men's lifestyles like dangerous driving, alcohol and tobacco use and risky occupations that men normally engage in. This may to some extent, explain the lower male survivorship in the life table as more males die from external causes at all ages compared to women, and this deficit is carried over in older ages.

Table 7.4: External Causes of Deaths by Selected Age Groups and Sex, Kenya (2019)

Age Group	Total	Male	Female	Male/ Female Ratio
Total Ext. Deaths (All Ages)	24,453	17,889	6,564	2.7
Total Age 15+	21,058	15,942	5,116	3.1
15 - 19	1,244	894	350	2.6
20 - 24	2,188	1,720	468	3.7
25 - 29	2,340	1,889	451	4.2
30 - 34	2,382	1,896	486	3.9
35 - 39	1,982	1,605	377	4.3
40 - 44	1,665	1,315	350	3.8
45 - 49	1,259	1,023	236	4.3
50 - 54	1,012	773	239	3.2
55 - 59	804	621	183	3.4
60+	3,091	2,103	988	2.1

Previous sections show that male survival chances are lower than that of females in almost all parts of the country and at every age. It is important to examine the male female differences in reported causes of death. However, a limitation of census data is that causes of death were asked for homicides and maternal deaths only. Perhaps, this could explain partly the observed lower male survivorship.

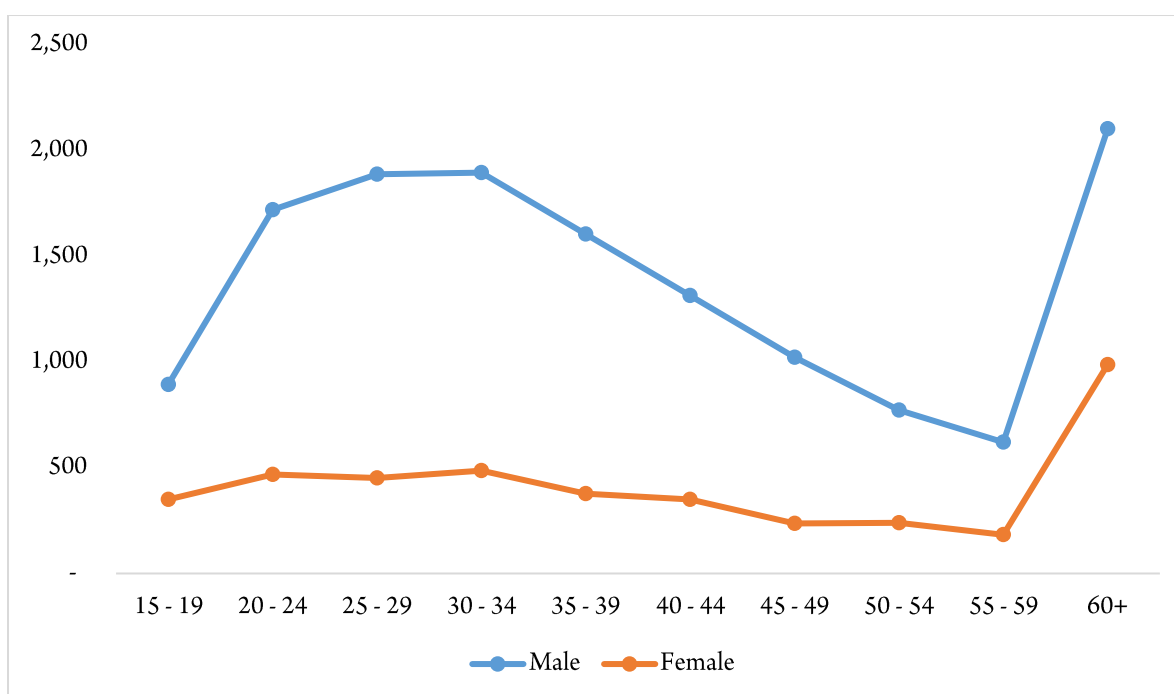


Figure 7.2: Male-Female Gap for deaths due to External Causes, Kenya 2019.

7.4.2 Rural-Urban Differentials in Causes of Deaths by Age and Sex, 2019

Males contribute more to the overall external deaths in rural areas compared to females. The gap is widest during the youthful ages, as shown in **Tables 7.5a and 7.5b**. At these ages, in both rural and urban areas, men are four times likely to die from preventable causes than women. This may be attributed to lifestyle behaviours and health seeking attributes.

Table 7.5a: External Causes of Deaths by Selected Age Groups and Sex, Rural Kenya (2019)

Age Group	Total	Male	Female	Male/ Female Ratio
Total Ext. Deaths (All Ages)	18,892	13,912	4,980	2.8
Total Age 15+	14,169	10,942	3,227	3.4
15 - 19	938	669	269	2.5
20 - 24	1,669	1,318	351	3.8
25 - 29	1,842	1,501	341	4.4
30 - 34	1,833	1,476	357	4.1
35 - 39	1,532	1,226	306	4
40 - 44	1,309	1,046	263	4
45 - 49	1,000	817	183	4.5
50 - 54	791	607	184	3.3
55 - 59	627	483	144	3.4
60+	2,628	1,799	829	2.2

Table 7.5b: External Causes of Deaths by Selected Age Groups and Sex, Urban Kenya (2019)

Age Group	Total	Male	Female	Male/ Female Ratio
Total Ext. Deaths (All Ages)	5,561	3,977	1,584	2.5
Total Age 15+	3,798	2,897	901	3.2
15 - 19	306	225	81	2.8
20 - 24	519	402	117	3.4
25 - 29	498	388	110	3.5
30 - 34	549	420	129	3.3
35 - 39	450	379	71	5.3
40 - 44	356	269	87	3.1
45 - 49	259	206	53	3.9
50 - 54	221	166	55	3
55 - 59	177	138	39	3.5
60+	463	304	159	1.9

Chapter 8: Summary, Conclusions and Recommendations

8.0 Introduction

This section presents a summary of main findings. Mortality indicators shown relate to childhood, adult, life expectancy and maternal mortality. Results on deaths due to accidents, suicide or homicide is also highlighted.

8.1 Summary of Major Findings

Childhood Mortality: Evidence from 2019 Census suggests that childhood mortality in Kenya has been on a downward trajectory since 1999. IMR in 2019 was 36 compared to 2009 which was 56 per 1,000 live births. Under five mortality was 52 compared to 79 per 1,000 live births in 2009.

The analysis shows that infant and under five mortality rates varied widely across the 47 counties and that in certain counties there is a persistent problem. Migori county recorded the highest infant and under five deaths of 67.2 and 107.2 per 1,000 live births respectively while Laikipia county registered the least with 17.3 infant and 27.9 under five deaths per 1,000 live births.

Reported deaths in the household: There were 152,051 deaths reported to have occurred in the households 12 months prior to the census date. Nationally, male deaths were 88,809 while female deaths were 63,242. Out of these reported deaths, nearly one out of four deaths occurred below year 1.

Adult mortality: The results show that women have a higher life expectancy than men at all adulthood ages than men nationally and at county level. Nationally, women have a higher life expectancy after attaining age 60 and 70 years. Life expectancy at age 60 is 14.2 years for men and 17.2 years for women. There have been improvements in adult mortality nationally from 2009 which was 348 male and 313 female deaths per 1000 male and females respectively.

Life Expectancy: Life expectancy at birth has increased for males and females has slightly increased since 2009. The life expectancy for males increased from 58 in 2009 to 60.6 in 2019 while for females is at 66.5 from 61 estimated from the 2009 census. Nyeri County has the highest female life expectancy of 75.8 years.

The **Maternal mortality ratio** has reduced slightly to 355 in 2019 from 495 per 100,000 live births but is still far above the SDG target of 70 per 100,000 live births.

Death Registration and External Cause: The notification of deaths is estimated to be approximately 86 per cent in Kenya. The highest number of deaths notified were in Nyeri County with 98 per cent while Garissa County has the least with 36 per cent.

Nationally, 59 per cent of deaths were reported to have occurred in a health facility while 40 per cent occurred in a non-health facility.

8.2 Conclusions

Despite the decline, comparison with the 2019 revision of World Population Prospects illustrates that Kenya's under five mortality for 2015-2020 remain relatively high. The country is also far from achieving the sustainable development goal of 25 deaths per 1,000 live births. There is a high propensity of men to die from external causes compared to women. Declines in both childhood and early adult mortality rates have resulted in the increasing life expectancy at birth. There is an improvement in the country's death registration and notification. Despite improvements in mortality indicators, death reporting is still poor especially during childhood and mainly in some counties.

8.3 Recommendations

- There is a need for in depth studies on reporting of deaths especially at childhood level.
- The quality of mortality data needs to be addressed through continuous surveillance and monitoring for future benchmarking and improvement.
- Strengthen the demographic statistical system to improve on the quality of data collected. Improvement of the civil registration systems which can be used as a base/ check to the indicators collected during a census.
- Reduce the number of questions in other modules to allow an increase in questions in the mortality modules.
- Deaths in the household question should be asked over 24 months and not 12 months. However, there is a need to test whether increasing the reference period to 24 months may improve the reporting coverage.

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Appendix 1: Questionnaires



Republic of Kenya

Population and Housing Census - 24th/25th August 2019

(CONFIDENTIAL)

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C. Information Regarding Persons with Disabilities in Living Activities of Daily Life										D. Information Regarding Education Attainment										E. Labor Force Participation										F. 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To be asked of persons aged 5 years and above except (P-43)										For Persons Aged 3 Years and Above										For those who worked or held job (including those on leave/ sick leave)										To be asked of all persons aged 5 years and above																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			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Republic of Kenya

POPULATION AND HOUSING CENSUS 24TH/25TH AUGUST 2019



Statistics Act 2006

STRICTLY CONFIDENTIAL

HOTEL/LODGE RESIDENTS, HOSPITAL IN-PATIENTS, PRISON/POLICE CELLS AND SCHOOLS/CHILDREN HOMES

County=		Sub-County=		Division=		Location=		Sub-Location=		E.A. Number	
E.A. Type=		E.A. Status=		Constituency=		Ward=		Males =		Females =	
Total Population =											
Type of Institution: Hotel/Lodge Residents Hospital In-patients Prison/Police Cells Schools/learning institution											
Name of Institution:											

Line Number (SQ01)	Name (SQ02)	Sex (SQ03)	Age (SQ04)	County/ Country of Birth (SQ05)	Nationality/ Ethnicity (SQ07)
Illustration	What are the names of all persons who spent the night of 24th/25th August, 2019 in this institution? (Record two names for each person.) <i>An illustration of how to write the names is shown below.</i>	What is <NAME>'s sex? 1=Male 2=Female 3=Other	How old is <NAME>? (Record age in completed years using two digits. If under 1 year, record "00". If 95 years and above, code "95".)	What is <NAME>'s country/ county of birth?	What is <NAME>'s Nationality/Ethnicity?
0 1	JOHN MOGAKA				
0 2					
0 3					
0 4					
0 5					
0 6					
0 7					
0 8					
0 9					
1 0					



REPUBLIC OF KENYA



CONFIDENTIAL

REPUBLIC OF KENYA

POPULATION AND HOUSING CENSUS 24th /25th AUGUST 2019 SHORT QUESTIONNAIRE FOR EMIGRANTS

E-01: Serial No.	E-01(a): Line No. of Respondent	E-02: Name of Emigrant Please give me the name(s) of the emigrant(s) ?	E-03: Sex What is <NAME>'s Sex? Male=1 Female=2	E-04: Age How old was <NAME> at the time of his/her departure ?	E-05: Level of Education What was the highest level of education that <NAME> had completed at the time of his/her departure?	E-06: Professional training What professional training had <NAME> acquired before departure from Kenya? (Applicable to persons age 15 years & above)	E-07: Country of first Destination What was <NAME>'s country of first destination during his/her departure?	E-08: Year of Departure When did <NAME> depart from Kenya?	E-09: Main reason for Departure What was the main reason for <NAME> departing from Kenya?	E-10: Country of current residence What is the current country of residence of <NAME>?	E-10a: Select the Name of the Emigrant if currently in Kenya.	E-11: Remittances Did <NAME> remit money to any member of this household while outside Kenya in the last 12 months? Yes= 1 No= 2 DK= 9	E-12: Utilization of funds How was the money utilized? (Allow for maximum of 3 responses)
1													
2													
3													
4													
5													
6													
7													
8													



POPULATION AND HOUSING CENSUS 24TH/25TH AUGUST 2019

Republic of Kenya

TRAVELLERS AND PERSONS ON TRANSIT

[illegible]



REPUBLIC OF KENYA



POPULATION AND HOUSING CENSUS 24th /25th AUGUST 2019

CONFIDENTIAL

SHORT QUESTIONNAIRE FOR STREET PERSONS/OUTDOOR SLEEPERS/VAGRANTS

County Sub-county Division

Location Sub-Location EA Number

Constituency Ward

Name of the street.....Code.....

Line /NO	Name (List at least two names)	SEX 1. Male 2. Female 3. Other 4. Not Stated	AGE in Completed years	COUNTRY/ COUNTRY OF BIRTH	ETHNICITY/ NATIONALITY <i>What is <NAME>'s Nationality/Ethnicity?</i>
1					
2					
3					
4					
5					
6					
7					
8					

TOTAL: MALES _____ FEMALES _____ OTHER _____ UNSPECIFIED SEX _____ TOTAL _____

Appendix 2: Life Tables by Sex, Residence and County, 2019

Notations

${}_n m_x / m(x, n)$: is the age-specific death rate between ages x and $x+n$

${}_n q_x / q(x, n)$: is the probability of dying between ages x and $x+n$,

(l_x) is the number of survivors alive at exact age x .

(ex) is the expectation of life at exact age x .

(x) exact age x

KENYA								
Age (x)	MALE				FEMALE			
	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0399	0.0385	100,000	60.6	0.0333	0.0324	100,000	66.5
1	0.0038	0.0150	96,145	62.0	0.0044	0.0174	96,762	67.7
5	0.0010	0.0049	94,705	58.9	0.0010	0.0052	95,074	64.9
10	0.0007	0.0033	94,237	54.2	0.0006	0.0031	94,581	60.2
15	0.0025	0.0123	93,922	49.4	0.0016	0.0080	94,283	55.4
20	0.0035	0.0175	92,768	44.9	0.0022	0.0109	93,532	50.8
25	0.0040	0.0200	91,145	40.7	0.0027	0.0132	92,508	46.4
30	0.0048	0.0237	89,321	36.5	0.0032	0.0159	91,290	41.9
35	0.0062	0.0306	87,207	32.3	0.0039	0.0194	89,837	37.6
40	0.0084	0.0414	84,539	28.2	0.0049	0.0240	88,092	33.3
45	0.0119	0.0577	81,041	24.3	0.0064	0.0317	85,976	29.0
50	0.0171	0.0823	76,367	20.7	0.0091	0.0447	83,250	24.9
55	0.0247	0.1164	70,083	17.3	0.0135	0.0656	79,526	20.9
60	0.0362	0.1662	61,927	14.2	0.0207	0.0985	74,308	17.2
65	0.0525	0.2323	51,634	11.5	0.0324	0.1505	66,986	13.8
70	0.0743	0.3130	39,640	9.3	0.0514	0.2287	56,902	10.8
75	0.1031	0.4072	27,233	7.3	0.0811	0.3375	43,887	8.2
80	0.1419	0.5154	16,143	5.7	0.1257	0.4745	29,075	6.2
85	0.2027	0.6484	7,822	4.3	0.1911	0.6275	15,278	4.5
90	0.2853	0.7748	2,750	3.3	0.2753	0.7626	5,691	3.4
95	0.4083	0.8844	619	2.4	0.3926	0.8749	1,351	2.5
100	0.5021	...	72	2.0	0.5591	...	169	1.8

Kenya Rural								
Age (x)	MALES				FEMALES			
	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0392	0.0379	100,000	60.3	0.0344	0.0335	100,000	66.2
1	0.0037	0.0146	96,206	61.6	0.0044	0.0173	96,654	67.5
5	0.0012	0.0060	94,803	58.5	0.0013	0.0063	94,979	64.7
10	0.0009	0.0046	94,236	53.9	0.0010	0.0050	94,378	60.1
15	0.0020	0.0099	93,798	49.1	0.0018	0.0089	93,907	55.4
20	0.0034	0.0166	92,874	44.6	0.0024	0.0119	93,070	50.9
25	0.0040	0.0198	91,330	40.3	0.0027	0.0133	91,964	46.4
30	0.0051	0.0254	89,521	36.0	0.0032	0.0156	90,745	42.0
35	0.0070	0.0346	87,249	31.9	0.0041	0.0201	89,326	37.7
40	0.0098	0.0480	84,228	28.0	0.0054	0.0264	87,535	33.4
45	0.0135	0.0653	80,183	24.2	0.0071	0.0350	85,223	29.2
50	0.0183	0.0876	74,948	20.7	0.0099	0.0486	82,240	25.2
55	0.0248	0.1172	68,380	17.5	0.0140	0.0676	78,247	21.3
60	0.0346	0.1597	60,369	14.5	0.0203	0.0966	72,957	17.7
65	0.0485	0.2169	50,728	11.7	0.0303	0.1411	65,910	14.3
70	0.0703	0.2992	39,726	9.3	0.0474	0.2128	56,612	11.2
75	0.1021	0.4050	27,841	7.2	0.0744	0.3145	44,564	8.5
80	0.1520	0.5417	16,564	5.4	0.1193	0.4573	30,549	6.3
85	0.2262	0.6919	7,592	4.0	0.1913	0.6305	16,578	4.5
90	0.3194	0.8114	2,339	3.0	0.2856	0.7761	6,126	3.3
95	0.4317	0.8934	441	2.3	0.3999	0.8772	1,371	2.4
100	0.5714	...	47	1.8	0.5545	...	168	1.8

KENYA URBAN								
Age (x)	MALE				FEMALE			
	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0388	0.0376	100,000	63.0	0.0350	0.0340	100,000	68.6
1	0.0033	0.0129	96,245	64.5	0.0037	0.0147	96,605	70.0
5	0.0010	0.0052	95,000	61.3	0.0010	0.0052	95,181	67.0
10	0.0008	0.0040	94,507	56.6	0.0008	0.0039	94,687	62.3
15	0.0017	0.0083	94,130	51.8	0.0013	0.0066	94,318	57.6
20	0.0027	0.0133	93,347	47.2	0.0018	0.0088	93,693	52.9
25	0.0030	0.0151	92,108	42.8	0.0020	0.0098	92,872	48.4
30	0.0038	0.0187	90,719	38.5	0.0023	0.0116	91,962	43.8
35	0.0051	0.0250	89,024	34.1	0.0030	0.0149	90,892	39.3
40	0.0071	0.0348	86,798	30.0	0.0040	0.0198	89,538	34.9
45	0.0100	0.0489	83,776	25.9	0.0055	0.0271	87,764	30.5
50	0.0142	0.0689	79,681	22.1	0.0079	0.0387	85,386	26.3
55	0.0204	0.0973	74,194	18.6	0.0115	0.0558	82,079	22.2
60	0.0296	0.1381	66,978	15.3	0.0172	0.0825	77,500	18.4
65	0.0431	0.1949	57,730	12.3	0.0267	0.1255	71,109	14.8
70	0.0641	0.2765	46,477	9.7	0.0433	0.1961	62,186	11.6
75	0.0954	0.3843	33,625	7.4	0.0702	0.2996	49,990	8.8
80	0.1448	0.5245	20,702	5.6	0.1147	0.4444	35,012	6.4
85	0.2198	0.6817	9,844	4.1	0.1875	0.6235	19,452	4.6
90	0.3144	0.8069	3,133	3.0	0.2835	0.7740	7,324	3.3
95	0.4283	0.8922	605	2.3	0.3999	0.8777	1,655	2.4
100	0.5739	...	65	1.7	0.5588	...	202	1.8

MOMBASA								
Age (x)	MALES				FEMALES			
	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0375	0.0363	100,000	65.7	0.0253	0.0247	100,000	71.1
1	0.0051	0.0203	96,365	67.1	0.0042	0.0168	97,529	71.9
5	0.0019	0.0097	94,409	64.5	0.0015	0.0074	95,888	69.1
10	0.0011	0.0056	93,497	60.1	0.0009	0.0045	95,177	64.6
15	0.0022	0.0107	92,971	55.4	0.0014	0.0068	94,749	59.9
20	0.0031	0.0153	91,976	51.0	0.0017	0.0085	94,102	55.3
25	0.0032	0.0161	90,566	46.8	0.0020	0.0100	93,306	50.8
30	0.0035	0.0174	89,110	42.5	0.0023	0.0114	92,373	46.3
35	0.0040	0.0196	87,560	38.2	0.0027	0.0133	91,316	41.8
40	0.0049	0.0241	85,847	33.9	0.0033	0.0163	90,105	37.3
45	0.0061	0.0303	83,777	29.7	0.0039	0.0191	88,634	32.9
50	0.0088	0.0432	81,242	25.5	0.0053	0.0262	86,940	28.4
55	0.0119	0.0579	77,729	21.5	0.0074	0.0362	84,660	24.1
60	0.0184	0.0880	73,231	17.7	0.0117	0.0567	81,598	20.0
65	0.0288	0.1349	66,790	14.2	0.0195	0.0934	76,970	16.0
70	0.0468	0.2103	57,780	11.0	0.0341	0.1580	69,779	12.4
75	0.0777	0.3265	45,627	8.2	0.0605	0.2642	58,756	9.2
80	0.1289	0.4845	30,732	5.9	0.1091	0.4288	43,234	6.5
85	0.2098	0.6651	15,843	4.2	0.1863	0.6207	24,696	4.6
90	0.3140	0.8089	5,306	3.0	0.2862	0.7783	9,368	3.2
95	0.4471	0.9074	1,014	2.2	0.4132	0.8904	2,077	2.4
100	0.5556	...	94	1.8	0.5187	...	228	1.9

KWALE								
MALES					FEMALES			
Age (x)	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0438	0.0422	100,000	58.2	0.0299	0.0291	100,000	60.7
1	0.0044	0.0173	95,776	59.7	0.0055	0.0219	97,087	61.5
5	0.0014	0.0070	94,119	56.7	0.0018	0.0089	94,962	58.9
10	0.0011	0.0053	93,458	52.1	0.0015	0.0076	94,120	54.4
15	0.0022	0.0110	92,960	47.4	0.0031	0.0151	93,403	49.8
20	0.0039	0.0193	91,933	42.9	0.0042	0.0210	91,988	45.5
25	0.0048	0.0236	90,156	38.7	0.0048	0.0239	90,058	41.4
30	0.0062	0.0306	88,031	34.5	0.0058	0.0287	87,908	37.4
35	0.0086	0.0419	85,337	30.6	0.0076	0.0375	85,381	33.4
40	0.0119	0.0577	81,758	26.8	0.0101	0.0493	82,179	29.6
45	0.0159	0.0767	77,040	23.3	0.0128	0.0620	78,131	26.0
50	0.0210	0.0997	71,131	20.0	0.0167	0.0804	73,289	22.5
55	0.0276	0.1294	64,037	16.9	0.0216	0.1026	67,394	19.3
60	0.0374	0.1714	55,749	14.0	0.0288	0.1343	60,482	16.2
65	0.0515	0.2286	46,196	11.4	0.0385	0.1758	52,357	13.3
70	0.0738	0.3116	35,633	9.0	0.0555	0.2440	43,152	10.6
75	0.1062	0.4172	24,530	7.0	0.0810	0.3368	32,624	8.2
80	0.1567	0.5527	14,296	5.3	0.1261	0.4759	21,637	6.1
85	0.2313	0.7000	6,394	3.9	0.1965	0.6398	11,339	4.4
90	0.3247	0.8165	1,918	2.9	0.2895	0.7803	4,084	3.2
95	0.4376	0.8962	352	2.2	0.4028	0.8787	897	2.4
100	0.5744	...	37	1.7	0.5562	...	109	1.8

KILIFI								
MALES					FEMALES			
Age (x)	nMx	nqx	l(x)	e(x)	nMx	nqx	l(x)	e(x)
0	0.0492	0.0473	100,000	57.8	0.0338	0.0328	100,000	59.2
1	0.0049	0.0192	95,275	59.6	0.0064	0.0253	96,717	60.2
5	0.0015	0.0077	93,445	56.8	0.0020	0.0101	94,273	57.8
10	0.0011	0.0056	92,728	52.2	0.0017	0.0086	93,317	53.3
15	0.0022	0.0111	92,206	47.5	0.0034	0.0170	92,513	48.8
20	0.0040	0.0196	91,178	43.0	0.0048	0.0236	90,939	44.6
25	0.0048	0.0238	89,394	38.8	0.0054	0.0267	88,790	40.6
30	0.0062	0.0307	87,264	34.7	0.0065	0.0320	86,415	36.6
35	0.0085	0.0418	84,582	30.7	0.0084	0.0413	83,650	32.8
40	0.0117	0.0570	81,046	26.9	0.0109	0.0532	80,199	29.1
45	0.0157	0.0754	76,427	23.4	0.0136	0.0659	75,929	25.5
50	0.0206	0.0980	70,664	20.1	0.0176	0.0846	70,924	22.2
55	0.0273	0.1280	63,739	17.0	0.0226	0.1072	64,926	19.0
60	0.0369	0.1690	55,581	14.1	0.0298	0.1387	57,966	15.9
65	0.0512	0.2271	46,187	11.4	0.0397	0.1811	49,928	13.1
70	0.0737	0.3110	35,696	9.0	0.0571	0.2503	40,887	10.4
75	0.1064	0.4179	24,593	7.0	0.0831	0.3440	30,652	8.1
80	0.1574	0.5544	14,316	5.3	0.1289	0.4833	20,107	6.0
85	0.2328	0.7025	6,380	3.9	0.1998	0.6461	10,389	4.4
90	0.3271	0.8189	1,898	2.9	0.2932	0.7845	3,677	3.2
95	0.4410	0.8981	344	2.2	0.4068	0.8810	793	2.4
100	0.5797	...	35	1.7	0.5601	...	94	1.8

TANA RIVER								
MALE					FEMALE			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0620	0.0591	100,000	56.2	0.0369	0.0358	100,000	58.6
1	0.0062	0.0243	94,087	58.8	0.0070	0.0274	96,422	59.8
5	0.0019	0.0094	91,800	56.2	0.0022	0.0109	93,784	57.5
10	0.0013	0.0064	90,937	51.7	0.0018	0.0091	92,763	53.1
15	0.0023	0.0115	90,352	47.0	0.0036	0.0178	91,918	48.5
20	0.0042	0.0208	89,314	42.5	0.0050	0.0247	90,286	44.4
25	0.0052	0.0257	87,452	38.4	0.0056	0.0278	88,056	40.4
30	0.0067	0.0330	85,207	34.3	0.0067	0.0330	85,607	36.5
35	0.0091	0.0443	82,398	30.4	0.0086	0.0422	82,781	32.7
40	0.0122	0.0594	78,748	26.7	0.0111	0.0539	79,289	29.0
45	0.0161	0.0773	74,070	23.2	0.0137	0.0662	75,016	25.5
50	0.0209	0.0994	68,342	20.0	0.0177	0.0847	70,050	22.1
55	0.0277	0.1299	61,551	16.9	0.0227	0.1075	64,119	18.9
60	0.0368	0.1689	53,555	14.0	0.0298	0.1389	57,223	15.9
65	0.0515	0.2286	44,509	11.3	0.0401	0.1824	49,276	13.0
70	0.0746	0.3144	34,333	8.9	0.0578	0.2528	40,288	10.4
75	0.1081	0.4232	23,540	6.9	0.0842	0.3477	30,105	8.0
80	0.1601	0.5608	13,577	5.2	0.1303	0.4871	19,637	6.0
85	0.2370	0.7093	5,963	3.8	0.2016	0.6494	10,071	4.3
90	0.3330	0.8245	1,733	2.9	0.2951	0.7866	3,531	3.2
95	0.4475	0.9020	304	2.2	0.4087	0.8821	753	2.4
100	0.6065	...	30	1.6	0.5616	...	89	1.8

LAMU								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0503	0.0483	100,000	64.1	0.0274	0.0268	100,000	68.9
1	0.0068	0.0269	95,171	66.3	0.0046	0.0182	97,324	69.8
5	0.0026	0.0128	92,611	64.1	0.0016	0.0080	95,550	67.0
10	0.0015	0.0074	91,428	59.9	0.0010	0.0048	94,784	62.6
15	0.0022	0.0107	90,749	55.4	0.0018	0.0087	94,325	57.9
20	0.0031	0.0155	89,774	50.9	0.0022	0.0108	93,503	53.3
25	0.0033	0.0162	88,384	46.7	0.0026	0.0127	92,494	48.9
30	0.0035	0.0175	86,951	42.4	0.0029	0.0145	91,317	44.5
35	0.0040	0.0197	85,425	38.1	0.0034	0.0168	89,994	40.1
40	0.0049	0.0243	83,742	33.8	0.0042	0.0206	88,481	35.7
45	0.0062	0.0305	81,710	29.6	0.0049	0.0240	86,659	31.4
50	0.0089	0.0435	79,222	25.5	0.0066	0.0326	84,577	27.2
55	0.0120	0.0582	75,773	21.5	0.0091	0.0446	81,817	23.0
60	0.0185	0.0885	71,364	17.7	0.0143	0.0691	78,165	18.9
65	0.0290	0.1356	65,051	14.1	0.0235	0.1116	72,764	15.1
70	0.0470	0.2111	56,233	10.9	0.0400	0.1829	64,646	11.7
75	0.0780	0.3273	44,360	8.2	0.0684	0.2935	52,821	8.7
80	0.1291	0.4851	29,842	5.9	0.1179	0.4540	37,320	6.3
85	0.2100	0.6654	15,367	4.2	0.1929	0.6329	20,378	4.5
90	0.3141	0.8090	5,142	3.0	0.2890	0.7808	7,480	3.2
95	0.4471	0.9073	982	2.2	0.4138	0.8897	1,639	2.4
100	0.5556	...	91	1.8	0.5174	...	181	1.9

TAITA TAVETA								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0317	0.0308	100,000	61.2	0.02	0.0217	100,000.00	69.15
1	0.0044	0.0172	96,916	62.2	0.00	0.0148	97,826.61	69.69
5	0.0017	0.0082	95,247	59.2	0.00	0.0065	96,380.59	66.71
10	0.0010	0.0048	94,465	54.7	0.00	0.0039	95,751.35	62.13
15	0.0038	0.0186	94,012	50.0	0.00	0.0092	95,373.88	57.37
20	0.0054	0.0265	92,259	45.9	0.00	0.0114	94,495.38	52.88
25	0.0056	0.0274	89,814	42.0	0.00	0.0134	93,414.71	48.46
30	0.0060	0.0293	87,351	38.2	0.00	0.0153	92,161.89	44.08
35	0.0066	0.0325	84,790	34.2	0.00	0.0177	90,753.21	39.73
40	0.0080	0.0394	82,037	30.3	0.00	0.0217	89,147.22	35.40
45	0.0100	0.0486	78,802	26.4	0.01	0.0252	87,215.50	31.12
50	0.0140	0.0676	74,973	22.7	0.01	0.0343	85,014.29	26.86
55	0.0183	0.0876	69,906	19.1	0.01	0.0467	82,099.97	22.72
60	0.0271	0.1274	63,785	15.7	0.01	0.0721	78,262.22	18.71
65	0.0404	0.1841	55,660	12.6	0.02	0.1158	72,616.77	14.96
70	0.0612	0.2660	45,414	9.9	0.04	0.1886	64,206.50	11.57
75	0.0937	0.3792	33,332	7.5	0.07	0.2998	52,099.26	8.64
80	0.1430	0.5200	20,694	5.6	0.12	0.4591	36,480.26	6.24
85	0.2185	0.6788	9,932	4.1	0.19	0.6353	19,733.13	4.44
90	0.3170	0.8109	3,190	3.0	0.29	0.7813	7,196.43	3.22
95	0.4476	0.9063	603	2.2	0.41	0.8896	1,573.68	2.36
100	0.5516	...	57	1.8	0.52	...	173.77	1.93

GARISSA								
MALE					FEMALE			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0546	0.0523	100,000	57.4	0.0328	0.0319	100,000	60.5
1	0.0054	0.0211	94,770	59.6	0.0059	0.0233	96,810	61.5
5	0.0017	0.0083	92,768	56.8	0.0019	0.0093	94,552	59.0
10	0.0012	0.0059	91,997	52.3	0.0016	0.0078	93,672	54.5
15	0.0022	0.0111	91,456	47.6	0.0031	0.0153	92,939	49.9
20	0.0040	0.0197	90,441	43.1	0.0043	0.0212	91,513	45.6
25	0.0049	0.0240	88,662	38.9	0.0049	0.0240	89,571	41.6
30	0.0062	0.0307	86,537	34.8	0.0058	0.0286	87,424	37.5
35	0.0085	0.0415	83,877	30.8	0.0075	0.0370	84,920	33.6
40	0.0115	0.0561	80,399	27.0	0.0099	0.0481	81,775	29.7
45	0.0153	0.0740	75,889	23.5	0.0124	0.0602	77,841	26.1
50	0.0202	0.0962	70,276	20.2	0.0163	0.0783	73,152	22.6
55	0.0270	0.1265	63,516	17.0	0.0212	0.1006	67,424	19.3
60	0.0363	0.1666	55,482	14.1	0.0283	0.1322	60,642	16.2
65	0.0508	0.2256	46,237	11.4	0.0383	0.1751	52,625	13.3
70	0.0735	0.3103	35,806	9.0	0.0557	0.2448	43,408	10.6
75	0.1065	0.4184	24,694	7.0	0.0817	0.3394	32,783	8.2
80	0.1579	0.5557	14,363	5.2	0.1272	0.4788	21,657	6.1
85	0.2341	0.7046	6,382	3.9	0.1980	0.6427	11,287	4.4
90	0.3292	0.8210	1,885	2.9	0.2911	0.7821	4,033	3.2
95	0.4438	0.8997	337	2.2	0.4042	0.8795	879	2.4
100	0.5881	...	34	1.7	0.5570	...	106	1.8

WAJIR								
Age	Males				Females			
	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$
0	0.05986	0.05715	100,000	56.7	0.02724	0.02661	100,000	62.0
1	0.00590	0.02325	94,285	59.1	0.00491	0.01940	97,339	62.7
5	0.00182	0.00906	92,093	56.5	0.00158	0.00787	95,451	59.9
10	0.00125	0.00623	91,259	52.0	0.00137	0.00683	94,700	55.4
15	0.00228	0.01134	90,690	47.3	0.00273	0.01357	94,053	50.8
20	0.00410	0.02030	89,661	42.8	0.00378	0.01873	92,777	46.4
25	0.00504	0.02490	87,841	38.6	0.00430	0.02128	91,040	42.3
30	0.00649	0.03195	85,654	34.6	0.00523	0.02582	89,103	38.1
35	0.00877	0.04295	82,917	30.6	0.00691	0.03399	86,802	34.1
40	0.01188	0.05775	79,356	26.9	0.00923	0.04515	83,851	30.2
45	0.01568	0.07553	74,773	23.4	0.01186	0.05765	80,066	26.5
50	0.02049	0.09760	69,125	20.1	0.01572	0.07572	75,450	22.9
55	0.02733	0.12812	62,379	17.0	0.02044	0.09737	69,737	19.6
60	0.03648	0.16746	54,387	14.1	0.02757	0.12918	62,947	16.4
65	0.05111	0.22702	45,279	11.4	0.03712	0.17020	54,815	13.5
70	0.07406	0.31246	35,000	9.0	0.05382	0.23770	45,485	10.7
75	0.10746	0.42122	24,064	6.9	0.07902	0.33011	34,674	8.3
80	0.15925	0.55883	13,928	5.2	0.12367	0.46917	23,227	6.2
85	0.23599	0.70769	6,144	3.8	0.19356	0.63428	12,330	4.5
90	0.33177	0.82336	1,796	2.9	0.28624	0.77652	4,509	3.3
95	0.44640	0.90128	317	2.2	0.39917	0.87655	1,008	2.4
100	0.60005	...	31	1.7	0.55245	...	124	1.8

MANDERA								
Age (x)	MALES				FEMALES			
	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0545	0.0522	100,000	57.3	0.0312	0.0304	100,000	60.5
1	0.0054	0.0212	94,776	59.5	0.0057	0.0227	96,963	61.4
5	0.0017	0.0083	92,767	56.7	0.0018	0.0091	94,765	58.8
10	0.0012	0.0059	91,996	52.2	0.0016	0.0078	93,902	54.3
15	0.0023	0.0112	91,455	47.5	0.0031	0.0154	93,172	49.7
20	0.0040	0.0198	90,431	43.0	0.0043	0.0213	91,738	45.5
25	0.0049	0.0242	88,639	38.8	0.0049	0.0241	89,786	41.4
30	0.0063	0.0311	86,493	34.7	0.0059	0.0290	87,621	37.4
35	0.0086	0.0420	83,805	30.7	0.0077	0.0377	85,081	33.4
40	0.0117	0.0568	80,286	27.0	0.0101	0.0492	81,878	29.6
45	0.0155	0.0748	75,725	23.4	0.0127	0.0617	77,849	26.0
50	0.0204	0.0971	70,061	20.1	0.0167	0.0801	73,042	22.5
55	0.0272	0.1273	63,261	17.0	0.0215	0.1023	67,194	19.3
60	0.0365	0.1675	55,206	14.1	0.0287	0.1340	60,320	16.2
65	0.0510	0.2264	45,961	11.4	0.0385	0.1760	52,239	13.3
70	0.0737	0.3111	35,556	9.0	0.0557	0.2448	43,042	10.6
75	0.1067	0.4190	24,495	7.0	0.0814	0.3383	32,505	8.2
80	0.1581	0.5562	14,230	5.2	0.1268	0.4776	21,508	6.1
85	0.2343	0.7049	6,315	3.9	0.1973	0.6414	11,236	4.4
90	0.3294	0.8211	1,863	2.9	0.2903	0.7813	4,030	3.2
95	0.4439	0.8997	333	2.2	0.4036	0.8792	881	2.4
100	0.5878	...	33	1.7	0.5567	...	107	1.8

MARSABIT								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0320	0.0311	100,000	57.9	0.0220	0.0216	100,000	62.6
1	0.0044	0.0174	96,889	58.8	0.0037	0.0147	97,838	63.0
5	0.0017	0.0083	95,206	55.8	0.0013	0.0065	96,400	59.9
10	0.0010	0.0048	94,419	51.3	0.0008	0.0039	95,775	55.2
15	0.0052	0.0258	93,962	46.5	0.0038	0.0189	95,402	50.5
20	0.0074	0.0362	91,541	42.6	0.0047	0.0231	93,600	46.4
25	0.0076	0.0371	88,227	39.1	0.0054	0.0268	91,434	42.4
30	0.0080	0.0393	84,954	35.6	0.0061	0.0301	88,980	38.5
35	0.0088	0.0430	81,618	31.9	0.0070	0.0343	86,302	34.6
40	0.0106	0.0515	78,107	28.2	0.0084	0.0411	83,345	30.8
45	0.0129	0.0625	74,083	24.6	0.0096	0.0468	79,919	27.0
50	0.0178	0.0854	69,449	21.1	0.0127	0.0617	76,182	23.2
55	0.0228	0.1081	63,520	17.8	0.0169	0.0811	71,480	19.5
60	0.0330	0.1527	56,651	14.7	0.0252	0.1189	65,682	16.0
65	0.0475	0.2127	47,999	11.9	0.0388	0.1775	57,871	12.8
70	0.0691	0.2947	37,789	9.4	0.0601	0.2619	47,598	10.0
75	0.1015	0.4030	26,651	7.2	0.0915	0.3719	35,130	7.7
80	0.1490	0.5344	15,911	5.5	0.1394	0.5105	22,066	5.7
85	0.2219	0.6840	7,409	4.0	0.2070	0.6573	10,801	4.3
90	0.3181	0.8117	2,341	3.0	0.2945	0.7856	3,702	3.2
95	0.4478	0.9058	441	2.2	0.4150	0.8882	794	2.4
100	0.5502	...	42	1.8	0.5091	...	89	2.0

ISIOLO								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0425	0.0410	100,000	60.1	0.0300	0.0292	100,000	59.6
1	0.0058	0.0229	95,901	61.7	0.0050	0.0199	97,078	60.4
5	0.0022	0.0109	93,708	59.1	0.0018	0.0088	95,149	57.6
10	0.0013	0.0063	92,687	54.7	0.0011	0.0053	94,315	53.0
15	0.0037	0.0185	92,100	50.0	0.0047	0.0231	93,817	48.3
20	0.0053	0.0263	90,392	45.9	0.0057	0.0281	91,648	44.4
25	0.0055	0.0273	88,014	42.1	0.0066	0.0324	89,072	40.6
30	0.0059	0.0291	85,614	38.2	0.0074	0.0361	86,184	36.9
35	0.0066	0.0323	83,120	34.3	0.0083	0.0409	83,069	33.2
40	0.0080	0.0392	80,437	30.3	0.0100	0.0486	79,674	29.5
45	0.0099	0.0483	77,285	26.5	0.0113	0.0548	75,801	25.8
50	0.0139	0.0673	73,552	22.7	0.0148	0.0716	71,644	22.2
55	0.0182	0.0871	68,605	19.1	0.0195	0.0929	66,512	18.7
60	0.0270	0.1269	62,626	15.7	0.0286	0.1339	60,333	15.4
65	0.0403	0.1835	54,682	12.6	0.0432	0.1954	52,253	12.3
70	0.0610	0.2654	44,649	9.9	0.0652	0.2807	42,042	9.7
75	0.0936	0.3786	32,799	7.5	0.0966	0.3878	30,243	7.5
80	0.1429	0.5197	20,382	5.6	0.1435	0.5204	18,514	5.7
85	0.2184	0.6787	9,790	4.1	0.2094	0.6612	8,879	4.2
90	0.3170	0.8109	3,145	3.0	0.2954	0.7864	3,008	3.2
95	0.4476	0.9063	595	2.2	0.4152	0.8880	643	2.4
100	0.5516	...	56	1.8	0.5100	...	72	2.0

MERU								
Age	MALES				FEMALES			
	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$
0	0.0408	0.0394	100,000	62.2	0.0282	0.0275	100,000	68.2
1	0.0056	0.0220	96,061	63.7	0.0047	0.0187	97,251	69.2
5	0.0021	0.0104	93,949	61.1	0.0017	0.0082	95,433	66.5
10	0.0012	0.0061	92,968	56.7	0.0010	0.0050	94,649	62.0
15	0.0031	0.0152	92,403	52.1	0.0019	0.0093	94,177	57.3
20	0.0044	0.0217	90,998	47.8	0.0023	0.0115	93,300	52.8
25	0.0046	0.0225	89,027	43.8	0.0027	0.0136	92,224	48.4
30	0.0049	0.0243	87,019	39.8	0.0031	0.0154	90,973	44.0
35	0.0055	0.0270	84,909	35.7	0.0036	0.0178	89,569	39.7
40	0.0067	0.0330	82,617	31.6	0.0044	0.0219	87,971	35.3
45	0.0084	0.0410	79,890	27.6	0.0052	0.0254	86,048	31.1
50	0.0119	0.0577	76,616	23.7	0.0070	0.0345	83,859	26.8
55	0.0157	0.0757	72,198	20.0	0.0096	0.0471	80,964	22.7
60	0.0237	0.1120	66,735	16.4	0.0150	0.0726	77,152	18.7
65	0.0360	0.1656	59,261	13.1	0.0247	0.1165	71,551	14.9
70	0.0559	0.2461	49,446	10.2	0.0416	0.1895	63,213	11.5
75	0.0882	0.3614	37,277	7.7	0.0705	0.3008	51,233	8.6
80	0.1384	0.5087	23,806	5.7	0.1200	0.4599	35,821	6.2
85	0.2158	0.6746	11,697	4.1	0.1944	0.6357	19,348	4.4
90	0.3161	0.8103	3,806	3.0	0.2896	0.7814	7,049	3.2
95	0.4475	0.9066	722	2.2	0.4139	0.8896	1,541	2.4
100	0.5528	...	67	1.8	0.5170	...	170	1.9

THARAKA-NITHI								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0222	0.0217	100,000	63.8	0.0155	0.0152	100,000	70.3
1	0.0031	0.0121	97,828	64.2	0.0026	0.0104	98,475	70.4
5	0.0012	0.0058	96,643	60.9	0.0009	0.0046	97,454	67.1
10	0.0007	0.0034	96,084	56.3	0.0006	0.0028	97,007	62.4
15	0.0033	0.0161	95,758	51.5	0.0018	0.0090	96,735	57.6
20	0.0047	0.0230	94,213	47.3	0.0022	0.0111	95,868	53.1
25	0.0048	0.0239	92,047	43.3	0.0026	0.0131	94,800	48.7
30	0.0052	0.0256	89,850	39.3	0.0030	0.0149	93,562	44.3
35	0.0058	0.0285	87,548	35.3	0.0035	0.0173	92,168	39.9
40	0.0071	0.0348	85,053	31.2	0.0043	0.0211	90,578	35.6
45	0.0088	0.0431	82,097	27.3	0.0050	0.0247	88,664	31.3
50	0.0124	0.0604	78,560	23.4	0.0068	0.0335	86,478	27.0
55	0.0164	0.0790	73,815	19.7	0.0093	0.0457	83,585	22.8
60	0.0247	0.1164	67,984	16.2	0.0146	0.0706	79,766	18.8
65	0.0373	0.1710	60,069	13.0	0.0240	0.1138	74,131	15.0
70	0.0575	0.2520	49,800	10.1	0.0408	0.1858	65,698	11.6
75	0.0898	0.3667	37,249	7.7	0.0693	0.2968	53,488	8.7
80	0.1398	0.5122	23,589	5.7	0.1188	0.4566	37,614	6.3
85	0.2166	0.6759	11,507	4.1	0.1936	0.6342	20,438	4.5
90	0.3164	0.8105	3,729	3.0	0.2893	0.7811	7,477	3.2
95	0.4475	0.9065	707	2.2	0.4139	0.8896	1,637	2.4
100	0.5524	...	66	1.8	0.5172	...	181	1.9

EMBU								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0313	0.0305	100,000	58.7	0.0225	0.0221	100,000	70.1
1	0.0043	0.0170	96,949	59.5	0.0038	0.0150	97,795	70.7
5	0.0016	0.0081	95,299	56.5	0.0013	0.0066	96,326	67.7
10	0.0010	0.0047	94,525	52.0	0.0008	0.0040	95,688	63.2
15	0.0049	0.0242	94,077	47.2	0.0016	0.0082	95,306	58.4
20	0.0069	0.0340	91,805	43.3	0.0020	0.0101	94,527	53.9
25	0.0071	0.0349	88,681	39.7	0.0024	0.0119	93,568	49.4
30	0.0076	0.0371	85,584	36.1	0.0027	0.0136	92,452	45.0
35	0.0083	0.0407	82,412	32.4	0.0032	0.0158	91,193	40.5
40	0.0100	0.0489	79,057	28.6	0.0039	0.0194	89,755	36.2
45	0.0123	0.0595	75,191	25.0	0.0046	0.0226	88,016	31.8
50	0.0170	0.0816	70,714	21.4	0.0063	0.0308	86,027	27.5
55	0.0219	0.1038	64,944	18.1	0.0086	0.0422	83,374	23.3
60	0.0318	0.1476	58,201	14.9	0.0135	0.0656	79,852	19.2
65	0.0461	0.2071	49,611	12.0	0.0224	0.1066	74,611	15.4
70	0.0676	0.2893	39,338	9.5	0.0384	0.1762	66,659	11.9
75	0.1000	0.3986	27,957	7.3	0.0663	0.2859	54,913	8.8
80	0.1479	0.5318	16,813	5.5	0.1156	0.4476	39,216	6.4
85	0.2213	0.6831	7,872	4.0	0.1912	0.6300	21,662	4.5
90	0.3179	0.8115	2,495	3.0	0.2883	0.7802	8,016	3.2
95	0.4478	0.9059	470	2.2	0.4136	0.8899	1,762	2.4
100	0.5504	...	44	1.8	0.5178	...	194	1.9

KITUI								
Age	MALES				FEMALES			
	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$
0	0.0304	0.0296	100,000	55.7	0.0205	0.0201	100,000	68.8
1	0.0042	0.0165	97,039	56.4	0.0035	0.0137	97,986	69.2
5	0.0016	0.0079	95,436	53.3	0.0012	0.0060	96,641	66.1
10	0.0009	0.0046	94,685	48.7	0.0007	0.0036	96,058	61.5
15	0.0065	0.0323	94,251	43.9	0.0020	0.0099	95,708	56.7
20	0.0092	0.0449	91,209	40.3	0.0025	0.0122	94,760	52.3
25	0.0093	0.0456	87,115	37.1	0.0029	0.0144	93,602	47.9
30	0.0098	0.0478	83,144	33.7	0.0033	0.0164	92,254	43.6
35	0.0107	0.0519	79,171	30.3	0.0038	0.0189	90,744	39.2
40	0.0127	0.0615	75,063	26.8	0.0047	0.0231	89,027	35.0
45	0.0153	0.0738	70,444	23.4	0.0054	0.0268	86,967	30.7
50	0.0208	0.0992	65,248	20.1	0.0074	0.0364	84,632	26.5
55	0.0263	0.1234	58,777	17.0	0.0101	0.0495	81,551	22.4
60	0.0372	0.1706	51,526	14.0	0.0158	0.0761	77,513	18.4
65	0.0523	0.2317	42,738	11.4	0.0258	0.1215	71,615	14.7
70	0.0741	0.3125	32,836	9.1	0.0432	0.1959	62,916	11.4
75	0.1061	0.4168	22,575	7.1	0.0724	0.3078	50,591	8.5
80	0.1524	0.5422	13,167	5.4	0.1220	0.4654	35,019	6.2
85	0.2238	0.6867	6,028	4.0	0.1958	0.6382	18,723	4.4
90	0.3187	0.8120	1,889	3.0	0.2902	0.7819	6,774	3.2
95	0.4479	0.9056	355	2.2	0.4141	0.8894	1,477	2.4
100	0.5495	...	34	1.8	0.5167	...	163	1.9

MACHAKOS								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0351	0.0341	100,000	57.9	0.0234	0.0229	100,000	63.9
1	0.0037	0.0146	96,592	58.9	0.0040	0.0160	97,707	64.4
5	0.0012	0.0062	95,183	55.8	0.0013	0.0065	96,140	61.4
10	0.0010	0.0049	94,594	51.1	0.0012	0.0057	95,513	56.8
15	0.0023	0.0112	94,127	46.4	0.0023	0.0115	94,965	52.1
20	0.0040	0.0199	93,074	41.9	0.0032	0.0158	93,869	47.7
25	0.0050	0.0247	91,225	37.7	0.0036	0.0180	92,384	43.4
30	0.0067	0.0328	88,976	33.5	0.0045	0.0221	90,717	39.2
35	0.0094	0.0461	86,055	29.6	0.0060	0.0295	88,711	35.0
40	0.0133	0.0645	82,086	25.9	0.0081	0.0399	86,096	31.0
45	0.0180	0.0861	76,788	22.5	0.0107	0.0521	82,659	27.2
50	0.0234	0.1105	70,180	19.4	0.0144	0.0695	78,351	23.5
55	0.0299	0.1394	62,422	16.5	0.0189	0.0904	72,903	20.1
60	0.0402	0.1831	53,721	13.7	0.0260	0.1221	66,315	16.8
65	0.0540	0.2381	43,887	11.2	0.0352	0.1620	58,220	13.8
70	0.0760	0.3190	33,437	8.9	0.0514	0.2281	48,786	11.0
75	0.1076	0.4214	22,771	7.0	0.0759	0.3195	37,656	8.5
80	0.1575	0.5543	13,176	5.3	0.1198	0.4583	25,627	6.3
85	0.2304	0.6981	5,873	3.9	0.1889	0.6252	13,881	4.5
90	0.3219	0.8135	1,773	2.9	0.2811	0.7704	5,203	3.3
95	0.4325	0.8934	331	2.3	0.3936	0.8731	1,195	2.5
100	0.5694	...	35	1.8	0.5468	...	152	1.8

MAKUENI								
MALES					FEMALES			
Age (x)	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0375	0.0363	100,000	58.1	0.0260	0.0255	100,000	62.4
1	0.0039	0.0153	96,367	59.3	0.0047	0.0185	97,454	63.0
5	0.0013	0.0064	94,893	56.2	0.0015	0.0075	95,647	60.2
10	0.0010	0.0050	94,288	51.5	0.0013	0.0066	94,928	55.6
15	0.0022	0.0111	93,813	46.7	0.0026	0.0131	94,303	51.0
20	0.0040	0.0196	92,767	42.2	0.0037	0.0181	93,066	46.6
25	0.0049	0.0242	90,948	38.0	0.0042	0.0207	91,378	42.4
30	0.0065	0.0320	88,745	33.9	0.0051	0.0252	89,487	38.3
35	0.0091	0.0445	85,909	29.9	0.0068	0.0333	87,233	34.2
40	0.0128	0.0619	82,087	26.2	0.0091	0.0444	84,331	30.3
45	0.0172	0.0825	77,005	22.8	0.0117	0.0570	80,585	26.6
50	0.0225	0.1065	70,651	19.6	0.0156	0.0751	75,992	23.0
55	0.0291	0.1356	63,129	16.6	0.0203	0.0966	70,287	19.7
60	0.0392	0.1789	54,567	13.8	0.0274	0.1284	63,501	16.5
65	0.0531	0.2347	44,807	11.3	0.0368	0.1690	55,345	13.6
70	0.0752	0.3162	34,292	9.0	0.0534	0.2359	45,990	10.8
75	0.1070	0.4196	23,449	7.0	0.0784	0.3278	35,139	8.3
80	0.1570	0.5534	13,610	5.3	0.1228	0.4668	23,619	6.2
85	0.2305	0.6984	6,078	3.9	0.1925	0.6322	12,594	4.5
90	0.3226	0.8142	1,833	2.9	0.2851	0.7751	4,632	3.3
95	0.4339	0.8942	341	2.2	0.3979	0.8758	1,042	2.4
100	0.5706	...	36	1.8	0.5513	...	129	1.8

NYANDARUA								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0375	0.0363	100,000	58.0	0.0244	0.0239	100,000	63.2
1	0.0039	0.0153	96,370	59.2	0.0043	0.0171	97,610	63.8
5	0.0013	0.0064	94,892	56.1	0.0014	0.0070	95,942	60.8
10	0.0010	0.0050	94,282	51.4	0.0012	0.0061	95,272	56.2
15	0.0023	0.0112	93,807	46.7	0.0025	0.0122	94,688	51.6
20	0.0040	0.0197	92,757	42.2	0.0034	0.0169	93,530	47.2
25	0.0049	0.0244	90,928	38.0	0.0039	0.0193	91,953	43.0
30	0.0065	0.0321	88,713	33.9	0.0048	0.0235	90,181	38.7
35	0.0092	0.0448	85,861	29.9	0.0064	0.0313	88,059	34.6
40	0.0129	0.0624	82,017	26.2	0.0086	0.0421	85,305	30.6
45	0.0173	0.0831	76,901	22.7	0.0112	0.0545	81,715	26.9
50	0.0226	0.1071	70,512	19.6	0.0150	0.0723	77,263	23.3
55	0.0292	0.1362	62,960	16.6	0.0196	0.0934	71,678	19.9
60	0.0394	0.1794	54,384	13.8	0.0267	0.1253	64,982	16.7
65	0.0532	0.2352	44,627	11.3	0.0360	0.1654	56,841	13.7
70	0.0753	0.3167	34,132	9.0	0.0523	0.2318	47,439	10.9
75	0.1071	0.4200	23,323	7.0	0.0770	0.3233	36,443	8.4
80	0.1572	0.5537	13,527	5.3	0.1211	0.4621	24,662	6.2
85	0.2306	0.6986	6,037	3.9	0.1905	0.6283	13,265	4.5
90	0.3227	0.8143	1,819	2.9	0.2828	0.7725	4,931	3.3
95	0.4340	0.8942	338	2.2	0.3955	0.8743	1,122	2.4
100	0.5705	...	36	1.8	0.5489	...	141	1.8

NYERI								
Males					Females			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0308	0.0300	100,000	66.4	0.0272	0.0266	100,000	75.8
1	0.0029	0.0117	96,998	67.4	0.0036	0.0143	97,345	76.9
5	0.0008	0.0038	95,867	64.2	0.0009	0.0043	95,952	73.9
10	0.0005	0.0026	95,499	59.4	0.0005	0.0026	95,542	69.3
15	0.0014	0.0069	95,250	54.6	0.0005	0.0025	95,294	64.4
20	0.0020	0.0099	94,594	49.9	0.0007	0.0034	95,057	59.6
25	0.0023	0.0114	93,659	45.4	0.0008	0.0042	94,730	54.8
30	0.0027	0.0136	92,590	40.9	0.0010	0.0051	94,334	50.0
35	0.0036	0.0179	91,327	36.4	0.0013	0.0063	93,852	45.2
40	0.0050	0.0246	89,695	32.0	0.0016	0.0079	93,260	40.5
45	0.0071	0.0351	87,492	27.8	0.0022	0.0107	92,520	35.8
50	0.0106	0.0517	84,420	23.7	0.0031	0.0156	91,530	31.2
55	0.0159	0.0765	80,052	19.9	0.0048	0.0239	90,106	26.6
60	0.0245	0.1160	73,925	16.3	0.0078	0.0382	87,957	22.2
65	0.0381	0.1746	65,353	13.1	0.0133	0.0643	84,598	18.0
70	0.0585	0.2559	53,942	10.3	0.0238	0.1127	79,158	14.0
75	0.0881	0.3607	40,136	7.9	0.0444	0.2013	70,235	10.5
80	0.1303	0.4865	25,659	6.0	0.0850	0.3527	56,097	7.4
85	0.1956	0.6362	13,177	4.4	0.1580	0.5602	36,314	5.1
90	0.2825	0.7722	4,793	3.3	0.2594	0.7453	15,971	3.5
95	0.4077	0.8851	1,092	2.4	0.3883	0.8777	4,067	2.5
100	0.4959	...	126	2.0	0.5048	...	498	2.0

KIRINYAGA								
MALE					FEMALE			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0267	0.0261	100,000	59.9	0.0226	0.0221	100,000	71.1
1	0.0037	0.0146	97,394	60.5	0.0038	0.0151	97,785	71.7
5	0.0014	0.0069	95,977	57.4	0.0013	0.0066	96,309	68.7
10	0.0008	0.0040	95,312	52.8	0.0008	0.0040	95,671	64.2
15	0.0046	0.0225	94,927	48.0	0.0015	0.0072	95,289	59.4
20	0.0065	0.0318	92,788	44.0	0.0018	0.0090	94,600	54.8
25	0.0067	0.0328	89,837	40.4	0.0021	0.0106	93,753	50.3
30	0.0071	0.0348	86,895	36.6	0.0024	0.0121	92,759	45.8
35	0.0078	0.0384	83,867	32.9	0.0028	0.0141	91,634	41.4
40	0.0095	0.0462	80,650	29.1	0.0035	0.0173	90,347	36.9
45	0.0116	0.0565	76,925	25.4	0.0041	0.0203	88,783	32.5
50	0.0161	0.0777	72,581	21.7	0.0056	0.0277	86,985	28.1
55	0.0209	0.0994	66,943	18.3	0.0078	0.0381	84,578	23.9
60	0.0305	0.1421	60,292	15.1	0.0123	0.0596	81,355	19.7
65	0.0446	0.2010	51,724	12.1	0.0205	0.0977	76,510	15.8
70	0.0659	0.2833	41,329	9.6	0.0355	0.1639	69,038	12.2
75	0.0984	0.3937	29,622	7.3	0.0624	0.2714	57,721	9.1
80	0.1467	0.5289	17,959	5.5	0.1113	0.4352	42,053	6.5
85	0.2206	0.6820	8,461	4.0	0.1880	0.6239	23,751	4.5
90	0.3177	0.8114	2,690	3.0	0.2869	0.7790	8,932	3.2
95	0.4477	0.9060	507	2.2	0.4133	0.8903	1,974	2.4
100	0.5507	...	48	1.8	0.5184	...	217	1.9

MURANG'A								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0406	0.0393	100,000	58.1	0.0224	0.0220	100,000	64.7
1	0.0041	0.0163	96,073	59.5	0.0038	0.0150	97,803	65.1
5	0.0014	0.0067	94,505	56.4	0.0012	0.0061	96,335	62.1
10	0.0010	0.0052	93,870	51.8	0.0011	0.0054	95,749	57.4
15	0.0022	0.0111	93,383	47.1	0.0022	0.0108	95,233	52.7
20	0.0039	0.0195	92,342	42.6	0.0030	0.0147	94,205	48.3
25	0.0048	0.0239	90,540	38.4	0.0034	0.0168	92,816	44.0
30	0.0064	0.0313	88,374	34.2	0.0042	0.0206	91,256	39.7
35	0.0088	0.0432	85,606	30.3	0.0056	0.0277	89,372	35.5
40	0.0123	0.0598	81,904	26.5	0.0077	0.0377	86,898	31.4
45	0.0166	0.0796	77,003	23.0	0.0102	0.0495	83,626	27.5
50	0.0217	0.1031	70,876	19.8	0.0138	0.0665	79,483	23.8
55	0.0283	0.1325	63,572	16.8	0.0182	0.0870	74,193	20.3
60	0.0383	0.1751	55,149	13.9	0.0252	0.1185	67,739	17.0
65	0.0523	0.2316	45,495	11.4	0.0343	0.1583	59,710	14.0
70	0.0745	0.3139	34,957	9.0	0.0503	0.2240	50,259	11.1
75	0.1066	0.4185	23,984	7.0	0.0747	0.3152	39,000	8.6
80	0.1569	0.5531	13,948	5.3	0.1183	0.4541	26,706	6.3
85	0.2309	0.6993	6,233	3.9	0.1872	0.6218	14,578	4.6
90	0.3237	0.8154	1,874	2.9	0.2792	0.7682	5,513	3.3
95	0.4358	0.8952	346	2.2	0.3916	0.8719	1,278	2.5
100	0.5723	...	36	1.7	0.5448	...	164	1.8

KIAMBU								
MALE					FEMALE			
Age	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$
0	0.0222	0.0218	100000.0	60.8	0.0171	0.0169	100000.0	72.8
1	0.0031	0.0121	97820.8	61.1	0.0029	0.0115	98314.9	73.0
5	0.0012	0.0058	96632.6	57.9	0.0010	0.0051	97186.6	69.9
10	0.0007	0.0034	96069.0	53.2	0.0006	0.0030	96692.2	65.2
15	0.0044	0.0218	95742.9	48.3	0.0013	0.0064	96397.7	60.4
20	0.0062	0.0307	93660.1	44.4	0.0016	0.0080	95777.8	55.8
25	0.0064	0.0317	90781.6	40.7	0.0019	0.0094	95014.5	51.2
30	0.0069	0.0337	87904.6	36.9	0.0022	0.0108	94120.8	46.7
35	0.0076	0.0372	84944.2	33.1	0.0025	0.0125	93104.9	42.1
40	0.0092	0.0448	81787.7	29.3	0.0031	0.0154	91939.0	37.7
45	0.0113	0.0549	78119.7	25.6	0.0037	0.0181	90520.0	33.2
50	0.0157	0.0757	73834.1	21.9	0.0050	0.0249	88882.4	28.8
55	0.0204	0.0970	68242.5	18.5	0.0070	0.0343	86673.4	24.4
60	0.0299	0.1393	61620.2	15.2	0.0111	0.0540	83701.6	20.2
65	0.0438	0.1978	53038.9	12.2	0.0186	0.0893	79184.6	16.2
70	0.0650	0.2801	42549.0	9.6	0.0327	0.1521	72113.3	12.5
75	0.0976	0.3911	30631.0	7.4	0.0585	0.2569	61148.0	9.3
80	0.1460	0.5273	18652.4	5.5	0.1068	0.4221	45439.8	6.6
85	0.2203	0.6815	8816.7	4.0	0.1845	0.6172	26260.0	4.6
90	0.3175	0.8113	2808.4	3.0	0.2854	0.7776	10051.1	3.3
95	0.4477	0.9060	530.0	2.2	0.4130	0.8906	2235.7	2.4
100	0.5508	...	49.8	1.8	0.5190	...	244.5	1.9

TURKANA								
MALE					FEMALE			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0464	0.0447	100,000	55.9	0.0359	0.0349	100,000	60.0
1	0.0063	0.0249	95,528	57.5	0.0060	0.0237	96,512	61.2
5	0.0024	0.0118	93,148	55.0	0.0021	0.0104	94,223	58.7
10	0.0014	0.0069	92,046	50.6	0.0013	0.0063	93,243	54.2
15	0.0055	0.0271	91,413	45.9	0.0042	0.0206	92,658	49.6
20	0.0077	0.0380	88,933	42.1	0.0051	0.0251	90,753	45.6
25	0.0079	0.0389	85,555	38.7	0.0059	0.0290	88,476	41.7
30	0.0084	0.0410	82,229	35.2	0.0066	0.0325	85,907	37.8
35	0.0092	0.0449	78,854	31.6	0.0075	0.0369	83,118	34.0
40	0.0110	0.0537	75,314	27.9	0.0090	0.0441	80,053	30.2
45	0.0134	0.0650	71,273	24.4	0.0103	0.0500	76,525	26.5
50	0.0185	0.0884	66,641	20.9	0.0136	0.0657	72,698	22.8
55	0.0236	0.1115	60,751	17.6	0.0179	0.0859	67,922	19.2
60	0.0339	0.1567	53,978	14.5	0.0266	0.1251	62,087	15.7
65	0.0486	0.2170	45,520	11.7	0.0406	0.1850	54,322	12.6
70	0.0702	0.2989	35,641	9.3	0.0622	0.2699	44,274	9.9
75	0.1026	0.4063	24,989	7.2	0.0937	0.3787	32,326	7.6
80	0.1499	0.5362	14,837	5.4	0.1412	0.5149	20,084	5.7
85	0.2224	0.6846	6,881	4.0	0.2080	0.6590	9,744	4.2
90	0.3182	0.8118	2,170	3.0	0.2949	0.7860	3,323	3.2
95	0.4478	0.9058	409	2.2	0.4151	0.8881	711	2.4
100	0.5500	...	38	1.8	0.5095	...	80	2.0

West Pokot								
Age	Males				Females			
	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0499	0.0479	100000	57.6	0.0288	0.0281	100000	61.1
1	0.0049	0.0195	95207	59.5	0.0053	0.0210	97195	61.9
5	0.0016	0.0078	93349	56.7	0.0017	0.0085	95158	59.2
10	0.0011	0.0057	92623	52.1	0.0015	0.0073	94348	54.7
15	0.0023	0.0112	92097	47.4	0.0029	0.0146	93657	50.1
20	0.0040	0.0197	91066	42.9	0.0041	0.0203	92289	45.8
25	0.0049	0.0241	89271	38.7	0.0047	0.0230	90420	41.6
30	0.0063	0.0310	87122	34.6	0.0057	0.0279	88337	37.6
35	0.0086	0.0421	84418	30.6	0.0074	0.0365	85875	33.6
40	0.0118	0.0574	80862	26.9	0.0099	0.0481	82741	29.7
45	0.0157	0.0758	76218	23.3	0.0125	0.0609	78760	26.1
50	0.0207	0.0984	70440	20.0	0.0165	0.0793	73967	22.6
55	0.0274	0.1284	63507	16.9	0.0213	0.1013	68103	19.4
60	0.0369	0.1693	55351	14.1	0.0285	0.1330	61207	16.3
65	0.0513	0.2275	45980	11.4	0.0381	0.1742	53065	13.4
70	0.0738	0.3115	35518	9.0	0.0550	0.2420	43819	10.6
75	0.1066	0.4185	24453	7.0	0.0803	0.3345	33213	8.2
80	0.1576	0.5550	14219	5.2	0.1253	0.4736	22102	6.1
85	0.2331	0.7030	6328	3.9	0.1954	0.6379	11634	4.4
90	0.3275	0.8193	1879	2.9	0.2883	0.7790	4213	3.2
95	0.4415	0.8983	340	2.2	0.4015	0.8780	931	2.4
100	0.5804	...	35	1.7	0.5549	...	114	1.8

SAMBURU								
Age	MALE				FEMALE			
	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0259	0.0253	100,000	58.5	0.0233	0.0229	100,000	67.4
1	0.0036	0.0141	97,471	59.0	0.0039	0.0156	97,713	68.0
5	0.0014	0.0067	96,096	55.8	0.0014	0.0069	96,192	65.0
10	0.0008	0.0039	95,449	51.2	0.0008	0.0041	95,531	60.4
15	0.0053	0.0260	95,073	46.4	0.0022	0.0111	95,135	55.7
20	0.0074	0.0365	92,599	42.6	0.0028	0.0137	94,079	51.3
25	0.0076	0.0374	89,220	39.1	0.0032	0.0161	92,790	47.0
30	0.0081	0.0396	85,880	35.5	0.0037	0.0183	91,298	42.7
35	0.0089	0.0434	82,483	31.8	0.0043	0.0211	89,629	38.4
40	0.0107	0.0519	78,907	28.2	0.0052	0.0257	87,740	34.2
45	0.0130	0.0630	74,812	24.6	0.0060	0.0298	85,483	30.0
50	0.0179	0.0859	70,101	21.1	0.0082	0.0402	82,938	25.9
55	0.0230	0.1087	64,077	17.8	0.0112	0.0544	79,603	21.9
60	0.0331	0.1534	57,111	14.6	0.0173	0.0830	75,272	18.0
65	0.0477	0.2135	48,350	11.8	0.0279	0.1310	69,025	14.4
70	0.0693	0.2955	38,029	9.4	0.0462	0.2080	59,983	11.1
75	0.1017	0.4036	26,791	7.2	0.0761	0.3206	47,506	8.3
80	0.1492	0.5347	15,979	5.5	0.1256	0.4751	32,277	6.1
85	0.2220	0.6841	7,435	4.0	0.1983	0.6425	16,942	4.4
90	0.3181	0.8117	2,349	3.0	0.2912	0.7828	6,056	3.2
95	0.4478	0.9058	442	2.2	0.4143	0.8891	1,316	2.4
100	0.5502	...	42	1.8	0.4990	...	146	2.0

Trans Nzoia								
Age	Males				Females			
	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$
0	0.0365	0.0354	100,000	64.4	0.0286	0.0279	100,000	67.9
1	0.0050	0.0198	96,461	65.7	0.0048	0.0190	97,213	68.9
5	0.0019	0.0094	94,556	63.0	0.0017	0.0084	95,369	66.2
10	0.0011	0.0055	93,666	58.6	0.0010	0.0050	94,571	61.7
15	0.0025	0.0126	93,153	53.9	0.0019	0.0096	94,095	57.0
20	0.0036	0.0180	91,981	49.6	0.0024	0.0119	93,191	52.5
25	0.0038	0.0188	90,326	45.4	0.0028	0.0140	92,083	48.1
30	0.0041	0.0203	88,626	41.2	0.0032	0.0159	90,799	43.8
35	0.0046	0.0227	86,827	37.0	0.0037	0.0184	89,357	39.5
40	0.0057	0.0279	84,852	32.9	0.0045	0.0225	87,714	35.1
45	0.0071	0.0349	82,483	28.7	0.0053	0.0261	85,745	30.9
50	0.0101	0.0495	79,608	24.7	0.0072	0.0354	83,506	26.7
55	0.0136	0.0657	75,667	20.8	0.0099	0.0483	80,546	22.5
60	0.0207	0.0987	70,698	17.1	0.0154	0.0743	76,658	18.5
65	0.0321	0.1489	63,722	13.7	0.0252	0.1190	70,960	14.8
70	0.0510	0.2271	54,234	10.6	0.0424	0.1927	62,517	11.5
75	0.0827	0.3433	41,919	8.0	0.0714	0.3043	50,472	8.6
80	0.1335	0.4965	27,530	5.8	0.1210	0.4627	35,112	6.2
85	0.2128	0.6699	13,863	4.1	0.1951	0.6370	18,868	4.4
90	0.3151	0.8096	4,576	3.0	0.2899	0.7817	6,850	3.2
95	0.4473	0.9070	871	2.2	0.4140	0.8895	1,496	2.4
100	0.5542	...	81	1.8	0.5168	...	165	1.9

Uasin Gishu								
Age	Males				Females			
	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$
0	0.0298	0.0291	100,000	63.6	0.0207	0.0203	100,000	71.7
1	0.0041	0.0162	97,095	64.5	0.0035	0.0138	97,968	72.2
5	0.0016	0.0077	95,522	61.5	0.0012	0.0061	96,613	69.2
10	0.0009	0.0045	94,784	57.0	0.0007	0.0037	96,025	64.6
15	0.0030	0.0149	94,354	52.2	0.0014	0.0069	95,670	59.8
20	0.0043	0.0213	92,948	48.0	0.0017	0.0086	95,012	55.2
25	0.0045	0.0222	90,970	44.0	0.0020	0.0101	94,199	50.7
30	0.0048	0.0238	88,951	39.9	0.0023	0.0116	93,247	46.2
35	0.0054	0.0266	86,832	35.8	0.0027	0.0135	92,167	41.7
40	0.0066	0.0325	84,527	31.7	0.0033	0.0166	90,926	37.2
45	0.0082	0.0404	81,781	27.7	0.0039	0.0194	89,420	32.8
50	0.0117	0.0568	78,481	23.8	0.0054	0.0266	87,688	28.4
55	0.0155	0.0747	74,022	20.1	0.0075	0.0366	85,359	24.1
60	0.0234	0.1107	68,494	16.5	0.0118	0.0573	82,234	19.9
65	0.0356	0.1640	60,911	13.2	0.0197	0.0944	77,520	15.9
70	0.0555	0.2444	50,921	10.3	0.0344	0.1593	70,203	12.3
75	0.0877	0.3597	38,478	7.8	0.0609	0.2658	59,021	9.2
80	0.1379	0.5076	24,636	5.7	0.1096	0.4302	43,331	6.5
85	0.2155	0.6742	12,131	4.1	0.1867	0.6214	24,688	4.6
90	0.3160	0.8102	3,952	3.0	0.2864	0.7784	9,346	3.2
95	0.4475	0.9066	750	2.2	0.4132	0.8904	2,071	2.4
100	0.5529	...	70	1.8	0.5187	...	227	1.9

ELGEYO MARAKWET								
Age	MALE				FEMALE			
	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$
0	0.0413	0.0399	100,000	57.9	0.0261	0.0255	100,000	62.5
1	0.0042	0.0166	96,006	59.3	0.0047	0.0185	97,449	63.1
5	0.0014	0.0068	94,410	56.3	0.0015	0.0075	95,650	60.3
10	0.0011	0.0053	93,765	51.7	0.0013	0.0065	94,930	55.7
15	0.0023	0.0112	93,270	46.9	0.0026	0.0131	94,311	51.1
20	0.0040	0.0198	92,221	42.4	0.0036	0.0180	93,078	46.7
25	0.0049	0.0242	90,398	38.3	0.0042	0.0205	91,399	42.5
30	0.0064	0.0317	88,209	34.1	0.0051	0.0249	89,521	38.3
35	0.0089	0.0438	85,412	30.2	0.0067	0.0330	87,288	34.3
40	0.0125	0.0605	81,674	26.4	0.0090	0.0440	84,406	30.3
45	0.0167	0.0803	76,733	23.0	0.0116	0.0566	80,688	26.6
50	0.0219	0.1038	70,571	19.7	0.0155	0.0745	76,124	23.1
55	0.0285	0.1332	63,247	16.7	0.0201	0.0960	70,452	19.7
60	0.0384	0.1756	54,821	13.9	0.0273	0.1278	63,687	16.5
65	0.0525	0.2323	45,192	11.3	0.0367	0.1685	55,546	13.6
70	0.0747	0.3147	34,695	9.0	0.0533	0.2356	46,186	10.8
75	0.1069	0.4193	23,777	7.0	0.0783	0.3276	35,306	8.4
80	0.1573	0.5540	13,807	5.3	0.1227	0.4666	23,741	6.2
85	0.2314	0.7000	6,159	3.9	0.1924	0.6320	12,664	4.5
90	0.3242	0.8160	1,848	2.9	0.2850	0.7750	4,660	3.3
95	0.4365	0.8956	340	2.2	0.3978	0.8757	1,048	2.4
100	0.5727	...	36	1.7	0.5511	...	130	1.8

NANDI								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.03099	0.03018	100,000	60.0	0.02305	0.02259	100,000	70.4
1	0.00426	0.01686	96,982	60.9	0.00388	0.01537	97,741	71.1
5	0.00161	0.00802	95,347	57.9	0.00136	0.00678	96,239	68.1
10	0.00094	0.00469	94,582	53.3	0.00082	0.00409	95,586	63.6
15	0.00431	0.02135	94,139	48.6	0.00156	0.00777	95,195	58.8
20	0.00612	0.03015	92,129	44.6	0.00194	0.00965	94,455	54.3
25	0.00632	0.03111	89,351	40.9	0.00228	0.01134	93,544	49.8
30	0.00673	0.03310	86,571	37.1	0.00261	0.01297	92,483	45.3
35	0.00744	0.03653	83,706	33.3	0.00303	0.01504	91,284	40.9
40	0.00902	0.04413	80,648	29.4	0.00373	0.01848	89,911	36.5
45	0.01110	0.05405	77,089	25.7	0.00436	0.02157	88,249	32.1
50	0.01548	0.07462	72,922	22.0	0.00598	0.02948	86,345	27.8
55	0.02009	0.09582	67,481	18.6	0.00825	0.04046	83,800	23.5
60	0.02950	0.13774	61,015	15.3	0.01299	0.06304	80,409	19.4
65	0.04333	0.19603	52,611	12.3	0.02158	0.10274	75,340	15.5
70	0.06452	0.27831	42,297	9.6	0.03719	0.17101	67,599	12.0
75	0.09708	0.38961	30,525	7.4	0.06465	0.27981	56,039	8.9
80	0.14567	0.52644	18,632	5.5	0.11381	0.44251	40,359	6.4
85	0.22005	0.68115	8,824	4.0	0.18990	0.62749	22,500	4.5
90	0.31747	0.81125	2,813	3.0	0.28775	0.77972	8,381	3.2
95	0.44771	0.90607	531	2.2	0.41351	0.89005	1,846	2.4
100	0.55093	...	50	1.8	0.51805	...	203	1.9

BARINGO								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0336	0.0327	100,000	65.4	0.0204	0.0201	100,000	68.9
1	0.0046	0.0182	96,735	66.6	0.0034	0.0136	97,994	69.3
5	0.0017	0.0087	94,971	63.8	0.0012	0.0060	96,658	66.3
10	0.0010	0.0051	94,148	59.4	0.0007	0.0036	96,075	61.6
15	0.0023	0.0116	93,669	54.7	0.0020	0.0098	95,725	56.9
20	0.0034	0.0167	92,584	50.3	0.0024	0.0121	94,791	52.4
25	0.0035	0.0174	91,041	46.1	0.0029	0.0142	93,646	48.0
30	0.0038	0.0188	89,452	41.9	0.0033	0.0162	92,316	43.7
35	0.0043	0.0211	87,769	37.6	0.0038	0.0187	90,823	39.3
40	0.0053	0.0260	85,914	33.4	0.0046	0.0228	89,126	35.0
45	0.0066	0.0325	83,683	29.2	0.0054	0.0266	87,091	30.8
50	0.0095	0.0464	80,960	25.1	0.0073	0.0360	84,778	26.6
55	0.0127	0.0618	77,208	21.2	0.0100	0.0490	81,728	22.5
60	0.0195	0.0933	72,438	17.4	0.0156	0.0753	77,725	18.5
65	0.0305	0.1420	65,676	13.9	0.0255	0.1204	71,872	14.8
70	0.0489	0.2189	56,350	10.8	0.0429	0.1945	63,221	11.4
75	0.0803	0.3352	44,015	8.1	0.0720	0.3063	50,927	8.5
80	0.1313	0.4907	29,263	5.9	0.1216	0.4642	35,329	6.2
85	0.2114	0.6676	14,902	4.2	0.1955	0.6376	18,931	4.4
90	0.3146	0.8093	4,953	3.0	0.2901	0.7818	6,860	3.2
95	0.4472	0.9072	945	2.2	0.4140	0.8894	1,497	2.4
100	0.5549	...	88	1.8	0.5168	...	165	1.9

LAIKIPIA								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0207	0.0203	100,000	59.2	0.0145	0.0143	100,000	71.9
1	0.0029	0.0113	97,973	59.4	0.0025	0.0098	98,566	71.9
5	0.0011	0.0054	96,863	56.0	0.0009	0.0043	97,602	68.6
10	0.0006	0.0031	96,342	51.3	0.0005	0.0026	97,178	63.9
15	0.0052	0.0258	96,039	46.5	0.0015	0.0076	96,926	59.1
20	0.0074	0.0362	93,558	42.6	0.0019	0.0094	96,192	54.5
25	0.0076	0.0371	90,167	39.1	0.0022	0.0110	95,292	50.0
30	0.0080	0.0393	86,817	35.6	0.0025	0.0126	94,240	45.5
35	0.0088	0.0431	83,408	31.9	0.0030	0.0146	93,050	41.1
40	0.0106	0.0516	79,816	28.2	0.0036	0.0180	91,688	36.6
45	0.0129	0.0626	75,700	24.6	0.0043	0.0211	90,033	32.3
50	0.0178	0.0854	70,961	21.1	0.0058	0.0288	88,135	27.9
55	0.0228	0.1082	64,900	17.8	0.0081	0.0395	85,597	23.7
60	0.0330	0.1528	57,879	14.7	0.0127	0.0617	82,212	19.5
65	0.0475	0.2128	49,037	11.9	0.0212	0.1008	77,141	15.6
70	0.0691	0.2948	38,603	9.4	0.0366	0.1683	69,365	12.1
75	0.1015	0.4031	27,222	7.2	0.0638	0.2766	57,690	9.0
80	0.1491	0.5344	16,250	5.5	0.1129	0.4398	41,731	6.4
85	0.2219	0.6840	7,566	4.0	0.1892	0.6262	23,378	4.5
90	0.3181	0.8117	2,391	3.0	0.2875	0.7794	8,740	3.2
95	0.4478	0.9058	450	2.2	0.4134	0.8901	1,928	2.4
100	0.5502	...	42	1.8	0.5182	...	212	1.9

NAKURU								
MALES					FEMALES			
Age	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$
0	0.0381	0.0369	100,000	58.3	0.0293	0.0286	100,000	69.1
1	0.0052	0.0206	96,306	59.5	0.0049	0.0194	97,142	70.1
5	0.0020	0.0098	94,321	56.7	0.0017	0.0086	95,254	67.5
10	0.0012	0.0057	93,396	52.2	0.0010	0.0051	94,438	63.0
15	0.0047	0.0235	92,861	47.5	0.0017	0.0082	93,953	58.3
20	0.0067	0.0331	90,682	43.6	0.0021	0.0102	93,181	53.8
25	0.0069	0.0340	87,684	40.0	0.0024	0.0120	92,231	49.3
30	0.0074	0.0361	84,702	36.3	0.0028	0.0137	91,121	44.9
35	0.0081	0.0397	81,645	32.6	0.0032	0.0159	89,872	40.5
40	0.0098	0.0478	78,403	28.8	0.0039	0.0195	88,441	36.1
45	0.0120	0.0582	74,658	25.1	0.0046	0.0228	86,715	31.8
50	0.0166	0.0799	70,312	21.5	0.0063	0.0310	84,738	27.5
55	0.0214	0.1019	64,691	18.2	0.0087	0.0425	82,109	23.3
60	0.0312	0.1453	58,097	15.0	0.0136	0.0661	78,617	19.2
65	0.0454	0.2045	49,657	12.1	0.0226	0.1072	73,424	15.3
70	0.0669	0.2868	39,502	9.5	0.0386	0.1770	65,555	11.9
75	0.0994	0.3966	28,174	7.3	0.0666	0.2868	53,952	8.8
80	0.1474	0.5306	17,000	5.5	0.1159	0.4484	38,480	6.3
85	0.2210	0.6826	7,980	4.0	0.1914	0.6303	21,226	4.5
90	0.3178	0.8115	2,533	3.0	0.2884	0.7803	7,847	3.2
95	0.4478	0.9059	477	2.2	0.4137	0.8899	1,724	2.4
100	0.5505	...	45	1.8	0.5177	...	190	1.9

NAROK								
Age	Males				Females			
	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.04996	0.04799	100,000	57.8	0.02713	0.02650	100,000	61.9
1	0.00492	0.01944	95,201	59.7	0.00494	0.01952	97,350	62.6
5	0.00156	0.00777	93,350	56.8	0.00159	0.00792	95,450	59.8
10	0.00113	0.00563	92,624	52.3	0.00138	0.00688	94,694	55.2
15	0.00223	0.01109	92,102	47.5	0.00276	0.01371	94,043	50.6
20	0.00394	0.01952	91,081	43.0	0.00383	0.01897	92,753	46.3
25	0.00481	0.02377	89,303	38.8	0.00437	0.02162	90,993	42.1
30	0.00621	0.03059	87,180	34.7	0.00532	0.02626	89,026	38.0
35	0.00847	0.04151	84,512	30.7	0.00703	0.03457	86,688	33.9
40	0.01163	0.05657	81,004	27.0	0.00939	0.04591	83,691	30.1
45	0.01553	0.07484	76,422	23.4	0.01205	0.05855	79,849	26.4
50	0.02043	0.09733	70,702	20.1	0.01594	0.07674	75,174	22.9
55	0.02717	0.12742	63,821	17.0	0.02068	0.09846	69,405	19.6
60	0.03667	0.16826	55,689	14.1	0.02783	0.13032	62,572	16.4
65	0.05100	0.22656	46,318	11.4	0.03735	0.17115	54,417	13.5
70	0.07354	0.31059	35,825	9.0	0.05402	0.23846	45,104	10.7
75	0.10629	0.41767	24,698	7.0	0.07917	0.33062	34,348	8.3
80	0.15733	0.55430	14,382	5.3	0.12384	0.46964	22,992	6.2
85	0.23288	0.70266	6,410	3.9	0.19371	0.63456	12,194	4.5
90	0.32734	0.81913	1,906	2.9	0.28642	0.77673	4,456	3.3
95	0.44138	0.89829	345	2.2	0.39941	0.87671	995	2.4
100	0.58069	...	35	1.7	0.55280	...	123	1.8

KAJIADO								
Age	Males				Females			
	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$	$m(x,n)$	$q(x,n)$	$l(x)$	$e(x)$
0	0.0366	0.0355	100,000	57.8	0.0239	0.0234	100,000	63.5
1	0.0038	0.0151	96,451	58.9	0.0042	0.0166	97,663	64.0
5	0.0013	0.0064	94,991	55.8	0.0014	0.0068	96,039	61.1
10	0.0010	0.0050	94,385	51.1	0.0012	0.0060	95,389	56.5
15	0.0023	0.0113	93,910	46.4	0.0024	0.0119	94,818	51.8
20	0.0040	0.0200	92,849	41.9	0.0033	0.0165	93,686	47.4
25	0.0050	0.0248	90,991	37.7	0.0038	0.0188	92,144	43.1
30	0.0067	0.0330	88,730	33.6	0.0047	0.0230	90,413	38.9
35	0.0094	0.0461	85,804	29.6	0.0062	0.0306	88,335	34.8
40	0.0133	0.0643	81,851	25.9	0.0084	0.0413	85,628	30.8
45	0.0179	0.0856	76,588	22.5	0.0110	0.0537	82,090	27.0
50	0.0232	0.1098	70,035	19.4	0.0148	0.0714	77,680	23.4
55	0.0298	0.1387	62,344	16.5	0.0194	0.0925	72,133	20.0
60	0.0400	0.1821	53,694	13.7	0.0265	0.1243	65,463	16.7
65	0.0538	0.2375	43,915	11.2	0.0357	0.1642	57,328	13.7
70	0.0759	0.3187	33,487	8.9	0.0519	0.2304	47,913	10.9
75	0.1077	0.4215	22,815	7.0	0.0766	0.3217	36,874	8.5
80	0.1577	0.5548	13,198	5.3	0.1206	0.4605	25,013	6.3
85	0.2309	0.6990	5,876	3.9	0.1898	0.6269	13,494	4.5
90	0.3227	0.8144	1,769	2.9	0.2821	0.7716	5,034	3.3
95	0.4338	0.8941	328	2.2	0.3947	0.8738	1,150	2.4
100	0.5702	...	35	1.8	0.5480	...	145	1.8

KERICHO								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0391	0.0378	100,000	58.1	0.0249	0.0244	100,000	62.9
1	0.0040	0.0158	96,220	59.4	0.0044	0.0176	97,559	63.5
5	0.0013	0.0066	94,700	56.3	0.0014	0.0072	95,846	60.6
10	0.0010	0.0051	94,077	51.6	0.0013	0.0063	95,158	56.0
15	0.0022	0.0111	93,593	46.9	0.0025	0.0126	94,561	51.4
20	0.0040	0.0196	92,550	42.4	0.0035	0.0174	93,371	47.0
25	0.0049	0.0241	90,735	38.2	0.0040	0.0198	91,751	42.8
30	0.0064	0.0317	88,546	34.1	0.0049	0.0241	89,938	38.6
35	0.0090	0.0439	85,743	30.1	0.0065	0.0320	87,769	34.5
40	0.0126	0.0610	81,978	26.4	0.0088	0.0429	84,960	30.5
45	0.0169	0.0811	76,980	22.9	0.0114	0.0555	81,312	26.8
50	0.0221	0.1049	70,734	19.7	0.0152	0.0734	76,801	23.2
55	0.0287	0.1341	63,317	16.7	0.0198	0.0947	71,167	19.8
60	0.0388	0.1770	54,823	13.9	0.0270	0.1265	64,431	16.6
65	0.0527	0.2332	45,117	11.3	0.0363	0.1668	56,283	13.6
70	0.0749	0.3152	34,594	9.0	0.0527	0.2333	46,897	10.9
75	0.1068	0.4191	23,692	7.0	0.0775	0.3249	35,956	8.4
80	0.1570	0.5533	13,762	5.3	0.1217	0.4638	24,274	6.2
85	0.2307	0.6989	6,147	3.9	0.1912	0.6297	13,016	4.5
90	0.3232	0.8149	1,851	2.9	0.2836	0.7734	4,820	3.3
95	0.4349	0.8947	343	2.2	0.3963	0.8748	1,092	2.4
100	0.5714	...	36	1.8	0.5497	...	137	1.8

BOMET								
MALES					FEMALE			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0445	0.0429	100,000	58.1	0.0239	0.0234	100,000	63.6
1	0.0044	0.0176	95,706	59.7	0.0042	0.0165	97,656	64.1
5	0.0014	0.0071	94,024	56.7	0.0014	0.0067	96,041	61.2
10	0.0011	0.0054	93,354	52.1	0.0012	0.0059	95,394	56.6
15	0.0022	0.0111	92,852	47.4	0.0024	0.0118	94,828	51.9
20	0.0039	0.0194	91,821	42.9	0.0033	0.0163	93,706	47.5
25	0.0048	0.0237	90,038	38.7	0.0038	0.0186	92,181	43.2
30	0.0062	0.0307	87,906	34.5	0.0046	0.0227	90,469	39.0
35	0.0086	0.0420	85,208	30.6	0.0061	0.0303	88,415	34.8
40	0.0119	0.0578	81,626	26.8	0.0083	0.0408	85,740	30.9
45	0.0159	0.0767	76,912	23.3	0.0109	0.0531	82,239	27.1
50	0.0209	0.0996	71,016	20.0	0.0146	0.0707	77,875	23.4
55	0.0276	0.1294	63,941	16.9	0.0192	0.0916	72,373	20.0
60	0.0374	0.1712	55,667	14.0	0.0263	0.1234	65,740	16.8
65	0.0515	0.2286	46,138	11.4	0.0355	0.1635	57,628	13.8
70	0.0739	0.3117	35,592	9.0	0.0518	0.2298	48,205	11.0
75	0.1062	0.4174	24,499	7.0	0.0765	0.3213	37,129	8.5
80	0.1569	0.5531	14,272	5.3	0.1204	0.4601	25,201	6.3
85	0.2316	0.7004	6,378	3.9	0.1897	0.6267	13,605	4.5
90	0.3251	0.8169	1,911	2.9	0.2819	0.7714	5,079	3.3
95	0.4382	0.8965	350	2.2	0.3945	0.8737	1,161	2.4
100	0.5750	...	36	1.7	0.5478	...	147	1.8

KAKAMEGA								
Age	MALES				FEMALES			
	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0445	0.0429	100,000	63.4	0.0326	0.0317	100,000	66.1
1	0.0061	0.0239	95,709	65.2	0.0055	0.0216	96,826	67.3
5	0.0023	0.0114	93,420	62.8	0.0019	0.0095	94,736	64.7
10	0.0013	0.0066	92,356	58.4	0.0012	0.0057	93,835	60.3
15	0.0026	0.0127	91,744	53.8	0.0022	0.0111	93,297	55.7
20	0.0037	0.0182	90,581	49.5	0.0028	0.0138	92,258	51.3
25	0.0038	0.0190	88,934	45.3	0.0033	0.0161	90,989	46.9
30	0.0041	0.0205	87,247	41.2	0.0037	0.0183	89,522	42.7
35	0.0046	0.0229	85,459	37.0	0.0043	0.0211	87,881	38.4
40	0.0057	0.0282	83,499	32.8	0.0052	0.0258	86,024	34.2
45	0.0072	0.0351	81,147	28.7	0.0061	0.0299	83,807	30.0
50	0.0102	0.0499	78,295	24.6	0.0082	0.0403	81,304	25.9
55	0.0137	0.0661	74,389	20.8	0.0112	0.0545	78,027	21.8
60	0.0208	0.0993	69,469	17.1	0.0173	0.0832	73,774	18.0
65	0.0322	0.1497	62,570	13.6	0.0280	0.1312	67,638	14.3
70	0.0512	0.2280	53,202	10.6	0.0463	0.2083	58,763	11.1
75	0.0830	0.3442	41,072	7.9	0.0762	0.3209	46,523	8.3
80	0.1338	0.4971	26,934	5.8	0.1257	0.4754	31,595	6.1
85	0.2130	0.6702	13,545	4.1	0.1983	0.6426	16,576	4.4
90	0.3151	0.8097	4,468	3.0	0.2912	0.7828	5,924	3.2
95	0.4473	0.9070	850	2.2	0.4143	0.8891	1,287	2.4
100	0.5541	...	79	1.8	0.4992	...	143	2.0

VIHIGA								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0477	0.0459	100,000	59.8	0.0466	0.0449	100,000	62.1
1	0.0065	0.0256	95,413	61.7	0.0078	0.0304	95,514	64.0
5	0.0024	0.0121	92,971	59.2	0.0027	0.0133	92,607	62.0
10	0.0014	0.0071	91,844	54.9	0.0016	0.0080	91,374	57.8
15	0.0036	0.0181	91,194	50.3	0.0029	0.0144	90,642	53.3
20	0.0052	0.0257	89,548	46.2	0.0036	0.0176	89,341	49.0
25	0.0054	0.0266	87,249	42.3	0.0042	0.0206	87,764	44.8
30	0.0058	0.0284	84,928	38.4	0.0047	0.0233	85,957	40.7
35	0.0064	0.0316	82,513	34.5	0.0054	0.0267	83,956	36.6
40	0.0078	0.0383	79,909	30.5	0.0066	0.0323	81,715	32.6
45	0.0097	0.0473	76,847	26.6	0.0076	0.0372	79,073	28.6
50	0.0136	0.0659	73,212	22.8	0.0102	0.0497	76,134	24.6
55	0.0179	0.0856	68,384	19.2	0.0137	0.0663	72,351	20.7
60	0.0266	0.1249	62,528	15.8	0.0209	0.0994	67,551	17.0
65	0.0397	0.1812	54,717	12.7	0.0330	0.1529	60,836	13.6
70	0.0604	0.2629	44,805	9.9	0.0529	0.2344	51,533	10.6
75	0.0929	0.3765	33,024	7.5	0.0838	0.3468	39,451	8.0
80	0.1423	0.5183	20,592	5.6	0.1328	0.4939	25,769	5.9
85	0.2181	0.6782	9,918	4.1	0.2029	0.6506	13,041	4.3
90	0.3168	0.8108	3,191	3.0	0.2930	0.7843	4,557	3.2
95	0.4476	0.9063	604	2.2	0.4147	0.8886	983	2.4
100	0.5517	...	57	1.8	0.5063	...	109	2.0

BUNGOMA								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0361	0.0350	100,000	65.5	0.0266	0.0260	100,000	68.2
1	0.0049	0.0195	96,500	66.9	0.0045	0.0177	97,403	69.1
5	0.0019	0.0093	94,616	64.2	0.0016	0.0078	95,681	66.3
10	0.0011	0.0054	93,736	59.7	0.0009	0.0047	94,938	61.8
15	0.0022	0.0111	93,226	55.1	0.0019	0.0096	94,492	57.0
20	0.0032	0.0160	92,187	50.6	0.0024	0.0118	93,589	52.6
25	0.0034	0.0167	90,715	46.4	0.0028	0.0139	92,482	48.2
30	0.0037	0.0181	89,199	42.2	0.0032	0.0158	91,196	43.8
35	0.0041	0.0203	87,585	37.9	0.0037	0.0183	89,753	39.5
40	0.0051	0.0250	85,808	33.6	0.0045	0.0224	88,107	35.2
45	0.0064	0.0314	83,663	29.4	0.0053	0.0261	86,133	30.9
50	0.0091	0.0447	81,038	25.3	0.0072	0.0354	83,888	26.7
55	0.0123	0.0598	77,414	21.4	0.0099	0.0482	80,919	22.6
60	0.0189	0.0906	72,788	17.6	0.0154	0.0742	77,021	18.6
65	0.0296	0.1383	66,196	14.0	0.0252	0.1188	71,307	14.8
70	0.0478	0.2145	57,038	10.9	0.0423	0.1924	62,839	11.5
75	0.0790	0.3307	44,802	8.1	0.0713	0.3040	50,749	8.6
80	0.1301	0.4876	29,984	5.9	0.1209	0.4624	35,322	6.2
85	0.2106	0.6664	15,364	4.2	0.1950	0.6368	18,990	4.4
90	0.3143	0.8091	5,126	3.0	0.2899	0.7816	6,896	3.2
95	0.4472	0.9073	979	2.2	0.4140	0.8895	1,506	2.4
100	0.5553	...	91	1.8	0.5169	...	166	1.9

BUSIA								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0484	0.0465	100,000	62.3	0.0363	0.0352	100,000	66.2
1	0.0066	0.0259	95,346	64.3	0.0061	0.0239	96,480	67.6
5	0.0025	0.0123	92,873	62.0	0.0021	0.0105	94,173	65.2
10	0.0014	0.0072	91,728	57.7	0.0013	0.0063	93,184	60.9
15	0.0028	0.0137	91,070	53.1	0.0021	0.0104	92,595	56.3
20	0.0040	0.0196	89,826	48.8	0.0026	0.0129	91,627	51.8
25	0.0041	0.0204	88,069	44.7	0.0031	0.0151	90,443	47.5
30	0.0044	0.0220	86,273	40.6	0.0035	0.0172	89,074	43.2
35	0.0050	0.0246	84,378	36.5	0.0040	0.0199	87,542	38.9
40	0.0061	0.0301	82,307	32.3	0.0049	0.0243	85,799	34.6
45	0.0076	0.0375	79,833	28.2	0.0057	0.0282	83,718	30.4
50	0.0109	0.0530	76,842	24.2	0.0078	0.0381	81,360	26.2
55	0.0145	0.0700	72,771	20.4	0.0106	0.0517	78,257	22.1
60	0.0220	0.1045	67,678	16.8	0.0165	0.0792	74,211	18.2
65	0.0338	0.1563	60,609	13.4	0.0267	0.1258	68,333	14.6
70	0.0532	0.2356	51,138	10.4	0.0446	0.2015	59,737	11.3
75	0.0852	0.3515	39,092	7.9	0.0741	0.3137	47,702	8.4
80	0.1357	0.5021	25,352	5.7	0.1237	0.4700	32,736	6.1
85	0.2142	0.6721	12,624	4.1	0.1970	0.6402	17,352	4.4
90	0.3155	0.8099	4,139	3.0	0.2906	0.7823	6,242	3.2
95	0.4474	0.9068	787	2.2	0.4142	0.8893	1,359	2.4
100	0.5535	...	73	1.8	0.5164	...	150	1.9

SIAYA								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0498	0.0478	100,000	53.4	0.0369	0.0358	100,000	61.6
1	0.0068	0.0266	95,220	55.0	0.0062	0.0243	96,417	62.9
5	0.0025	0.0126	92,684	52.5	0.0022	0.0107	94,071	60.4
10	0.0015	0.0074	91,515	48.1	0.0013	0.0064	93,065	56.0
15	0.0068	0.0336	90,840	43.5	0.0035	0.0173	92,467	51.4
20	0.0096	0.0467	87,786	39.9	0.0043	0.0212	90,866	47.2
25	0.0097	0.0473	83,690	36.7	0.0050	0.0246	88,937	43.2
30	0.0102	0.0495	79,732	33.4	0.0056	0.0278	86,745	39.2
35	0.0110	0.0536	75,785	30.0	0.0064	0.0317	84,336	35.3
40	0.0131	0.0635	71,720	26.6	0.0078	0.0381	81,663	31.3
45	0.0158	0.0759	67,169	23.2	0.0089	0.0435	78,549	27.5
50	0.0214	0.1017	62,068	19.9	0.0119	0.0577	75,132	23.6
55	0.0269	0.1261	55,753	16.9	0.0158	0.0762	70,796	19.9
60	0.0380	0.1738	48,720	13.9	0.0238	0.1125	65,400	16.3
65	0.0532	0.2350	40,254	11.3	0.0369	0.1697	58,039	13.1
70	0.0750	0.3155	30,796	9.0	0.0578	0.2534	48,192	10.2
75	0.1068	0.4190	21,081	7.0	0.0891	0.3643	35,981	7.8
80	0.1530	0.5434	12,248	5.4	0.1374	0.5056	22,873	5.8
85	0.2241	0.6871	5,592	4.0	0.2058	0.6553	11,307	4.3
90	0.3188	0.8121	1,750	3.0	0.2940	0.7853	3,897	3.2
95	0.4479	0.9056	329	2.2	0.4149	0.8883	837	2.4
100	0.5494	...	31	1.8	0.5084	...	93	2.0

KISUMU								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0456	0.0439	100,000	54.0	0.0353	0.0343	100,000	63.1
1	0.0062	0.0245	95,606	55.4	0.0059	0.0233	96,574	64.4
5	0.0023	0.0116	93,263	52.8	0.0021	0.0102	94,325	61.9
10	0.0014	0.0068	92,178	48.4	0.0012	0.0062	93,358	57.5
15	0.0067	0.0329	91,554	43.7	0.0030	0.0149	92,781	52.8
20	0.0094	0.0458	88,538	40.1	0.0037	0.0184	91,395	48.6
25	0.0095	0.0465	84,483	36.9	0.0043	0.0215	89,714	44.5
30	0.0100	0.0487	80,555	33.6	0.0049	0.0242	87,788	40.4
35	0.0108	0.0528	76,633	30.2	0.0056	0.0278	85,663	36.3
40	0.0129	0.0625	72,588	26.7	0.0068	0.0335	83,284	32.3
45	0.0155	0.0749	68,050	23.3	0.0079	0.0385	80,491	28.3
50	0.0211	0.1005	62,955	20.0	0.0105	0.0514	77,390	24.3
55	0.0266	0.1248	56,629	16.9	0.0142	0.0685	73,413	20.5
60	0.0376	0.1722	49,560	14.0	0.0215	0.1023	68,385	16.8
65	0.0528	0.2334	41,025	11.4	0.0339	0.1566	61,389	13.5
70	0.0746	0.3140	31,450	9.1	0.0540	0.2387	51,773	10.5
75	0.1065	0.4179	21,573	7.1	0.0850	0.3508	39,414	7.9
80	0.1527	0.5428	12,558	5.4	0.1339	0.4967	25,586	5.9
85	0.2239	0.6869	5,741	4.0	0.2036	0.6517	12,877	4.3
90	0.3187	0.8121	1,798	3.0	0.2932	0.7846	4,485	3.2
95	0.4479	0.9056	338	2.2	0.4147	0.8886	966	2.4
100	0.5495	...	32	1.8	0.5069	...	108	2.0

HOMA BAY								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0687	0.0653	100,000	50.5	0.0517	0.0496	100,000	60.2
1	0.0093	0.0362	93,472	53.0	0.0086	0.0336	95,037	62.3
5	0.0035	0.0171	90,090	50.9	0.0030	0.0147	91,846	60.4
10	0.0020	0.0100	88,549	46.8	0.0018	0.0088	90,496	56.3
15	0.0076	0.0375	87,668	42.2	0.0034	0.0166	89,699	51.8
20	0.0106	0.0517	84,382	38.7	0.0041	0.0204	88,208	47.6
25	0.0107	0.0522	80,019	35.7	0.0048	0.0237	86,409	43.5
30	0.0112	0.0543	75,843	32.5	0.0054	0.0267	84,360	39.5
35	0.0121	0.0586	71,722	29.3	0.0062	0.0305	82,108	35.6
40	0.0143	0.0689	67,519	25.9	0.0075	0.0368	79,600	31.6
45	0.0171	0.0819	62,868	22.7	0.0086	0.0421	76,673	27.7
50	0.0230	0.1088	57,719	19.4	0.0115	0.0559	73,447	23.8
55	0.0286	0.1337	51,437	16.5	0.0153	0.0740	69,344	20.1
60	0.0400	0.1823	44,557	13.7	0.0231	0.1096	64,213	16.5
65	0.0554	0.2436	36,434	11.1	0.0361	0.1660	57,176	13.2
70	0.0772	0.3232	27,558	8.9	0.0567	0.2493	47,687	10.3
75	0.1088	0.4247	18,651	7.0	0.0880	0.3606	35,799	7.8
80	0.1544	0.5466	10,730	5.3	0.1365	0.5032	22,889	5.8
85	0.2248	0.6882	4,865	4.0	0.2052	0.6544	11,371	4.3
90	0.3190	0.8123	1,517	3.0	0.2938	0.7851	3,930	3.2
95	0.4480	0.9055	285	2.2	0.4149	0.8884	845	2.4
100	0.5492	...	27	1.8	0.5081	...	94	2.0

MIGORI								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0834	0.0786	100,000	50.5	0.0583	0.0558	100,000	60.6
1	0.0111	0.0433	92,140	53.8	0.0096	0.0377	94,423	63.2
5	0.0041	0.0204	88,152	52.1	0.0033	0.0165	90,866	61.6
10	0.0024	0.0118	86,355	48.2	0.0020	0.0099	89,370	57.6
15	0.0067	0.0329	85,333	43.7	0.0029	0.0145	88,490	53.2
20	0.0094	0.0457	82,529	40.1	0.0036	0.0178	87,207	48.9
25	0.0095	0.0464	78,757	36.9	0.0042	0.0208	85,650	44.7
30	0.0100	0.0486	75,103	33.6	0.0048	0.0235	83,870	40.6
35	0.0108	0.0527	71,454	30.2	0.0055	0.0269	81,897	36.5
40	0.0129	0.0624	67,685	26.7	0.0066	0.0326	79,691	32.5
45	0.0155	0.0748	63,460	23.3	0.0076	0.0375	77,091	28.5
50	0.0211	0.1004	58,714	20.0	0.0103	0.0501	74,200	24.5
55	0.0266	0.1247	52,819	16.9	0.0138	0.0669	70,485	20.7
60	0.0376	0.1721	46,234	14.0	0.0210	0.1001	65,773	17.0
65	0.0527	0.2332	38,277	11.4	0.0332	0.1538	59,190	13.5
70	0.0745	0.3139	29,350	9.1	0.0531	0.2355	50,085	10.5
75	0.1064	0.4178	20,136	7.1	0.0841	0.3478	38,292	8.0
80	0.1527	0.5428	11,723	5.4	0.1331	0.4946	24,974	5.9
85	0.2239	0.6869	5,360	4.0	0.2031	0.6508	12,622	4.3
90	0.3187	0.8121	1,678	3.0	0.2930	0.7844	4,407	3.2
95	0.4479	0.9056	315	2.2	0.4147	0.8886	950	2.4
100	0.5495	...	30	1.8	0.5064	...	106	2.0

KISII								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0310	0.0302	100,000	56.1	0.0220	0.0215	100,000	66.9
1	0.0043	0.0168	96,983	56.8	0.0037	0.0147	97,846	67.4
5	0.0016	0.0080	95,352	53.8	0.0013	0.0065	96,411	64.4
10	0.0009	0.0047	94,587	49.2	0.0008	0.0039	95,786	59.8
15	0.0063	0.0310	94,144	44.4	0.0024	0.0119	95,414	55.0
20	0.0088	0.0432	91,225	40.7	0.0030	0.0147	94,275	50.6
25	0.0090	0.0439	87,287	37.5	0.0035	0.0173	92,885	46.4
30	0.0094	0.0461	83,454	34.1	0.0040	0.0196	91,278	42.1
35	0.0103	0.0502	79,605	30.6	0.0046	0.0226	89,488	37.9
40	0.0123	0.0596	75,611	27.1	0.0056	0.0275	87,465	33.7
45	0.0148	0.0716	71,104	23.6	0.0065	0.0318	85,062	29.6
50	0.0203	0.0965	66,012	20.3	0.0087	0.0428	82,361	25.5
55	0.0256	0.1205	59,638	17.2	0.0119	0.0577	78,840	21.5
60	0.0364	0.1673	52,449	14.2	0.0183	0.0875	74,292	17.7
65	0.0514	0.2283	43,673	11.5	0.0293	0.1372	67,788	14.1
70	0.0732	0.3094	33,703	9.1	0.0481	0.2157	58,491	10.9
75	0.1053	0.4144	23,275	7.1	0.0783	0.3284	45,877	8.2
80	0.1519	0.5409	13,630	5.4	0.1278	0.4809	30,812	6.0
85	0.2235	0.6862	6,258	4.0	0.1997	0.6450	15,994	4.4
90	0.3186	0.8120	1,964	3.0	0.2917	0.7833	5,677	3.2
95	0.4479	0.9056	369	2.2	0.4144	0.8890	1,231	2.4
100	0.5496	...	35	1.8	0.5021	...	137	2.0

NYAMIRA								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0312	0.0303	100,000	55.3	0.0244	0.0239	100,000	66.2
1	0.0043	0.0169	96,966	56.0	0.0041	0.0163	97,613	66.8
5	0.0016	0.0081	95,323	53.0	0.0014	0.0072	96,025	63.8
10	0.0010	0.0047	94,554	48.4	0.0009	0.0043	95,336	59.3
15	0.0068	0.0333	94,106	43.6	0.0025	0.0126	94,922	54.5
20	0.0095	0.0462	90,973	40.0	0.0031	0.0155	93,728	50.2
25	0.0096	0.0469	86,768	36.8	0.0037	0.0181	92,277	45.9
30	0.0101	0.0491	82,701	33.5	0.0042	0.0205	90,603	41.7
35	0.0109	0.0532	78,643	30.1	0.0048	0.0236	88,742	37.6
40	0.0130	0.0630	74,458	26.6	0.0058	0.0287	86,646	33.4
45	0.0157	0.0754	69,767	23.3	0.0067	0.0332	84,160	29.3
50	0.0213	0.1011	64,508	19.9	0.0091	0.0446	81,369	25.2
55	0.0267	0.1255	57,985	16.9	0.0123	0.0599	77,742	21.3
60	0.0378	0.1730	50,709	14.0	0.0189	0.0907	73,081	17.5
65	0.0530	0.2341	41,936	11.3	0.0303	0.1414	66,456	14.0
70	0.0748	0.3148	32,116	9.0	0.0494	0.2208	57,061	10.8
75	0.1067	0.4185	22,007	7.1	0.0798	0.3335	44,463	8.2
80	0.1529	0.5431	12,798	5.4	0.1292	0.4846	29,635	6.0
85	0.2240	0.6870	5,847	4.0	0.2006	0.6466	15,275	4.4
90	0.3187	0.8121	1,830	3.0	0.2921	0.7836	5,397	3.2
95	0.4479	0.9056	344	2.2	0.4145	0.8889	1,168	2.4
100	0.5495	...	32	1.8	0.5036	...	130	2.0

NAIROBI								
MALES					FEMALES			
Age	m(x,n)	q(x,n)	l(x)	e(x)	m(x,n)	q(x,n)	l(x)	e(x)
0	0.0419	0.0405	100,000	62.6	0.0319	0.0310	100,000	65.2
1	0.0057	0.0226	95,954	64.2	0.0053	0.0211	96,898	66.2
5	0.0022	0.0107	93,789	61.7	0.0019	0.0093	94,852	63.6
10	0.0013	0.0063	92,781	57.3	0.0011	0.0056	93,969	59.2
15	0.0029	0.0143	92,199	52.7	0.0025	0.0126	93,444	54.5
20	0.0041	0.0204	90,879	48.4	0.0031	0.0155	92,269	50.2
25	0.0043	0.0213	89,021	44.3	0.0037	0.0181	90,840	45.9
30	0.0046	0.0229	87,123	40.2	0.0042	0.0205	89,193	41.7
35	0.0052	0.0256	85,125	36.1	0.0048	0.0236	87,361	37.6
40	0.0064	0.0313	82,944	32.0	0.0058	0.0287	85,297	33.4
45	0.0080	0.0390	80,346	28.0	0.0067	0.0332	82,850	29.3
50	0.0113	0.0550	77,212	24.0	0.0091	0.0446	80,102	25.2
55	0.0150	0.0725	72,964	20.2	0.0123	0.0599	76,531	21.3
60	0.0227	0.1078	67,678	16.6	0.0189	0.0907	71,944	17.5
65	0.0347	0.1604	60,383	13.3	0.0303	0.1414	65,421	14.0
70	0.0544	0.2403	50,699	10.3	0.0494	0.2208	56,172	10.8
75	0.0865	0.3559	38,517	7.8	0.0798	0.3335	43,771	8.2
80	0.1369	0.5051	24,808	5.7	0.1292	0.4846	29,174	6.0
85	0.2149	0.6732	12,278	4.1	0.2006	0.6466	15,037	4.4
90	0.3158	0.8101	4,012	3.0	0.2921	0.7836	5,313	3.2
95	0.4474	0.9067	762	2.2	0.4145	0.8889	1,150	2.4
100	0.5532	...	71	1.8	0.5036	...	128	2.0

Appendix 3: Methodological Descriptions

Evaluation of Completeness of Deaths Reporting

i. The general growth balance method (GGB)

The GGB method, like the Brass version, derives from the “demographic balancing equation”. In a non-stable population unaffected by net migration, the entry rate into each open ended age segment $x+$ (if entries are regarded as “birthdays” at the lower boundary of the age segment) is equal to the true death rate for that segment plus the actual growth rate of the segment alternatively, the entry rate minus the growth rate will equal the death rate. If deaths are incompletely reported, the true death rate will be equal to the observed death rate multiplied by an unknown factor, the inverse of the completeness of death recording (assumed to be a constant c). This relationship can be expressed by the following equation:

$$b(x) - r(x) = (1/c) * d^{obs}(x+) \quad \text{where:}$$

$b(x)$ is the entry rate into the population segment age x and over

$r(x+)$ is the growth rate of the population segment x and over

$d^{obs}(x+)$ is the observed death rate in the population segment age x and over.

The equation implies a straight-line relationship between the residual estimates of the death rate (given by the entry rate minus the growth rate) and the observed death rates with slope $(1/c)$. The equation has no intercept but if data is available for two censuses then a change in census population coverage (by a constant proportion at each age) will create a systematic error in the growth rates, and any observed intercept can be interpreted to estimate the change in census coverage.

A positive intercept indicates that the observed growth rates are too small, and that population coverage was lower at the second of the two censuses, and vice versa. Fitting a straight line to the plot of the entry rates against the observed death rates for all possible age segments provides estimates of both coverage change and $(1/c)$.

ii. The synthetic extinct generations (SEG) method

The SEG method derives from the notion that the number of persons aged x alive today in a population not subject to migration will be equal to the future deaths at ages x and above of those persons (since everybody dies). Of course it is not practical to estimate coverage of death recording by painstakingly recording all future deaths over a century or more, but it can be shown that the current distribution of deaths at ages x and over can be adjusted by current population growth rates at ages x and over to equal future cohort deaths. The population at age x ($P^*(x)$) can be estimated from the period deaths at all ages y above that age x , by applying exponentiated summed age-specific growth rates from x to y to allow for the demographic history of the population:

Steps

- 1) Age-specific death rates (ASDRs) calculated both censuses, by dividing deaths in each age group by the population in that age group.
- 2) Calculate average annual person-years lived by age group (AAPYL). The Annual average person-years lived by age group (AAPYL) can be approximated by the geometric mean of the initial and the final population of each age group.
- 3)) Calculate average annual deaths (AAD). The Average annual death rates (AADs) are then estimated by multiplying the AAPYL by the ASDR (either from one or other of the two censuses or the average of both). These are the age-specific numbers of deaths used in applying the two methods. Both GGB and SEG require the inclusion of deaths in the last, open-ended age group See WHO guidelines⁵ for methods for calculation.
- 4) Estimating the number of birthdays at age x

Both methods also need estimates of the population of an exact age x, or the average annual number of entries into the population aged x+. The successive census counts provide a simple way of estimating these numbers.

In any census interval of 10 years or fewer, the population aged between x-5 and x at the first census, $5P_1(x-5)$, will have x^{th} birthdays in the following 5 years (except for the generally small number who die first), whereas the population aged between x and x+5 at the second census, $5P_2(x)$, reflect x^{th} birthdays in the past 5 years (except for the generally small number who die first). The geometric mean of the two (divided by 5 to put it on an annual basis) therefore provides a reasonable approximation of the value of $P^{\text{obs}}(x)$, that is $B(x)$ in the GGB method and the denominator of $c^{\wedge}(x)$ for the SEG method.

$$r^{\text{obs}}(x+) = (1/t) \ln (P_2(x+)/P_1(x+)) \text{ for GGB}$$

$${}_5r_x^{\text{obs}} = (1/t) = (1/t) \ln ({}_5P_2 X / {}_5P_1 X) \text{ for SEG}$$

- 5) Calculate entry rates (for GGB only). The entry rates $b(x)$ for GGB are calculated as the ratio of $B(x)$ and $AAPYL(x+)$. $b(x) = B(x) / [\text{sum from } y \text{ to last age group by 5year interval } ((AAPYL(x+)))]$
- 6) Calculate the “residual” estimates of the death rate and estimating completeness (for GGB only) where residual estimates of the death rates $x+$ are calculated as the difference between the entry rates $b(x)$ and the growth rates $r(x+)$. The residual estimates can then be plotted against the observed death rates.
- 7) Calculate the expected population age x based on deaths and growth rates (for SEG only). The calculation of expected deaths starts with the open interval and then works down in age. Once the expected population $() j P^{\wedge}$ for age j, the lower limit of the open interval (for example, age 75 years) has been obtained, the process. To obtain $P^{\wedge}(j-5)$, expand $() j P^{\wedge}$ by the exponentiated value of five times the growth rate $(j-5, j)$, that is, $\exp(5 \cdot 5r_{j-5, j})$, and add to it the deaths $(j-5, j)$ multiplied by the exponentiated value of 2.5 times the growth rate $(j-5, j)$, that is, $\exp(2.5 \cdot 5r_{j-5, j})$. To obtain $() j P^{\wedge}$, expand $P^{\wedge}(j-5)$ by the

⁵World Health Organization 2013

exponentiated value of five times the growth rate ($j-10, j-5$), that is, $\exp(5 \cdot 5r_{j-10})$, and add to it the deaths ($j-10, j-5$) multiplied by the exponentiated value of 2.5 times the growth rate ($j-10, j-5$), that is, $\exp(2.5 \cdot 5r_{j-10})$.

The two methods require different growth rate calculations. GGB requires the use of populations over age x , whereas SEG uses 5-year age groups.

Description of Key steps

Calculate the mean ages of childbearing of women and men

The estimate of the average age at which the parents had children is computed in order to control for variation in the age range over which they have been exposed to the risk of dying. Women's mean age of childbearing is calculated from census data on births in the 12 months prior to censuses by five-year age group at interview of the women giving birth. The measure is simply the average age of women giving birth calculated without adjusting for the age structure of the population using the following formula:

$$M^f = (17.5 \cdot B_{15-19} + 22.5 \cdot B_{20-24} + \dots + 47.5 \cdot B_{45-49}) / (B_{15-19} + B_{20-24} + \dots + B_{45-49})$$

The mean age at which men have children is estimated by adding an index of the difference in the ages of men and women bearing children to the mean age of childbearing of women.

$$M^m = M^f + d$$

One estimate of this difference that can be readily calculated from census data is the difference between the median ages of currently married men and currently married women.

Calculate the conditional life table survivorship ratios for women

The survivorship of women is estimated between a lower age of 25 and $25 + n$, where n is the upper limit of each successive age group of respondents. The following regression equation and the coefficients in Table below are used:

$${}_n p_{25} = a(n) + b(n) M^f + c(n) {}_5S_{n-5}$$

${}_5S_{n-5}$ is the proportion of the respondents with living mothers from exact age $n-5$ to age n

Coefficients for the estimation of women's survivorship from the proportions of adult respondents with living mothers among those with living mothers at age 20

n	$a(n)$	$b(n)$	$c(n)$
10	-0.2894	0.00125	1.2559
15	-0.1718	0.00222	1.1123
20	-0.1513	0.00372	1.0525
25	-0.1808	0.00586	1.0267
30	-0.2511	0.00885	1.0219
35	-0.3644	0.01287	1.0380
40	-0.5181	0.01795	1.0753
45	-0.6880	0.02343	1.1276
50	-0.8054	0.02721	1.1678

Source: Timaus (1992)

Calculate the conditional life table survivorship ratios for men

Men's survivorship is measured from age 35 to 35 + n, where n is the midpoint of the pair of age groups, using the following regression equation and the coefficients

$${}_n p_{35} = a(n) + b(n) M^m + c(n) {}_5 S_{n-5} + d(n) {}_5 S_n$$

Coefficients for the estimation of men's survivorship from the proportions of adult respondents with living fathers among those with living fathers at age 20

n	$a(n)$	$b(n)$	$c(n)$	$d(n)$
10	-0.5578	0.00040	1.4708	0.0698
15	-0.4013	0.00576	1.5602	-0.3522
20	-0.3329	0.01031	0.6656	0.3419
25	-0.4726	0.01559	0.2161	0.7896
30	-0.7056	0.02076	0.1997	0.9066
35	-0.9153	0.02493	0.3484	0.8631
40	-0.9950	0.02635	0.4269	0.8263

The final two steps involve the *convert the survivorship ratios into estimates of the level of mortality and Calculate the time location of the estimates* (for details refer to Moultrie et al 2013: 222;227)

Maternal Mortality Measures

- i. **Maternal Mortality Rate (Mmrte)** is an indicator of the risk of maternal death among women of reproductive age. It is simply a cause-specific death rate. The MMRate is usually multiplied by a factor of 1000.

$$\text{MMRate} = \frac{\text{Number of Maternal Deaths}}{\text{Number of Women of Reproductive Age (15-49)}} \times 1000$$

Note: MMRate provides an indication of the risk of maternal death in the adult female population but conceals the effect of differing levels of fertility in comparisons.

MMratio = (MMrate divided by General Fertility Rate)

- ii. **Proportion of maternal deaths among all deaths of females of reproductive age (PMDF):**
This

expresses the salience of maternal deaths relative to other causes of death among women of reproductive age.

- iii. **Lifetime Risk of Maternal Death (LTR).** The LTR reflects the chances of a woman dying from maternal causes over the course of her 35-year reproductive lifespan. This indicator takes into account the probability of a death due to maternal causes each time a woman becomes pregnant. It is .023 measured in two common ways.

$$\text{LTR} = 35 \times \text{MMRate} \text{ or } 1 - \{1 - \text{MMR}/100,000\}^{1/\text{TFR}}$$

The above computation does not take into account mortality from other competing causes therefore an alternative measure is

$$\text{LTR} = \{(T_{15} - T_{50})/I_{(15)}\} * \text{MMrate}$$

Where T are lifetable estimates

Pregnancy-related deaths can be substituted for maternal deaths in all of the above indicators.

Appendix 4: Contributors to the 2019 Kenya Population and Housing Census Monographs

Name and Institution	Role
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ISBN 978-9914-9986-1-0

