



Malawi Government

2018 Malawi Population and Housing

Census

Mortality Report

National Statistical Office
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FOREWORD



Following the successful implementation of the 2018 Malawi Population and Housing Census (PHC) and subsequent production of both preliminary and main reports, Malawi Government through the National Statistical Office (NSO) has produced 17 thematic reports. The reports have profiled demographic, social and economic sectors of the country. This effort is in line with the United Nations (UN) international standards of releasing main census results, and thematic reports thereafter to present findings across all sectors that were captured during the census. I am contented, therefore, to note that Malawi Government has fulfilled this requirement by producing thematic reports to inform various government ministries to guide development efforts in the country.

The 17 thematic reports form a primary source of socio-economic and demographic data at various levels and provide the country with important information to foster national development, good governance and decentralization. The results presented in this thematic report will form a solid basis against which the successes and challenges in the implementation of the third Malawi Growth and Development Strategy (MGDS III) and the Sustainable Development Goals (SDGs) will be monitored and evaluated. As government started implementing its MGDS III in 2017, it is imperative to have clear indicators under each sector that shall be meaningfully assessed around 2022, the end of the MGDS III. I am delighted to note that the thematic reports serve that purpose and will help guide our national development plan.

I am fully aware that for the government to produce this high quality report there was a dedicated team of experts from NSO and other sectors. I would, therefore, like to appreciate the effort of the Commissioner of Statistics, NSO staff and experts from other institutions for producing this report. I would also like to appreciate the support received from development partners and individuals during the whole process of writing the thematic report. Specifically, I wish to thank the United Nations Population Fund (UNFPA) for providing financial support and coordinating all development partners' support. I wish to also thank British Department for International Development (DFID), United States Agency for International Development (USAID), the Norwegian Government, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) from the German Government, the Irish Aid from the Irish Government, Iceland Government, the Peoples' Republic of China, the UN Family and the Standard Bank Malawi for providing financial and material resources for the 2018 PHC from which this report is derived. I would also like to thank US Census Bureau and Regional Centre for Mapping of Resources for Development (RCMRD) for providing technical support.

Cliff Chiunda

Secretary to the Treasury

PREFACE



The Malawi Government through the National Statistical Office (NSO) conducted its sixth Population and Housing Census (PHC) in September 2018. The 2018 PHC was the first one to be conducted using Computer Assisted Personal Interviewing (CAPI) technology. Data was collected and captured on tablets and transmitted to NSO server electronically via internet. The process proved to be efficient as it reduced time for data processing and cleaning since these processes were mostly done at data capturing stage. The preliminary and main reports were produced in a record time of 3 and 7 months, respectively.

The National Statistical Office has done further analysis of the census data to produce 17 Thematic Reports aimed at enhancing the understanding of the Malawi population. This Thematic Report on Mortality is one of them, others being: Assessment of Sex and Age Data Quality; Spatial Distribution of Population including Urbanization; Fertility and Nuptiality; Characteristics of Older Persons; Economic Characteristics of the Population; Migration; Water and Sanitation; Households and Living Conditions; Children and Youth; Gender; Disability; Education; Social Atlas; Population Projections; Implementation and Methodology and the Master Sampling Frame. The Thematic Reports were written by officers from NSO, lecturers from the University of Malawi, subject matter specialists from different Ministries, Civil Society, and the UN Family with technical support from US Census Bureau.

I would like to acknowledge the support NSO received from the Government, Development Partners, the Private Sector and individuals for the census including the production of 17 thematic reports. Specifically, I wish to thank UNFPA for providing funding and coordinating support from all Development Partners. I also wish to thank DFID, USAID, the Norwegian Government, GIZ, the Irish Aid, Iceland Government, the Peoples' Republic of China, the UN Family and the Standard Bank Malawi for providing financial resources for the 2018 PHC.

I am heavily indebted to all NSO staff, Census Zone Managers, Census District Supervisors, Control Centre Supervisors, Field Supervisors and Enumerators for their dedication and hard work during the 2018 PHC. Special thanks are extended to US Census Bureau and Regional Centre for Mapping of Resources for Development (RCMRD) for the technical assistance they rendered. I would also like to thank community leaders for mobilizing their members to be counted, and members of the general public for their willingness to participate in the 2018 PHC.

Mercy Kanyuka (Mrs.)
Commissioner of Statistics

EXECUTIVE SUMMARY

Among others, the 2018 PHC collected information on deaths that occurred in the household in the 12 months prior to the census. Using direct measures of mortality, the 2018 results show that the crude death rate (CDR) for Malawi is estimated at 6.3 deaths per 1,000 population with that of males slightly higher than for females, 7.3 and 5.4 deaths per 1,000 population, respectively.

Owing to data misreporting and other errors, indirect measures which use information on children ever born (CEB) and children surviving (CS) data to mothers aged 15 to 49 years were used to estimate infant and child mortality.

The 1998 PHC recorded the CDR of 21 deaths per 1000 population. By sex the CDRs were recorded at 23.4 for males and 18.6 for females. Comparing the results for the two censuses, it is noted that there was a remarkable decline in mortality in the intercensal period 1998-2008.

The probability of a child dying before reaching first age, infant mortality rate (1q0) has more than halved; from 87 deaths per 1000 live births in 2008 to 33 deaths per 1000 live births in 2018, which represents a reduction of 62.1 percent.

In 2008 PHC, for every 1000 live births, there were 140 deaths that occurred between birth and exact age five – under-five mortality (5q0); the 2018 census shows that it is currently at 44 deaths per 1000 live births, which is a decline of 68.6 percent.

There are variations in the probability of dying by residence. The probability of dying for children before reaching age one (1q0) is higher for the rural areas (39 deaths per 1000 live births) compared to the urban (30 deaths per 1000 births). The pattern is also true for the under-five mortality rates where children in the rural areas experience more deaths than their counterparts in the urban, 45 deaths and 39 deaths per 1000 live births, respectively.

Considering sex, male children are more likely to die as noted with infant mortality for males being higher (45 per 1000 live births) as compared to females (23 per 1000 live births).

While education of the mother is one of the major determinants of child survival, the 2018 census shows little variation by education attainment: the rates for IMR ranged from 30 deaths (mothers with no education) to 30 deaths (mothers with tertiary education) per 1000 births). Small monotonous decline was noted among mothers with no education (44 deaths); primary education (45 deaths); secondary education (40 deaths) and tertiary education (39 deaths).

Malawi has registered tremendous gains in between 2008 and 2018. Male and female life expectancy is at 62.4 years and 67.9 years, representing 29.2 percent and 32.1 percent increases, respectively, from the 2008 values of 48.3 years (males) and 51.4 years (females).

TABLE OF CONTENTS

FOREWORD	ii
PREFACE	iii
EXECUTIVE SUMMARY	iv
LIST OF FIGURES	vii
LIST OF ANNEX	ix
ABBREVIATIONS	x
1 SOURCES AND QUALITY OF DATA	1
1.1 Introduction	1
1.2 Population and Housing Censuses.....	1
1.2.1History of censuses in Malawi	1
1.2.2The 2018 Population and Housing Census	2
1.2.3Quality of Census Data	2
2 DIRECT ESTIMATION OF MORTALITY FROM HOUSEHOLD DEATHS	4
2.1 Introduction	4
2.2 Estimation of Mortality from Household Deaths	4
2.3 Crude Death Rate (CDR)	4
2.4 Age Specific Death Rates (ASDR).....	6
3 INDIRECT ESTIMATION OF MORTALITY RATES FROM HOUSEHOLD DEATHS	8
Definitions	8
3.1 Introduction	8
3.2 Estimating Infant and Child Mortality based on Children Ever Born (CEB) and Children Dead (CD) data.....	9
3.3 Estimating Infant Mortality Rate (IMR).....	9
3.3.1Estimation of Infant Mortality Rate Using Trussell's version of Brass method	9
3.4 Trends in Infant Mortality Rate	9
3.5 Estimation of Child Mortality Rate using Trussell's version of Brass method (North family of model life tables)	10
3.6 Estimation of Under Five Mortality Rate	10
4 TRENDS AND DIFFERENTIALS IN INFANT, CHILD AND UNDER FIVE MORTALITY	11
4.1 Introduction	11
4.2 Levels and Trends of Childhood Mortality in Malawi	11
4.3 Rural-Urban Differentials.....	12
4.4 Childhood mortality by region and district	13

4.5	Infant, Child and Under Five Mortality Rates Differentials by Level of Education of Mother	14
4.6	Infant, Child and Under Five Mortality Rates Differentials by Marital Status of Mother	15
4.7	Infant, Child and Under Five Mortality Rates Differentials by Economic Activity of the Mother	15
5	LIFE TABLES	17
5.1	Introduction	17
5.2	Estimated Life Tables for Malawi from Children Ever Born and Surviving and Household Deaths Data	18
5.3	Estimating Life Tables for Malawi from Children Ever Born and Children Surviving Data	18
5.4	Differentials in Life Expectancy	19
5.5	Variation in Mortality by Background Characteristics.....	19
5.5.1	Urban–Rural Mortality Differential	19
5.5.2	Regional and District Variations in Life Expectancy.....	20
6	POLICY IMPLICATIONS	25
	ANNEX	28
	REPORT AUTHORS	41
	REPORT REVIEWERS	41
	REFERENCES	43

LIST OF FIGURES

Figure 2.1: District Levels of Crude Death Rate, Malawi 2018	6
Figure 2.2 Reported Specific Death Rates by Sex, Malawi 2018	7
Figure 3.1: Time Location in Infant Mortality Rate in Malawi Population and Housing Censuses 1987, 1998, 2008 and 2018	10
Figure 4.1: Trends in Infant and Under Five Mortality Rates, Malawi 1992- 2018	12
Figure 4.2: Infant, Child and Under Five Mortality Rates by Urban Rural, Malawi 2018	12
Figure 4.3: Trends in Infant Mortality Rates, Malawi 2018	13
Figure 4.4: Infant and under five mortality by region, Malawi 2018.	14
Figure 4.5: Infant, Child and Under Five Mortality Rates Differentials by education level of Mother, Malawi 2018	14
Figure 4.6: Infant, Child and Under Five Mortality Rates Differentials for 2018 MPHC by Marital Status of Mothers, Malawi 2018	15
Figure 4.7: Infant, Child and Under Five Mortality Rates Differentials by economic activity of mothers, Malawi 2018	16
Figure 5.1: Life expectancy (years) national and rural – urban, for Malawi 2008 and 2018	20
Figure 5.2: Life expectancy by region, Malawi 2018	20
Figure 5.3: Male and female Life expectancies for cities, Malawi 2018	21
Figure 5.4: District variation in life expectancy by sex, Malawi 2018	22
Figure 5.5: District Levels of life expectations for Females, Malawi 2018	23
Figure 5.6: District Levels of life expectations for Males, Malawi 2018	24

LIST OF ANNEX

Annex 1: Crude Death Rates by Region, Districts and Sex, Malawi 2008 and 2018	28
Annex 2: Reported Age-Specific Death Rates by Sex, Malawi 2018.....	29
Annex 3 Time location of Infant and childhood Table: Time location of Infant and childhood Mortality Estimates for Malawi Population and Housing Censuses 1987- 2018	30
Annex 4: Estimation of infant mortality rate using North family of Trussell's version of Brass method: Both Sexes, Malawi 2018	30
Annex 5: Estimation of Child Mortality Rate using Trussell's version of Brass (North family).....	31
Annex 6: Infant, Child and under five Mortality Rates by Urban/Rural, Region and District, Malawi Population and Housing Censuses 1987 - 2018.....	33
Annex 7: Infant and child mortality rates for 2018 MPHC by selected socio - economic	34
Annex 8: Life Expectancies Distributions by Sex, Urban/Rural, Region and District, Malawi 2008 and 2018.....	35
Annex 9: Life Table Development Procedure.	36
Annex 10: Calculations for Direct and Indirect Mortality Rates	38

ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ART	Anti-Retroviral Therapy
ASDR	Age Specific Death Rate
CDR	Crude Death Rate
CEB	Children Ever Born
CS	Children Surviving
HIV	Human Immunodeficiency Virus
IMR	Infant Mortality Rate
CMR	Child Mortality Rate
U5MR	Under Five Mortality Rate
GGB	General Growth Balance
MDG	Millennium Development Goal
MDHS	Malawi Demographic and Health Survey
MMR	Maternal Mortality Ratio
NSO	National Statistical Office
OVC	Orphans and Vulnerable Children
SDG	Sustainable Development Goals
UN	United Nations
UNAIDS	United Nations Joint Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
UNFPA	United Nations Population Fund
WHO	World Health Organisation
PLHIV	People living with Human Immunodeficiency Virus
PMTCT	Prevention of Mother to Child Transmission

1 SOURCES AND QUALITY OF DATA

1.1 Introduction

For decades, Malawi has and still relies on the Population and Housing Censuses (PHC) as a major source of data for planning, monitoring and evaluation of its national and international development initiatives such as the Malawi Growth and Development Strategy III (MGDS III) and the Sustainable Development Goals (SDGs). The census data also facilitates intra and international comparisons of indicators over time and space. Other sources of vital statistics include; surveys, administrative records and civil registrations.

1.2 Population and Housing Censuses

1.2.1 History of censuses in Malawi

Malawi has conducted censuses both prior to independence and after attaining independence in 1964. The first census was conducted in 1891 when Malawi was a British Protectorate. This was not a complete census because the population count completely excluded Africans and excluded the whole Northern region and a large part of the Central region. The second population census was conducted in 1901. Unlike the first census, the second census attempted to count Africans and other races. However, there is very little information regarding these first two censuses. In 1911 an estimate of the entire population was achieved following the inclusion of the northern Ngoni into the Nyasaland protectorate. Subsequently, other pre-independence censuses followed in 1921, 1926, 1931, and 1945. Censuses conducted between 1921 and 1931 were for people who permanently resided in an area and this was *de jure* in principle. The 1945 census enumerated those present at home on the night of the census making it a *de facto* census.

The first census that included extensive training of enumerators and complete demarcation of enumeration areas was carried out in 1966 after independence. Other subsequent censuses which were all *de facto* followed in 1977, 1987 and 1998. The 2008 and 2018 PHC were both *de jure* and *de facto*. Unlike the previous censuses which used a paper-based questionnaire, 2018 Malawi Population and Housing Census used Computer Assisted Personal Interviewing (CAPI) for collecting data from households. The technology significantly reduced the data capture and analysis period compared to previous censuses.

1.2.2 The 2018 Population and Housing Census

The 2018 Population and Housing Census is the sixth in the post-independence period and is part of the United Nations 2020 World Round of Censuses. The 2018 census enumeration was conducted for three weeks, from 3rd to 23rd September, 2018. Enumerators were deployed to cover the entire country and administered the questionnaire to the household head or any knowledgeable member in regular households. Data was also collected from individuals in institutions and homeless individuals, including street kids.

The 2018 PHC collected census attributes such as sex, age, place of birth and residence, parental survivorship, education and literacy status, employment status and industry, marital status, children ever born and children surviving, household amenities and assets, housing conditions, business ownership, disability, deaths, emigrants and albinism.

1.2.3 Quality of Census Data

Quality is one of the most important aspects of data as it enhances credibility and increases its potential use. Credible data is vital for effective planning, policy formulation and decision making. A population and housing census is a huge undertaking that requires proper planning and implementation to ensure that the data collected is of high quality and reliable. According to the UN Principles and Recommendations for conducting a Population and Housing Census, a good PHC must have essential features which include: individual enumeration, universality within a defined territory, simultaneity, defined periodicity and small area statistics. NSO made sure that all these attributes of a good PHC are adhered to. These attributes give rise to two distinct properties of a census namely, content and coverage errors. Coverage errors arise from omissions or duplication of the population while content errors are deficiencies in the data arising from incorrect reporting by respondent or incorrect recording and tabulation by the census team. Great effort was taken to get rid of coverage and content errors.

In planning for the 2018 Population and Housing Census, lessons from previous censuses were considered. Efforts were made and strategies were instituted to collect high quality data and reduce errors arising from the use of poor maps, untested methodologies and instruments, inadequate supervision, poor training, inadequate support from general public and inadequacies in data processing. The National Statistical Office (NSO) took the following steps to ensure quality data was collected:

- Updating the administrative units and demarcating the country into enumeration areas to ensure complete coverage thus avoiding omissions or double counting during the enumeration exercise using Geographic Information System (GIS) and satellite imagery. This was the first time Malawi used satellite maps in the census enumeration.
- Developing census questionnaires through a consultative process with government ministries and departments, the private sector, university and research institutions, supporting partners and the general public.
- Preparing comprehensive supervisors' and enumerators' instruction manuals for guidance during the census training and enumeration.
- Pre-testing the questionnaire to correct any deficiencies.
- Piloting the census as a rehearsal of the main census.
- Providing adequate training of field staff at all levels of operations.
- Intensive supervision at all levels: one Field supervisor to five Enumerators, one Control Centre Supervisor to 8 Field Supervisors, 2 District Supervisors per census district, 12 Census Zone Supervisors and 1 National Supervisor.
- Providing a comprehensive census advocacy using all channels such as media (print electronic and social), faith-based organisations, community leaders and face to face publicity.
- Real time monitoring of census progress using a dashboard, checking and verifying completeness of coverage once the enumeration area was completed.

2 DIRECT ESTIMATION OF MORTALITY FROM HOUSEHOLD DEATHS

Definitions

Crude Death Rate (CDR) is the number of deaths per 1,000 populations in a given year.

Age-Specific Death Rate is the number of deaths of people in a specified age group per 1,000 population of that age group. It enables comparing mortality at different ages or at the same age over time.

2.1 Introduction

Mortality refers to deaths that occur within a population in a given period. Information on mortality is a basic indicator of a country's socio-economic development and quality of life. The probability of dying during a given time period is linked to many factors including age and sex. In general, the incidence of deaths can reveal much about populations' standard of living, health care and overall development of the country.

Methods of measuring mortality depend not only on data quality but also on detail of information available. If data from the civil registration, censuses or surveys are very reliable, mortality levels and trends can be estimated directly. This chapter presents estimates on levels and trends of mortality from reported 2018 Population and Housing Census data.

2.2 Estimation of Mortality from Household Deaths

The 2018 PHC collected data on deaths that occurred in the household in the 12-month period prior to the census enumeration date. This information includes number of deaths, age, sex and place of residence. The data allowed calculation of direct measures of mortality. In this respect, it has been possible to directly estimate levels and trends of mortality in the country by use of various techniques.

2.3 Crude Death Rate (CDR)

The CDR gives a very general indication of the level of mortality and is a function of both age structure of the population and its age specific mortality rates. In this respect, variations in the estimate from one area to another may yield spurious differences in mortality levels. Note that CDRs cannot be directly compared across different populations because diverse populations have different age distributions. CDR can be calculated using an equation in Annex 10.

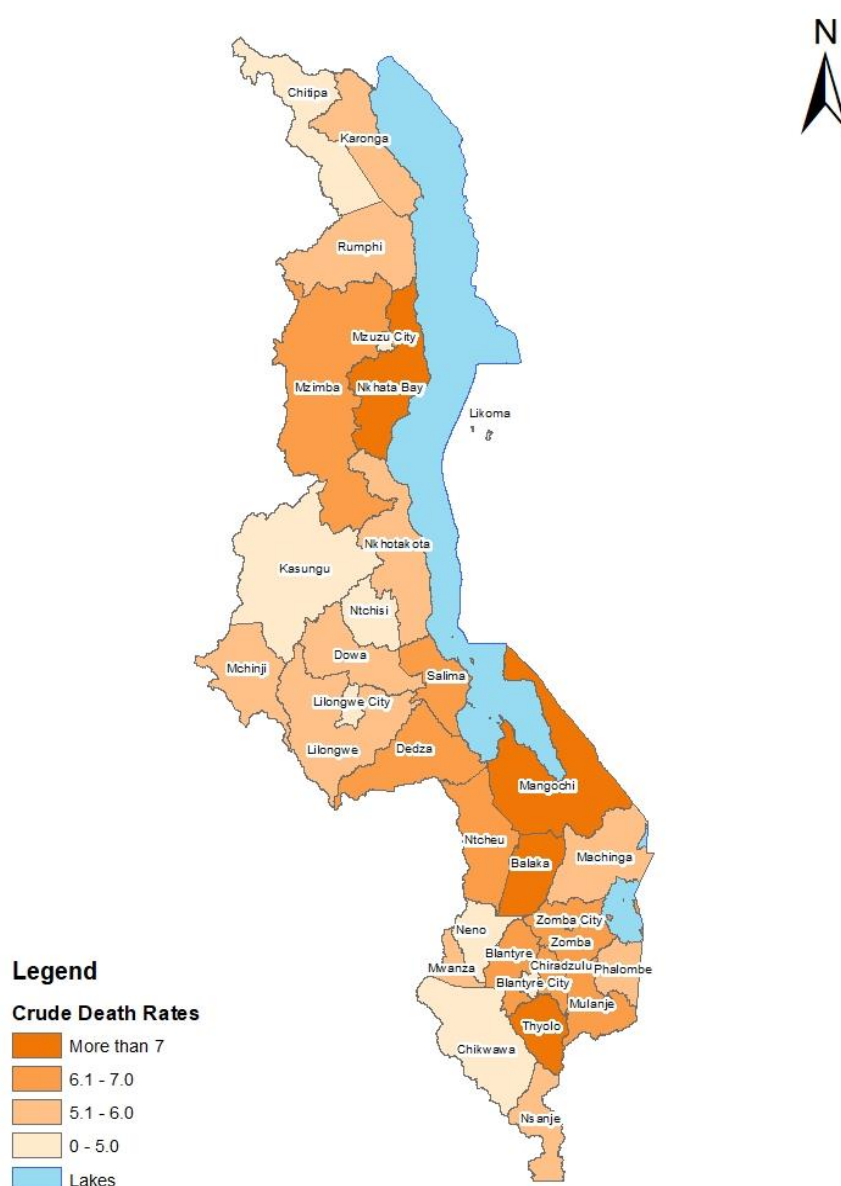
The 2018 CDR for Malawi was estimated at 6.3 deaths per 1000 population while in 2008 CDR was 10.4 deaths per 1000 population. By sex, the 2018 CDRs were 7.3 for males and 5.4 females (Annex 1).

At regional level, there were some marked differences in the crude death rates. Central region experienced the lowest CDR of 5.8 whereas the Southern region experienced the highest CDR of 6.7. The Northern region had a CDR of 6.3.

At district level, the districts of Nkhata Bay and Mzimba in the Northern region had higher values of CDR, 9.1 and 6.7 respectively. Ntcheu district had the highest CDR (7.3) in the Central Region followed by Salima district (6.5). In the Southern region the high CDRs were observed in Balaka (8.5) and Mangochi (7.8).

Except for Likoma District, males had consistently higher CDR compared to females, with an overall difference of about 1.6 points (Figure 2.1 and Annex 1).

Figure 2.1: District Levels of Crude Death Rate, Malawi 2018



Source: Malawi Population and Housing Census 2018

2.4 Age Specific Death Rates (ASDR)

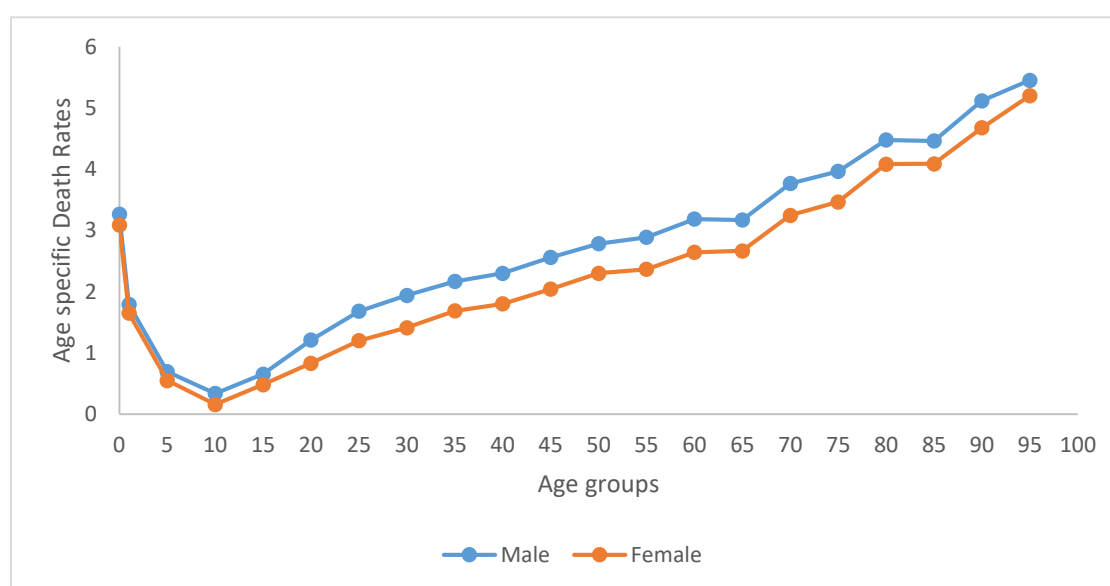
Unlike the CDR, the ASDR is an important measure because it shows where the force of mortality is substantial by singling out ages that are susceptible to death relative to others. ASDR can be calculated using the equation in Annex 10.

The distribution of deaths by age shows a rough “J-shape” as illustrated in

Figure 2.2. The ASDRs in both males and females decline from age 0 to the 10-14 age group, with the 10-14 year olds having the lowest ASDR in both sexes. Thereafter the ASDRs rise with increases in age. The ASDRs decline slightly between 60-64 and 65-69, and again between 80-84 and 85-89, probably because of reporting errors rather than an actual decrease in mortality rates. Death rates are often given separately for males and females because mortality varies by sex in any population (Annex 2).

The 2018 PHC reveals that in all age groups males have higher levels of mortality compared to females. The general shape of mortality curve is the same for males and females (Figure 2.2).

Figure 2.2 Reported Specific Death Rates by Sex, Malawi 2018



Source: Malawi Population and Housing Census 2018

3 INDIRECT ESTIMATION OF MORTALITY RATES FROM HOUSEHOLD DEATHS

Definitions

Infant Mortality Rate (1q0 or q1) is the probability of dying between birth and age one.

Child Mortality Rate (4q1 or q4) is the probability of dying between age one and five.

Under-five Mortality Rate (5q0 or q5) is a combination of infant and child mortality and is defined as the probability of dying between birth and exact age five.

The rates are expressed per 1,000 children.

3.1 Introduction

The indirect estimation relies on data which is easy to obtain and is at least subject to known sources of bias. In many developing countries including Malawi, the classical sources of demographic data, registration of vital events or periodic censuses are far from adequate which usually lead to underestimation of mortality and thereby affecting life expectancy estimation. Brass, Coale and their co-workers developed a set of powerful and less demanding techniques based on census or survey questions to replace the classical methods. These techniques overcome census-record problems by identifying the group indirectly, as children ever born to a representative collection of mothers who are directly interviewed. The ratio of children born to mothers of the same age who have died to all children ever born to them, is a mortality statistic which is both easy to obtain and relatively reliable. These demographic techniques have been used to estimate mortality from data collected in the 2018 Malawi Population and Housing Census.

When employing these models, a problem that always arises is the selection of mortality pattern that best represents the mortality prevalence in a specific country. Malawi demographic data indicates a pattern of mortality that closely resembles the North Family of Coale and Demeny Regional Life Tables (COALE, A and P. DEMENY, 1966). This has been the case after comparing with other existing systems of model life tables and has been used in previous analysis of mortality.

3.2 Estimating Infant and Child Mortality based on Children Ever Born (CEB) and Children Dead (CD) data

Estimation of infant and child mortality requires the following information when civil registration system is not available or incomplete.

- (a) The number of children ever born, classified by sex and by five-year age group of mother.
- (b) The number of children surviving, classified by sex and by five-year age group of mother.
- (c) The total number of women, classified by five-year age group.

For computation procedures refer to Annex 10.

3.3 Estimating Infant Mortality Rate (IMR)

Infant mortality rate is an important indicator of the socio-economic condition, health and nutritional standard of a country. Infant mortality rate is widely used for comparing levels of development in different countries. By dividing the mean number of dead children by the number of children ever born, the proportions of children dead are obtained. The proportions dead are then converted into estimates of probability of dying at age x , $q(x)$. In this analysis North family of Trussell estimation techniques have been used.

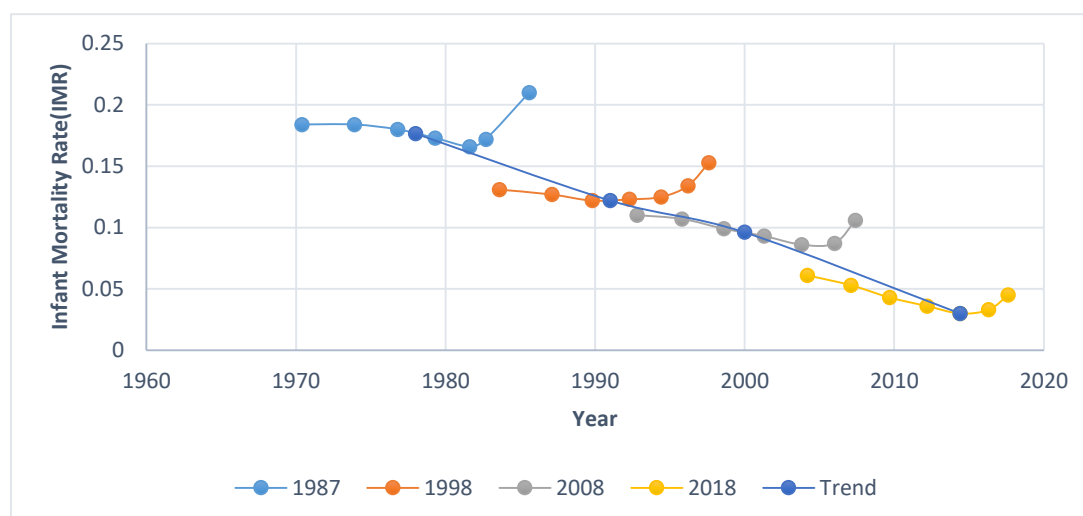
3.3.1 Estimation of Infant Mortality Rate Using Trussell's version of Brass method

Infant mortality rate for Malawi is estimated at 33 deaths per 1000 deaths from age group 20-25. More male infants (42) die than females (23) per 1000 live births before they reach their first year of life (**Annex 4**).

3.4 Trends in Infant Mortality Rate

There has been a declining trends in infant mortality rate since 1987 census to date, (Figure 3.1 and Annex 3) depicts the decline trend.

Figure 3.1: Time Location in Infant Mortality Rate in Malawi Population and Housing Censuses 1987, 1998, 2008 and 2018



Source: 1977, 1987, 1998, 2008, 2018 Malawi Population and Housing Censuses

3.5 Estimation of Child Mortality Rate using Trussell's version of Brass method (North family of model life tables)

In 2018 PHC, child mortality rate for Malawi was estimated at 12 deaths per 1000 births. Estimates have been computed after excluding the outlying age groups and using North Model for women aged 20- 24. Variations in child mortality by sex show that more male infants (17) die than females (7) per 1000 live births before they reach their first year of life (Annex 5).

3.6 Estimation of Under Five Mortality Rate

Child mortality is estimated at 12 deaths per 1000 live births while under-five mortality rate for Malawi is estimated at 45 deaths per 1000 live births. The results show that there are wide variations of under-five mortality by sex of the child; 58 male children per 1000 live births die before their fifth birthday compared to 30 deaths per 1000 live births among female children.

4 TRENDS AND DIFFERENTIALS IN INFANT, CHILD AND UNDER FIVE MORTALITY

4.1 Introduction

This chapter reports on levels, trends, and differentials in infant, child and under-five mortality for Malawi. The information on infant and child mortality is relevant to evaluating the progress of health programmes and in monitoring the current demographic situation. In addition, the data can be used to identify subgroups of the population that have high mortality risks. Trends in child mortality was obtained by comparing the current indicators to the estimates from the previous data sources such as Malawi Demographic and Health Survey, Multiple Indicator Cluster Survey and previous censuses.

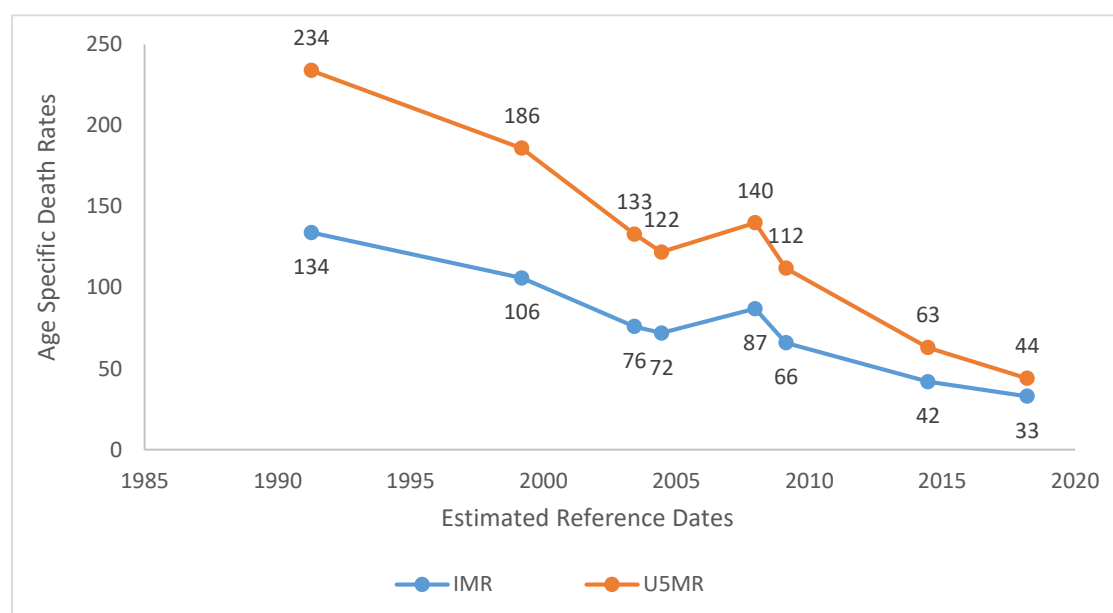
4.2 Levels and Trends of Childhood Mortality in Malawi

The 2018 PHC results showed that overall childhood mortality in Malawi has declined over the past 26 years, 1992 to 2018. The under-five mortality rate (${}_5q_0$), has declined from 234 deaths in 1992 to the current estimate of 44 deaths per 1000 live births in 2018. In the same period the infant mortality rate (${}_1q_0$) has declined from 134 deaths per 1000 live births to 33 deaths per 1000 live births, representing a decline of 101 deaths per 1000 live births.

The decline in infant and under-five mortality has not been consistent for the entire period of 26 years. In terms of infant mortality, a decline trend was observed from 1992 to 2005, then it picked up between 2005 and 2008. During 2008 and 2018 the infant mortality started declining again. Notably a similar pattern was observed in under five mortality rate (Figure 4.1).

The declines in under-five mortality in Malawi suggest a supportive environment whereby the Government has developed strategies that aim at reducing infant mortality and child mortality.

Figure 4.1: Trends in Infant and Under Five Mortality Rates, Malawi 1992- 2018

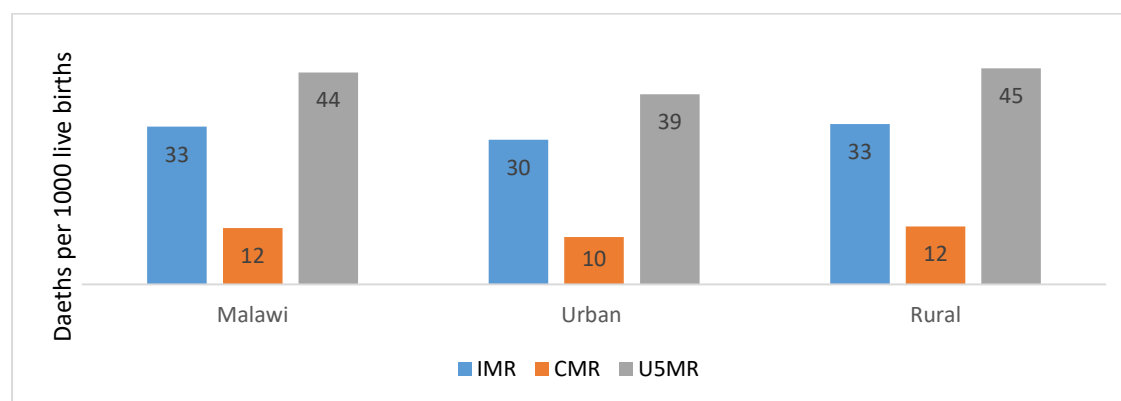


Sources: 1992 Malawi Demographic and Health Survey, 2000 Malawi Demographic and Health Survey, 2006 Multiple Indicator Cluster Survey, 2010 Malawi Demographic and Health Survey, and the 2016 Malawi Demographic and Health Survey and Malawi Population and Housing Census 2018

4.3 Rural-Urban Differentials

The rural-urban differentials in mortality are expected in developing countries owing to the differences in health care services. In sub-Saharan Africa, child and adult mortality are lower in urban than in rural areas (Filmer, Damien De Walque and Deon, 2013). In Malawi, Under five mortality was observed to be higher in rural areas than urban areas (45 deaths per 1,000 births versus 39 deaths per 1,000 live births) (Figure 4.2).

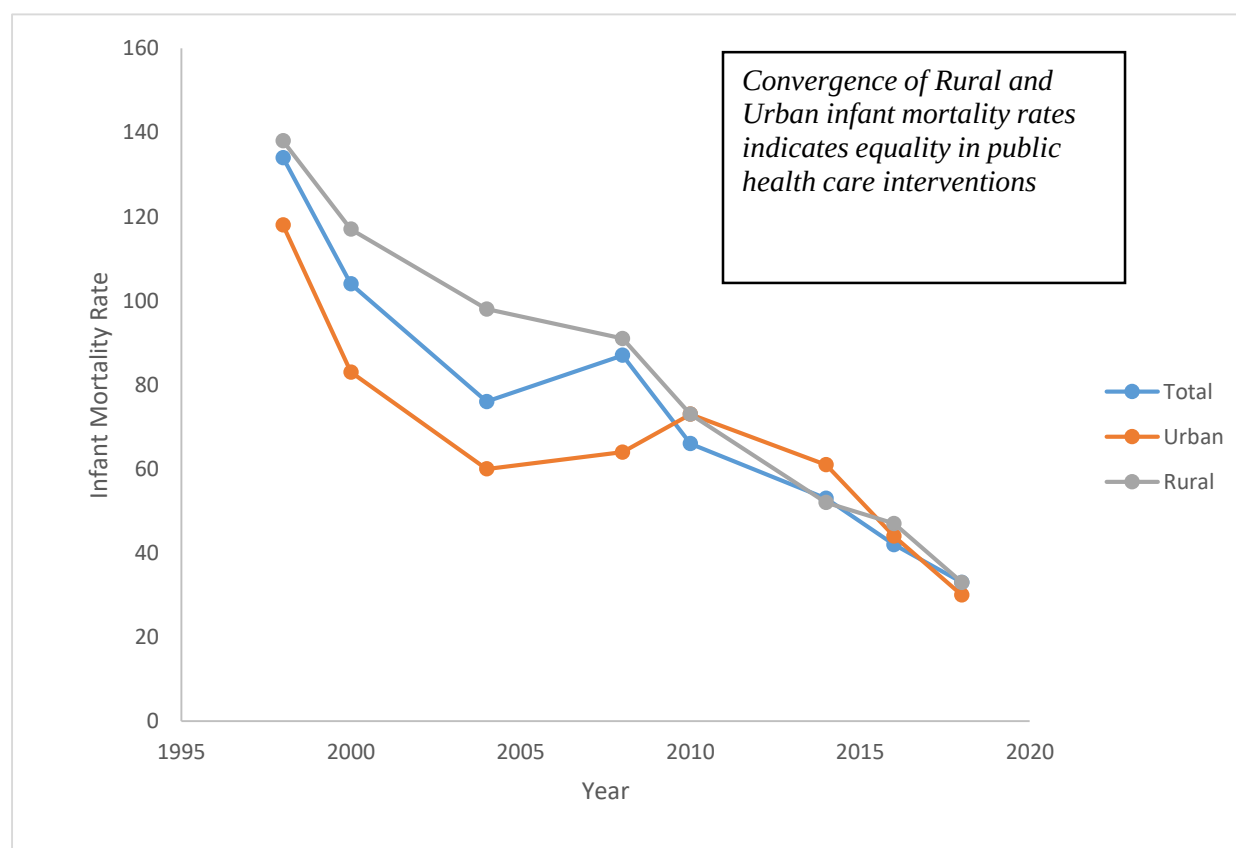
Figure 4.2: Infant, Child and Under Five Mortality Rates by Urban Rural, Malawi 2018



Source: Malawi Population and Housing Census 2018

Figure 4.3 illustrates the overall patterns of infant mortality trends by rural-urban residence from 1998 to 2018. Until 2004 there was a downward trend in IMR in both rural and urban areas. The pace of mortality reduction slowed in both rural and urban in 2005 and later accelerated until around 2008. Urban IMR begin to exceed that of rural in 2010 until 2018 where it gets below Rural IMR again. The decline was more rapid in both rural and urban areas, however the gap in urban–rural differentials has narrowed over time.

Figure 4.3: Trends in Infant Mortality Rates, Malawi 2018

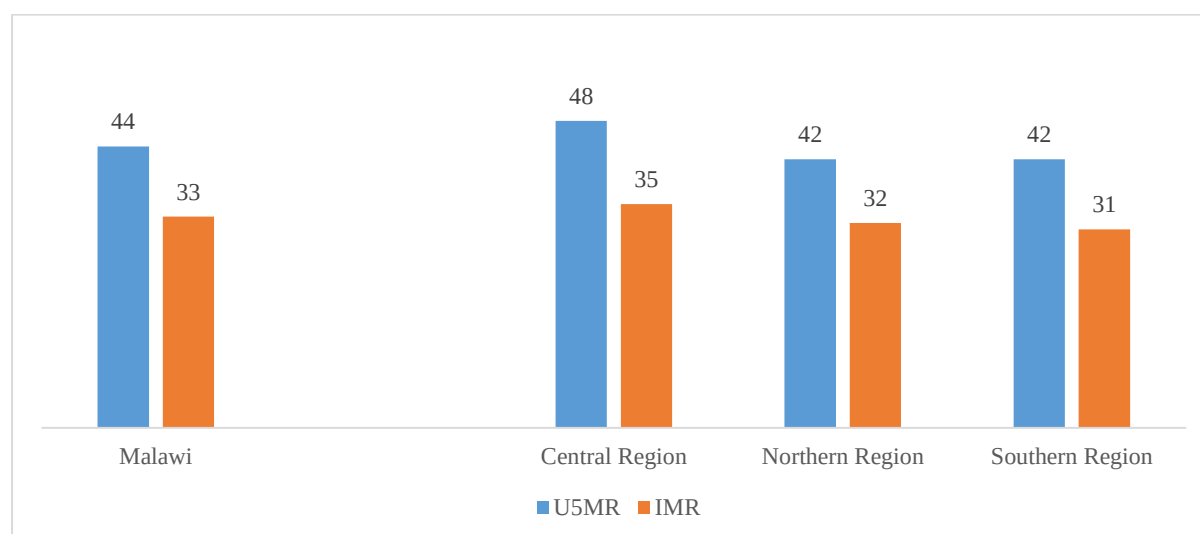


Sources: 1998 Malawi Population and Housing Census, 2000 Malawi Demographic and Health Survey, 2004 Malawi Demographic and Health Survey, 2008 Malawi Population and Housing Census, 2010 Malawi Demographic and Health Survey, and the 2016 Malawi Demographic and Health Survey and Malawi Population and Housing Census 2018

4.4 Childhood mortality by region and district

At regional level, it was observed that Central region had the highest under-five mortality rate (48 deaths per 1,000 live births) as well as Infant mortality rate (35 deaths per 1,000 live births). Infant mortality rate was lowest in the Southern region (31 deaths per 1,000 live births) (Figure 4.4).

Figure 4.4: Infant and under five mortality by region, Malawi 2018.



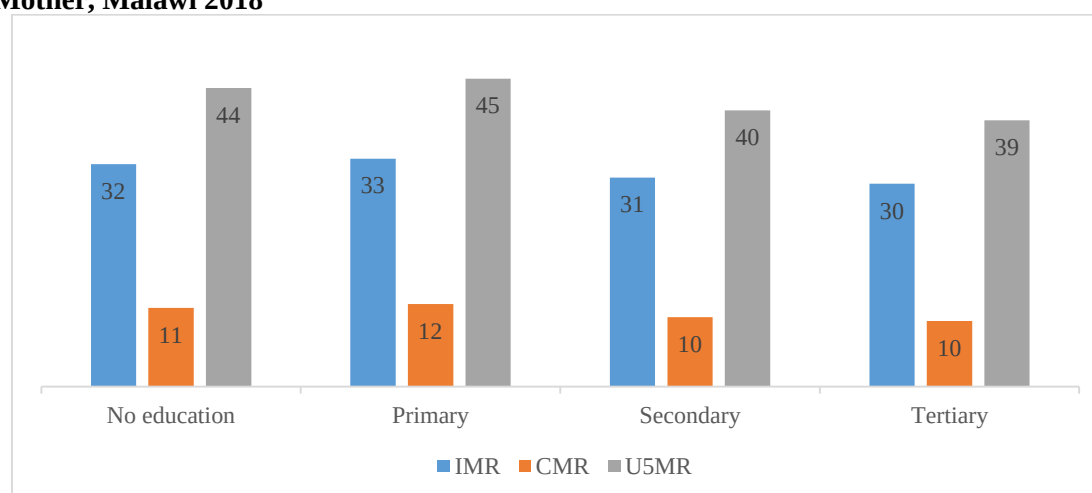
Source: Malawi Population and Housing Census 2018

4.5 Infant, Child and Under Five Mortality Rates Differentials by Level of Education of Mother

Education level of mothers significantly influences IMR, CMR and U5MR in Malawi. Both the infant and child mortality risks were much higher among the children born to women with little or no education, than the children born to educated mothers.

In terms of education of mothers, it is noted that infant, child and under-five mortality rates are low among those mothers with tertiary education. IMR and the U5MR are 39 deaths per 1000 live births and 30 deaths per 1000 live births, respectively. On the other hand mothers with primary education had the highest IMR (33 deaths per 1000 live births) as well as U5MR (45 deaths per 1000 live births). (Figure 4.5).

Figure 4.5: Infant, Child and Under Five Mortality Rates Differentials by education level of Mother, Malawi 2018

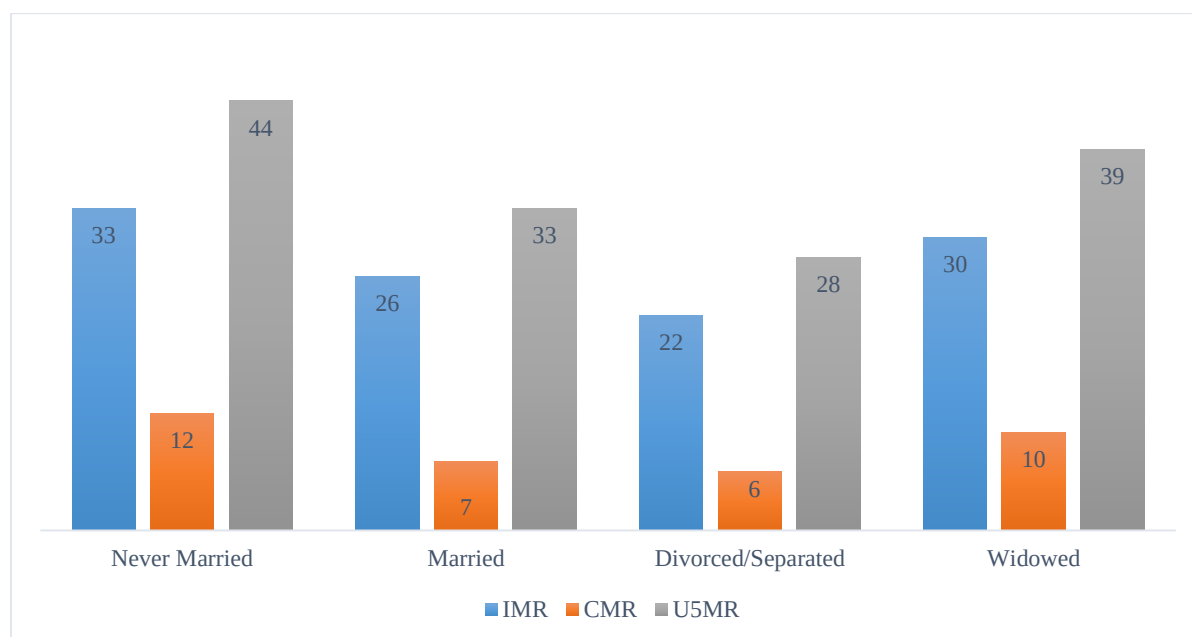


Source: Malawi Population and Housing Census 2018

4.6 Infant, Child and Under Five Mortality Rates Differentials by Marital Status of Mother

Differentials of childhood mortality by marital status of mothers are presented in Annex 7. It is noted that the highest infant and under five mortality occur to women who reported to be never married, 33 and 44 deaths per 1000 live births, respectively (Figure 4.6).

Figure 4.6: Infant, Child and Under Five Mortality Rates Differentials for 2018 MPHC by Marital Status of Mothers, Malawi 2018

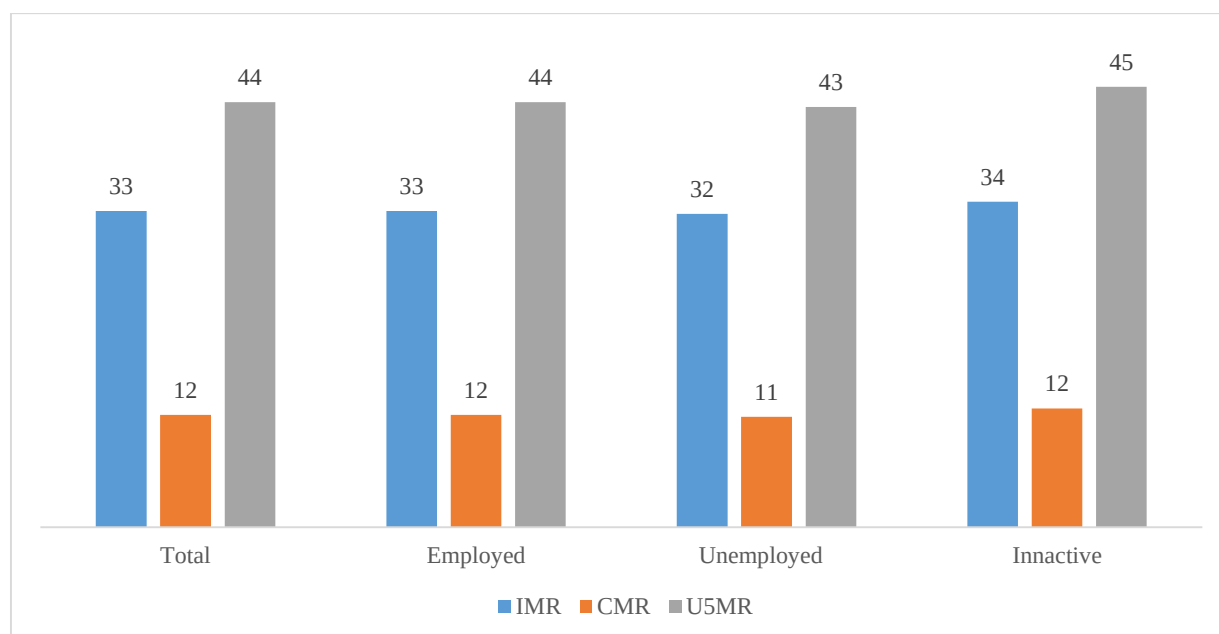


Source: Malawi Population and Housing Census 2018

4.7 Infant, Child and Under Five Mortality Rates Differentials by Economic Activity of the Mother

The picture we get about the effect of mother's economic activity is rather different from other socio economic activities. The distribution of infant, child and under five mortality rates is more homogeneous across employed, unemployed and inactive mothers. Differentials in under five mortality rates based on mothers' economic activity is almost negligible. Highest Infant mortality rates (34) and under five mortality rates (45) were obtained in economically inactive mothers (Figure 4.7).

Figure 4.7: Infant, Child and Under Five Mortality Rates Differentials by economic activity of mothers, Malawi 2018



Source: Malawi Population and Housing Census 2018

5 LIFE TABLES

Definitions

A **Life Table** is table that displays the 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.

Life Expectancy ($e(x)$) is an estimate of the average number of additional years a person could expect to live if the age-specific death rates for a given year prevailed for the rest of a person's life.

5.1 Introduction

Model life tables present in a tabular form the mortality indicators that are typical of given population groups by levels and patterns of the risks of dying in such populations. In its classical form, a life table displays various pieces of information about the dying out of a birth cohort. It is used by public health workers, demographers, actuaries and others in studies of longevity, fertility, migration and population growth as well as in making projections of population size and characteristics (Shryock, H.S, J.S Siegel and Associates, 1976). Life expectancy is a generic term for all population indicators that estimate the average time (in years) that a person could expect to live.

Invariably, the most frequently-used column of a life table is probably "expectation of life at age x " or "life expectancy at age x ," usually denoted $e(x)$. It refers to the average number of additional years that a person could expect to live beyond that age.

As with standard life tables, life expectancies can be calculated for a period or for a cohort (Shryock, H.S, J.S Siegel and Associates, 1976). The first method, which is more common, calculates the life expectancy for a hypothetical birth cohort exposed to currently observed event rates (e.g. rates of mortality, incidence and remission) over the course of its lifetime.

Information on life table as they provide the probability of surviving provides Malawi with a critical baseline tool for measuring mortality, as well as improving options for allocating health resources to best serve the needs of its citizens. The estimates on life expectancy also provide critical comparative perspective on mortality trends within Malawi and elsewhere in the world. Mortality information is crucial for monitoring and evaluating health interventions, and putting in place mechanisms to address them. The 2018 PHC was conducted, with focus on capturing information on mortality in addition to key demographic variables that are important for evidence based planning.

They are therefore a series of reference life tables that can be used to estimate mortality when only a few indicators are known.

5.2 Estimated Life Tables for Malawi from Children Ever Born and Surviving and Household Deaths Data

The 2018 PHC report on mortality departs from the 2008 PHC which used the In-depth life table to estimate mortality levels using children ever born and surviving data. The decision was arrived following a number of successes registered in reductions in deaths. Malawi's rapid and successful Antiretroviral Therapy (ARV) scale-up from 2004 to 2014 has critically influenced the HIV epidemic, reducing mortality, morbidity, and transmission (National AIDS Commission, 2015). Furthermore, since 2011, Malawi started implementing Prevention of Mother to Child Transmission (PMTCT) *Option B+* policy, making life-long ART available for all HIV infected pregnant and breastfeeding women, regardless of clinical stage or CD4 count. This has resulted in a 66% reduction of vertical transmission within 3 years.

Looking forward, the Malawi National Strategic Plan for HIV and AIDS (2015-2020) aims to meet the 90-90-90 treatment targets to control the HIV epidemic by 2030. By the end of 2020, Malawi will have: diagnosed 90% of all people living with HIV (PLHIV); started and retained 90% of those diagnosed on ART, and achieved viral suppression for 90% of patients on ART. Thus, reaching these targets will significantly reduce HIV related deaths. It is expected that life expectancy will increase steadily.

5.3 Estimating Life Tables for Malawi from Children Ever Born and Children Surviving Data

Preliminary analyses showed that there was a disparity in the average completeness of deaths; reporting of deaths under five was biased downwards leading to high, but implausible life expectancy for both sexes. Additionally, while reporting for deaths for 60 years and over among males was negligible, female deaths were heavily biased in this age group. Because of these observations, life tables were constructed differently.

Male lifetable for 2018 Population and Housing Census was computed using estimates of infant mortality rates derived from the 2015-16 Malawi Demographic and Health Survey collected five years before the survey. The infant mortality rate for the closest date (2013.47) before the census date (2018.2) was adopted to represent the most accurate period within which the deaths occurred.

The male lifetable was constructed by merging the male (${}_1q_0$) corresponding to the 2015-16 MDHS to the data derived from 2018 census data on children ever born and surviving with age specific mortality rates for older age groups (5-9 and over). For life table development refer to Annex 9.

The same procedure was followed in constructing the female lifetables, however due to biasness that was observed in age groups 60 years and over where using General Growth Balance (GGB) adjustments, showed that completeness of reporting of deaths during 12 months prior to the 2018 Census was estimated to be 64.1 percent, suggesting a multiplication of deaths from age group 60+ by 1/0.641 or 1.56 as a GGB Adjustment factor.

Completeness of reporting of household deaths was estimated by the methods of Brass (1979) and Hill (1987); see also United Nations 2002). Both methods compare inter-censal deaths estimated from two censuses' age distributions with inter-censal deaths estimated from household deaths reported during the 12 months prior to the census to estimate under reporting of the latter. Both methods also estimate, simultaneously, relative completeness of enumeration in the two censuses, which would otherwise bias the estimation of deaths from the census' age distributions.

Both methods assume a population closed to migration, a necessity for estimating inter-censal deaths from population age distributions, but are reasonably robust against moderate international migration in the young adult ages. Life expectancies for males and females at birth were estimated at 62.4 years for males and 67.9 years for females (Annex 9).

5.4 Differentials in Life Expectancy

This section considers socio-economic differentials of life expectancy by background characteristics. These indicators are affected by the nexus of environmental, economic, cultural, social, political and demographic factors. Factors considered in this analysis include place of residence - rural-urban, district and educational attainment.

5.5 Variation in Mortality by Background Characteristics

Policy-makers may be interested to know rural-urban, as well as regional and district levels of life expectancy for intervention purposes. At national level, life expectancy for males is 62.4 years and for females is 67.9 years.

5.5.1 Urban–Rural Mortality Differential

In the literature of mortality, area of residence is shown to influence the level of mortality (Ernest Moy, 1999). Generally, urban areas display a relatively lower level of mortality than rural areas; people living in urban areas tend to have access to better socio-economic services than their rural counterparts. This phenomenon is very obvious, as depicted in Figure 5.1.

Figure 5.1: Life expectancy (years) national and rural – urban, for Malawi 2008 and 2018

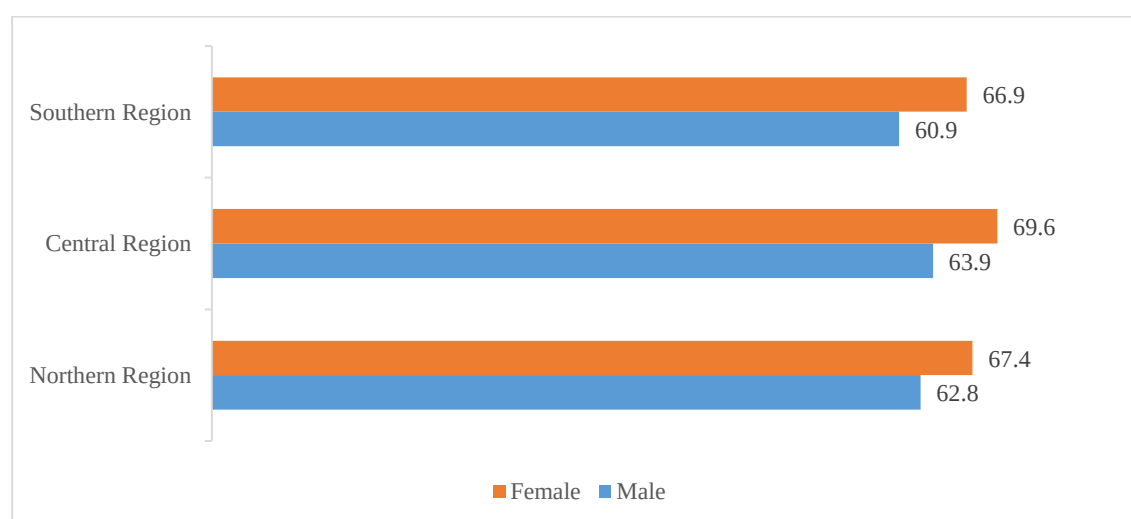


Source: 2008 Population and Housing Census and 2018 Population and Housing Census

5.5.2 Regional and District Variations in Life Expectancy

The estimates for the life expectancy at birth for the 2018 show considerable regional and district variations. Figure 5.2 shows that male life expectancy is highest in the Central region (63.9) and lowest in the Southern region (60.9 years). The same pattern is depicted for expectation of life at birth for females which shows that the Central region has the highest life expectancy (69.6 years) and southern the lowest (66.9 years).

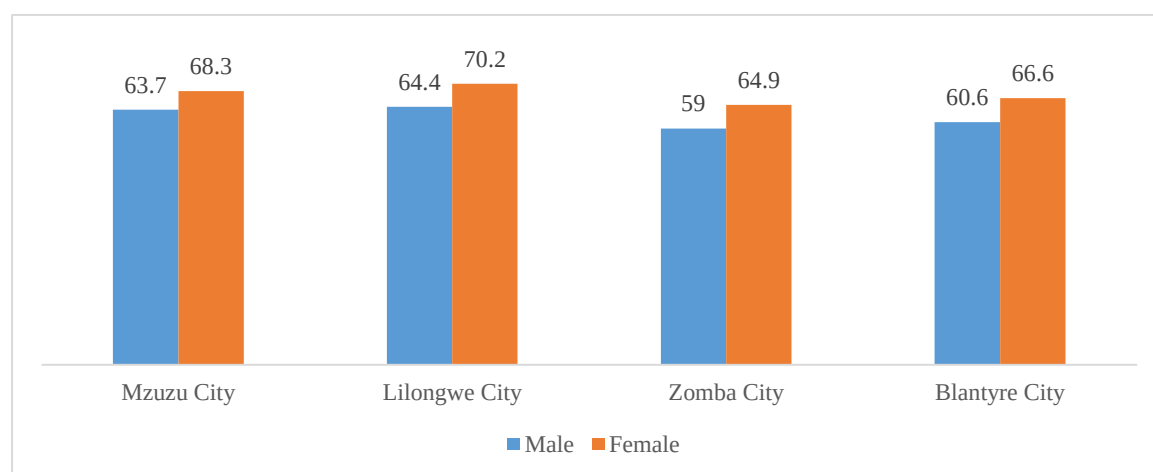
Figure 5.2: Life expectancy by region, Malawi 2018



Source: 2018 Population and Housing Census

Among cities, life expectancy is highest for males living in Lilongwe City with 64.4 years. In contrast, Zomba City registered the lowest male life expectancy (59 years). Similar patterns are also depicted for life expectancy among women; those residing in Lilongwe City have the highest expectation of life (70.2 years), and those in Zomba City the lowest (64.9 years) (Figure 5.3).

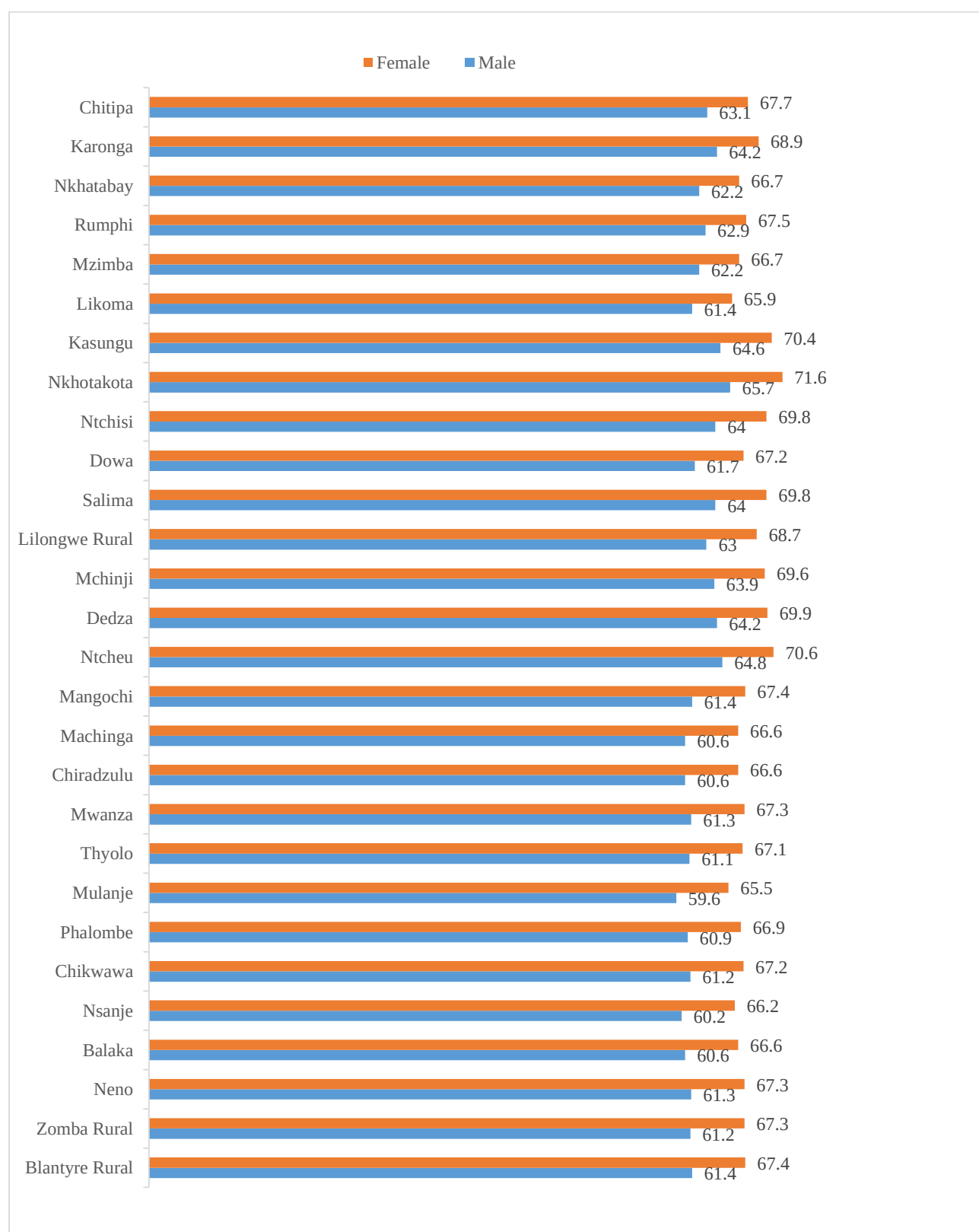
Figure 5.3: Male and female Life expectancies for cities, Malawi 2018



Source: 2018 Population and Housing Census

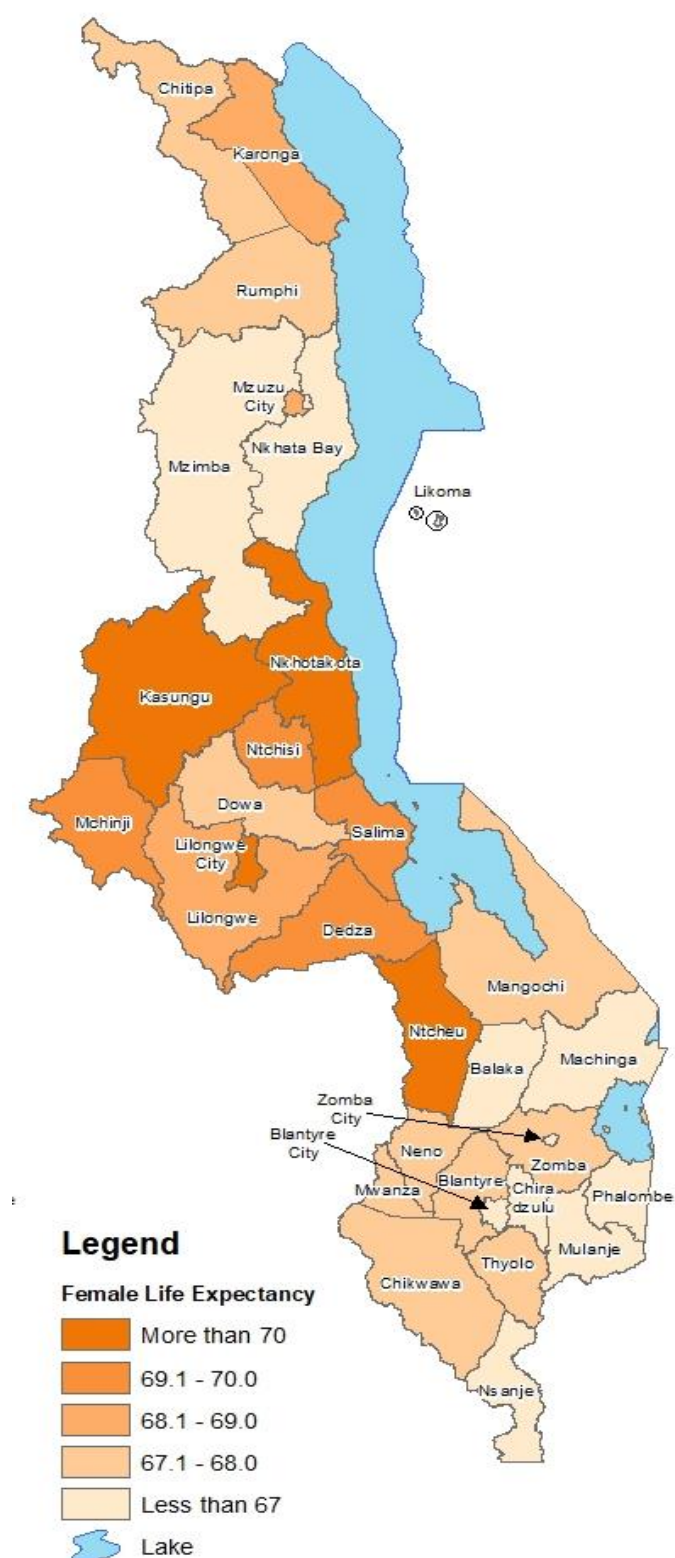
Life expectancy by district reveals a wider variation with almost all districts having life expectancy of over 60 years for males and females (Figure 5.4, Figure 5.5 and Figure 5.6).

Figure 5.4: District variation in life expectancy by sex, Malawi 2018



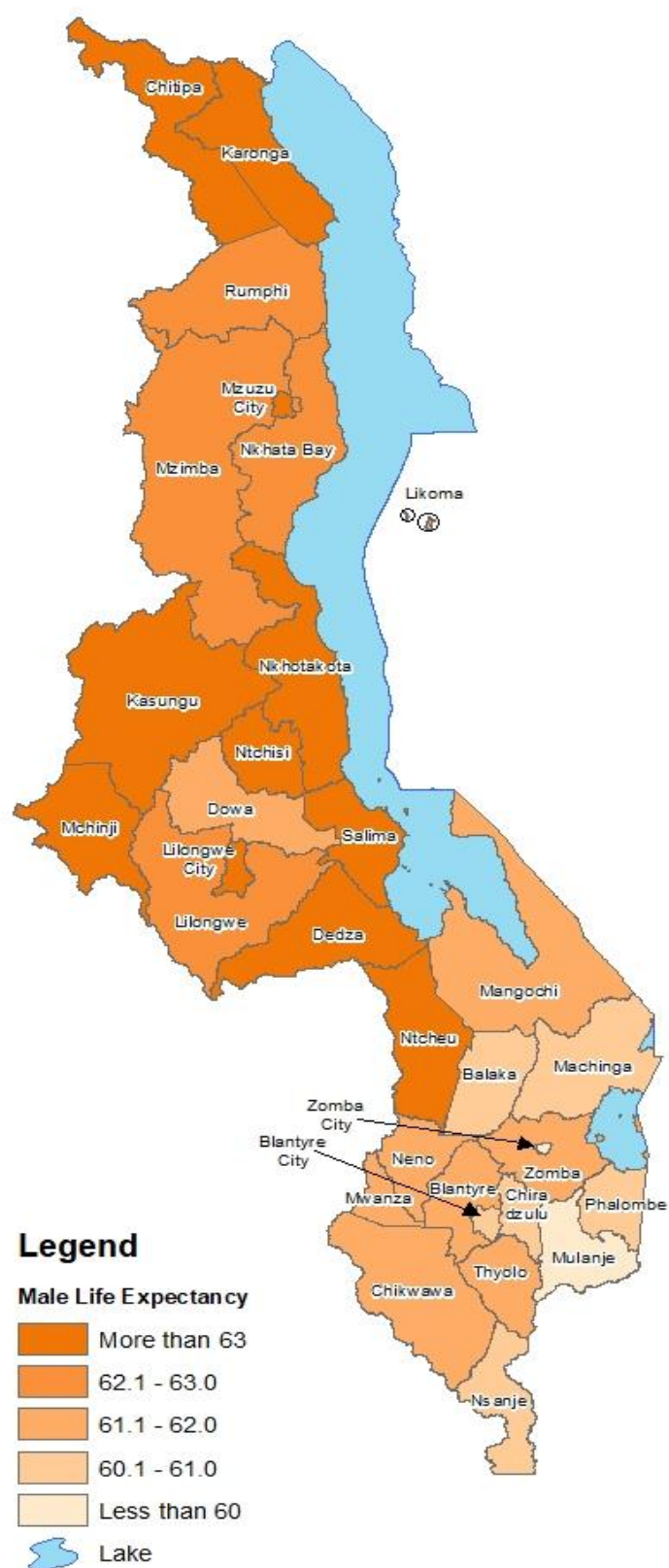
Source: 2018 Population and Housing Census

Figure 5.5: District Levels of life expectations for Females, Malawi 2018



Source: 2018 Population and Housing Census

Figure 5.6: District Levels of life expectations for Males, Malawi 2018



Source: 2018 Population and Housing Census

6 POLICY IMPLICATIONS

Demographic research on mortality is significant for understanding the health consequences of social inequality, human behaviour, biological factors, and various other forces in human populations. Understanding mortality patterns is crucial to comprehending the dynamics of human society.

Mortality data and demographic techniques confirm that there is overwhelming evidence that under five mortality rate has been reduced by almost 81% since 1990, with 44 deaths per 1,000 live births in 2018 compared to 234 deaths per 1,000 live births in 1990 (National Statistical Office, 2015). In the same period the infant mortality rate has declined from 134 deaths per 1000 live births in 1990s to the current estimate of 33 deaths per 1000 live births in 2018, representing a decline of 75%.

This suggests that Malawi met the 2015 Millennium Development Goal target of reducing under-five mortality by 2020. Assessing the country's progress towards SDG and child survival targets, it clearly indicates that Malawi may meet the proposed SDG target of 25 deaths per 1,000 live births by 2030 if it continues its current trends in reducing under-five mortality. SDG target 3.2.1 calls for all countries to aim to reduce U5MR to 25 or fewer deaths per 1,000 live births by 2030.

Despite its decline, mortality rate in Malawi is still high and it ranks among the highest in the world. High mortality patterns may profoundly influence the size and composition of the populations. It is generally agreed among policy makers, development planners and other key policy actors that high mortality rates exert pressure on aspects of social and economic development. It is therefore imperative that policies and development frameworks address issues of high mortality rates specifically infant and child mortality rates to attain sustainable development.

Understanding the causes of mortality provides important public health insights. Renewing the promise of survival for children relies on tracking and addressing the leading causes of deaths. Infectious diseases (such as pneumonia and diarrhoea) and neonatal complications are responsible for the vast majority of under five deaths in Malawi. For example, the prevalence of diarrhoea overall in Malawi is estimated at 17.5% with 38% in children 6-12 months. Introduction of BCG, DPT-HepB-Hib, Polio vaccines and vaccination against measles helped to reduce infant and child mortality by preventing diseases such as tuberculosis, diphtheria, whooping cough, tetanus, polio, measles, hepatitis B and haemophilus influenza type B. The government of Malawi introduced the pneumococcal conjugate vaccine (PVC 13) and monovalent human rotavirus vaccine (RV1) into the national infant immunisation programme in November 2011 and October 2012, respectively, this also helped to further reduce the infant and child mortality by preventing severe pneumonia, meningitis and gastroenteritis, respectively. The intervention by the government in the treatment of malaria during pregnancy, distribution of mosquito nets, HIV/AIDS awareness campaigns and treatment of fever among children have also significantly helped in bringing the infant and child mortality rates down. In summary, most child deaths are caused by diseases that are readily

preventable or treatable with proven, cost-effective interventions. Action must be taken immediately to save children's lives by expanding effective preventive and curative interventions.

It has been observed that there are wide variations in under-five mortality by regions. Central region has the highest under five-mortality rate of 48 and the highest infant mortality rate of 35; southern and northern regions have under-five mortality rates below the national average with 42 deaths per 1000 live births. Under five mortality rate in rural areas is higher (45) compared to that of urban areas (39).

The 2018 PHC reveals that at regional level, Central region experienced the lowest CDR of 5.8 whereas the southern region experienced the highest CDR of 6.7. The northern region had a CDR of 6.3. In terms of districts Nkhata Bay had the highest CDR, 9.1 while Likoma had the lowest CDR 5.8 in the country. This reveals that Nkhata Bay district experienced the largest number of deaths across all districts.

Life expectancy for males and females in Malawi is 62.4 years and 67.8 years, respectively. However, there are marked differences between rural and urban life expectancies, with urban males expected to live 64.1 years as opposed to 61.3 years for rural areas; and urban women expected to live 69.8 years, compared to 64.7 for their rural counterparts. These rural-urban differentials are substantially wide and call for attention to narrow the disparities. While broader policy frameworks mainly focus on improving the life expectancy of the population as a whole, deliberate interventions need to be developed to ensure that life expectancies of rural populations match those of their urban counterparts. Life expectancy of rural people can be improved through strategies such as access to markets and access to finance, increasing their labour.

Increased life expectancy among the elderly may be attributed to the introduction of Medicare. But future advances are necessary to ensure that contemporary gains in life expectancy persist into the future, including more comprehensive health care coverage for individuals of all ages; further scientific research on the determinants of cancer, heart disease, diabetes, HIV/AIDS, and various other illnesses; and continued progress in implementing medical technologies and information about healthy behaviours.

Although there have been periodic setbacks in life expectancy increases over time such as HIV/AIDS epidemic in Malawi, such setbacks are usually of short duration and are compensated for by later improvements in controlling and treating infectious diseases and by further improvements in other causes of death.

There is an opportunity to better understand the social and contextual influences on mortality. Although much work has focused on various social relationships, including marriage and family structure (Lillard and Waite 1995; Rogers 1995), less research has examined mortality patterns within couples or families.

The government can fund research to help better understand health and mortality patterns and can fund disease prevention and health promotion programs. Furthermore, government agencies can set priorities related to national health e.g. safe motherhood practises in order to further decline the infant and maternal mortality

The government should provide public education such as HIV/AIDS awareness campaigns to equip Malawians with knowledge that can help in reducing mortality rates, approval of food and drugs, tax regulation and regulation on some products are some of the important indirect determinants of mortality the government needs to pay attention to further reduce the mortality rates in Malawi.

ANNEX

Annex 1: Crude Death Rates by Region, Districts and Sex, Malawi 2008 and 2018

Region/District	2018			2008		
	Total	Male	Female	Total	Males	Females
Malawi	6.3	7.3	5.4	10.4	11.2	9.7
Urban	4.9	5.6	4.2	9.8	10.0	9.5
Rural	6.6	7.6	5.6	11.2	11.7	10.7
Northern Region	6.5	7.4	5.7	9.6	10.5	8.7
Chitipa	5.2	5.8	4.6	7.3	8	6.6
Karonga	6.4	7.7	5.2	9.3	10.6	8.1
Nkhata Bay	9.1	9.9	8.4	14.1	14.6	13.5
Rumphi	6.3	7.0	5.6	7.1	8.2	6.1
Mzimba	6.7	7.7	5.8	9.7	10.7	8.7
Likoma	3.9	3.1	4.8	10.9	9.4	12.2
Mzuzu City	4.3	4.9	3.6	8.8	9.3	8.4
Central Region	5.8	6.8	5.0	8.3	9.0	7.6
Kasungu	5.2	6.0	4.4	6.5	6.9	6.1
Nkhota Kota	6.1	6.9	5.4	9.4	9.6	9.1
Ntchisi	5.1	5.8	4.5	6.8	7.6	6.1
Dowa	6.3	7.2	5.4	7.1	7.6	6.4
Salima	6.6	7.9	5.4	10.3	11.1	9.6
Lilongwe	5.6	6.5	4.8	8.5	9.4	7.6
Mchinji	6	7.0	5.1	7.2	7.9	6.6
Dedza	6.6	8.1	5.3	8.6	9.6	7.4
Ntcheu	7.3	8.4	6.4	11.4	12.5	10.4
Lilongwe City	4.5	5.1	3.8	7.6	7.9	7.3
Southern Region	6.7	7.7	5.7	12.6	13.4	11.9
Mangochi	7.8	8.9	6.7	13.9	14.8	13.2
Machinga	6.4	7.4	5.4	10.8	11.6	10.1
Zomba	6.8	7.9	5.7	12.6	13.3	11.9
Chiradzulu	6.6	7.5	5.9	13.2	15	11.5
Blantyre	7.0	7.9	6.1	13.3	14	12.8
Mwanza	6.0	6.9	5.2	11.6	12.8	10.5
Thyolo	7.7	9.0	6.6	12.2	13.4	11.1
Mulanje	7.4	8.8	6.0	18.1	19.7	16.6
Phalombe	6.4	7.3	5.6	14.7	15.4	14.1
Chikwawa	5.1	5.9	4.3	9.2	10.3	8.0
Nsanje	5.7	6.4	5.1	10.9	11.9	10
Balaka	8.5	10	7.2	14.2	15	13.4
Neno	5.1	5.8	4.5	12.7	13.1	12.4
Zomba City	5.9	6.9	4.8	7.8	7.8	7.9
Blantyre City	4.9	5.4	4.3	9.8	9.8	9.9

Source: Malawi Population and Housing Census 2008, 2018

Annex 2: Reported Age-Specific Death Rates by Sex, Malawi 2018.

Age groups	Total	Male	Female
Total	6.3	7.3	5.4
<1	24.1	26.2	22.0
1-4	5.6	6.0	5.2
5-9	1.9	2.0	1.7
10-14	1.3	1.4	1.2
15-19	1.8	1.9	1.6
20-24	2.8	3.4	2.3
25-29	4.3	5.4	3.3
30-34	5.4	6.9	4.1
35-39	7.0	8.7	5.4
40-44	8.0	10.0	6.0
45-49	10.4	12.9	7.7
50-54	13.0	16.2	10.0
55-59	14.1	18.0	10.7
60-64	18.7	24.2	14.0
65-69	18.6	23.8	14.4
70-74	33.4	43.2	25.7
75-79	40.5	52.7	32.0
80-84	70.1	87.9	59.3
85-89	69.9	86.6	59.7
90-94	128.1	167.0	107.4
95+	200.1	233.2	181.6

Source: Malawi Population and Housing Census 2018

Annex 3 Time location of Infant and childhood Mortality Estimates for Malawi Population and Housing Censuses 1987-2018

Census	Reference Date	$1q_0$	$4q_1$
1987	1985.6	0.210	0.299
	1982.7	0.172	0.261
	1981.6	0.166	0.253
	1979.3	0.173	0.262
	1976.8	0.180	0.271
	1973.9	0.184	0.277
	1970.4	0.184	0.277
	1967.6	0.153	0.124
1998	1996.2	0.134	0.105
	1994.4	0.125	0.097
	1992.3	0.123	0.095
	1989.8	0.122	0.094
	1987.1	0.127	0.098
	1983.6	0.131	0.103
	2007.4	0.106	0.078
	2006.0	0.087	0.060
2008	2003.8	0.086	0.058
	2001.3	0.093	0.065
	1998.6	0.099	0.071
	1995.8	0.107	0.079
	1992.8	0.110	0.081
	2017.6	0.045	0.022
	2016.3	0.033	0.012
	2014.4	0.030	0.010
2018	2012.2	0.036	0.014
	2009.7	0.043	0.020
	2007.1	0.053	0.028
	2004.2	0.061	0.035

Source: 1977, 1987, 1998, 2008, 2018 Malawi Population and Housing Censuses

Annex 4: Estimation of infant mortality rate using North family of Trussell's version of Brass method: Both Sexes, Malawi 2018

Age group	Children Ever Born	Children Surviving	Prop Dead	North
15 – 20	0.2278	0.2174	0.0459	0.0452
20 – 25	1.1904	1.1447	0.0384	0.0326
25 – 30	2.3382	2.2465	0.0392	0.0303
30 – 35	3.576	3.3952	0.0506	0.0358
35 – 40	4.4873	4.1839	0.0676	0.0428
40 – 45	5.2596	4.7553	0.0959	0.0529
45 – 50	5.7286	4.9996	0.1272	0.0612

Source: 2018 Malawi Population and Housing Censuses

**Estimation of infant mortality rate using North family Trussell's version of Brass method:
Male, Malawi 2018**

Age group	Children Ever Born	Children Surviving	Prop Dead	North
15 – 20	0.1161	0.1085	0.0655	0.0641
20 – 25	0.6000	0.5699	0.0501	0.0420
25 – 30	1.1753	1.1216	0.0457	0.0353
30 – 35	1.7896	1.6910	0.0551	0.0394
35 – 40	2.2458	2.0860	0.0712	0.0457
40 – 45	2.6263	2.3690	0.0980	0.0554
45 – 50	2.8443	2.4810	0.1277	0.0629

Source: 2018 Population and Housing Census

**Estimation of infant mortality rate using North family Trussell's version of Brass method:
Female, Malawi 2018**

Age group	Children Ever Born	Children Surviving	Prop Dead	North
15 – 20	0.1118	0.1089	0.0255	0.0253
20 – 25	0.5904	0.5747	0.0266	0.0229
25 – 30	1.1630	1.1249	0.0327	0.0253
30 – 35	1.7865	1.7042	0.0460	0.0324
35 – 40	2.2415	2.0979	0.0641	0.0400
40 – 45	2.6334	2.3864	0.0938	0.0504
45 – 50	2.8853	2.5186	0.1271	0.0596

Source: 2018 Population and Housing Census

Annex 5: Estimation of Child Mortality Rate using Trussell's version of Brass (North family).

a) Both Sexes, Malawi 2018

Age group	Children Ever Born	Children Surviving	Proportion Dead	North
15 – 20	0.2278	0.2174	0.0459	0.0215
20 – 25	1.1904	1.1447	0.0384	0.0116
25 – 30	2.3382	2.2465	0.0392	0.0100
30 – 35	3.5760	3.3952	0.0506	0.0140
35 – 40	4.4873	4.1839	0.0676	0.0196
40 – 45	5.2596	4.7553	0.0959	0.0280
45 – 50	5.7286	4.9996	0.1272	0.0350

Source: 2018 Population and Housing Census

b) Male, Malawi 2018

Age group	Children Ever Born	Children Surviving	Proportion Dead	North
15 – 20	0.1161	0.1085	0.0655	0.0343
20 – 25	0.6000	0.5699	0.0501	0.0168
25 – 30	1.1753	1.1216	0.0457	0.0119
30 – 35	1.7896	1.6910	0.0551	0.0149
35 – 40	2.2458	2.0860	0.0712	0.0198
40 – 45	2.6263	2.3690	0.0980	0.0274
45 – 50	2.8443	2.4810	0.1277	0.0333

Source: 2018 Population and Housing Census

c) Female, Malawi 2018

Age group	Children Ever Born	Children Surviving	Proportion Dead	North
15 – 20	0.1118	0.1089	0.0255	0.0081
20 – 25	0.5904	0.5747	0.0266	0.0070
25 – 30	1.1630	1.1249	0.0327	0.0081
30 – 35	1.7865	1.7042	0.0460	0.0130
35 – 40	2.2415	2.0979	0.0641	0.0194
40 – 45	2.6334	2.3864	0.0938	0.0286
45 – 50	2.8853	2.5186	0.1271	0.0368

Source: 2018 Population and Housing Census

**Annex 6: Infant, Child and under five Mortality Rates by Urban/Rural, Region and District,
Malawi Population and Housing Censuses 1987 - 2018**

	1987		1998		2008		2018	
	IMR	U5MR	IMR	U5MR	IMR	U5MR	IMR	U5MR
	(1q0)	(5q0)	(1q0)	(5q0)	(1q0)	(5q0)	(1q0)	(5q0)
Malawi			0.127	0.215	0.087	0.140	0.033	0.044
Urban	-	-	-	0.125	0.064	0.100	0.030	0.039
Rural	-	-	-	0.207	0.091	0.147	0.033	0.045
Northern Region	0.132	0.177		0.176	0.071	0.111	0.032	0.042
Chitipa	0.104	0.141	0.097	0.159	0.069	0.107	0.029	0.041
Karonga	0.130	0.174	0.106	0.175	0.068	0.106	0.028	0.035
Nkhata Bay	0.105	0.143	0.105	0.173	0.072	0.113	0.034	0.045
Rumphi	0.127	0.170	0.091	0.148	0.063	0.098	0.031	0.042
Mzimba	0.161	0.213	0.106	0.175	0.078	0.124	0.033	0.045
Mzuzu City ¹	-	-			0.053	0.080	0.029	0.038
Likoma ¹	-	-	0.082	0.131	0.072	0.114	0.036	0.049
Central Region	0.175	0.231	0.133	0.223	0.089	0.145	0.035	0.048
Kasungu	0.191	0.250	0.135	0.227	0.089	0.144	0.033	0.044
Nkhotakota	0.128	0.172	0.139	0.234	0.085	0.138	0.030	0.039
Ntchisi	0.175	0.230	0.146	0.246	0.095	0.156	0.034	0.047
Dowa	0.180	0.236	0.132	0.221	0.086	0.138	0.041	0.058
Salima	0.176	0.231	0.131	0.219	0.093	0.151	0.034	0.047
Lilongwe Rural ²	-	-	-	-	0.101	0.166	0.037	0.052
Lilongwe City ²	-	-	-	-	0.063	0.096	0.033	0.045
Mchinji	0.221	0.276	0.131	0.221	0.094	0.153	0.035	0.048
Dedza	0.185	0.243	0.131	0.221	0.095	0.157	0.034	0.046
Ntcheu	0.164	0.217	0.127	0.213	0.085	0.138	0.032	0.043
Southern Region	0.16	0.211	0.129	0.216	0.09	0.145	0.031	0.042
Mangochi	0.193	0.252	0.126	0.216	0.089	0.145	0.030	0.040
Machinga	0.173	0.229	0.126	0.211	0.083	0.134	0.032	0.043
Zomba City ²	-	-	-	-	0.089	0.145	0.037	0.051
Zomba Rural ²	-	-	-	-	0.098	0.139	0.031	0.040
Chiradzulu	0.172	0.223	0.133	0.223	0.082	0.144	0.032	0.044
Blantyre City ²	-	-	-	-	0.098	0.147	0.032	0.044
Blantyre Rural ²	-	-	-	-	0.098	0.132	0.031	0.040
Mwanza	0.156	0.207	0.126	0.208	0.107	0.169	0.030	0.040
Thyolo	0.151	0.201	0.136	0.229	0.099	0.161	0.031	0.041
Mulanje	0.149	0.199	0.151	0.255	0.087	0.158	0.035	0.048
Phalombe	-	-	0.138	0.232	0.102	0.166	0.032	0.042
Chikwawa	0.174	0.230	0.133	0.223	0.085	0.139	0.031	0.041
Nsanje	0.186	0.249	0.150	0.253	0.084	0.151	0.033	0.045
Balaka ¹	-	-	0.124	0.253	0.073	0.126	0.029	0.043
Neno ¹	-	-	-	-	0.064	0.116	0.027	0.040

Source: 1987, 1998, 2008, 2018 Malawi Population and Housing Censuses

Annex 7: Infant and child mortality rates for 2018 MPHC by selected socio - economic Characteristics, Malawi 2018

	IMR (1q0)	CMR (4q1)	U5MR (5q0)
Malawi	32.6	11.6	43.9
Urban	29.9	9.8	39.4
Rural	33.2	12.0	44.7
Marital Status			
Never Married	32.5	11.5	43.7
Married	25.6	7.3	32.7
Divorced/Separated	31.7	10.9	42.2
Widowed	30.0	9.8	39.4
Economic Activity			
Employed	32.6	11.6	43.9
Unemployed	32.3	11.4	43.4
Inactive	33.6	12.3	45.4
Education			
No education	32.5	11.5	43.6
Primary	33.3	12.1	45.0
Secondary	30.5	10.1	40.3
Tertiary	29.6	9.6	38.9

Source: Malawi Population and Housing Census 2018

**Annex 8: Life Expectancies Distributions by Sex, Urban/Rural, Region and District, Malawi
2008 and 2018**

	2018 PHC		2008 PHC		Percentage change (%)	
	Male	Female	Male	Female	Male	Female
Malawi	62.4	67.9	48.3	51.4	29.2	32.1
Urban	64.1	69.8	53.0	59.0	20.9	18.3
Rural	61.3	64.7	47.5	50.9	29.1	27.1
Northern Region	62.8	67.4	51.0	56.0	23.2	20.4
Chitipa	63.1	67.7	51.0	56.1	23.8	20.7
Karonga	64.2	68.9	53.0	56.0	21.2	23.1
Nkhatabay	62.2	66.7	50.8	56.0	22.4	19.1
Rumphi	62.9	67.5	53.1	60.5	18.5	11.5
Mzimba	62.2	66.7	50.2	54.0	23.9	23.6
Mzuzu City	63.7	68.3	54.6	62.1	16.6	10.0
Likoma	61.4	65.9	50.1	56.1	22.5	17.4
Central Region	63.9	69.6	47.7	51.1	33.9	36.2
Kasungu	64.6	70.4	47.7	50.8	35.5	38.6
Nkhotakota	65.7	71.6	47.7	51.4	37.8	39.4
Ntchisi	64.0	69.8	46.5	50.8	37.7	37.4
Dowa	61.7	67.2	49.5	51.4	24.7	30.8
Salima	64.0	69.8	47.5	50.5	34.8	38.2
Lilongwe City	64.4	70.2	53.9	60.0	19.5	17.0
Lilongwe Rural	63.0	68.7	41.0	46.5	53.7	47.7
Mchinji	63.9	69.6	46.5	47.0	37.3	48.1
Dedza	64.2	69.9	49.0	51.4	31.0	36.1
Ntcheu	64.8	70.6	46.5	50.0	39.3	41.2
Southern Region	60.9	66.9	47.7	51.1	27.8	31.0
Mangochi	61.4	67.4	47.6	51.1	28.9	31.9
Machinga	60.6	66.6	49.0	52.8	23.7	26.1
Chiradzulu	60.6	66.6	44.1	46.9	37.4	41.9
Mwanza	61.3	67.3	42.5	46.9	44.2	43.6
Thyolo	61.1	67.1	42.5	46.0	43.8	45.9
Mulanje	59.6	65.5	41.0	45.0	45.4	45.5
Phalombe	60.9	66.9	42.5	46.5	43.2	43.8
Chikwawa	61.2	67.2	48.4	51.5	26.4	30.5
Nsanje	60.2	66.2	41.4	46.5	45.5	42.3
Balaka	60.6	66.6	48.6	51.5	24.7	29.3
Neno	61.3	67.3	48.6	53.1	26.1	26.8
Zomba City	59.0	64.9	48.6	56.0	21.5	15.8
Zomba Rural	61.2	67.3	47.3	51.0	29.4	31.9
Blantyre City	60.6	66.6	52.8	57.2	14.8	16.4
Blantyre Rural	61.4	67.4	48.5	52.1	26.6	29.4

Source: Malawi Population and Housing Census 2008, 2018

Annex 9: Life Table Development Procedure.

a) Calculation procedure

- i. Calculating the observed ASDRs from the reported data.
- ii. Converting ${}_n m_x$ to ${}_n q_x$ using MortPark.
- iii. Converting ${}_n m_x$ to ${}_n q_x$ in MortPak use LFTB Application.
- iv. Adjust ${}_n q_x$ (only ${}_1 q_0$) using the provided spreadsheet.
- v. Using 2015-16 MDHS-IMR as adjustment factors.
- vi. The adjustment factor was calculated using:
 - a. The expected infant deaths from 2015-16 MDHS IMR
 - b. Observed infant deaths were thus derived from 2018 census
 - c. Divide observed death by expected deaths to obtain the completeness of infant death reporting
 - d. Take the inverse of the completeness to calculate the adjustment factor
- vii. Smooth adjusted ${}_n q_x$ using MortPak (UNBAR Application).
- viii. Run the Life Table using smoothed adjusted ${}_n q_x$

b) Estimated Life table for Males, Malawi 2018

Age(x)	n	$m(x,n)$	$a(x,n)$	$q(x,n)$	$l(x)$	$d(x,n)$	$L(x,n)$	$T(x)$	$e(x)$
0	1	0.0433	0.1626	0.0418	100000	4178	96501	6239033	62.4
1	4	0.0043	1.5271	0.0169	95822	1622	379277	6142532	64.1
5	5	0.0020	2.5000	0.0098	94200	922	468693	5763255	61.2
10	5	0.0014	2.5000	0.0071	93278	658	464744	5294562	56.8
15	5	0.0020	2.6713	0.0099	92620	915	460969	4829818	52.1
20	5	0.0033	2.6867	0.0163	91705	1495	455067	4368849	47.6
25	5	0.0050	2.6463	0.0248	90210	2241	445776	3913782	43.4
30	5	0.0070	2.6057	0.0343	87969	3016	432626	3468006	39.4
35	5	0.0090	2.5746	0.0438	84954	3721	415744	3035380	35.7
40	5	0.0109	2.5531	0.0531	81233	4314	395607	2619636	32.2
45	5	0.0129	2.5400	0.0624	76918	4800	372783	2224029	28.9
50	5	0.0150	2.5351	0.0725	72118	5226	347707	1851246	25.7
55	5	0.0177	2.5381	0.0849	66892	5676	320483	1503539	22.5
60	5	0.0215	2.5477	0.1023	61215	6264	290714	1183055	19.3
65	5	0.0276	2.5596	0.1294	54951	7110	257405	892341	16.2
70	5	0.0378	2.5657	0.1731	47841	8281	219048	634937	13.3
75	5	0.0552	2.5540	0.2434	39560	9627	174253	415889	10.5
80	5	0.0851	2.5006	0.3509	29933	10505	123410	241636	8.1
85	5	0.1298	2.3984	0.4851	19428	9424	72625	118226	6.1
90	5	0.1913	2.2701	0.6284	10004	6287	32858	45602	4.6
95	5	0.2917	3.4282	...	3717	3717	12743	12743	3.4

Source: Malawi Population and Housing Census 2018

c) Estimated Life table for Females, Malawi 2018

Age(x)	n	m(x,n)	a(x,n)	q(x,n)	l(x)	d(x,n)	L(x,n)	T(x)	e(x)
0	1	0.0312	0.1413	0.0304	100,000	3,042	97,388	6,791,010	67.9
1	4	0.0030	1.4745	0.0119	96,958	1,158	384,907	6,693,623	69.0
5	5	0.0017	2.5000	0.0084	95,800	805	476,988	6,308,716	65.9
10	5	0.0012	2.5000	0.0061	94,995	576	473,537	5,831,728	61.4
15	5	0.0016	2.6327	0.0078	94,420	739	470,348	5,358,191	56.7
20	5	0.0023	2.6468	0.0116	93,680	1,088	465,842	4,887,844	52.2
25	5	0.0033	2.6159	0.0162	92,593	1,495	459,398	4,422,002	47.8
30	5	0.0042	2.5876	0.0208	91,097	1,897	450,911	3,962,604	43.5
35	5	0.0052	2.5709	0.0255	89,201	2,277	440,471	3,511,693	39.4
40	5	0.0062	2.5657	0.0307	86,923	2,665	428,129	3,071,222	35.3
45	5	0.0075	2.5704	0.0370	84,258	3,120	413,711	2,643,093	31.4
50	5	0.0094	2.5821	0.0460	81,138	3,733	396,664	2,229,383	27.5
55	5	0.0123	2.5963	0.0597	77,405	4,620	375,919	1,832,718	23.7
60	5	0.0169	2.6070	0.0812	72,785	5,909	349,784	1,456,799	20.0
65	5	0.0243	2.6088	0.1150	66,876	7,687	315,998	1,107,015	16.6
70	5	0.0363	2.5963	0.1671	59,189	9,887	272,176	791,017	13.4
75	5	0.0555	2.5635	0.2446	49,301	12,058	217,128	518,840	10.5
80	5	0.0859	2.4968	0.3534	37,244	13,162	153,270	301,712	8.1
85	5	0.1291	2.3924	0.4829	24,081	11,628	90,085	148,442	6.2
90	5	0.1863	2.2733	0.6176	12,453	7,691	41,294	58,357	4.7
95	5	0.2791	3.5833	...	4,762	4,762	17,063	17,063	3.6

Source: Malawi Population and Housing

Annex 10: Calculations for Direct and Indirect Mortality Rates

a) Crude Death Rate (CDR) was calculated using the equation

This can be expressed as:

$$CDR = D * \frac{k}{P}$$

Where:

CDR = Crude Death Rate

D = Total number of deaths occurring during the year

P = Total population or midyear population

k = Constant

b) Age Specific Death Rate (ASDR) was calculated using the equation

This can be expressed as:

$$ASDR = Di * \frac{k}{Pi}$$

Where:

$ASDR$ = Specific death rate for the i^{th} age group of the population

Di = Total number of deaths in i^{th} age group of the population

Pi = Population in the i^{th} age group of the population

k = Constant (radix, fixed at 1,000)

c) The estimation of under-five mortality was obtained by using the equation

$$5q0 = 1q0 + (1 - 1q0) 4q1$$

Where:

$5q0$ = Under five mortality

$1q0$ = Infant mortality

$4q1$ = Child mortality

d) Indirect Computation Procedure of Infant, Child and under-five mortality rates

Step 1: Calculation of average parity per woman.

Parity $P(i)$ refers to age group 15- 19, $P(2)$ to 20-24 and $P(3)$ to 25-29.

$$P(i) = \frac{CEB(i)}{FP(i)} \dots\dots\dots (i)$$

Where

$P(i)$ = Parity

$CEB(i)$ = Children ever born to women in age group i

$FP(i)$ = Total number of women in age group i ,

i = age group, (15-19, 20-24...)

Step 2: Calculation of proportion of children dead $CD(i)$ for each age group of mother.

In Trussell's version of the Brass's method, the estimates of the proportion surviving out of the children born per woman reported in each five year age group in the reproductive span (15-49 years) are computed by dividing the children surviving per woman by the corresponding estimate of children ever born per woman. These proportions are then subtracted from one (1) to get proportions dead, denoted as $D(i)$, which are further multiplied by factors, $k(i)$ developed by Brass to estimate the probability of dying from birth to different ages (Shryock, H.S, J.S Siegel and Associates, 1976).

$$D(i) = 1 - \left(\frac{CS}{CEB}\right) \dots\dots\dots (ii)$$

Where

$D(i)$ = 1 - Ratio of reported Children Surviving to reported CEB

$CD(i)$ = Children dead reported by women in age group i

$CEB(i)$ is defined as in step 1

Step 3: Calculation of multipliers $k(i)$.

The multipliers $k(i)$, are selected according to the value of $P1/P2$ and $P2/P3$ which are good indicators of the slope of the fertility curve at the beginning of the reproductive period. In case of Trussell's method, $K(i)$ is calculated by fitting regression coefficients $a(i)$, $b(i)$ and $c(i)$ into the following equation:

$$k(i) = a(i) + \frac{b(i)P1}{P2} + \frac{c(i)P2}{P3} \dots\dots\dots (iii)$$

Where $k(i)$ has already been defined above and

$P1$, $P2$ and $P3$ are the mean parities for the respective age groups of 15-19, 20-24 and 25-29.

The values of the coefficients $a(i)$, $b(i)$ and $c(i)$ were already estimated by regression analysis of simulated model cases and are given in the Step-by-Step Guide to the Estimation of Child Mortality (1990).

Step 4: Calculation of probability of dying.

Estimates of the probability of dying, $q(x)$ are obtained for different values of exact age x as the product of the reported proportions dead $D(i)$, and the corresponding multipliers $k(i)$.

In particular, $q(x)$ the probability of dying before age x is calculated using the equation:

$$q(x) = D(i) k(i) \dots\dots\dots (iv)$$

Estimation of mortality from multipliers $k(i)$, proportions dead $D(i)$, probabilities of dying (qx) for both sex, 2018

Age of Woman	Number Women	Children ever born	Children surviving	Average CEB	Average CS	$D(i)$	$k(i)$	$q(x)$
15 - 20	1031165	234947	224169	0.2278	0.2174	0.0459	1.0416	0.0478
20 - 25	873999	1040403	1000442	1.1904	1.1447	0.0384	0.8961	0.0344
25 - 30	646545	1511774	1452437	2.3382	2.2465	0.0392	0.8427	0.0331
30 - 35	590721	2112446	2005636	3.576	3.3952	0.0506	0.8831	0.0446
35 - 40	500810	2247289	2095324	4.4873	4.1839	0.0676	0.9473	0.0641
40 - 45	362429	1906246	1723472	5.2596	4.7553	0.0959	0.9428	0.0904
45 - 50	262119	1501565	1310500	5.7286	4.9996	0.1272	0.9633	0.1226

Source: 2018 Population and Housing Census and Step-by-Step Guide to the Estimation of Child Mortality (1990)

P1 (average for age group 15-19), P2 (average for age group 20-24), P3 (average for age group 25-29)

$P1/P2=0.1914$

$P2/P3=0.5091$

In Palloni-Heligman version of Brass's method, data requirements are essentially the same as those of Trussell's version discussed above. The application is also similar to Trussell's except that there is a need to calculate the mean age at maternity, M . In this respect, the equation to calculate $k(i)$ now includes M as input:

$$k(i) = a(i) + b(i) P1/P2 + c(i) P2/P3 + d(i) M$$

The values of the coefficients $a(i)$, $b(i)$, $c(i)$ and $d(i)$ for the seven age groups of women (from ages 15 – 19 through ages 45 – 49 ($i = 1, \dots, 7$), and for the five regional patterns of the UN models are also available in the Step-by-Step Guide to the Estimation of Child Mortality (1990).

The estimates of infant and child mortality rates using both versions of Brass Method have been computed using MORTPAK package developed by the United Nations.

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