GOVERNMENT OF ZIMBABWE

ZIMBABWE MORTALITY TRENDS ANALYSIS 1996–2015

MINISTRY OF HEALTH AND CHILD CARE
HARARE, ZIMBABWE

REGISTRAR GENERAL'S OFFICE
HARARE, ZIMBABWE

ZIMBABWE NATIONAL STATISTICS AGENCY
HARARE, ZIMBABWE

THE GLOBAL FUND TO FIGHT AIDS, TUBERCULOSIS AND MALARIA
GENEVA, SWITZERLAND

ICF
ROCKVILLE, MARYLAND, USA

September 2017

The Global Fund
To Fight AIDS, Tuberculosis and Malaria

ICF

CORRESPONDING CONTACTS: PORTIA MANANGAZIRA, MBChB, MPH**, EMAIL,** directoredc@gmail.com**; RAND STONEBURNER,** MD MPH, Independent Consultant, email: rlstoneburner@gmail.com; **FERN GREENWELL,** PhD MPH, ICF International Health and Development Division, email: fern.greenwell@icf.com.

Acknowledgements: The authors wish to thank Dr. Mutsa Mhangara at the Ministry of Health and Child Care (MOHCC) for hosting our visit and coordinating meetings with key stakeholders, Mr. Rodgers Sango at the Zimbabwe National Statistical Agency for sharing historical insights related to the collection and interpretation of civil registration vital statistics, and Celestino Basera and Portia Manangazira at MOHCC for seeing us through administrative matters. We deeply appreciate the information exchanges we had with professional staff at Mutare District Civil Registration Office, Parirenyatwa Central Hospital, and Mutare Provincial Hospital.

This report summarizes findings from death registration records from Zimbabwe's civil registration and vital statistics system. The anonymized records for years 1996 through 2015 were made available by the Registrar General's Office. The study was commissioned and coordinated by the Ministry of Health and Child Care and funded by the Global Fund to Fight AIDS, Tuberculosis and Malaria. ICF edited and formatted the final report.

Additional information about the Mortality Trends Analysis may be obtained from the Secretary of Health, Ministry of Health and Child Care, Kaguvi Building, Fourth Street, PO Box CY 1122, Causeway, Harare, Zimbabwe; http://www.mohcw.gov.zw/.

Suggested citation: Stoneburner, Rand, and Greenwell, Fern. 2017. *Zimbabwe Mortality Trends Report 1996–2015*. Rockville, Maryland, USA: Ministry of Health and Child Care, and ICF.

CONTENTS

Abbreviations

ART	antiretroviral therapy
ASDR	age-specific death rate
BID	brought in dead
BUCEN	U.S. Census Bureau
BTL	Basic Tabulation List
CDR	Crude death rate
CRVS	civil registration and vital statistics
DHIS	District Health Information System
GBM	growth balance method
ICD	International Statistical Classification of Diseases and Related Health Problems
IHME	Institute for Health Metrics and Evaluation
IMMIS	Inpatient Morbidity and Mortality Information System
MOHCC	Ministry of Health and Child Care
NCD	noncommunicable diseases
RGO	Registrar General's Office
SDR	standardized death rate
UN	United Nations
UNPD	United Nations Population Division
VS	vital statistics
WHO	World Health Organization
ZimStat	Zimbabwe National Statistical Agency

I. INTRODUCTION

Mortality statistics, including internationally comparable cause of death statistics, constitute a critical evidence base for public health planning, monitoring and evaluation, and disease surveillance. Zimbabwe has accumulated a wealth of health and demographic data spanning several decades, including data from national surveys, population censuses, and routine vital statistics.

The Zimbabwe National Statistical Agency (ZimStat) periodically conducts censuses and national surveys, including Demographic and Health Surveys[1] and Multiple Indicator Cluster Surveys.[2] Results from these surveys have contributed valuable insights to national stakeholders, especially regarding early childhood and maternal mortality trends (United Nations Children's Fund, United Nations Population Division [UNPD], & World Bank Group, 2016; World Health Organization [WHO], 2015; ZimStat 2014; Munjanja, 2007; Marindo & Hill, 1997). The survey reports, data files, and further analyses are widely available to outside users and are useful for monitoring global health priorities.

ZimStat also compiles and disseminates mortality information from routine vital statistics. It published a series of Zimbabwe Mortality Reports using data from death registration records from the civil registration system from 1997 through 2007. Since 1995, the Ministry of Health and Child Care, in collaboration with ZimStat, publishes an annual National Health Profile that presents detailed inpatient morbidity and mortality information using data from the routine health information system (Ministry of Health and Child Care & ZimStat, 2012). Although evidence from these routine sources is useful for health sectoral planning purposes, the publications and data files are not readily accessible to outside users.

In the absence of data available from routine vital statistics, national and international stakeholders rely on modeled estimates to ascertain recent levels of mortality, subnational levels of mortality, and cause-specific mortality. WHO, for example, produces periodic mortality estimates for each Member State to monitor noncommunicable diseases (NCD), but the estimates for Zimbabwe "are not based on any NCD mortality data" (WHO, 2014b). The Institute for Health Metrics and Evaluation (IHME) produces a Zimbabwe burden of disease country profile that includes mortality estimates due to selected diseases and injuries (IHME, n.d.). Although this report references the 2007 Zimbabwe Mortality Report published by ZimStat in 2013, its usefulness is limited to summary data presented in tables in that Report (ZimStat, 2013).

[1] Zimbabwe Demographic and Health Surveys, 2015, 2010-11, 2005-06, 1999, 1994, 1988
[2] Zimbabwe Multiple Indicator Cluster Surveys, 2014, 2009

II. PURPOSE

The purpose of this Zimbabwe mortality trends analysis is to investigate national and subnational mortality trends over two decades, from 1996 through 2015. Using routine vital statistics provided by the Registrar General's Office (RGO) from individual-level death registration records, and population estimates generated by ZimStat, we present all-cause mortality levels by age, sex, and location. We applied systematic approaches to assessing data quality and standard demographic techniques to generate adjusted and unadjusted death rates. We also discuss what the observed mortality trends might reveal about the effects of rolling out antiretroviral therapy (ART) in 2003 on young adult mortality.

The study was coordinated by the Ministry of Health and Child Care (MOHCC) and funded by the Global Fund to Fight AIDS, Tuberculosis and Malaria. It was originally conceived to ascertain cause-specific mortality, particularly for HIV, tuberculosis, and malaria; however, the ZimStat data files containing International Statistical Classification of Diseases and Related Health Problems (ICD)-coded causes of death were not available for cause of death analysis. Therefore, a separate follow-up analysis focusing on these diseases and other priority conditions would greatly enhance the findings from this study.

The main beneficiaries of this project are the MOHCC, the Global Fund, and other national and international stakeholders.

III. ROUTINE VITAL STATISTICS DATA SOURCES

Civil Registration System

The data for this study are derived almost exclusively from death registration records compiled by the RGO from 1996 to 2015. In a well-functioning civil registration system, death registration records constitute the timeliest and most accurate source of vital statistics (United Nations [UN], 2014).

The RGO is the national agency responsible for legally documenting individuals' vital events, including live births, deaths, stillbirths, and a few other events outside the purview of this project. Official vital statistics, including deaths and causes of death, are an output of the civil registration system and are generated in collaboration with the MOHCC and ZimStat.

Until 2008, ZimStat had assigned statisticians to work onsite at the RGO to enter data from archived hardcopies of death registration forms in an electronic database. In 2008, the RGO offices became physically uninhabitable due to a *force majeure*, and ZimStat moved off the premises. Since 2008, ZimStat also ceased to produce the annual Mortality Reports. Following the demise of the RGO central office, RGO had difficulties in compiling civil registration records from local registrars. Although ZimStat dispatched staff to help collect data that were missing from some provinces, the data gaps in 2009 are evident in the results of this study.

In 2011, the Government of Zimbabwe mandated the ZimStat Population Office to process the RGO's vital events data. At that time, however, ZimStat was occupied with planning, conducting, and processing the 2012 census, so the processing of vital statistics was delayed. Meanwhile, the RGO embarked on retrospectively capturing vital events records in electronic format. In 2015, RGO transmitted vital events data electronically to ZimStat for years 2008 and later. The data files from RGO contain variables from each death record, excluding personally identifiable information and a few other variables from the death registration form (Form B.D. 11) (see Appendix 1).

ZimStat is also responsible for coding the causes of death recorded on the medical certificate of cause of death form (Form B.D. 12) (see Appendix 2). In 2009, four data clerks were trained by the MOHCC Directorate of Epidemiology to code causes of death using ICD-10 codes, and from these, to identify the underlying cause of death. After being trained, they started back-coding deaths starting in 2004. At the time that this study was ramping up, they had coded deaths through 2009 and planned to complete the remaining more recent years by the end of 2015. The vital statistics for 2002 and 2003, and perhaps earlier, are coded in ICD-9.

Routine Health Information System

MOHCC's Inpatient Morbidity and Mortality Information System (IMMIS) is the national electronic application that was designed and rolled out in 2009 to capture individual patient discharge information, including for patients who died in the hospital. In 2013, the IMMIS was revised to facilitate the transition of coding from ICD-9 to ICD-10. It is being used in all admitting hospitals, numbering about 190.

Since 2013, the IMMIS has captured multiple causes of death through a pre-programmed list of ICD-10 labels and codes. Clerks in hospital health information units enter a diagnosis or condition from paper forms (namely, forms HS3 and HS5) in the IMMIS and then select the appropriate cause of death that appears in a drop-down list. IMMIS discharge data, including deaths, are automatically tabulated in a

table (T9) that groups the number of deaths in the following ways: three age groups—under 1 year, 1–4 years, and 5+ years; and about 65 causal groups based on the ICD-9 Basic Tabulation List (BTL).[3] For deaths occurring before 2013, it is not clear how the ICD-10 coded causes are mapped to each cause in the ICD-9 BTL. At the end of the month, each facility sends the T9 file as an email attachment to the central Health Information Office in the MOHCC.

For this study, we were able to obtain annual totals of deaths from the routine health information system for 1994 through 2010. It was not possible, however, to ascertain exactly which time series data were available through the IMMIS, namely, in which format (individual or aggregated), for which years, and for which level of hospitals. IMMIS data are operational data for the MOHCC and provide valuable insights into hospital administration and disease surveillance. Furthermore, although they are not official vital statistics until they enter into the civil registration vital statistics (CRVS) system, they could serve an important function in validating the number and, to some extent, the accuracy of the official vital statistics.

Data on individual deaths are entered in the IMMIS, and ICD codes are automatically generated. The causes entered, however, are not those that are medically certified on the medical certificate of death form (B.D. 12). Rather, clerks with little or no training in ICD-10 rules and instructions review the original patient files and choose a cause of death. Although this may be the most feasible process for generating operational data, it is not in line with the internationally recommended ICD rules and instructions for generating comparable mortality data (WHO, 2011).

In the future, patient mortality data will be captured in the District Health Information System (DHIS). Following the demise of the health information system in the late 2000s, when the system largely failed to generate needed statistics, the DHIS was adopted as the national health information platform in August 2010. DHIS version 1.4 was first piloted, and the DHIS version 2 (DHIS2) was rolled out in 2013. DHIS2 is a web-based, open-source information system developed by the University of Oslo, Department of Informatics. It collects, validates, analyzes, and disseminates health statistics, including capturing and storing information on individual, case-based records of deaths.[4]

Currently more than 1,700 facilities in Zimbabwe regularly report to DHIS2, which includes all facilities except some newly established and private ones. From 2011 to present, the reporting can be considered "good," and outpatient data are about 90 percent complete. The application is still evolving and will eventually incorporate data collection from other existing systems, such as HIV and TB programs and the IMMIS system with patient discharge information. The evolution of the DHIS2 and the feasibility of including a mortality module will likely be an important component of an updated Health Information Strategic Plan.

Comparison of Data Sources

Routine vital statistics are compiled independently from two sources: the MOHCC regularly compiles vital statistics from the routine health information system since 1994; and RGO and ZimStat compile vital statistics from the civil registration system. Table 1 and Figure 1 show a comparison of the number

[3] The original Basic Tabulation List includes 300+ groups, so there is a substantial loss of cause of death information, http://www.wolfbane.com/icd/icd9a.htm.
[4] DHIS2, https://www.dhis2.org/individual-data-records

of deaths disseminated by each agency starting in 1996 until the most recent year available. The total number of deaths provided for 1996–2010 by the MOHCC is less than the number of deaths provided by RGO and ZimStat from the civil registration system. This discrepancy is expected, since inpatient deaths are a subset of all the deaths in the facility and in the community that should be legally registered in the civil registration system.

ZimStat Social Statistics division is responsible for producing official health statistics including morbidity, mortality, and vital statistics.[5] ZimStat reported roughly a quarter more deaths than RGO across all years (except in 2003). Although the authors were able to meet and have rich technical exchanges with several people in the ZimStat Social Statistics division, ZimStat did not approve our requests to access anonymous data files of registered deaths. The ZimStat records also contain ICD-10 coded causes of death, while the data that RGO provided do not contain the coded causes of death.

Inquiries into the differences between the total numbers of deaths from the RGO and ZimStat—both derived from civil registration records—did not yield a conclusive explanation. However, at least some of the difference is likely due to the numbers of infant and under-5 deaths that were missing in the data provided by the RGO, but present in the ZimStat annual Mortality Reports. As described above, ZimStat had statisticians present at the RGO location to enter data from archived hardcopies of records until 2008. After that, there was a disruption in the usual process when ZimStat moved out of the RGO building. Although the RGO later entered the deaths independently in an electronic format, it appears that the RGO was not able to retrieve all the archived death records that ZimStat had entered previously.

Table 1. Comparison of the number of deaths reported by RGO, ZimStat, and MOHCC-IMMIS

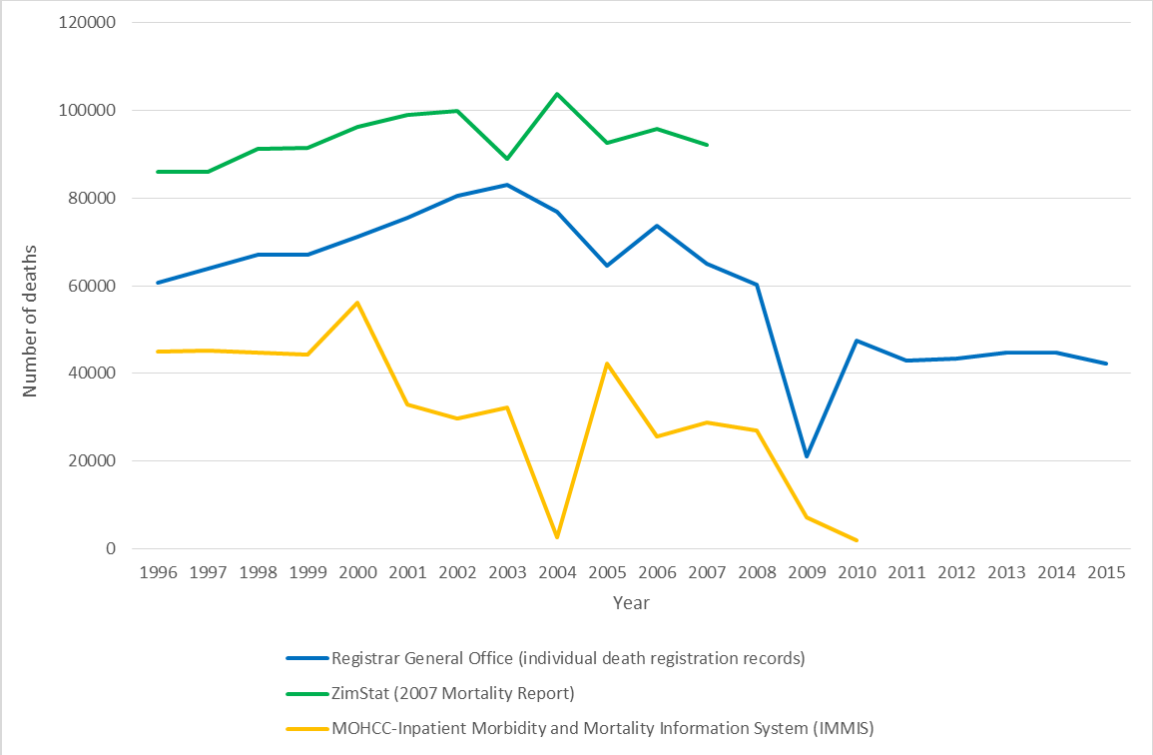
	RGO				ZimStat (2007 Mortality Report)			MOHCC	Percentage difference between ZimStat and RGO
Year	Female	Male	Unknown	Both	Female	Male	Both	Both	
1996	38,081	22,656	44	60,781	34,108	51,870	85,978	45,090	29.3
1997	39,744	24,157	22	63,923	34,393	51,571	85,964	45,314	25.6
1998	40,788	26,374	21	67,183	37,176	54,142	91,318	44,745	26.4
1999	39,843	27,324	30	67,197	37,838	53,679	91,517	44,326	26.6
2000	41,750	29,309	16	71,075	41,078	55,085	96,163	56,110	26.1
2001	43,185	32,305	16	75,506	42,827	56,119	98,946	32,951	23.7
2002	45,553	34,935	12	80,500	43,701	56,119	99,820	29,780	19.4
2003	46,283	36,797	15	83,095	39,115	49,831	88,946	32,178	6.6
2004	42,252	34,513	12	76,777	46,959	56,889	103,848	2,531	26.1
2005	34,562	30,110	6	64,678	42,896	49,620	92,516	42,228	30.1
2006	39,519	34,233	6	73,758	44,543	51,173	95,716	25,630	22.9
2007	34,535	30,383	5	64,923	43,381	48,804	92,185	28,796	29.6
2008	32,042	28,108	7	60,157				26,987	
2009	11,605	9,394	1	21,000				7,064	

[5] http://www.zimstat.co.zw/zimstat-made-5-divisions

Year	RGO				ZimStat (2007 Mortality Report)			MOHCC	Percentage difference between ZimStat and RGO
	Female	Male	Unknown	Both	Female	Male	Both	Both	
2010	25,391	22,028	7	47,426				2,015	
2011	22,980	19,862	8	42,850					
2012	23,365	20,037	3	43,405					
2013	24,124	20,710	1	44,835					
2014	24,236	20,625	0	44,861					
2015	22,283	19,854	0	42,137					

Sources: RGO data are from individual death registration records made available for this study; MOHCC data are extracted from the National Health Profile 2012 (MOHCC & ZimStat, 2012, Table 4.6.4); ZimStat data are extracted from the 2007 Mortality Report (ZimStat, 2013, Table 1).

Figure 1. Comparison of the number of deaths reported by RGO, ZimStat, and MOHCC-IMMIS



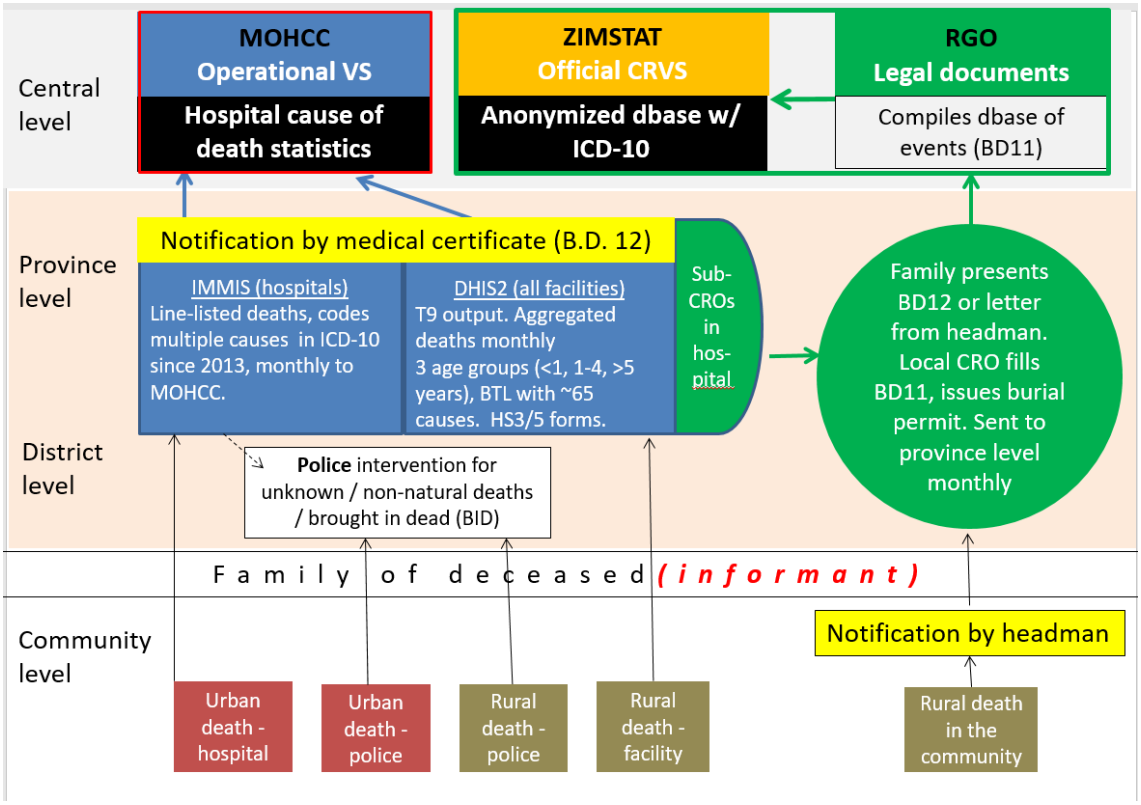
Sources: RGO data are from individual death registration records made available for this study; MOHCC data are extracted from the National Health Profile 2012 (MOHCC & ZimStat, 2012, Table 4.6.4); ZimStat data are extracted from the 2007 Mortality Report (ZimStat, 2013, Table 1).

Civil Registration and Vital Statistics Data Flow

Zimbabwe's Births and Deaths Registration Act, updated in 2005, is the civil registration legal framework that describes the official process for legally registering deaths (Government of Zimbabwe, 2005). The RGO is responsible for legally documenting individuals' vital events in the civil registration system, including deaths and causes of death. Civil registration vital statistics (CRVS) are derived from these legal records.

The flow of mortality data is depicted in Figure 2, starting with a death in the community or a health institution, up to the central level. Although the RGO is the vehicle for collecting legal information on vital events through its permanent, universal, continuous, and compulsory system (green boxes), it relies on two types of notifiers (yellow boxes) to initiate the death registration process: (1) medical practitioners who medically certify a death using the medical certificate of death form (form B.D. 12) (blue boxes), and (2) village headmen who write a letter in the presence of witnesses when a death occurs in the community and is not medically certified.

Figure 2. Flow of mortality data, Zimbabwe 2015



B.D. 11 = Birth and death registration form (death registration)
B.D. 12= Birth and death registration form (medical certificate of death)
CRO= Civil registration office

Regardless of the location or circumstances of death, all events without exception must be notified and registered. Typically, a relative or next of kin brings the notification—a completed B.D. 12 form or a letter signed by a village headman—to the local registrar, who legally records the event on a death registration form (form B.D. 11). The local registrar also issues the official burial permit. For unnatural or suspicious deaths, the police become involved and may call for a coroner to investigate the circumstances. Even the results of a legal inquest are to be communicated to the civil registry office. The local registry offices send completed paper B.D. 12 and B.D. 11 forms to the district, where the vital events are recorded electronically. Electronic files are transmitted to the central RGO.

IV. RESULTS

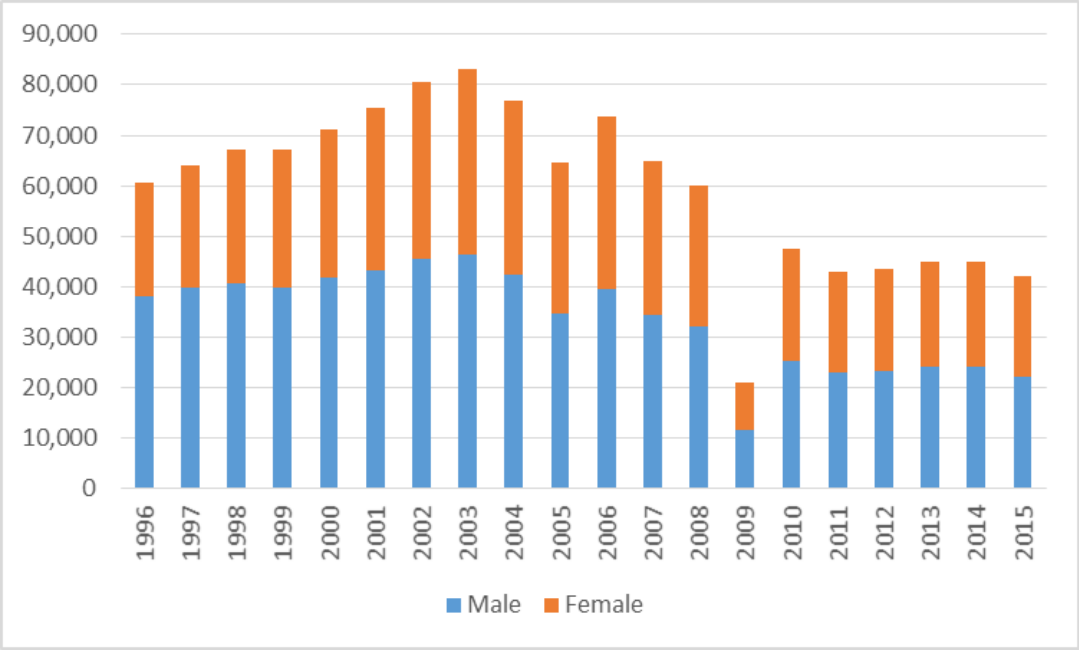
The results presented in this section are generated from death registration records provided by the RGO unless otherwise indicated. We used IBM Statistics SPSS 22, Microsoft Excel 2013, and Tableau Desktop 9.1 to analyze the data and produce visualizations. The geographical variables in the various data files needed substantial aligning to assign deaths to common districts and provinces across all years in the study, and to match population denominators that correspond to the same age, sex, and geographical areas as deaths, also for all years in the study. Appendix 3 and Appendix 4 describe this process.

We organize the results as follows: first, we present the distribution of deaths by age, sex, and province; second, we assess the timing of death registration; third, we estimate death registration coverage; and fourth, we compute unadjusted and adjusted death rates.

A. Distribution of Deaths

The total number of deaths registered by the RGO from 1996 to 2015 is about 1.2 million (N=1,196,067). The number of registered deaths ranges from 60,000 to 80,000 from 1996 to 2008, and around 40,000 from 2010 to 2015; 2005, and especially 2009, represent sharp decreases compared to previous and subsequent years (see Figure 3). Overall, about 44 percent of these deaths are female and 56 percent are male; a non-significant number have no sex recorded (see Table 1).

Figure 3. Total number of registered deaths by sex, 1996–2015

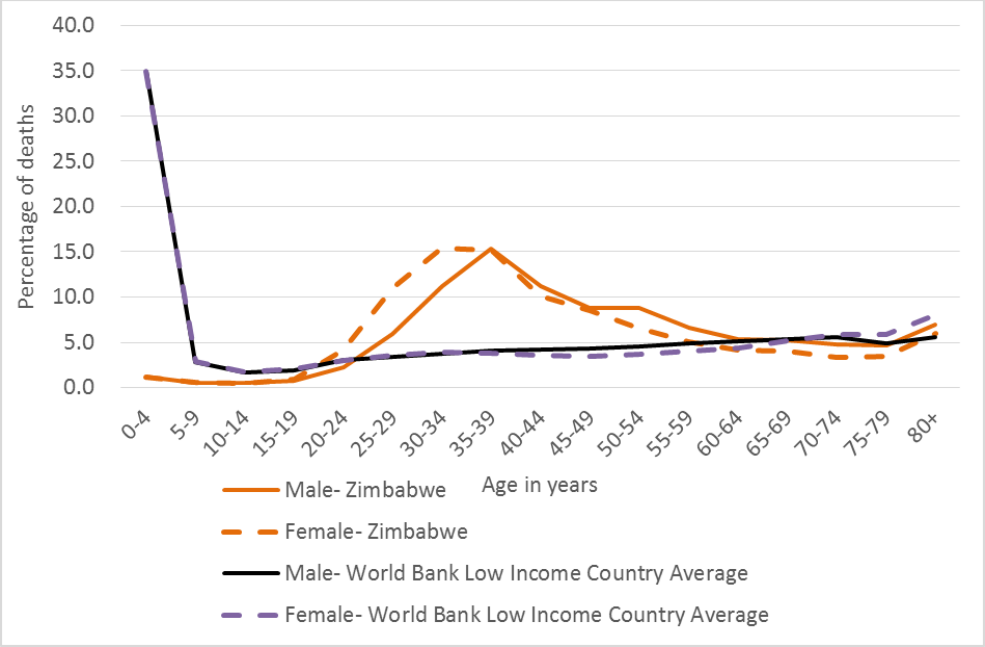


Source: RGO

Expected Distribution of Deaths

The World Bank prepared average percentage distributions of deaths in 2008, by age group and according to income group. The World Bank classifies Zimbabwe as a lower-income country, and, therefore, we expect its distribution of deaths to be similar to the average distribution for those countries. Figures 4a and 4b compare the average percentage distribution of deaths, by sex and age group, for lower-income countries in 2008 to the percentage distribution of registered deaths in Zimbabwe in 2008.

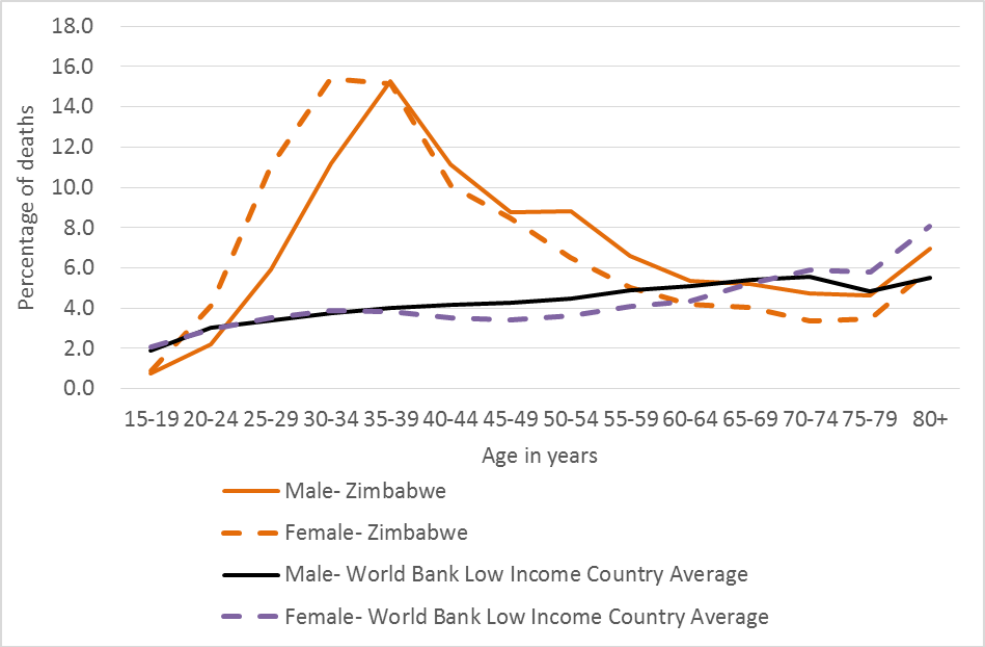
Figure 4a. Percentage distribution of deaths ages 0–80+, by sex, average World Bank low-income countries and Zimbabwe, 2008



Sources: Zimbabwe data are from RGO; World Bank low-income country averages are from disease and injury regional estimates, cause-specific mortality regional estimates for 2008, Geneva, WHO Department of Health statistics and informatics, 2011 (http://www.who.int/healthinfo/global_burden_disease/estimates_regional) (extracted from Analysis of Cause of Death[6])

[6] Analysis of Cause of Death is a WHO tool designed to assess the quality of mortality statistics and levels and causes of death.

Figure 4b. Percentage distribution of deaths, ages 15–80+, by sex, average World Bank low-income countries and Zimbabwe, 2008



Sources: Same as above

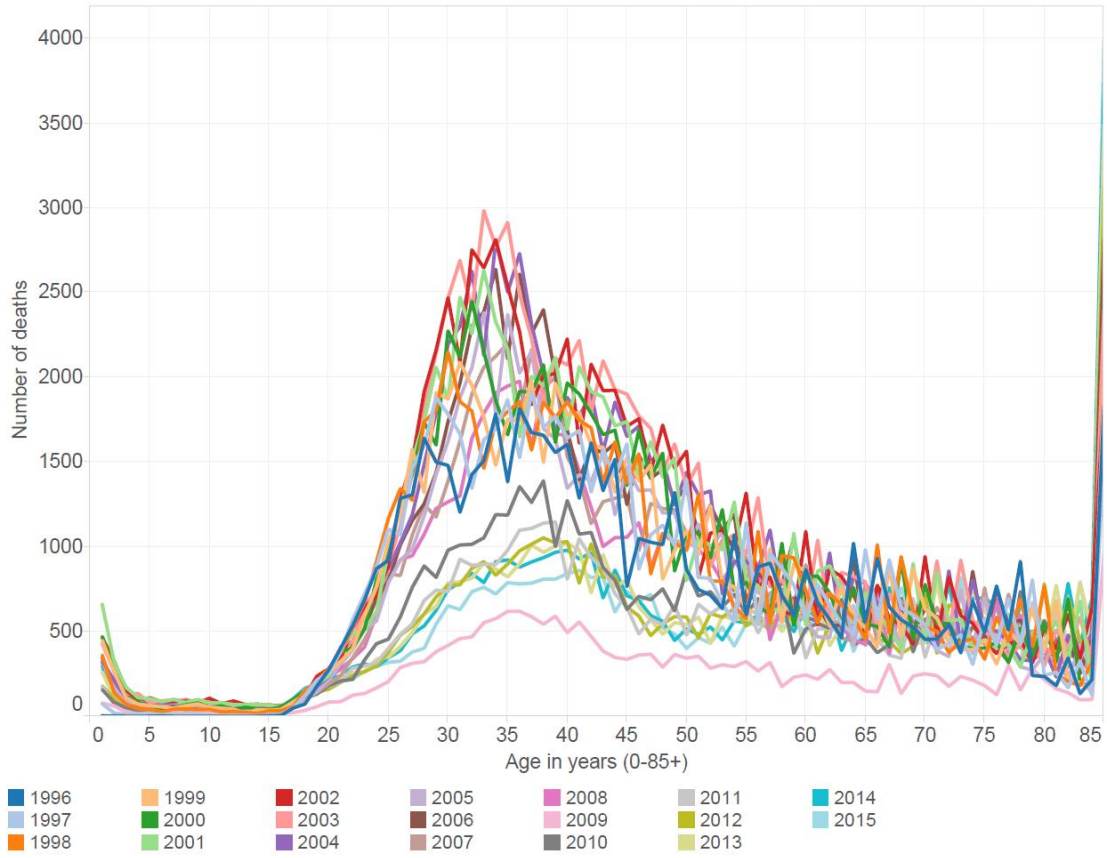
Zimbabwe's distribution of deaths diverges from the expected distribution in two main ways. First, in the average expected distribution, more than one-third of all deaths occur in the age group 0–4 years of age; in Zimbabwe, only about 1 percent of deaths under five years of age are registered. This indicates that early deaths are under-registered. The data file that RGO provided did not containany records of infant deaths under one year of age (age 0). The fact that there is not a single record of infant death in the database needs further investigation, especially since a substantial number of infant and early childhood deaths were published in the ZimStat mortality reports.

The second way the distribution of deaths in Zimbabwe diverges from the expected one is that it shows a relative "surplus" of deaths—four times the number of deaths among young adults 30–40 years of age, compared with the expected distribution. The pattern is expected for countries in sub-Saharan Africa with high HIV prevalence, consistent with an earlier mortality peak for females compared to males. A higher share of these deaths may also occur in the hospital, where deaths are more likely to be registered than deaths in the community.

Deaths by Year, According to Age

The annual numbers of registered deaths, for both sexes combined, for each of the 20 years between 1996 and 2015, also show a pattern similar to the death distribution in 2008 (see Figure 5). Namely, the annual data indicate under-reporting of deaths among children under five years of age and a surplus of deaths among young adults relative to deaths at other ages.

Figure 5. Number of deaths by age group, both sexes combined, 1996–2015

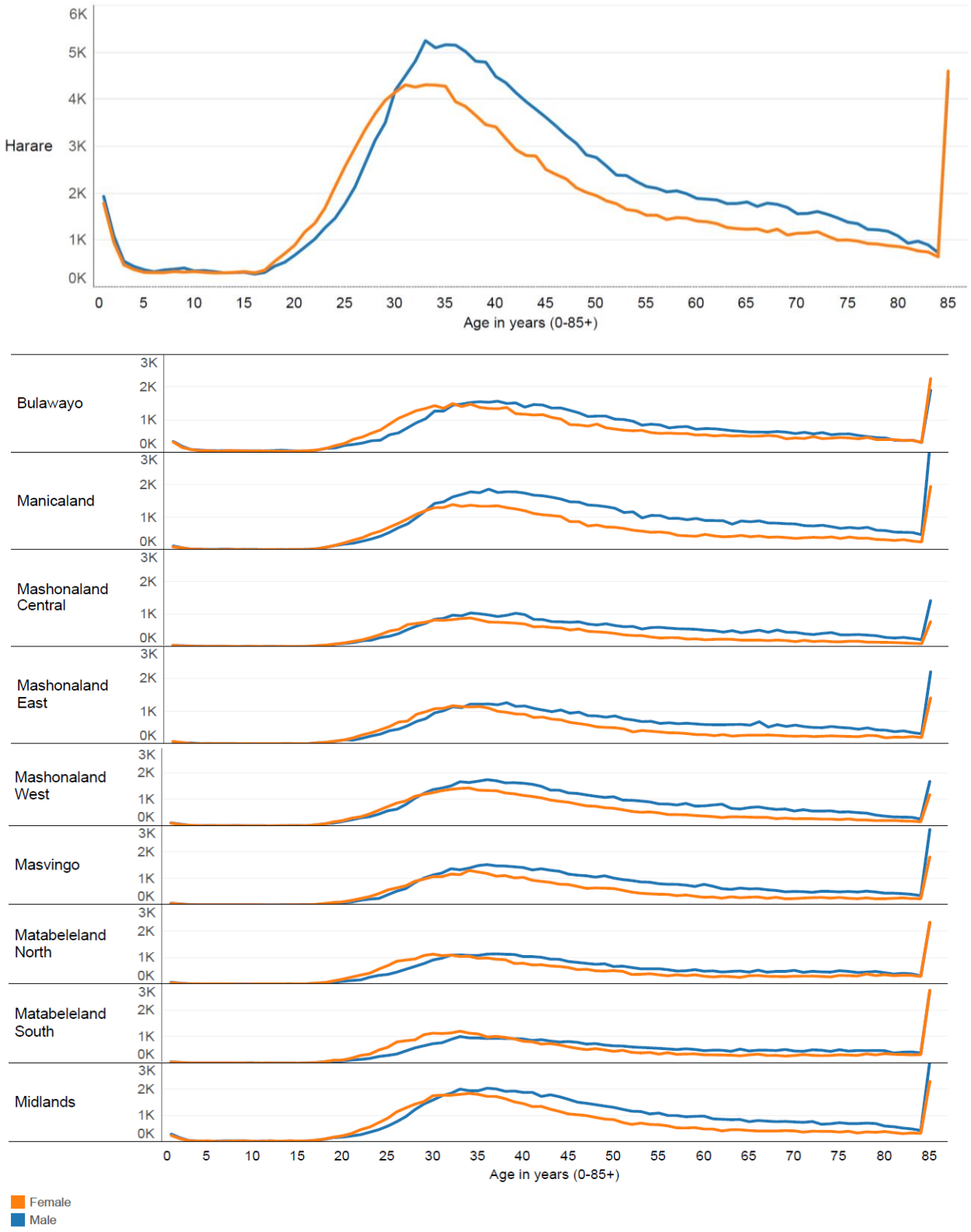


Source: RGO

Deaths by Age and Sex, According to Province

We observe the same age pattern of registered deaths across all the provinces, where deaths among children under five years of age are under-reported and deaths among young adults 25–54 years of age are relatively high (see Figure 6). As expected, the number of registered deaths among young adults in Harare is at least twice as high as in other provinces. Harare is also the only region where a significant number of deaths for children one year of age are included in the death records (although, there are still no records of death at age 0).

Figure 6. Number of deaths ages 0–85 years and older, by sex, 1996–2015, according to province

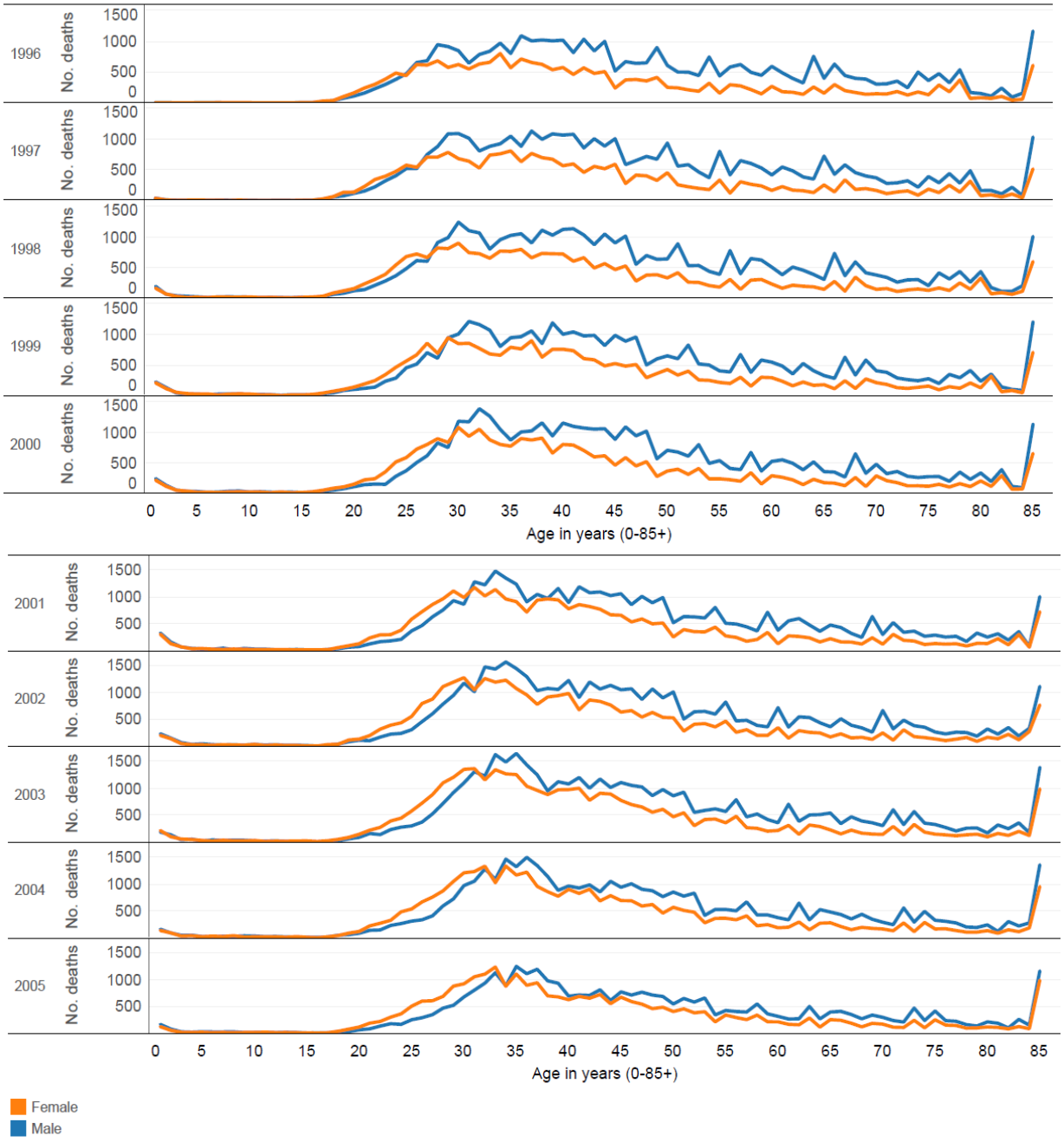


Source: RGO

Deaths by Age and Sex, According to Year

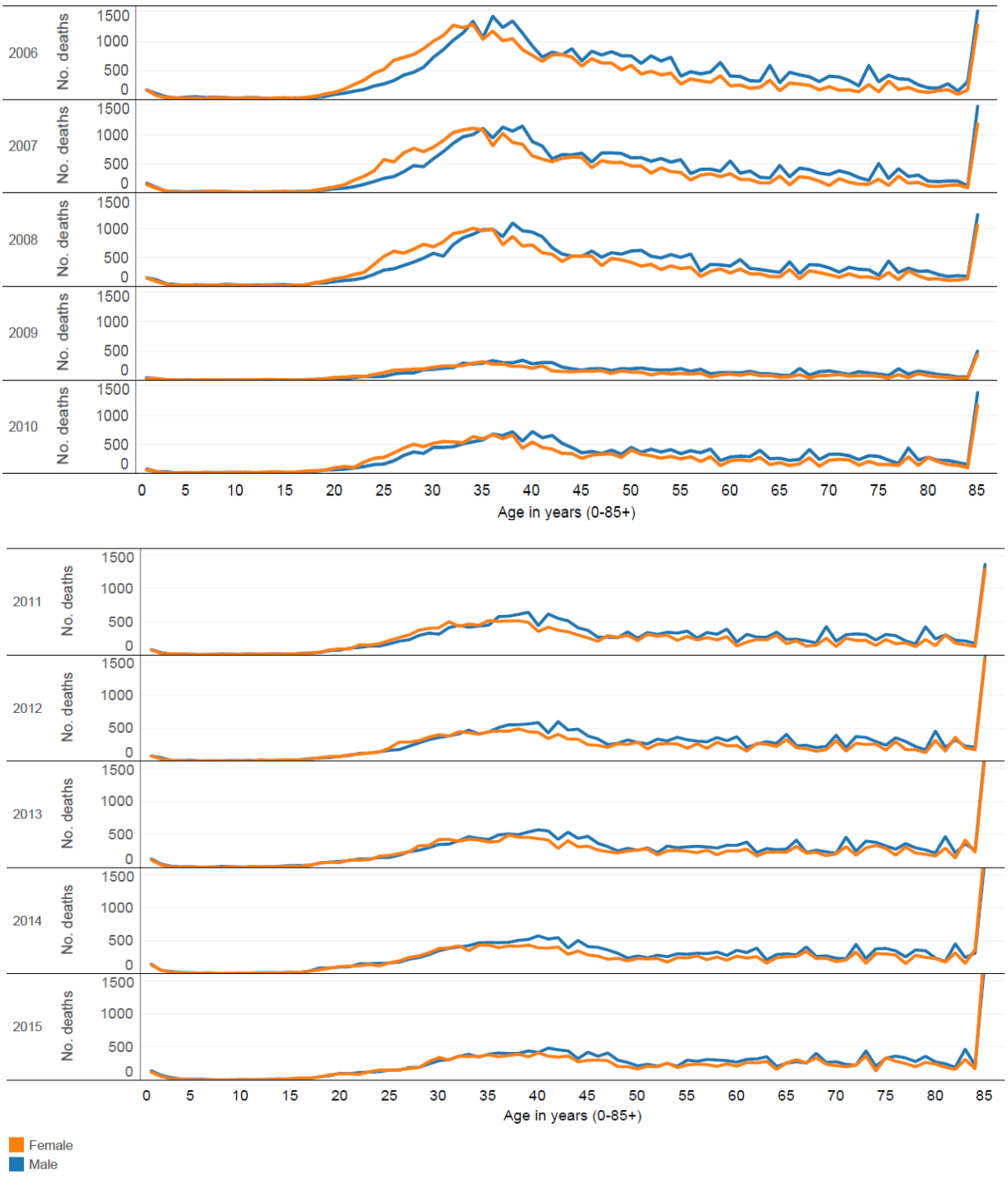
The ratio of male to female deaths in the world is about 1:1 until adolescence. After about age 15, male deaths exceed female deaths at a ratio of about 1:1.5–2.0 (WHO, 2008). In Zimbabwe, in every province, from 1996 to 2008, the ratios are inverted: female deaths exceed male deaths for ages 15–30 (see Figures 6 and 7). After 2008, the ratio of male to female deaths under age 30 follows the expected pattern. This may be related to the decrease in HIV-related deaths in Zimbabwe since 2004, which, because young women had a higher prevalence than young men, disproportionately favored improved survival rates among young women (UNAIDS, 2016; MOHCC, 2014).

Figure 7. Number of deaths ages 0–85+ years, by sex and year, 1996–2015



Source: RGO

Figure 7. ***Continued***



Source: RGO

B. Timing of Death Registration

> *No birth, still-birth or death which occurs after the 20th June, 1986 shall be registered after the expiry of twelve months from the date of such birth, still-birth or death except with the written authority of the Registrar-General.*
> —Chapter 5:02, Birth and Deaths Registration Act, PART III, 25(1)[7]

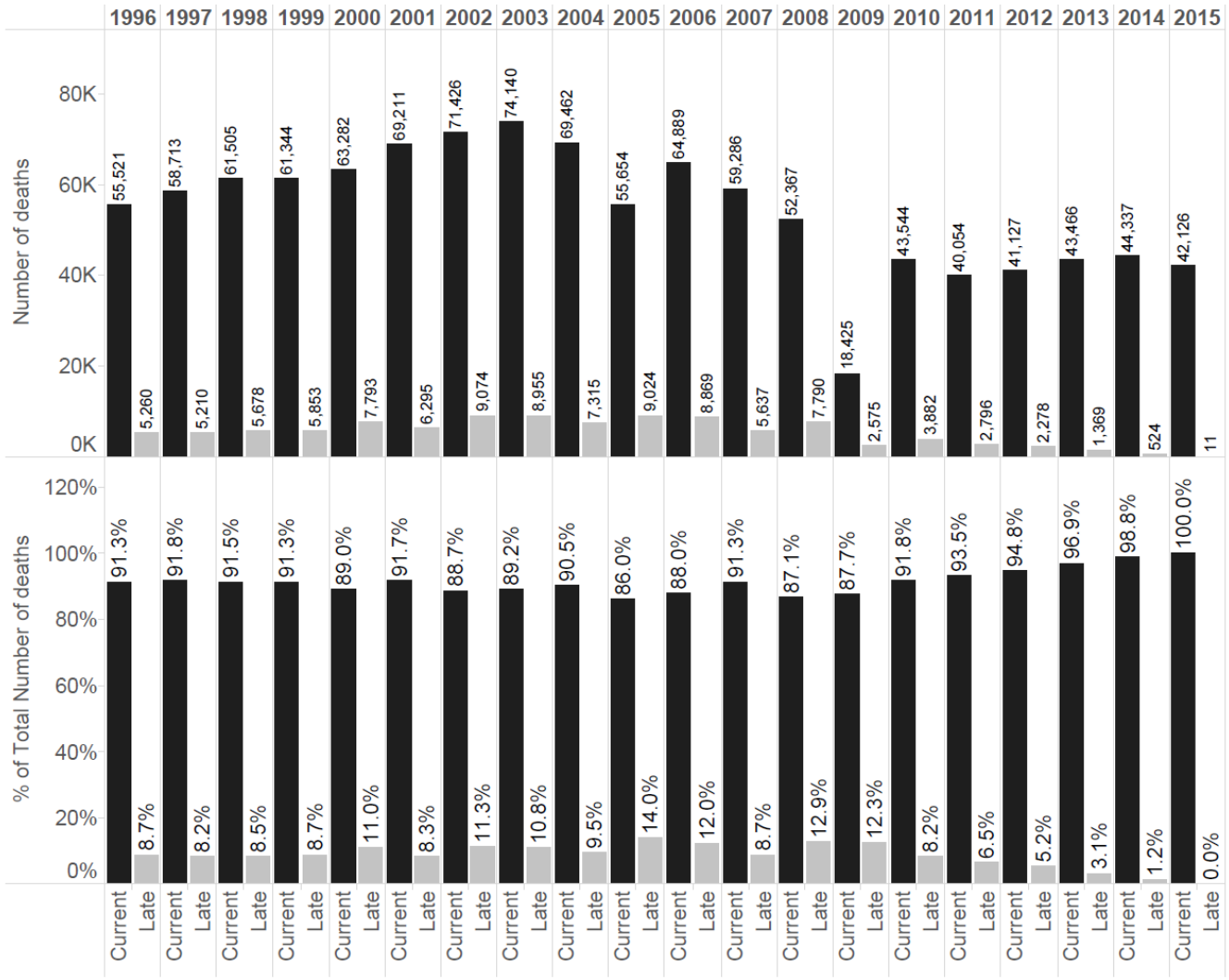
Current and Late Registrations

In line with the Birth and Deaths Registration Act quoted above, current registration in this analysis is defined as those deaths that are registered within 12 months of the occurrence of the death. Late registration is defined as registrations occurring 12 months or later after the occurrence of death.

Figure 8 shows the number and percentage of deaths registered within 12 months of the occurrence of the death (current registrations), and those registered one year or later after the occurrence of the death (late registrations). The percentage of currently registered deaths hovers around 90 percent for every year—ranging within 8 to 12 percent of late registrations per year—through 2010. More recent years, from 2011, suggest decreasing late registrations; however, the data are truncated at 2015 so some unknown number of late registrations had not been registered yet.

[7] www.law.co.zw

Figure 8. Number and percentage of current-registered deaths and late-registered deaths, 1996–2015

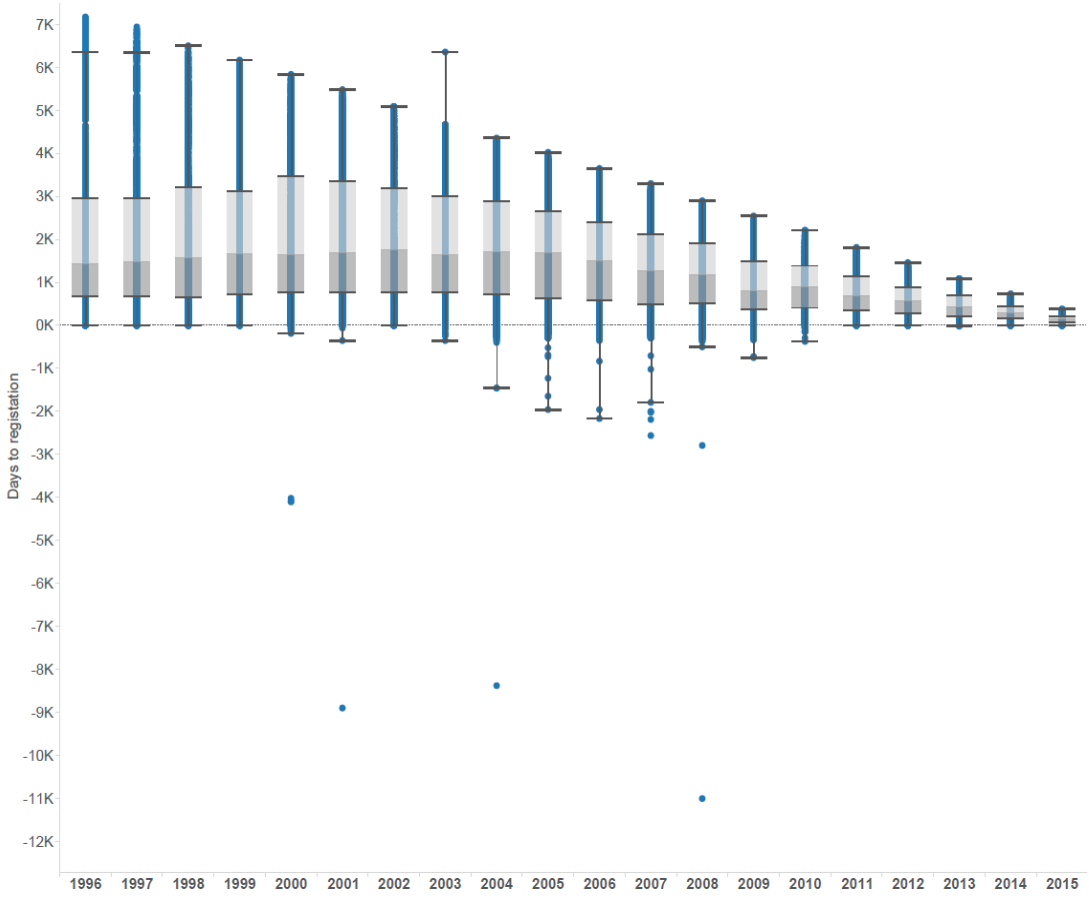


Source: RGO

Days between Death Occurrence and Registration

Box plots of registered deaths, by year of occurrence of death, show the distribution of the number of days between the occurrence of death and its registration. The boxes depict the interquartile range (50 percent of the days fall within the bounds of these boxes). The space between the lower bracket and the box depicts the days that fall within the first quartile, and the space between the box and the upper bracket depicts the days that fall within the fourth quartile. Observations falling outside the brackets are outliers (see Figure 9a). Note that 0.1 percent of observations had a negative number of days, indicating that the registration date recorded was before the death date. After 2011, this data quality problem has been corrected.

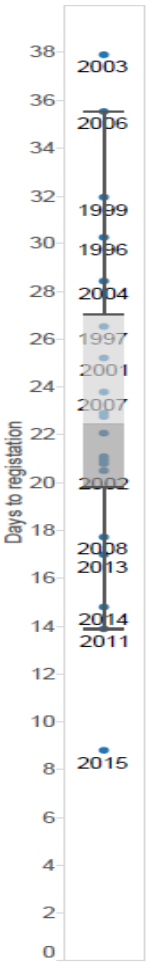
Figure 9a. Number of days between the occurrence of death and death registration, by year



Source: RGO

Evaluating the current-registered deaths only, across all years, the median number of days until registration was 22.4 (see Figure 9b). For more recent years, 2013–2015, the trend is toward a smaller median number of days for a current-registered death, under 18 days. The suggested increase in the proportion of current-registered deaths among all registered deaths and a more timely registration of current-registered deaths indicate a positive trend toward timely registration.

Figure 9b. Median number of days annually between occurrence of death and death registration

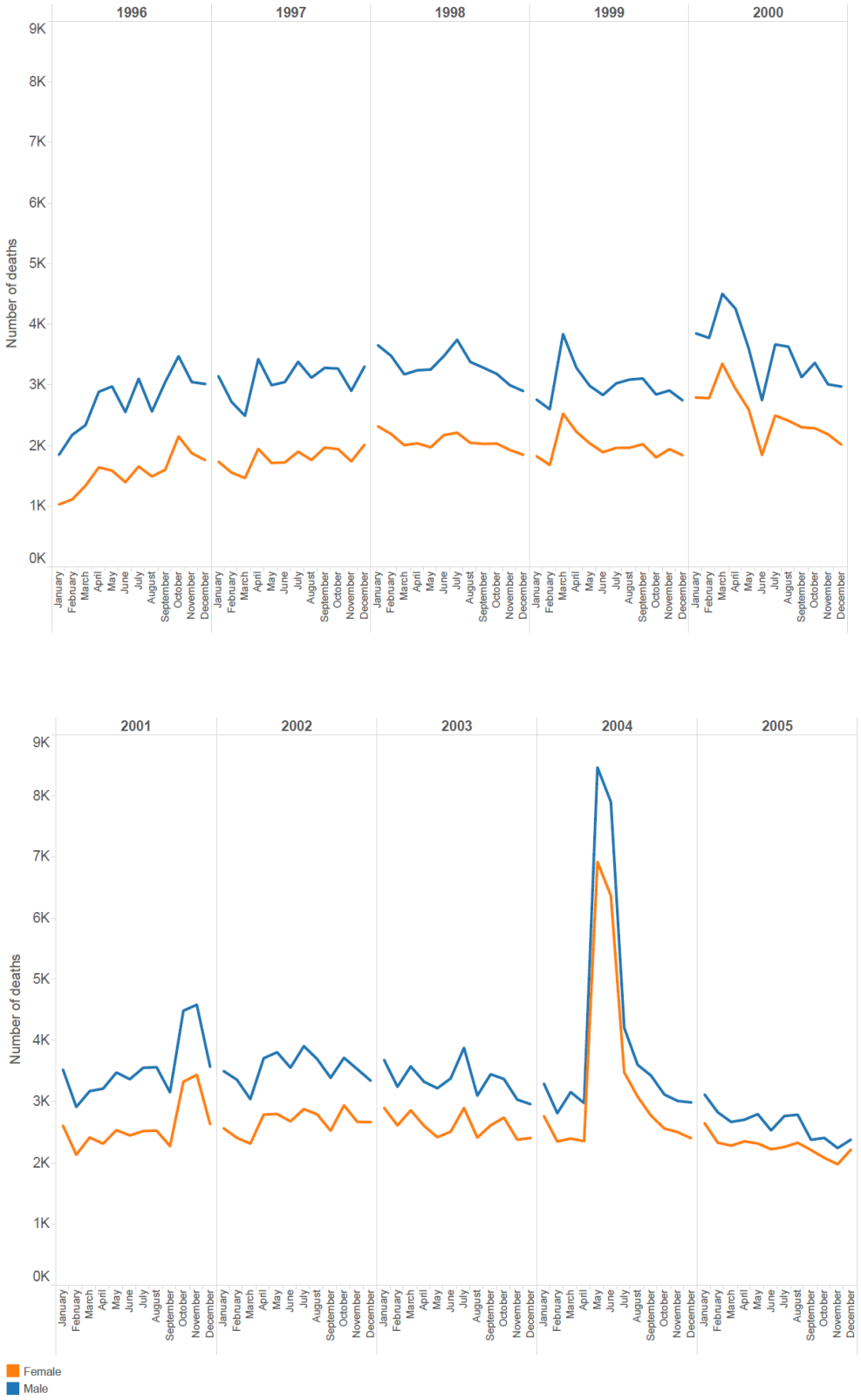


Source: RGO

Consistency of Death Registration over Time

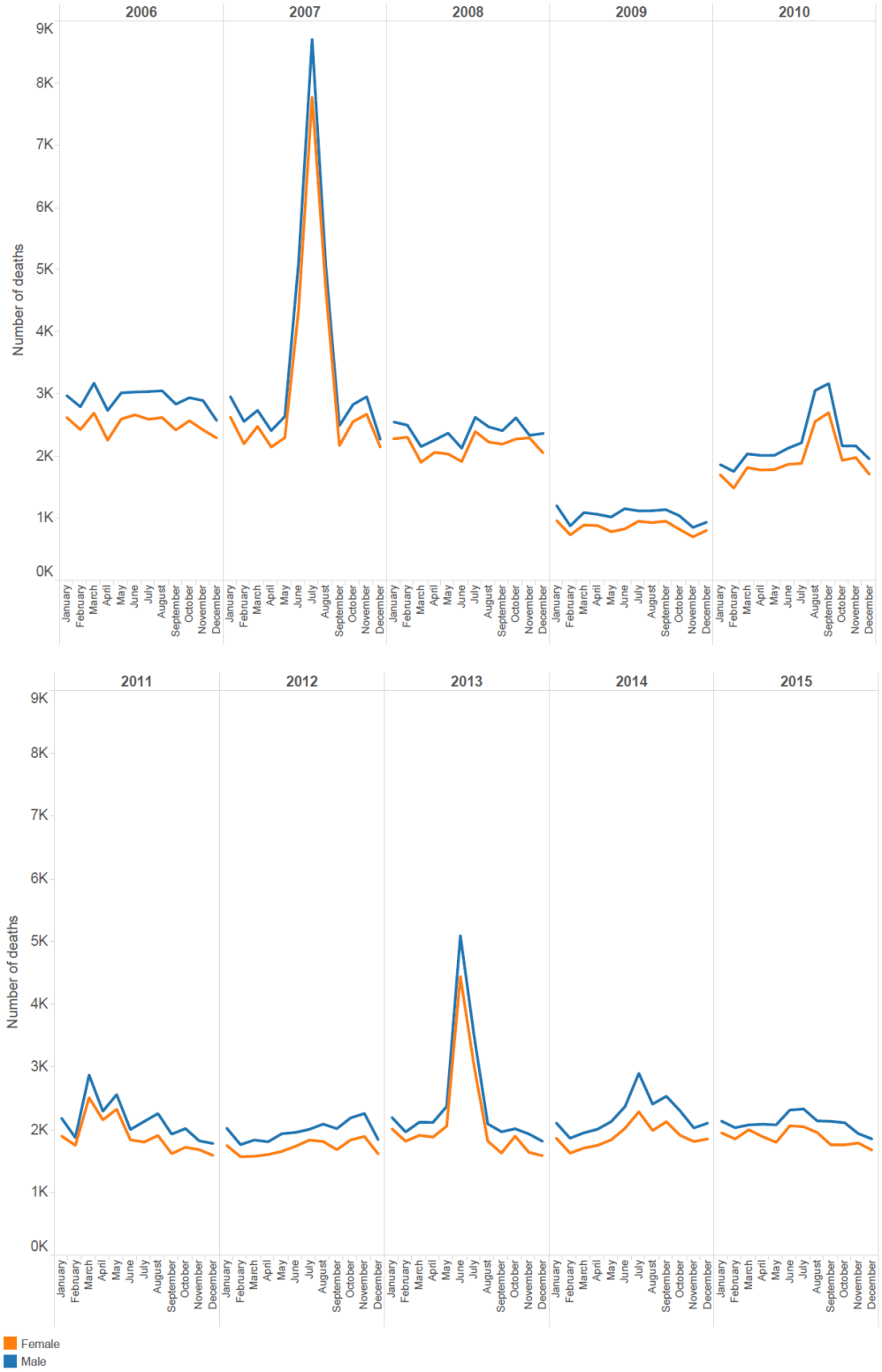
The number of death registrations across months, by year, is fairly consistent, barring a few exceptions. The number of death registrations for both sexes experiences a spike three times higher than usual in 2004 and 2007, and to a lesser extent in 2013 (see Figure 10). The pace of registrations in 2009 is steady, but it remains lower than expected relative to the neighboring years.

Figure 10. Number of registered deaths per month, by sex, 1996–2015



Source: RGO

Figure 10. ***Continued***

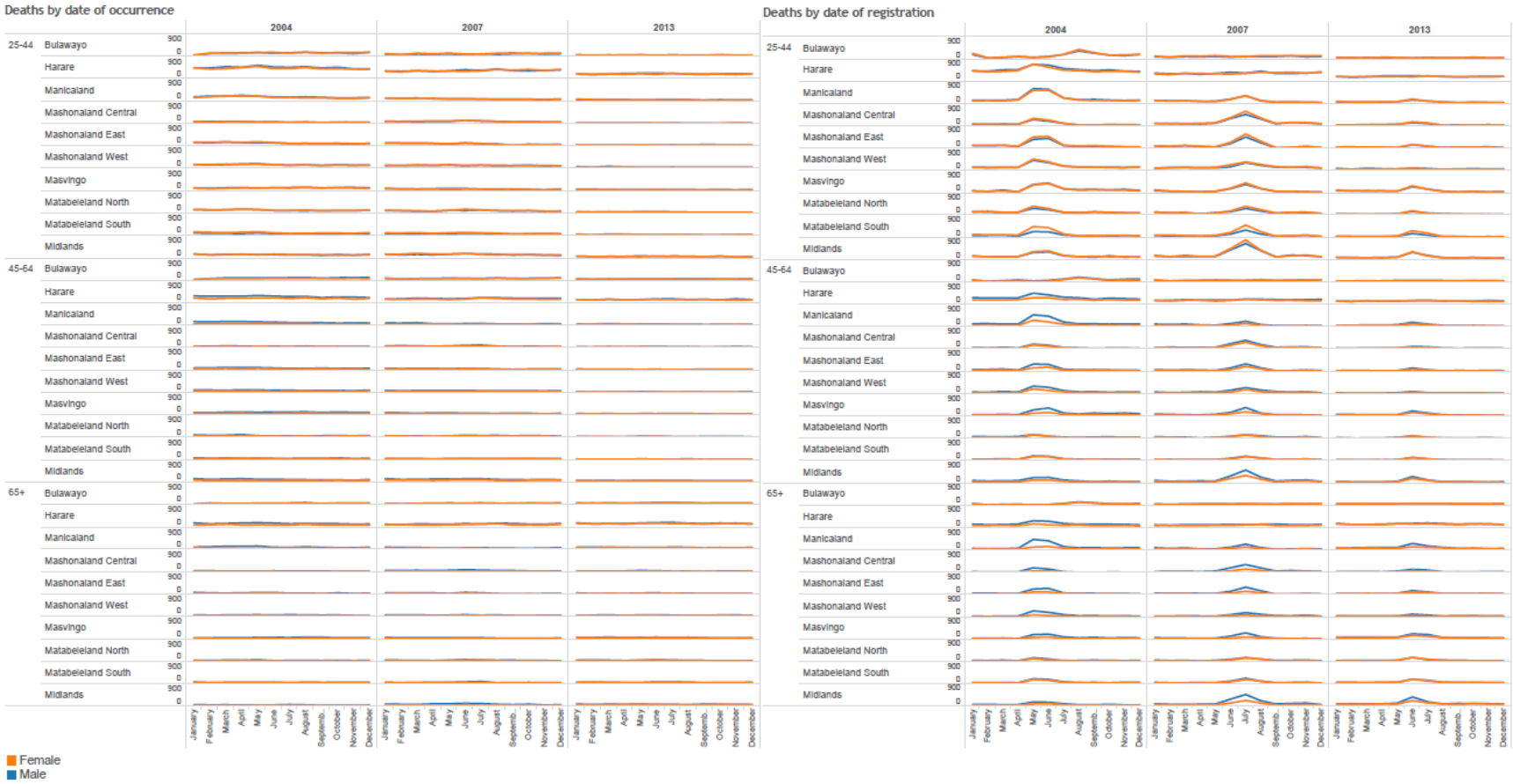


Source: RGO

We investigated further the three years with mid-year spikes in the number of registered deaths—2004, 2007, and 2013 —to determine if the sharp increases in the number of registrations reflect real clusters of deaths, or if the increases reveal delays in the registration. There are two main findings. One, the spikes in the number of registered deaths were due to adult deaths only, while the number of death registrations for deaths of children under 15 years of age remained constant (data not shown for under 15 years of age). Two, the spikes in the number of registered deaths do not reflect real increases in the number of deaths. This is confirmed in Figure 11 that compares deaths by the month of occurrence (showing relatively flat distributions) to deaths by month of registration (showing 'bumps' in the distributions when the deaths were registered). We conclude, therefore, that there is an administrative reason that applies across all provinces that accounts for registered deaths being grouped around June, July, and August for those three years.

Appendix 5 provides more detailed information for each district on the number of months for which no registered deaths were reported. The total number of months is 240 (for years 1996-2015). UMP district did not report any registered deaths for 38 of 240 months; Goromonzi did not report any for 24 of 240 months, and four other districts did not report for 16-17 months. In Mashonaland West province and Matabeleland South province, all districts reported deaths for every month (with just one district not reporting for one month).

Figure 11. Number of registered deaths by sex, according to date of registration and date of occurrence, 2004, 2007, and 2013



Source: RGO

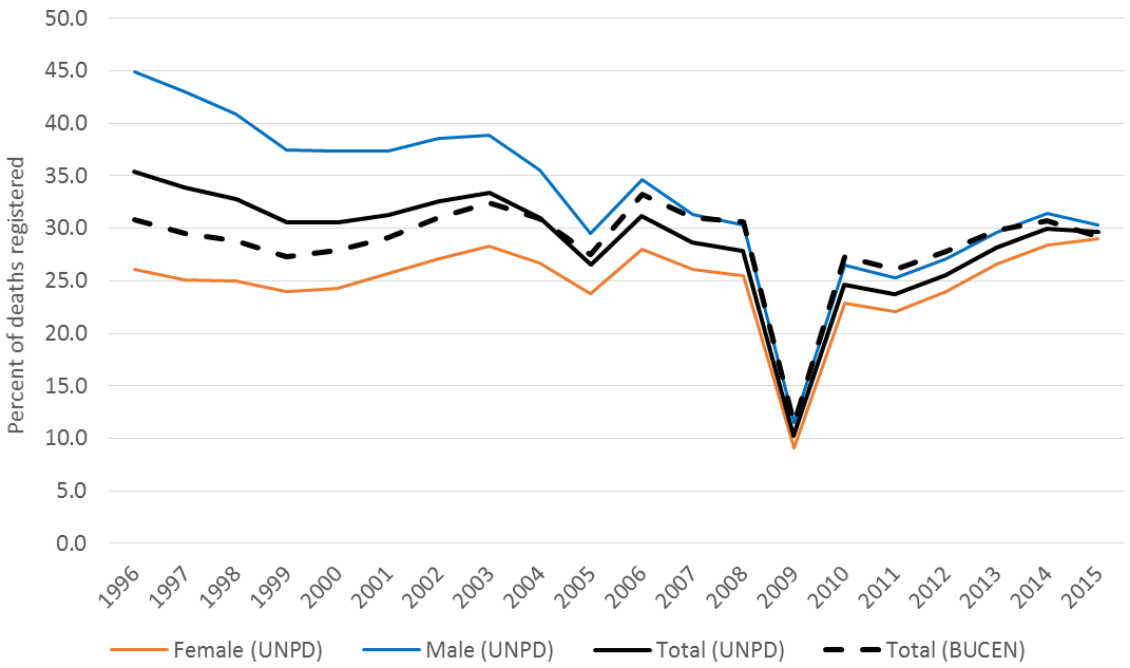
C. Coverage of Death Registration

The coverage of death registration is the proportion of deaths registered divided by the expected numbers of deaths. The UNPD and the U.S. Census Bureau (BUCEN) both publish time series of annual numbers of estimated deaths, and UN source also breaks these down by sex and age groups. We applied two independent approaches to calculating death registration coverage using information from these two sources.

Registration Coverage by Sex

For the first approach to calculating death registration coverage, we used the UNPD and BUCEN estimated total numbers of deaths. These results are largely consistent: death registration coverage for both sexes together, from 1996 to 2015, remains steady at about 30 percent, except for in 2009 when coverage rates decreased sharply to 10 percent (see Figure 12). Rates of death registration coverage for both sexes together, however, hide coverage differentials by sex, which have not been steady for male and female deaths. Registration coverage for male deaths decreased, from 45 percent in 1996 to 30 percent in 2015; female death registration coverage, which was 25 percent in 1996, converged with male death registration rates in 2015.

Figure 12. Coverage of death registration from selected sources, totals and by sex, 1996–2015



Sources: RGO for the total numbers of annual deaths (numerator). Estimated numbers of annual deaths (denominator) are from two international sources: (1) UNPD World Population Prospects (UN, 2017), and (2) U.S. Census Bureau International Database (IDB) (U.S. Census Bureau, 2016). Note, the IDB does not provide estimated numbers of deaths by sex, only the total number.

Various shortcomings in the functioning of the CRVS system have prevented complete registration and accounting of deaths. As described earlier in the report and shown in Figure 1, ZimStat counted a larger number of registered deaths than RGO, even though both used data from the civil registration system. Barriers related to complete and timely death registration include the following: (1) the relatives who

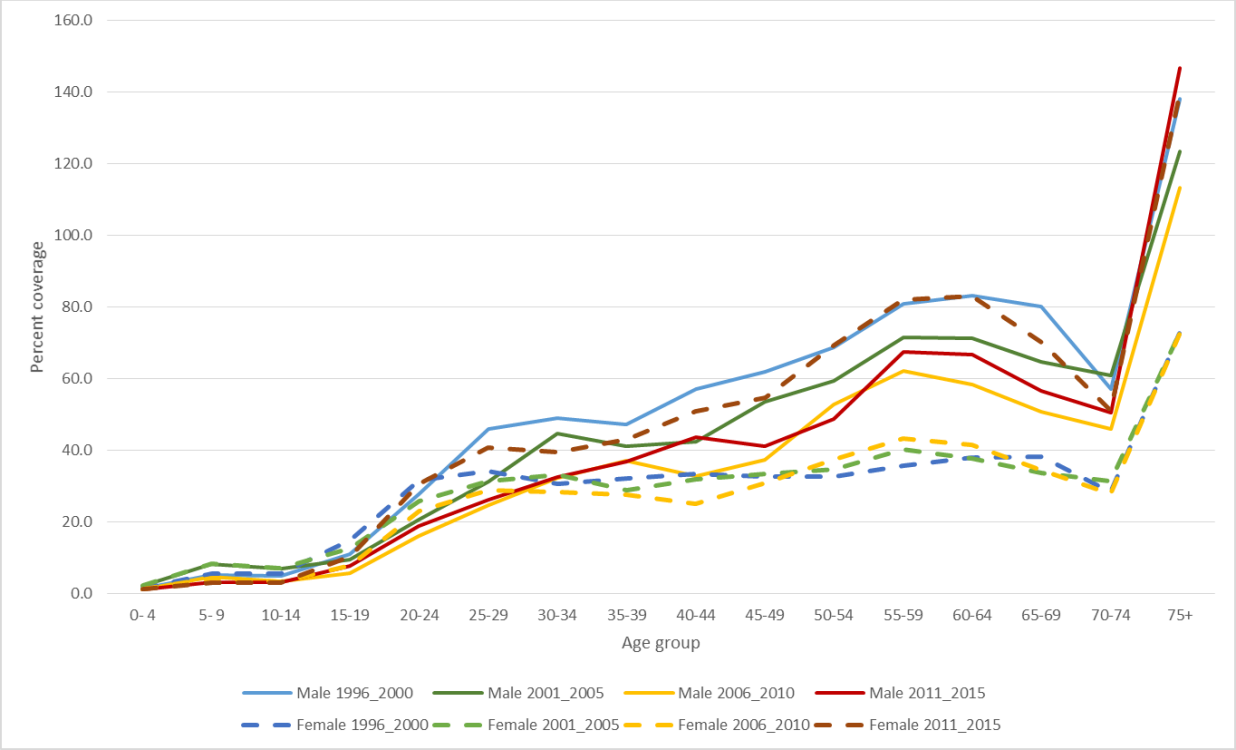
are responsible for transmitting the notification to the local registry office for registration may not comply, maybe due to lack of incentives or lack of enforcement in the legal structures and social norms; (2) local registry offices in every district and also in some hospitals may not be a sufficient number of service points for the entire population to access conveniently; and (3) village headmen may give permission to bury a body without a burial permit, thus not requiring relatives to seek a death certificate through the local registration office (a burial permit is issued when the death is registered). Financial barriers likely do not apply because there is no transaction fee for registration unless it is a late registration.

Registration Coverage by Age Group

For the second approach to calculating death registration coverage, we divided the RGO's registered deaths in five-year age groups by the UNDP-estimated deaths in the same age groups for four time periods (1995–2000, 2000–2005, 2005–2010, and 2010–2015). For males across all four time periods, registration coverage improves as age increases (excluding the highest age group, 75+, where there appears to be heaping of deaths at very old ages) (see Figure 13).

Registration rates are highest, around 60 to 80 percent, for males 55–70 years of age. Coverage for female adults remains at about half of that, approximately 40 percent, except for women in the most recent time period, who have registration rates that are comparable to men. These trends of higher coverage at older ages may be related to family members legally registering a death so they can obtain a pension, inheritance, or other benefits from the deceased adult.

Figure 13. Coverage of death registration by age group, for four five-year periods



Sources: RGO for the number of deaths by age group. Estimated numbers of annual deaths are from two international sources: (1) UNPD World Population Prospects (UN, 2017), and (2) U.S. Census Bureau International Database (IDB) (U.S. Census Bureau, 2016). Note, the IDB does not provide estimated numbers of deaths by sex, only the total number.

In summary, we conclude that average death registration coverage for both sexes, over all ages from 1996 to 2015, has continued to hover around 30 percent, except in 2009 when it is lower for the logistical reasons given earlier. Taking into account only adult deaths between ages 15 and 69, the average death registration for both sexes combined is slightly higher: 33.7% (1996-2000); 37.8% (2001-2005); 31.9 (2006-2010); and 43.0% (2011-2015). Overall, the coverage gap between male and female registration has largely closed by 2015, when female death registration coverage converged with male coverage. Significant improvements in coverage stand to be gained, especially among infants and up until age 20-24.

D. Death Rates

We produced a series of crude death rates at the national and province levels to assess death rates over time. We applied a standard adjustment approach, the Brass growth balance method (GBM), to compare these results with unadjusted rates.[8]

Crude Death Rates and Standardized Death Rates

The crude death rate (CDR) is the most common summary measure of mortality. It is the total number of deaths divided by the total population, typically using the mid-year population figures in a calendar year as the number of persons at risk of death. The main disadvantage of the CDR is that it does not account for changing or different population age structures and, therefore, readers should exercise caution in comparing mortality levels over time or between population groups.

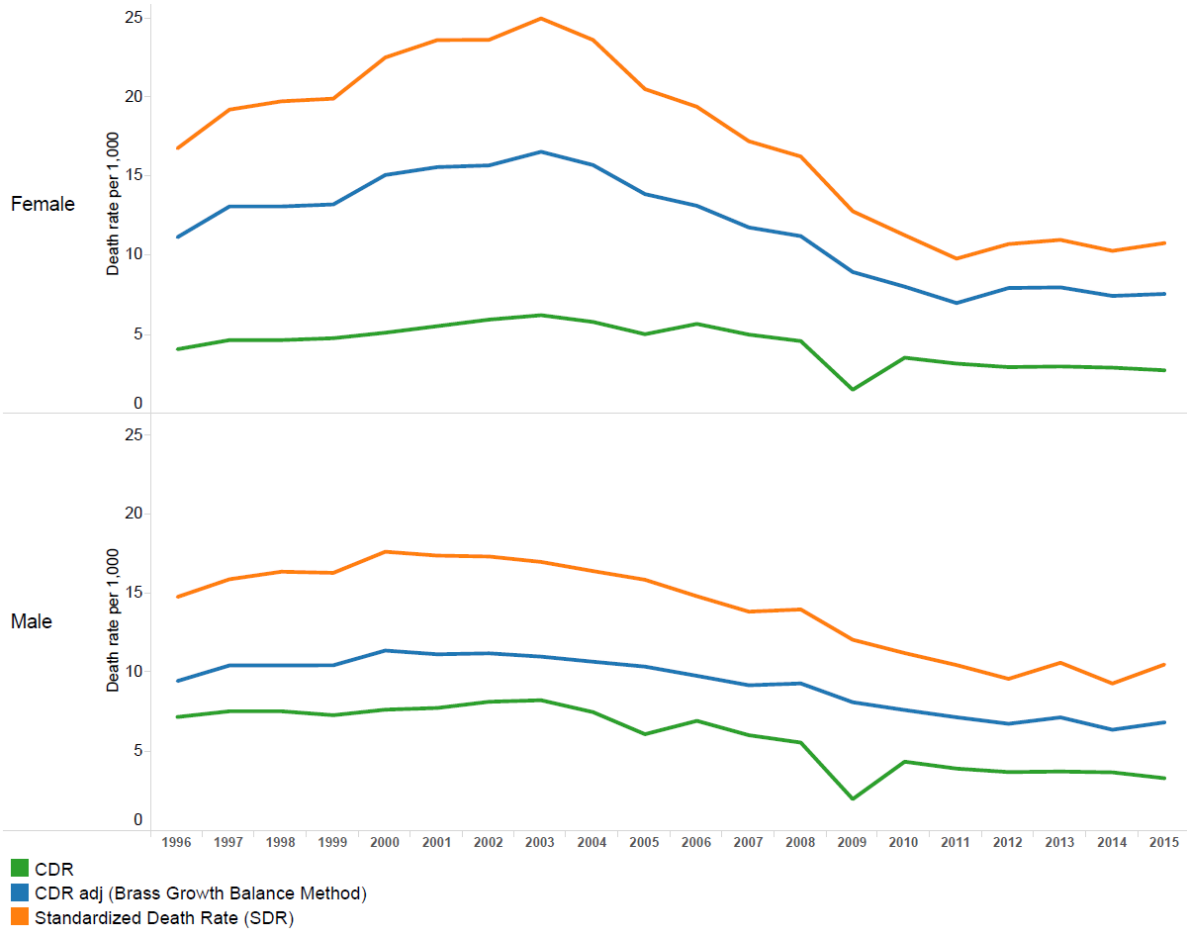
A more reliable single-figure indicator for comparing summary death rates over time or between populations is the standardized death rate (SDR), which is a direct standardization comparing two or more sets of age-specific death rates (ASDRs) and examining their impact on a common age structure. The SDRs in Figures 14 and 15 were obtained by dividing the total expected number of deaths—after applying the WHO standard population age structure to Zimbabwe annual ASDRs—by the total population (Ahmad, et al., 2001). It can be understood as a weighted average of ASDRs using the standard population as a weight.

The total expected number of deaths used to compute the SDRs was obtained after applying the GBM adjustment factor. This is one of the standard death distribution methods that use data on deaths and the population at risk by age, to estimate an adjustment factor to correct for incomplete reporting of deaths over 5 years of age (Dorrington, 2013). This method was applied to the national level, by sex, and to the province level for both sexes combined.

At the national level, the SDRs for females and males have decreased annually since around 2003 (see Figure 14). Female death rates have decreased at a faster pace than male death rates. The net decreases are seen clearly comparing the SDR trends, which indicate a real decrease in death rates while holding the population structure constant. The trends are less apparent when the population is not standardized.

[8] The adjusted rates resulting from the Brass Growth Balance method are mainly for illustrative purposes, while for a specific research question one might apply a range of death distribution methods taking into account each one's data requirements and assumptions.

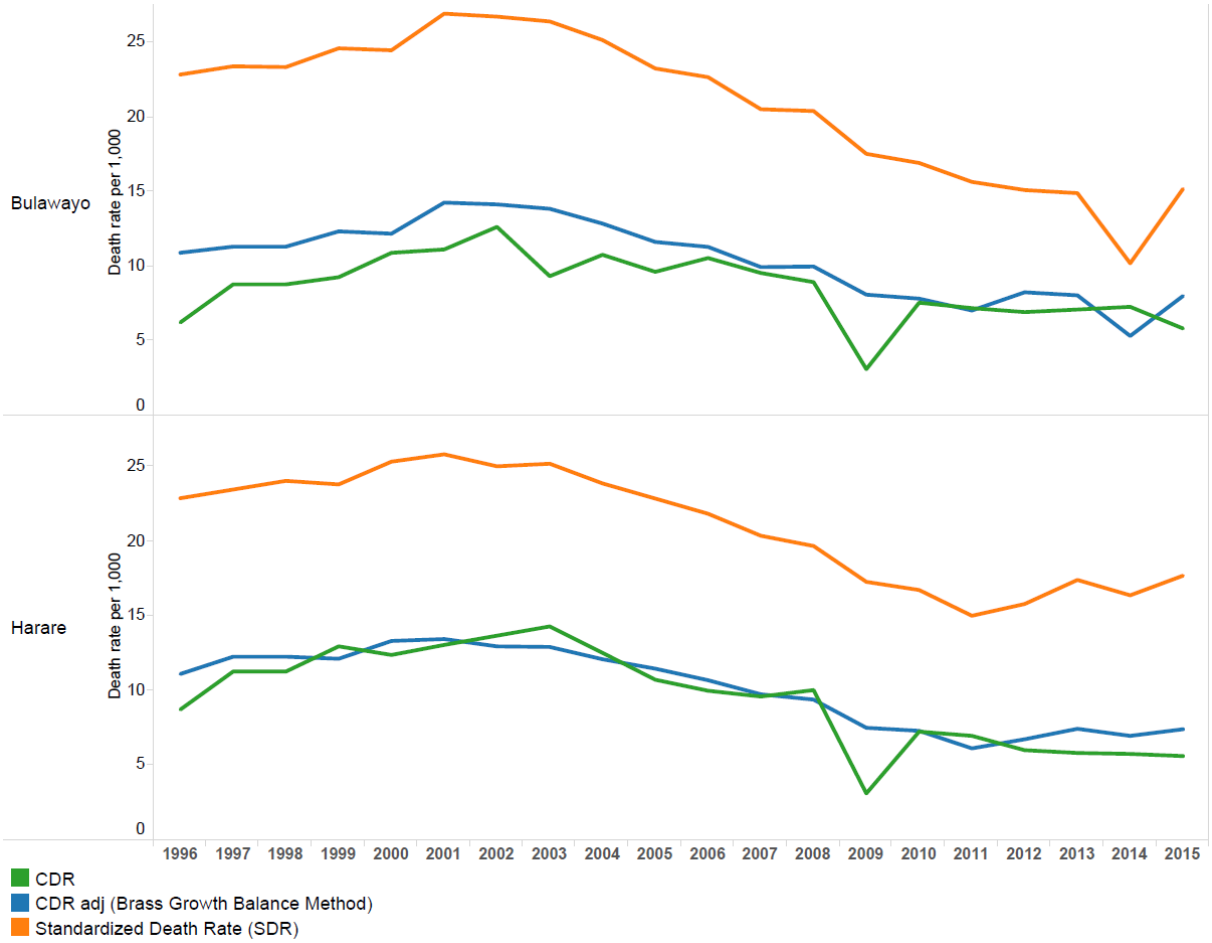
Figure 14. Crude death rates, unadjusted and adjusted, and standardized death rates (using adjusted crude death rates), by sex, 1996–2015



Sources: Registered deaths from RGO, and infant deaths from World Population Prospects (UN, 2017) applying the sex ratio from WHO (WHO, n.d.) (numerators); annual population estimates from ZimStat, with interpolated data for missing years (denominators) (see Appendix 4); WHO standard population (Ahmad, et al., 2001)

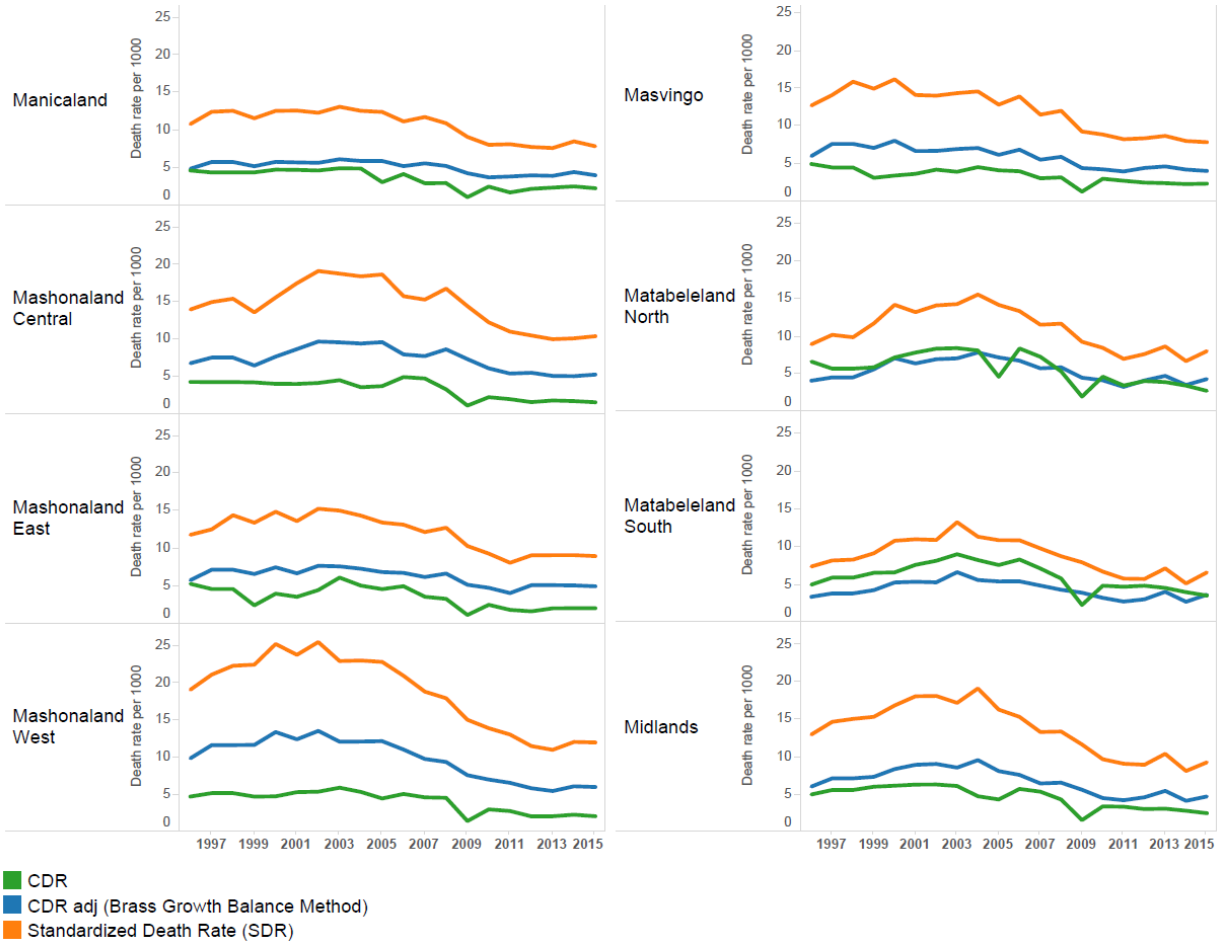
At the province level, SDRs also show a steady decrease since the early 2000s (see Figure 15). The corrections from the Brass GBM are not as high for provinces as they are for national level, but caution should be exercised in using this adjustment technique at the subnational level because internal migration—and smaller numbers of deaths and population, in general—may distort the results. In Matabeleland South, for example, the adjusted number of deaths is actually less than the observed number, which is not a likely scenario.

Figure 15. Crude death rates, unadjusted and adjusted, and standardized death rates (using adjusted crude death rates), for both sexes combined, by province, 1996–2015



Sources: Registered deaths from RGO and, for SDR, 0-4 deaths imputed using adjusted national death rate for both sexes (numerators); annual population estimates from ZimStat, with interpolated data for missing years (denominators) (see Appendix 4); WHO standard population (Ahmad, et al., 2001)

Figure 15. ***Continued***



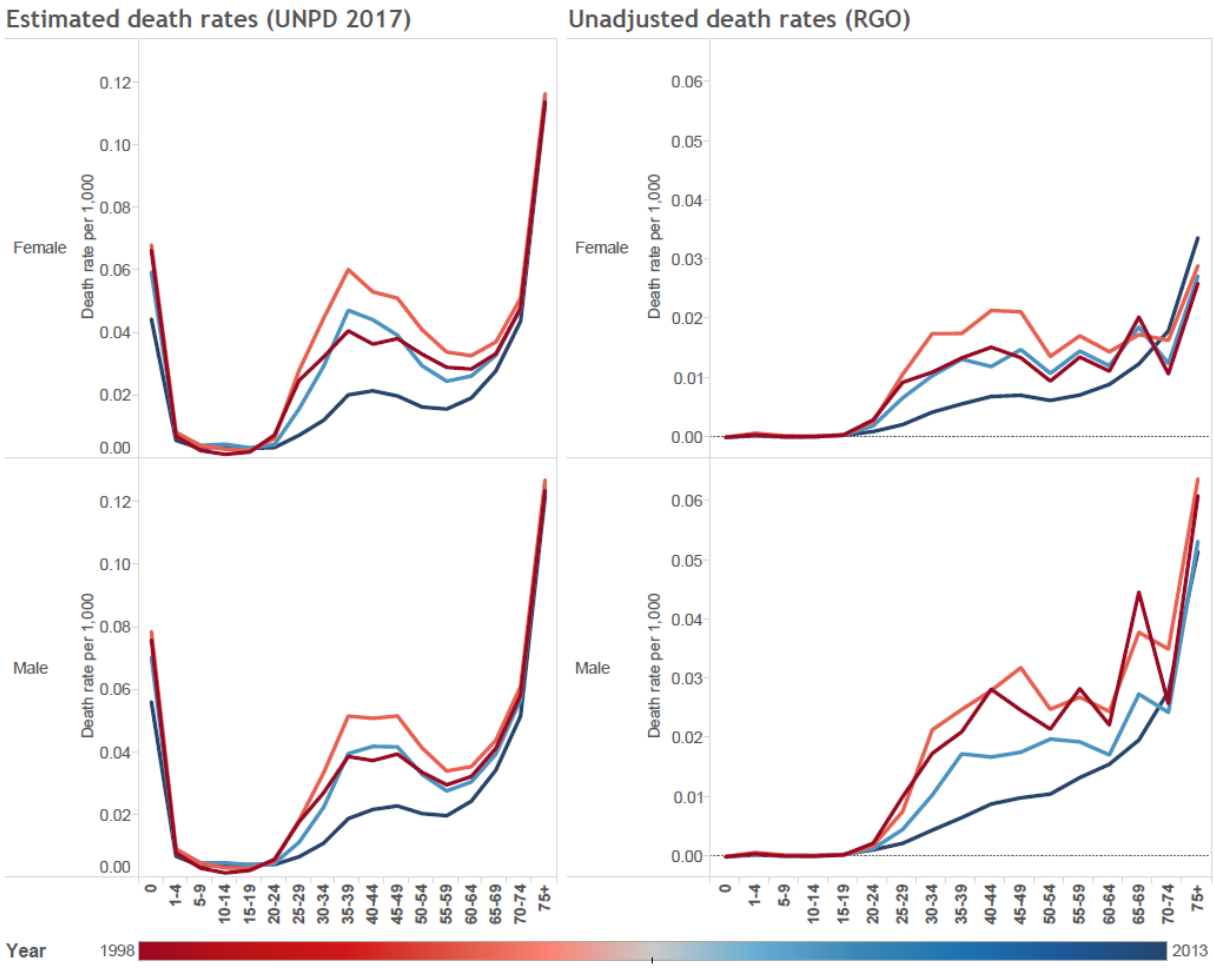
Sources: Registered deaths from RGO (numerators); annual population estimates from ZimStat, with interpolated data for missing years (denominators) (see Appendix 4); WHO standard population (Ahmad, et al., 2001)

We suggest that a separate, further analysis be done to apply various adjustment methods and to decide which one, if any, is acceptable to national specialists. The results shown above suggest that although the levels of death rates may be underestimated, the trends and patterns still provide informative insights.

Age-Specific Death Rates

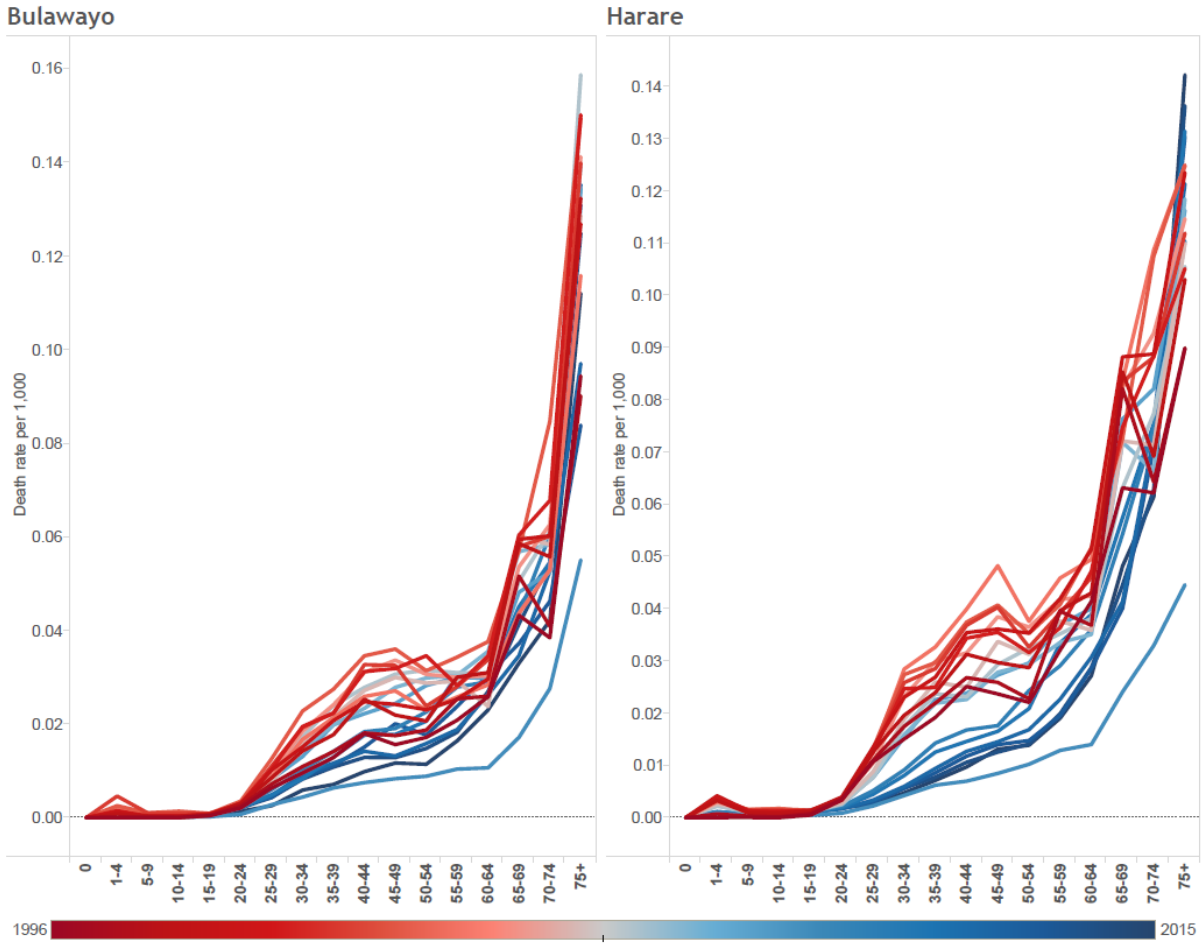
At the national level, we compared unadjusted age-specific death rates, for males and females, with UN-estimated death rates for four time periods (see Figure 16). Both series consistently show a decrease in death rates among adults 25–59 years of age (blue lines) for the most recent time period, 2011–2015. This pattern is strongly confirmed across all provinces, where death rates are lowest for both sexes together in the most recent years (see Figures 17a–c).

Figure 16. Estimated death rates and unadjusted death rates, males and females by age group, for four five-year periods: 1996–2000, 2001–2005, 2006–2010, and 2011–2015



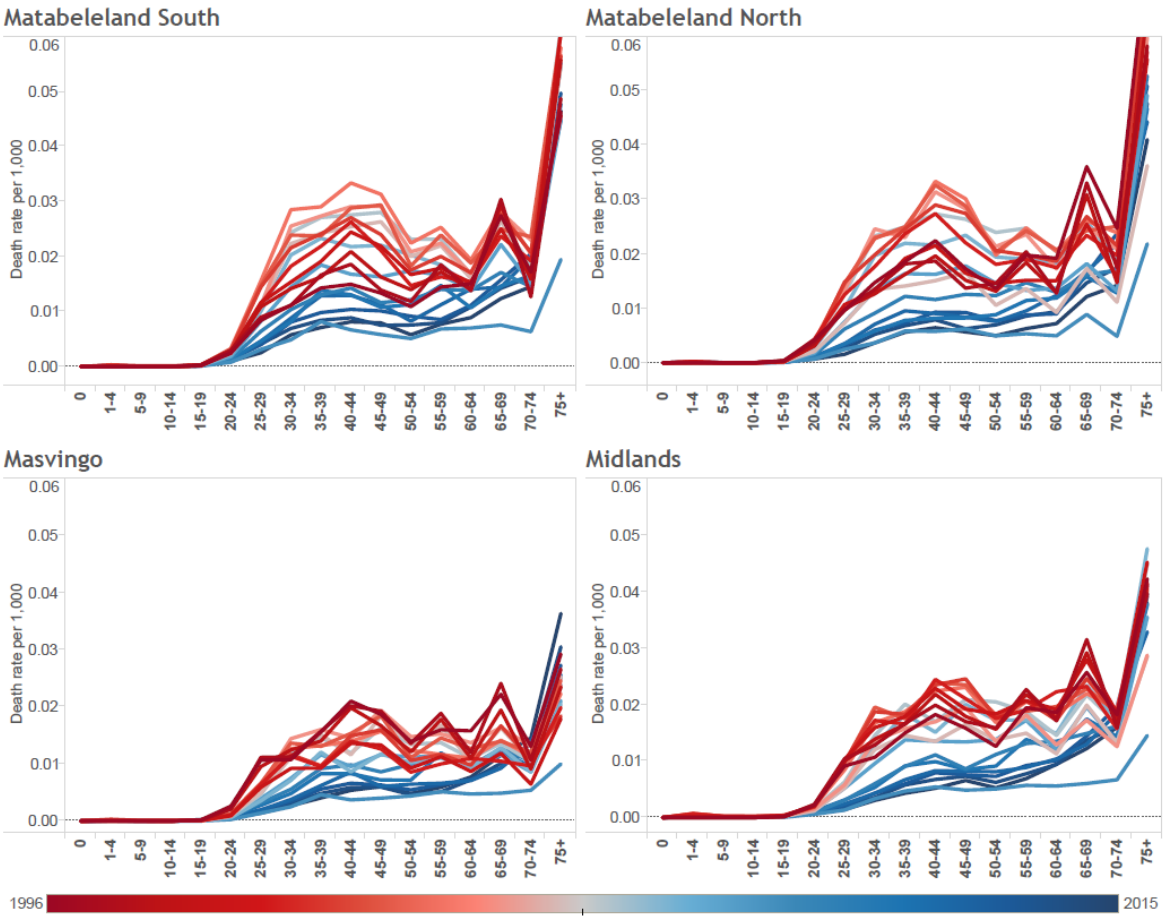
Sources: Estimated death rates (*mx*) from World Population Prospects abridged life tables (UN, 2017); unadjusted death rates from RGO (numerators); and annual population estimates from ZimStat, with interpolated data for missing years (denominators)

Figure 17. Unadjusted death rates, for both sexes, by province, 1996–2015



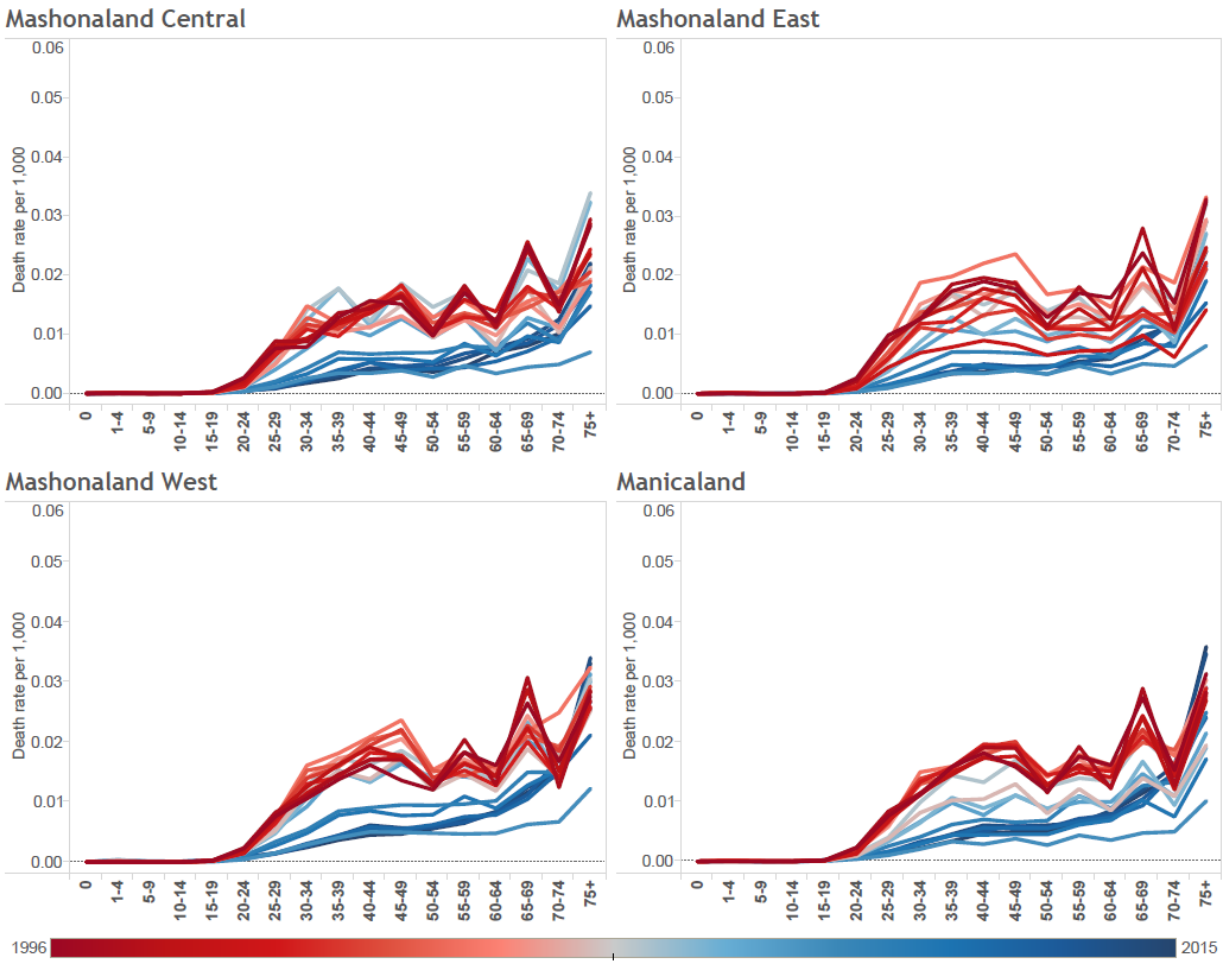
Sources: Unadjusted death rates from RGO (numerators) and annual population estimates from ZimStat, with interpolated data for missing years (denominators)

Figure 17. ***Continued***



Sources: Unadjusted death rates from RGO (numerators) and annual population estimates from ZimStat, with interpolated data for missing years (denominators)

Figure 17. ***Continued***



Sources: Unadjusted death rates from RGO (numerators) and annual population estimates from ZimStat, with interpolated data for missing years (denominators)

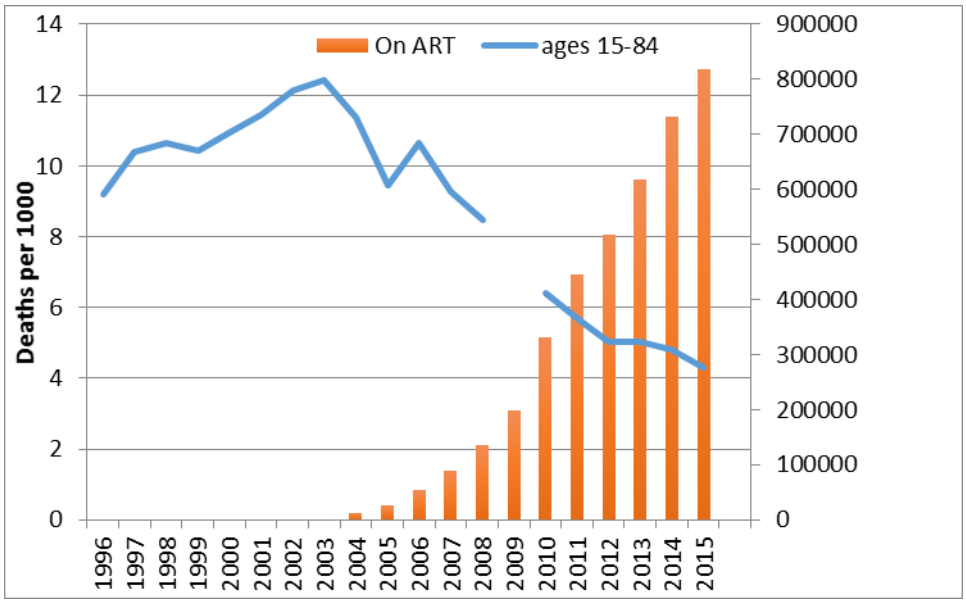
V. DISCUSSION AND RECOMMENDATIONS

Evidence to Support Mortality Declines Associated with ART Uptake, 2004–2015

The preceding analysis of the CRVS death registration records points to substantial decreases in adult all-cause mortality from 2003 through 2015 (see Appendix 6 for numbers of adult registered deaths). Similar trends appear across all provinces and thus lend confidence in the reliability of the patterns, even though the levels are under-estimated due to incomplete death registration coverage.

Patterns and timing of all-cause mortality over time provide plausible evidence that declines in the numbers of deaths are a consequence of ART uptake and the concomitant reversal of HIV-related immunosuppression from 2003 through 2015 (see Figure 18). The striking similarity of mortality trends in neighboring Botswana, South Africa, and other countries with stronger CRVS systems further suggests that these changes reflect ART impact and are not associated with shortcomings in the CRVS (Stoneburner, et al., 2014).

Figure 18. Number of people on ART and number of registered deaths, 1996–2015

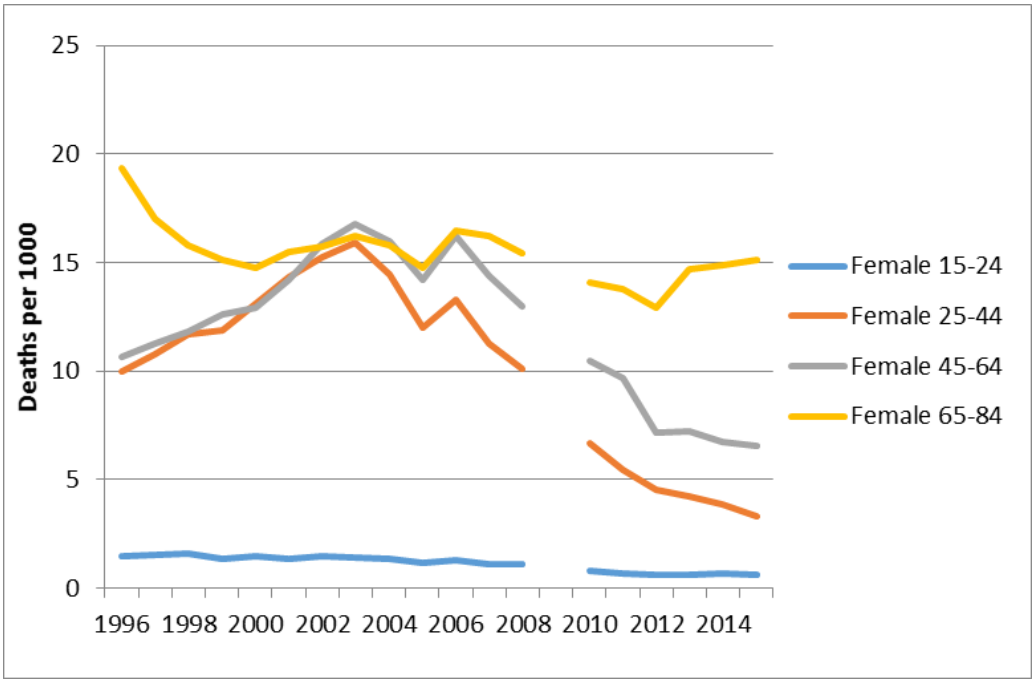


Source: UNAIDS, aidsinfoonline.org
Note: 2009 data on registered deaths are removed because of exceptionally low death registration coverage that year.

The Zimbabwe ART program provided free treatment for eligible persons with HIV beginning in late 2003. By the end of 2015, more than 900,000 individuals had received treatment. All-cause mortality (unadjusted) among adults 15–84 years of age crested in 2003 and then decreased by 65 percent through 2015, coinciding with increasing ART uptake in the adult population. Figure 19a shows age-specific mortality trends among females, and Figure 19b shows those trends for males. Decreases in mortality rates, comparing rates in 2003 to rates in 2015 by age group and sex, are as follows: 15–24 age group (females: 59 percent, males: 41 percent); 25–44 age group (females: 67 percent, males: 79 percent); 44–64 age group (females: 61 percent, males: 63 percent); and 65+ age group (females: 7

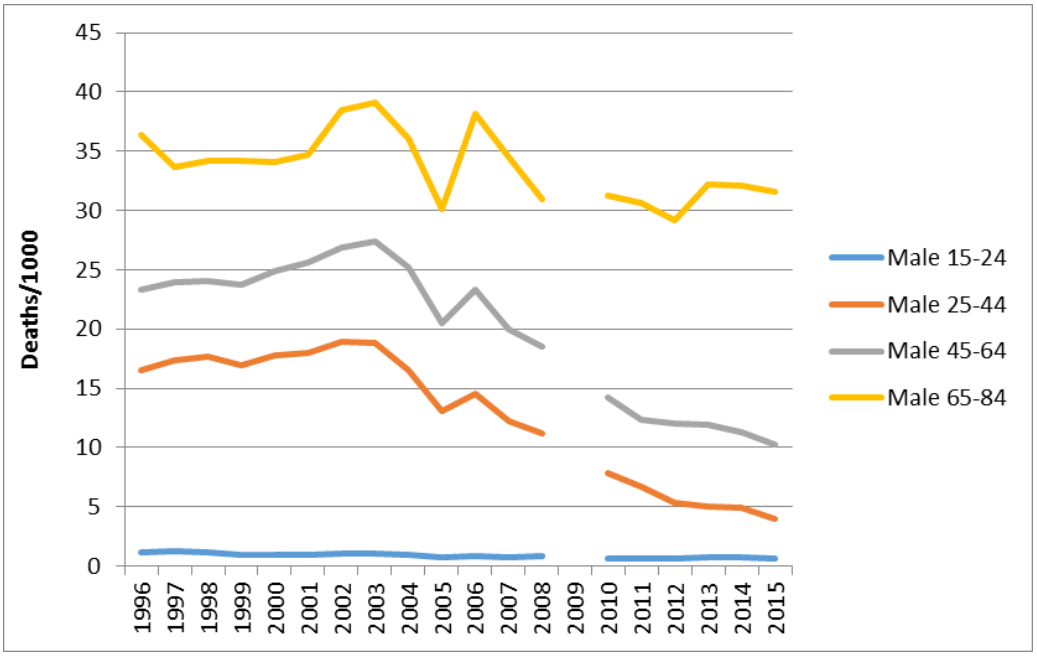
percent, males 19 percent). It is noteworthy that mortality rates are highest in males compared to females across all age groups except 15–24 years of age.

Figure 19a. Death rates (unadjusted) for women, by age group, 1996–2015



Source: RGO
Note: 2009 data on registered deaths are removed because of exceptionally low death registration coverage that year.

Figure 19b. Death rates (unadjusted) for men, by age group, 1996–2015



Source: RGO

Note: 2009 data on registered deaths are removed because of exceptionally low death registration coverage that year.

Across all provinces, the number of deaths and the crude mortality rates deceased among adults 15–64 years of age between 2003 and 2015 (see Figures 20a and 20b). Decreases in the numbers of deaths ranged from 74 percent in Matabeleland North to 51 percent in Masvingo; decreases in crude mortality rates ranged from 80 percent in Matabeleland North to 63 percent in Masvingo.

Figure 20a. Number of registered deaths, by province, 2003 and 2015

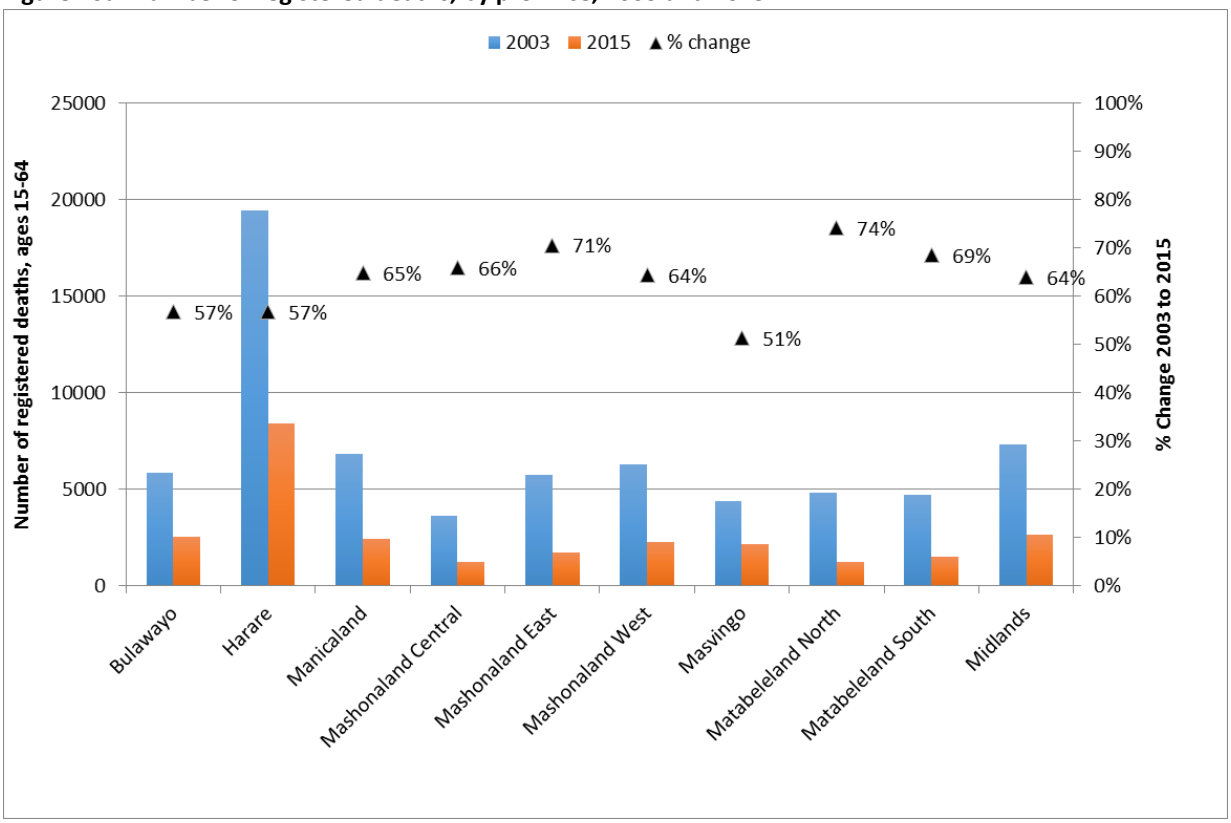
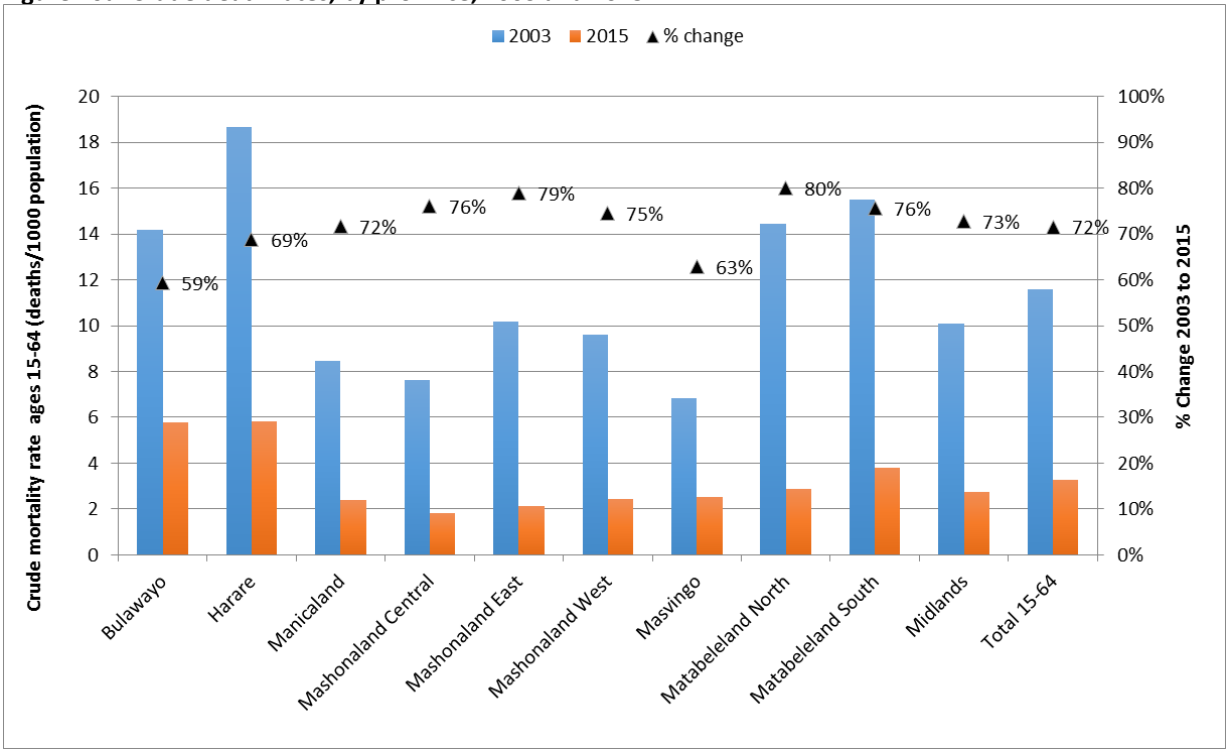


Figure 20a. Crude death rates, by province, 2003 and 2015



Source: RGO

In summary, the striking similarity of mortality trends in neighboring Botswana, South Africa, and other countries with functioning CVRS systems strengthens the conclusion that decreases in adult mortality in Zimbabwe largely reflect ART impact.

Key Recommendations

This study brought to light several areas where investments in strengthening the CRVS system would generate better quality data for monitoring mortality trends. We formulated these areas into five groups of recommendations.

Data flow

- *Data flow*. The RGO and ZimStat death records, both from the CRVS system, are not harmonized and result in different numbers of registered deaths. The official death records from the CRVS system should be harmonized in the official source of vital statistics (see Figures 1 and 2).
- *Community deaths*. Community deaths are often notified by village headmen, and sometimes by a medical notification or a legal inquiry (inquest). Pro-active follow-up on notified deaths would increase the registration coverage of community deaths, as well as coverage of death registration overall.

Data

- *Death records for infants*. The RGO death registration records do not contain any death records for deaths at age 0, while the ZimStat Annual Statistical Report from 1996 to 2007 did report a number of infant deaths. As above, concerted efforts to harmonize records and include all early deaths in the CRVS data files would improve the completeness of the CRVS (see section IV. A).

- *Deaths among the elderly*. Several ages at death in the data base were recorded as well over 100 years, with the oldest person dying at age 201 years (see section IV. A, deaths aggregated at 85+ years). These implausibly old ages were a negligible percentage of all deaths, but incorporating data quality controls and ranges would help ensure more accurate reporting of age at death.
- *Routine reporting*. Several counties failed to report registered deaths for a number of months between 1996-2015. The RGO should monitor and enforce monthly reporting of death registrations from every local civil registration office to improve complete and timely registration coverage. (see Appendix 5)

Forms

- *Death registration and cause of death forms*. The death registration form (B.D. 11) and the medical certificate of cause of death form (B.D. 12) are not aligned with the most recent UN and WHO international standards (UN, 2014; WHO, 2010). Aligning these forms with the latest standards would help ensure more streamlined, comparable vital statistics (see Appendices 1 and 2).

Causes of death

- *Certification of cause of death*. Currently, the health system is assigning cause of death to patients who died in the hospital; ZimStat is also coding causes of death from diagnoses recorded in the electronic death record (see section III). This is a duplicated effort, and the process should be streamlined, for example, by implementing the WHO Startup Mortality List (WHO, 2014a).
- *ICD coding clerks*. Designate one responsible entity, such as MOH or ZimStat, and train clerks to code death diagnoses recorded by physicians on the Medical Certificate of Cause of Death according to ICD rules and instructions.

Analysis and dissemination

- *Registration coverage*. Estimates of death registration coverage should be produced annually to track improvements in coverage (see section IV. C).
- *Tabulating causes of death*. The death registration records include ICD-10 codes assigned by ZimStat. Annual summaries of causes of death should be produced and disseminated based on WHO-recommended standard tabulations (see WHO 2016).
- *Priority causes*. Using ICD-10 coded deaths, carry out an in-depth analysis of the top ten causes of death and other priority conditions.

REFERENCES

Ahmad, O.B., Boschi-Pinto, C., Lopez, A., Murray, C., Lozano, R., & Inoue, M. (2001). *Age standardization of rates: A new WHO standard.* GPE Discussion Paper Series: No. 31. Geneva, Switzerland: World Health Organization. Retrieved from http://www.who.int/healthinfo/paper31.pdf

Dorrington, R.E. (2013). The Brass Growth Balance Method. In Moultrie, T.A., Dorrington, R.E., Hill, A.G., Hill, K., Timæus, I.M., & Zaba, B. (Eds). *Tools for demographic estimation.* Paris, France: International Union for the Scientific Study of Population. Retrieved from http://demographicestimation.iussp.org/content/brass-growth-balance-method

Government of Zimbabwe. (2005). Births and Deaths Registration Act, Chapter 5:02, Act 11/1998, 7/1994, 6/2001, 6/2005. Retrieved from http://www.africanchildforum.org/clr/Legislation%20Per%20Country/Zimbabwe/zimbabwe_birthreg_2005_en.pdf

Institute for Health Metrics and Evaluation. (n.d.). Global burden of disease profile: Zimbabwe. Retrieved from http://www.healthdata.org/sites/default/files/files/country_profiles/GBD/ihme_gbd_country_report_zimbabwe.pdf

Marindo, R., & Hill, D. (1997). *Zimbabwe further analysis. Trends and differentials in child mortality: Zimbabwe, 1970–1994.* Calverton, Maryland: Macro International Inc. Retrieved from https://dhsprogram.com/pubs/pdf/FA20/FA20.pdf

Ministry of Health and Child Care, AIDS & TB Programme. (2014). Zimbabwe National HIV and AIDS Estimates 2013. Retrieved from https://www.medbox.org/zimbabwe-national-hiv-and-aids-estimates/download.pdfMinistry of Health and Child Care & Zimbabwe National Statistics Agency. (2012). *Zimbabwe national health profile 2012.* Washington, DC: RTI International. Retrieved from http://www.zimstat.co.zw/sites/default/files/img/publications/Health/National_Health_Profile_2012.pdf

Munjanja, S. (2007). *Maternal and perinatal mortality study.* Ministry of Health and Child Welfare Zimbabwe, University of Zimbabwe, UK Department for International Development, United Nations Fund for Population Activities, World Health Organization, United Nations Children's Fund, & University of Umea, Sweden. Retrieved from http://www.unicef.org/zimbabwe/ZMPMS_report.pdf

Stoneburner, R., Korenromp, E., Lazenby, M., Tassie, J-M., Letebele, J., Motlapele, D., et al. (2014). Using health surveillance systems data to assess the impact of AIDS and antiretroviral treatment on adult morbidity and mortality in Botswana. *PLoS ONE, 9*(7): e100431. Retrieved from https://doi.org/10.1371/journal.pone.0100431

United Nations. (2014). *Principles and recommendations for a vital statistics system, revision 3.* Department of Economic and Social Affairs, Statistics Division, Statistical Papers, Series M, No. 19/Rev.3. New York, NY: United Nations. Retrieved from http://unstats.un.org/unsd/Demographic/standmeth/principles/M19Rev3en.pdf

United Nations. (2017). World population prospects: The 2017 revision. Interpolated demographic indicators by region, subregion and country, annually for 1950–2100. Retrieved from https://esa.un.org/unpd/wpp/Download/Standard/Interpolated/

UNAIDS. (2016). Country factsheets. Zimbabwe: HIV and AIDS estimates 2016. Retrieved from http://www.unaids.org/en/regionscountries/countries/zimbabwe

United Nations Children's Fund, United Nations Population Division, & World Bank Group. (2016). Child mortality estimates. CME Info. Retrieved from http://www.childmortality.org/index.php?r=site/graph#ID=ZWE_Zimbabwe

U.S. Census Bureau. (n.d.). International Data Base. Revised: September 27, 2016. Version: Data:16.0804 Code:12.0321. Retrieved from https://www.census.gov/population/international/index.html

World Health Organization. (n.d.). National burden of disease file: Exercise: Estimation of the completeness of death registration and calculation of a lifetable. Retrieved from http://www.who.int/healthinfo/bodreferencebrassgrowthbalanceexercise.pdf?ua=1

World Health Organization (WHO). (2008). Disease and injury regional mortality estimates for 2004-2008. Retrieved from http://www.who.int/healthinfo/global_burden_disease/estimates_regional_2004_2008

World Health Organization (WHO). (2010). *International statistical classification of diseases and related health problems.* 10th Revision. 2010 edition. Geneva, Switzerland: WHO. Retrieved from http://www.who.int/classifications/icd/en/

World Health Organization (WHO). (2011). *International statistical classification of diseases and related health problems.* 10th Revision. Volume 2. 2010 edition. Geneva, Switzerland: WHO. Retrieved from http://www.who.int/classifications/icd/ICD10Volume2_en_2010.pdf?ua=1

World Health Organization (WHO). (2014a). *WHO application of ICD-10 for low-resource settings initial cause of death collection: The startup mortality list (ICD-10-SMoL).* Vol. 2.0. Geneva, Switzerland: WHO. Retrieved from http://www.who.int/healthinfo/civil_registration/ICD_10_SMoL.pdf

World Health Organization. (2014b). Noncommunicable diseases country profiles, Zimbabwe. Retrieved from http://www.who.int/nmh/countries/zwe_en.pdf

World Health Organization (WHO). (2015). *Trends in maternal mortality: 1990-2015. Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division.* Geneva, Switzerland: WHO. Retrieved from http://apps.who.int/iris/bitstream/10665/194254/1/9789241565141_eng.pdf?ua=1

World Health Organization. (2016). WHO methods and data sources for global causes of death 2000-2015. Global Health Estimates Technical Paper WHO/HIS/HSI/GHE/2016.3. Geneva: World Health Organization. Retrieved from http://www.who.int/healthinfo/global_burden_disease/GlobalCOD_method_2000_2015.pdf

Zimbabwe National Statistical Agency (ZimStat). (2013). *Mortality report 2007.* Harare, Zimbabwe: ZimStat. Retrieved from http://www.zimstat.co.zw/sites/default/files/img/publications/Health/MortalityReport2007.pdf

Zimbabwe National Statistical Agency (ZimStat). (2014). *Maternal and under-five mortality in Zimbabwe. Multiple Indicators Cluster Survey 2014: Key findings.* Harare, Zimbabwe: ZimStat. Retrieved from http://www.zimstat.co.zw/sites/default/files/img/publications/Health/MICS2014/Child_Mortality.pdf

APPENDIX 1. DEATH REGISTRATION FORM (FORM B.D. 11)

Copy of Notice of Death of a Person

65426 – 3
Form Z 252 (B.D.)
Form B.D. 11

BIRTHS AND DEATHS REGISTRATION ACT NO. 11 OF 1986

Notice of the Death of a Person

WARNING:- In terms of subsection (2) of section 27 of the Act, any Person who willfully gives false information for the purpose of the Registration of the death of a person shall be guilt of an offence.

OFFICIAL USE ONLY
This registration is:

Current ☐
Late ☐
A re-registration ☐
See entry number

This form must be completed IN INK, *in* BLOCK LETTERS, *except where signatures are called for. Where squares, Thus* ☐ *, are provided, place an* "X" *in the* appropriate *square.*

Part 1	1	First names	2 Surname
PERSONAL DETAILS OF THE DECEASED	3	Number of document of identity	4 Sex Male ☐ Female ☐
	5	Usual residential address	
	6	Age* [1]	7 race 8 Country of birth
	9	Marital status	Single ☐ Married ☐ Divorced ☐ Separated ☐ Widow / er ☐
	10	Occupation	
	11	Date of death (in words)	day of 19
	12	Place of death	
	13	Intended place of burial / cremation	
	14	Cause / s of death 1. 2. 3. other.	
	15	Duration of last illness 1. 2. 3. Other.	
	16	Name of medical practitioner who attended the deceased	

*SEE NEXT PAGE FOR LATE REGISTRATIONS AND NOTES.

Appendix Document I (Contd):

Copy of Notice of Death of a Person

Part 2 PERSON GIVING NOTICE OF DEATH	1	Name (in full)
	2	I am giving notice of this death as * [2]
	3	Usual residential address
	4	Postal address
	5	Date of notice 6 Signature or mark of Person giving notice
Part 3		**OFFICIAL USE ONLY** The registration of this death is hereby authorized…….. (Registrar / Registrar – General) Date of registration…… District of registration…… Death registry entry number……..

LATE REGISTRATION OF A DEATH IN TERMS OF SECTION 25 OF THE BIRTHS AND DEATHS REGISTRATION ACT 1986

(To be completed where notice is given more than five days after the date of the death)

To: The District Registrar at……

The reason for the late registration of the death referred to in Part 1 (overleaf) are as follows:

……
……
……
…… ……..
(date) (Signature or mark of the person giving the late notice of death)

FOR OFFICIAL USE ONLY

DETAILS OF DOCUMENTS SUPPORTING THE LATE REGISTRATION OF THIS DEATH

Full description of documents	Seen	Accepted	Returned	Attached	Initials

Note:- A district registrar shall not accept a late registration of a death unless Parts 1,2 and 4 on this form have been completed to his satisfaction, and all necessary supporting documents are to hand and acceptable. Only in cases of doubt as to the validity or acceptability of reasons of evidence in terms of the late registration should the matter be referred to the Registrar –General.

*** NOTES**

* [1] State the age of the deceased in completed years, unless deceased is under two years of age, when the full date of birth must be given.

* [2] The person giving the notice of death should complete Part 2, section 2, in term of one of the following qualifications:-

(a) person present at the death;
(b) relative in attendance at the death;
(c) relative dwelling within the district in which the death took place;
(d) an occupier or inmate of the house in which the death took place;
(e) Person who has buried or has caused the body to be buried;
(f) The head of any kraal in which the death took place;
(g) Other person, e.g. an officer or authority of Zimbabwe (give details of rank if applicable).

APPENDIX 2. MEDICAL CERTIFICATE OF CAUSE OF DEATH FORM (FORM B.D. 12)

Copy of Medical Certificate of Cause of Death

65411-6
Z93(B.D.)
Form B.D. 12

BIRTHS AND DEATHS REGISTRATION ACT [CHAPTER 5:02]

MEDICAL CERTIFICATE OF CAUSE OF DEATH

I CERTIFY that I attended (insert full names and National Identity Card Number……during his/her last illness Since the……, 20…., that his/her age was stated to be……., that I last attended him/her alive on the……., 20….., that…. He/she died (a)…… …… on the…….. ., 20….., at (place) ……., that I saw and identified the body on the ……., 20….., and that, to the best of my belief, his/her death was in all respects due to the natural causes specified below.

CAUSE OF DEATH (b)

		Approximate interval between Onset and death (duration of illness)
Disease or condition directly causing death (c)	(i) ……	……
	due to (or as a consequence of)	
Antecedent causes Morbid condition, if any, giving rise to The above cause, stating the underlying Condition last	(ii) ……	……
	due to (or as a consequence of)	
	(iii) ……	……
Other significant conditions Contributing to the death, but not related to the disease or conditions causing it	……	……
	……	……
	……	……
	……	……
	……	……

SIGNED this……day of……., 20……..

Name and address of person to whom the certificate was given

……
Signature of medical practitioner

……
Name in block letters

……
Registered qualification…….

……
Residence……..

……
……..

APPENDIX 3. MAPPING OF DISTRICTS IN THE RAW POPULATION AND DEATH FILES

Table A.3 shows districts from two population data files from ZimStat—for years 1992–2001 and years 2012–2022—that were mapped to the death files for 1996–2015. All these files contained slightly different districts that had to be reconciled before producing comparable numbers and results across subnational areas. Note: Two districts in the death file, Mbire and Sanyati, are not in the final datafile for the study because official population estimates specific to these areas were not available. Mbire deaths are included in Guruve district, and Sanyati deaths are included in Mhondoro-Ngezi district.

Table A.3. Mapping of districts from various sources to create the 58 study districts

Serial no.	Uniique district code for this study	Districts in the study	Province	Districts in death file (1996-2015)	Districts in population file (1992-2001)	Districts in population file (2012-2022)	CSO district at time of study
	.			.	.	.	BULAWAYO URBAN
1	021_	BULAWAYO	Bulawayo	BULAWAYO	Bulawayo	Bulawayo	.
2	101	BUHERA	Manicaland	BUHERA	Buhera	Buhera	BUHERA
3	102	CHIMANIMANI	Manicaland	CHIMANIMANI	Chimanimani	Chimanimani	CHIMANIMANI
4	103_	CHIPINGE	Manicaland	CHIPINGE	Chipinge		.
						Chipinge Rural	CHIPINGE RURAL
						Chipinge Urban	CHIPINGE URBAN
5	104_	MAKONI	Manicaland	MAKONI	Makoni	Makoni	MAKONI
					Rusape	Rusape	RUSAPE
6	105_	MUTARE	Manicaland	MUTARE			.
					Mutare Rural	Mutare Rural	MUTARE RURAL
					Mutare Urban	Mutare Urban	MUTARE URBAN
7	106	MUTASA	Manicaland	MUTASA	Mutasa	Mutasa	MUTASA
	.	.		.	.	.	NYANGA RURAL
8	107_	NYANGA	Manicaland	NYANGA	Nyanga	Nyanga	.
9	201_	BINDURA	Mashonalan	BINDURA	Bindura		.
						Bindura Rural	BINDURA RURAL
					Bindura Urban	Bindura Urban	BINDURA URBAN
10	203_	GURUVE	Mashonalan	GURUVE	Guruve	Guruva	GURUVE
				MBIRE*		Mbire	MBIRE
11	204_	MAZOWE	Mashonalan	MAZOWE	Mazowe	Mazowe	MAZOWE
						Mvurwi	MVURWI
12	205	MOUNT DARWIN	Mashonalan	MOUNT DARWIN	Mt Darwin	Mt Darwin	MOUNT DARWIN
13	206	RUSHINGA	Mashonalan	RUSHINGA	Rushinga	Rushinga	RUSHINGA
14	207	SHAMVA	Mashonalan	SHAMVA	Shamva	Shamva	SHAMVA
15	202	MUZARABANI	Mashonalan	MUZARABANI	Centenary	Muzarabani	MUZARABANI
16	301	CHIKOMBA	Mashonalan	CHIKOMBA	Chikomba	Chikomba	CHIKOMBA
17	302_	GOROMONZI	Mashonalan	GOROMONZI	Goromonzi	Goromonzi	GOROMONZI
					Ruwa Local Board	Ruwa Local Board	RUWA LOCAL BOAR
18	304_	MARONDERA	Mashonalan	MARONDERA	Marondera		MARONDERA
						Marondera Rural	MARONDERA RURA
					Marondera Urban	Marondera Urban	.
19	305	MUDZI	Mashonalan	MUDZI	Mudzi	Mudzi	MUDZI
20	306	MUREWA	Mashonalan	MUREWA	Murehwa	Murehwa	MUREHWA
21	307	MUTOKO	Mashonalan	MUTOKO	Mutoko	Mutoko	MUTOKO
22	308	SEKE	Mashonalan	SEKE	Seke	Seke	SEKE
23	309	UMP	Mashonalan	UZUMBA/MARAMBA/F	Uzumba Maramba Pfungwe	Uzumba Maramba Pfungwe	UZUMBA/MARAMBA
24	303	HWEDZA	Mashonalan	WEDZA	Hwedza	Hwedza	HWEDZA
25	401_	CHEGUTU	Mashonalan	CHEGUTU	Chegutu	Chegutu	CHEGUTU
							CHEGUTU RURAL
					Chegutu Urban	Chegutu Urban	.
26	402_	HURUNGWE	Mashonalan	HURUNGWE	Hurungwe	Hurungwe	HURUNGWE
						Karoi	KAROI
27	403_	MHONDORO-NG	Mashonalan	MHONDORO-NGEZI		Mhondoro-Ngezi	MHONDORO-NGEZ
				SANYATI*		Sanyati	SANYATI
					Kadoma		KADOMA
					Kadoma Urban	Kadoma Urban	KADOMA
28	404_	KARIBA	Mashonalan	KARIBA	Kariba		KARIBA
						Kariba Rural	KARIBA RURAL
					Kariba Urban	Kariba Urban	.
29	405_	MAKONDE	Mashonalan	MAKONDE	Makonde	Makonde	MAKONDE
					Chirundu		MAKONDE
					Chinhoyi		CHINHOYI
						Chinhoyi Urban	.
30	406_	ZVIMBA	Mashonalan	ZVIMBA	Zvimba	Zvimba	ZVIMBA
					Norton	Norton	NORTON
31	501	BINGA	Matabelelan	BINGA	Binga	Binga	BINGA
32	502	BUBI	Matabelelan	BUBI	Bubi	Bubi	BUBI
33	503_	HWANGE	Matabelelan	HWANGE	Hwange	Hwange Rural	HWANGE
							HWANGE RURAL
					Hwange Urban	Hwange Urban	.
					Victoria Falls	Victoria Falls	VICTORIA FALLS
34	504	LUPANE	Matabelelan	LUPANE	Lupane	Lupane	LUPANE
35	505	NKAYI	Matabelelan	NKAYI	Nkayi	Nkayi	NKAYI
36	506	TSHOLOTSHO	Matabelelan	TSHOLOTSHO	Tsholotsho	Tsholotsho	TSHOLOTSHO
37	507	UMGUZA	Matabelelan	UMGUZA	Umguza	Umguza	UMGUZA
38	601_	BEITBRIDGE	Matabelelan	BEITBRIDGE	Beitbridge		BEITBRIDGE
						Beitbridge Urban	.
						Beitbridge Rural	BEITBRIDGE RURA
						Bulilima	BULILIMA
39	602_	BULILIMA MANG	Matabelelan	BULILIMA MANGWE	Bulililamamangwe		.
						Mangwe	MANGWE
						Plumtree	PLUMTREE
40	604_	GWANDA	Matabelelan	GWANDA	Gwanda		GWANDA
						Gwanda Rural	GWANDA RURAL
					Gwanda Urban	Gwanda Urban	.
41	605	INSIZA	Matabelelan	INSIZA	Insiza	Insiza	INSIZA
42	606	MATOBO	Matabelelan	MATOBO	Matobo	Matobo	MATOBO
43	607	UMZINGWANE	Matabelelan	UMZINGWANE	Umzingwane	Umzingwane	UMZINGWANE
44	701_	CHIRUMANZU	Midlands	CHIRUMANZU	Chirumanzu	Chirumhanzi	CHIRUMANZU
45	702_	GOKWE	Midlands		Gokwe		.
				GOKWE NORTH		Gokwe North	GOKWE NORTH
				GOKWE SOUTH		Gokwe South	GOKWE SOUTH
						Gokwe Town	GOKWE TOWN
46	704_	GWERU	Midlands	GWERU	Gweru		GWERU
						Gweru Rural	GWERU RURAL
					Gweru Urban	Gweru Urban	.
47	705_	KWEKWE	Midlands	KWEKWE	Kwekwe		KWEKWE
						Kwekwe Rural	KWEKWE RURAL
					Kwekwe Urban	Kwekwe Urban	.
					Redcliffe	Redcliff	REDCLIFF
48	706	MBERENGWA	Midlands	MBERENGWA	Mberengwa	Mberengwa	MBERENGWA
49	707_	SHURUGWI	Midlands	SHURUGWI	Shurugwi		SHURUGWI
						Shurungwi Rural	SHURUGWI RURAL
					Shurugwi Urban	Shurugwi Urban	.
50	708_	ZVISHAVANE	Midlands	ZVISHAVANE	Zvishavane		ZVISHAVANE
	.	.		.	.	.	ZVISHAVANE MINE
						Zvishavane Rural	.
					Zvishavane Urban	Zvishavane Town	.
51	801	BIKITA	Masvingo	BIKITA	Bikita	Bikita	BIKITA
52	802_	CHIREDZI	Masvingo	CHIREDZI	Chiredzi		CHIREDZI
						Chiredzi Rural	.
						Chiredzi Urban	CHIREDZI TOWN
53	803	CHIVI	Masvingo	CHIBI	Chivi	Chivi	CHIVI
54	804	GUTU	Masvingo	GUTU	Gutu	Gutu	GUTU
55	805_	MASVINGO	Masvingo	MASVINGO	Masvingo		MASVINGO
						Masvingo Rural	MASVINGO RURAL
					Masvingo Urban	Masvingo Urban	.
56	806	MWENEZI	Masvingo	MWENEZI	Mwenezi	Mwenezi	MWENEZI
57	807	ZAKA	Masvingo	ZAKA	Zaka	Zaka	ZAKA
58	901_	HARARE	Harare	HARARE			.
					Harare Rural	Harare Rural	HARARE RURAL
					Harare Urban	Harare Urban	HARARE URAN
						Epworth	EPWORTH
					Chitungwiza	Chitungwiza	CHITUNGWIZA

APPENDIX 4. POPULATION ESTIMATES BY AGE AND SEX, NATIONALLY AND BY PROVINCE, 1996–2015

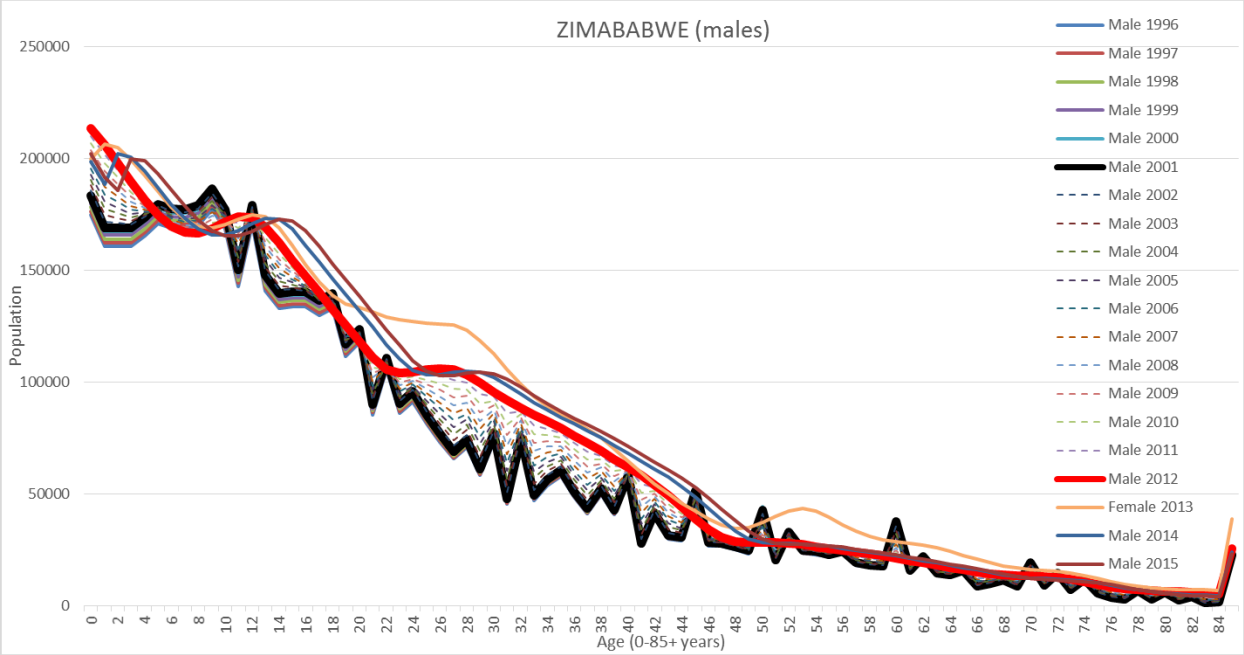
Official population estimates by district were provided in two separate data files—for years 1992–2001 and for years 2012–2022. The districts in these two files differed due to restructuring of administrative areas between the 1992 and 2012 censuses. See Annex 3 for details of mapping to unique study districts.

The earlier population file, 1992–2001, included district populations of unknown ages. Overall, these cases of unknown ages represented less than 1 percent; however, because the percentage missing varied across age groups and districts, we decided to redistribute them proportional to the population across all ages. Other sporadically missing population estimates by age and sex were interpolated by inserting the average of the two neighboring years for that age and sex group.

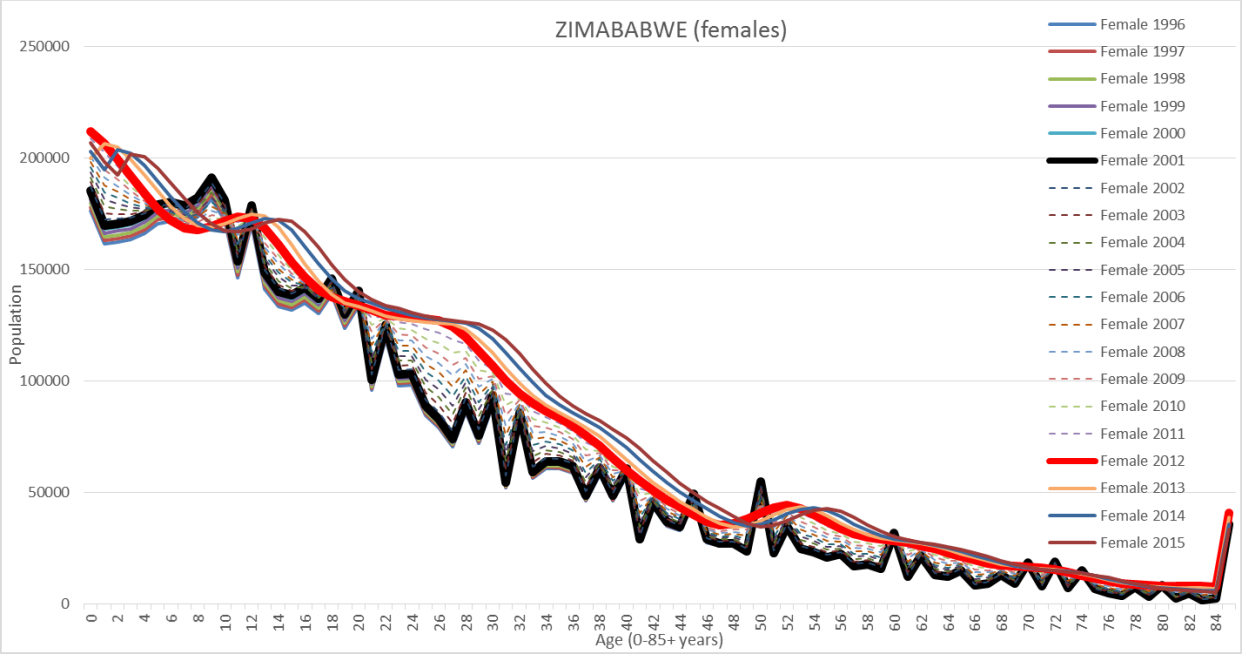
For the gap in population estimates from 2002 to 2011, we produced single-year estimates, applying an average annual rate of increase for single years for each of the 58 districts.

The figures in this appendix present results of the study district populations aggregated by province and nationally. The bold black line indicates the last official estimate for the 1992–2001 period (i.e., 2001); the bold red line indicates the baseline population for the 2012 census. The remaining solid lines (not bold) are official estimates, and the dashed lines are interpolated estimates that we made for the years between 2001 and 2012, for which official estimates were not available.

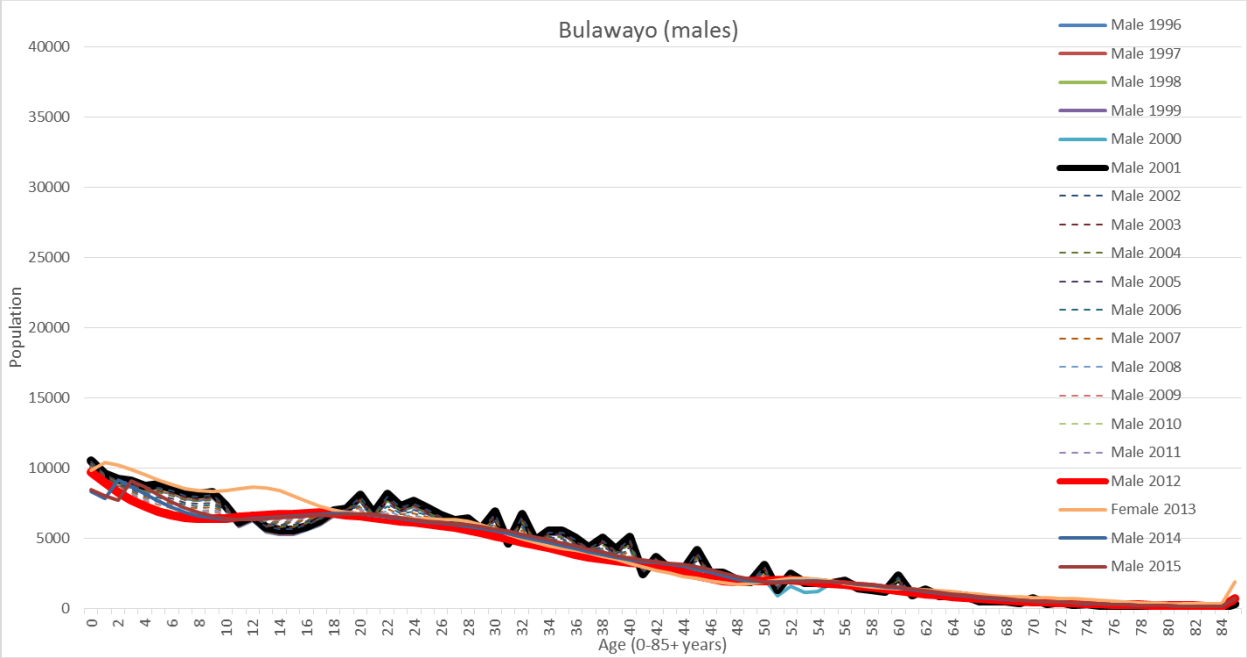
Source: Zimstat population estimates for years 1992–2001 and 2012–2022; authors' annual interpolated population estimates for the years for which official estimates were not available, 2002 to 2011



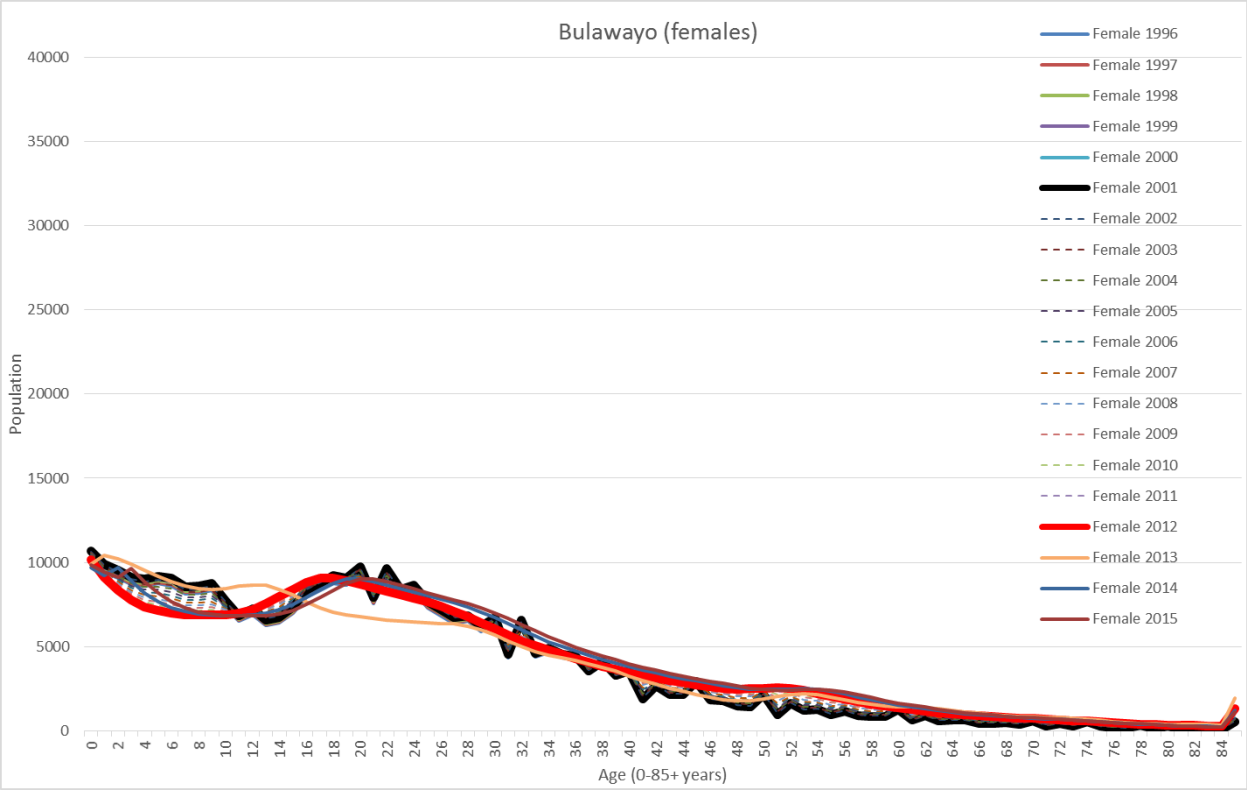
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



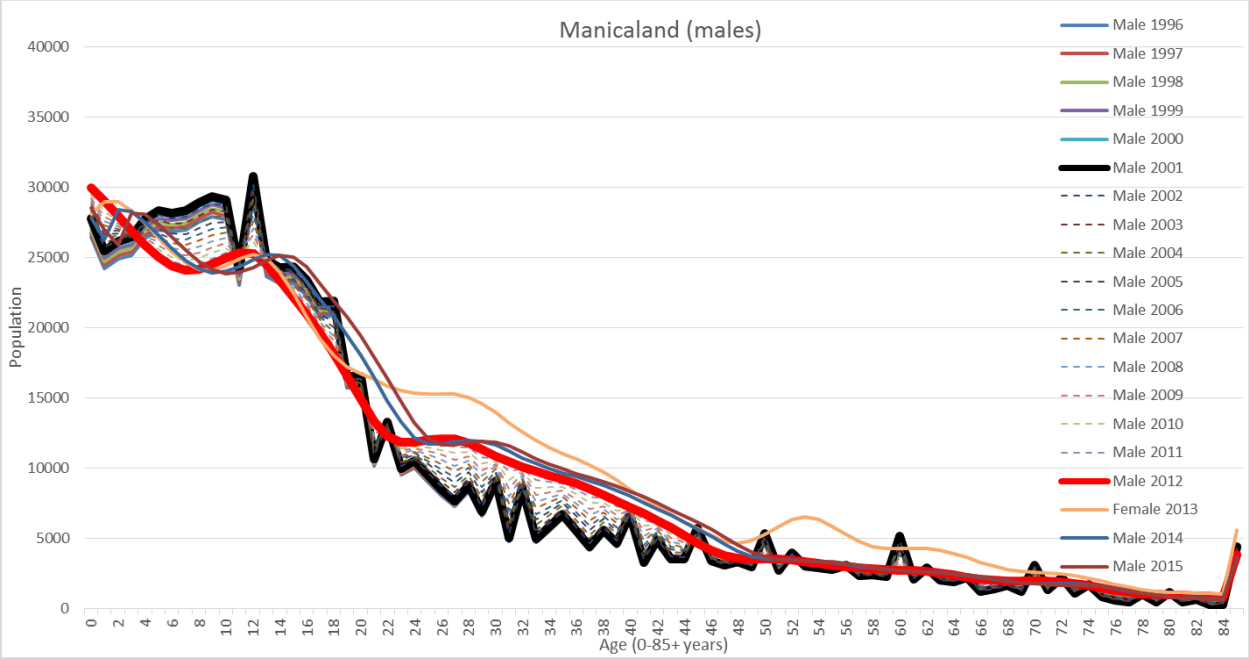
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



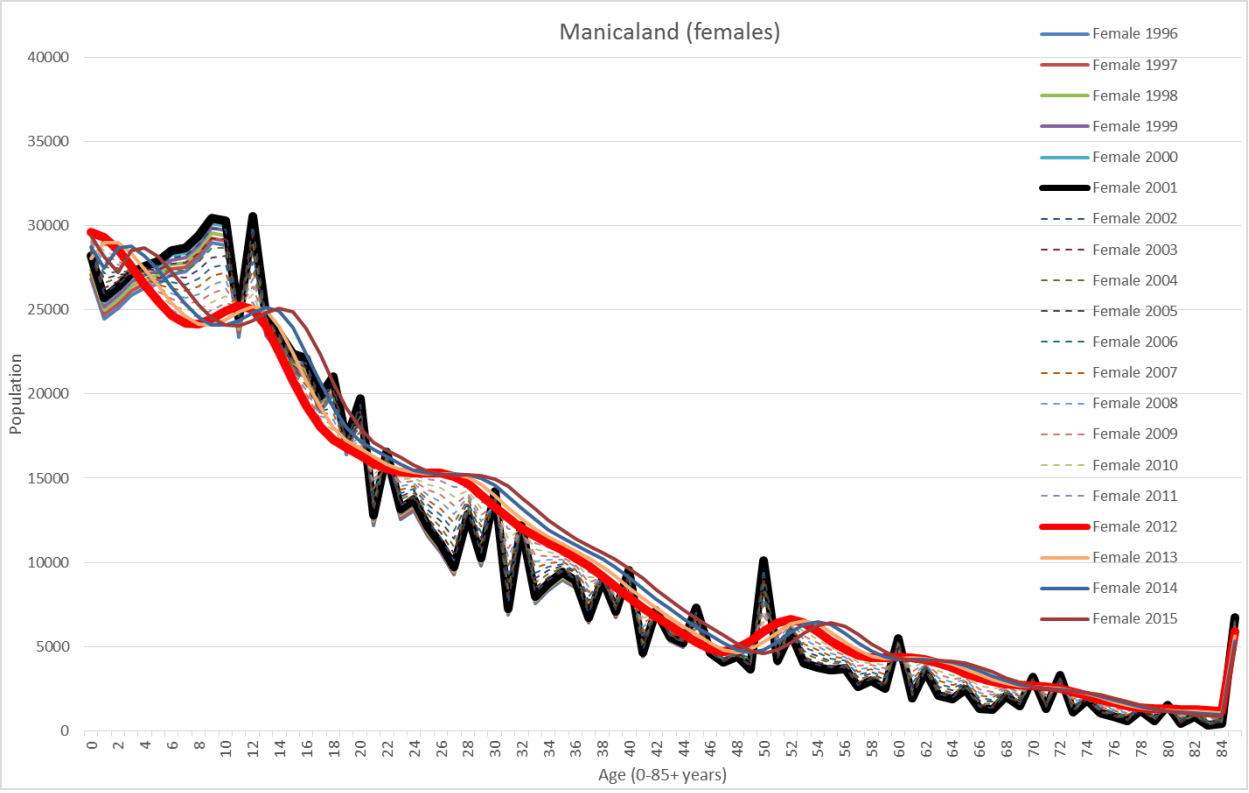
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



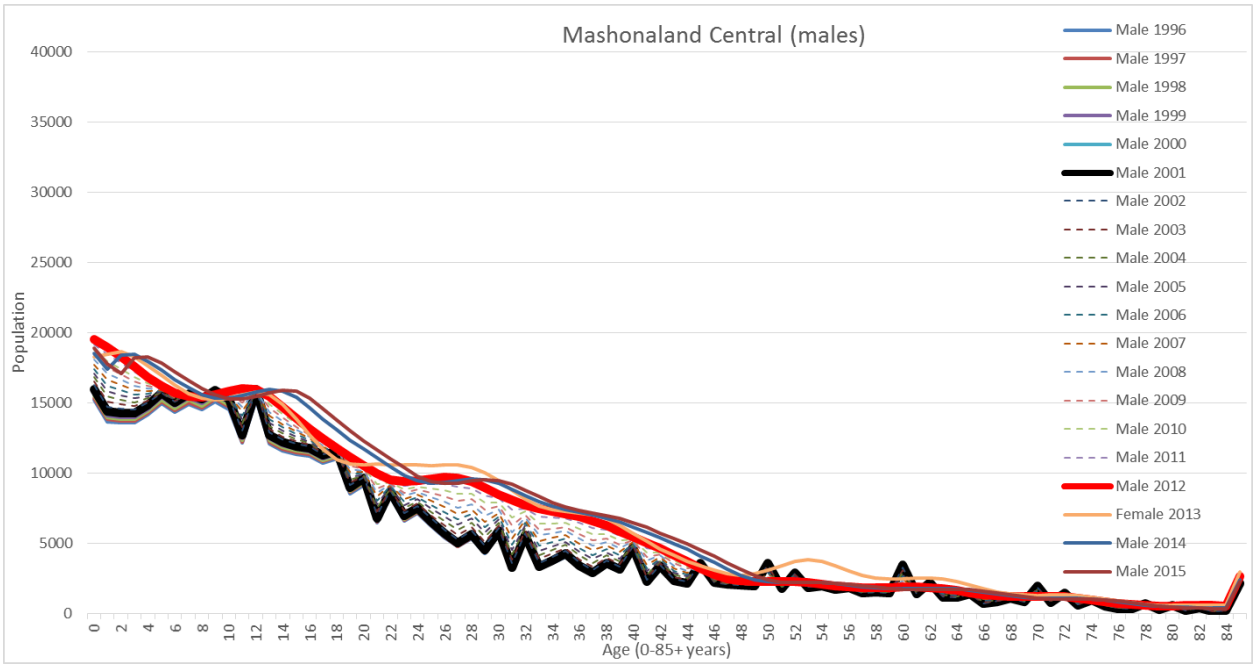
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



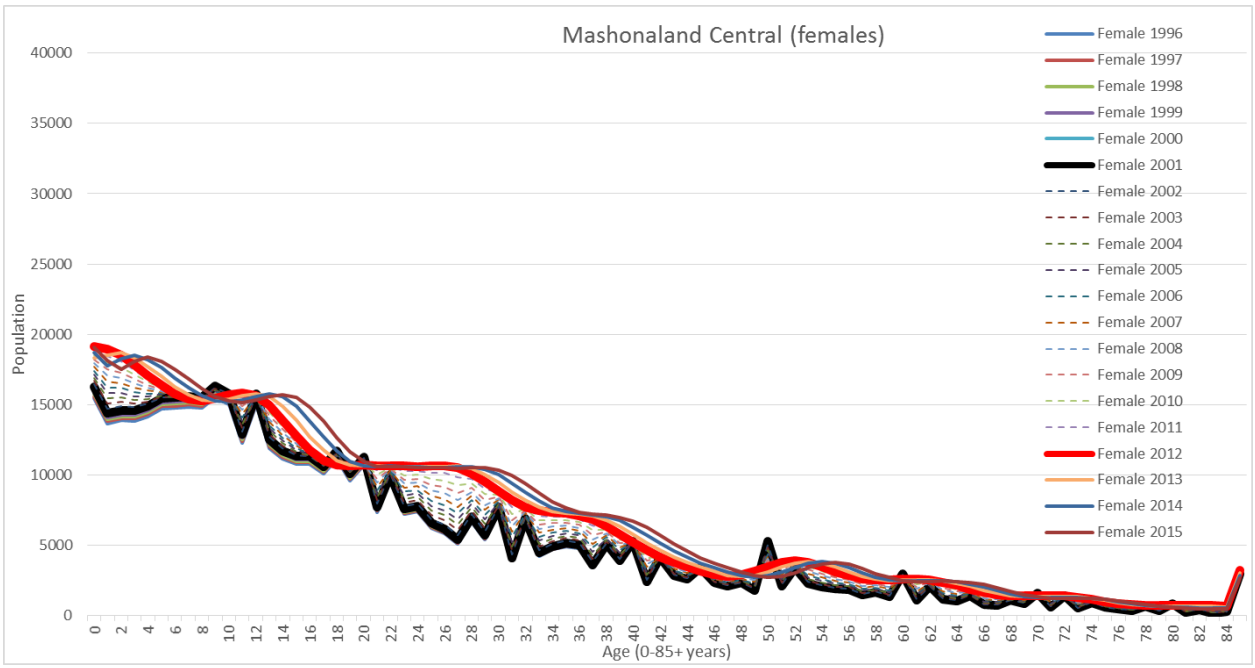
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



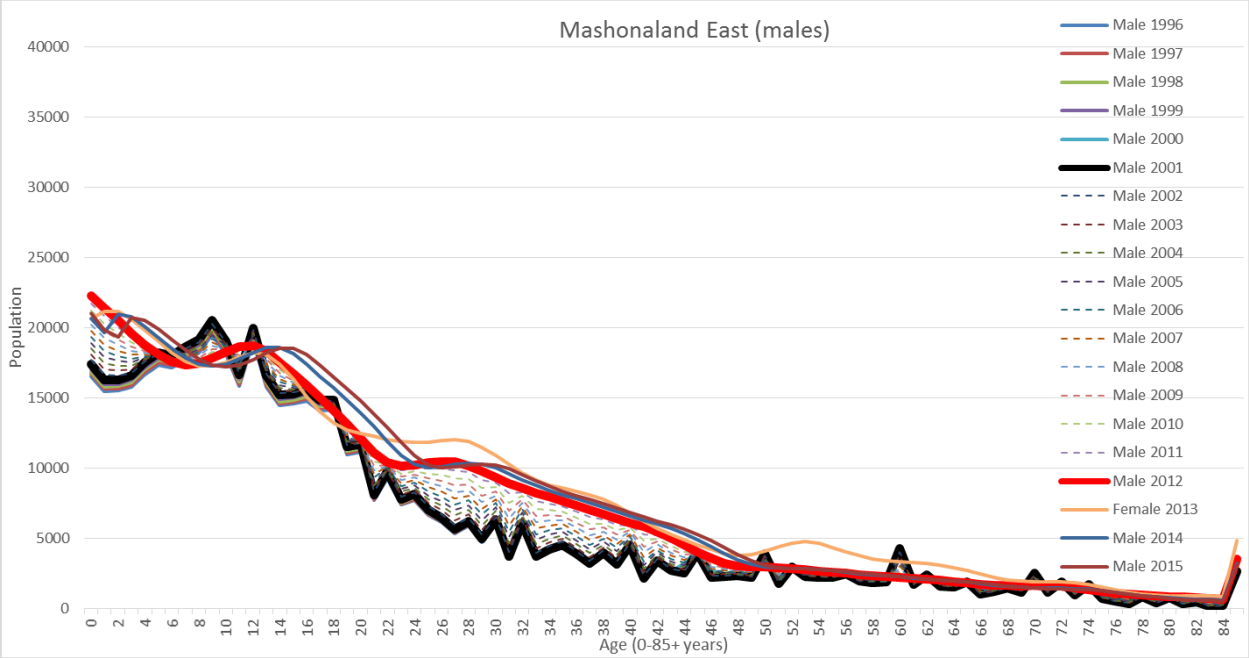
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



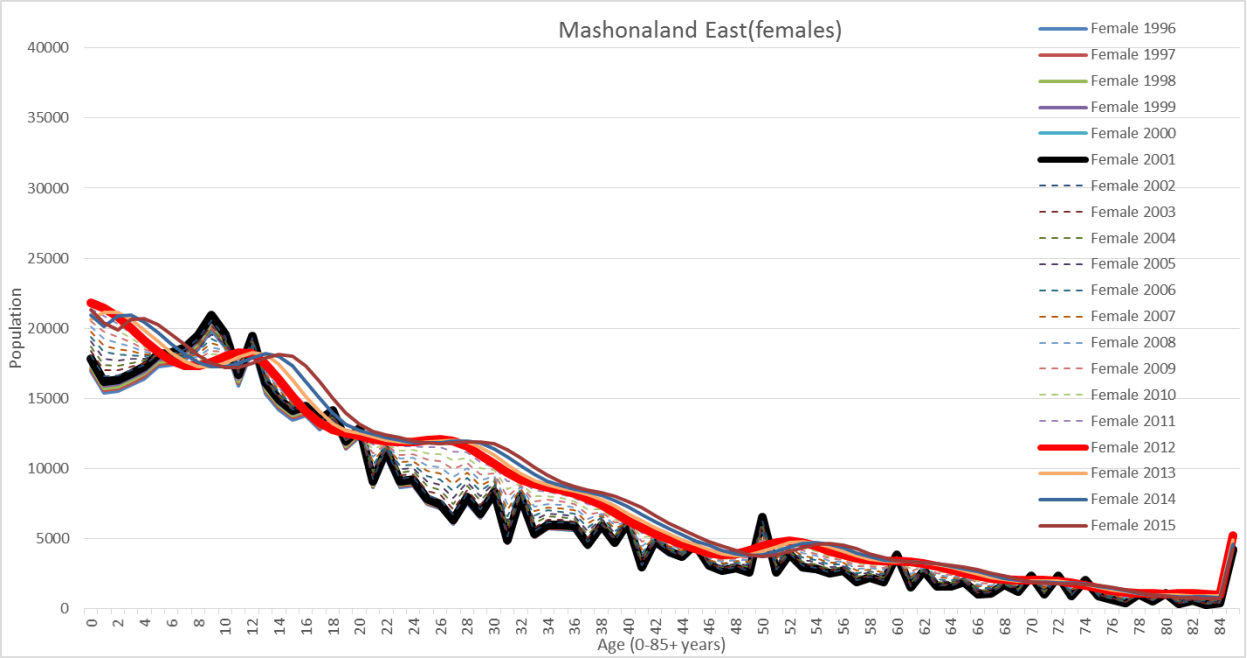
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



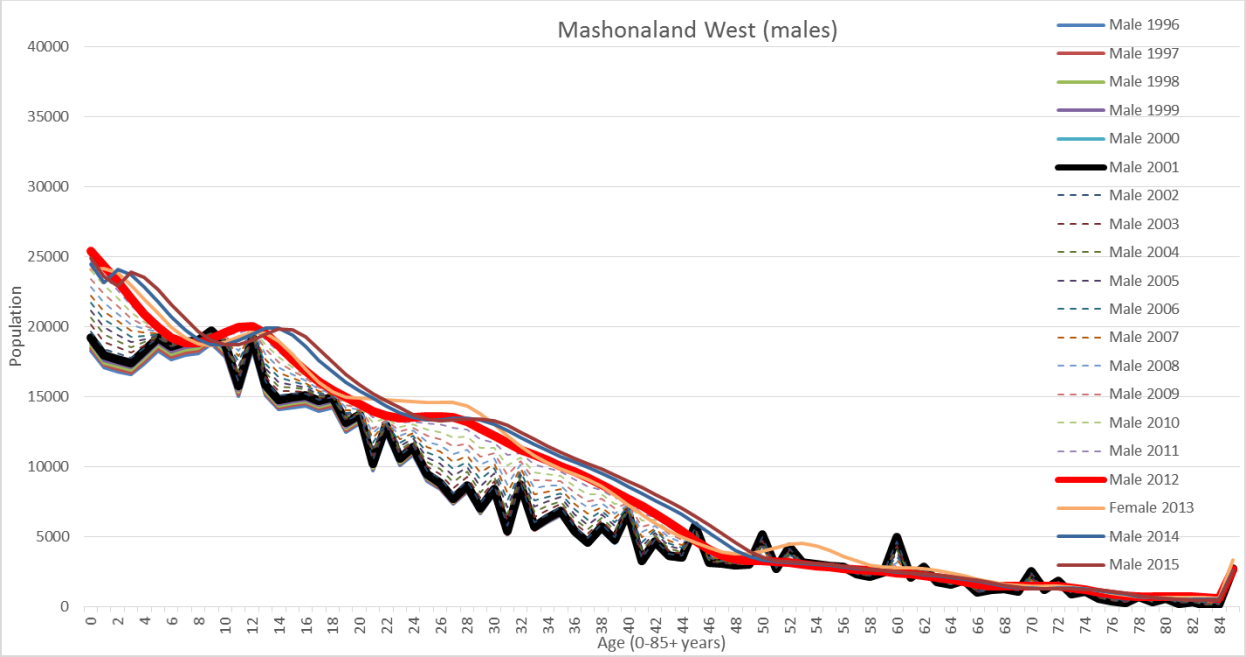
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



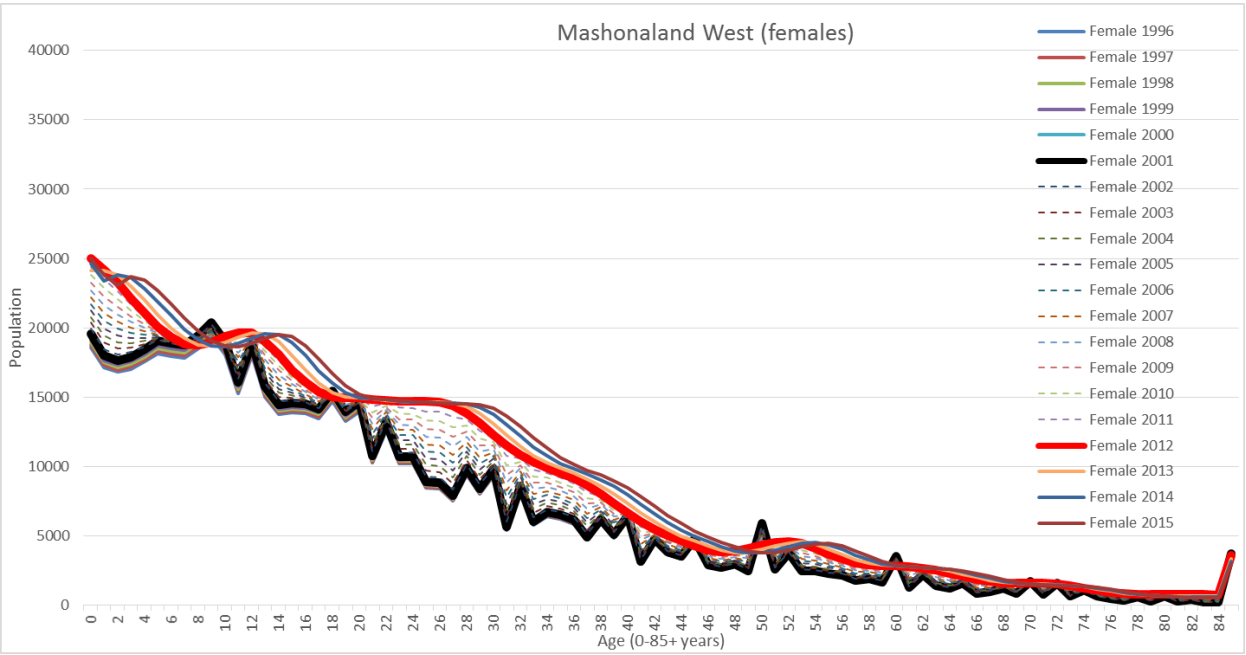
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



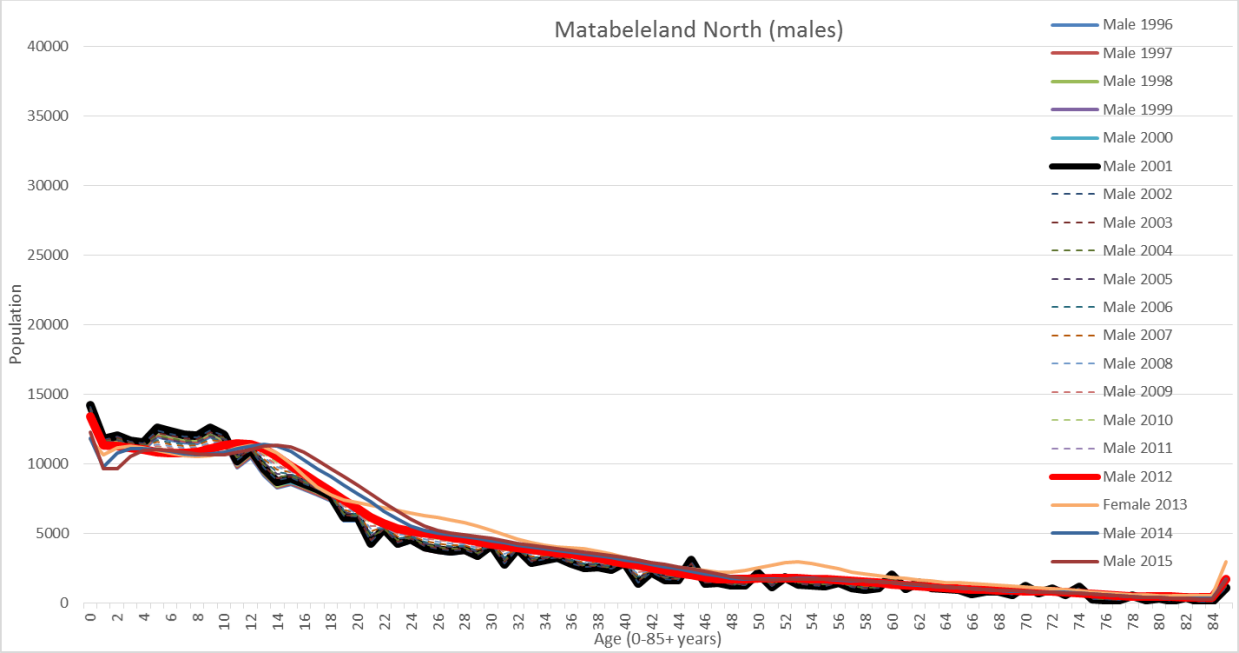
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



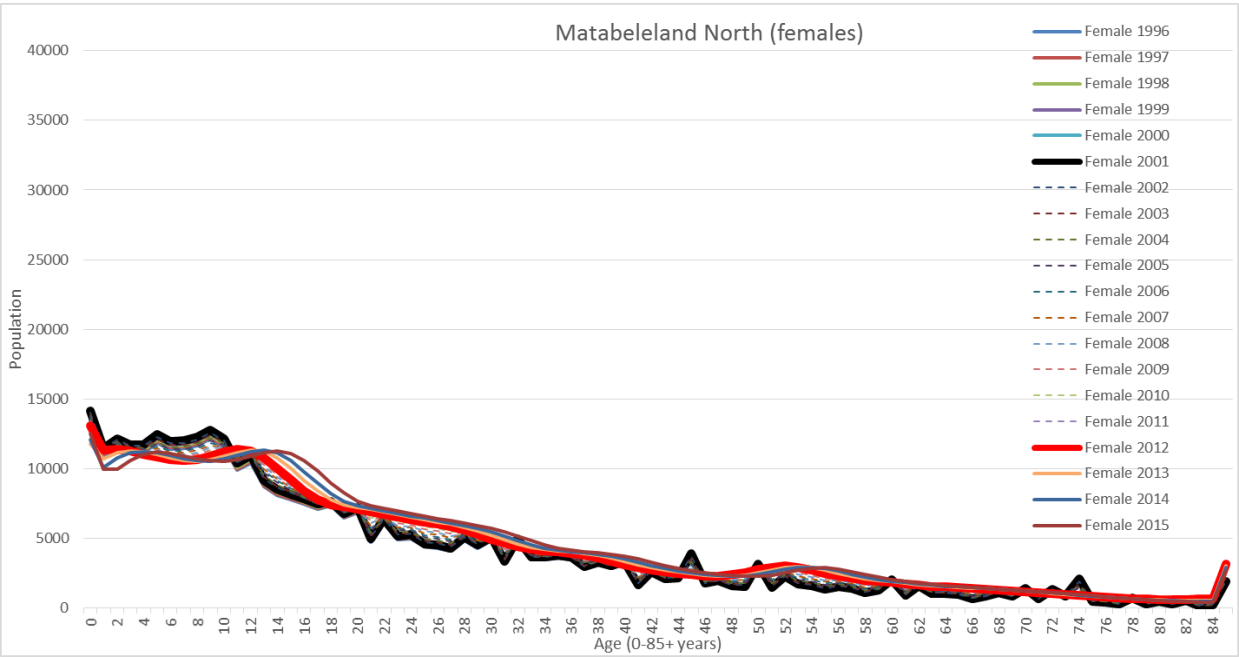
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



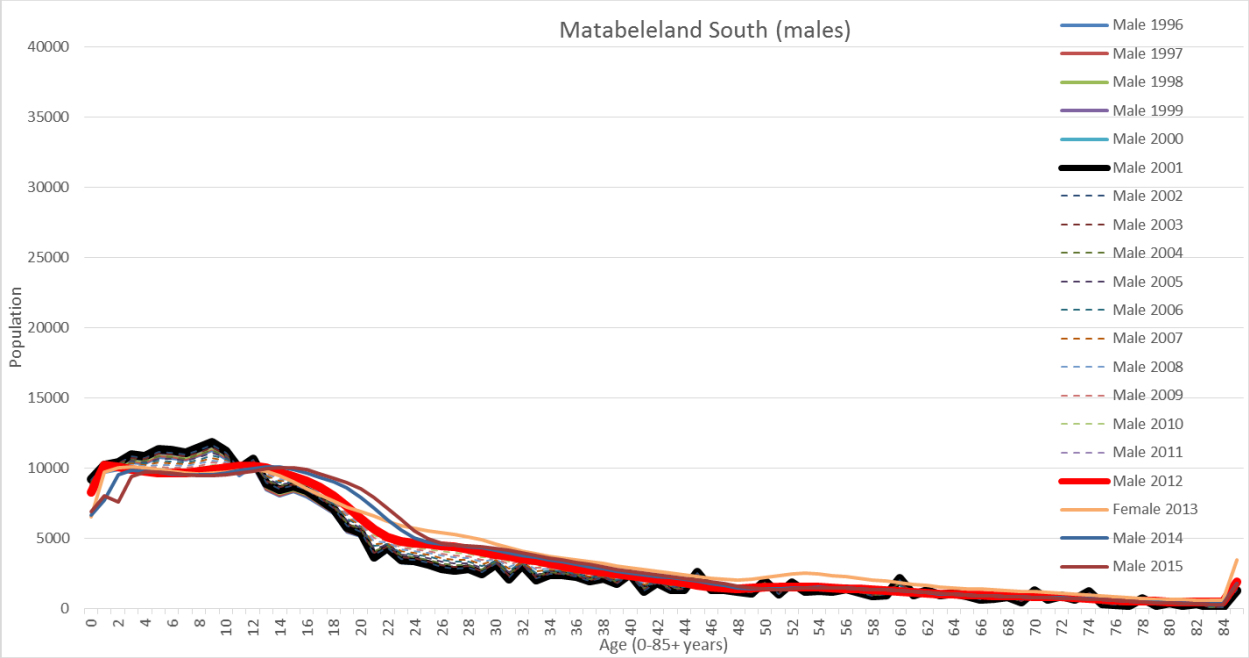
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



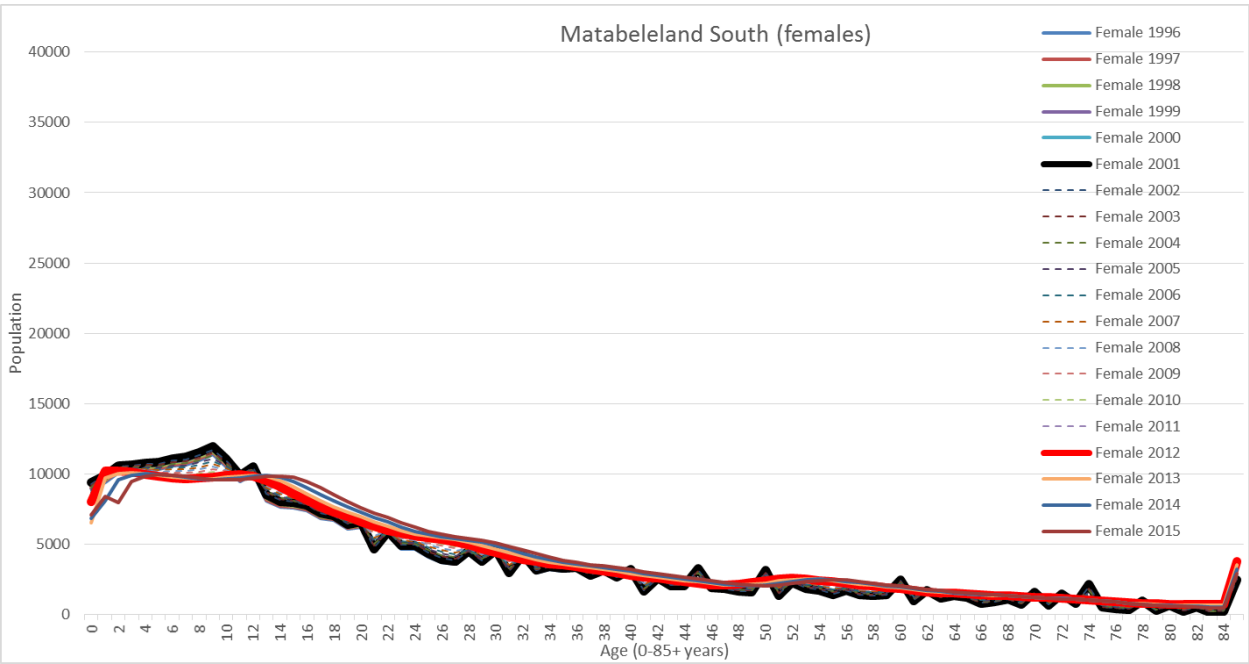
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



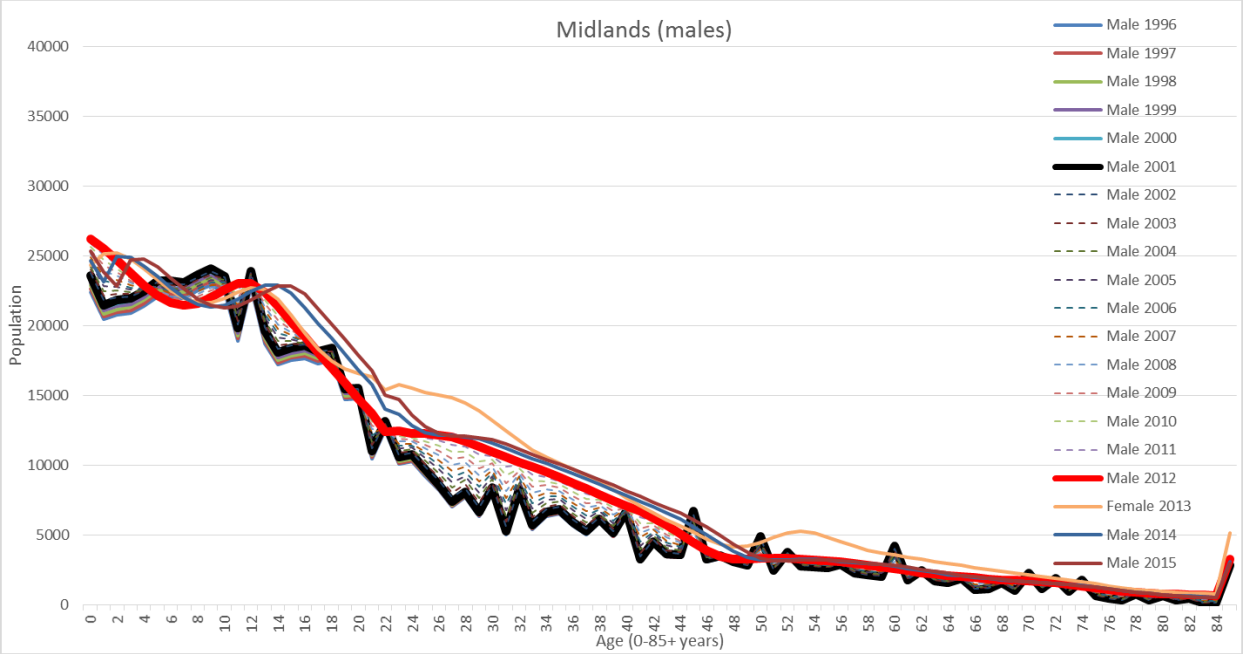
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



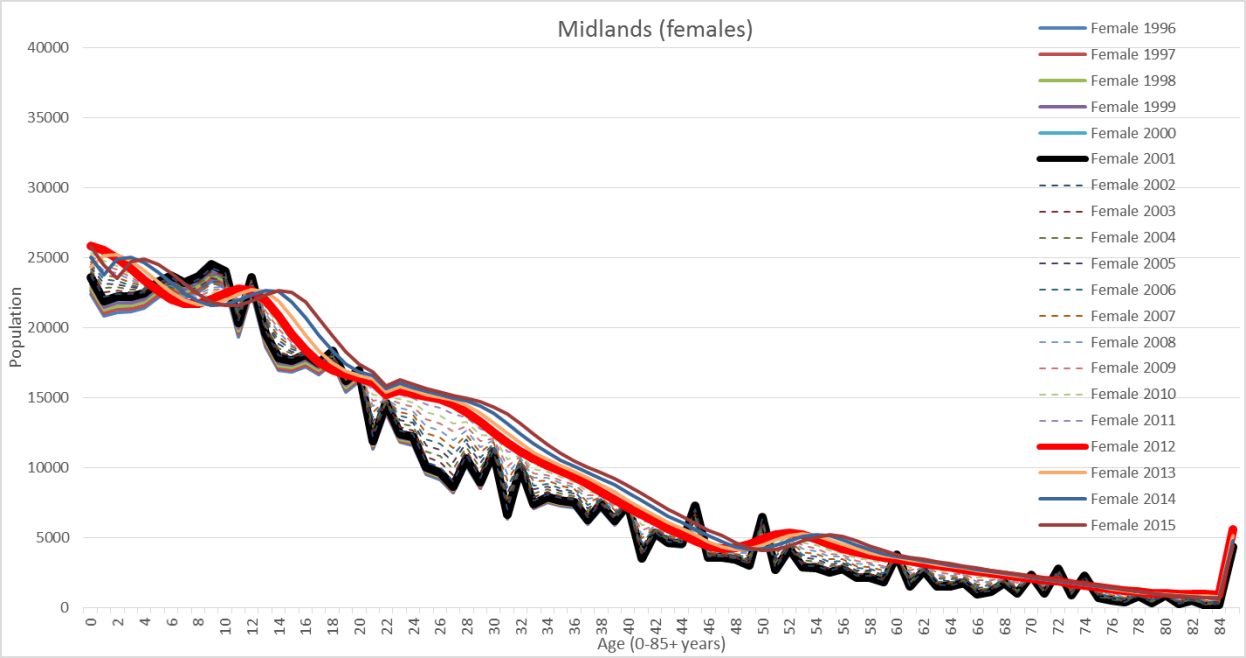
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



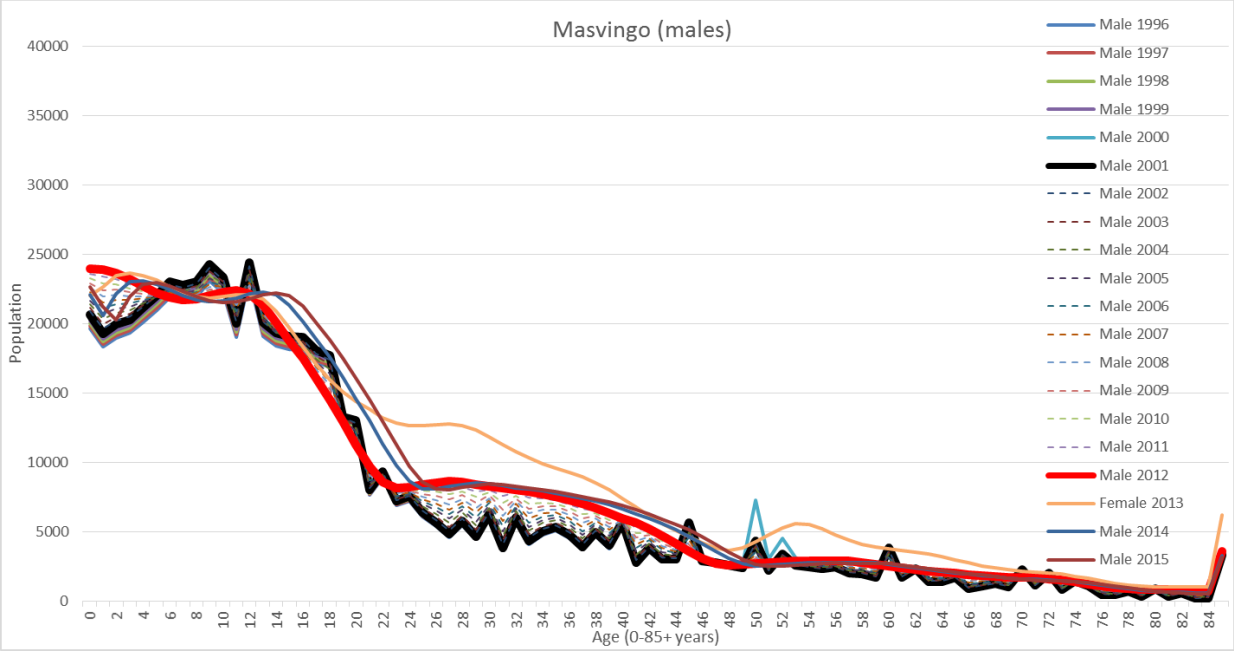
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



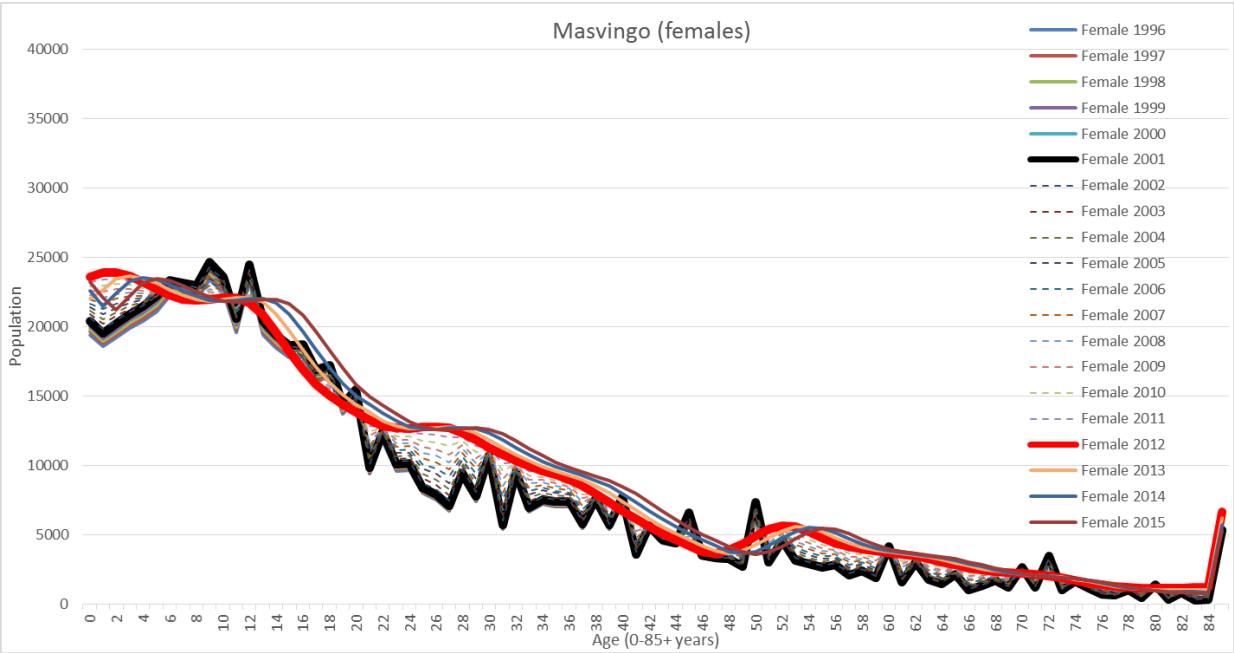
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



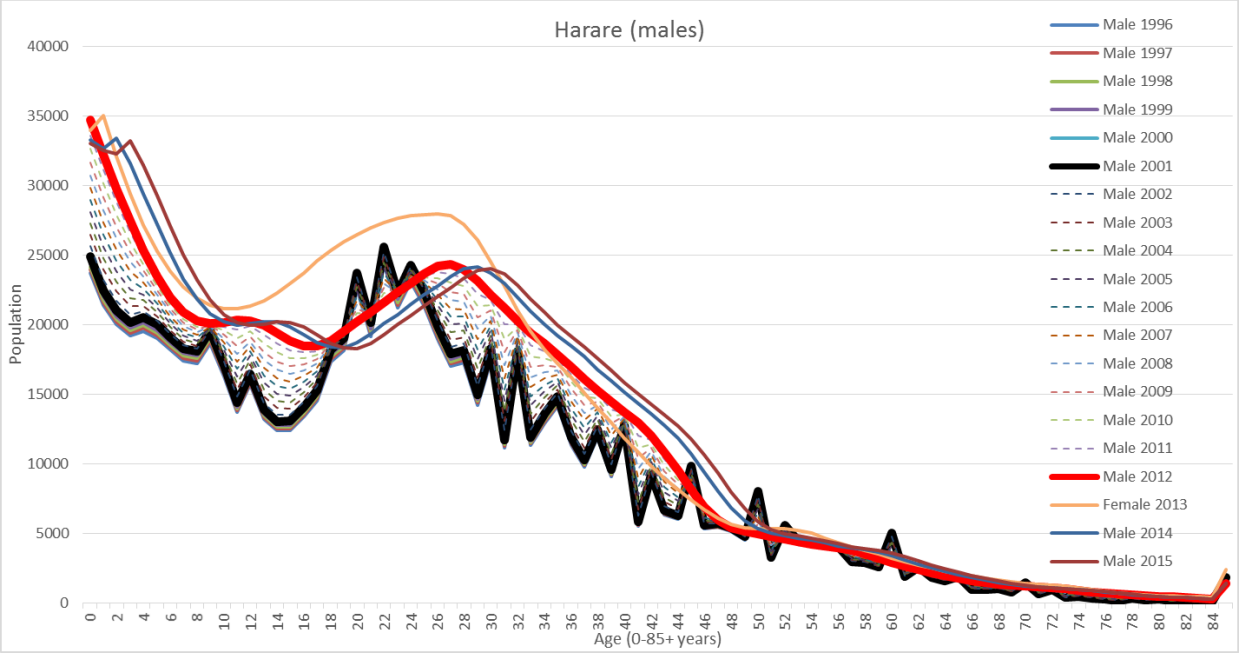
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



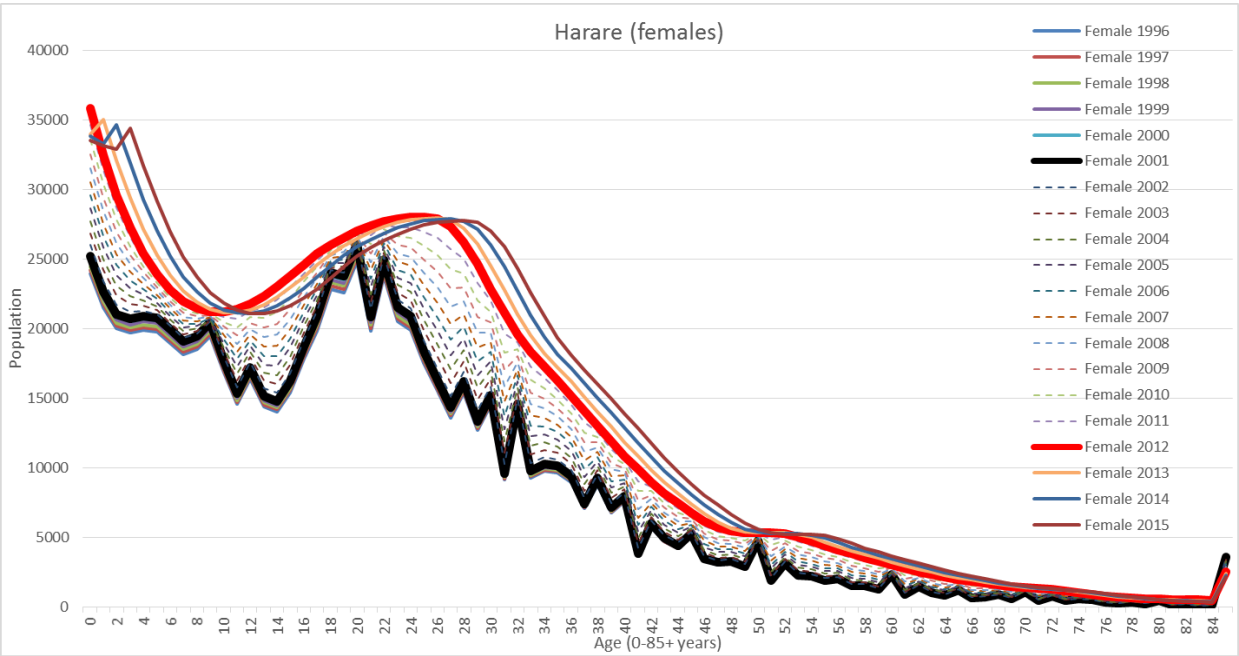
Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011

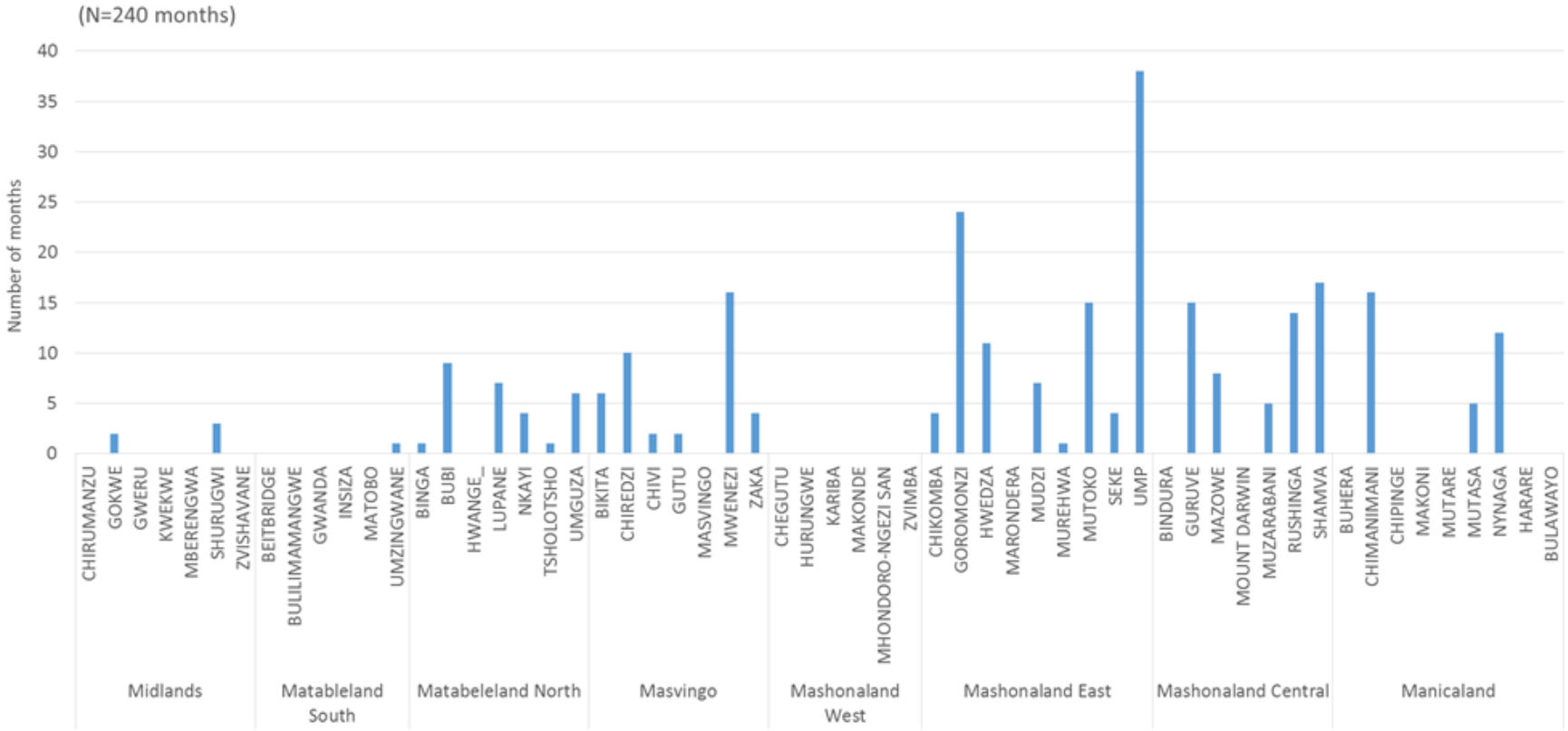


Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011



Source: Zimstat official estimates for 1992–2001 and 2012–2022; annual interpolated estimates for years that official estimates were not available, 2002 to 2011

APPENDIX 5. NUMBER OF MONTHS WITH NO REGISTERED DEATHS REPORTED, 1996-2015



APPENDIX 6. NUMBERS OF REGISTERED DEATHS FOR ADULTS 15–64 YEARS OF AGE, 1996–2015

Table A.5. Number of registered deaths for adults 15–64 years of age, by sex, 1996–2015

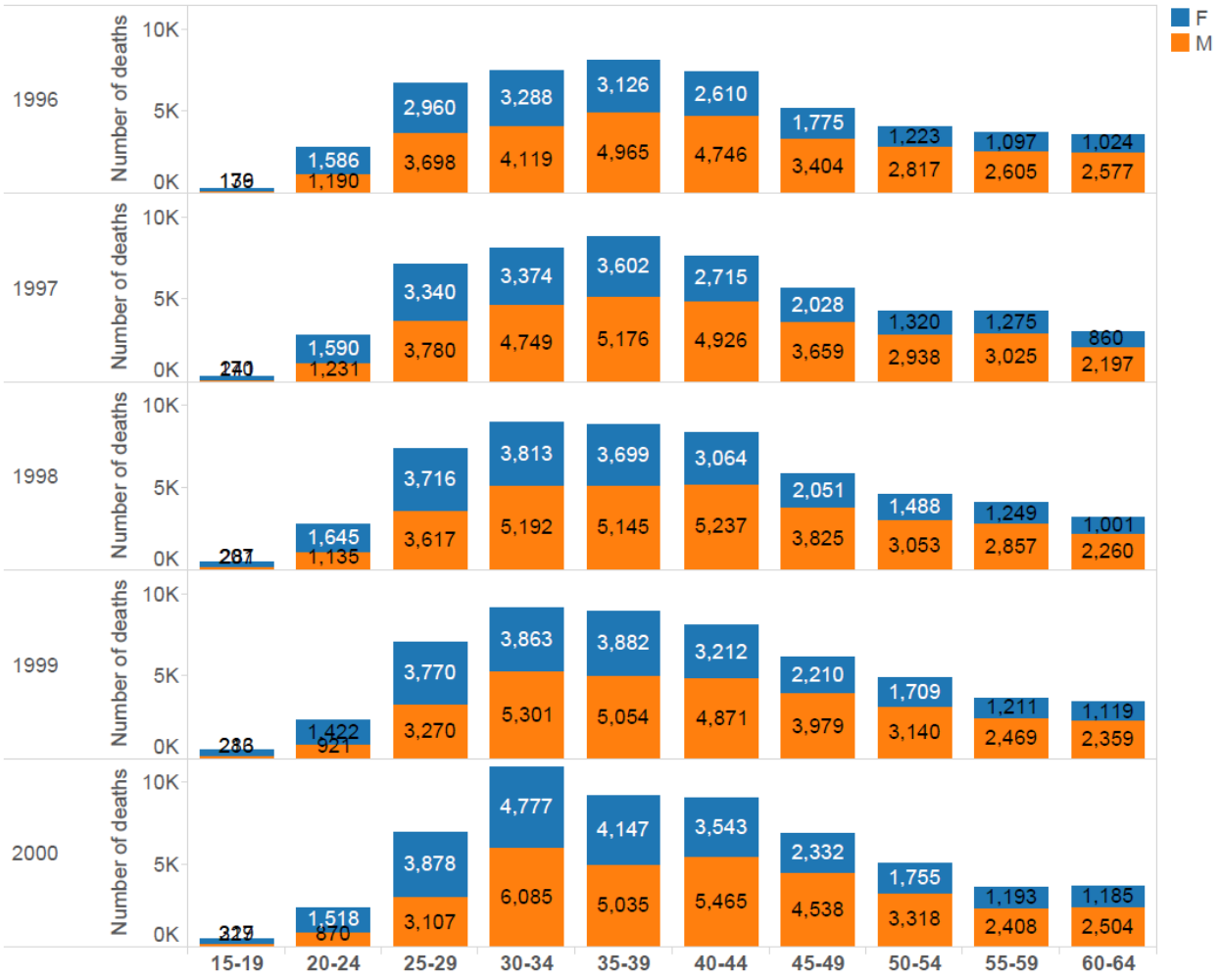
		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	15	2	7	15	18	21	33	26	39	26	28	41	39	17	14	30	26	30	28	29	32
	16	4	6	22	27	33	34	25	29	18	24	26	25	32	9	31	26	29	25	29	43
	17	29	27	34	49	58	36	51	42	35	30	42	26	35	9	49	33	38	42	50	40
	18	38	65	87	79	91	75	58	68	58	58	64	54	71	21	58	52	63	75	69	58
	19	103	136	123	110	114	110	135	104	103	97	100	84	101	28	64	85	79	87	95	91
	20	164	139	160	148	159	146	152	162	134	136	132	112	141	53	108	99	81	82	120	105
	21	243	231	237	199	229	252	216	235	236	207	187	151	167	57	127	98	106	124	125	103
	22	303	345	310	253	248	309	334	288	285	239	268	229	215	75	116	163	115	120	130	96
	23	388	399	393	351	360	313	408	406	339	318	341	297	252	69	206	157	133	126	150	138
	24	488	476	545	471	522	395	452	459	496	379	457	386	386	104	269	178	148	180	127	160
	25	447	580	683	573	593	598	569	590	548	520	525	581	525	135	285	227	207	191	175	160
	26	627	547	726	676	732	737	808	736	678	614	680	542	613	177	362	270	296	220	204	168
	27	618	712	669	865	808	869	889	893	768	621	729	696	579	182	444	310	296	248	257	183
	28	688	712	825	701	902	974	1,120	1,109	882	701	780	772	648	194	510	382	320	337	280	201
	29	580	789	813	955	843	1,119	1,203	1,213	1,057	891	878	717	732	199	468	408	372	341	327	291
	30	627	686	903	858	1,086	998	1,285	1,359	1,216	933	1,008	793	689	227	526	417	409	431	391	351
	31	554	645	748	865	942	1,184	1,063	1,373	1,239	1,063	1,103	906	773	250	557	508	389	433	399	312
	32	636	533	731	781	1,057	1,027	1,269	1,165	1,339	1,112	1,279	1,044	915	249	549	439	452	403	431	367
	33	664	744	657	690	884	1,145	1,202	1,352	1,033	1,243	1,238	1,088	945	256	537	473	438	435	357	365
	34	807	766	774	669	808	970	1,238	1,276	1,340	889	1,291	1,116	1,005	297	639	456	414	422	439	367
	35	575	813	768	799	781	922	1,085	1,262	1,174	1,114	1,042	1,087	965	323	604	525	451	393	443	390
	36	718	637	801	772	905	730	967	1,048	1,228	906	1,177	818	988	280	673	514	463	401	403	364
	37	661	772	664	907	881	950	793	971	966	952	1,015	1,029	724	283	605	518	460	496	429	378
	38	630	703	736	638	912	971	929	894	867	711	1,047	874	864	242	668	523	496	465	424	399
	39	542	677	730	766	668	954	953	982	784	692	861	843	703	245	441	498	453	462	442	362
	40	579	571	726	767	808	789	994	985	910	640	765	643	719	210	547	361	442	443	400	418
	41	465	600	608	743	798	867	692	1,010	836	700	661	589	586	251	455	425	350	424	397	371
	42	573	462	665	614	710	831	873	789	913	667	772	545	560	166	426	379	414	297	411	355
	43	482	560	497	593	604	782	847	918	697	736	777	601	438	155	353	357	343	414	302	373
	44	511	522	568	495	623	680	780	904	795	566	734	625	526	149	351	308	339	319	353	285
	45	243	595	471	532	470	671	650	786	704	687	581	617	532	160	268	266	257	329	294	307
	46	375	280	530	491	593	548	677	709	700	606	707	441	527	162	323	214	248	273	275	312
	47	382	417	283	516	457	602	558	664	603	558	635	562	367	165	338	299	218	247	228	302
	48	359	405	380	301	527	512	643	568	630	475	632	530	489	122	345	273	271	228	243	214
	49	416	331	387	370	285	528	553	621	473	501	517	533	464	164	284	303	260	256	204	211
	50	254	456	335	435	373	270	544	484	579	422	593	472	423	144	409	223	294	272	239	178
	51	245	258	419	344	403	406	299	557	522	471	445	470	357	142	339	317	194	285	234	218
	52	213	226	265	408	319	368	425	319	489	398	491	350	389	97	313	290	267	199	240	211
	53	190	200	260	265	415	363	438	433	293	418	431	441	299	129	270	305	272	259	185	266
	54	321	180	209	257	245	451	376	442	375	232	460	375	362	114	302	228	269	268	254	199
	55	159	336	184	224	247	289	483	373	377	358	271	360	315	122	259	287	204	253	248	238
	56	296	124	310	207	231	262	277	492	350	311	360	231	339	111	295	233	272	233	279	250
	57	278	308	148	308	208	191	324	283	421	273	328	315	181	126	215	270	201	271	222	242
	58	217	267	298	164	345	224	221	270	238	356	302	336	267	61	296	235	296	201	262	217
	59	147	240	309	308	162	353	220	218	260	233	415	289	310	97	144	283	238	259	214	254
	60	270	167	234	301	296	145	361	231	201	232	244	339	240	110	226	143	245	255	276	219
	61	182	229	166	243	271	290	168	325	212	186	255	241	307	90	243	201	160	284	246	274
	62	173	171	215	169	229	279	307	161	308	177	201	239	224	121	223	241	278	183	267	269
	63	139	161	198	230	151	254	276	332	165	303	217	183	225	83	284	234	263	238	172	291
	64	260	132	188	176	238	178	265	303	286	134	338	182	180	86	161	306	231	242	250	170

Source: RGO

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Male	15	3	3	20	20	20	33	34	32	29	25	28	26	39	9	25	15	27	39	35	25
	16	3	6	13	15	25	25	25	19	24	26	36	33	33	9	22	32	32	39	29	25
	17	21	23	25	36	41	39	34	38	33	26	33	36	35	14	41	39	49	44	55	34
	18	36	59	65	53	59	54	61	41	63	49	43	48	70	16	49	44	54	78	97	61
	19	76	79	84	92	84	81	103	76	75	51	60	60	70	31	69	73	64	91	98	76
	20	112	119	125	110	117	93	131	105	101	84	96	82	93	33	74	80	81	100	110	112
	21	161	156	143	127	150	142	122	175	154	102	117	91	112	31	83	109	96	115	114	108
	22	232	225	213	147	160	183	188	155	161	153	152	118	127	51	104	121	127	138	162	124
	23	301	324	284	243	156	198	242	247	244	197	181	157	158	68	128	141	131	138	161	131
	24	384	407	370	294	287	226	257	292	279	185	240	206	218	65	161	141	151	159	168	137
	25	475	524	486	463	379	381	324	315	324	270	276	260	290	72	172	176	173	160	172	160
	26	660	525	618	523	512	482	474	386	349	308	333	290	312	113	226	215	184	195	185	159
	27	690	754	607	711	624	642	619	538	422	365	427	374	370	132	318	237	236	247	231	198
	28	952	885	913	620	833	768	797	728	604	484	475	477	427	130	378	303	285	269	255	202
	29	921	1,092	993	953	759	941	959	931	734	537	561	460	495	184	353	337	334	308	299	255
	30	853	1,097	1,246	1,016	1,188	874	1,184	1,108	980	691	731	595	577	193	455	321	366	357	358	303
	31	651	1,021	1,108	1,222	1,179	1,288	1,027	1,316	1,061	817	862	717	528	210	455	419	388	361	391	319
	32	792	813	1,071	1,171	1,392	1,231	1,483	1,235	1,287	945	1,022	858	726	221	467	453	422	413	414	369
	33	845	888	807	1,079	1,271	1,486	1,444	1,631	1,096	1,138	1,149	972	843	298	517	425	476	473	433	398
	34	978	930	960	813	1,055	1,356	1,574	1,494	1,468	898	1,346	1,009	903	281	552	442	420	447	475	356
	35	809	1,054	1,030	955	881	1,244	1,454	1,652	1,329	1,255	1,068	1,114	984	297	584	456	449	431	481	400
	36	1,098	889	1,057	973	1,013	919	1,303	1,441	1,501	1,120	1,432	952	989	341	683	585	514	500	478	418
	37	1,014	1,138	908	1,067	1,030	1,056	1,047	1,258	1,349	1,202	1,242	1,135	862	306	658	592	557	515	483	409
	38	1,029	1,003	1,116	861	1,162	981	1,087	962	1,149	988	1,352	1,068	1,095	303	722	618	558	504	513	411
	39	1,015	1,092	1,034	1,198	949	1,164	1,067	1,130	893	944	1,145	1,154	963	347	562	650	570	544	527	449
	40	1,026	1,072	1,128	1,012	1,159	906	1,233	1,089	972	706	924	888	940	286	727	450	590	577	581	425
	41	823	1,086	1,140	1,050	1,104	1,196	921	1,208	935	727	735	813	861	307	621	624	437	559	533	491
	42	1,041	863	1,037	986	1,077	1,087	1,205	1,011	993	719	818	593	674	307	660	558	604	433	554	466
	43	850	1,012	880	994	1,059	1,100	1,075	1,180	865	823	775	666	565	231	526	521	478	541	398	449
	44	1,006	893	1,052	829	1,066	1,034	1,143	1,025	1,059	625	877	662	529	200	452	417	491	447	511	332
	45	523	1,013	908	994	893	1,068	1,062	1,115	949	785	670	690	525	178	364	378	389	478	419	430
	46	675	590	1,019	899	1,095	868	1,079	1,063	1,013	726	835	538	616	201	386	274	344	374	409	369
	47	646	655	558	967	950	1,019	884	1,034	912	779	770	694	510	203	351	276	260	323	368	418
	48	655	723	701	510	1,026	901	1,076	875	885	726	826	697	587	170	408	267	277	259	319	310
	49	905	678	639	609	574	997	912	986	776	700	759	685	564	202	340	355	329	298	245	276
	50	612	942	645	659	713	533	1,021	871	861	561	755	610	617	201	456	259	293	270	279	224
	51	504	564	893	612	684	647	522	938	785	663	627	615	628	214	372	345	269	302	250	247
	52	503	588	535	835	617	641	655	565	841	596	756	552	527	188	424	316	341	234	289	222
	53	447	468	538	526	805	621	663	601	431	672	667	599	497	177	377	350	314	332	267	262
	54	751	376	442	508	499	814	612	629	540	360	732	538	556	181	418	337	369	307	311	217
	55	441	807	393	413	544	522	835	582	539	441	408	580	507	203	348	367	331	320	304	310
	56	586	422	782	396	416	509	487	799	515	422	484	342	565	158	400	262	311	328	319	293
	57	627	654	404	680	397	457	498	483	679	413	448	413	272	193	365	346	301	319	314	320
	58	500	608	651	390	677	381	404	535	439	561	479	417	388	116	427	319	365	302	337	312
	59	451	534	627	590	374	726	377	433	439	379	642	383	379	135	230	398	317	344	287	303
	60	597	420	510	555	531	395	731	374	388	333	410	556	360	136	291	203	377	343	363	280
	61	492	550	387	492	557	568	373	715	349	284	404	348	471	130	306	318	214	392	330	323
	62	400	487	512	364	500	610	562	400	657	288	330	385	318	157	298	277	268	235	397	328
	63	326	387	460	533	393	491	550	517	349	516	324	278	301	118	407	274	302	294	218	362
	64	762	353	391	415	523	375	453	524	537	286	593	265	274	115	261	350	277	278	299	215

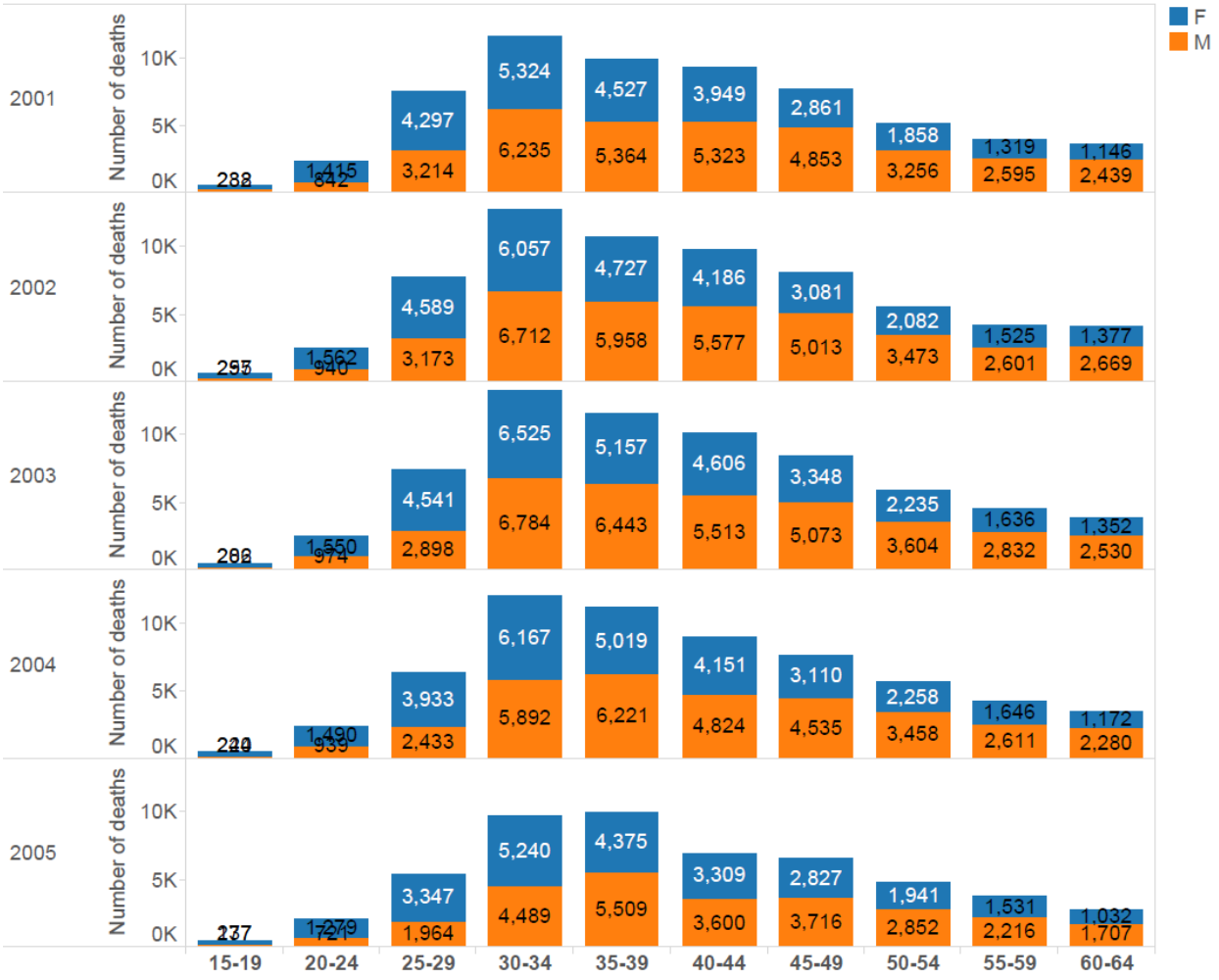
Source: RGO

Figure A.6. Distribution of adult deaths, by age group and sex



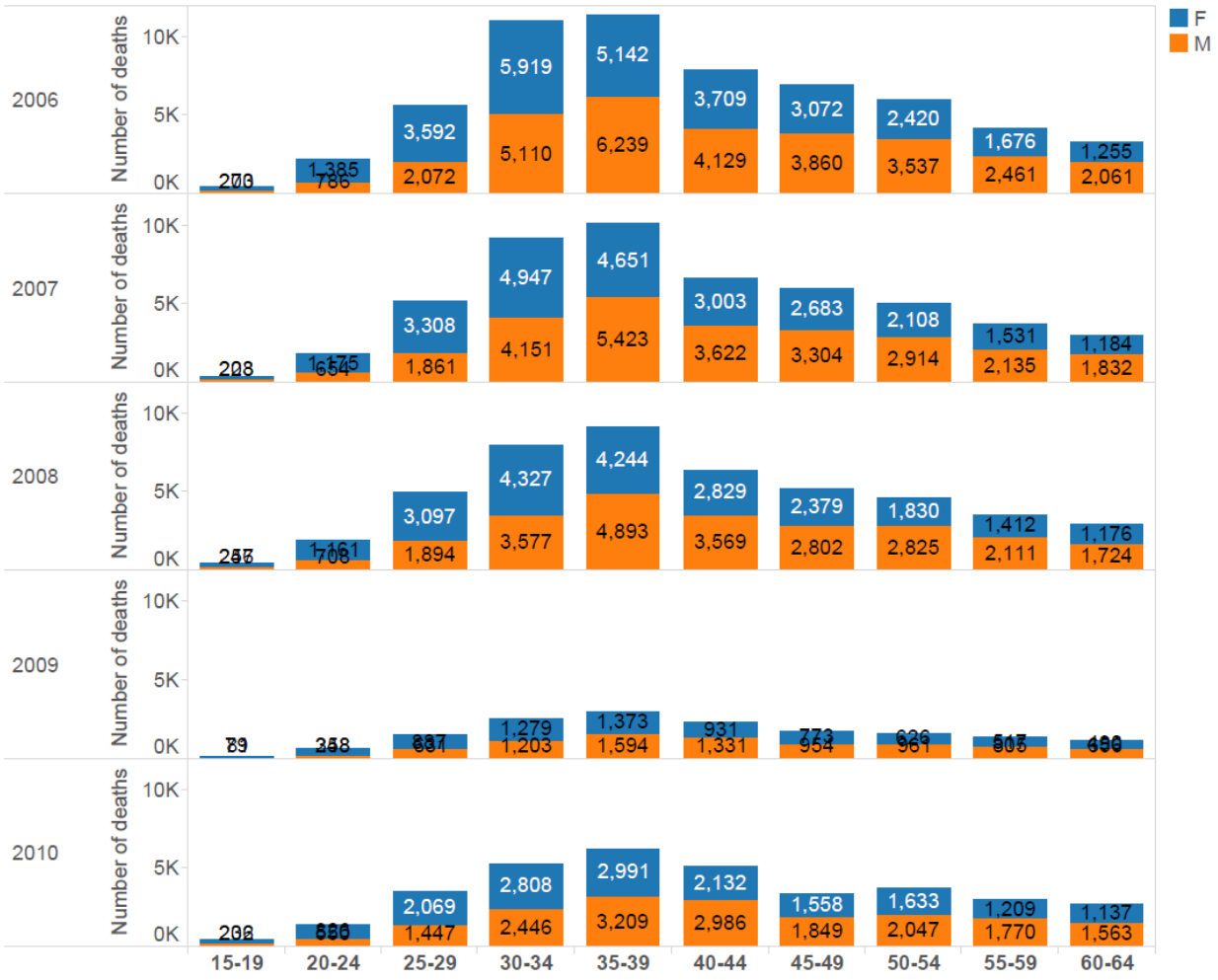
Source: RGO

Figure A.6. ***Continued***



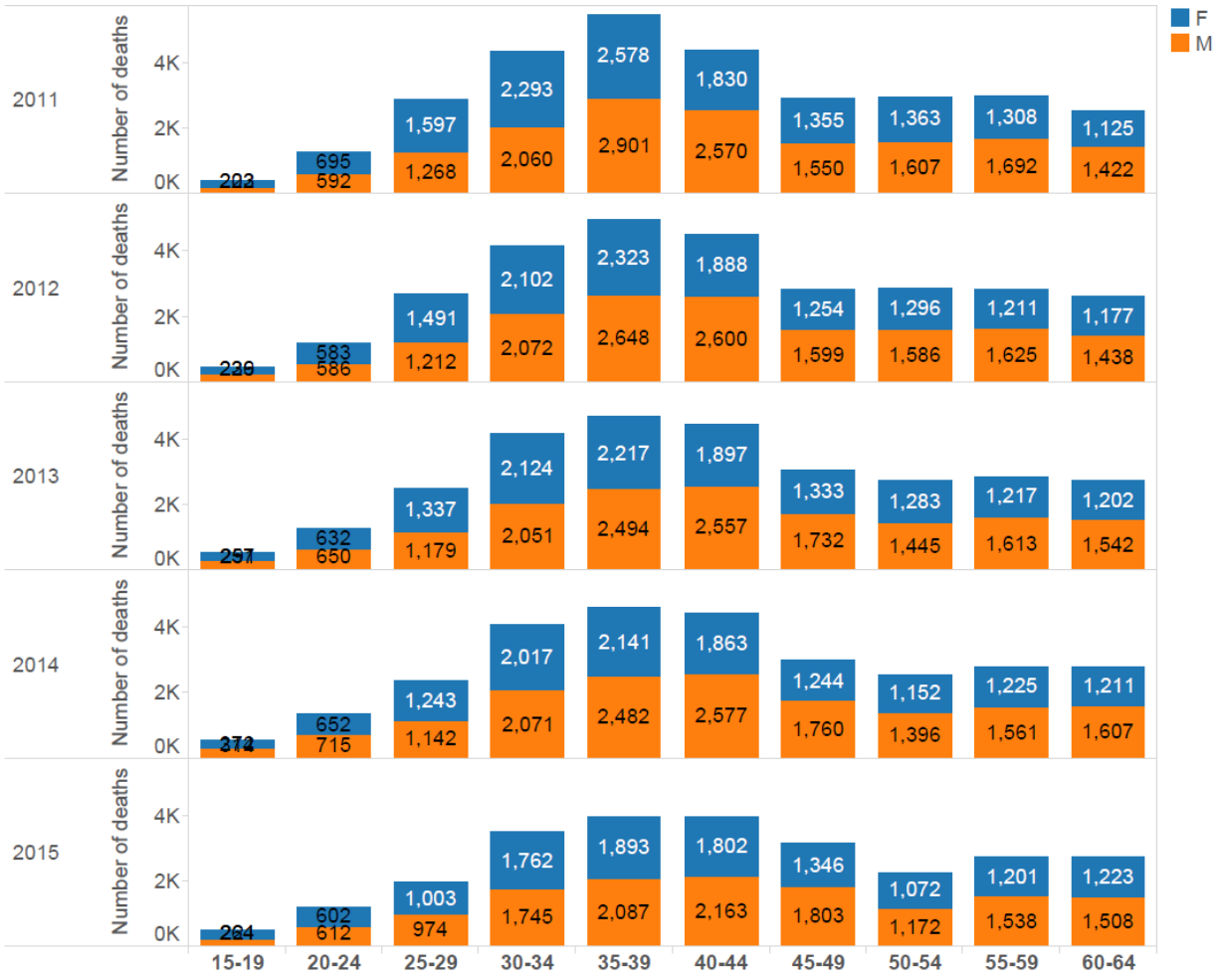
Source: RGO

Figure A.6. ***Continued***



Source: RGO

Figure A.6. ***Continued***



Source: RGO