Libyan Cause of Death Report

Analysis of cause of death data for two years

2016-2017

Ministry of Health - Health Information Centre 2019

This report was prepared for the Health Information and Documentation Centre/ Ministry of Health Libya by Dr Hajer Mohamed Elkout

Project coordinator: Eng Zaed Abdelslam Zaed

Data collection and entry: ICD focal points in hospitals and Health Information Centre team

Contents

List of Tables

List of Figures

Foreword

Health Information System is considered one of the important pillars for any country's health system. All health system sectors depend on accurate information to be able to function appropriately. For example, establishing causes of death should be a result of accurate data that can be depended on to uncover the actual health situation of the country population. However, this health report has been completed as a result of an accurate two-year data collection (2016-2017) to establish the cause of death in Libya. No previous report has been done to establish the causes of death in Libya before this report.

This report is a real base for MOH - Libya to commence guiding the progress towards achieving the Sustainable Development Goals. It is also a base to measure the progress all Health-Related Targets and reduce both; maternal and infant mortality by 2030 in particular.

Because of this unique event, I thank the team of the World Health Organization, Libya office, for their continuous Technical Support throughout the process of data collection and analysis. I also acknowledge the effort and dedication of the Health Information Centre Staff members, Libyan Civil Registration Authority and all others who contributed in accomplishing this unprecedented Achievement. Thanks are also afforded to the EU for their financial support.

I hope that this report will provide all MOH Directorates, our stakeholders and partners in the health sector with the information they need to back joint planning and support for strengthening Libya's health system. I also hope that this report help in combatting diseases and health problems that cause death and morbidity. I realize that significant work needs to be done, and we, in the ministry of health, are committed towards working together to ensure healthy lives and promote well-being of the Libyan population.

Dr. Ehmid Mohamed Ben Omer
Minister of Health – Libya

Acknowledgments

The cause of death study has been completed for the first time in Libya in 2019 by the health information centre (MoH) in collaboration with the WHO country office. This participative process involved considerable contributions and support from both individuals and institutions.

We therefore wish to extend my sincere gratitude to his Excellency Dr. Ehmid Mohamed Ben Omer, the Minster of Health in Libya, and all those that contributed to the cause of death study. We also wish to sincerely acknowledge the timely and generous financial support of European Union, without their valuable support, this work would have not been produced.

Furthermore, we would like to acknowledge the World Health Organization country office and WHO regional office for their technical support. Particular recognition goes to Dr. Syed Jaffar Hussain, the former WHO Representative for Libya and to Dr. Haroon Ur Rashid, the Public Health Officer WHO Libya.

We sincerely acknowledge contribution of the following nationals:

- Dr. Hajer Mohamed Elkout, for data cleaning, analysis and writing the study report.
- Eng. Zaid Abdulsalam, HIC, the study general coordinator and supervisor of the field staff.
- Health Information Centre Staff for their effort throughout the Study.
- Hospital Directors for their cooperation.
- ICD Focal Points in all hospitals and data entry staff at national and facility level (Names listed in Annex 6)
- Civil Registration Authority and Bureau of Statistic and Census for their cooperation.

We all hope for this report to assist all decision makers in the MoH, as well as our stakeholders and partners, in their future plans and strategies to strengthen Libyan health system. Finally we wish and pray that this report will benefit all.

Mohamed Ibrahim Saleh Daganee
Director of Health Information Centre

Acronyms and Abbreviations

- ✓ ASMR Age Specific Mortality Rates
- ✓ BSC Bureau of Statistics and Census
- ✓ COD Cause of Death
- ✓ CRA Civil Registration Authority
- ✓ CRVS Civil Registration and Vital Statistics
- ✓ HIC Health Information Centre
- ✓ ICD International Classification of Diseases
- ✓ IHME Institute of Health Metrics and Evaluation
- ✓ IMR Infant Mortality rate
- ✓ MoH Ministry of Health
- ✓ SDG Sustainable Development Goals
- ✓ UN United Nations
- ✓ WHO World Health Organization

Executive Summary

Mortality data play a fundamental role in measuring planning and monitoring public health outcomes. Complete registration of deaths involves not only capturing death but also the describing details of the cause of death. The lack of data on the causes of death represent the most significant gap in many low- and middle-income countries. Civil registration system in Libya is well developed with recognised legislations and advanced changes have recently developed in registrations and data capture with 100% birth registration and death registration of more than 95%.

However, this lack of information in cause of death data limits the detection of emerging diseases and conditions, and the Identification of areas where medical research may have the greatest impact and hence hinders subsequent actions by decision makers. Also, it can hamper the allocation and distribution of resources within health sector and monitoring of programmes, including those relevant to the Sustainable Development Goals.

This report assesses and analyses mortality and cause of death data in Libya for the years 2016 and 2017. Data in this report are obtained from the paper forms of death certificates and vital registration database. In Libya, all deaths occurring in hospital are medically certified by the attending physician with the cause of death. However, the quality of cause of death is poor and recent actions were taken to train doctors and medical students in certifying death according to the recent WHO recommendations. Deaths occurring in homes and other places outside hospitals are also transferred to hospitals or forensic department, and eventually certified by a physician. This step is a legal obligation and must be completed before burial can be authorised by the Civil Registration Authority.

The data presented in this report is the first published Libyan mortality statistics based on underlying cause of death using the International Classification of Diseases. The data showed that the crude death rates for both years was four per 1000 live births and cardiovascular diseases were the leading causes of death for both years. External causes of death contributed to 7.1% of deaths in 2016 and 4.7% of the total deaths in 2017.

There was considerable variation in the quality of data available. In 2016, the quality of the data measured by the Vital Statistics Performance Index scored 62.4%, while in 2017 the score was 57.1%.

The analysis in this report highlight the fact that improving certification of death data to generate reliable cause of death information should be a priority.

Highlights

- A total of 25478 deaths occurred in Libya in 2016 and 27167 in 2017.
- Crude death rates for 2016 was 4.0/1000 population, and for 2017 was 4.1/1000 population.
- Cardiovascular diseases were the leading causes of deaths in all ages and both genders for the two years.
- In men, lung cancer is the leading cause of cancer-related deaths.
- In women, breast cancer is the leading cause of cancer-related deaths in women.
- Maternal mortality ratio was in 2016 the ratio was 15.4 per 100000 live births and for 2017 was 11.6 per 100000 live births.
- Infant mortality rate was 10.6 deaths per 1000 live births in 2016, and 11.8 per 1000 live births in 2017.
- The death rate of children under five years of age in 2016 was 14.7 per 1000 for males and 10.3 per 1000 for females. In 2017, the rate was 16.3 per 1000 for males and 11.9 per 1000 for females.
- Life expectancy at birth for both years was 81 years for males and 85 years for females.

Introduction

Background:

A well-developed mortality statistics system is a key and important vital information used to measure the health status of a country. Medically certified death reporting system which includes cause-of-death data are a principal source of information for health policy and planning. The data should convey reliable high quality information essential for policy formulation, planning and implementation and monitoring of programmes.

Mortality data and other civil registration data are needed to measure and monitor social and economic development in countries. These data are essential to measure and to meet at least 24 of the 169 targets of the sustainable development goals (SDGs). Civil registration provides the denominator for all population-based targets and indicators of the SDGs. In addition to Goal 16, in which CRVS is a goal in its own, timely birth and death data assists countries to measure and to meet the following health –related SDG targets:

- 3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births
- 3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under 5 mortality to at least as low as 25 per 1,000 live births.
- 3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases
- 3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.
- 3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents.

- 16.1 Significantly reduce all forms of violence and related death rates everywhere
- 3.1 Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.

  Also, the following non health related SDG rely on accurate death and birth data:
- 17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and Small Island Developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts.
- 17.19 By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries.

The accuracy and adequacy of the medically certified death reporting system are vital to the overall mortality statistics and to the informed decisions for policy makers and health planners and for programme implementation and performance reviews.

Libya CRVS rapid assessment was completed in December 2012. The CRVS rapid assessment score is almost 75% which indicates a system which is “Functional but inadequate”. The inadequate attribute is due to the weak production of causes of deaths statistics. In Djerba, Tunisia, in May 2015, the CRVS stakeholders were invited and the CRVS comprehensive assessment and the CRVS improvement strategic plan of action were completed.

The World Health Organization has approved a standard form for the medical certificate of cause of death [annex 1]. This legal document provides a framework for the listing of multiple clinical diagnoses or conditions that occur in a chronological sequence terminating in death, along with the listing of other significant conditions that are not directly linked to the chain of events that lead to death. Mortality statistics

are based on the underlying cause of death. According to the WHO, the underlying cause of death, the key concept in death certificates, is “the disease or injury which initiated the train of morbid events leading directly to death”. Cause of death statistics in this report are listed using the International Classification of Diseases, 10th Revision (ICD10); the main purpose of the ICD is to facilitate the conversion of word descriptions of diseases and injuries to alphanumeric codes, which simplify storage, retrieval and analysis of data. It also allows for the standardised comparison and sharing of morbidity and mortality data within a population and across countries [1]. This study is a first attempt to report on the mortality in Libya according to the underlying cause of death using the International Classification of diseases, 10th revision.

Historical Overview

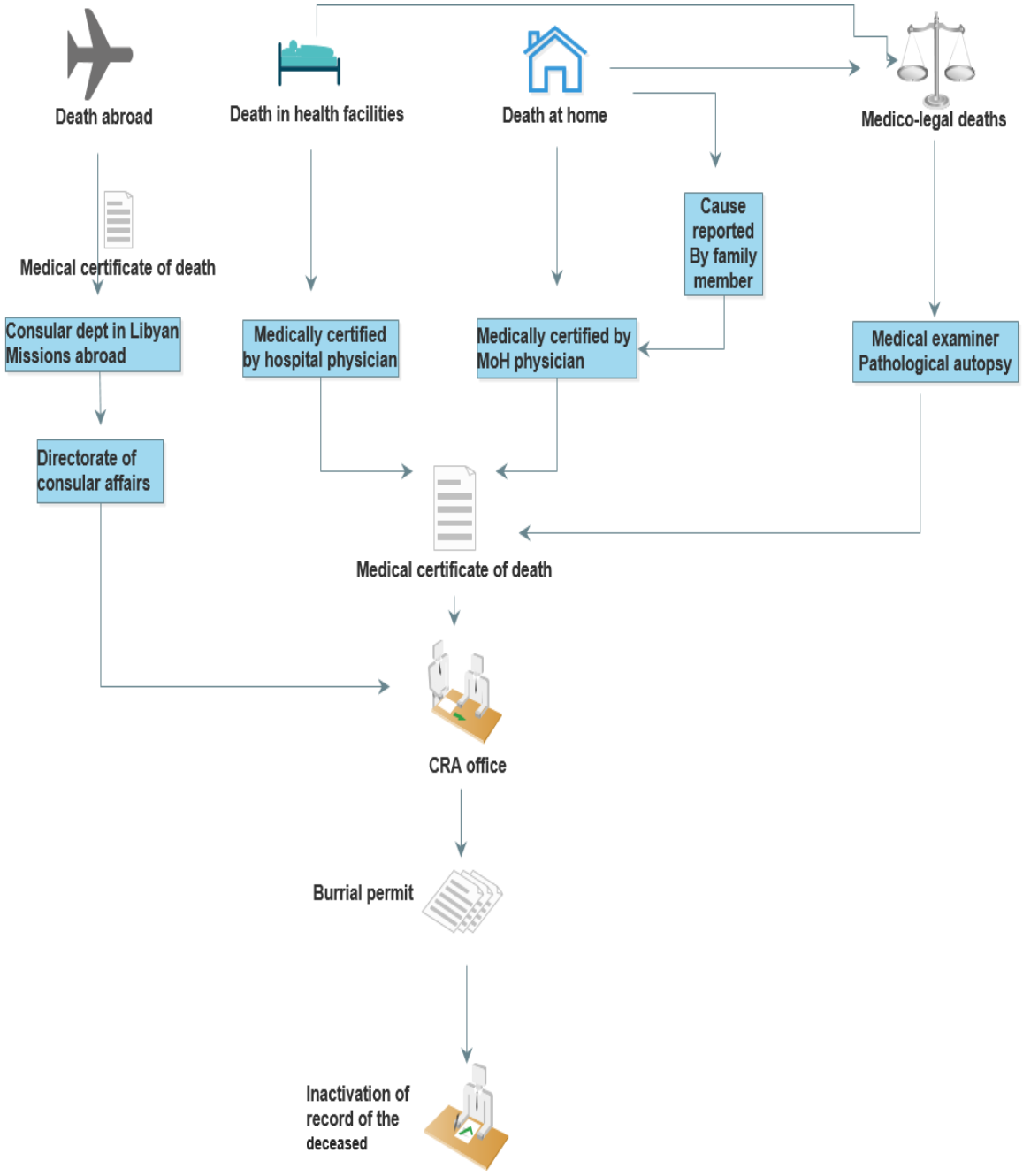
- The first documented census was conducted in 1936.
- Other general census were conducted in 1954, 1964, 1973, 1984, 1995, 2006.
- Libya has a valid civil registration Law (Law 36 for 1968). And established a special authority for civil registry.
- Civil registration and vital statistics system is used to record and document births, deaths, and marriages, and divorces.
- Registration has begun for births - deaths events since the beginning of the last century, relying on the manual system.
- Data collections for births and deaths are managed through the Civil Registration Authority (CRA) where the events are recorded in official records and legal documents issued.
- The Civil Registration Authority has 12 branches and 380 civil registration service offices available throughout Libya.
- All general hospitals and some private hospitals with maternity wards have civil registration offices.
- All offices are fully automated and electronically linked to central CRA.
- Since 2013, national ID is provided at birth.
- Birth registration is quasi 100% and 99.8% of deliveries take place in health institutions.

- The bureau of statistics and census (BSC) has previously published reports on all cause and cause-specific mortality tabulated by age group and gender, up to 2011 [2].
- Currently, the death certificate used in most health facilities in the country corresponds to the WHO principles.
- The CRVS comprehensive assessment concluded that death registration is more than 95% and there is complete access to civil registration services.

Although civil registration authority is the primary source of mortality statistics, cause of death data required to be completed by a doctor [3] and CRA need to rule out unnatural causes that may require medicolegal action and further forensic investigations [4]. The process of death registration as illustrated in figure 1 is as follows:

- Deaths in hospitals are certified as to cause by attending physicians, and these are termed as medically-certified deaths.
- In accordance with Libyan legislation, forensic post mortem investigations (Belongs to the Ministry of Interior) are undertaken to determine the causes of death from medico-legal perspectives in the following situations: suspected unnatural death such as unexpected deaths of previously healthy person, deaths from suicides, homicides or accidents, unclear identity, and in cases were malpractice is suspected.
- For those who die abroad, similar actions are taken if the body is repatriated to Libya. If the deceased is buried abroad, the Libyan Consulate in the respective country should be informed. All deaths eventually registered in the CRA.
- All information from different certification methods are reported to the CRA for acquisition of burial permit. However, official registration of death and inactivation of the death record does not occur until a family member of the deceased request this from the CRA office. This delay in registration has recently corrected by freezing the civil registry record of the deceased immediately at the same time of issue of the burial permit. This step has increased the registration rate of death to the current levels.

Figure 1*:* Diagram of the reporting and registration processes for deaths



Major developments in CRVS system

- Development of the national number, which is considered as a unique identifier.
- Establishment of a database with a prospect of full automation of the system at the CRA.

- The CRA immediate inactivation of the record of the deceased reduced the time lag in death registration.

Current challenges in death registration processes:

1. Lack of training of doctors lead to incompleteness and inaccuracy of the direct and underlying causes of death.
2. Assessment and follow-up for quality of data of cause of death.
3. Lack of coordination between the CRA and MoH regarding the death certificate form contributed to the poor quality of cause of death data.
4. No direct automated linkage between CRA and MoH.

Objective:

The main objectives of this report is to gather updated information about the mortality patterns in Libya by cause, age and gender. The aims of the report are:

1. To measure mortality statistics by age and gender.
2. To identify the leading causes of deaths based on the underlying cause of death and ICD 10 classification.
3. To measure mortality indicators and compare with international estimates.

Methodology:

This report presents descriptive tabulations of information reported on death certificates, filled by physician in the years 2016-2017. The original data were collected from hospitals in the country in paper-form certificates. The death certificates were then entered manually in the death certification database directly at the hospitals or at the Health Information Centre/Ministry of Health (HIC/MoH). The death certification database is an online application originally programmed for this purpose and available from the HIC website.

Data was then extracted and raw data given in Microsoft® Office excel (Microsoft® Office excel 2013, SP3, copyright© Microsoft Corporation) file format [Table 1].

Variables extracted for each case included certificate identification number, Hospital, clinical department, gender, date of birth or age, date of death, place of residence (by municipality), place of death (hospital, nursing home or assisted living, private residence, other/unknown), time and causes of death recorded as cause and ICD codes). Names were not extracted to ensure data was anonymous.

Table 1 Variables included in the Libyan cause of death database

Auto Number
Region/Municipality
Hospital
Department Name
First Name, Father Name, Surname, Mother Name
Gender
Age/Date of Birth
Nationality
Marital status
Place of residence
Death Date/ year
ICDCode1, Reason of Death1, Time1
ICDCode2, Reason of Death2, Time2
ICDCode3, Reason of Death3, Time3
ICDCode4, Reason of Death4, Time4
Other Reason of Death
Smoker, Smoking Period
Pregnant, During Birth, Before 6 Weeks Number of weeks before abortion/birth
Signature Date of completion.

The final data extract was verified and the following steps were taken:

1. Duplicates where deleted.
2. Missing age and gender data were completed:
   - Gender was completed based on the name of the deceased.
   - Age was partially completed based on the date of birth (when available).
3. Missed cause of death data was completed using the free text (when available).
4. Selection rules were applied; For example, an underlying cause of death was assigned for each death based on ICD-10. When the unit record listed more than

one cause, the underlying cause of death was allocated then the contributory causes (part II of the death certificate) were reviewed to assess whether the selection of underlying cause would differ if it included that contributory causes in empty lines for Part I of the certificate when entered in the database.

5. The data were corrected for typos, wrong spelling, extra information, information placed in the wrong field and other technical errors.
6. The cause of death/ICD part was reorganized whenever needed
   - A single underlying cause of death was determined.
   - Empty fields/records were removed.
   - The sequence of the chain of events was corrected and rearranged.
   - Abbreviations and symbols were replaced by the appropriate text/ICD code.

Cause-of-death statistics presented in this report are classified in accordance with the International Classification of Diseases, Tenth Revision (ICD–10). The measures of mortality used in this report include crude, age-specific, infant, neonatal, and maternal mortality rates; life expectancy and the 10 leading cause of death.

Final cause of death was also classified to the WHO Global Burden of Disease (GBD) Study categories: Group I (infectious, perinatal, and maternal conditions), Group II (non-communicable diseases), and Group III (external causes) [5].

Whenever appropriate, mortality data from this analysis was compared to United Nation (UN), World Health Organisation (WHO), or Institute for Health Metrics and Evaluation (IHME) comparator estimate data.

Population denominators used to measure ratios and rates obtained from the Civil Registration Authority (CRA) database taking into accounts recent estimates and revisions [6].

Unless otherwise indicated, all-cause mortality data used in the trends and mortality rates were derived from the CRA database for the years 2016-2017 classified by age group and gender. While the cause of death data were obtained from the HIC database based on the actual paper death certificates.

Statistical analysis

The data was described with counts and proportions as appropriate. Cross tabulation were used to examine the distribution of causes of death by age and gender. SPSS for Windows 22.0 (SPSS Inc, Chicago, IL) was used to analyse data.

Definitions

Underlying Cause of Death: The disease or injury, which initiated the chain of morbid events leading directly to death or the circumstances of the accident or violence, which produced the fatal injury.

External Cause of Death: Cases where the underlying cause of death is one of a group of causes external to the body (suicide, transport accidents, poisoning or falls)

$$\text{Crude death rates} = \frac{\text{Number of deaths in calendar year}}{\text{Mid-year population}} \times 1000$$

Age-specific mortality rates: the number of deaths per 1,000 people of a given age group in a given time period.

Life expectancy at birth: 'The average number of years a baby born in a particular area or population can be expected to live if it experiences the current age-specific mortality rates of that particular area or population throughout its life'.

Infant mortality rates: Deaths under 1 year of age over a specified time period divided by the total number of live births in that population over the same period.

Neonatal mortality rate: Deaths under 28 days of age per 1,000 live births

The under-five mortality rate is defined as deaths in children aged 0–4 years over a specified time period divided by the total number of live births in that population over the same period.

Maternal mortality: The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from

any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

$$\text{Maternal mortality ratio} = \frac{\text{No of maternal deaths of women 15-49 years}}{\text{Number of live births}} \times 100{,}000$$

$$\text{Maternal mortality rate} = \frac{\text{No of maternal deaths of women 15-49 yrs}}{\text{Mid-year population of women aged 15-49 years}} \times 100{,}000$$

Population data

Figures 2 and 3 illustrate the population pyramid, data were derived from the CRA. The Libyan population, similar to other countries in the region is young population; more than 42% of the population is under 15 years of age and only 11% are over 50 years. The population pyramid shown in figure 4 is obtained from the 2006 census [7].

Figure 2: Population pyramid for the year 2016

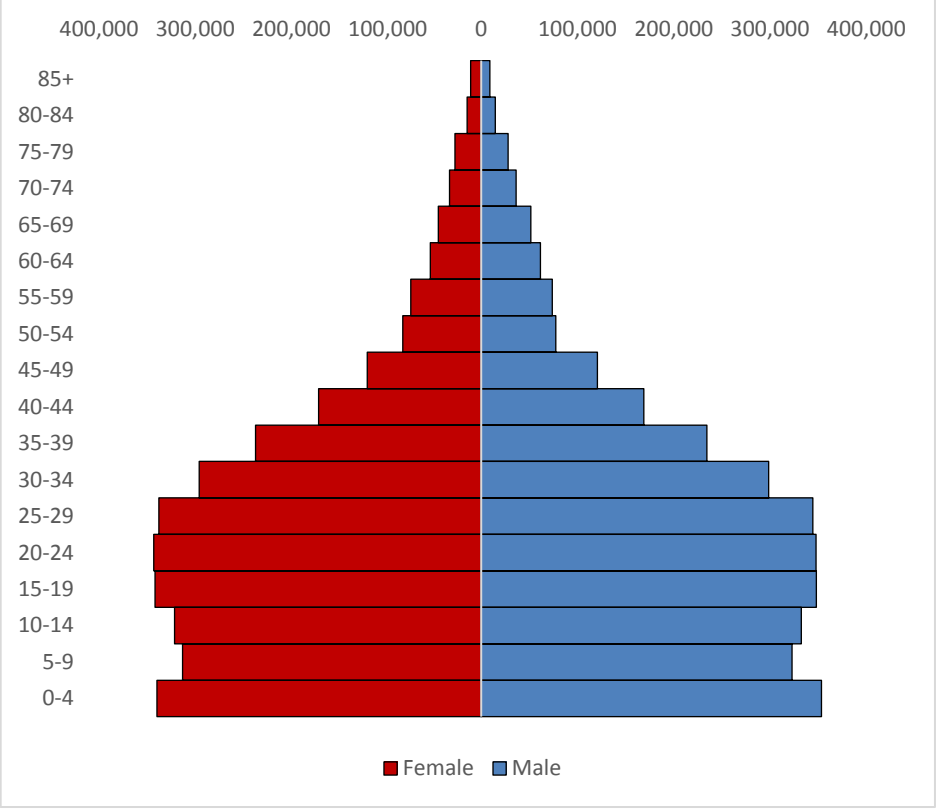


Figure 3: Population pyramid for the year 2017

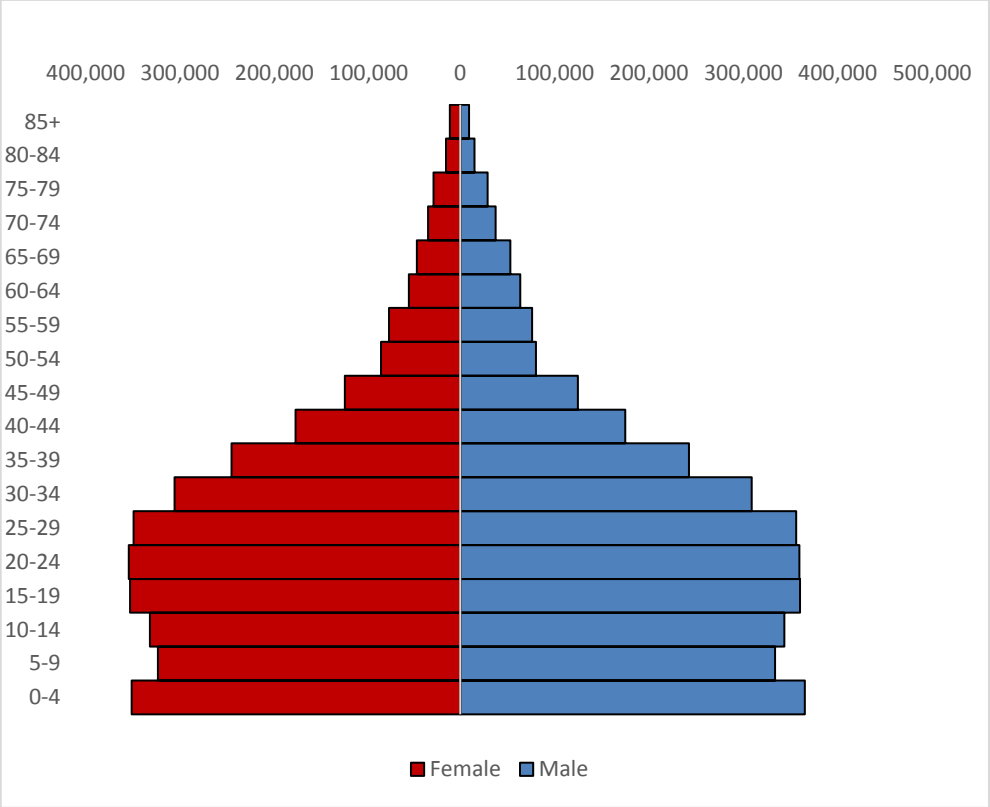
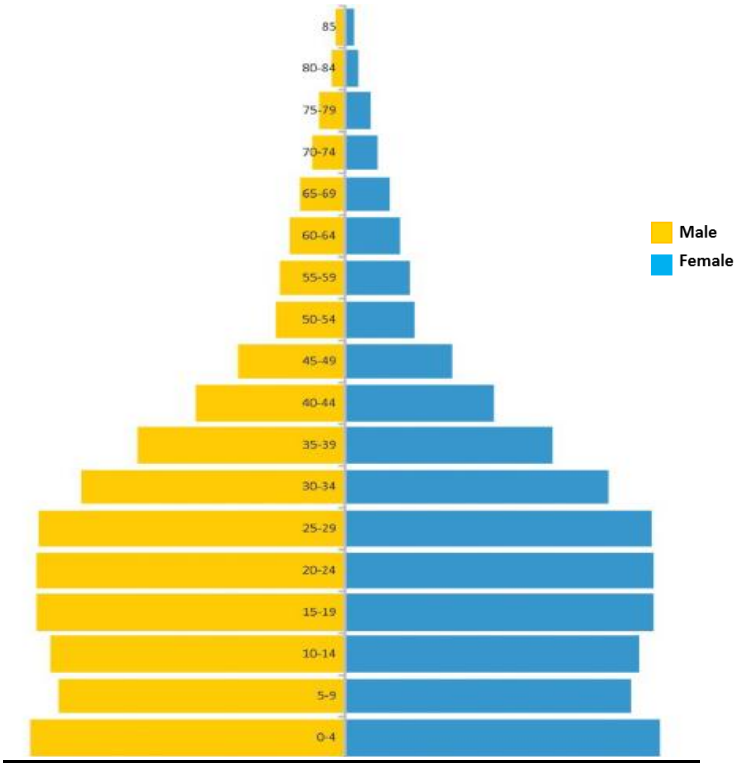


Figure 4 Libyan population pyramids from national census in the year 2006.



Source: Bureau of Statistics and census [7]

Total Deaths

The absolute number of the total death (all cause deaths) registered at the CRA in 2016 was 25478 deaths 68.4% males and 31.6% females. In addition, the total deaths in 2017 were 27167; 65.0% and 35.0% for the males and females respectively. The number and proportion of death certificates processed for the analysis of cause of deaths is shown in Table 2.

Table 2 Total deaths in the years 2016 and 2017 compared to the number of analysed death certificates.

	2016		2017	
	Registered All-cause mortality	No of death certificates (%)*	Registered	No of death certificates
Total	25478	15725 (62%)	27167	16197 (60%)
Males	17416	9543 (55%)	17670	9707 (55 %)
Females	8062	6182 (77%)	9497	6490 (68%)

*** Percentage of total registered deaths.**

Crude Death rates

Crude death rate (CDR) in Libya for both genders in the year 2016 reached 4.01/1000 population. The CDR for males and females in this population was 5.4 and 2.6 per 1000, respectively. This is marginally lower than the BSC estimated rates in 2010 (Total CDR=4.6 per 1000) and not far from that estimated for the country by the IHME in 2015 (5.2 for males and 3.8 for females). The gender difference in mortality can also be found in other populations.

Similarly, for the year 2017, Total CDR was 4.1 per 1000 and that for males and females was 5.3 and 2.9 per 1000, respectively. The small increase in the CDR indicates higher registration rates.

Distribution of deaths according to age bands

In 2016, the results shows that highest proportion (13.2%) of deaths occurred in over 85 years age band. Deaths in children aged 10-14 years had the lowest proportion of deaths, comprising only 1.1% of the total deaths in the population [Table 3].

Table 3 Number and percentage distribution of deaths by age, 2016

Age group	Number	Percentage*
0-1	622	2.4%
1-4	824	3.2%
5-9	332	1.3%
10-14	277	1.1%
15-19	570	2.2%
20-24	1318	5.2%
25-29	1374	5.4%
30-34	1137	4.5%
35-39	1165	4.6%
40-44	1076	4.2%
45-49	1200	4.7%
50-54	1236	4.9%
55-59	1370	5.4%
60-64	1223	4.8%
65-69	1706	6.7%
70-74	2122	8.3%
75-79	2203	8.6%
80-84	2365	9.3%
85+	3358	13.2%

***Percentage of the total deaths**

Tables 4 Shows the number and percentage distribution of deaths by age for deaths that occurred in 2017. Similar to the previous year, the highest proportion of deaths were amongst those aged over 85 years (15.8%), followed by those aged 80–84 years and 75–79 years, with the former comprising 10.2% and the latter comprising 9.9% of total deaths. Age groups 5–9 years and 10–14 years had the lowest proportions of deaths, each comprising about 1% of all deaths.

Table 4 Number and percentage distribution of deaths by age, 2017

Age group	Number	Percentage*
0-1	742	2.7%
1-4	902	3.3%
5-9	382	1.4%
10-14	278	1.0%
15-19	478	1.8%
20-24	895	3.3%
25-29	960	3.5%
30-34	906	3.3%
35-39	966	3.6%
40-44	1047	3.9%
45-49	1343	4.9%
50-54	1438	5.3%
55-59	1564	5.8%
60-64	1435	5.3%
65-69	1930	7.1%
70-74	2154	7.9%
75-79	2684	9.9%
80-84	2765	10.2%
85+	4298	15.8%

***Percentage of the total deaths**

Age-Specific Mortality Rates by Gender

In general, mortality rates among males tend to be higher than females at all ages, especially among young adults since young males are more likely to die from violence, road traffic accidents, and other external causes. Our data confirm this fact in both years; males have a consistently higher mortality rate than females, shown by a ratio of > 1 at all ages, which indicates that gender discrimination is unlikely in death registration. However, in 2016 and 2017, the ratio of male to female mortality rates was greater than 5 in the 20-24 age band and greater than 4 in the 25-29 age band [Figure 5], which is higher than the IHME and UN estimates [8-9]. This may result from the under-estimation of external causes of male deaths in those age groups by the international organisations. Figures 6 and 7 show higher rates of male mortality compared to female mortality across all ages, with a peak in both male and female mortality at the oldest age groups. As expected female deaths are higher in the oldest age group while the peak in male mortality between the ages of 15 and 44, representing an increase in external causes.

Figure 5: Male to female age-specific mortality ratio

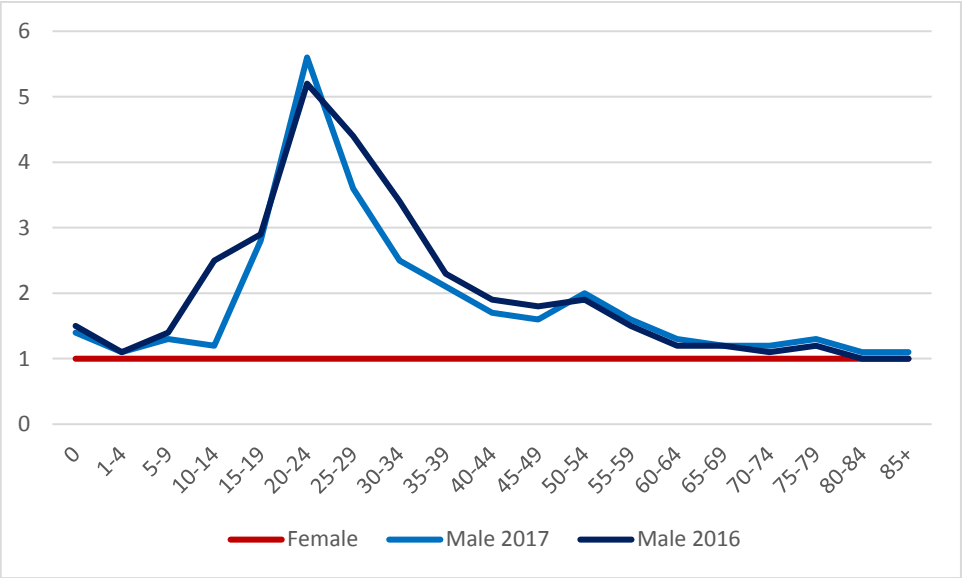


Figure 6 Death pyramid by age and gender. 2016.

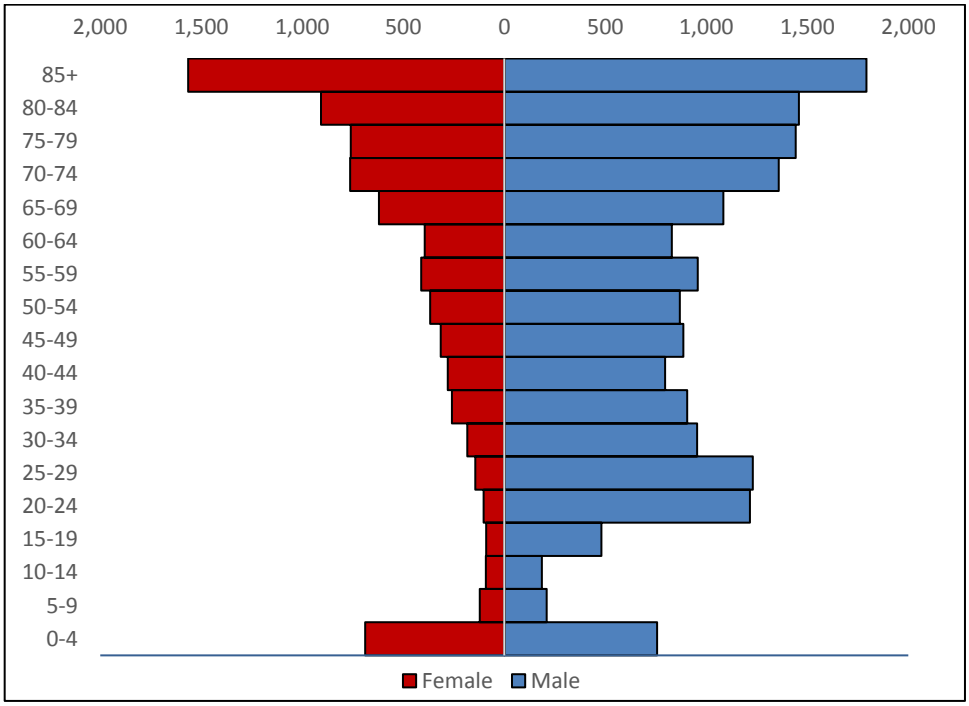
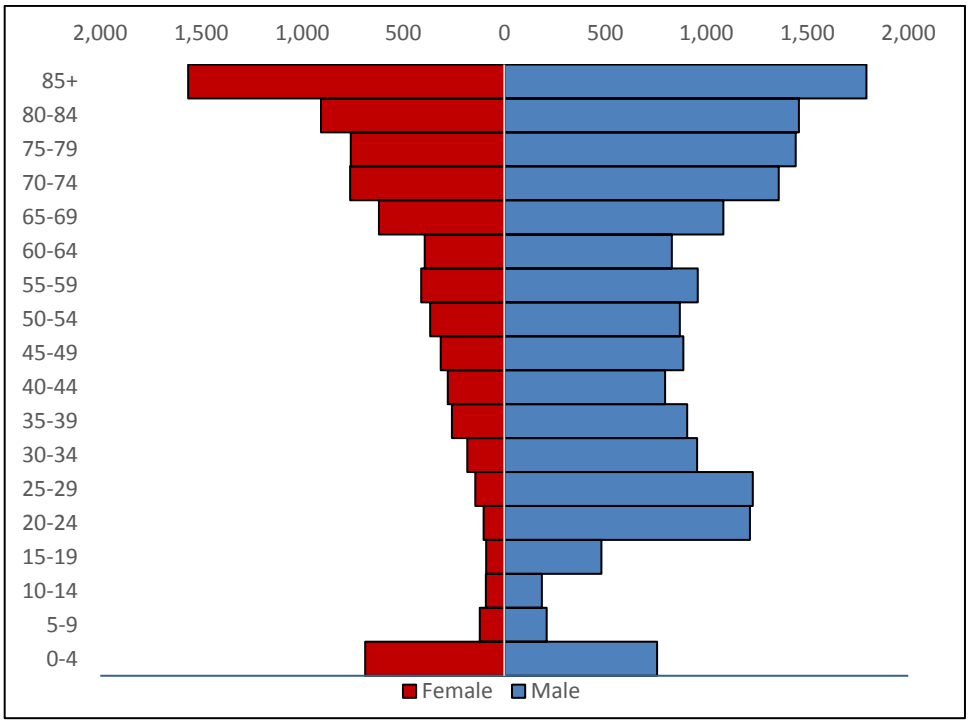


Figure 7 Death pyramid by age and gender. 2017.



The logarithmic scale of age-specific mortality rate (ASMR) for both years shows the same J-shaped curve pattern similar to the IHME 2015 data with higher mortality rates for the very young and the very old. However, the curve illustrating male mortality for both years shows an upward elevation at the 20-30 age groups which indicates the higher rates of death from external injuries among Libyan young men [Figures 8-9].

Figure 8 Age-specific mortality rate curve per 10,000 population for the year 2016.

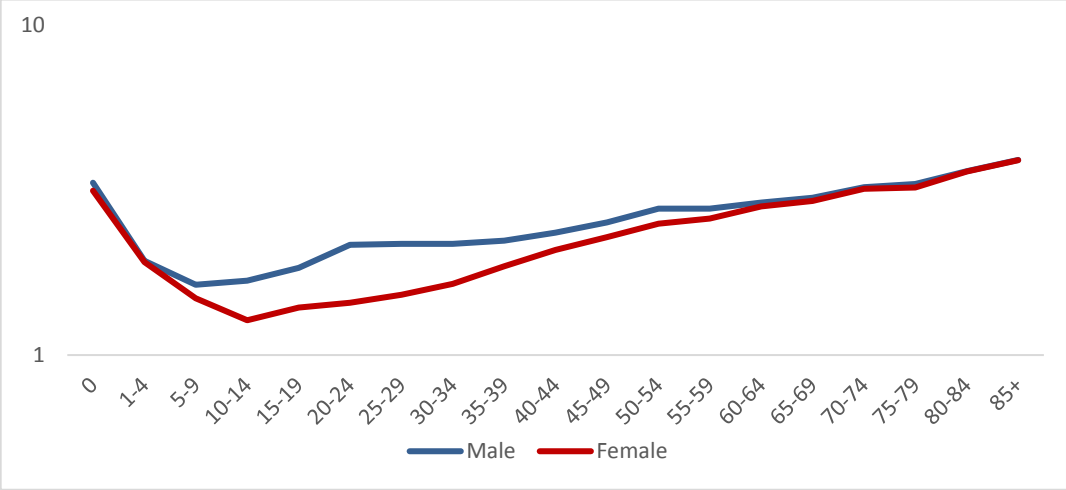
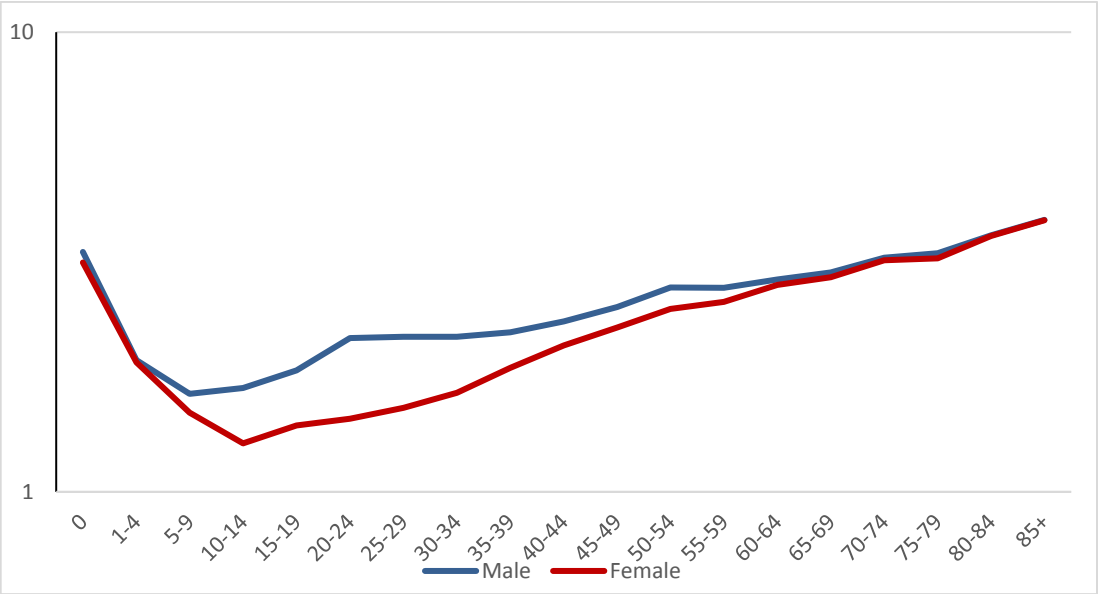


Figure 9 Age-specific mortality rate curve per 10,000 population for the year 2017.



Life expectancy measures

Life expectancy was calculated using a life table, which converts observed population based mortality rates into risk of dying at each age. There are significant variations in life expectancy at birth and according to gender value; higher life expectancy at birth for females on the national level compared with that for males, reaching 85 years for females compared with 81 years for males in both years. However, these values were higher than the WHO and IHME comparator data of 69 and 75 years for males and females respectively.

Measures of infant and child mortality

For this section, live births were defined as the number of live births during the given calendar year, irrespective of registration of the date of birth. The data were obtained from the civil registry. There was a total of 247052 live births registered in the year 2016, 126371 (51.2%) males and 120681 (48.8%) females. In 2017, the total absolute number of live births was 232595; 119053 (51.2%) males and 113542 (48.8%) females.

Neonatal mortality rates

The first month of life is associated with the highest risk to survival. Data from the CRA did not include details on gestational age or age in months. In addition, it was not possible to calculate age in months for all infants from the death certificates as a small percentage of the death certificates contained information on the date of birth and or gestational age. Hence, it was not possible to measure neonatal mortality rates for the years of the report.

Infant mortality rates

The Infant mortality rate was 10.6 deaths per 1000 live births in 2016, implying that 10.6 out of every 1,000 infant deaths occur during the first year of life, similar to the UN comparator data. The rate was higher in 2017 reaching 11.8 per 1000 live births, higher than the UN estimate for the same year [10].

Previous data from the Libyan BSC showed a progressive decrease in Infant mortality rates over the years, an observation demonstrated by the UN and IHME estimates Improved obstetrical practices and reduction in diarrheal disease contributed to the observed decline in IMR.

Under five Mortality rates

In 2016 the total mortality rate of children under 5 years of age was 12.5 per 1000 live births, 14.7/1000 for males and 10.3/1000 for females. These values are similar to the UN comparator data [10]. Whereas in 2017, the total mortality rate of children under 5 years of age was 14.2/1000, higher than the previous year and higher than the UN comparator estimates for the same year. When 2017 data was segregated by gender, under 5 mortality rates for males was 16.3/1000 and 11.9 for females.

Leading causes of Deaths

Deaths certified as unknown formed around 12.5% (1973) of all deaths in 2016. In addition, deaths due to ill-defined cause of death (R Chapter and other ill-defined codes) comprised 13.2% (2079) of the total deaths. In 2017, the proportions of unknown and ill-defined causes of deaths were 6.8% (1097) and 14.2% (2278) respectively. The overall percentage of causes that are ill-defined indicating generally medium-quality cause of death certification and coding practices in Libya.

During the process of ranking Leading causes of death, symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00–R99), were excluded from the list, as the information is not detailed enough to be of public health use. The WHO condensed ICD-10 mortality tabulation list was used for ranking the leading cause of deaths [Annex 6].

Heart diseases and Neoplasm of all sites taken together were the first two principal underlying causes of mortality in 2016, with 1744 (11.1%) and 1194 (7.6%) deaths respectively. Similarly, in 2017, heart disease and neoplasms accounted for 2681 (16.5%) and 1226 (7.6%) respectively. The results were similar for both males and females in both years. The distribution of deaths by Chapter of the International Classification of Diseases Revision) showed that Diseases of the Circulatory System (Chapter IX) were responsible for 22.4% of all deaths in 2016 and 29.1% in 2017. Of the 1194 deaths due to Neoplasms in 2016, the most common types of cancer were that of trachea, bronchus and lung, colon and female breast with 12.2%, 9.9% and 9.4% respectively. In 2017, there were 1213 deaths due to cancer, of those, 13.7% due to lung cancer, 12.0% due to colon cancer and 8.6% due to cancer breast.

Of the 1367 deaths due to external causes in 2016, 48.1% were due to transport accidents, and 30.8% due to firearm-related deaths. Suicides, accidental drowning and submersion, accidental falls and accidental exposure to smoke, fire and flames accounted only for 6.3% of death due to external causes. In 2017, 1083 deaths were due to external causes. Of those, transport accidents accounted for 40.0% and fire arms-related deaths accounted for 34.2%. While suicides, accidental drowning and

submersion, accidental falls and accidental exposure to smoke, fire and flames were responsible only for 6.0% of death due to external causes.

Tables 5-6 lists the ten leading causes of deaths distributed by gender in the two years of the study.

Table 5: Proportion of deaths for the 10 leading causes of death by gender, 2016.

Rank	Cause of death	ICD 10	Deaths	%
Males				
1	Heart disease	I30-I52	1000	10.5%
2	All Malignancy	C00-D48	636	6.7%
3	Other and unspecified conditions originating in the perinatal period	P80-P96	567	5.9%
4	Transport accidents	V01-V99	527	5.5%
5	Ischaemic heart diseases	I20-I25	374	3.9%
6	Cerebrovascular diseases	I60-I69	332	3.5%
7	Diabetes mellitus	E10-E14	326	3.4%
8	Respiratory and cardiovascular disorders specific to the perinatal period	P20-P29	292	3.1%
9	Renal failure	N17-N19	247	2.6%
10	Accidents involving firearms	W32-W34	228	2.4%
Females				
1	Heart disease	I30-I52	744	12.0%
2	All Malignancy	C00-D48	558	9.0%
3	Diabetes mellitus	E10-E14	343	5.5%
4	Cerebrovascular diseases	I60-I69	265	4.3%
5	Other and unspecified conditions originating in the perinatal period	P80-P96	247	4.0%
7	Ischaemic heart diseases	I20-I25	222	3.6%
6	Renal failure	N17-N19	193	3.1%
8	Respiratory and cardiovascular disorders specific to the perinatal period	P20-P29	184	3.0%
9	Hypertensive diseases	I10-I15	184	3.0%
10	Influenza and pneumonia	J09-J18	180	2.9%

ICD 10 code: International Classification of Diseases, Tenth Revision.

Table 6: Proportion of deaths for the 10 leading causes of death by gender, 2017.

Rank	Cause of death	ICD 10	Deaths	%
Males				
1	Heart disease	I30-I52	1586	16.4%
2	All Malignancy	C00-D48	663	6.8%
3	Cerebrovascular diseases	I60-I69	405	4.2%
4	Ischaemic heart diseases	I20-I25	357	3.7%
5	Accidents involving firearms	W32-W34	356	3.7%
6	Transport accidents	V01-V99	347	3.6%
7	Diabetes mellitus	E10-E14	286	2.9%
8	Renal failure	N17-N19	275	2.8%
9	Respiratory and cardiovascular disorders specific to the perinatal period	P20-P29	275	2.8%
10	Other and unspecified conditions originating in the perinatal period	P80-P96	258	2.7%
Females				
1	Heart disease	I30-I52	1095	16.9%
2	All Malignancy	C00-D48	563	8.7%
3	Cerebrovascular diseases	I60-I69	343	5.3%
4	Ischaemic heart diseases	I20-I25	269	4.1%
5	Diabetes mellitus	E10-E14	266	4.1%
6	Renal failure	N17-N19	218	3.4%
7	Influenza and pneumonia	J09-J18	186	2.9%
8	Hypertensive diseases	I10-I15	179	2.8%
9	Respiratory and cardiovascular disorders specific to the perinatal period	P20-P29	161	2.5%
10	Other and unspecified conditions originating in the perinatal period	P80-P96	130	2.0%

ICD 10 code: International Classification of Diseases, Tenth Revision.

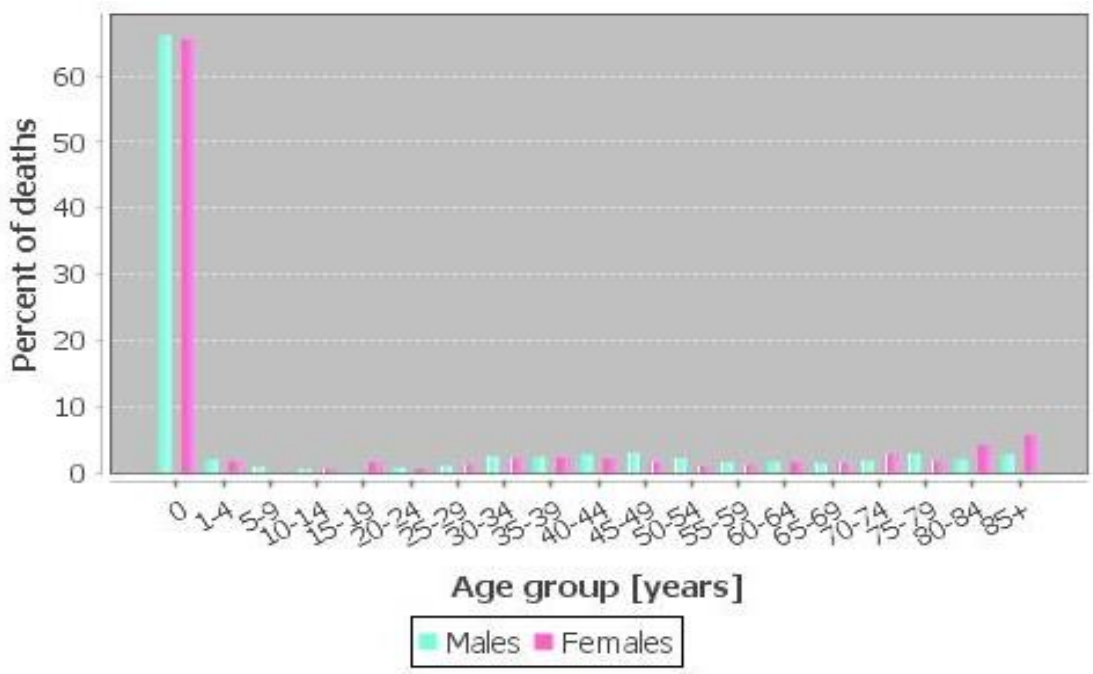
Distribution of deaths according to the three broad GBD cause of death groups

It can be observed that in both years, the Libyan death data has a higher percentage of deaths due to Group II (non-communicable diseases) and relatively lower percentages of deaths due to Group I (infectious, perinatal, and maternal conditions) and Group III (external causes). Ratio of non-communicable to communicable causes of death was 3.2 and 3.3 for 2016 and 2017 respectively. The analysis showed that deaths from Group I are most prevalent among the 0–4 age group and decrease gradually with age. While deaths from Group II increase with age and deaths from

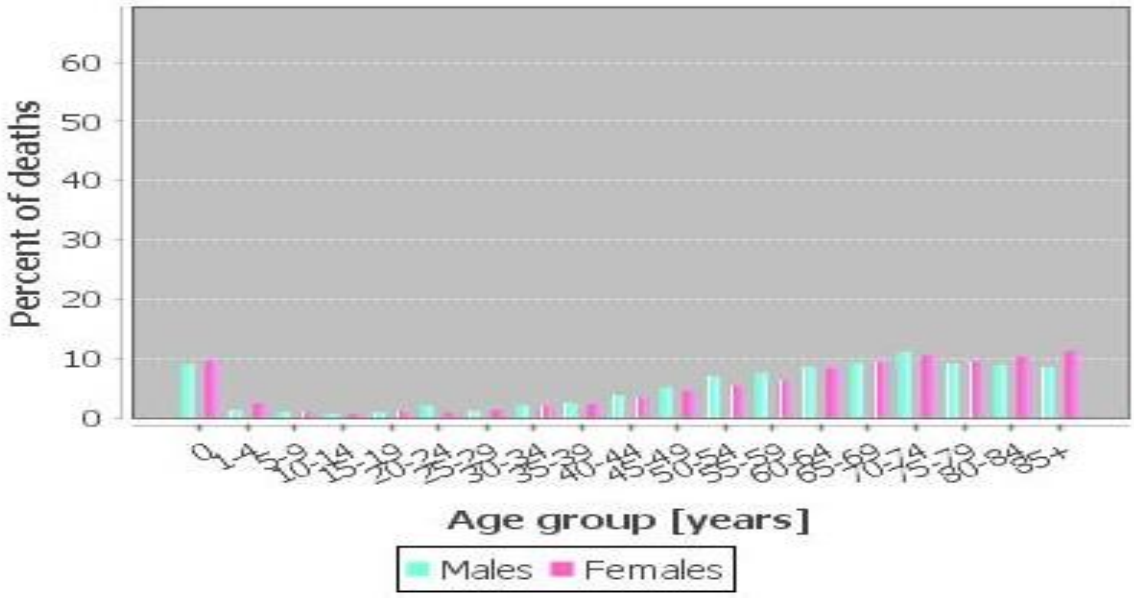
Group III are prevalent among young adults, with a peak in males at the 15–29 year group [Figures 10-11].

Figure 10: Age patterns for the three broad GBD cause of death groups, 2016

A- GBD Group I: infectious, perinatal, and maternal conditions.



B- GBD Group II: Non-Communicable diseases.



C- GBD Group III: Injuries and External causes.

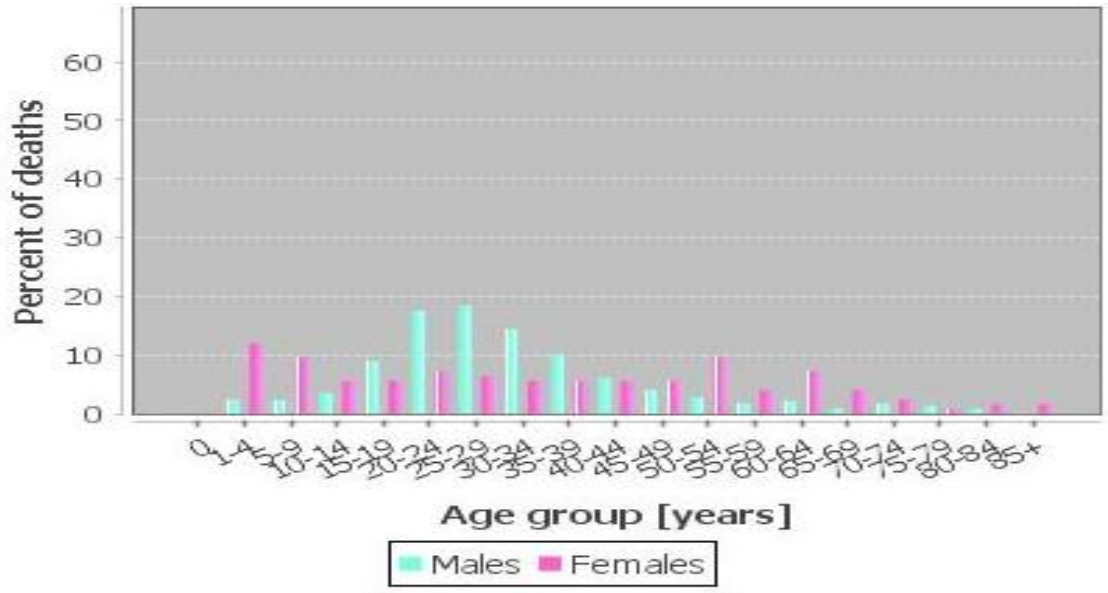
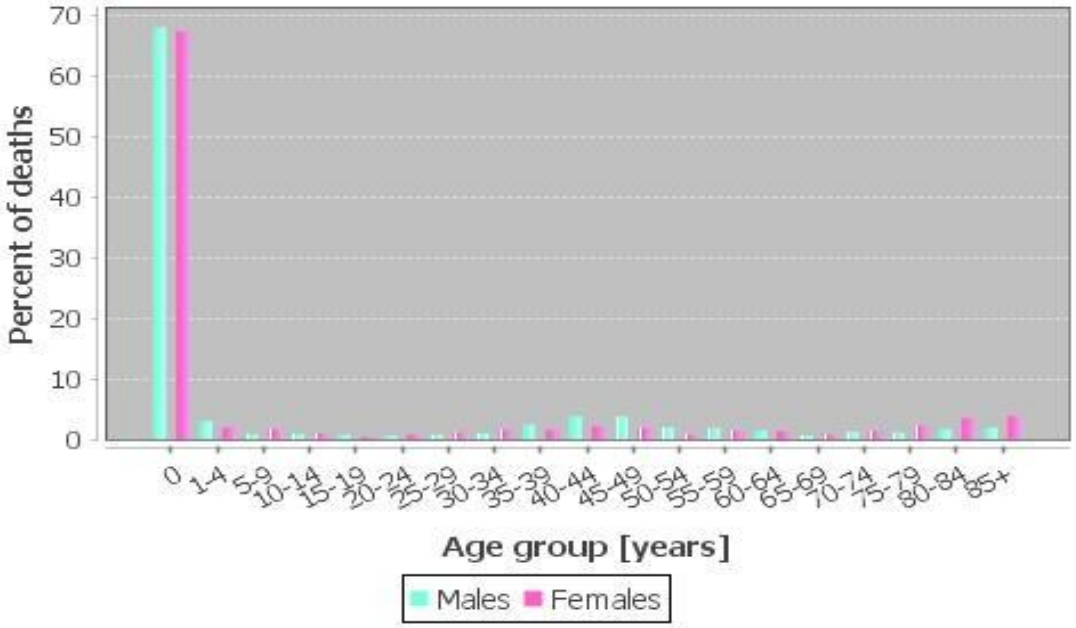
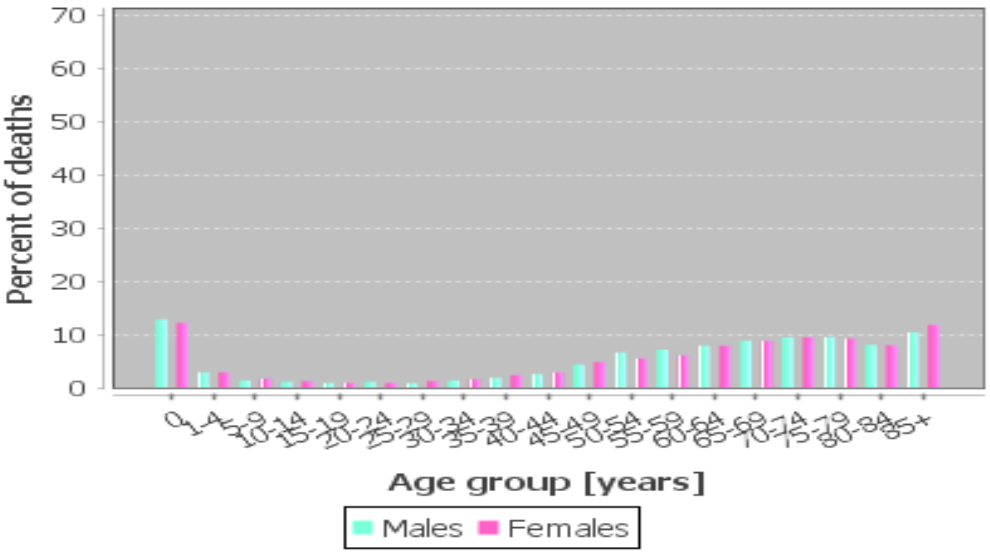


Figure 11: Age patterns for the three broad GBD cause of death groups, 2017

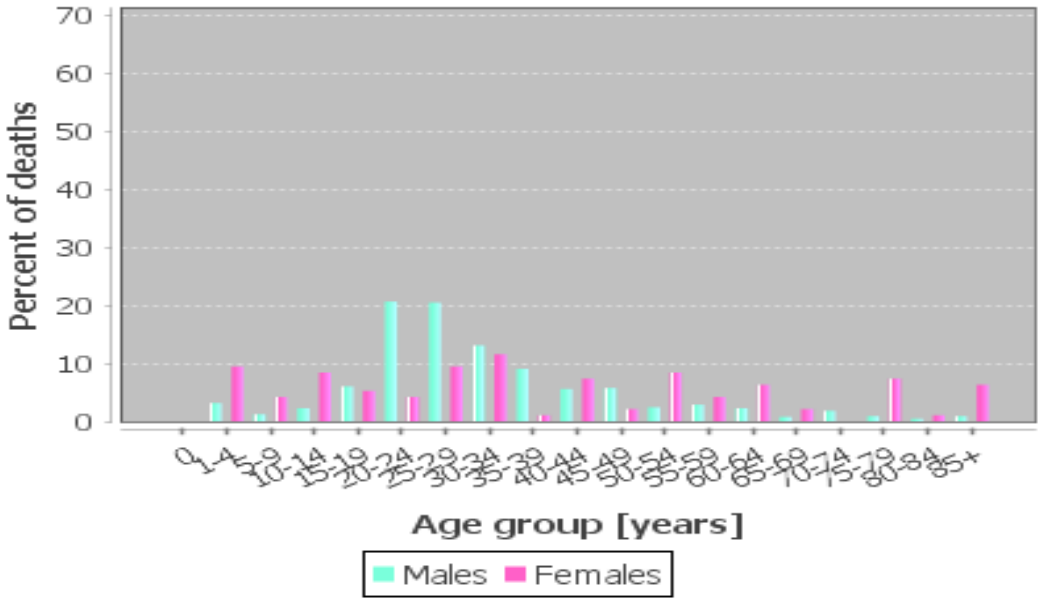
A- GBD Group I: infectious, perinatal, and maternal conditions.



B- GBD Group II: Non-Communicable diseases.

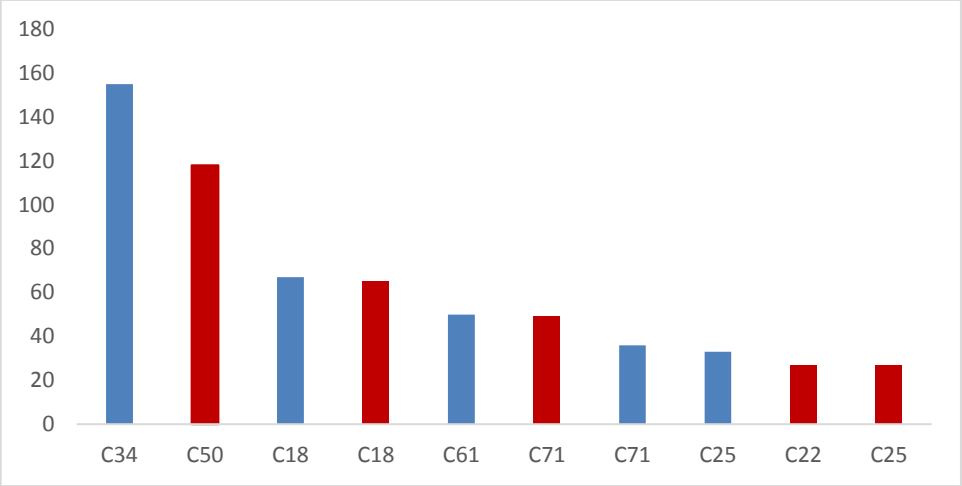


C- GBD Group III: Injuries and external causes.



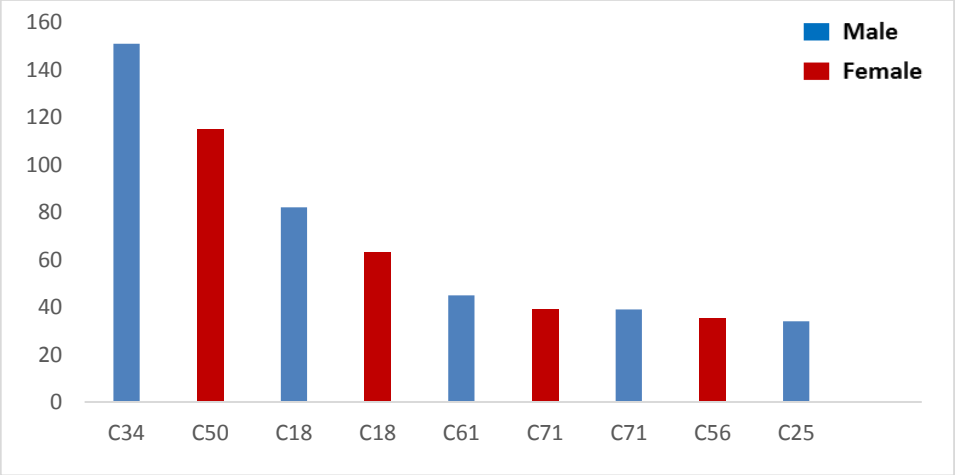
In both years of the analysis, most deaths were due to non-communicable diseases in both men and women. Death from cardiovascular diseases had the highest rank followed by malignancy. The following figures illustrate the number of deaths from the top five malignant neoplasms and injuries distributed by gender [Figures 12-15].

Figure 12: Number of deaths from the top five malignant neoplasms by Gender, 2016.



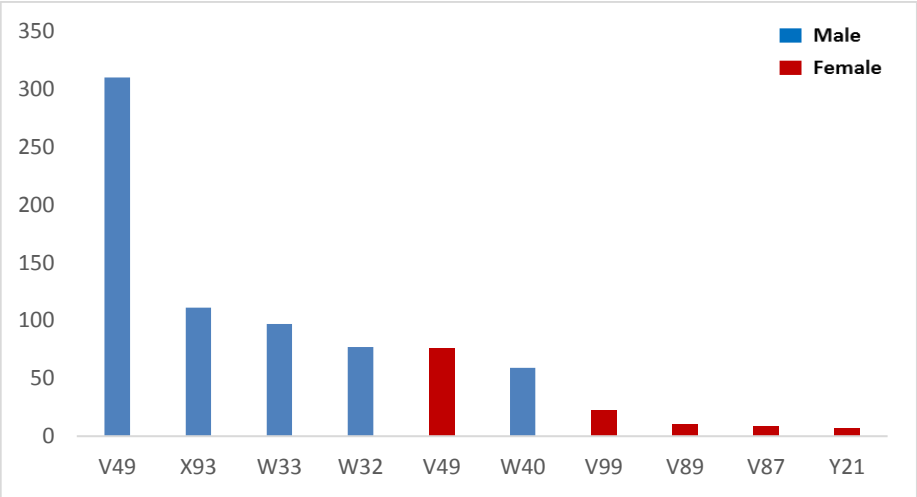
C34 - Malignant neoplasm of bronchus and lung;
C50 - Malignant neoplasm of breast;
C18 - Malignant neoplasm of colon;
C61 - Malignant neoplasm of prostate;
C71 - Malignant neoplasm of brain;
C25 - Malignant neoplasm of pancreas;
C22 - Malignant neoplasm of liver and intrahepatic bile ducts.

Figure 13: Number of deaths from the top five malignant neoplasms by Gender, 2017.



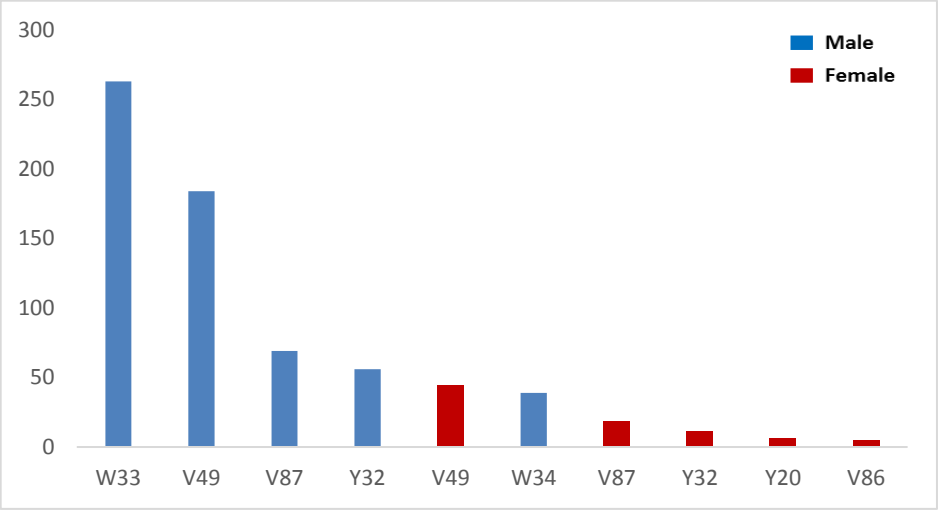
C34 - Malignant neoplasm of bronchus and lung;
C50 - Malignant neoplasm of breast;
C18 - Malignant neoplasm of colon;
C61 - Malignant neoplasm of prostate;
C71 - Malignant neoplasm of brain;
C56 - Malignant neoplasm of ovary;
C25 - Malignant neoplasm of pancreas.

Figure 14: Number of deaths from external causes by gender, 2016



V49 - Car occupant injured in other and unspecified transport accidents;
X93 - Assault by handgun discharge;
W33 - Rifle, shotgun and larger firearm discharge;
W32 - Handgun discharge;
W40 - Explosion of other materials; V99 - Unspecified transport accident;
V89 - Motor- or nonmotor-vehicle accident, type of vehicle unspecified;
V87 - Traffic accident of specified type but victim's mode of transport unknown;
Y21 - Drowning and submersion, undetermined intent.

Figure 15: Number of deaths from external causes by gender, 2017



W33 - Rifle, shotgun and larger firearm discharge;
V49 - Car occupant injured in other and unspecified transport accidents;
V87 - Traffic accident of specified type but victim's mode of transport unknown;
Y32 - Crashing of motor vehicle, undetermined intent;
W34 - Discharge from other and unspecified firearms;
Y20 - Hanging, strangulation and suffocation, undetermined intent;
V86 - Occupant of special all-terrain or other motor vehicle designed primarily for off-road use, injured in transport accident.

Maternal mortality measures

Maternal and pregnancy-related deaths remain under-reported in health records in most developing countries. In our analysis, there were 38 deaths in the cause of death data attributable to maternal causes of death in 2016. In the same year, total deaths of women in childbearing age, from all causes, was 1371, 17% of the total female death in that year. The same applies to the 2017, 1560 deaths of women in childbearing age; 16% of the total female death in that year, however, only 27 deaths in the cause of death data were attributable to maternal death.

Maternal mortality ratio and maternal mortality rate

The maternal mortality ratio, a sustainable Development Goal, SDG 3.1, takes into account the number of live births; in 2016 the ratio was 15.4 per 100000 live births and for 2017 was 11.6 per 100000 live births.

Maternal mortality rates on the other hand, measures the risk of maternal death out of the population of women aged 15 to 49 years. In the present study, maternal mortality rates were 1.5 and 2.0 per 100000 women in child-bearing age for the years 2016 and 2017 respectively.

Quality of mortality statistics using ANACONDA

The reliability of the mortality and cause of death data in describing the actual mortality patterns in the population is a common concern. Analysis of Causes of National Death for Action (ANACONDA) is an electronic designed to assist in analyses of mortality datasets and to evaluate the quality, accuracy and completeness of mortality and cause of death data. The tool can help identify probable errors, misdiagnoses and inconsistencies in the mortality and causes of death data. Data from both years of the report were entered and analysed by the ANACONDA tool. The following points were noted:

1. Completeness of death registration was 98.5% for males and 92.3% for females in 2016, likewise, 98.7% for males and 93.9 for females in 2017

2. Estimated under-registration of children, in the two years, under five mortality rates calculated from our data were higher than the comparator estimates, which renders under reporting of child deaths unlikely.

3. The percentage of unusable causes of death was 35.9% and 43.3% in 2016 and 2017 respectively [Figures 16-17].

   It is of great significance to mention that the term “unusable codes” indicates causes of death that are of limited or no value for public health analysis such as septicaemia, cerebral palsy and other causes that can be used as immediate causes of death.

Figure 16: The percentage of useable causes of death, 2016.

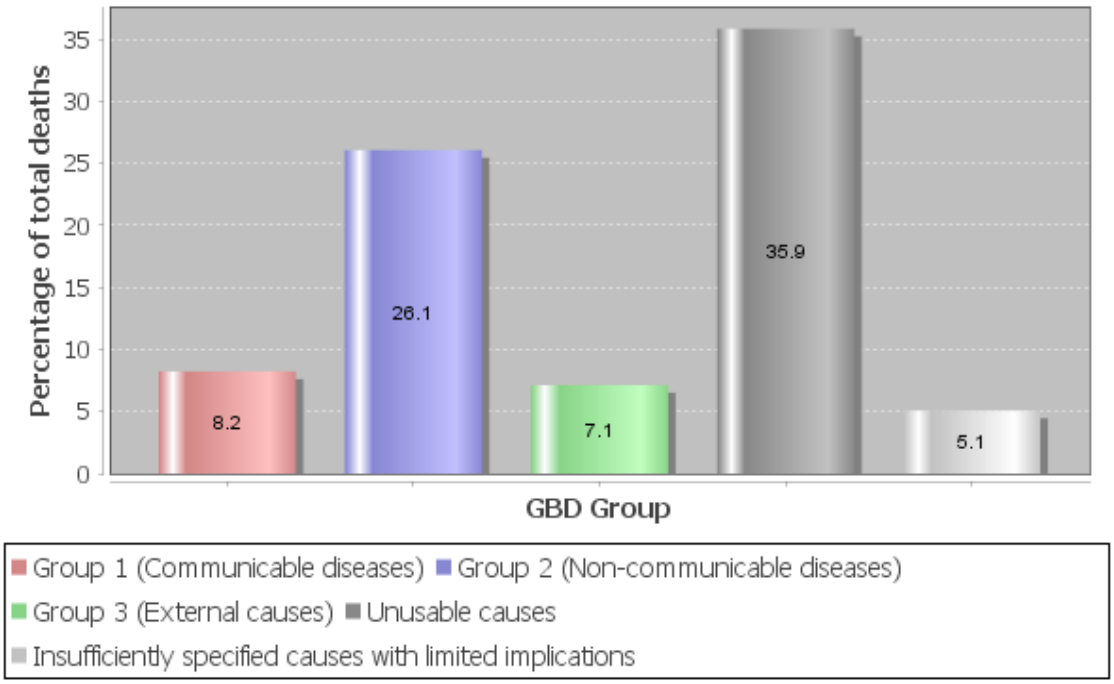
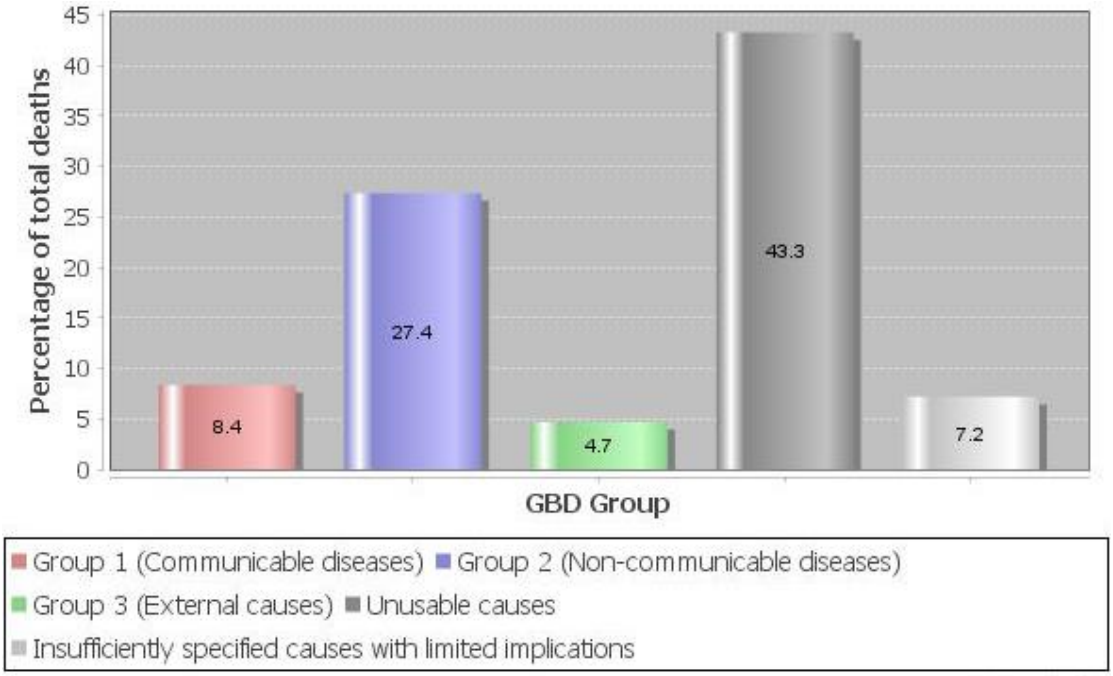


Figure 17: The percentage of useable causes of death, 2017.



4. ANACONDA classifies unusable codes based on their severity into five main categories [11]:

Category 1: Symptoms, signs and ill-defined conditions mostly drawn from chapter XVIII of ICD 10 (R00-R99).

Category 2: Impossible as underlying cause of deaths such as 'essential hypertension'.

Category 3: Intermediate CODs. Causes that have been triggered by the underlying cause.

Category 4: Immediate CODs, for example, heart failure.

Category 5: Insufficiently specified causes within ICD chapters within a larger disease category. These include causes like 'ill-defined site of cancer' and 'ill-defined injuries'.

Figures 18-19 illustrate the proportions of these categories in our data

Figure 18: Distribution of unusable causes of death by category, 2016.

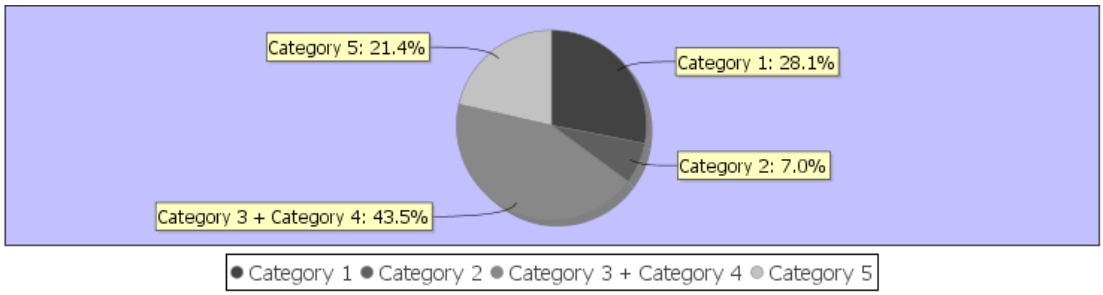
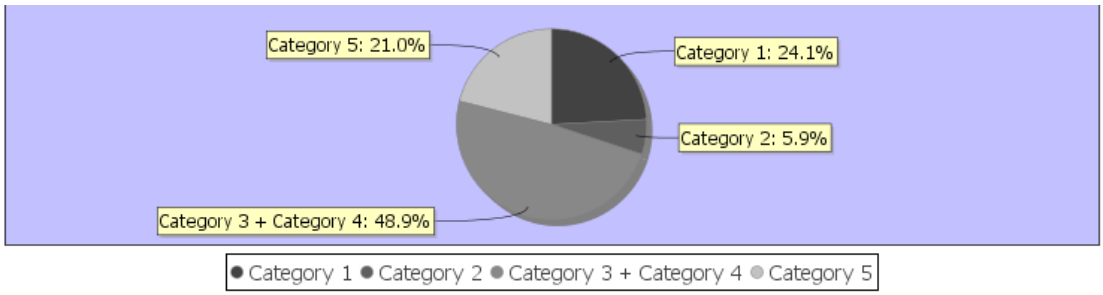


Figure 19: Distribution of unusable causes of death by category, 2017.



ANACONDA also analyse the age and gender distribution of these unusable causes of death. In 2016 the majority of the unusable causes of death were among males 5-64 years followed by older males over 65 years of age. While in 2017, the majority of these unusable codes were assigned to males at the 5-64 years age band followed by older males over 65 years of age [Figures 20-21].

5. Vital Statistics Performance Index for Quality (VSPI(Q)): This index is an overall summary of the quality of mortality data. It is automatically calculated by ANACONDA based on five different components such as completeness of the registration and the proportion of the unusable causes. It gives a single score ranges from 0 to 100. The year 2016 data scored 62.4%, and the year 2017 data scored 57.1% and both classified of medium quality.

Figure 20: Age and gender distribution of unusable causes, 2016.

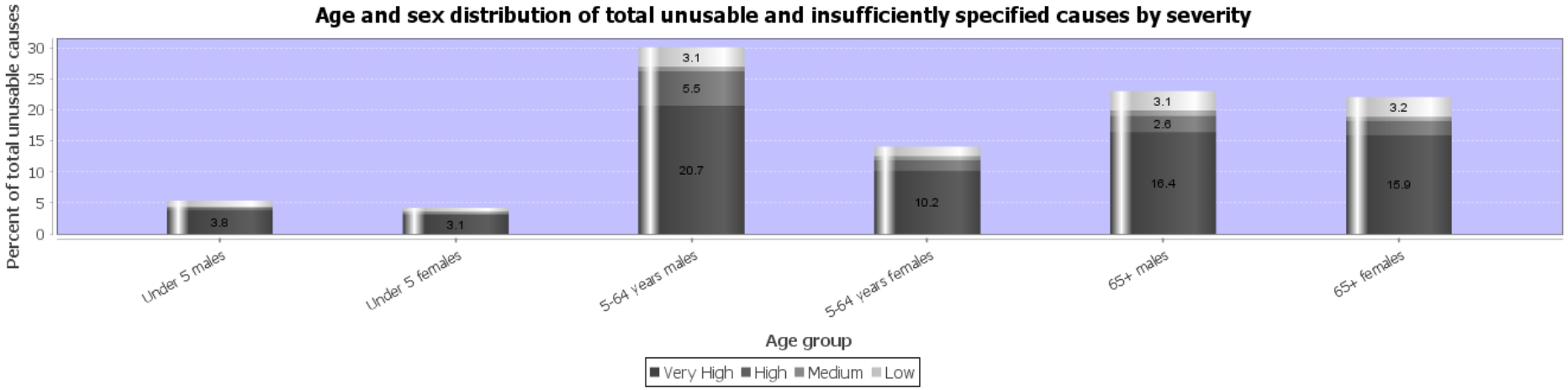
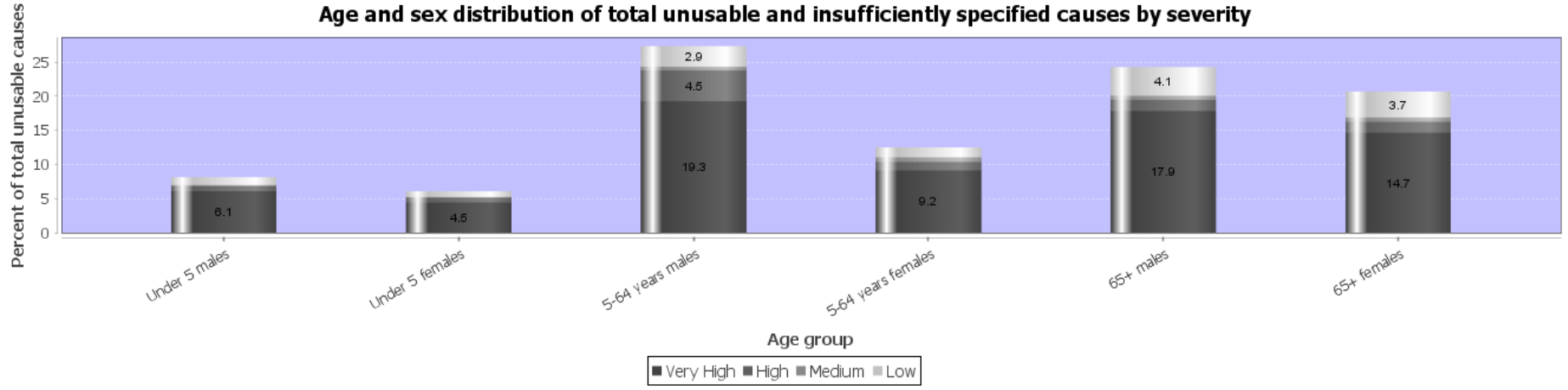


Figure 21: Age and gender distribution of unusable causes, 2017.



Strengths and limitations

The strength of this analysis is that national mortality data from two full years were used and the consistency of the results made it representative of the recent trends. Another strength of this analysis is that deaths from external causes are well represented. Death from gunshots, explosions and other warfare are expected to be relatively high in the security conditions of the country during the study years. Furthermore, the mortality rates due to road traffic accidents observed in the current report are in consistence with traffic reports from the ministry of Interior [12].

The unacceptably high proportions of deaths coded to ill-defined conditions and to under specified vascular diseases, such as cardiac arrest and cardiac failure, suggests the need for urgent measures to improve the cause of death certification and coding practices among Libyan clinicians and emphasise on the crucial necessity for coders in our health system.

The high proportion of infant deaths attributed to premature birth found in this report is inconsistent with the figures from the CRA all-cause mortality data. This may reflects absence of the gestational age from the death certificates and over recording of miscarriages. The answer would be in further scrutinizing death certificates from hospitals with paediatric and neonatal departments and delivery facilities.

Despite these issues, the currently available data can provide an empirical foundation to estimate national cause-specific mortality in Libya that can direct policy makers and health planners to target areas of need.

Recommendations

1. Strengthening the coordination between CRA and MoH to use the standard international death certificate form.
2. Raising awareness among medical students and practicing clinicians about the value and significance of properly completed death certificate and continuous training is required to improve the quality of certification of death.

3. Supporting the electronic civil registration in order to improve completeness and timeliness of death registration.
4. Establishing ICD coding units in hospitals and train coders with suitable qualifications to ensure completion of death certificate.
5. Standardising the lower limit of gestational age for registering foetal deaths and stillbirths.
6. Due to the relatively high proportions of death with no cause or coded to ill-defined conditions, the need for further measures to improve the death certification and coding practices is strongly recommended.

Conclusions

The present mortality data can be used to measure, evaluate and monitor the health status of the Libyan population in terms of current and long-term mortality trends. In addition, the patterns and the causes of death observed from this report can be used to identify segments of the population at greater risk of death from specific diseases and injuries and to monitor progress toward the Sustainable Development Goals. Finally, our conclusions were in accordance with international estimates for Libya and the conform with the general patterns observed in neighbouring countries, nevertheless, the results of the present study should be interpreted with caution while acknowledging the drawbacks and limitations of the data used.

References

1- World Health Organisation. International statistical classification of diseases and related health problems—10th revision. 5th ed. Geneva: World Health Organisation; 2016.

2- Bureau of Statistics and Census Libya. National statistical books. Available at http://www.bsc.ly/# Last accessed on 12/08/2019.

3- AbouZahr C, Cleland J, Coullare F, Macfarlane SB, Notzon FC, Setel P, et al. The way forward. *Lancet*. 2007;370(9601):1791-9

4- Mahapatra P, Shibuya K, Lopez AD, Coullare F, Notzon FC, Rao C, et al. Civil registration systems and vital statistics: successes and missed opportunities. *Lancet*. 2007.

5- Murray CJL, Lopez AD. Estimating causes of death: new methods and global and regional applications for 1990. In: Murray CJL, Lopez AD (eds). The global burden of disease. Boston: Harvard School of Public Health, 1996. pp. 118–200.

6- 2016-2017 birth and death data, Civil Registration Authority. Unpublished data, accessed on 10/09/2019.

7- National Population Census [Libya], 2006. Bureau of Statistics and Census.

8- Department of Economic and Social Affairs Population Division. World

Population Prospects: The World Population Prospects 2019. New York, United Nations. Available from: https://population.un.org/wpp/ Last accessed on 10/10/2019.

9- Institute of Health Metrics and Evaluation. Country profile, Libya. Available from: http://www.healthdata.org/libya Last accessed on 25/08/2019.

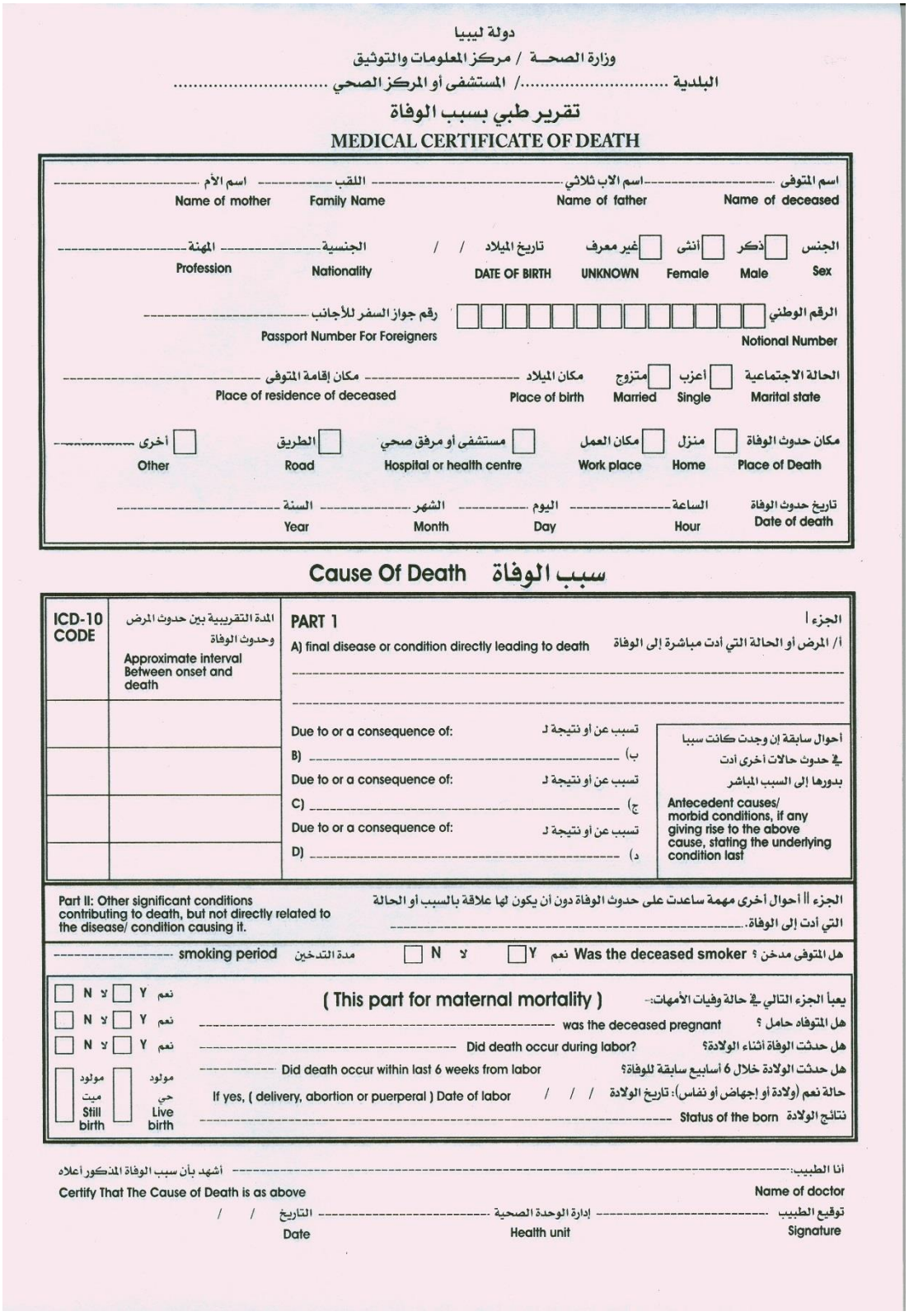
10- United Nations Inter-agency Group for Child Mortality Estimation, 2019. Available from: https://childmortality.org/data Last accessed on 15/10/2019.

11- CRVS Knowledge Gateway. ANACONDA Mortality Data Quality Assessment Tool. Available from: https://crvsgateway.info/ANACONDA-Mortality-Data-Quality-Assessment-Tool~686 Last accessed on 15/10/2019.

12- Traffic and Licensing Department, Ministry of Interior (2017). Annual statistical report. Tripoli, Libya. Ministry of interior.

Annexes

Annex 1: Medical Certificate of death used in Libya.



دولة ليبيا

وزارة الصحـــة / مركز المعلومات والتوثيق

البلدية ..... /..... المستشفى أو المركز الصحي .....

تقرير طبي بسبب الوفاة

MEDICAL CERTIFICATE OF DEATH

اسم المتوفى ---------- Name of deceased
اسم الاب ثلاثي ---------- Name of father
اللقب ---------- Family Name
اسم الأم ---------- Name of mother

الجنس Sex: ذكر Male ☐ أنثى Female ☐ غير معرف UNKNOWN ☐
تاريخ الميلاد DATE OF BIRTH / /
الجنسية ---------- Nationality
المهنة ---------- Profession

الرقم الوطني ☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Notional Number
رقم جواز السفر للأجانب ---------- Passport Number For Foreigners

الحالة الاجتماعية Marital state: أعزب Single ☐ متزوج Married ☐
مكان الميلاد ---------- Place of birth
مكان إقامة المتوفى ---------- Place of residence of deceased

مكان حدوث الوفاة Place of Death: منزل Home ☐ مكان العمل Work place ☐ مستشفى أو مرفق صحي Hospital or health centre ☐ الطريق Road ☐ أخرى Other ☐

تاريخ حدوث الوفاة Date of death: الساعة Hour ---------- اليوم Day ---------- الشهر Month ---------- السنة Year

Cause Of Death سبب الوفاة

ICD-10 CODE	المدة التقريبية بين حدوث المرض وحدوث الوفاة Approximate interval Between onset and death	PART 1 الجزء I A) final disease or condition directly leading to death أ/ المرض أو الحالة التي أدت مباشرة إلى الوفاة ----------	أحوال سابقة إن وجدت كانت سببا في حدوث حالات أخرى أدت بدورها إلى السبب المباشر Antecedent causes/ morbid conditions, if any giving rise to the above cause, stating the underlying condition last
		Due to or a consequence of: تسبب عن أو نتيجة لـ B) ب) ----------	
		Due to or a consequence of: تسبب عن أو نتيجة لـ C) ج) ----------	
		Due to or a consequence of: تسبب عن أو نتيجة لـ D) د) ----------	

Part II: Other significant conditions contributing to death, but not directly related to the disease/ condition causing it.
الجزء II أحوال أخرى مهمة ساعدت على حدوث الوفاة دون أن يكون لها علاقة بالسبب أو الحالة التي أدت إلى الوفاة. ----------

هل المتوفى مدخن ؟ Was the deceased smoker نعم Y ☐ لا N ☐
مدة التدخين ---------- smoking period

(This part for maternal mortality) يعبأ الجزء التالي في حالة وفيات الأمهات:-

هل المتوفاه حامل ؟ ---------- was the deceased pregnant
هل حدثت الوفاة أثناء الولادة؟ ---------- Did death occur during labor?
هل حدثت الوفاة خلال 6 أسابيع سابقة للوفاة؟ ---------- Did death occur within last 6 weeks from labor
حالة نعم (ولادة أو إجهاض أو نفاس): تاريخ الولادة / / If yes, (delivery, abortion or puerperal) Date of labor
نتائج الولادة ---------- Status of the born

مولود ميت Still birth ☐ مولود حي Live birth ☐

أنا الطبيب: ---------- Name of doctor
أشهد بأن سبب الوفاة المذكور أعلاه Certify That The Cause of Death is as above
توقيع الطبيب ---------- Signature
إدارة الوحدة الصحية ---------- Health unit
التاريخ / / ---------- Date

Annex 2: All underlying causes of death, 2016

Cause of death	ICD10 Code	Number	%
Certain infectious and parasitic diseases	(A00-B99)	357	2.3%
Neoplasms	(C00-D48)	1194	7.6%
Diseases of blood and blood forming organs	(D50-D89)	88	0.6%
Endocrine, nutritional and metabolic diseases	(E00-E89)	812	5.2%
Mental and behavioral disorders	(F01-F99)	11	0.1%
Diseases of the nervous system	(G00-G98)	191	1.2%
Disease of Eye, Ear, Nose and Throat	(H00-H69)	1	0.0%
Diseases of the circulatory system	(I00-I99)	3530	22.4%
Diseases of the respiratory system	(J00-J98)	920	5.9%
Diseases of the digestive system	(K00-K92)	208	1.3%
Diseases of skin and subcutaneous tissue	(L00-L98)	18	0.1%
Diseases of the musculoskeletal system and connective tissue	(M00-M99)	20	0.1%
Diseases of the genitourinary system	(N00-N99)	472	3.0%
Pregnancy, childbirth and the puerperium	(O00-O99)	38	0.2%
Certain conditions originating in the perinatal period	(P00-P96)	1689	10.7%
Congenital malformations	(Q00-Q99)	396	2.5%
Symptoms and signs not elsewhere classified	(R00-R99)	2079	13.2%
Injury, poisoning and certain other consequences of external causes	(S00-T98)	348	2.2%
External causes of mortality	(V01-Y89)	1366	8.7%
Factors influencing health status and contact with health services	(Z00-Z99)	14	0.1%
No underlying cause		1973	12.5%
Total	**15725**		

Annex 3: All underlying causes of death, 2017

Cause of death	ICD10 code	Number	%
Certain infectious and parasitic diseases	(A00-B99)	504	3.1%
Neoplasms	(C00-D48)	1226	7.6%
Diseases of blood and blood forming organs	(D50-D89)	99	0.6%
Endocrine, nutritional and metabolic diseases	(E00-E89)	808	5.0%
Mental and behavioral disorders	(F01-F99)	20	0.1%
Diseases of the nervous system	(G00-G98)	281	1.7%
Disease of Eye, Ear, Nose and Throat	(H00-H69)	1	0.0%
Diseases of the circulatory system	(I00-I99)	4707	29.1%
Diseases of the respiratory system	(J00-J98)	1055	6.5%
Diseases of the digestive system	(K00-K92)	246	1.5%
Diseases of skin and subcutaneous tissue	(L00-L98)	12	0.1%
Diseases of the musculoskeletal system and connective tissue	(M00-M99)	28	0.2%
Diseases of the genitourinary system	(N00-N99)	530	3.3%
Pregnancy, childbirth and the puerperium	(O00-O99)	27	0.2%
Certain conditions originating in the perinatal period	(P00-P96)	1321	8.2%
Congenital malformations	(Q00-Q99)	597	3.7%
Symptoms and signs not elsewhere classified	(R00-R99)	2278	14.1%
Injury, poisoning and certain other consequences of external causes	(S00-T98)	267	1.6%
External causes of mortality	(V01-Y89)	1083	6.7%
Factors influencing health status and contact with health services	(Z00-Z99)	13	0.1%
No underlying cause		1097	6.8%
Total	**16197**		

Annex 4: Leading causes of Deaths according to age bands

The tables are colour coded according to the GBD three broad causes of deaths groups

Group I ((infectious, perinatal, and maternal conditions),

Group II (Non- Communicable diseases),

Group III (External Causes).

Leading causes of deaths in infant, 2016

Rank	Cause of death (ICD Code)	Number	%*
1	Other and unspecified conditions originating in the perinatal period (P80-P96)	806	30.6%
2	Respiratory and cardiovascular disorders specific to the perinatal period (P20-P29)	460	17.5%
3	Disorders related to length of gestation and foetal growth (P05-P08)	204	7.8%
4	Congenital malformations of the circulatory system (Q20-Q28)	159	6.0%
5	Infections specific to the perinatal period (P35-P39)	112	4.3%
6	Heart disease (I30-I52)	95	3.6%
7	Other congenital malformations (Q80-Q89)	73	2.8%
8	Anencephaly and other malformations of the nervous system (Q00-Q07)	45	1.7%
9	Other diseases of the respiratory system (J95-J99)	33	1.3%
10	Haemorrhagic and haematological disorders of foetus and newborn (P50-P61)	26	1.0%

***Percentage of the total infant deaths in the year 2016**

Leading causes of deaths in infant, 2017

Rank	Cause of death (ICD Code)	Number	%*
1	Respiratory and cardiovascular disorders specific to the perinatal period (P20-P29)	406	14.7%
2	Other and unspecified conditions originating in the perinatal period (P80-P96)	386	14.0%
3	Disorders related to length of gestation and fetal growth (P05-P08)	276	10.0%
4	Heart disease (I30-I52)	238	8.6%
5	Congenital malformations of the circulatory system (Q20-Q28)	212	7.7%
6	Infections specific to the perinatal period (P35-P39)	120	4.4%
7	Other congenital malformations (Q80-Q89)	103	3.7%
8	Septicemia (A40–A41)	66	2.4%
9	Influenza and pneumonia (J09-J18)	63	2.3%
10	Chromosomal abnormalities, not elsewhere classified (Q90-Q99)	50	1.8%

***Percentage of the total infant deaths in the year 2017**

Leading cause of deaths in children under-five years of age, 2016

Rank	Cause of death (ICD Code)	Number	%*
1	Other and unspecified conditions originating in the perinatal period (P80-P96)	807	26.2%
2	Respiratory and cardiovascular disorders specific to the perinatal period (P20-P29)	463	15.0%
3	Disorders related to length of gestation and fetal growth (P05-P08)	204	6.6%
4	Congenital malformations of the circulatory system (Q20-Q28)	170	5.5%
5	Heart disease (I30-I52)	140	4.5%
6	Infections specific to the perinatal period (P35-P39)	113	3.7%
7	Other congenital malformations (Q80-Q89)	78	2.5%
8	Influenza and pneumonia (J09-J18)	56	1.8%
9	Anencephaly and other malformations of the nervous system (Q00-Q07)	47	1.5%
10	Other diseases of the respiratory system (J95-J99)	41	1.3%

***Percentage of the total deaths of children aged 0-5 in the year 2016**

Leading cause of deaths in children under-five years of age, 2017.

Rank	Cause of death (ICD Code)	Number	%*
1	Respiratory and cardiovascular disorders specific to the perinatal period (P20-P29)	409	12.4%
2	Other and unspecified conditions originating in the perinatal period (P80-P96)	386	11.7%
3	Heart disease (I30-I52)	298	9.0%
4	Disorders related to length of gestation and fetal growth (P05-P08)	277	8.4%
5	Congenital malformations of the circulatory system (Q20-Q28)	249	7.6%
6	Infections specific to the perinatal period (P35-P39)	121	3.7%
7	Other congenital malformations (Q80-Q89)	108	3.3%
8	Septicemia (A40–A41)	99	3.0%
9	Influenza and pneumonia (J09-J18)	96	2.9%
10	Pulmonary heart disease and diseases of pulmonary circulation (I26-I28)	65	2.0%

***Percentage of the total deaths of children aged 0-5 in the year 2017**

Leading cause of deaths in children 5-14 years of age, 2016.

Rank	Cause of death (ICD Code)	Number	%*
1	Transport accidents (V01-V99)	66	14.5%
2	Heart disease (I30-I52)	40	8.8%
3	Malignant neoplasms of lymphoid, haematopoietic and related tissue (C81-C96)	16	3.5%
4	Influenza and pneumonia (J09-J18)	12	2.6%
5	Cerebral palsy and other paralytic syndromes (G80-G83)	10	2.2%
6	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D54-D89)	10	2.2%
7	Accidents involving firearms (W32-W34)	9	2.0%
8	Metabolic disorders (E70-E90)	6	1.3%
9	Cancer meninges, brain & other parts of central nervous system C70-C72	6	1.3%
10	Assault (X85-Y09)	6	1.3%

***Percentage of the total deaths of children aged 5-14 in the year 2016**

Leading cause of deaths in children 5-14 years of age, 2017.

Rank	Cause of death (ICD Code)	Number	%*
1	Heart disease (I30-I52)	54	11.2%
2	Transport accidents (V01-V99)	30	6.2%
3	Influenza and pneumonia (J09-J18)	27	5.6%
4	Malignant neoplasms of lymphoid, haematopoietic and related tissue (C81-C96)	20	4.1%
5	Pulmonary heart disease and diseases of pulmonary circulation (I26-I28)	19	3.9%
6	Septicaemia (A40–A41)	15	3.1%
7	Renal failure (N17-N19)	15	3.1%
8	Cerebral palsy and other paralytic syndromes (G80-G83)	14	2.9%
9	Cancer meninges, brain & other parts of central nervous system C70-C72	13	2.7%
10	Congenital malformations of the circulatory system (Q20-Q28)	12	2.5%

***Percentage of the total deaths of children aged 5-14 in the year 2017**

Rank	Cause of death (ICD Code)	Number	%*
1	Transport accidents (V01-V99)	394	10.4%
2	Heart disease (I30-I52)	373	9.8%
3	All Malignancy (C00-D48)	259	6.8%
4	Accidents involving firearms (W32-W34)	217	5.7%
5	Assault (X85-Y09)	182	4.8%
6	Ischaemic heart diseases (I20-I25)	129	3.4%
7	Cerebrovascular diseases (I60-I69)	93	2.5%
8	Renal failure (N17-N19)	90	2.4%
9	Diabetes mellitus (E10-E14)	79	2.1%
10	Legal intervention and operations of war (Y35-Y36) W40	55	1.5%

***Percentage of the total deaths of men 15-59 years of age in the year 2016**

Women

Rank	Cause of death (ICD Code)	Number	%*
1	All Malignancy (C00-D48)	276	17.7%
2	Heart disease (I30-I52)	190	12.2%
3	Transport accidents (V01-V99)	81	5.2%
4	Diabetes mellitus (E10-E14)	74	4.7%
5	Ischaemic heart diseases (I20-I25)	36	2.3%
6	Cerebrovascular diseases (I60-I69)	33	2.1%
7	Hypertensive diseases (I10-I15)	28	1.8%
8	Accidental falls (W00-W19)	26	1.7%
9	Influenza and pneumonia (J09-J18)	25	1.6%
10	Cirrhosis and other diseases of liver (K70-K76)	22	1.4%

***Percentage of the total deaths of women 15-59 years of age in the year 2016**

Leading cause of deaths in adults 15-59 years of age by gender, 2017

Men

Rank	Cause of death (ICD Code)	Number	%*
1	Heart disease (I30-I52)	504	14.8%
2	Accidents involving firearms (W32-W34)	294	8.6%
3	Transport accidents (V01-V99)	267	7.8%
4	All Malignancy (C00-D48)	218	6.4%
5	Ischaemic heart diseases (I20-I25)	101	3.0%
6	Event of undetermined intent (Y10-Y34)	95	2.8%
7	Renal failure (N17-N19)	92	2.7%
8	Cerebrovascular diseases (I60-I69)	91	2.7%
9	Diabetes mellitus (E10-E14)	87	2.6%
10	Human immunodeficiency virus [HIV] disease (B20-B24)	86	2.5%

***Percentage of the total deaths of men 15-59 years of age in the year 2017**

Women

Rank	Cause of death (ICD Code)	Number	%*
1	All Malignancy (C00-D48)	290	18.9%
2	Heart disease (I30-I52)	272	17.7%
3	Renal failure (N17-N19)	62	4.0%
4	Diabetes mellitus (E10-E14)	58	3.8%
5	Cerebrovascular diseases (I60-I69)	54	3.5%
6	Transport accidents (V01-V99)	49	3.2%
7	Ischaemic heart diseases (I20-I25)	45	2.9%
8	Human immunodeficiency virus [HIV] disease (B20-B24)	33	2.1%
9	Metabolic disorders (E70-E90)	24	1.6%
10	Influenza and pneumonia (J09-J18)	24	1.6%

***Percentage of the total deaths of women 15-59 years of age in the year 2017**

Leading cause of deaths in adults over 60 years of age by gender, 2016.

Men

Rank	Cause of death (ICD Code)	Number	%*
1	Heart disease (I30-I52)	512	14.6%
2	All Malignancy (C00-D48)	289	8.3%
3	Ischaemic heart diseases (I20-I25)	207	5.9%
4	Diabetes mellitus (E10-E14)	203	5.8%
5	Cerebrovascular diseases (I60-I69)	199	5.7%
6	Renal failure (N17-N19)	144	4.1%
7	Hypertensive diseases (I10-I15)	131	3.7%
8	Influenza and pneumonia (J09-J18)	112	3.2%
9	Transport accidents (V01-V99)	50	1.4%
10	Chronic lower respiratory diseases (J40-J47)	44	1.3%

***Percentage of the total deaths of men over 60 years of age in the year 2016**

Women

Rank	Cause of death (ICD Code)	Number	%*
1	Heart disease (I30-I52)	473	17.1%
2	Diabetes mellitus (E10-E14)	223	8.0%
3	Cerebrovascular diseases (I60-I69)	209	7.5%
4	All Malignancy (C00-D48)	193	7.0%
5	Ischaemic heart diseases (I20-I25)	165	6.0%
6	Hypertensive diseases (I10-I15)	142	5.1%
7	Renal failure (N17-N19)	139	5.0%
8	Influenza and pneumonia (J09-J18)	115	4.2%
9	Pulmonary oedema and other interstitial pulmonary diseases (J80-J84)	35	1.3%
10	Cirrhosis and other diseases of liver (K70-K76)	34	1.2%

***Percentage of the total deaths of women over 60 years of age in the year 2016**

Leading cause of deaths in adults over 60 years of age by gender, 2017.

Men

Rank	Cause of death (ICD Code)	Number	%*
1	Heart disease (I30-I52)	867	19.8%
2	All Malignancy (C00-D48)	407	9.3%
3	Cerebrovascular diseases (I60-I69)	302	6.9%
4	Ischaemic heart diseases (I20-I25)	253	5.8%
5	Diabetes mellitus (E10-E14)	199	4.5%
6	Renal failure (N17-N19)	159	3.6%
7	Hypertensive diseases (I10-I15)	132	3.0%
8	Influenza and pneumonia (J09-J18)	123	2.8%
9	Cirrhosis and other diseases of liver (K70-K76)	52	1.2%
10	Chronic lower respiratory diseases (J40-J47)	50	1.1%

***Percentage of the total deaths of men over 60 years of age in the year 2017**

Women

Rank	Cause of death (ICD Code)	Number	%*
1	Heart disease (I30-I52)	673	17.9%
2	Cerebrovascular diseases (I60-I69)	280	7.5%
3	All Malignancy (C00-D48)	236	6.3%
4	Ischaemic heart diseases (I20-I25)	224	6.0%
5	Diabetes mellitus (E10-E14)	205	5.5%
6	Hypertensive diseases (I10-I15)	164	4.4%
7	Renal failure (N17-N19)	137	3.6%
8	Influenza and pneumonia (J09-J18)	106	2.8%
9	Metabolic disorders (E70-E90)	50	1.3%
10	Cirrhosis and other diseases of liver (K70-K76)	50	1.3%

***Percentage of the total deaths of women over 60 years of age in the year 2017**

Annex 5: ANACONDA data quality assessment

Cause of death classified based on ANACONDA tool. The levels of severity are categorised from 1-4 according to their potential impact on guiding public policy.

2016 ICD chapter	Description	ICD code range	Total deaths	% of total deaths	Total unusable causes	Total unusable level 1/2/3	Total unusable level 4	% of total unusable causes
1	Chapter I: Certain infectious and parasitic diseases	A00-B99	357	2.3	139	139	0	2.2
2	Chapter II: Neoplasms	C00-D48	1195	7.6	91	91	0	1.4
3	Chapter III: Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	D50-D89	88	0.6	38	38	0	0.6
4	Chapter IV: Endocrine, nutritional and metabolic diseases	E00-E90	809	5.1	91	91	0	1.4
5	Chapter V: Mental and behavioural disorders	F00-F99	11	0.1	9	9	0	0.1
6	Chapter VI: Diseases of the nervous system	G00-G99	191	1.2	87	69	18	1.4
7	Chapter VII: Diseases of the eye and adnexa	H00-H59	1	0.0	1	1	0	0.0
8	Chapter VIII: Diseases of the ear and mastoid process	H60-H95	0	0.0	0	0	0	0.0
9	Chapter IX: Diseases of the circulatory system	I00-I99	3544	22.5	2389	2110	279	37.1
10	Chapter X: Diseases of the respiratory system	J00-J99	919	5.8	579	289	290	9.0
11	Chapter XI: Diseases of the digestive system	K00-K93	208	1.3	33	33	0	0.5
12	Chapter XII: Diseases of the skin and subcutaneous tissue	L00-L99	18	0.1	0	0	0	0.0
13	Chapter XIII: Diseases of the musculoskeletal system and connective tissue	M00-M99	20	0.1	7	7	0	0.1
14	Chapter XIV: Diseases of the genitourinary system	N00-N99	472	3.0	245	245	0	3.8
15	Chapter XV: Pregnancy, childbirth and the puerperium	O00-O99	38	0.2	16	16	0	0.2
16	Chapter XVI: Certain conditions originating in the perinatal period	P00-P96	1687	10.7	36	0	36	0.6
17	Chapter XVII: Congenital malformations, deformations and chromosomal abnormalities	Q00-Q99	396	2.5	0	0	0	0.0
18	Chapter XVIII: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	R00-R99	2079	13.2	2072	2072	0	32.2
19	Chapter XIX: Injury, poisoning and certain other consequences of external causes	S00-T98	348	2.2	348	348	0	5.4
20	Chapter XX: External causes of morbidity and mortality	V01-Y98	1367	8.7	244	67	177	3.8
21	Chapter XXI: Factors influencing health status and contact with health services	Z00-Z99	14	0.1	14	14	0	0.2
22	Chapter XXII: Codes for special purposes	U00-U85	0	0.0	0	0	0	0.0

2017 ICD chapter	Description	ICD code range	Total deaths	% of total deaths	Total unusable causes	Total unusable level 1/2/3	Total unusable level 4	% of total unusable causes
1	Chapter I: Certain infectious and parasitic diseases	A00-B99	357	2.3	139	139	0	2.2
2	Chapter II: Neoplasms	C00-D48	1195	7.6	91	91	0	1.4
3	Chapter III: Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	D50-D89	88	0.6	38	38	0	0.6
4	Chapter IV: Endocrine, nutritional and metabolic diseases	E00-E90	809	5.1	91	91	0	1.4
5	Chapter V: Mental and behavioural disorders	F00-F99	11	0.1	9	9	0	0.1
6	Chapter VI: Diseases of the nervous system	G00-G99	191	1.2	87	69	18	1.4
7	Chapter VII: Diseases of the eye and adnexa	H00-H59	1	0.0	1	1	0	0.0
8	Chapter VIII: Diseases of the ear and mastoid process	H60-H95	0	0.0	0	0	0	0.0
9	Chapter IX: Diseases of the circulatory system	I00-I99	3544	22.5	2389	2110	279	37.1
10	Chapter X: Diseases of the respiratory system	J00-J99	919	5.8	579	289	290	9.0
11	Chapter XI: Diseases of the digestive system	K00-K93	208	1.3	33	33	0	0.5
12	Chapter XII: Diseases of the skin and subcutaneous tissue	L00-L99	18	0.1	0	0	0	0.0
13	Chapter XIII: Diseases of the musculoskeletal system and connective tissue	M00-M99	20	0.1	7	7	0	0.1
14	Chapter XIV: Diseases of the genitourinary system	N00-N99	472	3.0	245	245	0	3.8
15	Chapter XV: Pregnancy, childbirth and the puerperium	O00-O99	38	0.2	16	16	0	0.2
16	Chapter XVI: Certain conditions originating in the perinatal period	P00-P96	1687	10.7	36	0	36	0.6
17	Chapter XVII: Congenital malformations, deformations and chromosomal abnormalities	Q00-Q99	396	2.5	0	0	0	0.0
18	Chapter XVIII: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	R00-R99	2079	13.2	2072	2072	0	32.2
19	Chapter XIX: Injury, poisoning and certain other consequences of external causes	S00-T98	348	2.2	348	348	0	5.4
20	Chapter XX: External causes of morbidity and mortality	V01-Y98	1367	8.7	244	67	177	3.8
21	Chapter XXI: Factors influencing health status and contact with health services	Z00-Z99	14	0.1	14	14	0	0.2
22	Chapter XXII: Codes for special purposes	U00-U85	0	0.0	0	0	0	0.0

Annex 6: WHO mortality tabulation list 1, general mortality, condensed list

code	Detailed List Numbers	Cause
1000		All causes
1001	A00-B99	Certain infectious and parasitic diseases
1002	A00	Cholera
1003	A09	Diarrhoea and gastroenteritis of presumed infectious origin
1004	A01-A08	Other intestinal infectious diseases
1005	A15-A16	Respiratory tuberculosis
1006	A17-A19	Other tuberculosis
1007	A20	Plague
1008	A33-A35	Tetanus
1009	A36	Diphtheria
1010	A37	Whooping cough
1011	A39	Meningococcal infection
1012	A40-A41	Septicaemia
1013	A50-A64	Infections with a predominantly sexual mode of transmission
1014	A80	Acute poliomyelitis
1015	A82	Rabies
1016	A95	Yellow fever
1017	A90-A94, A96-A99	Other arthropod-borne viral fevers and viral haemorrhagic fevers
1018	B05	Measles
1019	B15-B19	Viral hepatitis
1020	B20-B24	Human immunodeficiency virus [HIV] disease
1021	B50-B54	Malaria
1022	B55	Leishmaniasis
1023	B56-B57	Trypanosomiasis
1024	B65	Schistosomiasis
1025	A21-A32, A38, A42-A49, A65-A79, A81, A83-A89, B00-B04, B06-B09, B25-B49, B58-B64, B66-B94, B99	Remainder of certain infectious and parasitic diseases
1026	C00-D48	Neoplasms
1027	C00-C14	Malignant neoplasm of lip, oral cavity and pharynx
1028	C15	Malignant neoplasm of oesophagus
1029	C16	Malignant neoplasm of stomach
1030	C18-C21	Malignant neoplasm of colon, rectum and anus
1031	C22	Malignant neoplasm of liver and intrahepatic bile ducts
1032	C25	Malignant neoplasm of pancreas
1033	C32	Malignant neoplasm of larynx
1034	C33-C34	Malignant neoplasm of trachea, bronchus and lung
1035	C43	Malignant melanoma of skin
1036	C50	Malignant neoplasm of breast
1037	C53	Malignant neoplasm of cervix uteri
1038	C54-C55	Malignant neoplasm of other and unspecified parts of uterus
1039	C56	Malignant neoplasm of ovary
1040	C61	Malignant neoplasm of prostate
1041	C67	Malignant neoplasm of bladder
1042	C70-C72	Malignant neoplasm of meninges, brain and central nervous system

code	Detailed List Numbers	Cause
1043	C82-C85	Non-Hodgkin's lymphoma
1044	C90	Multiple myeloma and malignant plasma cell neoplasms
1045	C91-C95	Leukaemia
1046	C17, C23-C24, C26-C31, C37-C41, C44-C49, C51-C52, C57-C60, C62-C63,C68-C69,C73-C81,C88,C96-C97	Remainder of malignant neoplasms
1047	D00-D48	Remainder of neoplasms
1048	D50-D89	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism
1049	D50-D64	Anaemias
1050	D65-D89	Remainder of diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism
1051	E00-E88	Endocrine, nutritional and metabolic diseases
1052	E10-E14	Diabetes mellitus
1053	E40-E46	Malnutrition
1054	E00-E07, E15-E34, E50-E88	Remainder of endocrine, nutritional and metabolic diseases
1055	F01-F99	Mental and behavioural disorders
1056	F10-F19	Mental and behavioural disorders due to psychoactive substance use
1057	F20-F99	Remainder of mental and behavioural disorders
1058	G00-G98	Diseases of the nervous system
1059	G00, G03	Meningitis
1060	G30	Alzheimer's disease
1061	G04-G25, G31-G98	Remainder of diseases of the nervous system
1062	H00-H57	Diseases of the eye and adnexa
1063	H60-H93	Diseases of the ear and mastoid process
1064	I00-I99	Diseases of the circulatory system
1065	I00-I09	Acute rheumatic fever and chronic rheumatic heart diseases
1066	I10-I13	Hypertensive diseases
1067	I20-I25	Ischaemic heart diseases
1068	I26-I51	Other heart diseases
1069	I60-I69	Cerebrovascular diseases
1070	I70	Atherosclerosis
1071	I71-I99	Remainder of diseases of the circulatory system
1072	J00-J98	Diseases of the respiratory system
1073	J10-J11	Influenza
1074	J12-J18	Pneumonia
1075	J20-J22	Other acute lower respiratory infections
1076	J40-J47	Chronic lower respiratory diseases
1077	J00-J06, J30-J39, J60-J98	Remainder of diseases of the respiratory system
1078	K00-K92	Diseases of the digestive system
1079	K25-K27	Gastric and duodenal ulcer
1080	K70-K76	Diseases of the liver
1081	K00-K22, K28-K66, K80-K92	Remainder of diseases of the digestive system
1082	L00-L98	Diseases of the skin and subcutaneous tissue
1083	M00-M99	Diseases of the musculoskeletal system and connective tissue
1084	N00-N98	Diseases of the genitourinary system
1085	N00-N15	Glomerular and renal tubulo-interstitial diseases

code	Detailed List Numbers	Cause
1086	N17-N98	Remainder of diseases of the genitourinary system
1087	O00-O99	Pregnancy, childbirth and the puerperium
1088	O00-O07	Pregnancy with abortive outcome
1089	O10-O92	Other direct obstetric deaths
1090	O98-O99	Indirect obstetric deaths
1091	O95-O97	Remainder of pregnancy, childbirth and the puerperium
1092	P00-P96	Certain conditions originating in the perinatal period
1093	Q00-Q99	Congenital malformations, deformations and chromosomal abnormalities
1094	R00-R99	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified
1095	V01-Y89	External causes of morbidity and mortality
1096	V01-V99	Transport accidents
1097	W00-W19	Falls
1098	W65-W74	Accidental drowning and submersion
1099	X00-X09	Exposure to smoke, fire and flames
1100	X40-X49	Accidental poisoning by and exposure to noxious substances
1101	X60-X84	Intentional self-harm
1102	X85-Y09	Assault
1103	W20-W64, W75-W99, X10-X39, X50-X59, Y10-Y89	All other external causes

Annex 7: List of participants in the collection of death certificates, Data entry and administrative support

1	Khalid Mohammed Al Dabri	**40**	Ahmed Abdul Hafeez Abdul Rahman Musa
2	Naima Abdulsalam Al Kilani	**41**	Maha Mokhtar Al Jaroushi
3	Amal Adel Mansour	**42**	Gaber Abdul Salam Arebi
4	Thuraya Taher Elmelady	**43**	Ahmed Elmabrouk Elghaziwi
5	Ayad Mohammed Sadiq	**44**	Fatima Mohamed Alzoi
6	Mohamed Ali Daw	**45**	Yahya Ali Abdul Azim
7	Waleed Masood Abdullah Masood	**46**	Yahya Ahmed Omar
8	Manal Khaled Bin Anbeh	**47**	Najwa Bashir
9	Mohammed Hassan Al-Asham	**48**	Ashraf Tarhouni
10	Rabea Ali Abdelsalam Ezzeddine	**49**	Mohamed Eltaeb
11	Ahmed Yousef Salem	**50**	Hatem Elhafi
12	Salem Al - Amin Ebrahim	**51**	Ezz Edin Khalifa Abdullah
13	Najla Omran Kaheel	**52**	Faraj Farkash
14	Sharif Mohamed Saleh	**53**	Khaled Ahmad Almsallati
15	Fardos Alhadi Algali	**54**	Khari Aldbar
16	Saleh Abdullah Ger	**55**	Waleed Masoud
17	Fatima Mohamed Alzoi	**56**	Ahmad Mohamed Karatem
18	Ahlam Said Kafu	**57**	Hussein Milad Aburhaila
19	Widad Ebrahim Salem Kafu	**58**	Sabah Ebrahim Abdul Rahman
20	Mofeda Hasan Albakoosh	**59**	Eman Bannour Eltief
21	Fatima Elsharif Elrgeeg	**60**	Salem Al - Amin Ebrahim
22	Esmail al-Qanti	**61**	Zeina Muammar
23	Fahima Khetouni	**62**	Moftah Abd Alaziz
24	Soad Saleh Moftah	**63**	Ahmed Saleh Ali
25	Miloud Mohamed	**64**	Mohamed Mansor
26	Mohamed Elsadeg	**65**	Suleiman Omran
27	Abd Al Jawad Eid Abd Al Jawad	**66**	Essa Abdul Hadi Mohammed
28	Salem Yonis	**67**	Hamza Ali Abubakr
29	Ebtisam Saad Othman	**68**	Attia Mikael
30	Saad Aqeela	**69**	Aisha Mohammed Abdul Qader
31	Mehdi Kaouni	**70**	Gomaa Ali Abdelkader
32	Abdelfattah Embark Abdullah	**71**	Nizar Abdurraziq Mohamed
33	Khalifa Al Jatlawi	**72**	Ashraf Dalaf
34	Mohammed Ramadan Sunni	**73**	Ahmed Yousuf Farajallh
35	Kamila Gibran Zayani	**74**	Omar Alaref Said
36	Mahmoud Saleh Mahmoud	**75**	Osama Mohamed .E. Abdulgader
37	Elsnouusy Ayad	**76**	Nadir Khalifa Shalbak
38	Salem Mohamed AIbshir	**77**	Ebtissam Mohamed Elshibani
39	Nour Eddine Abu Fteita	**78**	Khuloud Ammar Salama