TUVALU
CIVIL REGISTRATION AND VITAL STATISTICS REPORT
2012–2016

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TUVALU

CIVIL REGISTRATION AND VITAL STATISTICS REPORT 2012–2016

CENTRAL STATISTICS DIVISION, GOVERTNMENT OF TUVALU

Pacific Community
Communauté du Pacifique

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ABBREVIATIONS

ASFR	age specific fertility rate
CBR	crude birth rate
CDR	crude death rate
C.I	confidence intervals
CMR	consolidate monthly report
CRVS	civil registration and vital statistics
ICD	International Classification of Diseases
NCD	non-communicable diseases
SPC	Pacific Community
TFR	total fertility rate
WHO	World Health Organization

SUMMARY OF MAIN INDICATORS

Data sources: Birth and death records maintained by the civil registration and health information system		2012-2016
Births and Fertility	Completeness of birth records	88.3%
	Total number of recorded births	1082
	Average number of births recorded per year	216
	Sex ratio at birth – male: female	117
	Adjusted crude birth rate (per 1,000 population)	22.5
	Adjusted total fertility rate	3.4
Mortality	Completeness of death records	61.5%
	Total number of recorded deaths	342
	Average number of deaths recorded per year	68
	Recorded maternal deaths	1
Cause of Death	Proportion of deaths assigned ill-defined causes	27(12.0%)
	Percentage of deaths due to non-communicable diseases (NCDs^) in adults aged 15–59	43

^ Selected NCDs were those best matching the NCDs selected for WHO international targets.

EXECUTIVE SUMMARY

This is Tuvalu's first civil registration and vital statistics report based on administrative records of births and deaths. The report provides statistics pertaining to live births and deaths that occurred in the country, and were captured in either the civil registration or health information system between 2012 and 2016. The birth and death data analysed from the combined dataset was 83.3% and 61.5% complete respectively. Due to the high level of incompleteness of the death data set, it was not possible to compute any mortality rates and indicators. The study therefore focused on presenting the proportional distribution of reported deaths by year, age and sex.

There was an average of 216 births reported per year, between 2012 and 2016; with 116 male births and 99 female births. The crude birth rate was 22.5. There was an average of three babies born to every woman in her lifetime during these years. Fertility was highest amongst women in the 25–29 age groups (161 births per every 1,000 women in this age group). There was an irregular pattern in the yearly reporting of births. The lowest number of births was reported in 2012 (187 births) and the highest in 2014 (261 births).

The total number of deaths reported for the period 2012 to 2016 was 342; equating to an average of 68 deaths per year for the five-year period. As with births, there was an irregular pattern in the reporting of deaths, with the highest number reported in 2016 (90 deaths) and the lowest in 2013 (49 deaths). The fluctuations in the level of reporting are further seen in the distribution of deaths by age. There appears to be significant under reporting of deaths in the age groups 35–39, 65–69, and 70–74.

Causes of death for 2012–2015 were tabulated according to the ICD-10 General Mortality List 1, at chapter and sub-chapter levels. Diabetes mellitus and 'other heart diseases' were the leading causes of death for all ages and both sexes. Children aged 0-4 ýears mostly died of perinatal conditions (33% C.I 11.1, 55.6). Non-communicable diseases were responsible for 43% of all deaths in the 15–59 age group, of which diseases of the circulatory system accounted for 56% and diabetes mellitus accounted for 26% of deaths in this age group.

This report provides important information on the status of the civil registration and health information system of Tuvalu, with regard to the capturing of birth and death occurrences and associated information. By providing basic statistics on births and deaths, the report demonstrates the potential value that the two records could play in providing the country with routine administrative data if they achieved universal completeness and a high-level of data quality. The findings of the study underline the critical need to strengthen the coverage and completeness of the two collections, more specifically, collections by the civil registration system. It is envisaged that the report will serve as a fundamental tool in advocating for further investment in improving the performance of both systems. It is recommended that the country establishes a routine schedule of analysing data from these two sources (at least every three years), as a means of improving the quality of data and monitoring the performance of the systems.

1. INTRODUCTION

Vital statistics refers to the collection of statistics on vital events in the lifetime of a person, as well as relevant characteristics of the events themselves and of the person(s) concerned. There are ten vital events recognised by the United Nations.[1] Principal among them are events that are directly associated with life and death, namely live births and deaths.

Vital statistics provide crucial information on the population of a country. This information is required by governments for planning at national and subnational levels. The government in each country requires statistics on the number and characteristics of the population in order to be able to allocate resources and to plan for the future in numerous sectors, including education, health, housing, transport and infrastructure. In Tuvalu, these statistics are crucial to the monitoring of the progress of the health targets outlined in the National Strategy for Sustainable Development, as well as commitments to the United Nations 2030 Agenda for sustainable development.

This report presents an analysis of birth and death records maintained by the health information system and the civil registration system of Tuvalu. The records from both systems were reconciled and consolidated into one data-set which was used for the analysis. The consolidation of records from both sources was found necessary in order to provide a more complete data-set for the analysis.

The report presents statistics on live births and deaths, analysed by selected socio-demographic characteristics for the years 2012–2016. The report also includes basic fertility estimates for the same period, as well as the leading causes of death (for 2012–2015), disaggregated by age and sex. Since the two data sources used were incomplete, the statistics and estimates produced are not nationally representative.

1 According to the United Nations, vital events include live births, deaths and foetal deaths, marriage, registered partnership, separation, divorce, legal dissolution of registered partnerships and annulment of marriage, adoption, legitimation and recognition. See https://unstats.un.org/unsd/demographic/standmeth/principles/M19Rev3en.pdf

2. DATA AND METHODOLOGY

2.1 Data sources

There were two sources of data for this study: the civil registration database and Tuvalu's health information system. Each of these provided unit-record data on birth, deaths and causes of death for 2012–2016 and 2012–2015 respectively. For the purpose of this exercise, records from the two data-sets were consolidated into one, in order to provide a more complete record for the analysis. The analysis also relied on the records of the 2012 Population and Housing Census for verification and imputation purposes. The 2012 census collected information on deaths that occurred between 2009 and 2012 and on births by place of occurrence. The census report also includes important fertility estimates that were used for comparison purposes.

2.2 Data cleaning

The data were cleaned primarily by editing and imputation. This involved the removal of duplicates and standardising the format of the records. In cases where there were missing variables, such as sex of child, birth dates of child, age of mother and birth year of the deceased, the variables were imputed from the 2012 census records. Foetal deaths (still-births and miscarriages) were removed from both the live birth and death data. The descriptions of causes of death of some cases were wrongly recorded and needed to be corrected, using information provided by the health administration department.

Tuvalu uses a medical certificate of death that is consistent with the international standard medical certificate of death from the 10th version of the International Classification of Diseases (ICD-10). During the analysis, it was found that the cause-of-death descriptions were filled out according to primary diagnosis, and not according to the format outlined in the international medical certificate. The causes were also not coded; and therefore the analysis included a coding exercise. Coding was conducted according to the WHO General Mortality List 1, which provides 104 categories of causes of death (See Appendix 2).

2.3 Coverage and completeness of data

a. Coverage

The data analysed in this study included all births and deaths of all population groups in the country, including the main and outer islands, in the period 2009–2012. The analysis was based on a combined data-set of the health information system database and the civil registration system. The former provided records of births and deaths that occurred in the country's main hospital and all the health clinics, while the civil registration database, which covers all regions of the country, provided records of all births and deaths registered.

b. Completeness

To estimate completeness of the data, the number of births and deaths that were in the combined data-set (2009–2016) were divided by the total number of births and deaths expected to have occurred in the country in that period. The expected number of events was computed from the crude birth rate and the crude death rate estimates provided by the 2012 Population and Housing Census.

As shown in Table 1, the births data recorded in the civil registration and health database for 2012 to 2016 represents 88.3% of national births. This means that births are under-reported in the combined data-set by 11.7%; about 143 births were not included in the data-set that was analysed.

Table 1: Completeness of birth records (%) by period (2012–2016)

Year/ Period	Births recorded (observed)	Expected births	Births registration completeness (%)
2012	187	239	78.3
2013	216	242	89.3
2014	261	245	106.6
2015	208	248	83.8
2016	210	251	83.6
(2012-2016)	1082	1225	88.3

For deaths, the completeness level for the period 2012–2016 was found to be 61.5% (Table 2). This means that about 214 deaths, an average of 43 cases annually, were not captured in the data-set that was analysed. The level of incompleteness of the death data-set is of concern, as it inevitably affects the reliability of the population estimates, as well as the representativeness of the findings. Due to the incompleteness of the data-set, it was not possible to compute any mortality rates/indicators.

Table 2: Completeness of death records (%) by period (2012–2016)

Year/ Period	Deaths recorded (observed)	Expected deaths	Death registration completeness (%)
2012	52	108	48.1
2013	49	110	44.5
2014	85	111	76.6
2015	66	113	58.4
2016	90	114	78.9
(2012–2016)	342	556	61.5

In general, it is important to emphasise that all the statistics and estimates/indicators produced in this report are based on the **reported** number of events, i.e. births and deaths that were captured in the civil registration and health database, rather that the events that **actually occurred** and should therefore be interpreted as such.

2.4 Analysis and report format

The data were analysed on Microsoft Excel, using analysis software developed by the University of New South Wales. Birth and death data in the first and second chapter (respectively) are presented by absolute numbers for different years and also cross-tabulated by selected socio-demographic variables, mainly age and sex. The second part presents basic fertility indicators, with the formulas applied for each indicator presented in the appendix. The last chapter ranks the leading causes of death, categorized by the World Health Organization's General Mortality List 1) and categorised by age and sex.

In order to minimise instability in the figures due to the small size of the population and subsequently the risk of misleading interpretation, data were aggregated over a five-year period for calculation of all fertility rates. Confidence intervals are presented to highlight the uncertainty in the data. These were calculated using Poisson distributions, except for crude birth rates, where confidence intervals were calculated using binomial normal distribution.

3. BIRTHS AND FERTILITY

3.1 Reported number of births

The total number of reported births during the period 2012 to 2016 was1082; equating to an average of 216 reported births per year. These figures are displayed annually by sex in Table 3 and by year in Figure 1. There appears to be have been a steady rise in the number of births recorded in the years 2012 to 2014 and a drop in 2015, which is probably due to incompleteness in reporting of births. The 2012 Population Census of Tuvalu reported an average of 262 births for 2012; with 147 male births and 115 female births. A comparison between the census and the birth records as reported in the civil registration and health information database reveals under-registration of births by the latter.

Table 3: Reported births by sex (2012–2016)

Year of birth	Sex		Total
	Male	Female	
2012	102	85	187
2013	110	106	216
2014	139	122	261
2015	110	98	208
2016	122	88	210
TOTAL	**583**	**499**	**1082**
Average (2012–2016)	116.6	99.8	216

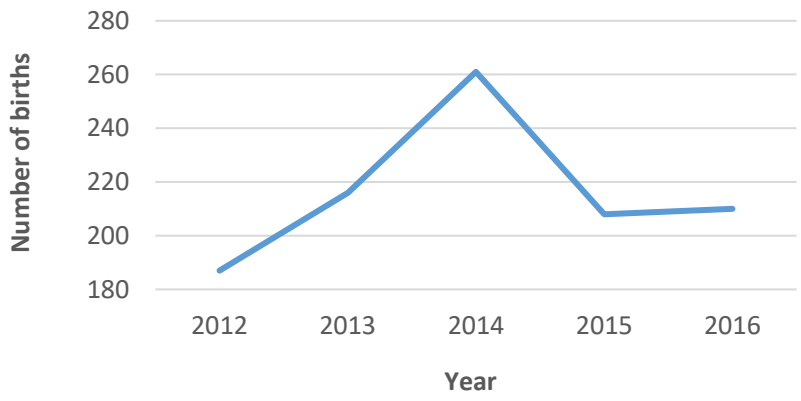

Figure 1: Reported births by year (2012–2016)

3.2 Reported births by age of mother

Child bearing is generally considered to occur between 15 and 49 years of age. Child birth to mothers outside this age range is possible but not common. Children born to mothers outside this age group are often at higher risk of morbidity and mortality, and the mothers often suffer from birth complications that could easily result in death. Understanding the distribution of mothers by age group is therefore important in enabling decision-makers to effectively design and target their maternal and neo-natal health interventions to the right population groups.

A majority of the births reported/recorded in the civil registration and health databases in the years 2012 to 2016 occurred to mothers aged between 20 and 29 years; births in this age group accounted for 61.2% of total births reported (Table 4 and

Figure 2). There was an average of 14 births among teenage mothers (aged 15 to 19) every year.

Table 4: Percentage distribution of reported births by age of mother (2012–2016)

Mothers' age group	Number of births	Percentage
<15	1	0.09
15–19	68	6.28
20–24	352	32.53
25–29	310	28.65
30–34	206	19.04
35–39	114	10.54
40–44	29	2.68
45–49	2	0.18
Total	**1082**	**1082**

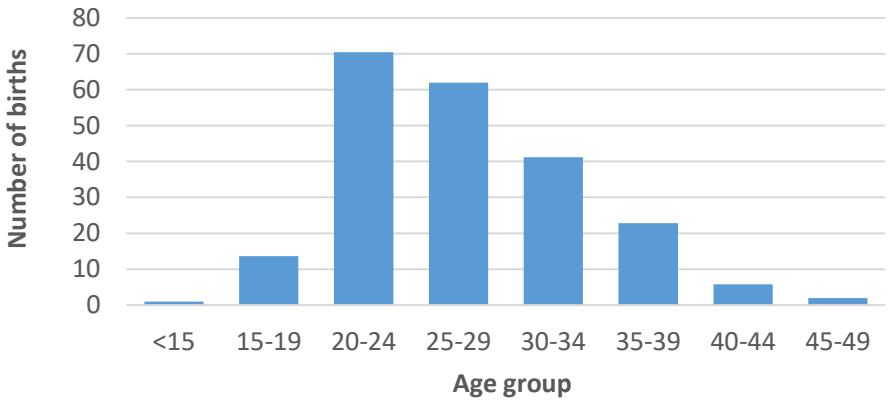

Figure 2: Average annual births by age of mother (2012–2016)

3.3 Reported births by place of birth

Table 5 provides the distribution of births by the region of occurrence. As would be expected, a majority of births occur in Funafuti. Over the five years, the highest number of outer island births were reported in 2014 (30 births). That same year also provides the closest estimate to the 2012 population census yearly number of births (261 as compared to 262 births reported by the census). This implies that that under-registration of births is more pronounced in the outer islands. Efforts to improve registration completeness should therefore be more focused in the outer islands.

Table 5: Reported births by year and region of occurrence (2012–2016)

Year	Funafuti	Outer Islands	Total
2012	178	9	187
2013	212	4	216
2014	231	30	261
2015	197	11	208
2016	194	16	210
Total	**1012**	**70**	**1082**

3.4 Crude birth rate based on reported number of births

The crude birth rate is a basic measure of fertility, referring to the number of births per thousand in the population over a given period of time. For small populations such as Tuvalu, it is advisable to always use multi-year averages while estimating such demographic rates, because annual fluctuations of the numbers can be quite considerable in small populations. Birth data for years 2012 to 2016 was, therefore, aggregated and divided by the mid-year population for the same period. (The mid-year population projections are provided in Appendix 1).

The crude birth rate is estimated to be 22.5 (C.I 19.8, 25.3) (Table 6). This means that there are about 23 births per 1,000 people of Tuvalu.

Table 6: Crude birth rate (2012–2015)

Year	CBR (95% confidence interval)	Adjusted Crude birth rate ((95% confidence interval)
2012-2015	19.9 (17.3-22.5)	22.5 (19.8-25.3)

3.5 Sex ratio at birth based on reported number of births

The sex ratio refers to the proportional distribution of the sexes in a population aggregate, expressed as the number of males per 100 females born. In most countries the sex ratio at birth is about 105–106 males per 100 females, meaning that, on average, there are more males than females born at any given point in time.

The sex ratio at birth for the period 2012 to 2016 is 117, which means that there were 117 male births per every 100 female births in the same period (Table 7). The sex ratio by year ranges from 103 in 2013 to 139 in 2016. The sex ratio estimate for the country for years 2012, 2014, 2015 and 2016 is outside the expected global range. This reflects a high likelihood of under-registration of female births. Figure 3 further showcases the differentials in the annual number of births by sex. It is evident that that births of both sexes are under-reported for most years by sex. The figure confirms under-registration, especially of female births; the number of female births reported in 2012 and 2016 was significantly lower than that of all other years.

Table 7: Sex ratio at birth, by year (2012–2016)

Year	Sex ratio
2012	120
2013	104
2014	114
2015	112
2016	139
2012–2015	117

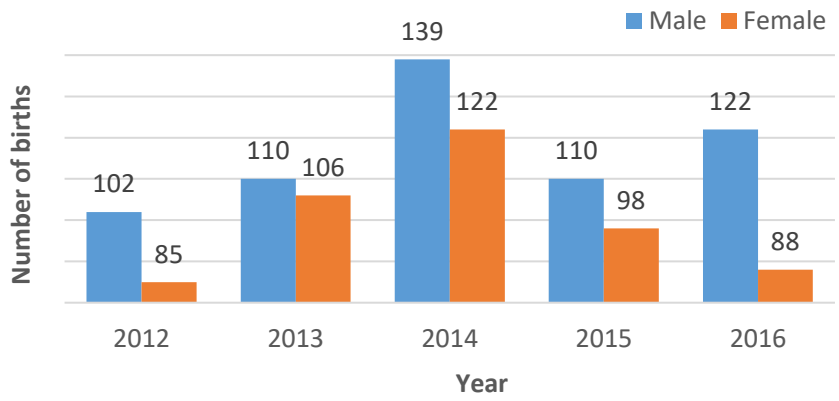

Figure 3: Percentage distribution of births by sex and year (2012–2016)

3.6 Age specific fertility rate based on reported number of births

The age-specific fertility rate (ASFR) refers to the number of births occurring to mothers of a certain age group per 1,000 women in that age group in a given period of time. As illustrated by Table 8 and

Figure 4, fertility rises steadily between ages 15–19 and 20–24, and peaks in the 25–29 age group (161 births per 1,000 women). It begins to steadily decline in the following age groups, to a low of one birth per 1,000 women aged 45–49 years.

Table 8: Age specific fertility rate based on reported births (2012–2016)

Age group	ASFR (fertility per 1,000 women)	95% confidence intervals	
15–19	25.4	19.28	36.78
20–24	156.5	142.83	176.85
25–29	161.0	148.88	186.43
30–34	128.8	109.04	145.68
35–39	102.6	80.78	132.78
40–44	23.7	13.80	38.11
45–49	1.3	0.20	7.65

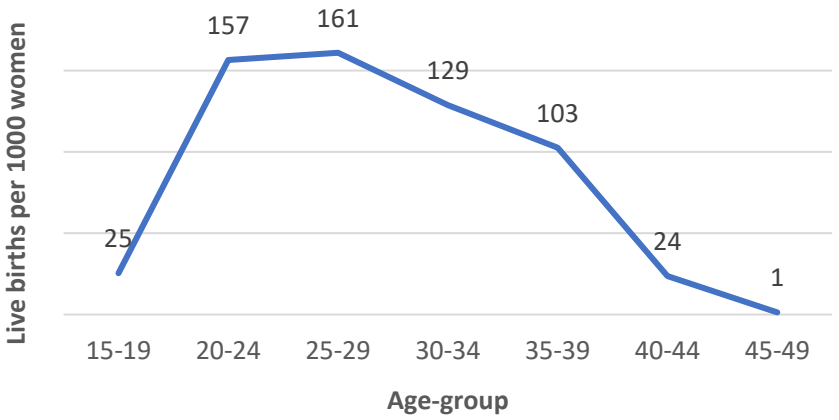

Figure 4: Reported births by mother's age group (2012–2016)

3.7 Total fertility rates based on reported number of births

The total fertility rate (TFR) is the average number of children a woman would give birth to during her lifetime if she were to pass through her childbearing years experiencing the present day age-specific fertility rates. The 2012 to 2016 birth data indicate that, on average, a Tuvaluan woman will have three children in her life time (Table 9).

Table 9: Total fertility rate (2012–2016)

Year	TFR (95% confidence intervals)	Adjusted TFR (95% confidence intervals)
2012–2016	3.0(2.8–3.2)	3.4(3.0–3.8)

4. MORTALITY

4.1 Number of reported deaths

The total number of deaths reported for the period 2012 to 2016 was 342; equating to an average of 68 deaths per year for the five-year period. These figures are displayed annually by year of reporting and by sex in Figure 5 and Figure 6 respectively. There is an uneven distribution of the number of reported deaths by year. There was a slight decline in the number of deaths reported between 2012 and 2013 (from 52 deaths to 49 deaths). This number shot to a high of 85 in 2014 and then declined to 66 in 2015. The highest number of deaths (90) was reported in 2016.

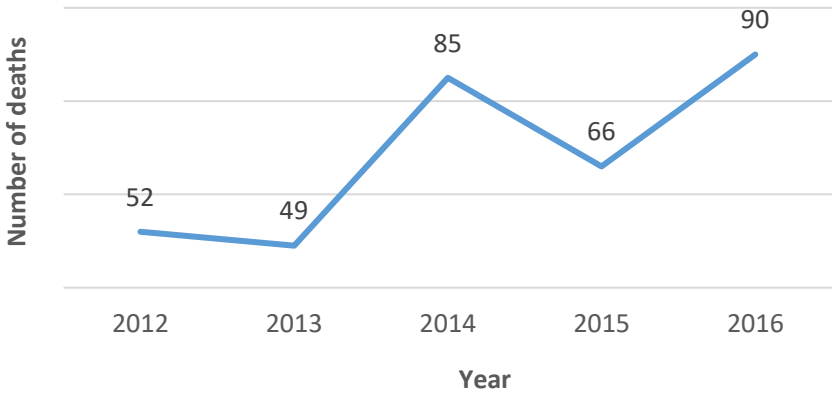

Figure 5: Reported deaths by year of reporting (2012–2016)

Differentials in reported deaths by sex reflect a relatively steady number of male deaths in 2012, 2013 and 2015 (an average of 27 deaths per year), and a considerably higher number of reported deaths in 2014 and 2016. Female deaths are unevenly reported across all years; the highest number of female deaths was reported in 2016. Comparisons between the annual number of reported deaths and those estimated by the census (which reported an average of 111 deaths per year) confirms under-reporting of deaths across all years.

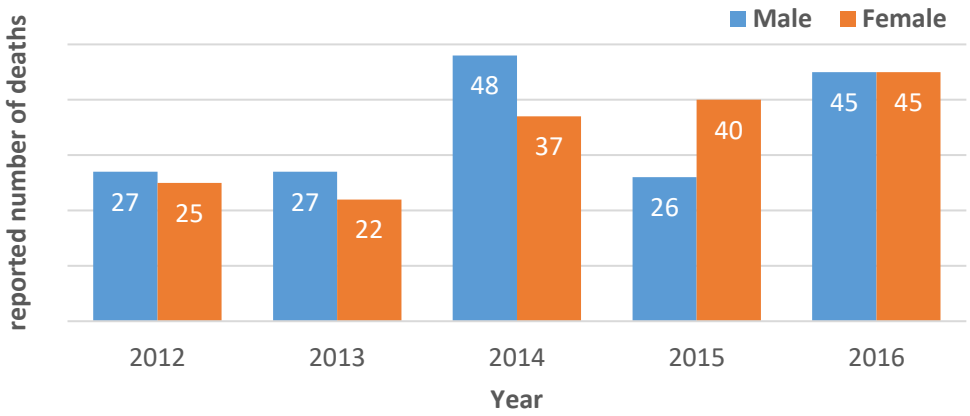

Figure 6: Reported deaths by sex of deceased (2012–2016)

4.2 Reported number of deaths by age

Figure 7 displays the distribution of reported deaths by age-group of the deceased for the period 2012–2016. Mortality is high among infants (aged below one year) and then declines in the 1–4 age group. There were no deaths among children aged 5–14 years and few in the age group 10–14. The number began to rise gradually, though irregularly, in the age groups 15–19, 25–29 and 30–34. There is a high possibility of under-reporting of death in the age groups 30–34 and 35–39. Often, the incentive to report

deaths (especially those occurring outside health facilities) is linked to the possibility of inheritance of the deceased estates. Where such is not existent, which is common in the younger age-groups, deaths are likely to go unreported. The rise in the number of deaths in the teenage and early adult age groups is often associated with injuries and accidents, which are common among youthful populations and occurs mostly among males.

Mortality begins to rise steadily from the age group 40–44 and reaches its peak in the age group 80+, as would be expected. There is an irregular pattern in the scale of mortality in some of the older age groups (differing from the expected trend of a steady rise), e.g. in age-groups 65–69 and 70–74, which could be associated with a possible under-reporting of deaths.

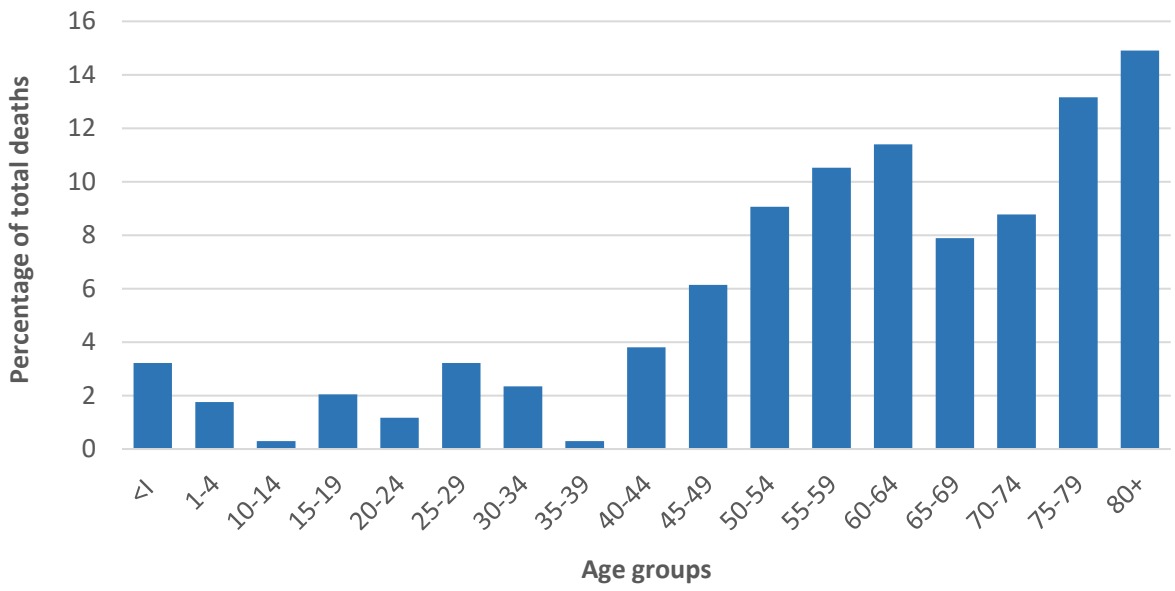

Figure 7: Reported deaths by age group of the deceased (2012–2016)

4.3 Summary measures of mortality

Due to the high level of incompleteness of the death data-set, it was not possible to compute generic mortality rates and indicators such as the crude death rate, the age-standardised mortality rate, indicators of early childhood mortality, and the maternal mortality rate. Table 10 provides a summary of some mortality measures as reported by the Tuvalu 2012 census results. *These *two child mortality rates are very sensitive to the small numbers. For example, if there was one less death in females aged 0 years, then the IMR and U5M would be 7 per 1,000 instead of 25 per 1,000.*

^ Crude death rate for both sexes combined = 9.8

Table 11 also provides age specific mortality rates, disaggregated by sex.

Table 10: Summary measures of mortality as reported by the last census

	Males	**Females**
Crude death rate^	10.2	9.4
*Infant mortality rate (IMR)	21	25
Under five mortality rate (U5M)	28	25
Life expectancy at birth	63.9	66.5

**These two child mortality rates are very sensitive to the small numbers. For example, if there was one less death in females aged 0 years, then the IMR and U5M would be 7 per 1,000 instead of 25 per 1,000.*

^ Crude death rate for both sexes combined = 9.8

Table 11: Age-specific death rates as estimated by the 2012 census

Age group	Total	Male	Female
0	23.3	21.4	25.6
1–4	0.9	1.8	0.0
5–9	0.0	0.0	0.0
10–14	0.0	0.0	0.0
15–19	2.5	2.4	2.6
20–24	3.4	4.2	2.5
25–29	1.6	1.5	1.8
30–34	3.1	3.1	3.2
35–39	4.8	4.6	4.9
40–44	5.5	3.6	7.5
45–49	13.9	12.3	15.6
50–54	13.2	22.5	5.9
55–59	17.3	17.8	16.8
60–64	29.5	29.9	29.2
65–69	42.9	42.2	43.4
70–74	41.2	50.0	35.1
75–79	102.9	193.2	49.2
80–84	185.2	250.0	147.1
85+	454.5	555.6	384.6

^ Note that small numbers lead to zero probability of dying in younger age groups.

5. CAUSES OF DEATH

Cause-of-death information and statistics provide crucial information for a country's health sector. It is only through understanding 'what the people are dying of' that governments can adequately safeguard their populations from premature and avoidable causes of mortality. Goal 3 of the Sustainable Development Goals outlines four major causes of mortality that countries around the world should work towards addressing. Among these, and predominant in the Pacific are non-communicable diseases (NCDs), deaths due to accidents and injuries, and causes of death among neonates and infants.

Table 12 provides the distribution of causes of death for Tuvalu, based on reported deaths for the years 2012–2015, classified by chapters of the International Classification of Diseases version 10 (ICD-10), General Mortality List 1. Diseases of the circulatory system are responsible for 34% of all deaths, followed by endocrine, nutritional and metabolic diseases (18%) and infectious and parasitic diseases. Twenty-seven deaths (12% of all deaths) were ill-defined and it was therefore not possible to attribute them to any particular cause. There was one maternal death reported over the four-year period.

Table 12: Causes of death for all ages and both sexes (2012–2015)

Cause of death for males and females by ICD Chapter	Number of deaths	Percentage
Diseases of the circulatory system	77	34.2
Endocrine, nutritional and metabolic diseases	40	17.8
Certain infectious and parasitic diseases	35	15.6
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	27	12.0
Neoplasms	24	10.7
External causes of morbidity and mortality	14	6.2
Diseases of the respiratory system	13	5.8
Diseases of the digestive system	6	2.7
Diseases of the genitourinary system	6	2.7
Certain conditions originating in the perinatal period	3	1.3
Diseases of the skin and subcutaneous tissue	3	1.3
Congenital malformations, deformations and chromosomal abnormalities	1	0.4
Diseases of the musculoskeletal system and connective tissue	1	0.4
Diseases of the nervous system	1	0.4
Pregnancy, childbirth and the puerperium	1	0.4
TOTAL	**252**	
TOTAL LESS ILL-DEFINED	**225**	

Males and females at different ages usually die of different causes. Table 13 displays the top ten leading causes of death disaggregated by sex and categorised at ICD-10 sub-chapter level. Between 2012 and 2015 the two leading causes of death for both males and females were diabetes mellitus and other heart diseases). Ischaemic heart diseases and septicemia ranked third among males and females respectively. Cerebrovascular diseases were the fourth leading cause of death among both sexes. It is worth noting that half of the ten causes listed for each sex are NCDs.

Table 13: Top-ten leading causes of death, for all ages by sex, 2012 to 2015

Males	No.
Diabetes mellitus	13
Other heart diseases	13
Ischaemic heart diseases	12
Cerebrovascular diseases	8
Pneumonia	7
Septicaemia	7
Diarrhoea and gastroenteritis of presumed infectious origin	6
Diseases of the skin and subcutaneous tissue	5
All other external causes	4
Hypertensive diseases	4
Intentional self-harm	4
Remainder of diseases of the genitourinary system	4
Other causes	33
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	8
TOTAL	**128**

Females	No.
Diabetes mellitus	22
Other heart diseases	14
Septicaemia	10
Cerebrovascular diseases	8
Hypertensive diseases	8
Malignant neoplasm of breast	6
Diarrhoea and gastroenteritis of presumed infectious origin	4
Remainder of endocrine, nutritional and metabolic diseases	4
Malignant neoplasm of cervix uteri	3
Pneumonia	3
Other causes	18
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	22
TOTAL	**122**

5.1 Causes of death among children aged 0–4 years

Due to the small number of deaths, causes of death among neonates, infants and children aged below four years are aggregated by age and sex in Table 14. The leading cause of death among children aged 0-4 were 'Certain conditions originating in the perinatal period'. This cause was responsible for 33% (C.I 11.1, 55.6) of all deaths in this age group, followed by 'Diarrhoea and gastroenteritis of presumed infectious origin' and 'Pneumonia'.

Table 14: Causes of death among children aged 0–4, 2012 to 2015

Mortality among children aged 0-4	No.	Proportional mortality (95% C.I)
Certain conditions originating in the perinatal period	3	33.3 (11.1-55.6)
Diarrhoea and gastroenteritis of presumed infectious origin	2	22.2 (0-44.4)
Pneumonia	2	22.2 (0-44.4)
Congenital malformations, deformations and chromosomal abnormalities	1	11.1 (0-33.3)
Remainder of diseases of the digestive system	1	11.1 (0-33.3)
TOTAL	**9**	

5.2 Causes of death among adults aged (15–59)

Diseases of the circulatory system were the most predominant cause of death among adults aged 15–59; accounting for 35% of all deaths in this age group. 'Endocrine, nutritional and metabolic diseases' were the second leading cause of death (24%), followed by 'external causes of morbidity and mortality' (15%).

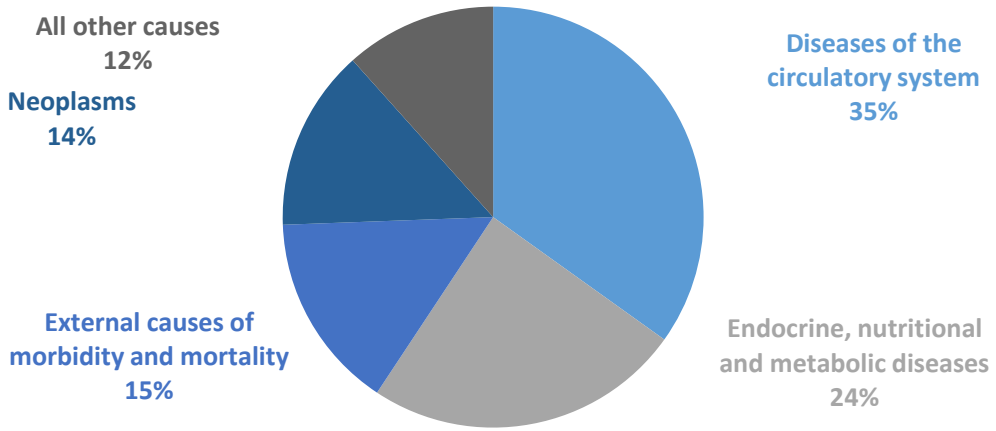

Figure 8: Mortality in adults aged 15–59: main causes of death, % distribution: 2012–2015

Table 15 provide the top leading causes of death among males and females, for the age group 15–59, categorised at ICD-10 sub-chapter level, General Mortality List 1. Based on reported deaths, diabetes and 'Other heart diseases' are the leading causes of death among males in Tuvalu in the period 2012–2015, accounting for 11% (C.I. 8.51, 25.5) of all deaths in this age group respectively. Cerebrovascular diseases, pneumonia and septicaemia, are also important causes of mortality among males in this age group.

Table 15: Leading causes of death for males aged 15–59, 2012 to 2015

Causes of death among male adults (15–59)	**Total deaths**	**Proportional mortality by cause, excluding ill-defined causes (95% C.I)**
Diabetes mellitus	13	10.8 (6.7-15.8)
Other heart diseases	13	10.8 (6.7-15.8)
Ischaemic heart diseases	12	10.0 (5.8-15.0)
Cerebrovascular diseases	8	6.7 (3.3-10.8)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	8	--
Pneumonia	7	5.8 (2.5-9.2)
Septicaemia	7	5.8 2.5-9.2)
Diarrhoea and gastroenteritis of presumed infectious origin	6	5.0 (1.7-8.3)
Diseases of the skin and subcutaneous tissue	5	4.2 (1.7-7.5)
All other external causes	4	3.3 (0.8-5.8)
Hypertensive diseases	4	3.3 (0.8-5.8)
Intentional self-harm	4	3.3 (0.8-5.8)
Remainder of diseases of the genitourinary system	4	3.3 (0.8-5.8)
Accidental drowning and submersion	3	2.5 (0.8-5.0)
Certain conditions originating in the perinatal period	3	2.5 (0.8-5.0)
Diseases of the liver	3	2.5 (0.8-5.0)
Malignant neoplasm of stomach	3	2.5 (0.8-5.0)
Respiratory tuberculosis	3	2.5 (0.8-5.0)
All other causes	18	15.0 (10.0-20.8)
TOTAL	**128**	
TOTAL LESS ILL-DEFINED	**120**	

Diabetes mellitus was similarly the leading cause of death among females aged 15–59, contributing to a higher proportion of deaths (22% C.I 14.7, 28.4) compared to male deaths (11%). 'Other heart diseases' and septicaemia were the next leading causes of death, contributing to 14 deaths (14% C.I 8.8, 19.6) and 10 deaths, (10% C.I 4.9, 14.7) respectively.

Table 16: Leading causes of death for females aged 15–59, 2012 to 2015

Causes of death among female adults (15–59)	Total deaths	Proportional mortality by cause, excluding ill-defined causes (95% C.I)
Diabetes mellitus	22	21.6 (14.7-28.4)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	22	--
Other heart diseases	14	13.7 (8.8-19.6)
Septicaemia	10	9.8 (4.9-14.7)
Cerebrovascular diseases	8	7.8 (3.9-12.7)
Hypertensive diseases	8	7.8 (3.9-12.7)
Malignant neoplasm of breast	6	5.9 (2.0-9.8)
Diarrhoea and gastroenteritis of presumed infectious origin	4	3.9 (1.0-6.9)
Remainder of endocrine, nutritional and metabolic diseases	4	3.9 (1.0-6.9)
Malignant neoplasm of cervix uteri	3	2.9 (1.0-5.9)
Pneumonia	3	2.9 (1.0-5.9)
Ischaemic heart diseases	2	2.0 (0.0-4.9)
Remainder of diseases of the genitourinary system	2	2.0 (0.0-4.9)
Remainder of malignant neoplasms	2	2.0 (0.0-4.9)
Respiratory tuberculosis	2	2.0 (0.0-4.9)
Other causes	12	11.8 (7-17.6)
TOTAL	**124**	
TOTAL LESS ILL-DEFINED CAUSES	**102**	

5.3 Maternal mortality

Maternal death is defined by WHO as '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'.[2] The maternal mortality ratio (MMR) is the ratio of the number of maternal deaths during a given time period per 100,000 live births during the same time-period.

There was one maternal death reported in Tuvalu for the years 2012–2015 (Table 17). Due to incompleteness of the death data-set, the maternal mortality ratio could not be calculated.

Table 17: Reported maternal deaths, 2012 to 2015

Years	Number of maternal deaths
2012-2012	1

2 https://en.wikipedia.org/wiki/Maternal_death

5.4 Mortality in older adults (aged 60+ years)

The leading cause of death among males and females aged 60+ were diseases of the circulatory system (40%), followed by 'Certain infectious and parasitic diseases'. Endocrine nutritional and metabolic diseases and neoplasms were also significant causes of mortality in this age group (

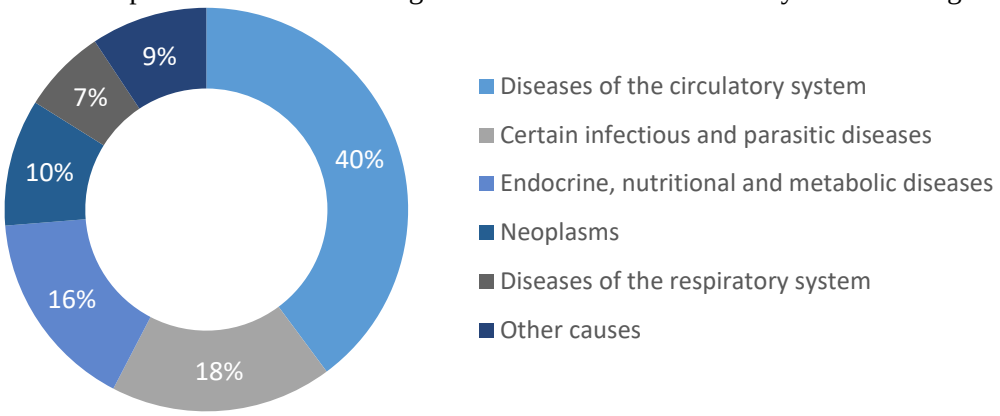

Figure 9).

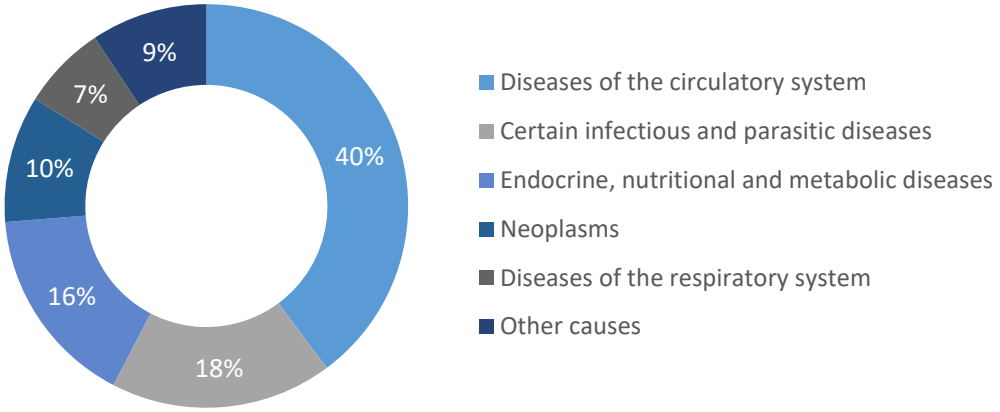

Figure 9: Mortality in adults aged 60+: main causes of death, % distribution: 2012–2015

5.5 Adult mortality from non-communicable diseases

According to the World Health Organization,[3] non-communicable diseases (NCDs) are by far the leading cause of death in the world, representing 63% of all annual deaths, and an estimated 70–75% of all deaths in the Pacific region. There are four main types of NCDs recommended by the World Health Organization for global monitoring, namely: cardiovascular diseases, cancer, chronic respiratory diseases and diabetes.

As demonstrated in Figure 10 and Figure 11, 43% of all reported deaths that occurred in Tuvalu among persons aged 15–59 for the period 2012–2015 were due to NCDs. Most NCD deaths (56%) were due to diseases of the circulatory system, followed by diabetes mellitus (26%).

3 http://www.wpro.who.int/mediacentre/factsheets/fs_20120926e/en/

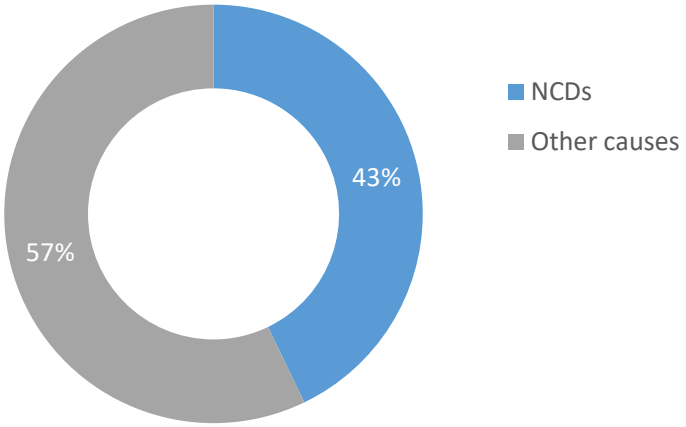

Figure 10: Percentage of deaths due to NCDs compared to all other causes in adults aged 15–59, 2012–2015

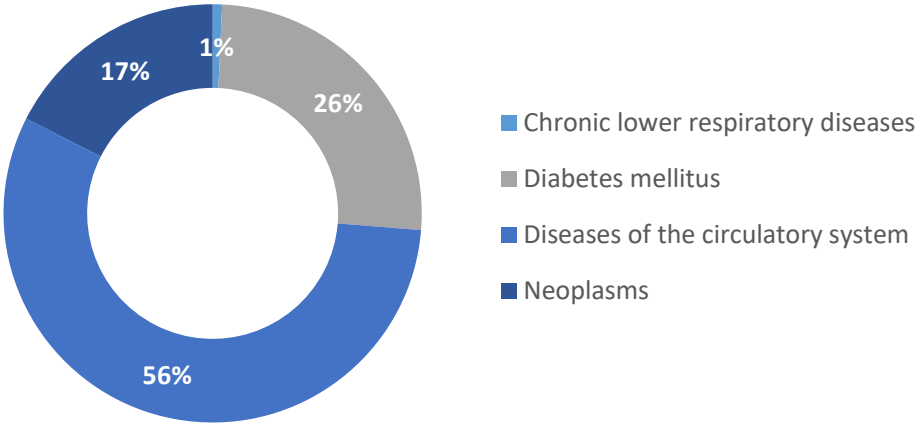

Figure 11: Percentage of deaths due to NCDs among adults aged 15–59, by cause, 2012–2015

6. CONCLUSION

Administrative records, especially civil registration systems, are globally recognised to be critical sources of vital statistics. The health information system of Tuvalu was found to be more complete, i.e. to have recorded a higher number of events (both birth and deaths) for all years, compared to the civil registration system. The distribution of reported births and deaths reveals significant disparities in reporting of both events by year, with the highest level of reporting in 2014. In general there is a high level of under-reporting, especially of deaths. Twenty-seven deaths (12.0%) of total deaths were ill-defined/classified as ICD code '1-094 Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified'. This reflects weaknesses in recording deaths and in cause of death certification practices, which need to be addressed.

The findings of this study underline the critical need to improve the completeness of the collections undertaken by both systems, as well as the quality of records. It is essential that relevant stakeholders undertake a systematic review of the major impediments to registration, and that they design effective strategies to address the issues identified. Improving the capturing of cause-of-death information could involve the training of physicians in the certification of causes-of-death as an initial step.

In general, it is important that the government devotes resources to strengthening these data sources and that the country adopts a schedule of analysing data from these two sources (at least every three years), as a fundamental measure to improve the quality of data and monitor performance of the systems.

APPENDIX 1: TABLES

Table 1: Registered births by year and age groups of mothers

Year	<15	15–19	20–24	25–29	30–34	35–39	40–44	45–49	Total
2012	1	10	56	59	32	24	5		**187**
2013		14	76	71	27	25	3		**216**
2014		17	88	64	60	20	10	2	**261**
2015		13	65	61	43	22	4		**208**
2016		14	67	55	44	23	7		**210**
Total	**1**	**68**	**352**	**310**	**206**	**114**	**29**	**2**	**1082**

Table 2: Reported deaths by sex and year

Age group	2012			2013			2014			2015			2016			TOTAL		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
0–4	1	0	1	2	0	2	3	0	3	2	0	2	4	5	9	12	5	17
0–5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10–14	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
15–19	1	0	1	4	1	5	0	0	0	0	1	1	0	0	0	5	2	7
20–24	1	0	1	0	0	0	1	1	2	0	1	1	0	0	0	2	2	4
25–29	2	0	2	0	0	0	1	1	2	2	1	3	3	1	4	8	3	11
30–34	0	1	1	2	0	2	1	1	2	2	0	2	0	1	1	5	3	8
35–39	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
40–44	4	1	5	1	0	1	1	0	1	1	1	2	0	4	4	7	6	13
45–49	0	2	2	2	3	5	5	2	7	1	4	5	1	1	2	9	12	21
50–54	3	1	4	3	1	4	6	6	12	5	1	6	4	1	5	21	10	31
55–59	2	5	7	2	2	4	2	4	6	1	6	7	8	4	12	15	21	36
60–64	3	4	7	2	0	2	10	3	13	4	4	8	6	3	9	25	14	39
65–69	3	1	4	1	5	6	3	1	4	2	2	4	3	6	9	12	15	27
70–74	3	2	5	3	1	4	6	2	8	2	3	5	3	5	8	17	13	30
75–79	3	2	5	2	4	6	3	6	9	1	7	8	8	9	17	17	28	45
80+	1	6	7	3	5	8	5	9	14	3	9	12	5	5	10	17	34	51
Total	**27**	**25**	**52**	**27**	**22**	**49**	**48**	**37**	**85**	**26**	**40**	**66**	**45**	**45**	**90**	**173**	**169**	**342**

Table 3: Mid-year population of women at fertility age

Age group	2012	2013	2014	2015	2016
15–19	500	517	535	552	571
20–24	433	442	450	458	466
25–29	365	376	385	395	405
30–34	312	316	320	324	327
35–39	241	231	222	213	204
40–44	266	255	244	234	224
45–49	309	306	305	302	299
Total	**2,426**	**2,443**	**2,461**	**2,478**	**2,496**

Table 4: Mid-year population by age group and year

Age group	2012	2013	2014	2015	2016
0–4	1,301	1,313	1,325	1,336	1,345
5–9	1,135	1,127	1,119	1,110	1,102
10–14	1,061	1,056	1,052	1,047	1,041
15–19	1,063	1,090	1,119	1,149	1,177
20–24	938	970	1,002	1,035	1,068
25–29	804	840	878	918	960
30–34	632	643	652	661	670
35–39	494	478	462	446	430
40–44	542	528	513	500	485
45–49	620	625	630	633	638
50–54	617	636	655	674	693
55–59	482	511	541	572	605
60–64	353	361	370	379	387
65–69	193	192	190	188	187
70–74	172	172	172	172	172
75–79	110	111	111	112	114
80+	76	77	78	78	79
Total	**10,593**	**10,730**	**10,869**	**11,010**	**11,153**

APPENDIX 2: ICD General Mortality List 1

List code	Disease	ICD Codes
1-001	Certain infectious and parasitic diseases	A00–B99
1-002	Cholera	A00
1-003	Diarrhoea and gastroenteritis of presumed infectious origin	A09
1-004	Other intestinal infectious diseases	A01–A08
1-005	Respiratory tuberculosis	A15–A16
1-006	Other tuberculosis	A17–A19
1-007	Plague	A20
1-008	Tetanus	A33–A35
1-009	Diphtheria	A36
1-010	Whooping cough	A37
1-011	Meningococcal infection	A39
1-012	Septicaemia	A40–A41
1-013	Infections with a predominantly sexual mode of transmission	A50–A64
1-014	Acute poliomyelitis	A80
1-015	Rabies	A82
1-016	Yellow fever	A95
1-017	Other arthropod-borne viral fevers and viral haemorrhagic fevers	A90–A94, A96–A99
1-018	Measles	B05
1-019	Viral hepatitis	B15–B19
1-020	Human immunodeficiency virus [HIV] disease	B20–B24
1-021	Malaria	B50–B54
1-022	Leishmaniasis	B55
1-023	Trypanosomiasis	B56–B57
1-024	Schistosomiasis	B65
1-025	Remainder of certain infectious and parasitic diseases	A21–A32, A38, A42–A49, A65–A79, A81, A83–A89, B00–B04, B06–B09, B25–B49, B58–B64, B66–B94, B99
1-026	Neoplasms	C00–D48
1-027	Malignant neoplasm of lip, oral cavity and pharynx	C00–C14
1-028	Malignant neoplasm of oesophagus	C15
1-029	Malignant neoplasm of stomach	C16
1-030	Malignant neoplasm of colon, rectum and anus	C18–C21
1-031	Malignant neoplasm of liver and intrahepatic bile ducts	C22
1-032	Malignant neoplasm of pancreas	C25
1-033	Malignant neoplasm of larynx	C32
1-034	Malignant neoplasm of trachea, bronchus and lung	C33–C34
1-035	Malignant melanoma of skin	C43

1-036	Malignant neoplasm of breast	C50
1-037	Malignant neoplasm of cervix uteri	C53
1-038	Malignant neoplasm of other and unspecified parts of uterus	C54–C55
1-039	Malignant neoplasm of ovary	C56
1-040	Malignant neoplasm of prostate	C61
1-041	Malignant neoplasm of bladder	C67
1-042	Malignant neoplasm of meninges, brain and other parts of central nervous system	C70–C72
1-043	Non-Hodgkin's lymphoma	C82–C85
1-044	Multiple myeloma and malignant plasma cell neoplasms	C90
1-045	Leukaemia	C91–C95
1-046	Remainder of malignant neoplasms	C17, C23–C24, C26–C31, C37–C41, C44–C49, C51–C52, C57–C60, C62–C66, C68–C69, C73–C81, C88, C96–C97
1-047	Remainder of neoplasms	D00–D48
1-048	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	D50–D89
1-049	Anaemia	D50–D64
1-050	Remainder of diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	D65–D89
1-051	Endocrine, nutritional and metabolic diseases	E00–E88
1-052	Diabetes mellitus	E10–E14
1-053	Malnutrition	E40–E46
1-054	Remainder of endocrine, nutritional and metabolic diseases	E00–E07, E15–E34, E50–E88
1-055	Mental and behavioural disorders	F01–F99
1-056	Mental & behavioural disorders due to psychoactive substance use	F10–F19
1-057	Remainder of mental and behavioural disorders	F01–F09, F20–F99
1-058	Diseases of the nervous system	G00–G98
1-059	Meningitis	G00, G03
1-060	Alzheimer's disease	G30
1-061	Remainder of diseases of the nervous system	G04–G25, G31–G98
1-062	Diseases of the eye and adnexa	H00–H59
1-063	Diseases of the ear and mastoid process	H60–H93
1-064	Diseases of the circulatory system	I00–I99
1-065	Acute rheumatic fever and chronic rheumatic heart diseases	I00–I09
1-066	Hypertensive diseases	I10–I13
1-067	Ischaemic heart diseases	I20–I25
1-068	Other heart diseases	I26–I51
1-069	Cerebrovascular diseases	I60–I69
1-070	Atherosclerosis	I70
1-071	Remainder of diseases of the circulatory system	I71–I99
1-072	Diseases of the respiratory system	J00–J98

1-073	Influenza	J10–J11
1-074	Pneumonia	J12–J18
1-075	Other acute lower respiratory infections	J20–J22
1-076	Chronic lower respiratory diseases	J40–J47
1-077	Remainder of diseases of the respiratory system	J00–J06, J30–J39, J60–J98
1-078	Diseases of the digestive system	K00–K92
1-079	Gastric and duodenal ulcer	K25–K27
1-080	Diseases of the liver	K70–K76
1-081	Remainder of diseases of the digestive system	K00–K22, K28–K66, K80–K92
1-082	Diseases of the skin and subcutaneous tissue	L00–L98
1-083	Diseases of the musculoskeletal system and connective tissue	M00–M99
1-084	Diseases of the genitourinary system	N00–N99
1-085	Glomerular and renal tubulointerstitial diseases	N00–N15
1-086	Remainder of diseases of the genitourinary system	N17–N98
1-087	Pregnancy, childbirth and the puerperium	O00–O99
1-088	Pregnancy with abortive outcome	O00–O07
1-089	Other direct obstetric deaths	O10–O92
1-090	Indirect obstetric deaths	O98–O99
1-091	Remainder of pregnancy, childbirth and the puerperium	O95–O97
1-092	Certain conditions originating in the perinatal period	P00–P96
1-093	Congenital malformations, deformations and chromosomal abnormalities	Q00–Q99
1-094	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	R00–R99
1-095	External causes of morbidity and mortality	V01–Y89
1-096	Transport accidents	V01–V99
1-097	Falls	W00–W19
1-098	Accidental drowning and submersion	W65–W74
1-099	Exposure to smoke, fire and flames	X00–X09
1-100	Accidental poisoning by and exposure to noxious substances	X40–X49
1-101	Intentional self-harm	X60–X84
1-102	Assault	X85–Y09
1-103	All other external causes	W20–W64, W75–W99, X10–X39, X50–X59, Y10–Y89
1-901	SARS	U04