Patterns and trends of hospital mortality due to non-communicable diseases and injuries in Tanzania: a 10- year retrospective analysis

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Abstract

Background: Globally, non-communicable diseases (NCD) kill about 40 million people annually, with about three-quarters of the deaths occurring in low and middle-income countries. This study was carried out to determine the patterns, trends, and causes of non-communicable disease mortality in hospitals of Tanzania from 2006-2015.

Methods: This retrospective study involved primary, secondary, tertiary, and specialized hospitals in Tanzania. Death statistics were extracted from inpatient department registers, death registers, and International Classification of Diseases (ICD) report forms. Variables collected were deceased's age, sex, cause and date of death. The ICD-10 coding system was used to assign each death to its underlying cause. Data were analysed using STATA version 14.

Results: A total of 247,976 deaths were reported during the 10 years (2006–2015) in 39 hospitals. Of the total deaths, 67,711 (27.3%) were due to non-communicable diseases (NCD) and injuries. Cardio-circulatory diseases (31.9%), cancers (18.6%), chronic respiratory diseases (18.4%), and injuries (17.9%) accounted for the largest proportion (86.8%) of deaths due to NCDs. The majority (57.6%) of deaths due to NCD occurred among males. Overall, the total deaths from NCDs increased by 153.3% from 4,298 in 2006 to 10,886 in 2015. The age group 15-59 years (53.4%) was the most affected category. The overall 10-year annual age-standardized mortality rate (ASMR) for all NCDs and injuries was 235.2 per 100,000 population. It was higher for males (287.2/100,000) than for females (186.7/100,000). The annual ASMR increased from 11.9 in 2006 to 36.5 per 100,000 populations in 2015. Most of the NCD deaths occurred in the secondary (40.0%) and primary level hospitals (27.8%). There were variations in the type of non-communicable diseases by geographical distributions.

Conclusions: There was a substantial increase in ASMR due to NCDs and injuries in Tanzania from 2006 to 2015. Most of the deaths due to NCD and injuries affected the productive young adult group and males. The burden caused by NCD in the most productive ages means that families, communities, and the nation at large suffer from premature deaths. The government of Tanzania must invest in early detection and timely treatment of NCDs to reduce premature deaths.

Background

Globally, non-communicable diseases (NCD) kill about 40 million people annually, with about three-quarters of the deaths occurring in low and middle-income countries [1, 2]. In 2017, NCDs accounted for 73.4% of the total global deaths [3]. The global burden of NCDs is gradually increasing with devastating health consequences in low- and middle-income countries [4]. Predictions indicate that the global burden of NCDs is expected to rise and by 2025 it will account for over 70% of all deaths [5]. The cumulative economic losses from NCDs are estimated to account for over 75% of the global Gross Domestic Product by 2030 [6]. These cumulative economic losses are expected to surpass US\$47 trillion by 2030 [7]. While there has been some progress made in improving the health of populations over the last three decades, the rise of NCDs threatens to reverse these gains and delays social and economic developments [8].

Evidence indicates an increase in the burden of non-communicable diseases in Sub-Saharan Africa [9–17]; though specific NCDs and their risk factors vary considerably between countries and between urban and rural settings [17]. Studies in Nigeria, Sudan, and Tanzania have reported that NCDs account for 81% of admissions among > 60 years old individuals [18]. In East Africa, 40% of deaths are attributable to non-communicable diseases, which are expected to overtake communicable diseases as the leading causes of death over the next 20 years [19]. The rate of urbanization and unhealthy lifestyles associated with poverty and inequality has been described as the reasons for an increasing burden of NCD in Sub-Saharan Africa [17, 20].

According to estimates by the World Health Organization, NCDs account for 33% of all deaths in Tanzania [21]. Several studies in Tanzania provide data for specific geographical areas on the prevalence of overweight, diabetes, cardiovascular disease, and cancers [22–28]. A very high prevalence of elevated blood pressure among adults has been reported in Tanzania in recent years [23, 26, 27, 29]. High prevalence rates of diabetes and chronic respiratory diseases have also been reported in the country [30, 31]. Cases and deaths due to road traffic injuries have increased by 44% and deaths by 64%, respectively between 1990 and 2000 [32]. Most of the major NCDs share risk factors. Tobacco use, excessive alcohol consumption, poor diet and lack of physical activities have been described as the most common behavioural risk factors associated with the major NCDs in Tanzania [31]. These factors are closely correlated with social determinants such as education, income, occupation, gender and ethnicity [33].

Although several studies have addressed the prevalence and risk factors of NCDs in Tanzania, there is limited information on the causes and mortality patterns of in-hospital NCDs. In Tanzania, most often community-based data have been used as sources of mortality data [34–39]. Nonetheless, such data are only available every 5–10 years. In-hospital mortality records are likely to be another important source of information on deaths. The cause of deaths certified by a medical practitioner is considered as the gold standard for cause-of-death reporting [40, 41]. In-hospital mortality statistics derived from information reported on death certificates is among the most widely used and reliable sources of health data. However, only about one-third of countries in Sub-Saharan Africa collect in-hospital deaths where the underlying cause of death has been coded according to the International Classification of Diseases [42]. This study was, therefore, carried out to determine the patterns and trends of hospital mortality due to non-communicable diseases and injuries in Tanzania from 2006 to 2015.

Methods

Study design and source of data

This retrospective study carried out from July-December 2016 involved 39 hospitals in Tanzania. The health system in Tanzania is structured into three functional levels: Primary level with district hospitals, secondary level with the regional referral hospitals, and tertiary level with zonal referral hospitals and the national hospital. There are also specialized hospitals that do not fit directly into the administrative level. The hospitals included in this study at the tertiary level were Muhimbili National Hospital, Bugando Medical Centre, Kilimanjaro Christian Medical Centre, and Mbeya Zonal Referral Hospital. The specialized hospitals

were Ocean Road Cancer Institute, Mirembe Mental Hospital, Muhimbili Orthopaedic Institute, and Kibong'oto Infectious Disease Hospital. At regional level hospitals included were Temeke, Kagera, Kitete–Tabora, Morogoro, Maweni–Kigoma, Dodoma, Bombo-Tanga, Mara, Mount Meru–Arusha, Shinyanga, Manyara, Ruvuma, Singida, Geita, Ligula–Mtwara, Tumbi–Pwani, Rukwa, Iringa, Sokoine–Lindi, and Njombe. The district-level hospitals were Sengerema, Ukerewe, Mpanda, Kyela, Chunya, Biharamulo, Nzega, Kilosa, Kibondo, Lushoto, and Maswa. The study sites were purposively selected to ensure representation for all geographical regions in the country.

Mortality data were extracted from the inpatient department (IPD) registers, death registers and International Classification of Diseases (ICD)-10 report forms. Hospital records were extracted manually from sources and filled in a customized paper-based collection tool. The extraction process was done iteratively moving from one source to another until all sources were assessed and all death events related to NCDs and injuries that occurred in the hospital were collected. Variables collected were deceased's age, sex, cause and date of death. Details in data extraction have been described elsewhere [43].

Statistical analysis

The ICD-10 coding system was used to assign each death to its underlying cause. Data was entered and processed in Epi-Data Software (Odense Denmark, EpiData Association, 2010). Data were analysed using STATA version 14 (STATA Corp LLC, Texas, USA). The age-standardized mortality rate was calculated for each of the major NCDs. We examined for any significant 10-year changes in trends of mortality rate for each disease, hospital type, and geographical zone.

Results

A total of 247,976 deaths were captured over 10 years (2006–2015) in 39 hospitals. Of the total deaths, 67,711 (27.3%) were due to non-communicable diseases and injuries. Cardio-circulatory diseases (31.9%), cancers (18.6%), chronic respiratory diseases (18.4%), and injuries (17.9%) accounted for the largest proportion of deaths (86.8%) due to NCDs. The majority (57.6%) of deaths due to NCD occurred among males (Table 1). Males also accounted for the largest proportion of death due to chronic respiratory diseases (54.1%), Cardio-circulatory diseases (52.7%), Injuries (78.4%), Cancers (54.5%) and Diabetes (58.5%). Overall, during the 10 years, the total deaths from NCDs increased by 153.3% from 4,298 in 2006 to 10,886 in 2015. Deaths due to cancers increased by 74.6% from 2006 to 2015, followed by diabetes (67.8%), nephritis + nephrotic syndrome + nephrosis (65.7%), cardio-circulatory diseases (60.5%), injuries (62.5%), brain disorders (58.0%) and chronic respiratory diseases (47.1%).

Table 1

The number and percentages of cause-specific non-communicable diseases and injuries by sex, 2006–2015

Cause of death (ICD-10 Code)	Females		Males		Missing Sex		Total	
	n	%	n	%	n	%	n	%
Chronic Respiratory diseases (J40-J47)	5702	20.5	6726	17.0	59	19.2	12487	18.4
Cardio circulatory diseases (I00-I09, I11, I13, I20-I51, I60-69)	10166	36.6	11315	28.6	88	28.6	21569	31.9
Injuries (X01-X59, X60-X84, Y85-Y86)	2602	9.4	9452	23.9	78	25.3	12132	17.9
Cancer (C00-C97)	5728	20.6	6854	17.3	39	12.7	12621	18.6
Diabetes (E10-E14)	1693	6.1	2397	6.1	26	8.4	4116	6.1
Brain disorders (G93-G94)	1098	4.0	1379	3.5	15	4.9	2492	3.7
Nephritis, nephrotic syndrome and nephrosis (N00-N07, N17-N19, N25-N27)	803	2.9	1465	3.7	3	1.0	2271	3.4
Liver diseases (K72)	2	0.0	21	0.1	0	0.0	23	0.0
Total	27794	41.1	39609	58.5	308	0.5	67711	100.0

Table 1:

The age group 15–59 years (53.4%) was the most affected category while the age group 0–4 years (4.1%) was the least affected. Over 88.4% of all deaths due to cardio-circulatory diseases affected individuals aged > 15 years old; with those aged $\geq$ 60 years being most affected (44.7%). Chronic respiratory diseases (14.0%) and Liver diseases (13.0%) accounted for about a quarter of the deaths among the youngest (0–4 years) individuals. The majority of deaths (93%) due to diabetes were recorded among 15–59 and $\geq$ 60 years old individuals. Injuries, Cancers, Diabetes, and Brain disorders affected most of the 15–59 years old category (Table 2).

Table 2
Distribution of deaths due to non-communicable diseases by age group, 2006–2015

Disease	0-4yrs		5-14yrs		15-59yrs		≥ 60yrs		Unknown age		Total
	n	%	n	%	N	%	N	%	n	%	
Chronic respiratory diseases	44	14.0	862	25.0	7820	46.1	2959	9.6	802	5.3	12487
Cancer	346	2.7	586	4.6	6787	53.8	4293	34.0	609	4.8	12621
Cardio-circulatory diseases	822	3.8	899	4.2	9424	43.7	9649	44.7	775	3.6	21569
Injury	1035	0.4	923	6.9	7696	62.6	1320	23.7	1158	6.4	12132
Diabetes	53	1.3	88	2.1	2049	49.8	1777	43.2	149	3.6	4116
Brain Disorders	350	8.5	624	7.6	1148	63.4	238	10.9	132	9.6	2492
Nephritis, nephrotic syndrome and nephrosis	120	5.3	83	3.7	1203	53.0	806	35.5	59	2.6	2271
Liver diseases	3	13.0	1	4.4	15	65.2	4	17.4	0	0.0	23
Total	2773	4.1	4066	6.0	36142	53.4	21046	31.1	3684	5.4	67711

Table 2:

Figure 1:

The overall 10-year annual age-standardized mortality rate (ASMR) for all NCDs and injuries was 235.2 per 100,000 population. It was higher for males (287.2/100,000) than females (186.7/100,000). The overall annual ASMR increased from 11.0 in 2006 to 35.0 per 100,000 populations in 2015 (Fig. 1). ASMR due to cardio-circulatory diseases increased from 11.04/100,000 in 2006 to 35.02 in 2015. Similarly, ASMR due to Chronic Respiratory Diseases increased from 2.45/100,000 in 2006 to 5.94/100,000 in 2013 and remained almost stable until 2015. The ASMR due to diabetes increased from 0.69/100,000 in 2006 to 2.51/100,000 in 2013 before declining slightly in 2014 (2.35/100,000) and 2015 (2.28/100,000). Similarly, ASMR due to injuries increased from 1.52 in 2006 to 4.89 in 2013, then dropped slightly in 2014 and 2015. ASMR due to cancer increased from 1.45/100,000 in 2006 to 8.59 in 2015 (Fig. 2).

Figure 2:

Most of the NCD deaths occurred in the regional hospitals (40.0%) followed by zonal hospitals (27.8%), district hospitals (20.6%), and specialized hospitals (11.6%) (Table 3). While most deaths due to cancer were reported from zonal hospitals (39.9%), those due to cardio-circulatory diseases were from regional (44.2%) and zonal (31.5%) hospitals. Similarly, most deaths due to chronic respiratory diseases were reported from regional (48.1%) and district (31.1%) hospitals. Death due to injuries were most common in regional hospitals (44.7%).

Table 3
Distribution of non-communicable diseases by type of hospital, 2006–2015

Cause of death	District		Regional		Specialized		Zonal		Total	
	N	%	n	%	n	%	N	%	n	%
Chronic respiratory diseases	3,889	2.2	6,010	3.5	456	2.5	2,132	5.6	12,487	3.7
Cardio-circulatory diseases	4,652	5.6	9,543	8.6	586	57.2	6,788	26.7	21,569	18.6
Injuries	2,980	33.3	5,425	35.3	2,015	7.5	1,712	36.0	12,132	31.9
Cancer	786	27.9	2,322	22.2	4,482	5.8	5,031	11.3	12,621	18.4
Diabetes	1,001	7.2	2,043	7.6	88	1.1	984	5.2	4,116	6.1
Brain disorders	308	21.4	944	20.0	192	25.7	1,048	9.1	2,492	17.9
Nephritis, nephrotic syndrome and nephrosis	338	2.4	771	2.9	23	0.3	1,139	6.0	2,271	3.4
Liver diseases	1	0.0	7	0.0	0	0.0	15	0.1	23	0.0
Total	13,955	20.6	27,065	40.0	7,842	11.6	18,849	27.8	67,711	100

Table 3:

There were variations in the type of non-communicable diseases by geographical distributions. Chronic respiratory diseases were the leading causes of deaths in the South-West (36.4%), Southern Highlands (35.5%), and Central Zone (30.1%). Most deaths due to cardio-circulatory diseases were reported from hospitals in the Southern (37.1%), Lake Victoria (34.8%), Central (31.4%), and Western zone (31.2%). Eastern (25.3%), Lake Victoria (12.2%), and northern (11.8%) zones reported the largest proportion of deaths due to cancers. Injuries accounted for the largest proportions of deaths in the Western (27.4%), Central (19.5%), and South-West (16.9%). Deaths due to diabetes were almost equally distributed in all zones (Fig. 3).

Discussion

During the 10 years (2006–2015) NCDs and injuries accounted for about one-third of all in-hospital deaths in Tanzania. The majority of deaths due to NCDs occurred among those 15–59 years old. Similar to our findings, a study in Ethiopia reported that NCDs contribute to high proportions of mortality in hospitals [44]. The findings of this study indicate that most of the deaths due to NCD and injuries affected the young adult group and males. Similar findings have been reported elsewhere [45]. It has been described that as age increases one becomes more exposed to the risk factors for long periods until the complications develop and hence experiences the clinical syndromes of NCDs [46]. Like in our study, males accounted for most NCD deaths in studies in Brazil, Sri Lanka, and China [47–49]. Despite the observations that NCD deaths affected more males than females, several studies in Tanzania have reported that women have a higher risk of being obese than men, hence more vulnerable to several NCDs [50–52]. Overweight and obesity are major risk factors for diabetes, cardio-circulatory diseases, and cancer [54]. A recent systematic review has identified several factors related to gender differences in the burden of NCDs. These include gender roles, physical access to recreational facilities, and preferences for walking and engaging in physical activity [55].

Cardio-circulatory diseases were the number one leading NCD cause of deaths followed by cancer and chronic respiratory diseases. Like elsewhere in Sub-Saharan Africa, the findings of this study indicate that the largest proportion of the NCD mortalities are due to cardio-circulatory diseases, cancers, chronic respiratory diseases, injuries, and diabetes [17, 21, 56, 57]. Both cardio-circulatory diseases, cancers, and chronic respiratory diseases have also been described as among the most prevalent NCDs in Tanzania [58]. According to WHO estimates, cardio-circulatory diseases are responsible for 13% of the total deaths in Tanzania [5, 21]. There has been an increased prevalence of cardio-circulatory death rates from 9–13% between 2012 and 2016 in Tanzania [5, 59]. Like in this study, previous studies in Tanzania have reported cardio-circulatory diseases as among the major causes of deaths due to NCDs [60].

The findings from this study have shown that both injuries have increased by about 63% during 10 years. The majority of the injuries in this study were associated with road traffic accidents, drowning, and animal bites. Road traffic injuries (RTI) have been reported to account for the largest proportion of unintentional injuries in low-and middle-income countries [61]. The overall 31.98/100,000 age-standardized mortality rate due to injuries in this study was similar to that reported in a population-based study in a rural district of Tanzania [39]. It has already been reported that more males than females are likely to die from injuries than women [39]. A previous descriptive analysis of road traffic injuries in Tanzania has shown that between 1990 and 2000 the number of RTI rose by 44% and that of death by 64% [32]. Globally, each year 5.1 million people die from injuries and a quarter of these deaths are due to road traffic accidents [5] and 90% occur in low- and middle-income countries [62].

An increasing trend in ASMR due to cancers and diabetes was observed throughout the 10 years. Recent estimates in Tanzania indicate that age-standardized in-hospital mortality rate for cancer is 47.8/ 100,000 population; with cervical, oesophageal, and liver cancers being among the top three causes of deaths in Tanzania [63]. Cancer has been described as a major emerging public health problem in Sub-Saharan

Africa because of population aging and growth, as well as increased prevalence of key risk factors, including those associated with socio-economic transition [64]. Diabetes was also among the five leading causes of deaths due to NCDs in Tanzania. World Health Organization's recent statistics indicate diabetes mellitus death in Tanzania accounts for 1.86% of total death and age-adjusted death rate is 30.24 per 100,000 populations [8] which is higher than the findings from this study (17.21 per 100,000). As in our study where about 50% of the deaths due to diabetes affect the 15–49 years' age group, about three-quarters of diabetes-related deaths occur in economically-productive persons under the age of 60 years [8].

Except for diabetes, the contributions of NCDs to the total deaths varied by geographical zones of the country and levels of hospitals. Chronic respiratory diseases accounted for about one-third of deaths in the Southern Western, Southern Highlands, and Central Zones. About half of all deaths due to cardio-circulatory diseases were reported from hospitals in the Southern, Lake Victoria, Western and Central zones. Eastern, Lake Victoria, and northern zones reported the largest proportion of deaths due to cancers. Injuries accounted for the largest proportions of deaths in the Western, Central, and Southern Highlands. These variations are likely to indicate regional and demographic differences in NCD prevalence underlying differences in lifestyle, socioeconomic status, and access to healthcare [65].

This study is likely to have some limitations. We analysed data on broadly defined disease categories such as chronic respiratory diseases, cardio-circulatory diseases, cancers, injuries, diabetes, brain disorders, and kidney diseases. The analysis could not make inferences on specific diseases. Moreover, despite the usefulness of the information that is available from this study, the hospital data are likely to provide an incomplete picture of the burden of NCDs in Tanzania, as the majority of deaths occur in the community and their causes are not registered. Despite these limitations, this study consolidates information on the NCD mortality and highlights patterns and trends of major NCDs in Tanzania.

Conclusions

NCD and injuries account for about one-third of all in-hospital deaths in Tanzania. In-hospital mortalities due to NCDs in Tanzania have increased by over half during the 10 years. Cardio circulatory diseases, cancers and chronic respiratory diseases and are responsible for over two-thirds of the deaths due to NCD and the majority of deaths affect males. The young adult age category accounts for the majority of those dying from NCDs. There were regional differences in terms of the number of deaths and types of NCDs. If the current trends continue, the probability of dying prematurely from the four main NCDs is likely to increase in Tanzania. It is important that the government of Tanzania invest in better management of NCD which includes early detection, screening, and timely treatment at all levels of the health system.

Abbreviations

ASMR

age standardized mortality rate

CCD

cardio-circulatory diseases

CRD
chronic respiratory diseases
NCD
non-communicable diseases

Declarations

Ethics approval and concent to participate

This study received ethical approval from the Medical Research Coordinating Committee of the National Institute for Medical Research (Ref. No. NIMR/HQ/R.8a/Vol. IX/2230). Permissions to access hospital registers and reports were sought from the Ministry of Health, Community Development, Gender, Elderly and Children and the President's Office Regional Administration and Local Government through the respective Regional Administrative Secretaries and Hospital Authorities. No consent to participate was required due to the nature of the study which involved extraction of data from registers and report forms.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests

Availability of data

The data that support the findings of this study are available from the National Institute for Medical Research but restrictions apply to the availability of these data. Data are however available from the authors upon reasonable request and with permission of the Tanzania Medical Research Coordinating Committee.

Competing interests

None declared.

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Authors' contributions

LEGM, SFR designed the study. LEGM, CK, SFR, MGC collected the data. CK, SFR, LEGM, EK analysed and interpreted the data. LEGM drafted the manuscript. SFR, CK, MGC critically revised the manuscript for important intellectual contents. All authors have read and approved the manuscript, have full access to all of the data, and take responsibility for the integrity of the data and the accuracy of the data analysis.

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Tables

Table 1: The number and percentages of cause-specific non-communicable diseases and injuries by sex, 2006–2015

Cause of death (ICD-10 Code)	Females		Males		Missing Sex		Total	
	n	%	n	%	n	%	n	%
Chronic Respiratory diseases (J40-J47)	5702	20.5	6726	17.0	59	19.2	12487	18.4
Cardio circulatory diseases (I00-I09, I11, I13, I20-I51, I60-69)	10166	36.6	11315	28.6	88	28.6	21569	31.9
Injuries (X01-X59, X60-X84, Y85-Y86)	2602	9.4	9452	23.9	78	25.3	12132	17.9
Cancer (C00-C97)	5728	20.6	6854	17.3	39	12.7	12621	18.6
Diabetes (E10-E14)	1693	6.1	2397	6.1	26	8.4	4116	6.1
Brain disorders (G93-G94)	1098	4.0	1379	3.5	15	4.9	2492	3.7
Nephritis, nephrotic syndrome and nephrosis (N00-N07, N17-N19, N25-N27)	803	2.9	1465	3.7	3	1.0	2271	3.4
Liver diseases (K72)	2	0.0	21	0.1	0	0.0	23	0.0
Total	27794	41.1	39609	58.5	308	0.5	67711	100.0

Table 2: Distribution of deaths due to non-communicable diseases by age group, 2006-2015

Disease	0-4yrs		5-14yrs		15-59yrs		≥60yrs		Unknown age		Total
	n	%	n	%	N	%	N	%	n	%	
Chronic respiratory diseases	44	14.0	862	25.0	7820	46.1	2959	9.6	802	5.3	12487
Cancer	346	2.7	586	4.6	6787	53.8	4293	34.0	609	4.8	12621
Cardio-circulatory diseases	822	3.8	899	4.2	9424	43.7	9649	44.7	775	3.6	21569
Injury	1035	0.4	923	6.9	7696	62.6	1320	23.7	1158	6.4	12132
Diabetes	53	1.3	88	2.1	2049	49.8	1777	43.2	149	3.6	4116
Brain Disorders	350	8.5	624	7.6	1148	63.4	238	10.9	132	9.6	2492
Nephritis, nephrotic syndrome and nephrosis	120	5.3	83	3.7	1203	53.0	806	35.5	59	2.6	2271
Liver diseases	3	13.0	1	4.4	15	65.2	4	17.4	0	0.0	23
Total	2773	4.1	4066	6.0	36142	53.4	21046	31.1	3684	5.4	67711

Table 3: Distribution of non-communicable diseases by type of hospital, 2006–2015

Cause of death	District		Regional		Specialized		Zonal		Total	
	N	%	n	%	n	%	N	%	n	%
Chronic respiratory diseases	3,889	2.2	6,010	3.5	456	2.5	2,132	5.6	12,487	3.7
Cardio-circulatory diseases	4,652	5.6	9,543	8.6	586	57.2	6,788	26.7	21,569	18.6
Injuries	2,980	33.3	5,425	35.3	2,015	7.5	1,712	36.0	12,132	31.9
Cancer	786	27.9	2,322	22.2	4,482	5.8	5,031	11.3	12,621	18.4
Diabetes	1,001	7.2	2,043	7.6	88	1.1	984	5.2	4,116	6.1
Brain disorders	308	21.4	944	20.0	192	25.7	1,048	9.1	2,492	17.9
Nephritis, nephrotic syndrome and nephrosis	338	2.4	771	2.9	23	0.3	1,139	6.0	2,271	3.4
Liver diseases	1	0.0	7	0.0	0	0.0	15	0.1	23	0.0
Total	13,955	20.6	27,065	40.0	7,842	11.6	18,849	27.8	67,711	100

Figures

Figure 1

The overall NCD and injuries age standardized mortality rate per 100,000 population, 2006-2015

Figure 2

Age standardized mortality rate per 100,000 population for the top five specific NCD, 2006-2015

Figure 3

Geographical distribution of major NCD mortality (Key: CRD= chronic respiratory diseases; CCD= cardio-circulatory diseases)