

# The changing patterns of Non-communicable diseases and injuries in Nepal from 1990-2017: A review of evidence from Global Burden of Disease Study 2017

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## Research

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## Abstract

Background Nepal has made significant strides towards its commitment to achieve universal health coverage in the past few decades. However, the paucity of evidence on morbidity, mortality and trends in non-communicable diseases (NCDs) has posed a significant hindrance in targeting resources for prevention, screening and treatment services. Thus, we conducted a systematic review of the existing evidence on the distribution of NCDs and their trends in Nepal from 1990 to 2017.

Methods We analysed data on disability adjusted life years (DALYs), years lived with disability, years of life lost due to NCDs in Nepal and its comparator countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Pakistan and Sri Lanka) from 1990 to 2017 using all available data sources from Global Burden of Disease 2017. We also conducted supplemental analysis using data from the 2016 Nepal Demographic Health Survey (NDHS) to further elucidate the provincial level prevalence of key NCD risk factors.

Results The result showed that between 1990 and 2017, life expectancy at birth increased by 14 years, from 58 years to 71 years on an average in Nepal. The three leading causes of DALYs in 2017 were cardiovascular diseases (CVDs), maternal and neonatal disorders and chronic respiratory diseases. High systolic blood pressure, smoking and high fasting plasma glucose were leading contributors to the NCD DALYs burden in 2017. At any ages  $\geq 40$  years, NCDs and injuries were responsible for 75–82% of total DALYs. Injuries, self-harm and violence, mental, neurological and musculoskeletal disorders superseded CVDs to become the leading causes of DALYs in young population aged 15–35 years.

Conclusions CVDs were the leading causes of death in 2017 followed by chronic respiratory diseases and cancers. Data such as these are an important tool for framing a coherent policy response towards achieving the sustainable development goals, and the targets set by Nepal's first Multi-sectoral Action plan on NCDs (2014–2020).

## Introduction

Non-communicable diseases (NCDs), such as heart diseases, diabetes, cancer and chronic respiratory diseases accounts for nearly 72% of all deaths [1]. Every year, 15 million people between the ages of 30 and 69 years die of NCDs; over 85% of these "premature" deaths occur in low- and middle-income countries (LMICs) [2]. It is expected to grow further unless preventative efforts are put in place [3]. In Nepal, NCDs are the leading source of financial expenditure at the households level [4]. Nearly 1.7% of such households are pushed into poverty every year due to catastrophic financial expenditure [2]. Despite health and financial implications of NCDs, data on disease incidence, prevalence, morbidity and mortality are scantily available in Nepal.

Like other LMICs, Nepal's existing national health system is ill-prepared to address NCDs which are responsible for almost half of the disease burden in the country [5]. The modifiable risk factors attributing to the NCD deaths and Disability Adjusted Life Years (DALYs) are mostly related to unhealthy lifestyle [6]. Nearly 30% of population have hypertension [7], 8.4% have diabetes [8], 21% are overweight or obese [6], and 23% have raised total cholesterol ( $\geq 190$  mg/dl) [6]. The 2015 STEPS survey showed that in Nepal, 19% of the participants smoked tobacco, of which 27% of men and 10% women were current smokers [9]. Further, fruits and vegetable consumption were low (less than 5 servings a day) in 99% of population [6]. Due to these unabated risk factors, the burden of NCDs is expected to increase substantially in the coming years if appropriate action is not taken [5].

The third Sustainable Development Goal (SDG3) has emphasized prevention and treatment of NCDs for reducing premature mortality by one-third by 2030 [10]. Despite the growing interest in responding to NCD burden in Nepal, there are insufficient data to map and monitor the NCD trends over time. National level data are a prerequisite for policy makers to formulate a locally feasible, effective, and efficient strategy to control the emerging NCD burden. Therefore, we conducted a systematic review of the existing evidence on the distribution of NCDs and their trends in Nepal from 1990 to 2017 [6, 11].

## Methods

### Overview

This study reports the trends in NCDs burden in Nepal in comparison to the countries from the South Asia region, namely Afghanistan, Bangladesh, Bhutan, India, Maldives, Pakistan and Sri Lanka. Such comparison informs where Nepal stands in terms of demographic and epidemiological transition and forms a coherent policy response in Nepal that is comparable to its neighbouring countries. For reporting the burden of disease, this study uses the GBD 2017 results. Details on GBD 2017 methods are described elsewhere [12, 13], and a summary of key points are listed below. All the analysis was done in the R Statistical package and SAS 9.4.

### Global burden of disease data

We extracted the data on disability adjusted life years (DALYs), years lived with disability (YLDs), years of life lost (YLLs) due to NCDs and injuries for Nepal and the comparator countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Pakistan and Sri Lanka) from 1990 to 2017 from the Institute of Health Metrics and Evaluation's (IHME) databases [14]. Briefly, the prevalence of NCDs and injuries (NCDI) are estimated based on the cause of death ensemble modelling, and disaggregated based on location, age, sex and year [15]. GBD use available data sources, including covariates in the modelling process to estimate the YLLs and YLDs. The GBD comparative risk assessment framework was used to produce the risk factors attributable disease burden. All the available data endpoints across age, time and location were used to provide a reliable estimate. GBD uses data on covariates if they have been shown to affect the outcome of interest if the data on outcomes are not available, which is the predominant estimation method in Nepal, and less common in data rich countries [12, 13]. We presented the trends from 1990–2017 and compared with South Asian countries to better reflect the changing disease burden. Using higher level cause data based on endpoints available from elsewhere will introduce more error to the burden estimates, therefore we used level 2 causes for DALYs, YLLs, YLDs, and deaths and level 4 causes for risk factors.

## Other data sources

GBD country-wise estimates lacks sub-national data for Nepal. We used the recently published 2016 Nepal demographic health survey (NDHS) estimates for some of the NCDs and their risk factors at the provincial level (eSupplementary methods). We used the prevalence of NCD risk factors: tobacco smoking (Yes, No) [9], overweight obesity ( $< 25$ ,  $\geq 25$  kg/m<sup>2</sup>), and hypertension ( $\geq 140$  mm of Hg systolic and/or  $\geq 90$  mm of Hg diastolic and current use of medication) [16, 17], indoor air pollution (at least present: passive smoking, solid fuel use and presence of indoor cooking practice) [18] where relevant to present the disease burden at the sub-national level.

Similarly, we used estimates from Nepal NCDs Survey 2019 for some of the NCDs and their risk factors at the provincial level (eSupplementary methods). We used the prevalence of NCDs: diabetes (fasting plasma glucose level  $\geq 7.0$  mmol/L or raised post prandial blood glucose  $\geq 200$  mg, or taking antidiabetic medications), chronic kidney disease (urinary albumin to creatinine ration  $\geq 30$  mg/g or e-GFR  $< 60$  ml/min/1.73 m<sup>2</sup>), coronary artery disease (affirmative response to Rose angina questionnaire [19] after applying exclusions for local causes of pain) and chronic obstructive pulmonary disease (FEV1 to FVC ratio of  $< 0.7$  on spirometry test).

## Uncertainty

The estimates are reported with uncertainty intervals (UI) where relevant. These UIs are calculated based on 1000 runs of the models where particular variable is considered, and the lower and upper bound are the 2.5th and 97.5th percentiles, respectively [1, 12, 13].

# Results

## Epidemiological transition and drivers of disease-trend

Between 1990 and 2017, life expectancy at birth in Nepal increased by 14 years, from 58 years to 71 years on an average (**Supplementary Fig. 1**). For the same period, life expectancy at birth increased across the comparator countries, ranging from 11 years in Afghanistan (from 53 years to 64 years) to 16 years in Maldives (from 66 years to 82 years).

Figure 1 shows the percentage change in DALYs for top 22 contributors of DALYs from 1990 to 2017 in Nepal. From 1990 to 2017, the DALYs rate for NCDs decreased by 2%, communicable, maternal, neonatal and nutritional diseases (CMNN) decreased by 83% and injuries decreased by 34%. The contribution of NCDs to total DALYs has increased; six out of ten leading causes of DALYs in 2017 were NCDs compared to three out of ten in 1990. Cardiovascular diseases (CVDs) became the topmost leading cause of DALYs in 2017 from the sixth leading cause in 1990. DALYs rate due to CVD increased from 3,105 [95% UI: 2,677-3,546] in 1990 to 3,859 [3,285-4,375] per 10,000 population (24% increase) in 2017. Respiratory infections and tuberculosis were the leading causes of DALYs in 1990 which decreased to become second in 2006 (66% reduction) and fourth in 2017 (53% reduction). During the same period, chronic respiratory diseases, musculoskeletal disorders and neoplasms climbed to become the 3rd, 5th and 6th leading causes of DALYs in the 2017 respectively.

DALYs due to non-NCDs such as CMNN diseases have decreased- only three non-NCDs were among the top ten in 2017 compared to six in 1990. Nutritional deficiencies dropped from being the fifth leading cause of DALYs in 1990 to the 17th in 2017, with overall decline in DALYs by 67% from 1990 to 2006 and 49% from 2006 to 2017. Though DALYs due to maternal and neonatal disorders declined by 54% from 1990 to 2006 and 47% from 2006 to 2017, it remained the second leading cause of DALYs in 2017.

Figure 3 shows the risk factors contributing to total DALYs. A short gestation for birth weight was attributed to the highest number of DALYs in Nepal. High systolic blood pressure was the second leading risk factor attributable to total DALYs. Smoking and high fasting plasma glucose are at the third and fourth position as leading risk factors attributable to total DALYs (Fig. 2).

NCDs were responsible for majority of deaths, YLLs and DALYs among aged  $\geq 40$  years (**Supplementary Fig. 2–4**). For those 40 years and older, NCDs and injuries were responsible for 75–82% of total DALYs. CVDs, chronic respiratory diseases and neoplasms were the top three leading causes of DALYs in this age group. Injuries, self-harm and violence, mental, neurological and musculoskeletal disorders superseded CVDs to become the leading contributors of DALYs in young population aged 15–35 years (Fig. 3).

## Trend of NCDs in comparison to South Asian countries

The trends of major NCDs (CVDs, diabetes, cancer, chronic respiratory diseases, mental disorders and transport injuries) from 1990 to 2017 in comparison to comparator countries are shown in Fig. 5. In Nepal, the trends in DALYs rate (per 100,000) examined from 1990–2017 varied according to NCD types: increasing for diabetes, decreasing for CVDs, cancer and chronic respiratory diseases and remained stable for mental disorders. The incidence of transport injuries (new cases per 100,000) is increasing, however, the YLDs rate (per 100,000) remained stagnant (**Supplementary Fig. 5**).

Afghanistan ranked the highest in DALYs rate for CVDs, diabetes, chronic respiratory disease and mental disorders. The total burden of cancer was responsible for the highest DALY in Pakistan and twice as high as in Nepal. Nepal had the highest DALYs rate for chronic respiratory diseases in 1990 which decreased substantially in 2017. For the rest of the NCDs, Nepal showed a similar trend in DALYs rate from 1990–2017 compared to other South Asian countries. However, the overall burden was halfway between the highest and lowest burden countries. Furthermore, Nepal had the lowest DALYs rate for diabetes in the South Asia region from 1990–2017 (Fig. 4).

CVDs were ranked as the leading cause of deaths in all South Asian countries. Neoplasms were ranked second in India, Bangladesh, Bhutan, Maldives, and Sri Lanka and chronic respiratory diseases were ranked third in Bangladesh, Bhutan, and Pakistan (Fig. 5). When comparing the DALYs rate between Nepal and the comparator countries in 2017, CVD was the leading causes of DALYs except Afghanistan and Pakistan. This was followed by maternal and neonatal

disorder which was ranked second in Bangladesh, Bhutan and India. Musculoskeletal disorders were ranked fifth leading causes of DALYs in Nepal and the top five causes of DALY in Bangladesh, Bhutan, Maldives and Sri Lanka (Fig. 6).

CVD was ranked as the leading cause of YLL in Nepal, India, Bangladesh, Sri Lanka, Bhutan, and Maldives (**Supplementary Fig. 6**). Musculoskeletal disorder was ranked as the leading cause of YLDs in Nepal, Bhutan, Maldives, Bangladesh and Sri Lanka and the second leading cause of YLDs in Afghanistan, India and Pakistan. Mental disorders were ranked as the second leading causes of YLDs in Nepal, Bhutan, Maldives, Bangladesh and Sri Lanka, and primary causes of YLDs in Afghanistan, India and Pakistan (**Supplementary Fig. 7**).

Analysis based on Nepal Demographic Health Survey and National NCDs Survey data provided some estimates on the prevalence of chronic kidney disease (CKD), coronary artery disease (CAD), diabetes, hypertension, overweight/obesity, tobacco smoking and indoor air pollution markers at the sub-national level. The province 4 has a high burden of hypertension, overweight/obesity, tobacco smoking and indoor air pollution markers. Though Provinces 6 and 7 have a relatively low burden of hypertension and overweight/obesity, they have higher burden of tobacco smoking and indoor air pollution markers, and chronic obstructive pulmonary disease (COPD). Burden of hypertension and obesity/overweight were higher among high socio-economic groups. This was contrasting to tobacco smoking and indoor air pollution markers which were higher among low socio-economic groups (**Supplementary Fig. 8–10**).

## Discussion

### Summary and discussion of results

In Nepal, DALYs rate for NCDs decreased by 2% from 1990 to 2017, CMNN during the same time decreased by 83% and injuries decreased by 34% in Nepal. CVD was the leading cause of disease burden in 2017 with 3,859 DALYs per 100,000 population. Among 40 years or older population, NCDs and injuries were responsible for 75–82% of total DALYs. CVDs, chronic respiratory diseases and neoplasms were the top three leading causes of DALYs in this age group. Injuries, self-harm and violence, mental, neurological and musculoskeletal disorders superseded CVDs to become the leading contributors of DALYs in young population aged 15–35 years.

### Interpretation of findings

Our findings are interesting yet expected given Nepal's epidemiological and demographic transition and are comparable to countries in the South Asia region. Particularly, CVD was the leading cause of deaths overall and among older adults in Nepal. An earlier study using American Heart Association's seven metrics of risk factors (smoking, alcohol, fruits and vegetable intake, physical activity, hypertension, diabetes, obesity) found a low prevalence of ideal cardiovascular health that deteriorated with aging in urban population of Nepal [20]. The dietary and demographic transition has predisposed more population to high calorie diet, sedentary lifestyle and resulted in increased cardiovascular deaths [20, 21].

Another important challenge is the growing burden of chronic respiratory diseases in Nepal. The disease is closely related to the burden of tobacco consumption and indoor air pollution, including widespread use of biomass stoves [22]. Indoor air pollution is the major cause of deaths overall as well as the leading cause of deaths among women in Nepal [23]. Women are particularly affected due to their higher exposure to indoor environment. Men who have a prior history of tobacco smoking, are also at higher risk of respiratory diseases. Particularly those from poorer households were mostly affected [24].

Cancer is the third leading cause of deaths and sixth leading cause of DALYs in Nepal. The burden is particularly higher in older adults. Despite the growth in the burden, affordable treatment services remained unavailable to majority of the population [25]. Musculoskeletal disorders related to ergonomic (work related factors such as force, repetition and posture) and individual risk factors (poor work practices, fitness and health habits) are the fifth leading cause of DALYs and (first) leading cause of YLDs. In addition to curative services, preventive initiatives aimed at improving posture and work-loads for agrarian populations, expanded treatment services are needed to address this growing burden of musculoskeletal disorders, including physiatrist and physiotherapy services [26].

Besides that, injuries in Nepal has become a prominent cause of deaths corroborating with an earlier study [27]. Our analysis showed that injuries were the leading cause of deaths among young population. Of note, injuries of all kind, and particularly transport injuries, have increased after the 2015 earthquakes. Reconstruction efforts is reported to have increased road traffic accidents with a corresponding increase in traffic and congestion [28].

### Burden of disease data from local studies

Diabetes, CKD, CAD, hypertension, overweight/obesity, tobacco consumption, were more common in provinces with relatively higher affluence [9, 16, 22, 29, 30]. Particularly, burden of hypertension, overweight/obesity, and tobacco smoking were higher in province 4. Province 6 and 7, on the other hand, have a comparatively low burden of hypertension and overweight/obesity, and higher burden of tobacco smoking, indoor air pollution and COPD (**Supplementary Fig. 9**). Such geographical variation in disease risk factors further warrants a detailed exploration in future studies. These conditions were typically associated with older age groups. The prevalence of these diseases were the lowest among the young age group (20–39 years): Diabetes (3.1%), CKD (2.6%), CAD (1.7%) and COPD (6.7%), and highest among older adults ( $\geq 60$  years): Diabetes (13.3%), CKD (11.5%), CAD (2.8%) and COPD (21.5%) [30].

The Nepal Health Research Council Health Research Council, a regulatory body for health research in Nepal has launched a Population Based Cancer Registry (PBCR) in Nepal since January 2018. Although the findings of the cancer registry are yet to be made public, the interim analysis of the Kathmandu valley has found the highest incidence of cancer among females compared to males and in the older age groups: 230.5 per 100,000 in 70–74 years old followed by 203 per 100,000 in 65–69 years old. The top three leading cancer sites in males were lungs, lip and oral cavity and gastrointestinal cancers. Similarly breast, lungs and cervix were the top three leading cancer sites in females [31].

## Implications for policy and programmatic improvement

In response to the growing burden of NCDs, the national Multi-Sectoral Action Plan on the 'Prevention and Control of NCDs 2014–2020' targets to reduce NCDs by 25% by 2025 aligning with SDG goals [6]. The government of Nepal has adopted the World Health Organizations' package of essential NCD (PEN) to deliver NCD health services at primary healthcare level [10] in response to the growing burden of NCDs. A package such as this would roughly cost 8.8 USD per capita (1.4% of GDP) at primary health care level [32].

The availability of health services is poor with wide rural and urban disparities. A previous national report found 93.2% of primary health care facilities had adequate readiness to provide services for CVD, 75.6% for diabetes and 98.5% for chronic respiratory diseases [32]. However, this picture of readiness does not reveal about the actual availability of health services as most of the health facilities do not have a calibrated equipment, trained human resource in place, and year-round availability of medicines. For example, only 0.5% of primary health care facilities have trained their health staffs to provide cardiovascular services, and there is low availability of essential CVD medicines at these facilities (only 14%, and 18.2% of these facilities had aspirin and amlodipine—two key CVD drugs) [33].

Tackling growing burden of NCDs requires financial protection from NCDs related expenditures. Nearly 48% of health expenditure in Nepal is paid out-of-pocket (OOP), and of this, nearly 88% is spent on medicines [34]. The high OOP expenditure is particularly due to heavy reliance on private health services which is not covered by insurance schemes. Nearly 40 USD per capita per person is spent in health, and nearly 12 USD is spent in medicines [7]. Providing financial protection from OOP is an important health priority in the country, however is inadequate. Further, a pilot insurance program was launched in 2015 which is yet to become fully operational [8].

NCDs have an improvising impact in the population due to highly priced diagnostics, medicines and medical services. To address this, the PEN which provides financial protection up to \$916 USD per year for treatment of major NCDs was proposed to support treatment of NCDs among poor and vulnerable population [25]. Despite high hopes, only a limited progress has been seen so far on its implementation [25].

## Future implications for research

Given the limitations of the modelled GBD data, we need more local data points that can be collected at low cost by incorporating NCDI indicators in future surveys and creating disease and death registries and at national and sub-national level. Further efforts should be placed in developing local information management system which can be used to capture disease events across the population. While this study is the first national assessment, further studies should delve deeper into the geographic heterogeneity in the burden of key NCDs and their risk factors.

## Strengths and limitations

The main strengths of this study are following: i) this is the first nationwide assessment on NCDI that captures both the global and local data, and ii) the standard GBD methodology was used allowing for regional comparison among countries from the South Asia region. The limitations of this study are the general limitations on GBD as discussed elsewhere.[1, 35] In brief, i) Nepal does not have a functional cause of death reporting system, ii) the disaggregated data by age, sex, provinces were not available for major disease outcomes such as chronic respiratory diseases, mental disorders and musculoskeletal diseases, and iii) imputation methodology was used when Nepal data sources was not available. To improve our modelling capacity, we need more data from Nepal in the future.

## Conclusion

CVDs are currently the leading causes of deaths and DALYs in Nepal. This is followed by respiratory diseases and cancer as the leading causes of deaths. At any ages  $\geq 40$  years, NCDs and injuries were responsible for 75–82% of total DALYs. High systolic blood pressure, smoking and high fasting plasma glucose were a leading contributor to the NCDs DALY burden. Studies like this can become an important tool for framing a coherent policy response towards achieving the goals and targets set by Nepal's first multi-sectoral action plan on NCDs in 2015. To achieve the goals laid out by the MOHP and the SDGs, addressing the NCDI burden is a critical next step for the health of all Nepalese.

## Abbreviations

CAD  
coronary artery disease; CVD:cardiovascular disease; CKD; chronic kidney disease; COPD:chronic obstructive pulmonary disease; CMNN:communicable, maternal, neonatal and nutritional diseases; DALYS; disability adjusted life years; FEV; forced expiratory volume; FVC:forced vital capacity; GBD:global burden of disease; GFR:glomerular filtration rate; LMICs:low and middle income countries; NCD(I):non communicable disease (and injuries); NDHS:Nepal demographic and health survey; OOP:out of pocket expenditure; PEN:package of essential noncommunicable disease interventions; SDGs:sustainable development goals; STEPs:Stepwise approach to non-communicable diseases; USD:United States dollar, YLDs:year lived with disability; YLLs:years of life lost.

## Declarations

## Ethics approval and consent to participate

The use of the aggregated-level and de-identified GBD data does not require ethics approval.

## Consent for publication

All the authors have read the final version of this manuscript and consent for publication.

## Availability of data and material

The corresponding author has full access to the data which can be made available upon request and can also be accessed from <http://www.healthdata.org/gbd>. The remaining data from Nepal Demographic Health Survey can also be accessed <https://dhsprogram.com/data/Getting-Started.cfm>.

## Competing interests

SRM, ARS, AV, DS, DN, KA, ABS, BGK and BIK were members/commissioners at the Nepal NCDI Poverty Commission (<http://www.ncdipoverty.org/nepal>). There are no other conflicts of interests.

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## Figures

Figure 1: Percentage change in DALYs from 1990 to 2017 for 22 leading causes of DALYs (both sex, all ages)

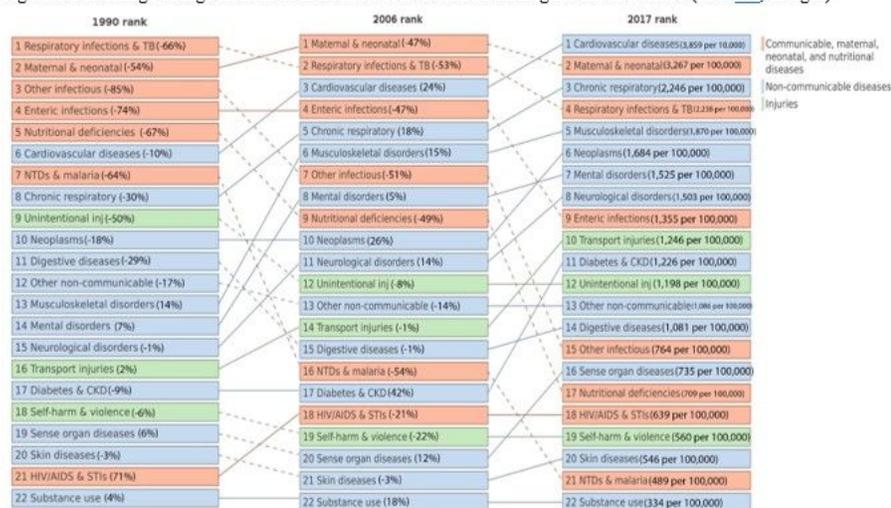


Figure 1

Percentage change in DALYs from 1990 to 2017 for 22 leading causes of DALYs (both sex, all ages)

Figure 2: DALY rates (per 100,000) attributable to different risks for both sexes for Nepal for all ages in 2017

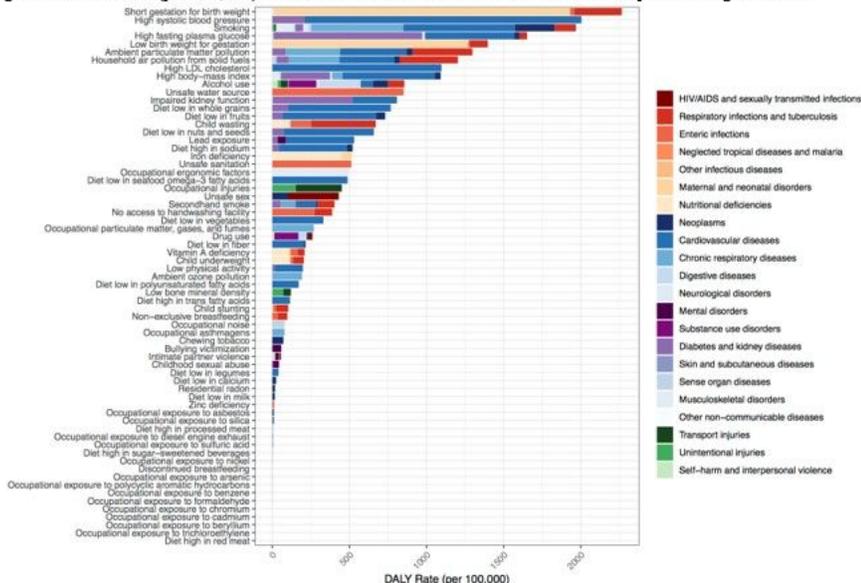


Figure 2

DALY rates (per 100,000) attributable to different risks for both sexes for Nepal for all ages in 2017

Figure 3: Percent of total NCDs related DALYs by age groups in Nepal for both sexes (2017)

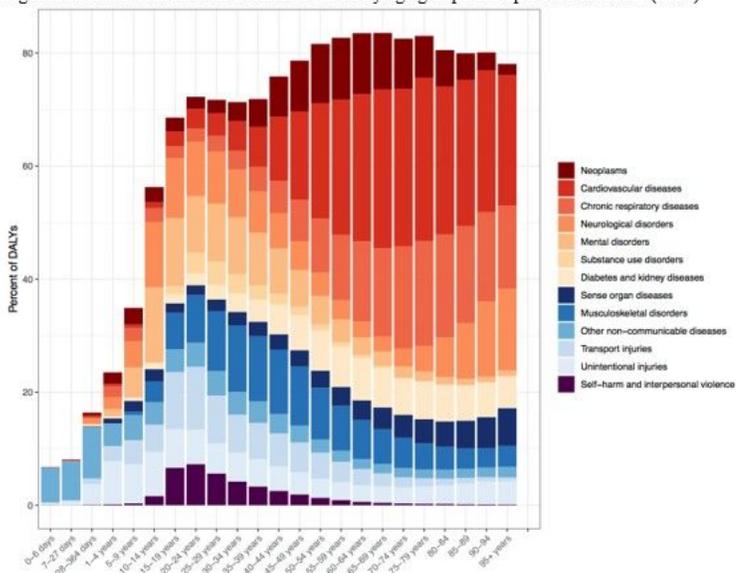


Figure 3

Percent of total NCDs related DALYs by age groups in Nepal for both sexes (2017)

Figure 4: DALYS rate (per 100,000) of cardiovascular diseases, diabetes, cancer, chronic respiratory disease, mental disorders, and incidence of transport injuries (new cases per 100,000) among aged 15-49 years in Nepal and comparator countries for both sexes (2017)

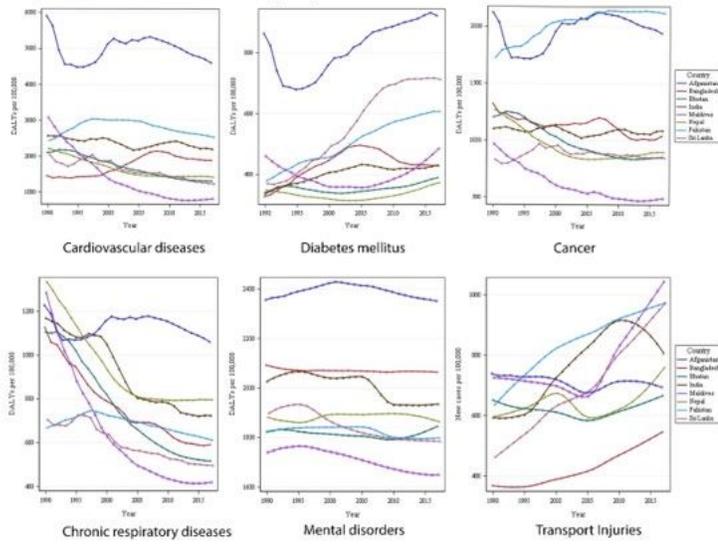


Figure 4

DALYS rate (per 100,000) of cardiovascular diseases, diabetes, cancer, chronic respiratory disease, mental disorders, and incidence of transport injuries (new cases per 100,000) among aged 15-49 years in Nepal and comparator countries for both sexes (2017)

Figure 5: Ranking of Deaths rates for both sexes for Nepal and the comparator countries for all ages (both sexes) in 2017

	1	2	3	4	5	6	7	8
Cardiovascular diseases	1	1	1	1	1	1	1	1
Chronic respiratory diseases	11	3	3	2	4	2	7	4
Neoplasms	4	2	2	4	2	3	3	2
Respiratory infections and tuberculosis	3	5	6	3	9	4	4	6
Enteric infections	10	8	10	5	16	5	8	14
Diabetes and kidney diseases	8	6	4	6	3	6	5	3
Maternal and neonatal disorders	2	4	7	8	10	7	2	12
Digestive diseases	13	7	5	9	11	8	6	8
Transport injuries	9	12	14	12	7	9	9	10
Unintentional injuries	7	9	8	7	6	10	12	9
Neurological disorders	14	10	9	10	5	11	13	5
Other infectious diseases	6	14	13	13	14	12	10	13
HIV/AIDS and sexually transmitted infections	17	17	12	16	20	13	15	18
Other non-communicable diseases	5	11	11	14	8	14	11	11
Self-harm and interpersonal violence	12	13	15	11	12	15	14	7
Neglected tropical diseases and malaria	16	15	16	15	15	16	16	16
Nutritional deficiencies	15	16	19	17	17	17	17	17
Musculoskeletal disorders	19	20	18	19	19	18	18	20
Substance use disorders	18	18	17	18	18	19	19	15
Skin and subcutaneous diseases	20	19	20	20	13	20	20	19
Mental disorders	21	21	21	21	21	21	21	21
	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka

Figure 5

Ranking of Deaths rates for both sexes for Nepal and the comparator countries for all ages (both sexes) in 2017

Figure 6: Ranking of DALYs rates for both sexes for Nepal and the comparator countries for all ages (both sexes) in 2017

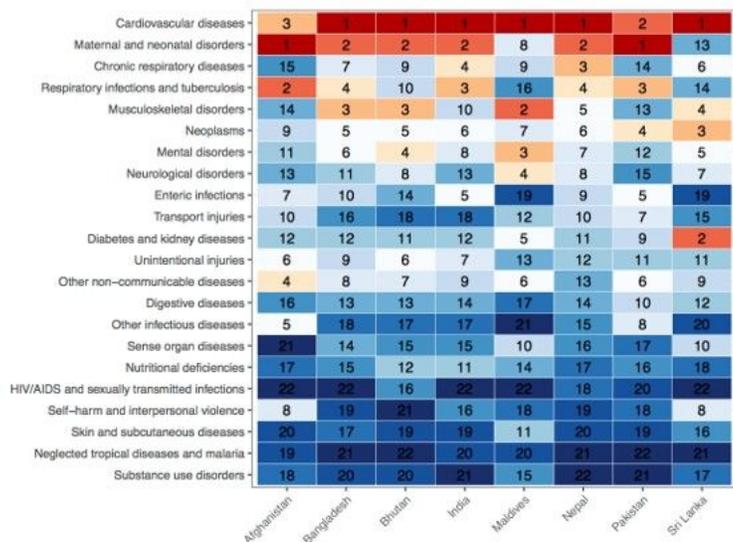


Figure 6

Ranking of DALYs rates for both sexes for Nepal and the comparator countries for all ages (both sexes) in 2017

### Supplementary Files

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- [Supplementaryappendix1.09.2019.docx](#)