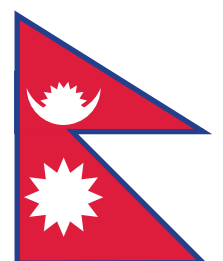


The Nepal NCDI Poverty Commission

*An Equity Initiative to
Address Noncommunicable
Diseases and Injuries*

National Report – 2018





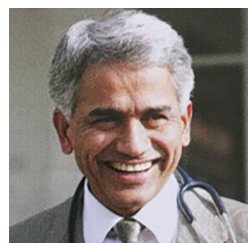
ACRONYMS & ABBREVIATIONS

AHW:	Auxiliary Health Worker	MPI:	Multidimensional Poverty Index
ANM:	Auxiliary Nurse Midwife	NCD:	Noncommunicable Diseases
ASI:	Assistant Sub-Inspector of police	NCDI:	Noncommunicable Disease and Injuries
ASRH:	Adolescent and Sexual and Reproductive Health	NHFS:	Nepal Health Facility Survey
BAC:	Blood Alcohol Content	NLSS:	National Living Standards Surveys
CAPD:	Continuous Ambulatory Peritoneal Dialysis	OOP:	Out of Pocket
CBS:	Central Bureau of Statistics	OPHI:	Oxford Poverty and Human Development Initiative
CHU:	Community Health Unit	ORCs:	Outreach Clinics
DALY:	Disability Adjusted Life Years	PEN:	Package of Essential Noncommunicable Diseases
DDA:	Department of Drug Administration	PHC:	Primary Health Care
DH:	District Hospital	PHCC:	Primary Health Care Center
DMARDs:	Disease-Modifying Agents Used in Rheumatic Disorders	PHCRD:	Primacy Health Care Revitalization Division
EHCS:	Essential Health Care Services	PL:	Poverty Line
EPI:	Expanded Program for Immunization	PMTCT:	Prevention of Mother to Child Transmission
FHCP:	Free Health Care Policy	PoP:	Plaster of Paris
FHD:	Family Health Division	SES:	Socio-economic Status
FP:	Family Planning	SHP:	Sub-Health Post
GBD:	Global Burden of Disease	SLTHP:	Second Long-Term Health Plan
GBV:	Gender Based Violence	SN:	Staff Nurse
GoN:	Government of Nepal	STS:	Service Tracking Survey
HA:	Health Assistant	VDC:	Village Development Committee
HIV:	Human Immunodeficiency Virus	VIA:	Visual inspection with acetic acid
HOTC:	Human Organ Transplant Center	WHO:	World Health Organization
HP:	Health Post	YLD:	Years Lived with Disability
HRH:	Human Resource for Health	YLL:	Years of Life Lost
MDGP:	Doctor of Medicine in General Practice		
MoH:	Ministry of Health		



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FOREWORD

Nepal is currently challenged by the dual threats of communicable and noncommunicable diseases. The emergence of noncommunicable diseases in Nepal is evident; there is an increasing number of deaths among adults due to chronic diseases such as diabetes, cardiovascular diseases, respiratory diseases, or cancer. However, the burden of NCDs does not stop there. It also includes childhood illnesses, such as rheumatic heart disease, that can cause a life of disability and early death. It includes life threatening consequences, such as kidney failure or liver cirrhosis, which require advanced care, and sometimes, palliation. It includes mental health disorders, such as depression, that can cause suffering over a lifetime. It includes injuries from falls, natural disasters, or road traffic accidents that lead to costly surgeries and the need for rehabilitation. In total, these health threats are a great toll on the well-being and productivity of our population.

It is with this concern that the Ministry of Health in 2016 endorsed the Nepal NCDI Poverty Commission to analyze the state of NCDs and injuries in Nepal and provide recommendations on how to better address these conditions within our context. This Commission's work will focus on the ideals of the Nepal Health Policy in placing health at the center of the development agenda with equitable access to health services, high quality of health services, health system reform, and multi-sectoral action. We believe that the work of this commission will serve as a milestone in tackling these diseases and reducing their impact on the health and wealth of our country.

With gratitude to all those who inspired and supported us,

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EXECUTIVE SUMMARY

The burden of noncommunicable diseases and injuries (NCDIs) in terms of disability and death in Nepal has more than doubled over the past 25 years. In 2015, 51% of all death and disability (DALYs) were caused by NCDs and 14% were caused by injuries. Approximately half of this burden of disease actually occurs during childhood and early productive years (under the age of 40), and virtually all NCDIs cause death at an earlier age in Nepal than higher-income countries. Although global targets in NCDs largely focus on four major diseases (cardiovascular disease, type 2 diabetes, chronic respiratory diseases, and cancers), 60% of death and disability from NCDIs in Nepal are due to other conditions, such as non-ischemic cardiac conditions, infection-related cancers, musculoskeletal disorders, mental health conditions, neurological disorders, and injuries (particularly as a result of natural disasters).

Some of these conditions disproportionately affect poorer segments of the Nepali population, such as ischemic and hypertensive heart disease, COPD, hemorrhagic and ischemic stroke, asthma, hearing loss, rheumatic heart disease, congenital heart disease, cirrhosis due to HBV, and peptic ulcer disease. Households in lower income quintiles have higher prevalence of respiratory diseases and asthma, gastrointestinal conditions, musculoskeletal conditions, and heart-related conditions. Many of these conditions are more likely linked to untreated infectious diseases, living conditions associated with poverty, and poor access to health services. Injuries, gastrointestinal conditions, and heart-related diseases cause the most impoverishment among NCDIs across the population, and at an individual household level, cancers, injuries, heart-related conditions, and kidney/liver diseases are severely impoverishing. Patient voices and narratives have been documented to faithfully capture the human experience of these conditions (visit <http://www.voicesofncdipoverty.org>).

Despite inclusion of NCDIs in basic health services and high reported availability of NCDI services at public facilities, availability of key medications and readiness of NCD services remain very limited, and availability of trained human resources is a particular challenge. Although the government allocates 11% of expenditures to health, 48% of total health expenditure in Nepal comes from out of pocket. Thirty-three percent of this out-of-pocket spending is on NCDIs. The government allocates only 6.4% of health spending



to NCDIs. Considering the burden and distribution of NCDIs in Nepal, this commission selected 25 NCDI disease conditions on which to increase health sector interventions. These conditions, which build on the existing goals in the Nepal health system, include asthma, chronic obstructive pulmonary disease, hypertensive heart disease and stroke, rheumatic heart disease, diabetes (type 1 and 2), breast and cervical cancer, childhood leukemias/lymphomas, major depressive disorder, epilepsy, sickle cell disease, cirrhosis, motor vehicle road injuries and other injuries. The commission has identified 23 potential cost-effective interventions to be introduced and/or incrementally intensified within the health sector to establish Universal Health Coverage for these priority NCDI conditions by 2030. These interventions, if implemented to a realistic target coverage, are projected to avert at least 9,680 premature deaths every year by the year 2030. Furthermore, these interventions will lead to larger benefits by averting morbidity and DALYs given the emphasis on interventions for severe conditions affecting those at younger ages. These interventions would cost roughly 22% of total health expenditure, or 1.4% of current GDP, roughly \$8.76 per capita, which although high, may be reasonable in consideration of the vast burden of disease comprised collectively by these conditions.

In addition to consideration of these interventions, the commission also identified several areas to strengthen governance, health system strengthening, and monitoring of this expanded set of priority NCDIs. Specific approaches include strengthening the availability and readiness of essential health services and consideration of structured capacity building program for health service providers; promoting care packages, such as the Package of Essential Noncommunicable Disease (PEN) interventions for primary health care; increasing the availability of specialty services and personnel; expanding progressive vertical programs providing free-care for disease specific areas (as has been done for cardiac surgery and dialysis); decentralizing and task-shifting services for improved access in remote areas; and expanding basic health coverage for NCDIs to avoid impoverishing out-of-pocket costs. Monitoring of the response can be strengthened by expanding existing household data collection (i.e., STEPs, DHS, MICS) to include more diverse NCDI conditions as well as socioeconomic stratifiers, strengthening civil registration and vital statistics system to improve cause of death reporting mechanism such as obtaining information from community verbal autopsy



programs, establishing disease registries to capture NCDs at the community level, and expanding health facility surveys to include key areas such as in NCDs, mental health, and injury related services (i.e., surgery, rehabilitation, and palliative care). The establishment of a specific directorate for NCDs within the federal and provincial Ministries of Health, as well as a high-level multi-sectoral task force, would provide greater governance and accountability to lead and track progress on NCDs in Nepal. Finally, given the clear health and economic burden of the vast category of NCDs, increased resources for NCDs should be strongly considered, including a possible target of 20% of government expenditure on health towards these conditions. Progressive taxation on tobacco, alcohol, and sugary beverages, as well as other revenue streams, should be explored to both generate revenue and discourage use of key NCDI risk factors.

In summary, this report provides a critical analysis of NCDs in Nepal; and recommends realistic interventions to address an expanded set of prioritized NCDI conditions. Our recommendations specifically consider challenges pertinent to the poorest population and also pay attention to the unique differences in the diseases and risk factors that impact them. In the current context of national health system reform, we are confident that the recommendations of this report will provide valuable guidance for framing new policies and programs on NCDs in Nepal.



THE NEPAL NCDI POVERTY COMMISSION

The Nepal NCDI Poverty Commission, led by Co-Chairs Dr. Senendra Raj Upreti, then Secretary at the Nepal Ministry of Health, and Dr. Bhagawan Koirala from Tribhuvan University, is a pioneering group in Nepal that brings experts from diverse disease specialties together to address NCDIs and equity. This team of 22 Commissioners represent a range of fields – medicine, surgery, population epidemiology, economics, and journalism – and a variety of institutions within Nepal – the Ministry of Health, the National Health Research Council, Tribhuvan University, Kathmandu University, BP Koirala Institute of Health Sciences, Harvard University, University of Washington, Possible, other key hospitals and specialty centers. The Commission was established in response to an initiative of the global *Lancet* Commission on Reframing Noncommunicable Diseases and Injuries for the Poorest Billion (“Lancet NCDI Poverty Commission”)¹, which invited the co-chairs and coordinator to participate in a three-day meeting in Kigali, Rwanda, in September 2016, assisted in the launch of the Commission in January 2017, and provided ongoing technical support.





1.0 Background

1.1 INTRODUCTION AND BACKGROUND OF NCDIS IN NEPAL

Nepal is a land-locked country with a total land area of 147,181 square kilometers. It stretches 885 kilometers (east-west) and 193 kilometers (north-south with India to the east, south, and west and China to the north). The country hosts a bustling population of 26.6 million, nearly half of which lives in the plains in the south.² A new federal structure of the government has proposed seven federal states and nearly 700 village and municipal councils to govern administrative regions, including health care.³

In the last two decades, the country has not just seen a rapid demographic transition from a high total fertility rate from 5.1 children per woman in 1991⁴ to 2.3 in 2016⁵, but also witnessed epidemiological transition. Noncommunicable diseases and injuries (NCDIs) are now the leading causes of deaths surpassing communicable diseases, nutritional deficiencies, maternal and newborn related deaths.⁶ This adds to the burden on Nepal's already existing health system constraints, including infrastructure, supply chain management, and healthcare workforce in its unique topographical situation.

Nepal's constitution regards health as a universal right and guarantees the basic care for all. The Nepal Health Policy 2014 states the nation's commitment to Universal Health Coverage (UHC) as well as the fundamental principles of right and easy access to quality health care, equity, and health services accountability.⁷ The Nepal Health Sector Strategy 2015-2020 provides a structure, plan, and monitoring framework to achieve a goal to improve health status for all people through an "accountable and equitable health service delivery system."⁸ This goal is aimed to be achieved through nine outcomes, including rebuilding and strengthening health systems, improving quality of care at point of delivery, equitable utilization of health services, strengthening decentralized planning and budgeting, improving management and governance, improving sector management and governance, improving sustainability of health sector financing, promoting health lifestyles and environment, strengthening management of public health emergencies, and improving availability and use of evidence in decision-making processes.

The governance of management and accountability of the NCDI response is maintained within the Primary Health Care Revitalization Division, Department of Health Services (DoHS), Ministry of Health (MoH). Under the DoHS, the MoH has regional and district health administrative structures and tiers of care providers. Health posts, primary health care centers, and



district level hospitals provide health services within each district and region. Additionally, there are zonal, sub-regional, regional and central specialty and referral hospitals, and several teaching hospitals. In 2014, the Multi-sectoral Action Plan for the Prevention and Control of Noncommunicable Diseases (2014-2020) was developed and laid out a broad action plan for the NCD response in Nepal, with a focus on raising the priority of NCDs in national agendas and policies, strengthening national capacity and governance, reducing modifiable and environmental risk factors, strengthening health systems for NCD care, promoting research, and monitoring progress towards these aims. This action plan focused on regionally established targets, tackling risk factors such as alcohol, tobacco, indoor biomass fuels, salt, and obesity, as well as the response to ischemic/hypertensive cardiac disease, diabetes, and chronic respiratory diseases.

The Government of Nepal (GoN) has initiated several innovative and progressive structural, policies and plans such as the Free Health Care Policy (FHCP), and the Second Long-Term Health Plan (SLTHP-1997-2017)⁹ to promote increased access to health services. Other programmatic initiatives are the Impoverished Citizen Treatment Fund for the poor¹⁰ and free essential health care services (EHCS) to strengthen the national health system, including NCDIs with a focus on disadvantaged and medically underserved populations.⁹ The MPOWER policy package was adopted and implemented in 2009 and has dramatically strengthened the national response to tobacco.¹¹ The Vehicle and Transport Management Act 2049¹² strengthened injury prevention and management, including the use of alcohol.¹² Policies have been introduced to facilitate health services for key NCDIs such as heart surgery, cancer care, organ transplant, and kidney dialysis.¹³ In addition, there is a provision of free cardiac care under 15 years of age (Children Assistance Program-CAP) and above 75 years of age (Senior Citizen Program-SCP). There is also a provision of free treatment for rheumatic heart disease and free valve replacement in the two national cardiac centers in Nepal.^{14,15} Similarly, the Mental Health Policy was formulated in 1995 and acknowledged and addressed the severe burden of mental health in Nepal. (See Appendix 1.0 for an in-depth description of these policies and programs.) Overall, the GoN has established a strong policy and programmatic foundation to respond to the rise of NCDIs in Nepal.



1.2 OBJECTIVES OF THE NEPAL NCDI POVERTY COMMISSION

The general objectives of the Nepal NCDI Poverty Commission are as follows in the context of Nepal:

1. To provide baseline epidemiological and socioeconomic situational analysis of NCDI in relation to poverty.
2. To explore priorities, delivery platforms and integration of services for NCDI.
3. To determine fiscal space, resource needs and financing for programs targeting NCDI.
4. To critically examine current policy, advocacy and communication environment in the context of NCDIs.



1.3 METHODOLOGY

The estimated burden of NCDI is based on the Global Burden of Disease (GBD) estimates from GBD 2015¹⁶ (see Appendix 2.0). The disease or the condition is explained in terms of three levels (see Appendix 2.3). Level 1 is the overall consolidated categories of diseases described in terms of communicable, maternal, neonatal, and nutritional diseases; noncommunicable diseases; and injuries. Level 2 is the subcategories of the three categories of Level 1. Level 3 consists of all individual conditions listed in the Global Burden of Disease database. The risk factors are based on the estimates from the GBD. Risk factors are characterized as behavioral (i.e. smoking, diet low in whole grains, fruits or high in sodium and alcohol intake etc.), metabolic (i.e., high systolic blood pressure, fasting plasma glucose and body mass index etc.), and environmental (i.e., household air pollution from solid fuels, ambient particulate matter pollution and occupational economic factors etc.). The burden of disease that cannot be associated with any given risk factor in the data provided within GBD is considered “unattributable.”

We have further presented the relationship of NCDI burden with socio-economic status determined primarily for the National Living Standard Survey (see Appendix 2.5), literature review (see Appendix 3.0), and the rates of diseases among the poor and non-poor from the GBD estimates. We estimated the burden of NCDIs for those living in the poorest global billion population (“poor”) and those not living in the global poorest billion population (“non-poor”) in Nepal using global associations of national burden of disease and proportion of extreme poverty (see Appendix 2.1). Consistent with the Lancet NCDI Poverty Commission, the global poorest billion were defined as those living in households deprived in 5 or more of the 8 categories on the Multidimensional Poverty Index (MPI)^{17,18}, excluding health indicators in order to avoid confounding. The consumption quintile (see Appendix 2.5) is household consumption data that includes food and non-food consumption, as well as home production for consumption. Individual weight was used while estimating poverty. Out-of-Pocket (OOP) payment for chronic illness or injury includes health expenditure includes the consultation cost or medicine cost made by the household while getting treatment. The average cost for the disease and its Impoverishment impact are measured from the difference between poverty incidence before and after OOP payment for health care based on the NLSS dataset of consumption.^{19,18}



2.0 Situation Analysis of NCDIs and Socioeconomic Status in Nepal

2.1 DISTRIBUTION OF POVERTY IN NEPAL

Nepal is a low-income country with gross national income per capita of \$730. The average annual GDP growth rate of Nepal is estimated to be 4.38% from 1993 to 2016^{20,21}, and about 15% of the population is at poverty head count ratio of \$1.90 a day.²² The United Nations Development Program reports that Nepal is 146th on the Human Development Index.²³ The Lancet NCDI Poverty Commission used a Multidimensional Poverty Index (MPI)^{17,18} to estimate household poverty. The MPI created by the Oxford Poverty and Human Development Initiative consists of three domains and 10 indicators (see Appendix 2.1): education (years of schooling, child school attendance); health (child mortality, nutrition); and living standard (electricity, improved sanitation, improved drinking water, flooring and cooking fuel, and assets ownership) (see Appendix 2.0 for detailed methodology). The adapted MPI used by the Lancet NCDI Poverty Commission utilizes the 8 non-health indicators, weighting each indicator equally. Approximately one billion people globally reside in households deprived in 5 or more of these 8 indicators. Nearly five million people of Nepal (i.e. 22% of the Nepalese population) would be part of this poorest global billion.

According to this definition of poverty, there are regional variations in the distribution of poverty in Nepal. Nepal is geographically stratified into 15 eco-developmental regions, and the highest density or proportion of the poorest individuals is found in the Mid-western Hill and Mountain regions (Figure 1). Similarly, the provincial distribution of poverty as per the National Planning Commission of Nepal shows that Province 2 (0.217) and Province 6 (0.230) have the highest levels of MPI poverty (Figure 2).^{24,18} However, in terms of absolute numbers, Central Terai and Mid-western Hill have the highest number of the poorest billion - 1.2 million and 0.71 million, respectively (Figure 3).



Distribution of extreme poverty in Nepal

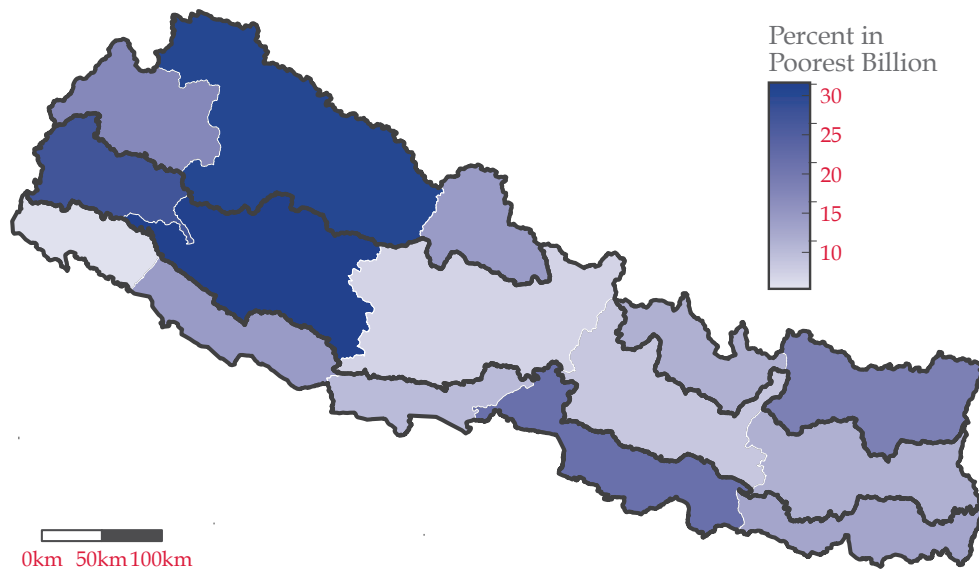


Figure 1: Distribution of percent of individuals living in the global “poorest billion” within Nepal. (Source: Oxford Poverty & Health Development Initiative)

Distribution of Multidimensional Poverty Index (MPI) poverty in Nepal

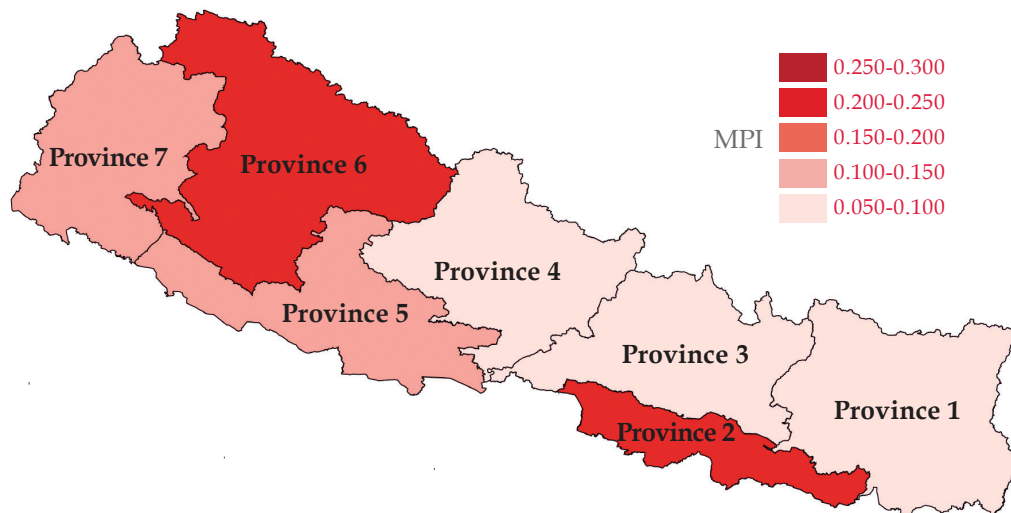


Figure 2: Multidimensional Poverty Index (MPI) Map by Province (Source: Nepal’s Multidimensional Poverty Index: Analysis Towards Action 2014, Nepal Planning Commission, GoN)



Number of people identified as the poorest billion in 2011, by region

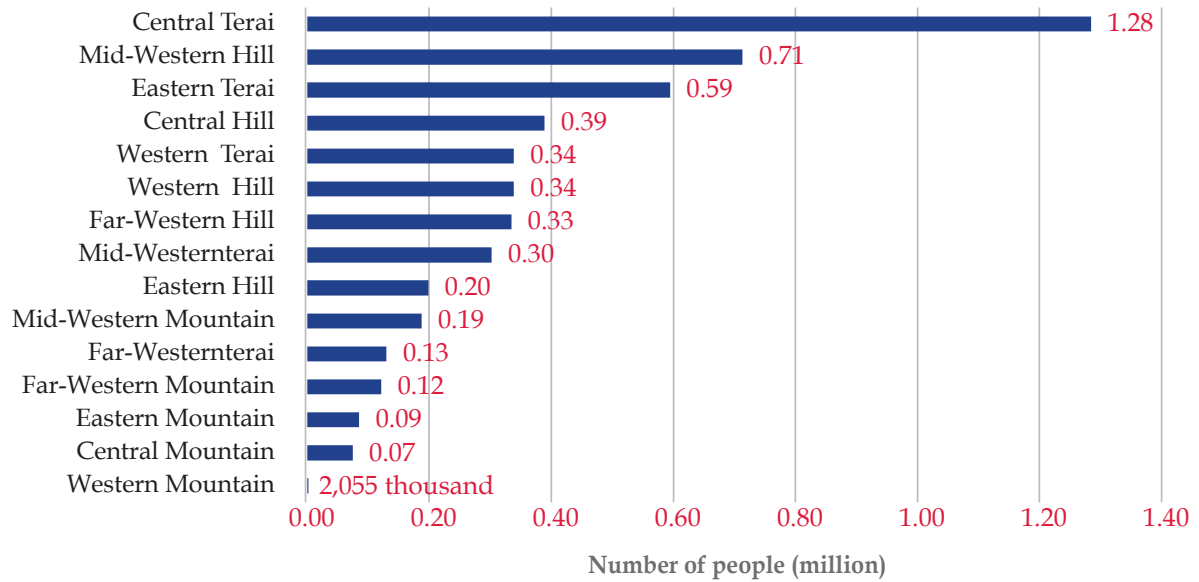


Figure 3: Distribution of absolute numbers of individuals living in the global "poorest billion" in Nepal. (Figures are in thousands) (Source: Oxford Poverty & Human Development Initiative)



2.2 BURDEN OF DISEASES IN NEPAL

Noncommunicable diseases (51%) contribute to the largest proportion of total DALYs in Nepal, followed by communicable, maternal and nutritional deficiencies (35%) and injuries (14%). Figure 4 presents the increasing trend of both noncommunicable diseases and injuries since 1990 while the prevalence of communicable diseases, maternal, neonatal and nutritional diseases is decreasing over the period of 25 years. The age standardized DALYs per 100,000 population due to NCDs in Nepal has increased from 14,939 in the year 2004 to 16,439 per 100,000 population in the year 2015. The DALY rate for injuries has also increased from 3,559 per 100,000 in the year 2004 to 4,596 per 100,000 population in 2015.

Share of burden of disease from NCDs and injuries, 1990-2015

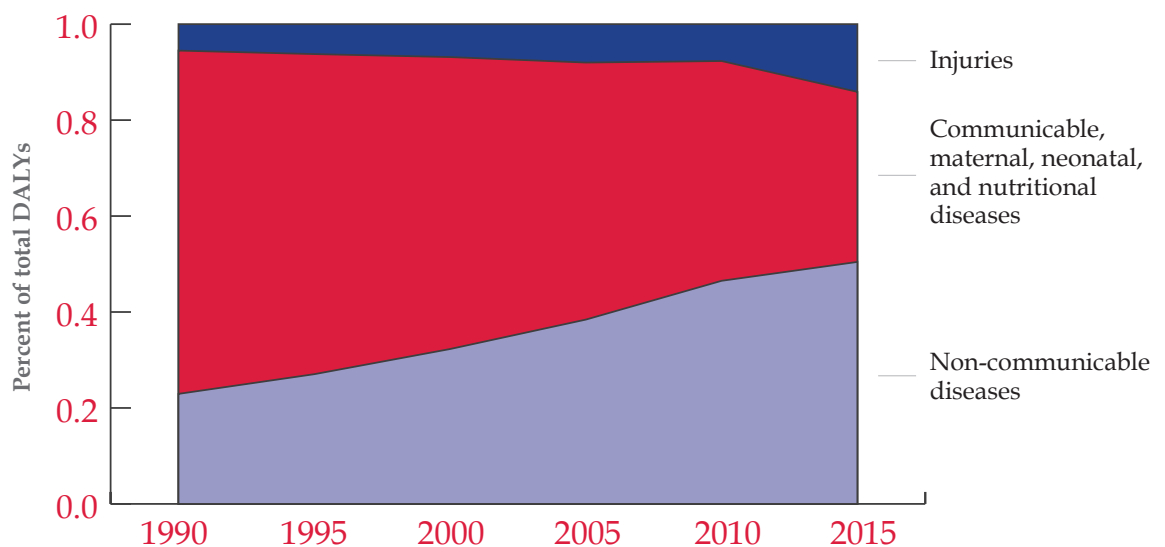


Figure 4: Major causes of burden of disease (Level 1) in Nepal (DALY=Disability Adjusted Life Years) (Source: Global Burden of Disease 2015)

Although NCDs and injuries are often considered to affect older individuals, it is notable that 37.9% of all DALYs from NCDs and 79% of all DALYs from injuries occur before the age of 40 (Figure 5). This finding emphasizes the diversity of NCDs and injuries affecting the population, including those that affect children and young adults at an early age. Particular NCDs that affect Nepalese at a young age include asthma, congenital heart disease, rheumatic heart disease, leukemia and lymphomas, sickle cell disease, and type 1 diabetes. Injuries affecting younger populations include road injuries, drowning and self-harm. Furthermore, virtually all NCDs and injuries cause death at an earlier age in Nepal than in higher income countries (Figure 6). For example, an individual in a high-income country with epilepsy will on average lose 35 years of their life; however, an individual in Nepal with epilepsy will on average lose 55 years of life and hence die at a younger age.



Major causes of burden of disease by age

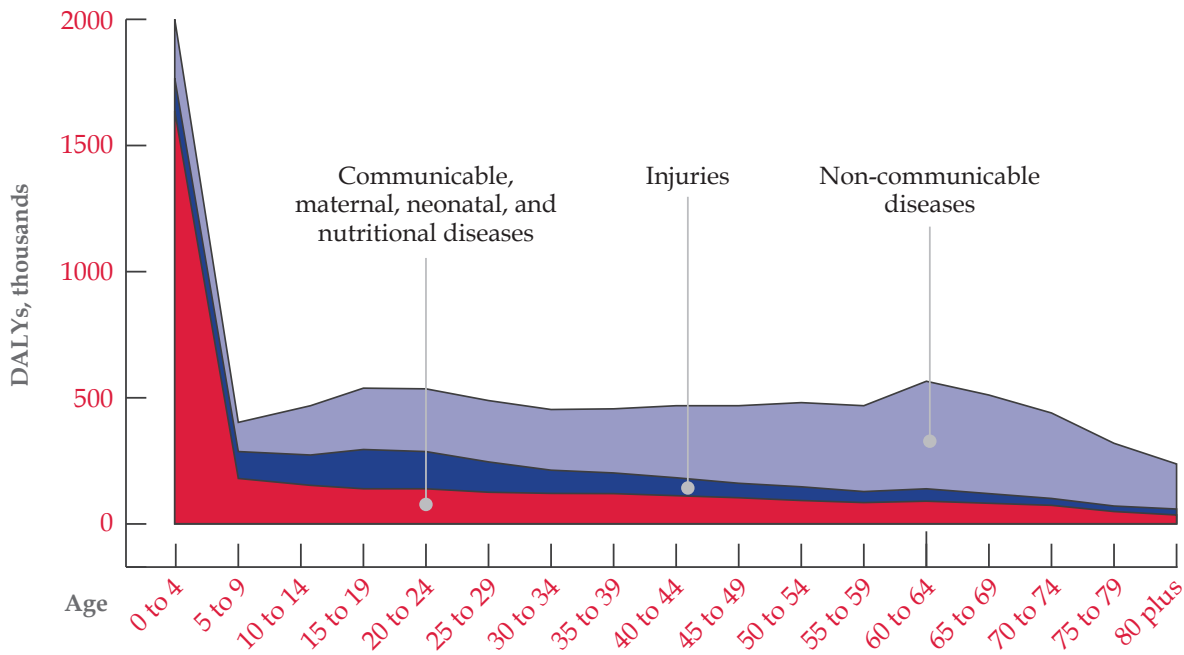


Figure 5: Major causes of DALYs by age, Nepal. (DALYs= Disability Adjusted Life Years, in thousands)
(Source: Global Burden of Disease, 2015)

Years of life lost (YLLs) by condition - Nepal vs. high-income countries

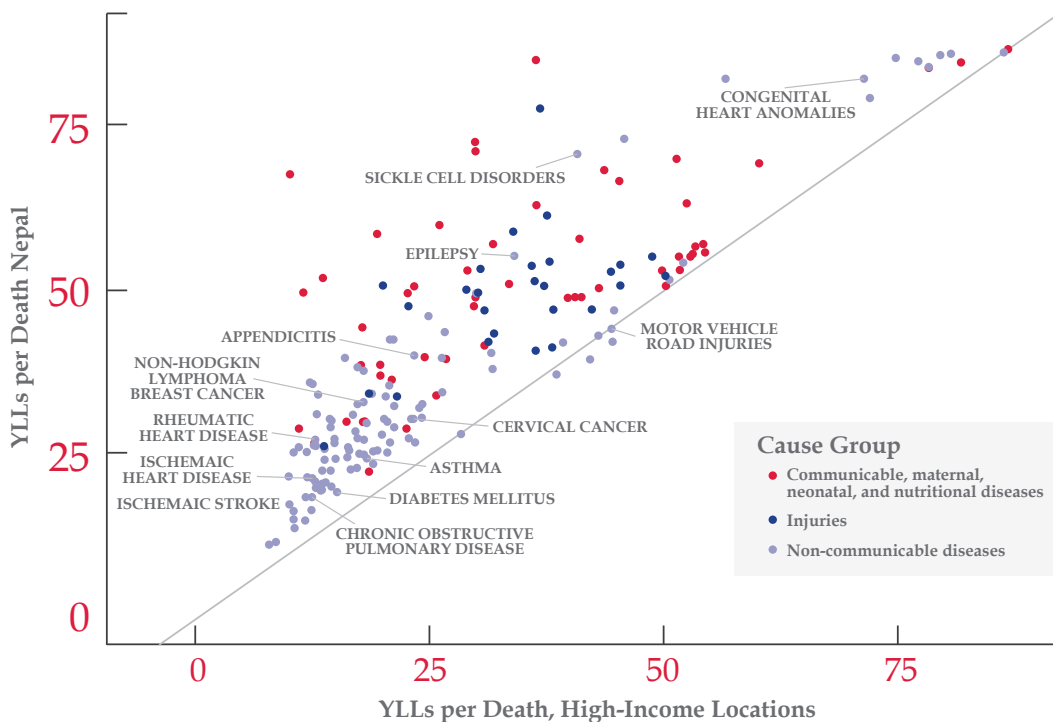


Figure 6: Years of life lost (YLLs) per death per condition in Nepal (y-axis) versus YLLs per death per condition in high-income countries



As expected, the NCDI disease burden is comprised of a large diversity of disease categories. The conditions with large proportions of DALYs include cardiovascular diseases (17%), chronic respiratory diseases (10%), and diabetes (8%) (Figure 7). However, it is notable that there is also a high proportion of DALYs attributed to categories such as “forces of nature, war, and legal intervention” (10%), musculoskeletal disorders (9%), mental and substance abuse disorders (8%), unintentional injuries (6%), and neurological disorders (5%). The “forces of nature” relate primarily to the devastating 2015 earthquake. It is also notable that the “4x4” conditions emphasized for global intervention and monitoring by the WHO (cardiovascular diseases, diabetes, cancer, chronic obstructive lung disease) account for only about 40% of the DALYs due to NCDIs in Nepal.

Major NCDI causes of burden of disease in Nepal

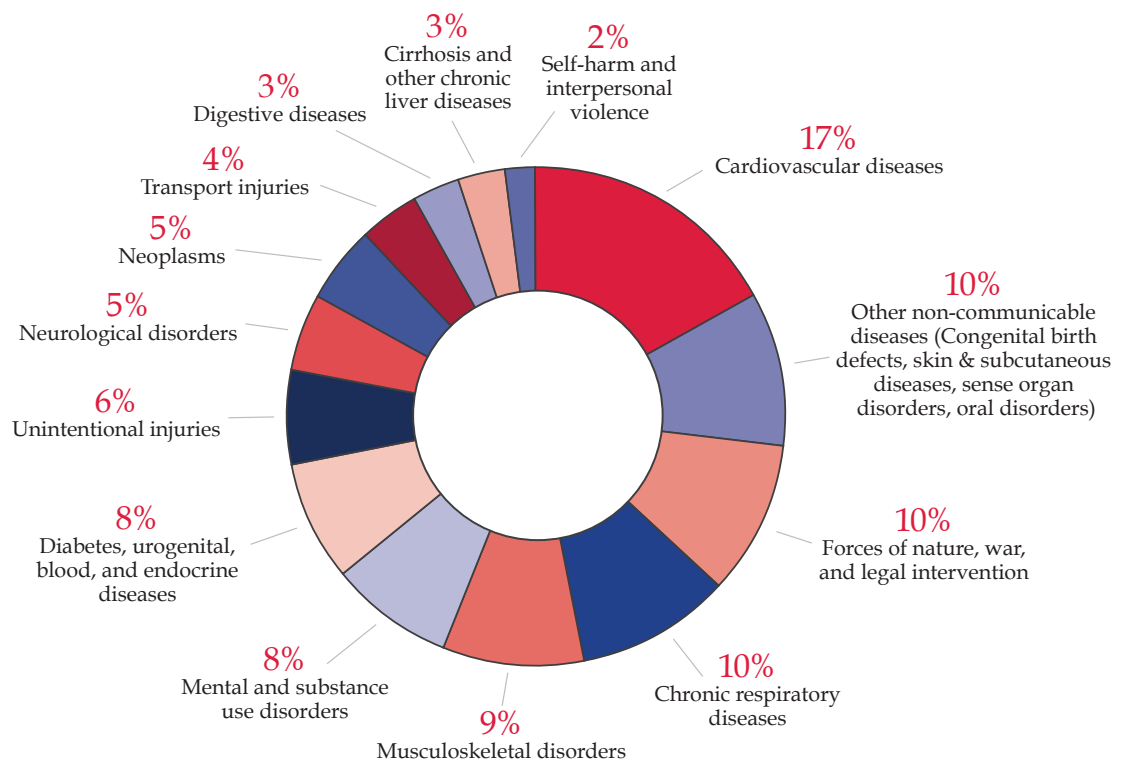


Figure 7: Percent of NCDI DALYs for each disease (Level 2) category in Nepal (all ages, both sexes, 2015) (Source: Global Burden of Disease, 2015)



Further detailed breakdown of DALY rates in Nepal show that no single condition comprises a large proportion of the NCDI disease burden in Nepal (as is the case with communicable, maternal, neonatal, and nutritional diseases). Conversely, there is a large diversity of conditions that affect the population, and many of these are not included in the traditional “4x4” conditions emphasized by the global monitoring framework (Figure 8). It is noteworthy that among the 25 individual NCDI conditions with the highest burden of DALYs in Nepal, over half of them are not related to the “4x4” risk factors or conditions, including conditions such as rheumatic heart disease, congenital heart disease, and liver cirrhosis. Notably, six of these conditions are related to injuries, such as pedestrian road injuries, falls, self-harm, and burns. Compared to high income countries, the DALY rates for forces of nature, war and legal intervention, chronic respiratory diseases, unintentional injuries, transport injuries, and cirrhosis and other chronic liver disease are higher in Nepal. The overwhelming high rate of DALY due to forces of nature, war, and legal intervention is due to the infamous 2015 earthquake.

NCDI conditions with highest DALY rates in Nepal

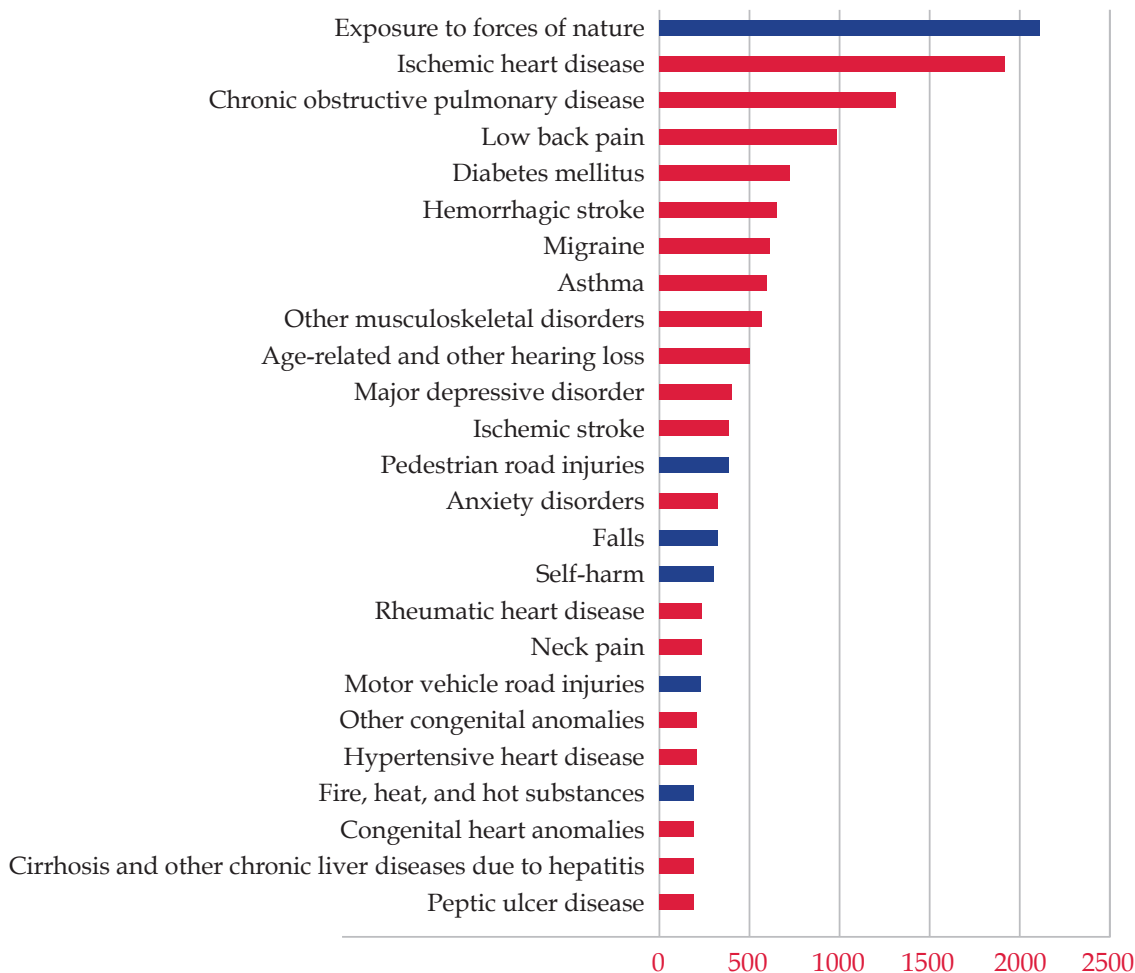


Figure 8: Individual NCDI conditions (Level 3) with most DALYs per 100,000 populations in Nepal (all ages, both sexes, 2015) (Source: Global Burden of Disease, 2015)



2.3 RISK FACTOR PROFILE FOR NCDIS IN NEPAL

We have attributed the total DALYs for NCDIs to various risk factors based on the GBD.¹⁶ Risk factors are characterized as behavioral (i.e. smoking, diet low in whole grains, fruits or high in sodium and alcohol intake etc.), metabolic (i.e., high systolic blood pressure, fasting plasma glucose and body mass index etc.), and environmental (i.e., household air pollution from solid fuels, ambient particulate matter pollution and occupational economic factors etc.). The burden of disease that cannot be associated with any given risk factor in the data provided within GBD is considered “Unattributable”. As displayed in figure 9, only 19% of NCDI DALYs could be attributed to behavior and metabolic risk factors, such as those included in global monitoring frameworks. At least 11% of NCDI DALYs could be attributed to environmental factors. However, the majority of NCDI DALYs (62%) could not be attributed to these risk factors, indicating other potential risk factors. Such risk factors could be related to acute and chronic infections, conditions related to poverty, and lack of access to appropriate health care.

Risk factor attribution for NCDIs in Nepal

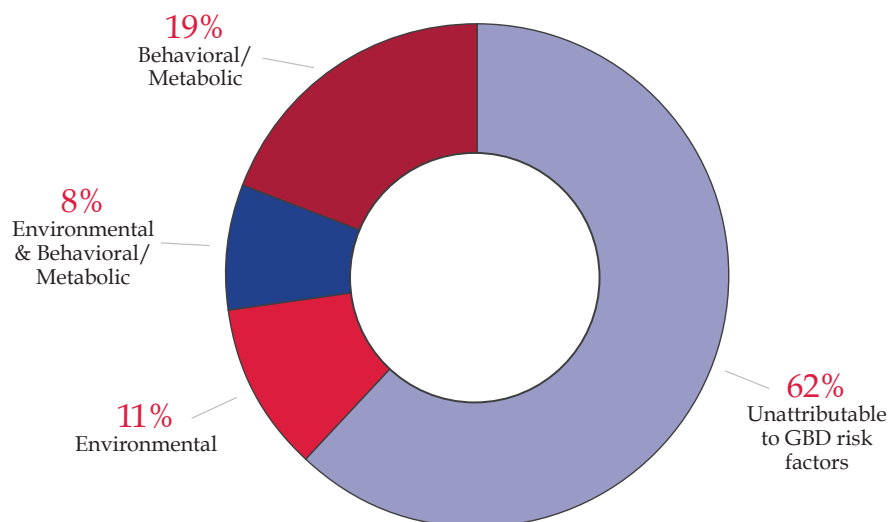


Figure 9: Percent of NCDI DALYs attributable to risk factor categories within Global Burden of Disease, 2015



2.4 RELATIONSHIP OF NCDI BURDEN WITH SOCIO-ECONOMIC STATUS

2.4.1 Literature Review

A literature review of all NCDI-related articles from Nepal from the years 2006-2016 was conducted. Studies were considered “relevant” if they met any of the following criteria: (1) contained data on either prevalence, risk, mortality, incidence or hospital-based case counts for NCDIs; (2) contained estimates of NCDI burden stratified by socioeconomic status, gender, age, and ethnicity. For all the NCDI categories excluding ‘other NCDs’, a total of 3035 PubMed search results were retrieved. After an initial screen, and applying the exclusion criteria, 229 articles were considered relevant and included in the final review (Table 1). See appendix 3.0 for the total number of articles, the types of outcome measures assessed, the location of studies, and the number of studies which provided estimates of the NCDI outcome disaggregated by socio-economic status, gender, age, and ethnicity.

The majority of studies (148, 64%) were hospital-based and 42 studies (18%) reported population estimates (See Appendix 3.2, Bibliometric of literature review). Case counts were the most frequently reported outcome measure (51%) followed by community level or population level prevalence (41%). Only 3% of studies reported incidence. Although many studies disaggregated by age and sex and other socio-demographics, 21 studies disaggregated by income, and 53 by caste/ethnicity. Most of the studies which provided outcome estimates disaggregated by income and ethnicity were in three disease categories: CVD, mental & substance use, and injuries.

There were several large studies of multiple NCDI outcomes. Data from the Jhaukhel-Duwakot Health Demographic Surveillance Site in Bhaktapur²⁵ (n=13669) showed that the most common cause of illness was respiratory problems, followed by heart disease, hypertension and gastric ailments. Age-adjusted multivariate analysis of the composite prevalence of the main four NCDs (i.e., heart disease, hypertension, cancer and diabetes) found that NCDs occur more frequently in females, Tibeto-Burman ethnic groups, agricultural workers or laborers, the illiterate and smokers. A cross sectional study (n=4000) which randomly selected patients from 31 health institutions found the chronic obstructive pulmonary disease (43%) was the most common NCD followed by cardiovascular disease (40%), diabetes mellitus (12%) and cancer (5%). Ovarian (14%), stomach (14%) and lung cancer (10%) were the main cancers accounting for 38% of the distribution.²⁶ Although we did not focus on risk factors in this



review, data on risk factors is available from the 2013 STEPs survey which used a multistage cluster sampling method to randomly select 4,200 respondents and identify risk factors for NCDs.²⁷

Review of published studies on NCDs in Nepal

NCDI Disease Area	Total No of Studies	Relevant Studies included	Socio-economic Disaggregation
Chronic Resp.	40	9	4
Cirrhosis	17	2	1
CVD	346	35	15
Diabetes	596	30	13
Digestive	314	7	3
Mental & Substance Use	184	41	18
Musculoskeletal	151	4	2
Neoplasms	403	44	19
Neurological	578	13	6
Injuries	406	44	19
Total	3035	229 (7.5%)	100 (3.3%)

Table 1: Frequency of total published studies, relevant published studies, and published studies with socioeconomic disaggregation within each NCDI disease category. (Source: Nepal NCDI Poverty Commission)

Overall, we found very few studies that related socioeconomic status in Nepal with NCD and injury conditions, and no such studies are available in the areas of chronic respiratory diseases, cirrhosis, and musculoskeletal disease with socioeconomic status. Of those studies including wealth (or wealth proxy) disaggregation, a summary of findings is presented in a table under Appendix 3.3 The full description of NCDs and injuries from the literature review can be found in Appendix 3.0.



2.4.2 Rates of NCDI Disease Burden by Poverty Level (GBD)

In order to better understand the differential effect of these “top 25” NCDI conditions on the poor in Nepal, we used the global relationships of the national burdens of each GBD condition and the percentage of the population living in poverty. Using this model, we were able to estimate the burden of DALYs for each condition in Nepal for those living in the poorest billion globally (“poor”) and those not living in the poorest billion (“non-poor”). For detailed methodology, please see Appendix 2.0.

Using this model, we estimated higher DALY rates for the poor as compared to the non-poor for the majority of NCDI conditions, including ischemic and hypertensive heart disease, COPD, hemorrhagic and ischemic stroke, asthma, hearing loss, rheumatic heart disease, congenital heart disease, cirrhosis due to HBV, and peptic ulcer disease (Figure 10). These conditions may reflect a higher prevalence of environmental exposures (asthma, COPD) as well as uncontrolled hypertension (heart disease, stroke) in the poor, as was also suggested by our literature review. Falls, burns, and pedestrian road injuries were also more common in the poor. These findings highlight the fact that exclusive focus of NCD on traditional cardiovascular diseases, diabetes, chronic obstructive pulmonary disease and cancer might in fact not fully capture the disparities in the types of disease burden between the poor and the non-poor.



Comparison of NCDI DALY rates in Nepal - poor vs. non-poor

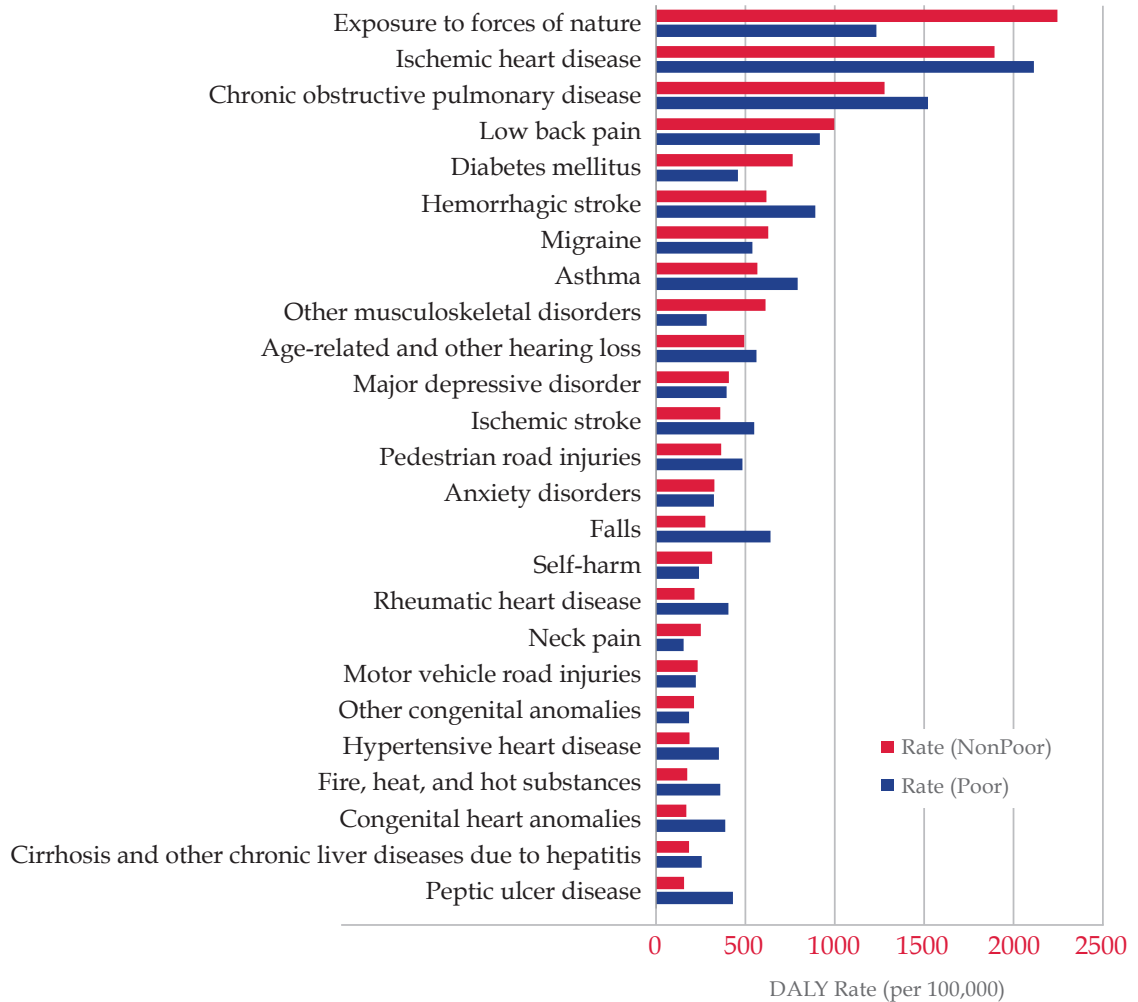


Figure 10: Individual NCDI conditions with most DALYs per 100,000 populations in Nepal (all ages, both sexes) modelled for rate within population in global poorest billion ("poor") and population not in global poorest billion ("Non-Poor") (Source: Global Burden of Disease 2015 and Oxford Poverty & Human Development Initiative)

2.4.3 Household Burden of Disease by Consumption Quintile

The disease burden (expressed as prevalence) based on consumption quintile was obtained from the NLSS 2011, a nationally representative household survey. Figure 11 shows the pattern of the distribution of several chronic diseases according to poverty status. Respiratory related chronic illnesses and asthma both display a trend of higher household prevalence with decreasing wealth quintile. Gastrointestinal conditions, which included peptic ulcer disease, and "rheumatic" conditions, which included musculoskeletal disorders such as arthritis and low



back pain, also displayed a clear trend towards increased prevalence in lower income households. Heart-related conditions, which as a broad category includes both infectious and non-infectious risk factors, appear to be of highest prevalence in the lowest consumption quintile, which may reflect a higher incidence of rheumatic heart disease or congenital heart disease in this group. Interestingly, an opposite trend was seen in the case of high blood pressure and diabetes, where there was a clear trend towards higher prevalence in higher consumption quintiles, as may be expected with higher prevalence of metabolic (obesity, hypercholesterolemia) and behavioral risk factors (sedentary life style, diet) in these wealthier groups. These findings strongly corroborate with the findings from the socioeconomic modeling from data from Global Burden of Disease, described earlier (section 2.4.2). The prevalence of epilepsy, cancers, and kidney/liver conditions was too low to detect a socioeconomic trend. The Nepal Health Research Council (NHRC) is currently conducting a population-based survey on the prevalence of selected NCDs covering an estimated 13,200 population households, with results expected in 2018. Additionally, a national population-based cancer registry has been established in January 2018. Results of these efforts will greatly support NCDI policy and planning in Nepal. Beside this, NHRC has been conducting community-based interventions studies for prevention and control of NCDs in selected districts of Nepal.

Household prevalence of NCDs by socio-economic status

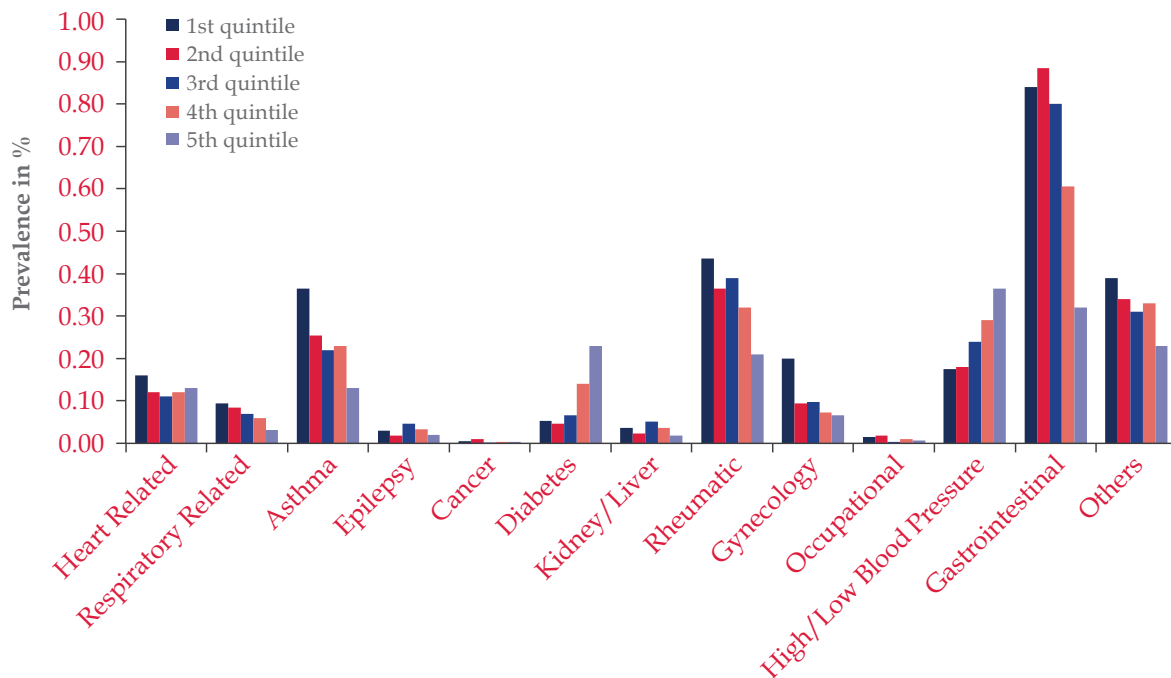


Figure 11: Household prevalence of chronic illnesses, by quintile (Source: NLSS, 2010)
(NB- "Rheumatic" indicates musculoskeletal illness, typically arthritis)



2.5 NCDI HEALTH SECTOR SERVICES IN NEPAL

2.5.1 National Health Facilities and Human Resources

Currently, health services for NCDIs are provided under the Ministry of Health (MoH)²⁸ (See appendix 1.1). Information on the number of health facilities overall and those providing NCDI services along with human resources are collected via the Service Tracking Survey (STS 2013), NLSS, Human Resource for Health Profile, and Nepal Health Facility Survey. According to Human Resource for Health Country Profile 2014²⁹, 0.17 doctors, 0.5 nurses (SN and ANM) and 0.37 paramedics (HA+AHW) were available per 1000 population. According to the survey (NLSS 2011¹⁹) on the households' access to health facilities (SHP, HP), 44.3% of households had access to a health facility within 30 minutes in the Mountain region. Similarly, 48.9% and 77.9% of households had access to health facilities within 30 minutes in the Hill and Terai regions respectively. According to NHFS 2015²⁸, staffing and services at public health facilities based on type of facility are as shown on table in Appendix 1.1.

2.5.2 The Current NCD Basic Services (free of cost) Provided at the Lowest Levels

Table 2 below shows the basic NCDI services being provided free of cost at different levels. The highest levels are the district hospital levels and the lowest levels are community health units.



Standard NCDI services at various levels of the health system

Lowest level	NCD basic service provided including the laboratory services (free of cost)
Community Health Unit (CHU)	<p>Micro-nutrients supplementation (iron, folic acid, Vitamin A, iodine, zinc)</p> <p>Counselling services (FP, Safe Motherhood, Neonatal, Child health, HIV, PMTCT, Nutrition, NCD, ASRH, Mental health, substance abuse, oral health, Ear- Nose-Throat diseases, hygiene and sanitation, legal and GBV counselling)</p> <p>Growth monitoring and BMI screening</p> <p>Acute exacerbation of COPD and asthma emergency management</p>
Health Post (HP)	<p>Screening for visual and hearing impairment</p> <p>Screening for hypertension and Diabetes (Clinical)</p> <p>Screening for pelvic organ prolapse, obstetric fistula, cervical cancer (VIA)</p> <p>Urine dip-stick test (albumin and sugar)</p>
Primary Health Care Center (PHCC)	<p>Minor procedures such as simple fracture reduction and PoP</p> <p>Biochemistry: Sugar and Urea</p>
District Hospital (DH)	<p>Treatment of Epilepsy</p> <p>Treatment of Schizophrenia, bi-polar disorders</p> <p>Treatment for depression and anxiety</p> <p>Physiotherapy services</p> <p>Injuries: Post exposure treatment with anti-rabies vaccine, Post exposure treatment with anti-snake venom</p>

Table 2: The current NCD services standards in Nepal at various levels of the health system basic services (free of cost) provided at the lowest levels. (Source: NHSS)



2.5.3 Current Availability of NCDI Services in Nepal

According to the national health facility survey (Service Provision Assessment 2015), the great majority of health facilities at the district hospital (DH) and primary health care center (PHCC) report the availability of NCD services, including diabetes, cardiovascular diseases, and chronic respiratory diseases (see table 3). However, essential components, including training, guidelines, essential medications, and essential diagnostics are dramatically lacking (Table 3). For example, although 97.4% of district hospitals report having diabetes services, only 59.5% had metformin, 12.2% had insulin, and 17.6% had capability to test blood glucose. Similarly, for cardiovascular disease, although 98.7% of district hospitals reported having cardiovascular services, only 56% had aspirin or a beta-blocking medication. Although 98.7% of district hospitals also reported having chronic respiratory disease services, only 29.3% had a peak flow meter and very few had inhaled beclomethasone (9.3%). Of note, availability of inhaled salbutamol was quite high across facilities. The availability of guidelines or trained staff for all three of these services was extremely low, suggesting an urgent need for technical support and training. Therefore, although these services are reportedly available, actual readiness for patient care is severely compromised for these basic services.

Availability of essential NCD services at district hospitals and primary health care centers

Diabetes			Cardiovascular			Chronic Respiratory Disease		
	DH	PHCC		DH	PHCC		DH	PHCC
Service Availability	97.4	75.6	Service Availability	98.7	93.2	Service Availability	98.7	98.5
Guidelines Available	8.1	3.2	Guidelines Available	4.0	3.1	Guidelines Available	4.0	6.4
Trained staff available	0.0	1.3	Trained staff available	4.0	0.5	Trained staff available	9.3	9.8
Serum glucose	17.6	5.1	Aspirin	56.0	14.0	Peak flow meter	29.3	8.9
Metformin	59.5	19.2	Atenolol	56.0	37.4	Salbutamol inhaler	90.7	88.7
Glibenclamide	9.5	5.8	Amlodipine	72.0	18.2	Beclomethasone inhaler	9.3	11.3
Insulin	12.2	---	Thiazide Diuretic	13.3	2.6	Prednisolone tablet	49.3	11.8

Table 3: Availability of Essential Components of Care for Diabetes, Cardiovascular Disease, and Chronic Respiratory Disease at District Hospitals and Primary Health Care Centers (Source: Nepal Service Provision Assessment)
Abbreviations: DH=District Hospital, PHCC=Primary health care center



In addition to low overall readiness for NCD services, there was a wide variation in the availability of care for NCDs by provider type (public or private). For example, overall only 15.1% of public facilities reported offering diabetes services compared to 95.2% of private facilities, and nearly all private facilities offer CVD services compared to only 71% of public facilities. There was not a large variation in service availability among ecological regions (Mountain, Hill, and Terai). Unfortunately, there have not yet been any nationwide active efforts to collect data on the health services associated with other noncommunicable diseases, mental health, and surgery, although limited studies do exist.^{30,31,28} This is a major hindrance for an evidence-based approach to policy-making and planning for addressing NCDs in the country.

There are some encouraging initiatives in Nepal currently underway. The Package of Essential NCD Interventions (PEN) for Primary Health Care developed by the World Health Organization (WHO) and adopted by the Ministry of Health in its health care delivery system addresses these three broad conditions of diabetes, cardiovascular diseases, and chronic respiratory diseases. It aims to expand coverage of essential services as well as essential medicines and diagnostics. According to the Nepal Health Sector Strategy-Implementation Plan (NHSS-IP)⁸, the full PEN has been implemented in two districts (Ilam and Kailali) in the country since 2016. The package will be expanded to 10 other districts in the fiscal year 2016/2017 which will be followed by 30 total districts in second year of implementation. The package will cover 75 districts in a 5-year period in the country.³² The Global Heart Initiative³³ from WHO and United States Center for Disease Control (US CDC), which was developed to support low income economies addressing cardiovascular diseases, will be scaled in Nepal by strengthening existing tobacco control initiatives and developing management protocols and health system capacity for CVDs. Some aims from the Global Heart Initiative includes developing salt reduction activities, improving access to medicines and technologies within the health system as a whole, and increasing capacity to plan, implement and monitor priority interventions for CVDs and other NCDs.



2.5.4 Specialty NCDI Services in Nepal

According to Nepal Medical Council, in 2016 there were 17,449 registered specialist doctors in Nepal including 547 internists, 427 pediatricians and pediatric surgeons, 111 cardiologists and cardiovascular and thoracic surgeons, 131 psychiatrists, 402 orthopedic surgeons, 19 surgical oncologists, 19 nephrologists and 15 endocrinologists.³⁴ Most specialists are practicing in the central hospitals, teaching hospitals or the private hospitals, which are mostly concentrated in the urban areas of Nepal. Similarly, there is a disparity in the availability of specialized services between public and private hospitals. For example, according to the annual health report from the DOHS of fiscal year 2016-2017, while 88% and 76% of private hospitals offered echocardiography and electrocardiography, respectively, only 12% and 24% of public hospitals provided those services, respectively.³⁵



2.6 ECONOMIC IMPACT OF NCDIS ON HOUSEHOLDS

2.6.1 Household Cost of NCDIs

From data collected during the NLSS in 2011, we are able to assess and compare the average annual household cost for a variety of NCDIs.¹⁸ As shown in Figure 12, the average cost of treatment is the highest for cancer (NRs 105,000), kidney and liver disorders (NRs 91,177), and heart-related illnesses (NRs 88,483). Presumably, these costs are related to medical visit copayments, medications, inpatient hospitalizations, and specialty needs for advanced disease, such as chemo-radiotherapy, dialysis or organ transplant surgery, or echocardiography and cardiac surgery. Average annual household expenditure is less for conditions such as respiratory disorders and asthma, epilepsy, high blood pressure, and gastrointestinal disorders, presumably due to the lack of specialty services or interventions required in these conditions. There is no consistent socioeconomic trend for these expenditures, though it does appear that higher consumption quintile do spend more on care for these conditions, presumably by accessing a higher proportion of private health care services. However, the data displayed is not adjusted for household wealth and hence should be interpreted with caution.

Average costs of NCD treatment by consumption quintile

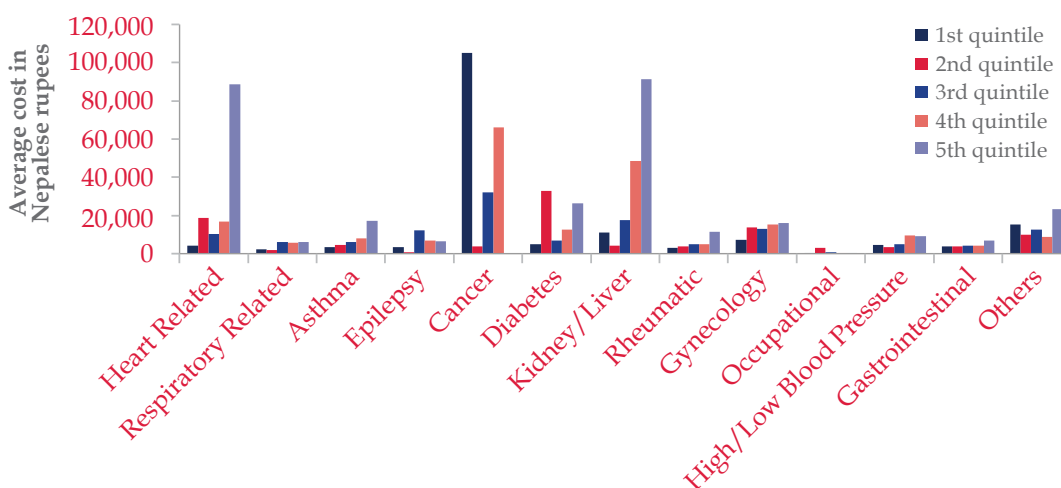


Figure 12: Average household annual cost of treatment for various chronic diseases by consumption quintile (Source: NHLSS Year 2011)



2.6.2 Impoverishment Impact of NCDIs

Figure 13 shows the overall incidence of impoverishment (as measured by poverty incidence) due to various NCDIs measured in the NLSS.¹⁸ The overall impoverishment impact at a population level is highest due to injuries (0.38%), gastrointestinal related illness (0.38%), and heart-related diseases (0.25%). However, on an individual household level, if the incidence of impoverishment is adjusted for the prevalence of each condition (ratio of poverty incidence to disease prevalence), the impoverishing effect of each condition can be assessed. With this metric, the most impoverishing conditions on a household level are cancer (ratio: 1.5), high blood pressure (1.33), injuries (0.39), heart-related illness (0.38), and kidney/liver related illness (0.29). Among these conditions, several were previously shown to have a high household cost, such as cancer, heart-related illnesses, and kidney/liver related illnesses. However, in the case of high blood pressure, the data suggests that although costs are low in absolute terms, they create a high relative burden on affected households over time, leading to eventual impoverishment.

The individual household economic burden of these conditions cannot be overstated. Please see Appendix 5.0 for in-depth narratives on the patient experience of living with several of these chronic conditions. Additionally, this commission has captured these narratives in the “Voices of NCDI Poverty” documentary, which can be accessed from www.voicesofncdipoverty.org.

Prevalence of NCDI conditions and impact on impoverishment

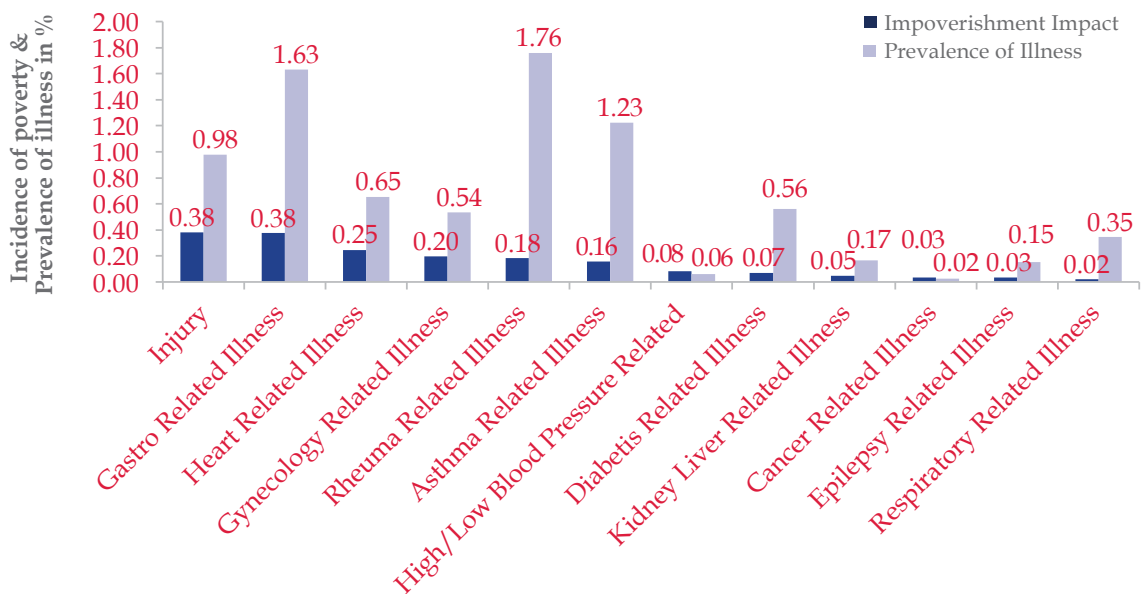


Figure 13: Prevalence of NCD and injury conditions and their impact on poverty



3.0 Priority Setting for NCDI Pathways

3.1 EXPANSION OF PRIORITY NCDI CONDITIONS

The objective of the Nepal NCDI Poverty Commission was to recommend a package of cost-effective health sector interventions addressing NCDIs with an emphasis on conditions affecting the poor in Nepal. This commission first ranked all NCDI conditions on the overall health impact of each condition by total DALYs from the GBD 2015 as well as key findings from the NCDI literature search and prevalence from the NLSS as presented previously in this report. The committee then utilized data from these same sources to evaluate each condition in terms of premature mortality, the extent of disability caused by the condition on each individual affected, and the inequity of health outcomes from the condition between the poor and non-poor. The committee also considered which conditions are highly impoverishing, which have potentially feasible and effective interventions, and which are often neglected by the health care system and monitoring frameworks. Using these criteria, the committee selected 25 conditions requiring priority attention by Nepal health policy and programs. The selected conditions are listed in Table 4.

The prioritized conditions include those traditionally included in NCD global monitoring frameworks, such as heart disease and stroke, type II diabetes, and COPD/asthma. However, based on the above criteria of burden, severity, equity, and financial impoverishment, the commission also selected several cancers (cervical, breast, childhood leukemia and lymphomas), sickle cell disorders, heart conditions such as rheumatic heart disease and congenital heart disease, epilepsy, mental health conditions, and injuries (see Table 4).



Priority NCDI conditions for expansion of services

Disease Category	Prioritized Disease/condition
Respiratory	Asthma
Respiratory	Chronic obstructive pulmonary disease
Cardiovascular	Ischemic/hypertensive heart disease and stroke
Cardiovascular	Rheumatic heart disease
Endocrine	Diabetes mellitus
Cancers	Cervical cancer
Cancers	Breast cancer
Cancers	Pediatric leukemias and lymphomas
Mental Health	Major depressive disorder
Mental Health	Anxiety disorders
Mental Health	Self-Harm
Neurologic	Epilepsy
Congenital	Congenital heart anomalies
Congenital	Sickle cell disorders
Liver	Cirrhosis and other chronic liver diseases due to hepatitis B
Liver	Cirrhosis and other chronic liver diseases due to alcohol use
Renal	Chronic kidney disease due to hypertension
Surgical	Paralytic ileus and intestinal obstruction
Injuries	Motor vehicle road injuries
Injuries	Pedestrian road injuries
Injuries	Fire, heat, and hot substances
Injuries	Exposure to forces of nature
Injuries	Falls
Injuries	Motorcyclist road injuries
Injuries	Venomous animal contact

Table 4: Selected priority NCDI conditions for expansion of services and interventions
(Source: Nepal NCDI Poverty Commission)



3.2 SELECTED INTERVENTIONS FOR EXPANDED NCDI HEALTH SECTOR CAPACITY

Addressing the prioritized NCDI conditions in Nepal will involve the design, implementation, integration, and scale up of a complex set of health sector interventions. Some of these interventions already exist within the health care system and others have yet to be introduced. A package of cost-effective interventions to achieve universal health care, including NCDIs, in low-income countries has recently been recommended by the Disease Control and Priorities 3 group. This guidance is based on the best evidence available globally as interpreted by the health economists and public health experts within this group, which had the goal of defining a package of interventions to achieve UHC.

The interventions recommended for UHC contain 69 interventions targeting NCD and injury conditions. These interventions were costed for low-income countries using best evidence available, and their prices adjusted for health care personnel salaries on a country level. Each intervention was additionally assigned an ordinal ranking for its properties of cost-effectiveness, financial risk protection, and equity based on the literature and expert opinion from the DCP3 group. The ranking ranges are slightly different for cost-effectiveness (0-4), financial risk protection (0-6), and equity (0-3), with 0 representing minimal and higher numbers representing more optimal values in each respective metric. The interventions were also assigned a target level of the health system: population, community, health center, first-level hospital, and referral/specialty hospital.

These interventions were evaluated and judged by the commission based on the following criteria: alignment with the prioritized disease conditions, feasibility in Nepali context, cost-effectiveness, financial risk protection (or protection against catastrophic expenditures), and provide some priority to the “worst-off” (i.e. children, individuals suffering from severe disease, those living in poverty, etc.). After evaluation according to these above criteria, 23 interventions were selected for further evaluation. These 23 conditions are listed below and organized by NCDI condition (Table 5). The baseline coverage for each intervention, as estimated by the commissioners using available data sources and expert opinion, are listed for each condition. The cost of each intervention was determined by multiplying the unit cost of each intervention adjusted for Nepal by the estimated population in need of each intervention in Nepal. Direct costs included personnel, equipment, testing services, diagnostics, drugs and other consumables. A 50% indirect cost was added to the total direct cost to account for indirect costs at the facility level, including items such as laboratory, buildings, rent, maintenance, and utilities.



An additional 17% indirect cost was added for non-facility based costs, such as financing, supply chain, and health information systems. The incremental cost for each intervention was then determined by multiplying the total cost by the coverage increment. The majority of these conditions (18/23) were ranked as “high-priority” interventions for achieving UHC in low- and low-middle-income countries by DCP3.

Although these interventions represent a broad set of cost-effective interventions, given resource constraints, this commission opted to defer several interventions. For example, cross-cutting services for pain and palliative care and rehabilitative medicine were considered important and aspirational, but they were not included as first-priority recommendations due to resource constraints and low health-system readiness. Additionally, these packages are quite comprehensive, and include various elements that may not be appropriate for the Nepal health system at this time. Other interventions, such as universal screening for hypertension or primary prevention of cardiovascular disease, whereas important, were ranked as lower cost-effectiveness, and they could be introduced in future years.

The commission proposes these 23 interventions to be introduced and/or incrementally intensified within the health sector to establish Universal Health Coverage by 2030. If implemented to target coverage, this would avert at least 9,680 premature deaths every year by the year 2030. This estimate is conservative and is based on current NCDI mortality rates (GBD, 2015) adjusted for the estimated population in 2030 with the estimated effect size for a similar package of interventions proposed by the DCP3 group.^{35,28} This figure represents an approximate 10% reduction in expected premature deaths in the year 2030 (according to 2015 death rates). Furthermore, these interventions will also lead to larger benefits by averting morbidity and DALYs given the emphasis on interventions for severe conditions affecting those at younger ages.

The total annual cost for the incremental increase in coverage represented by this package is estimated at \$250.2 million USD. This represents 1.4% of current gross domestic product, or approximately \$8.76 per capita. This incremental annual investment would therefore represent 22% of current total health expenditure (2014: ~\$1,123,000,000).



Priority-setting parameters and costs for scaling up selected NCDI interventions

Condition	Intervention	Cost Effectiveness Rating	Financial Risk Protection Rating	Equity Rating	Base-line coverage 2018	Target Coverage 2030	Incremental Cost	Health System Level
Respiratory	Low-dose inhaled corticosteroids and bronchodilators for asthma and for selected patients with COPD	1	3	1	0.05	0.35	45,214,446	Health Center
Respiratory	Management of acute exacerbations of asthma and COPD using systemic steroids, inhaled beta-agonists, and, if indicated, oral antibiotics and oxygen therapy	1	4	1	0.10	0.40	25,683,611	First-Level Hospital
Respiratory	Mass media for awareness on handwashing and household air pollution health effects	4	1	1	0.20	0.50	108,519	Population
Respiratory/ Alcohol	Mass media messages concerning use of tobacco and alcohol	4	1	1	0.20	0.50	108,591	Population
Cardiovascular	Long term management of IHD, stroke, and PVD with aspirin, beta blockers, ACEi, and statins (as indicated), for secondary prevention	2	2	1	0.20	0.50	20,676,926	Health Center
Cardiovascular	Mass media messages concerning healthy eating or physical activity	4	1	1	0.20	0.50	108,591	Population
Cardiovascular	Use of aspirin in case of suspected myocardial infarction	4	2	1	0.10	0.40	806	Health Center
Cardiovascular & RHD	Medical management of acute heart failure	4	5	3	0.15	0.45	35,211,144	First-Level Hospital
Cardiovascular & RHD	Medical management of chronic heart failure with diuretics, beta-blockers, ace-inhibitors, and mineralocorticoid antagonists	4	4	3	0.15	0.45	17,242,752	Health Center
Rheumatic Heart Disease	Treatment of acute pharyngitis in children to prevent rheumatic fever	4	2	1	0.20	0.50	375,836	Health Center
Rheumatic Heart Disease	Secondary prophylaxis with penicillin for rheumatic fever or established RHD	0	1	1	0.20	0.50	187,918	Health Center

Table continues on next page.



Condition	Intervention	Cost Effectiveness Rating	Financial Risk Protection Rating	Equity Rating	Baseline coverage 2018	Target Coverage 2030	Incremental Cost	Health System Level
Diabetes	Prevention of long-term complications of diabetes through blood pressure, lipid, and glucose management as well as consistent foot care	4	2	1	0.15	0.45	43,662,600	Health Center
Diabetes	Screening for diabetes in all high-risk adults	4	2	1	0.10	0.40	1,987,498	Health Center
Diabetes	Screening for diabetes in pregnant women	1	3	3	0.30	0.60	2,216,862	Health Center
Breast cancer	Treat early stage breast cancer with appropriate multimodal approaches, including generic chemotherapy, with curative intent, for cases that are referred from health centers and first-level hospitals following detection using clinical examination	4	4	1	0.05	0.35	431,121	Referral Hospital
Cervical Cancer	School-based HPV vaccination for girls	3	3	1	0.05	0.35	1,236,958	Community
Cervical Cancer	Treatment of early-stage cervical cancer	0	4	1	0.20	0.50	24,926	First-Level Hospital
Childhood Cancers	Treat selected early-stage childhood cancers with curative intent in paediatric cancer units/hospitals	2	5	2	0.10	0.30	67,823	Referral Hospital
Sickle Cell	In settings where sickle cell disease is a public health concern, universal new-born screening followed by standard prophylaxis against bacterial infections and malaria	4	2	3	0.05	0.35	796,593	First-level Hospital
Depression; Anxiety	Management of depression and anxiety disorders with psychological and generic antidepressant therapy	3	4	1	0.10	0.40	8,621,047	Health Center
Epilepsy	Management of epilepsy using generic anti-epileptics	4	4	3	0.20	0.50	1,034,884	Health Center
Injuries & Surgical	Basic first-level hospital surgical services				0.50	0.80	44,172,840	First-level Hospital
Injuries & Surgical	Specialized surgical services				0.10	0.40	1,060,148	Referral Hospital
				Total Cost			\$250,232,296	

Table 5: Cost effectiveness, financial risk protection, and equity scores for selected health sector interventions for expanded NCDI services in Nepal. Baseline and target coverage estimates as well as incremental cost of introduction and scale up are shown. (Source: Nepal NCDI Poverty Commission)



3.3 INTEGRATION OF PROPOSED INTERVENTIONS IN THE NEW FEDERAL STRUCTURE

The interventions selected and described in Table 6 represent services that exist within Nepal, though at very low levels of coverage, access, and quality. Significant premature mortality and disability can be averted in the Nepali population through greater investment in these proven cost-effective interventions, progressive integration into existing services, and decentralization to lower levels of the health system.

In the new Federal structure proposed for Nepal, governance and authority of these interventions would need to be considered according to level of the health system. For example, those interventions at the population or community level, such as mass media campaigns or disease screening, would need to be adopted and promoted by local and municipality governments (see Figure 14). Other examples include inpatient treatment of complications of chronic diseases, advanced diagnostics, or basic surgery, which would need to be implemented at regional and provincial levels. Advanced treatment modalities, such as chemotherapy or radiation therapy for malignancies or specialized surgeries would be implemented at referral and specialized hospitals, and governed by the federal level.

These interventions will necessarily need to be integrated within existing service delivery platforms. For example, screening and case finding for woman's malignancies, cardiovascular disease, or diabetes will need to be incorporated with existing programs such as the safe motherhood program or national family planning program. Screening and treatment for rheumatic heart disease or chronic conditions such as asthma, or mental health issues in adolescents, will need to be considered for school-health based programs. Care for chronic diseases, such as hypertension, diabetes, heart failure, COPD, and epilepsy, could be integrated at a single point of care with infectious chronic disease platforms like antiretroviral treatment programs. Injury care and expanded surgical services should build on existing surgical platforms. These services will of course require greater investment and capacity building of the health workforce, infrastructure, supply chain, laboratory, and information systems in order to reach progressively greater coverage for the Nepali population.

The PEN represents a promising approach to improvement of basic services for cardiovascular diseases, diabetes, and chronic respiratory diseases at the primary health care center level, and particularly in training of health care personnel and equipping with valuable clinical tools. However, in order to address the full breadth of the NCDI burden of disease, a broader set of



interventions, such as those proposed by this commission, will be required, particularly to more equitably address conditions affecting younger and poorer populations. Such interventions will need to extend beyond the primary care level into all levels of the health system, as described above.

Organization of proposed interventions under Federal structure

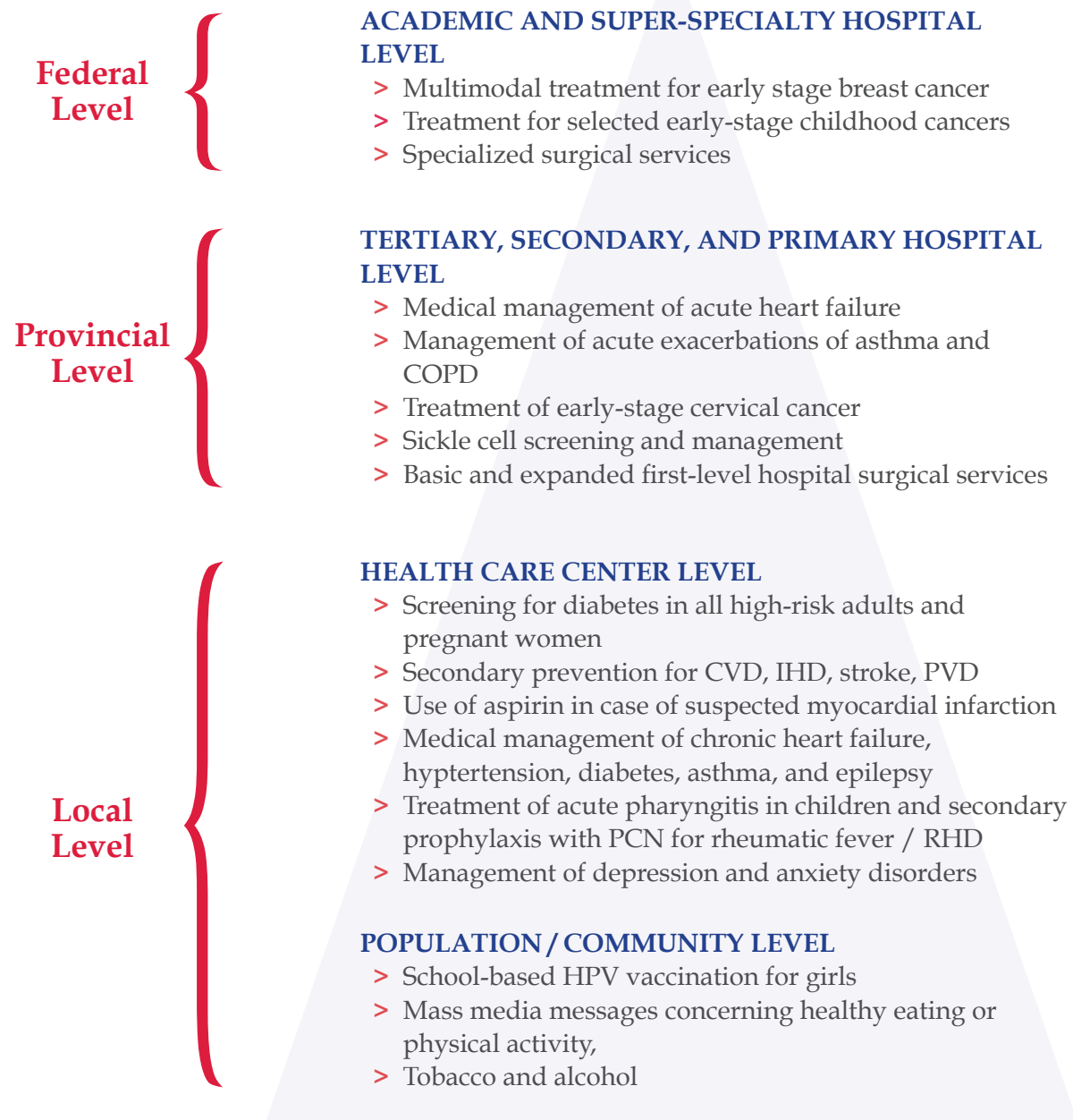


Figure 14: Organization of proposed interventions by level of governance under Federal structure. (Source: Nepal NCDI Poverty Commission)



The re-organization and introduction of the Federalist structure comes at an opportune time for health system strengthening and addressing of NCDIs. New local and provincial level governments and policy makers now have an opportunity to assess the local burden of disease, as well as locally prevalent risk factors that may affect the health and well-being of their populations. This may come through primary data collection, such as population surveys, or through review of existing data sources. Secondly, newly elected governments may take stock of the capacity and effectiveness of the local health system, carefully noting the gaps in preventive, diagnostic, and treatment services for NCDIs. These governments will have the opportunity to set new targets and objectives in accordance with the needs and desires of the community. Data presented in this report may assist with defining those priorities and establishing an approach to strengthening health systems services for the NCDI response.

3.4 AFFORDABILITY AND FISCAL SPACE FOR PROPOSED INTERVENTIONS

3.4.1 Health Expenditure on NCDI

In the year 2014, total health expenditure in Nepal was 6% of the gross domestic product, or approximately \$40 USD per capita.^{37,38,39} The government contributed 40% of the total health expenditure (~\$16 USD per capita) and allocated approximately 11% of all government expenditure towards health. In 2014, 6.4% of the total government expenditure on health was for NCDIs.³² Less than 1% of external development assistance for health in Nepal is earmarked for NCDs.⁴⁰ Less than 1% of total current health expenditure from external development assistance for health in Nepal is earmarked for NCDs.⁴⁰

In 2014, 48% of total health expenditure was from OOP sources, or approximately ~\$19 USD per capita, higher than the government contribution. From Nepal National Health Accounts data⁴¹ in 2012, out of pocket payment for NCDI services comprised 58.4% of all out of pocket expenses in Nepal and 33% of all household expenditure on health.⁴¹



Breakdown of out-of-pocket expenditures, 2011-12

Indicators	%
Out of pocket payment / Total current health expenditure	56.2
Inpatient care payment / Total current health expenditure	9.5
Outpatient care payment / Total current health expenditure	18.3
Medicine payment/ Total current health expenditure	43.7
Out of pocket payment for NCDI/ total current health expenditure	32.8

Table 6: Break down of out of pocket payments in Nepal
 (Source: Further estimated based on National Health Account Data (Pandey JP, Karn RK, Shrestha DK, Neupane GP, Bajracharya B (2016). Nepal National Health Accounts, 2009/10 – 2011/12, Ministry of Health, Government of Nepal, Kathmandu, Nepal)

Currently, in order to address the challenge of health-related OOP spending and impoverishment, the GoN is developing a new health insurance plan, according to the National Health Insurance Policy 2013. A Social Health Security Development Committee has been formed to serve as a legal framework to start implementing a social health security scheme (SHS). The health insurance scheme will be implemented in phases throughout the country.⁴²

3.4.2 Opportunities for Expanding Fiscal Space for NCDI Services

As demonstrated, a more rigorous and comprehensive approach to addressing NCDIs will require increased resources. There exists very limited scope within the health sector to increase the health budget from general tax revenue because of competing priorities with other sectors, including education and local development. With the upcoming restructuring to Federalism, there may exist more budget in the form of block grants for local governments and ministries to accompany greater devolution of decision and policy making to local governments.

Total revenues generated by excise taxes on tobacco, alcohol, and beer was nearly 267,086,913 USD in 2014/15 (considering 1 USD= 100 Nepali Rupees). The tobacco excise tax saw faltering growth in 2014. However, the growth was highest for alcohol, beer and total taxes for the same year (Table 7).



Excise tax revenues from tobacco and alcohol

	Excise Tax (Nepali Rupees: NRs)	Percentage change from previous year
Tobacco	7,163,084,300.27	-35.14
Alcohol	12,690,197,639.95	138.23
Beer	6,855,409,360.12	86.70
Total	26,708,691,300.34	

Table 7: Revenue collected from excise duty in NPR (2014/15)

As a way forward to addressing this fluctuating trend of revenue collection through tobacco and alcohol taxes, the tax structure can be revised by placing higher tax structure and stringent tax monitoring in future. For example, this commission modeled the impact increasing taxes on tobacco products would have on tobacco consumption, government revenue, and life expectancy at birth of the users (Table 8). For regular tobacco users, price elasticity for tobacco was found to be -0.97, which indicates that a 10% increase in price would bring about 9.7 percent decrease in cigarette smoking. For potential users, price elasticity is higher (-1.17) than regular users (-0.97). The elasticity for the poorest income group rural areas was highest (-1.24) among the groups. The elasticity parameters were combined to get future change in consumption, years of life saved, and government revenue (Table 9). First we proposed 10 to 80 percent increases in tobacco taxes and estimated the increase in the price of tobacco products at each level. Then we estimated the percent reduction of consumers (regular and potential), years of life saved and millions of government revenue generates. We found that a 50% tax increase on tobacco could result in 158,462 people leaving tobacco smoking, almost 1% of the current smoking population, resulting in 1,584,624 years of life saved. This tax increase would result in 18,658,000,000 Nepali rupees per year, or approximately \$186 million USD.

Diversification of revenue by more stringent tax structures, revision of tax frameworks and strengthening of tax monitoring could facilitate the efficiency of tax collation and reduce tax evasion. Taxes on sugar, salt, energy dense foods and sugar sweetened beverages should be explored; these are currently subjected to a low tax structure and should be expanded. Revenue from the new health insurance scheme, which is to be allocated towards expanding new health sector services, should also be considered to finance expanded NCDI services in the health sector.



Projected impact of excise tax increases on tobacco use, health, and revenue

Tax (%) based year 2010/11	Price	Change in Tobacco Consumption	Number of people leaving tobacco	Quitting tobacco (%)	Years of life saved (years)	Govt. Revenue (in millions)
10%	11	-198331587	-31692	-0.18	316925	3609.287
20%	12	-396663174	-63385	-0.35	633850	7398.812
30%	13	-594994762	-95077	-0.53	950775	11249.58
40%	14	-793326349	-126770	-0.71	1267700	15042.58
50%	15	-991657936	-158462	-0.88	1584624	18658.83
60%	16	-1189989523	-190155	-1.06	1901549	21979.32
70%	17	-1388321110	-221847	-1.24	2218474	24885.05
80%	18	-1586652698	-253540	-1.41	2535399	27257.02

Table 8: Scenario analysis for projected change in tobacco consumption, number and percent of people discontinuing tobacco use, years of life saved, and government revenue at various tax rates and price of tobacco
 (Source: Adhikari SR and Sapkota VP 2017 Impact of increasing Tobacco tax on government revenue and tobacco consumption: Evidence from Nepal Working paper Nepal Environment and Health System Development Kathmandu, Nepal)



4.0 Conclusions and Summary

In summary, this report provides the current situation of the NCDs in Nepal, including traditionally recognized noncommunicable diseases, as well as an expanded set of noncommunicable disease, particularly those affecting women and children, mental health disorders, injuries, and conditions requiring surgery, rehabilitation, or palliative care. We have described the current burden of disease of these conditions, focusing on socio-economic gradients in risk factors and disease outcomes. We have critically analyzed the economic impact of these conditions on household impoverishment and documented several personal stories behind this challenge. We have assessed the availability of services available to treat these conditions within health sector and identified key gaps in availability and access to care. We have then proposed a set of priority conditions and interventions to potentially consider for the health sector, along with cost and impact estimates for this set of interventions. We have assessed current resources for NCDs in Nepal, and the potential space to increase commitment of the public health sector towards these conditions. Based on this extensive research and exercise, following are the summary of key findings and recommendations from this Commission. We strongly recommend that these be considered as guiding evidence for the evolving health programs and policies in Nepal.

4.1 KEY FINDINGS

- **NCDs comprise a large share of the burden of disease in Nepal.** 51% of all death and disability (DALYs) are caused by NCDs and 14% are caused by injuries. The proportion of DALYs due to NCDs has more than doubled over the past 25 years.
- **NCDs occur at young ages.** 38% of all DALYs associated with NCDs and 79% of all injuries occur before the age of 40. Virtually all NCDs cause death at an earlier age in Nepal than higher-income countries.
- **The burden of NCDs is very diverse.** 60% of all NCDI DALYs in Nepal are due to NCDI conditions other than the four diseases included in global monitoring frameworks (cardiovascular disease, diabetes, chronic respiratory diseases, and cancers). These include conditions such as non-ischemic cardiac conditions, infection-related cancers, musculoskeletal disorders, mental health conditions, neurological disorders, and injuries (particularly as a result of natural disasters), resulting in a high burden of NCDs in Nepal.
- **Poorer households have a higher prevalence for many NCDs,** such as of respiratory, GI, musculoskeletal, and heart-related conditions. Wealthier households have a higher prevalence of high blood pressure and diabetes.



Through modelling of the global association of burden of disease and poverty, it is estimated that the poorest households in Nepal may suffer disproportionately more from many NCDs, including ischemic and hypertensive heart disease, COPD, hemorrhagic and ischemic stroke, asthma, hearing loss, rheumatic heart disease, congenital heart disease, cirrhosis due to HBV, and peptic ulcer disease.

- **Most of the NCDI disease burden cannot be attributed to individual lifestyle choices.** In modeling of risk factors for NCDs, only 27% of the risk factor profile can be attributed to individual behaviors, such as tobacco or alcohol, or metabolic risk factors, such as obesity or blood pressure. Other risk factors may include environmental factors, infectious diseases, conditions associated with poverty, and poor access to health care.
- **Services for basic NCDs are lacking.** Despite inclusion of NCDs in basic health services and high reported availability of NCD services at public facilities, availability of key medications and readiness of NCD services, such as diabetes, cardiovascular disease, and chronic respiratory diseases remains very limited. Availability of trained human resources is a particular challenge.
- **NCDs encompass the majority of out-of-pocket spending in Nepal.** 58.4% of out-of-pocket expenditures for health in Nepal were for NCDs.
- **Many NCDs cause significant household level and population-level impoverishment.** Injuries, gastrointestinal conditions, and heart-related diseases cause the most impoverishment among NCDs across the population. At an individual household level, cancers, injuries, heart-related conditions, kidney, and liver diseases are the most impoverishing.
- **However, resource allocation for NCDs remains extremely limited.** Currently, the government allocates 11% of total government expenditure to health (\$16 USD), which represents only 40% of total health expenditures in the country. Of the government expenditure on health, only 6.4% is for NCDs. Furthermore, less than 1% of external development assistance for health is earmarked for NCDs.
- **We must expand our NCDI focus.** This commission selected 25 NCDI conditions for which to increase health sector interventions. These conditions were selected based on burden of disease, severity and disability of illness, equity profile, and impoverishing impact of each condition. These conditions include asthma, chronic obstructive pulmonary disease, hypertensive heart disease and stroke, rheumatic heart disease, diabetes (type 1 and 2), breast and cervical cancer, childhood cancers, depression, epilepsy, sickle cell disease, cirrhosis, and several common disabling injuries.



- **There are proven health interventions that can address these NCDIs.** This commission recommends an evidence-based package of 23 high-priority interventions to be introduced or intensified within the health sector to target these priority NCDI conditions and establish Universal Health Coverage by 2030. These interventions were selected on the criteria of potential health impact, cost-effectiveness, financial risk protection, and priority to the vulnerable.
- **We can prevent early deaths from NCDIs.** If implemented to target coverage, the interventions recommended here would avert at least 9,680 premature deaths every year by the year 2030. Furthermore, these interventions will also lead to larger benefits by averting morbidity and DALYs given the emphasis on interventions for severe conditions affecting those at younger ages.
- **More investment for NCDIs is needed.** The package of cost-effective interventions for NCDIs recommended by this commission would cost \$8.76 USD per capita. This equals 1.4% of current GDP or 22% of current total health expenditures. These costs could be offset by revenue from sources such as taxation on tobacco, alcohol, sugary beverages, and packaged foods or through premiums on health insurance.
- **Improvised data collection on burden, access and quality of care related to NCDIs needs to be done.** Structured nationwide surveys need to be conducted to fill the information-gap on NCDIs for an evidence-based policy-making and program implementation.
- **More data are needed.** Large data gaps exist on the burden of disease, access to services, and quality of care related to NCDIs. **In particular,** population-based nationwide data is limited for NCDIs in Nepal, and data disaggregated by poverty status is scarce.



4.2 KEY RECOMMENDATIONS IN FIVE CATEGORIES

SERVICE PROVISION

NCDI services should be expanded within the national health care delivery system to include a broader set of diseases. In order to achieve UHC, the diversity of NCDIs included in basic and specialty services should be expanded and include attention to diseases that affect individuals at an early age and those that affect the poor. Based on our analyses, this expanded set of conditions should include rheumatic heart disease, congenital heart disease, childhood cancers, breast cancer, cervical cancer, type 1 diabetes, epilepsy, and sickle cell anemia. Progressively establishing universal health coverage by 2030 for the 23 interventions recommended here should be strongly considered as a high-priority and cost-effective strategy for Nepal.

Current services for basic NCDIs should be strengthened. Existing services for well recognized conditions, such as type II diabetes, hypertension, heart disease and stroke, asthma and COPD require strengthening and greater resources. In particular, additional training of health providers and provision of essential medications at all levels of health facilities should be emphasized.

NCDI services should be progressively decentralized and integrated. Services for NCDIs should be progressively decentralized from urban centers and referral hospitals to district hospitals and primary care health centers, while integrating these services with other existing programs. The PEN, as one possible solution, should be closely monitored and evaluated for potential nationwide scale up to strengthen NCD training and delivery at the primary care level. Select high-priority cost-effective interventions, such as those proposed by this commission, should be considered for introduction and scale-up.



STRATEGIC INFORMATION

Civil Registration and Vital Statistics systems (including cause of death recording through techniques such as community verbal autopsy) should be strengthened to obtain mortality information on NCDIs. Health demographic surveillance sites should be considered for more granular data on the incidence, prevalence, and mortality associated with NCDIs in Nepal. Such data systems should attempt to include socio-economic information such that data can be disaggregated on basis of wealth status.

Household-level data collection, through surveys such as STEPs and DHS, should be expanded to include additional NCDI disease conditions as well as socio-economic information.

Disease-specific national registries should be strengthened for monitoring for NCDIs, specifically for more severe conditions, such as congenital heart disease, rheumatic heart disease, childhood and women's cancers, and type I diabetes.

Health facility surveys should be expanded to include information on additional NCDs, mental health, and injury related services (i.e., surgery, rehabilitation, and palliative care). Results of these surveys should be used for close monitoring of adequacy and equity of service provision.

FINANCIAL PROTECTION

Disease-specific policies and programs should be introduced for high-cost conditions. These programs should take into account socioeconomic parameters to address equity issues.

Insurance coverage schemes should be expanded and include priority NCDI conditions. Given the great out-of-pocket economic burden of NCDIs, there should be consideration of increased insurance coverage schemes for NCDIs in Nepal. Relief schemes should be adopted for specific conditions for the poor.



RESOURCE ALLOCATION

The Government of Nepal should consider a greater allocation of health-related resources towards NCDIs given the magnitude of NCDIs burden on Nepali population. A reasonable benchmark

suggested by this commission is 1.4% of GDP, or 22% of total government expenditure on health towards NCDIs. Progressive taxation on tobacco, alcohol, sugary beverages, and processed or packaged foods may be utilized to both generate revenue and discourage use of key NCDI risk factors.

Potential revenue streams to increase fiscal space for NCDIs should be explored. Progressive taxation on tobacco, alcohol, sugary beverages, and processed or packaged foods, and utilizing premiums from new insurance schemes to finance health system improvements should be considered.

External donor funds should be reoriented to include support for NCDI services. Less than 1% of total current health expenditure of donors funding in Nepal is targeted towards NCDs (not including injuries). There is need for advocacy to reorient EDPs' funding priority for health in Nepal without affecting other urgent priorities for health (i.e., maternal and new-born interventions).

GOVERNANCE / ADVOCACY

Provincial and local governance should also focus on their NCDI response. Authorities at these levels should consider establishment of local governance and accountability for NCDIs, increased resources for health services, multi-sectoral response to create enabling environments for prevention of NCDI risk factors, and collection and monitoring of data towards comprehensive targets in NCDIs.

Engage all stakeholders. Governmental and non-governmental stakeholders (including but not limited to civil society organizations, patient advocacy groups, academic institutions, and community members) should engage actively to strengthen the NCDI response.



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*Reframing Noncommunicable Diseases
and Injuries for the Poorest Billion*

