PREVALENCE OF NON COMMUNICABLE DISEASE IN NEPAL HOSPITAL BASED STUDY

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Executive summary

Non communicable diseases (NCDs) are in epidemic proportion worldwide. Particularly four diseases - Cardiovascular diseases, Chronic Obstructive Pulmonary Diseases (COPD), cancer and diabetes have greatest share in the morbidity and mortality accounting for around 60% of all deaths worldwide. Disease pattern is also changing from infectious to chronic in Nepal like other developing countries due to epidemiological transition. Burden of infectious diseases is still high; on the top of that it is also facing the problem of non communicable diseases creating new challenges for our public health system. Data is necessary to formulate policy for tracking the changing diseases pattern of the nation. As a result Nepal Health Research Council conducted this study to determine hospital based prevalence of non communicable diseases, to assess its associated risk factors and to take the general information from selected health institutions regarding availability of human resources, infrastructures, diagnostic and treatment facilities for managing NCDs.

A cross sectional study was performed to find out hospital based prevalence of NCDs, wherein 400 indoor patients of fiscal year 2065/66 were randomly selected from each of the 31 selected health institutions. The health institutions included all the regional and sub regional hospitals, zonal hospitals, specialized hospitals of cancer and heart diseases and Medical colleges in peripheral level. One central hospital and one medical college and one private hospital of Kathmandu valley were also selected randomly.

Data was entered in MS-Excel and further analyzed in SPSS (version 11.5). Distribution of NCDs in terms of socio demographic variables (age, sex, ethnic groups, and geographic area) was calculated. Data shows that out of the total admitted patients, 36.5% patients suffered from NCDs. Out of total NCDs, 38% were having heart diseases followed by COPD (33%), where as diabetes and cancer accounted for 19% and 10% cases respectively. Out of the total heart diseases, nearly half of the patients suffered from hypertension. Among the cancer, burden was higher in the females than males. Regarding ethic group, relatively advantaged janajati was found to be suffering from heart diseases, DM and cancer whereas Dalit suffered more from COPD. Proportionately, female suffered more from COPD and cancer, where as male were suffered from heart diseases and Diabetes. The study revealed that proportion of NCD increased with age. Distribution of NCDs was less in (35-50) year's age group but highest in above 80 years of age. In term of developmental region, the proportion of heart diseases was seen to be highest n the CDR and WDR while in case of EDR, almost equal proportion of people suffered from heart diseases and cancer. On the remaining two regions, FWDR and MWDR, people were suffered from COPD.

For assessing the availability of infrastructure and human resources regarding non communicable diseases, some information was taken from self observation by the enumerators whereas some information was retrieved by interviewing key person of the different health institutions. It was found that most of the health institutions had limited and untrained human resources and inadequate infrastructure for delivering the health services to manage NCDs. Further, a Case and control study was conducted to assess the common associated factors of NCDs. Cases and an equal number of controls were selected. Out of total 111 cases, 30 cases diagnosed with heart diseases, 31 cases with COPD, 25 cases with cancer and 25 cases with diabetes who had been admitted in the selected health institution were involved in the study. For those cases, 111 controls (free from NCDs) were taken by matching age, sex and geographical areas. For the conformation of diagnosis, case file was reviewed and structured questions was asked to the respondents to access the associated factors of NCDs. Association between risk factors (smoking, alcohol, physical activities and intake of serving vegetables and fruits) and NCDs were identified by calculating odds ratios and confidence intervals. Multiple regression analysis was done to find the independent risks factors of NCDs.

The odds of developing NCDs among smokers were 1.6 times more than those who did not smoke. It showed that the attribution of smoking in development of NCDs was 60%. Similarly odds of developing NCDs among alcohol consumption group was 1.00, which suggests that there is no association between alcohol and NCDs. Odds of developing NCDs among physically inactive group (vigorous and moderate) was 4.39 & 3.5 times more than those who were physically active group, implying that physically inactive group is more at risk than physically active group.

Regarding intake of serving fruit and vegetable, there was no significant association between intake of serving fruits, vegetables and NCDs. Almost all cases and controls took less than 5 standards serving of fruit and vegetable in a day. Finally, multiple regression analysis shows that alcohol and physical activities are independent risks factors for developing the NCDs. This study recommended that risk factors reduction activities should be implement immediately for the reduction of NCDs in Nepal.

Proper recording and reporting of the data should be maintained, data-base system should be established to centralize the data and to properly maintain the data at different level of health system. Ministry of Health should develop a national level policy and plan of action for implementing the collaborative action between the health sector and other donor agencies to emphasize on clinical as well as preventive measures for the controls of NCDs.

List of Abbreviation

FT	:	Autonomic Function Test
ABG	:	Arterial Blood Gases
BMI	:	Body Mass Index
BPKIHS	:	B. P. Koirala Institute of Health Sciences
CCF	:	Congestive Cardiac Failure
CDC	:	Center for Diseases Control and Prevention
ECG	:	Electrocardiography
CDR	:	Central Development Region
CI	:	Confidence Interval
COPD	:	Chronic Obstructive Pulmonary Disease
CVA	:	Cerebrovascular Accident
CVD	:	Cardiovascular Disease
DM	:	Diabetes Mellitus
EDR	:	Eastern Development Region
EMG	:	Electromyography
EPS	:	Electrophysiology
FWDR	:	Far Western Development Region
GoN	:	Government of Nepal
HIV	:	Human Immunodeficiency Virus
HTN	:	Hypertension
IHD	:	Ischemic Heart Disease
MWDR	:	Mid-Western Development Region
NCD	:	Non Communicable Disease
PEFR	:	Peak Expiratory Flow Rate
PFT	:	Pulmonary Function Test
RHD	:	Rheumatic Heart Disease
SPSS	:	Statistical Package for Social Sciences
TMT	:	Trade Mill Test
TUTH	:	Tribhuvan University Teaching Hospital
WDR	:	Western Development Region
WHO	:	World Health Organization

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Introduction

Non communicable diseases (NCDs) refers to diseases or conditions that occur in, or are known to affect, individuals over an extensive period of time and for which there are no known causative agents that are transmitted from one affected individual to another.(1)

The risk factors for many of these conditions are associated with lifestyle related choices environmental and genetic factors. NCD have emerged as the major causes of morbidity and mortality worldwide.(2)

Smoking habit, alcoholism, low quality diet intakes, physical in activity are some of the established risk factors of the NCDs. These risk factors have 80% contribution in the development of NCDs. Cardiovascular disease, cancer, Chronic Obstructive Pulmonary Disease (COPD) and Diabetes Mellitus are the most common NCDs in the world. These diseases have been the leading cause of death in high-income countries over the last fifty years, and they are emerging as a leading cause of death in low and middle income countries.(3) According to World Health Organization, in 2005, out of 58 million deaths from all causes, non-communicable diseases account for 35 million deaths.(4)

In past century, communicable diseases were the major contributor of burden of diseases in the world. Enhancement in public health measures have contributed in the control of many infectious diseases and reduction in mortality and fertility. But nowadays, NCDs have replaced them even in the developing countries. This is mainly due to changing demographic and lifestyles of the population. This includes rapid urbanization, increased industrialization, rising personal incomes,expanded education and improved health care. These demographic changes have led to an increase in aging population. Most of the NCDs are a part of the degenerative diseases group and have higher prevalence in the older population. In addition, many of the lifestyle risk factors for NCDs are showing an upward trend in the present world. This has led to an emergence of NCDs as important causes of morbidity and mortality.(5)

Although the major challenge in prevention of NCD is related to behavior change and life style modification, the scientific evidence for feasibility exist. The occurrence of NCD can be prevented,to the extent of 80%, simply by adopting good lifestyle like physical exercise, balance diet, avoiding use of smoking and alcohol.

NCDs and their risk factors can be identified at earlier stage through simple and cost effective clinical modalities. Simple clinical history, anthropometric measurements, blood glucose and cholesterol measurement, for example, are few simple methods to identify major risk factors for NCDs.

NCDs need continuous care and demand sophisticated health structure, financial means and human resources. On the other hand,the dominant features of NCD epidemic is shifting towards younger age group leading to loss of productive life and major economic impact. The observed rapid rise in NCDs threatens health and economic capacity of millions of people.Chronic

diseases are larger problem in low-income settings, as double burden of infectious as well as chronic diseases in low- income-countries are straining their health services.(6)

Eighty percent of the NCDs can be prevented by adopting good lifestyle like physical exercise, balance diet, avoiding use of smoking and alcohol.(7)However, the growing global burden of non-communicable diseases in poor countries and poor population has been neglected by policy makers, major multilateral and bilateral donor agency and academics. (8) So it is urgent that these issues are incorporated in policy. Attention of international donor agencies for its prevention and control as cost effective interventions to reduce chronic disease risks exist, and have worked in many countries(9)

Global Scenario

Globally, NCDs are increasingly recognized as a major cause of morbidity and mortality. The World Health Report 2004 indicated that NCDs account for almost 60% of deaths and 47% of the global burden of disease. Seventy five percent of the total deaths due to NCDs occur in developing countries.(10)

Cardiovascular Diseases

The major CVDs include: Coronary heart disease, cerebrovascular disease, hypertension, heart failure. Ischemic heart disease and strokes are the two most common cause of death worldwide. CVDs have no geographic, gender or socio-economic boundaries affecting more in population of demographic transition affecting more in population of demographic transition.(11)

According to the World Health Report 2003, CVD was responsible for 29.2% (16.7 million) of the total global deaths. Out of 16.7 million deaths,7.2 million people died from ischemic heart disease, 5.5 million from cerebro vascular disease, and an additional 3.9 million from hypertensive and other heart conditions. Around 80% of CVD deaths took place in low and middle income countries. By 2010, CVD will be the leading cause of death in developing countries too.(12)

Cancer:

Cancer affects people of all ages. In many countries, cancer isthe second leading cause of death after cardiovascular diseases. In the year 2000,cancer was responsible for 12% (7 millions) of the total annual deaths. More than 70% of all cancer deaths occurred in low and middle-income countries. (13, 1) Data of 2007 showed that it caused about 13% deaths (7.6 million) of total human deaths. At least 11.4 million people are expected to die worldwide of cancer by 2015.(14)

Based on the GLOBOCAN database 2002, the proportion of new cancer cases were found to be higher in male than females (53.4% vs. 46.6%).Nearly 45 percent of the new cases were diagnosed in Asia, 26 percent in Europe, 15 percent in North America, 7 percent in Latin America, and 6 percent in   Africa. For males and females combined, the most common cancer

Cardiovascular Diseases

CVDs account for 27% of all deaths in the Region. The incidence of CVD is greater in urban areas than in rural areas reflecting the acquisition of several risk factors, including sedentary lifestyles, consumption of fatty foods, obesity and smoking.(21)

In 2003, the prevalence of CHD in India was estimated to be 3-4 percent in rural areas (two-fold higher compared with 40 yr ago), and 8-10 per cent in urban areas (six-fold higher compared with 40 yr ago), with a total of 29.8 million affected (14.1 million in urban areas, and 15.7 million in rural   areas) according to population-based cross-sectional surveys. In India, 1.17 million deaths were from coronary heart disease in 1990, 1.59 million deaths in 2000 and expected to rise to 2.03 millionin 2010.(22)

In Pakistan, one third of people of aged 45 years or above have hypertension. In Sri Lanka the prevalence of hypertension was estimated to be 17% in urban and 8% in rural areas. Several studies across India also report a higher prevalence in adults in urban compared with rural areas (20-40% v 12-17%). Hypertension was positively associated with higher socioeconomic status in both urban and rural areas.(23)Similarly in Nepal various studies have shown that the prevalence of hypertensions in adult population is around 20% in urban population(24)

Cancer

It is estimated that more than one million people die every year from cancer in the Region. Cancers contributed to 3.4% of all deaths reported from India, 6 . 6 % f r o m Indonesia, 2.9% from Myanmar, 0.8% from Nepal, 4.2% from Sri Lanka and 5.4% from Thailand. In India, Indonesia, Sri Lanka and Thailand,   cancer of the respiratory tract (trachea/bronchus/lungs) is reported as the most common cause of death from cancers among men. Cervix cancer is the most common cancer in India and Indonesia among women. Sri Lanka and Thailand reported a slightly higher number of breast cancer cases compared to cervical cancer. Cancers related to sites associated with the use of tobacco constitute nearly 44.6% of cancers in men and 20% of cancers in women. Over 80% of cases come for treatment at a late stage when survival rates are low.(25,20)

Diabetes

The prevalence of diabetes in adults in countries of the Region ranges from 2.1% to 4.1%. In major urban areas,the prevalence is reported to range from 6% to 12%. Based on projections, the prevalence rates and urban/rural ratios are expected to increase by two to three folds in the countries of South East Asia.(25)

India has a higher number of people with diabetes than any other country in the world. Pakistan is among the top 10 world nations for high numbers of people with diabetes the number of people with diabetes is expected to rise by 195% in India during 1995-2025 to reach 57.2   million in 2025. Pakistan is expected to have about 14.5 million people with diabetes by site worldwide was lung (12%). The second most common site was colon (9%) followed by stomach (9%). Among women, the number one cancer site was breast (23%) followed by cervix (10%) and colon (9%). Among men, three most common cancer sites were lung (17%), prostate (12%) and stomach (10%).(15)

Diabetes

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Healthy diet, regular physicalactivity, maintaining a normalbody weight and avoiding tobacco usecan prevent or delay the onset of diabetes.

According to estimate made in 1998, globally, 150 million people suffered from diabetes in 1998 and this figure is expected to increase by 300 million by 2025 according to WHO estimate.(16)171 million in 2004, 220 million in 2005, 230 million in 2007.(17) This increasing trend of diabetes is more in developing nationals. For example, In India alone, an estimated 19.3 million people had diabetes in 1995, and this is expected to almost triple to 57.2 million in 2025.(18, 11)

In 2005, 1.1 million people were estimated to have died due to. Almost 80% of diabetes deaths occur in low- and middle-income countries. Almost half of diabetes deaths occur in people under the age of 70 years;55% of diabetes deaths are in women. WHO projects that diabetes death will double between 2005 and 2030.(19)

Chronic Obstructive Pulmonary Disease (COPD)

Chronic Obstructive Pulmonary Disease (COPD) is a chronic lung disease characterized by progressive and irreversible airflow limitation.Every hour, COPD is estimated to kill over 250 people worldwide and the annual death rate from the disease is greater than that of lung cancer and breast cancer combined. WHO in 2005 estimated that 80 million people have moderate to severe COPD. More than 3 million people were estimated to have died from COPD accounting for 5% of all global deaths. Almost 90% of COPD deaths were estimated to occur in low and middle income countries. At time, COPD was previously more common in men, but because of increase of tobacco use among women in high income countries and higher risks of exposure to indoor pollutions such as biomass fuel used for cooking and heating in low income countries, the disease now affects men and women almost equally.(20)

South East Asia

Countries in South East Asia, including Nepal, are witnessing an epidemic of CVD, diabetes and other non-communicable diseases. The magnitude of the problem may vary among countries and within country in urban and rural area. This may reflect the degree of developmental and epidemiological transition. Now, South Asia region is facing the triple burden of diseases – burden of communicable diseases, non-communicable diseases and injury.(20) that year. South Asians have been observed to have a high risk of developing diabetes at lower levels of body mass index.(26,23) According to the data

of 'Sunsari Health Survey' of the year 1993, the prevalence of diabetes and hypertension in Sunsari District, from eastern Nepal, was about 6% and 5.1% respectively in adults. A more recent data from an urban area has shown the prevalence of diabetes and impaired fasting glucose as 14.2% and 9.1% respectively(27)

COPD:

Chronic obstructive airway diseases (emphysema and chronic bronchitis) and asthma, resulting from indoor and outdoor air pollution, account for a large proportion of the burden of chronic respiratory diseases. Morbidity from respiratory diseases accounts for 65 million cases and about 580 000 deaths in India. Indoor air pollution contributes to chronic obstructive airway disease in South Asia, where poorer people burn wood fuel in their homes. It is a major contributor to the disease in regions such as Nepal and rural India and Pakistan. Burning wood fuel in the home is likely to increase the burden of this disease, especially in winter. (28, 23)

Rationale of the study

Non communicable diseases are pandemic worldwide and are major health challenges to global development. Despite the fact that medical science has made significant achievements in the twentieth century, it has been challenged by the burden of non communicable diseases at present. Most of the non communicable diseases are incurable. The burden has exceeded more than 60% in the developed countries and its trend has significantly escalated even in the developing countries.

Chronic diseases are larger problem in low-income settings, as double burden (even triple burden) of infectious as well as chronic diseases is straining their health services. The magnitude of non communicable disease in Nepal is not known. This study intends to find out the extent of non communicable diseases in Nepal by estimating the hospital based prevalence data from the regional, sub-regional, zonal and specialized centers across the country.

Nepal, one of the poorest countries in the world - at 136th position of human development index has grossly limited treatment options for NCD and their end organ effects. For example treatment for heart disease (Sahid Gangalal National Heart Center), for cancer disease (BP Koirala Memorial Cancer Hospital and Bhaktapur Cancer Hospital) exists in Nepal for the treatment of heart and cancer patients. But these centers are now not enough to sustain the burden of rapid emergence of non communicable diseases. Due to cost and complexity of the treatment for end organ damage related to NCD (e.g. Kidney failure due to Diabetes or hypertension) these treatments option becomes non-viable option for the majority of the country's population limiting access.

There is no study to document the magnitude of non communicable disease in Nepal. However, such data are necessary to formulate a plan for the national strategy. For this purpose initially hospital based prevalence data generated from the regional, sub-regional, zonal and specialized centers across the country is targeted. This study is expected to provide a baseline data on magnitude of the NCD in Nepal. This research aims to find out the magnitude of the problem of non communicable diseases in Nepal, thus directing the concerned authorities and at policy level

Statement of the problem

Today, non-communicable diseases (NCDs), mainly cardiovascular diseases, cancers, chronic respiratory diseases and diabetes represent a leading threat to human health and development. These four diseases are the world's biggest killers, causing an estimated 35 million deaths each year - 60% of all deaths globally - with 80%in low- and middle-income countries.(29)

According to national reports gathered by WHO's South East Asia regional office, of the total deaths in South Asia, the proportion attributable to selected non-communicable diseases ranged from about 7% in Nepal to 40% in the Maldives in 1998. In Sri Lanka the 1999 census report records diabetes prevalence as 8% in rural areas and 12% in urban areas; equivalent current rates for Nepal have been reported as 3% and 15% respectively. (30, 23)

In Nepal, prevalence of CHD in eastern region was 5.7% in 2005. Similarly prevalence of hypertension was 22.7% in Dharan municipality. (31)

The World Health Organization (WHO) stated in 2002 that "in many regions, some of the most formidable enemies of health are joining forces with the allies of poverty to impose a double burden of disease, disability and premature death in many millions of people." Although communicable diseases remain as a public health threat, non-communicable diseases are rising. Almost half of the adult burden of disease is attributable to non-communicable diseases. (32)

Nepal is one of the developing countries of the world. It is facing double burden of diseases with an added burden of non-communicable diseases. Many researches on NCDs were conducted in Nepal but magnitude of NCDS is still unknown. The ministry of Health, Government of Nepal has not yet formulated policy regarding non-communicable diseases in the absence of evidence based finding. Thus it is important to address the burden of non-communicable diseases through research.

Globally, a number of researches have been carried out to show the association between NCDs and risk factor but such kind of study is rare in Nepal. Ministry of Health and Population has carried out survey related to NCDs risk factor but the association between NCDs and their risk factors was not done. Identification of the subjects early enough with NCD and its risk factors for chronic disease, mostly cardiovascular disease and implementation of prevention program at a relatively low cost could be of great help both for the patients and the country.

Objectives

1. To identify hospital based prevalence of non communicable diseases in Nepal.
2. To assess availability of infrastructure and human resources of different health institutions of Nepal to deliver the health services related to non communicable disease.
3. To find out the strength of association between risk factors and non communicable diseases in the context of Nepal.

Methodology

1. *Study Type*

The study comprise two study designs; cross sectional and case control study to identify the hospital based prevalence of 4 non communicable diseases (cancer, heart diseases, diabetes mellitus and COPD) and to assess their common risk factors respectively.

2. *Study Site*

Thirty one health institutions (Central, Regional, Sub-regional, Zonal hospitals, medical colleges and specialized centers) were selected from the five developmental regions. (Details in Annex 1)

In Nepal, most of the cases of non communicable diseases are treated in the tertiary level hospitals like Central, Regional, Sub-regional, Zonal, specialized hospitals and medical colleges. District level hospitals have few facilities for the diagnosis and treatment of NCD cases so they refer these cases in tertiary level hospitals. Taking these issues into account, we selected all the tertiary level hospitals to calculate the hospital based prevalence of NCDs. In case of Kathmandu valley, one central hospital, one medical college and one private hospital was selected for this study. All specialized centers (Bhaktapur Cancer Hopsital, Bharatpur Cancer Hospital and Sahid Gangalal National Heart Center) were also selected to identify the different types of cancer and heart diseases prevalent in Nepal.

3. *Study duration*

This study was conducted for the period of eight months from December 2009 and to July 2010

4. *Study population*

Indoor patients, 35 years or older were included in the studies. Past studies showed that high proportion of NCDs were present in this age group. This study included only the indoor patients from the hospital because hospitals maintain detailed case records of indoor patients only and they were easily accessible for the study.

5. *Sample size*

Four hundred indoor cases were randomly selected from each of selected health institution for the cross sectional study. The total number of indoor cases registered in the given year in a record book was accessed. Then the given sample size (i.e. 400 indoor patients) were selected on the basis of computer generated random sampling method from each health institution.

If the selected number is not within the inclusion criteria, then immediate next number was taken as a case. So, the selected case should be any of the four NCDs with age more than 35 years.

The case control study was carried in 200 patients who were admitted to the indoor ward of the selected health institutions. Matching controls were selected who were free from the diseases in question.100 patients who were suffering from one or more NCD and 100 patients who were not diagnosed as having NCD were enrolled as cases and controls respectively.

Sample Size calculation

Sample size was calculated on the basis of prevalence (40%) of non communicable disease with 12% allowable error (95% CI). The sample size calculated is 384 and the round figure of 400 was taken from each health institution.

6-Sampling Techniques

For cross sectional study

All the selected specialized centers, Regional hospitals, sub-regional hospitals, Zonal hospitals and medical colleges were selected. All of the medical colleges out of Kathmandu valley were included in the study. In the case of Kathmandu valley, three health institutions - one central level hospital, one medical college and one private hospital were randomly selected by listing all health institutions and using lottery method.

Four hundred cases were selected byusing simple random sampling for which random number was generated using software. Required detail information of the 400 indoor patients (IPD number, age, sex, ethnicity, address and diagnosis) was obtained from the medical record books of the health institutions of fiscal year 2065/66.

For case control study

Main objective of this research is to study the association of the common risk factors to the four NCDs. For this purpose, 31 health institutions were selected to collect primary data.Patient suffering from one or more NCD (diagnosed by physician as DM, CVD, COPD and Cancer) and admitted in the health institution was taken as a case. Controls were selected from those patients who were free from 4 NCDs and matched for age, sex and place of residence. Specialized centers (Two cancer hospitals and one cardiac center) were excluded for the case control study as there was high possibility of bias and confounders.

7. *Tools and Technique used for data collection*

Secondary data collection tool was applied for cross sectional study to obtain NCD prevalence and primary data collection technique was used for the case control study to analyze the associated factors of NCDs.

For cross sectional study

The study involved different approaches of collecting information from the study groups. Both the qualitative as well as quantitative technique was used for the collection of the information. Quantitative technique was used to calculate hospital based prevalence of NCDs. The technique involved structural format (Details in Annex III). Qualitative technique – observation and interview techniques were used to collect the information regarding infrastructure, health personnel, diagnostic and treatment facilities, referral system; problem to deliver the NCD related services and their recommendations.

Cases control Study

Quantitative technique was also used to analyze the associated factors of NCD (DM, heart diseases, COPD and cancer). The technique involved face to face interviews with the respondents. (Details in Annex IV)

8. *Human Resources*

The research team involved one Senior Epidemiologist, one Bio-statistician, one Research Officer (Team supervisor), two Assistant Research Officers and four Enumerators. All were recruited centrally.

Human Resource Mobilization

The data collection was done in two phases; firstly, data was collected from health institutions of Eastern Development Region. After the completion of data collection from eastern development region, enumerators collected the data from health institutions of CentralRegion. Then the enumerators collected the data from health institutions of Western, Mid-western and Far-western regions.

9. *Data management and Data analysis*

Data was edited in the field after filling the questionnaire. Data obtained were coded and entered in Ms-Excel sheet. SPSS software of 11.5 version was used to analyze the data. Association between exposure factors and non communicable disease was determined by calculating Odds ratio and confidence interval. Multiple regression analysis was done to find the independent associated risk factors of NCDs.

10. *Ethical issues*

The study was approved by the ethical review board of Nepal Health R e s e a r c h Council. Formal permission was taken from the concerned authorities of the selected health institutions. An informed verbal consent was obtained from all subjects. Objectives of the research were explained in simple language to all subjects Confidentiality was maintained.

Operational Definition

Case: Patients (diagnosed by physician as Cancer, COPD, DM and CVD) who were admitted in indoor wards of selected health institution.

Control: Patients (diagnosed by physician as other diseases) who were admitted in indoor ward of selected health institutions.

Other Diseases: Represent other Non Communicable Diseases and Communicable diseases.

NCDs: Represents four Non Communicable Diseases (Cancer, COPD,DM and CVD)

National Level: Represents Central, Regional, Sub-regional, Zonal, Specialized hospitals and Medical colleges.

Specialized Center: Represents Bhaktapur Cancer Hopsital, Bharatpur Cancer Hospital and Sahid Gangalal National Heart Center

Tertiary Level: Represents selected 28 Health Institutions excluding specialized center.

Results of Cross Sectional Study

Descriptive Finding
This study was conducted in 31 health institutions (Regional, Sub Regional, Zonal, medical colleges, specialized centers and central hospital) of Nepal for the purpose of identifying the hospital based prevalence of non communicable diseases.

The total number of patient admitted to these hospitals in fiscal year 2065/66 was 3, 47,261, out of which 11,907 cases were randomly selected. The number of cases selected from the health institutions ranged from 350 - 400.

Proportion of NCDs and at tertiary level
Figure 1 shows the distribution pattern of NCDs and other diseases. NCDs accounts for 31% (3294) of all the admitted cases in 28 tertiary level hospitals. Three specialized hospitals were excluded in the analysis as they represent cancer and heart diseases admitted to those hospitals. NCD represents heart diseases, COPD, Diabetes Mellitus (DM) and cancer where as other diseases represents other NCDs and communicable diseases. Study shows that hospital based prevalence of NCDs is 308/1000 population in Nepal.
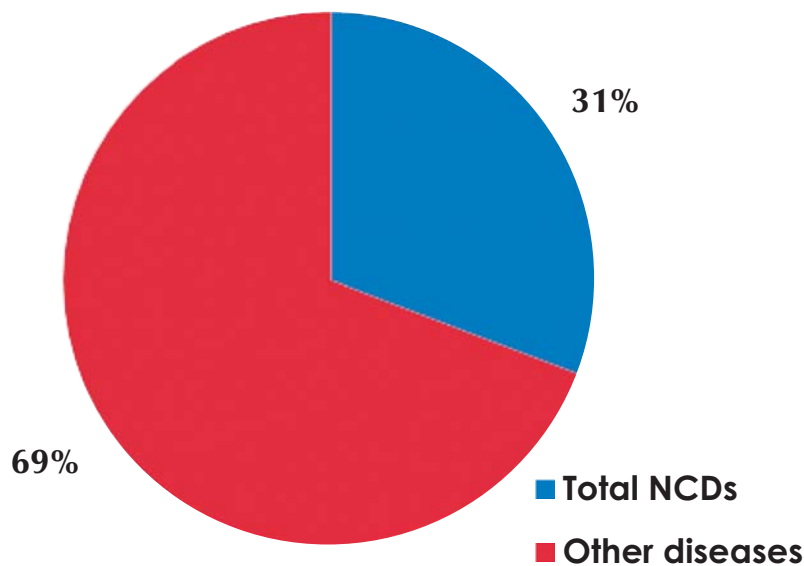
Figure 1 Proportion of NCDs at the tertiary level

Proportion of the various NCDs at the tertiary level
Figure 2 shows the distribution of NCDs in tertiary level health institution. Out of 3294 NCDs cases, majority of the cases (43%) were of COPD, 40% were heart diseases followed by DM and cancer 12% and 4% respectively. The proportion of diabetes and cancer was probably low because of the nature of ambulatory care of the diabetic patients, whereas most of the cancer patients visit specialized treatment center for the treatment.
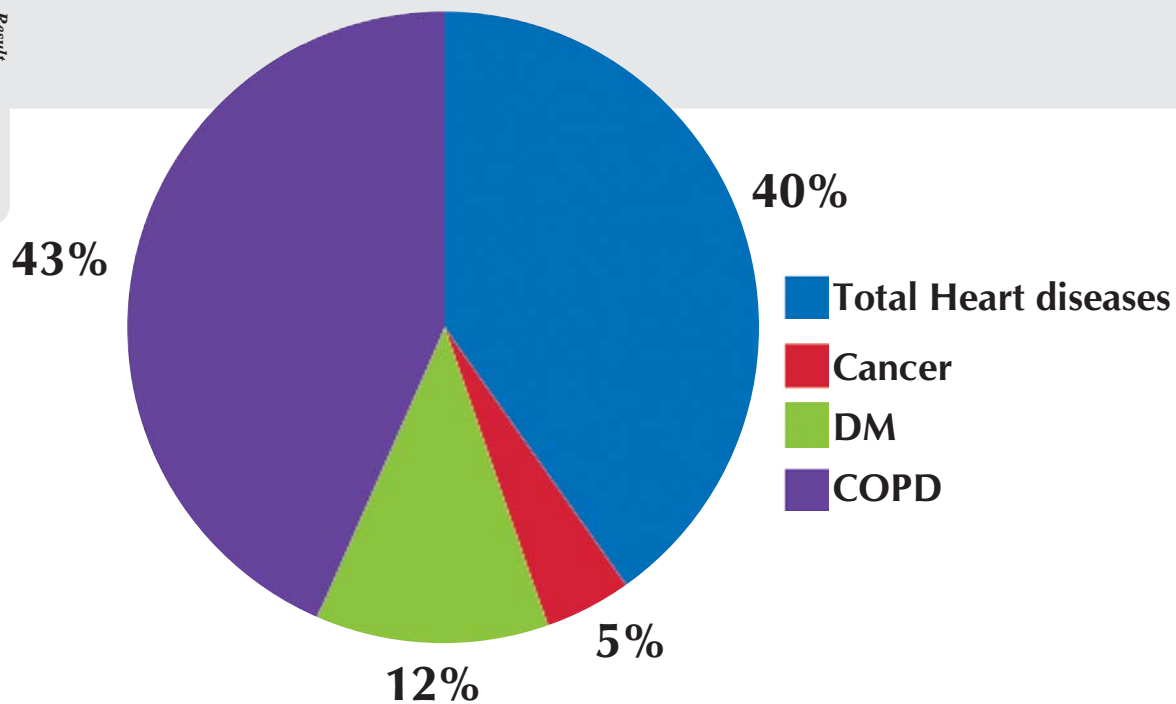
Figure 2 Distribution of the various NCDs in the tertiary level

Proportion of NCDs at the National level

Altogether 11,907 cases were selected from the 31 health institutions including specialized centers. Figure 3 shows that among them 36.5% (4,343 cases) suffered from NCDs. The percentage of NCDs calculated excluding specialized centers was lower but the percentage of NCDs calculated in overall showed relatively higher (36.5%). Heart diseases and cancer cases were higher in respective specialized health centers (Sahid Gangalal Heart Center and 2 cancer hospitals) which have contributed to the increase in the percentage of NCDs cases.
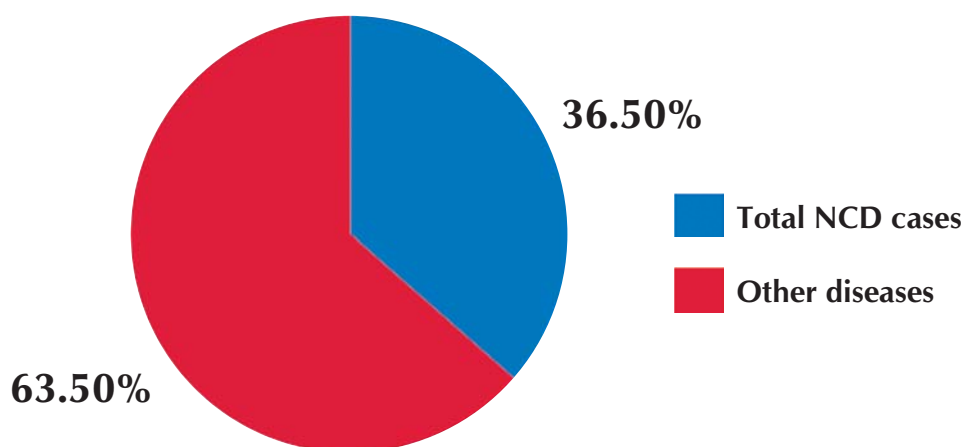
Figure 3 Proportion of NCDs at the National level

Distribution of various NCDs at the National level

In terms of the distribution of NCDs including specialized health institutions, the proportion of heart diseases was higher than other NCDs. Out of the total (4343) NCD cases, heart diseases constituted 38%. COPD was the second leading disease (33%) where as diabetes and cancer reported 10% and 19% for each. (Figure 4)
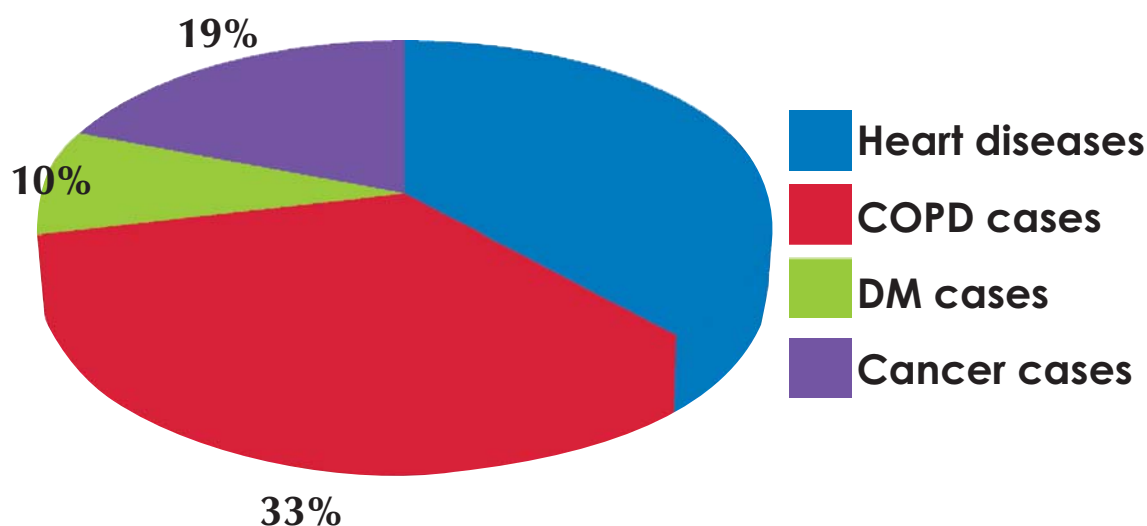
Figure 4 Distribution of various NCDs at the National level

Comparison of different types of cardiovascular diseases (CVDs) at the specialized and Tertiary levels health institutions

Figure 5 shows the different types of CVDs diagnosed in tertiary and specialized centers. Out of 1660 CVD cases, 80% cases were diagnosed in tertiary center and 20% in Specialized center Sahid Ganga Lal Heart Center. CVD were classified in 7 categories according to the frequency of the diseases. The main heart diseases were Cerebro Vascular Disease (CVD), Congestive Cardiac Failure (CCF), Ischemic Heart Diseases (IHD), Myocardial Infraction (MI), Hypertension (HTN), and other heart diseases which included - hypotension, arterial fibrillation, corpulmonale etc.

At the tertiary level, majority of the cases were of HTN. But in case of specialized center, majority (22%) of the cases were of RHD whereas other heart diseases accounted for 41% of the total because advanced diagnosis facilities of complicated heart diseases were only available at the specialized centers. At tertiary level, CVA accounted for 16% followed by CCF 11%, where as less than 10% were IHD, MI and RHD. At tertiary level other heart diseases reported for more than 10% as there was lack of infrastructure and diagnostic facilities for different heart diseases.
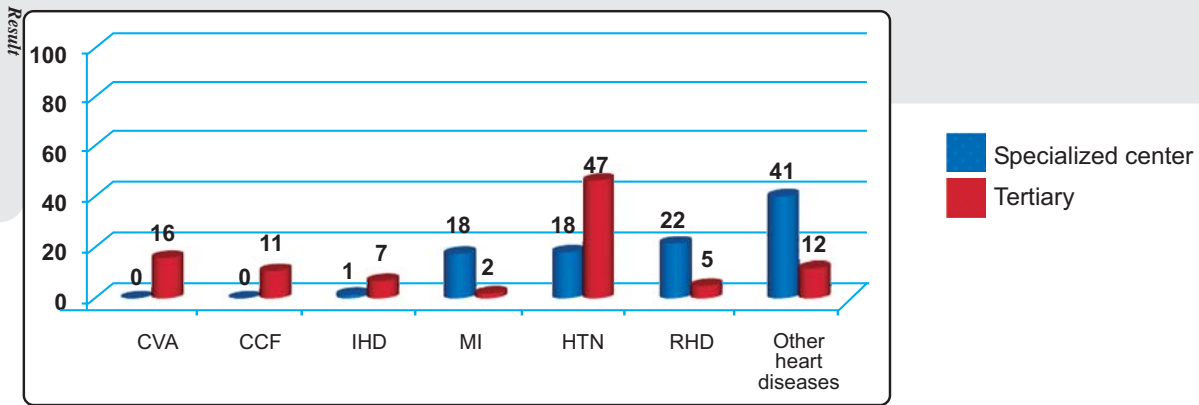
Figure 5 Comparison of different types of CVDs at the specialized and tertiary level health institutions

Comparison of different types of cancers at the Tertiary and specialized health institutions

Figure 6 shows different types of cancers in the two different levels. Out of the 829 cancer cases, 82% cases were diagnosed in tertiary center and 18% in specialized centers. Cancers of lungs, breast, cervix, ovarian, esophagus, gall bladder, rectum, stomach were more common. Cancers like anus cancer, appendix cancer, lip cancer, prostate cancer, and tongue cancer were found less.

At tertiary level, ovarian and stomach cancer accounted for 14% each whereas one tenth of the cases were lungs cancer. But breast, cervix, oesophagus and gall bladder cancer were reported less than 10%. Likewise at specialized center, cases of breast cancer and cervix cancer was 19% and 17% respectively followed by ovarian with 10% whereas the cases of lungs, oesophagus, gall bladder, stomach and rectum cancer were less than 10%.

At both levels, percentage of other cancers was higher than that of cancer which was cumulative percentage of all other cancers not specified in the figure.
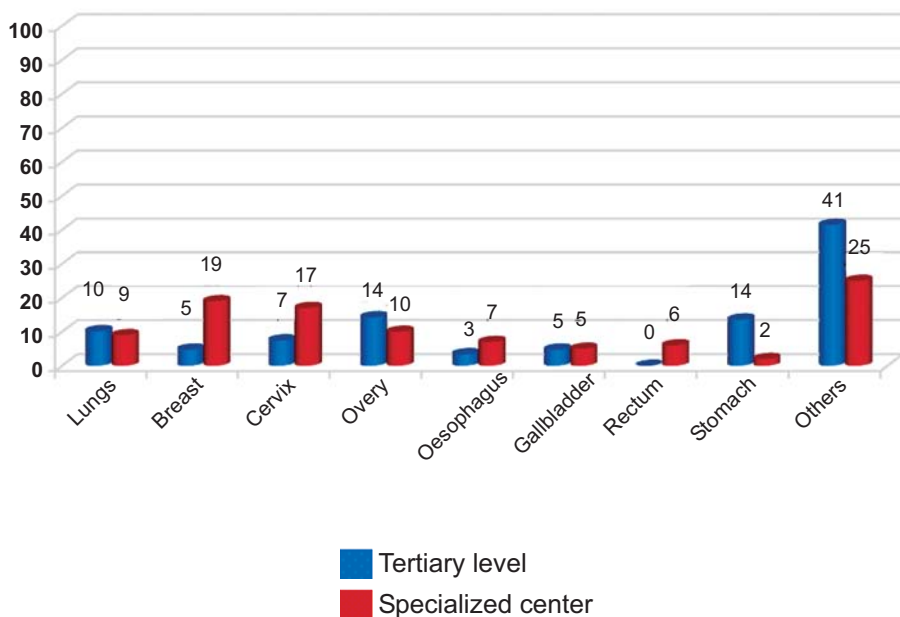
Figure 6 Comparison of different types of cancers at the tertiary and specialized health institutions

Distribution of NCD by Age group

Table 1 show the distribution of NCDs by age which has been categorized into four groups. Among the different age groups, majority of the patients were from 35-50 years followed by 51-65 years. Proportion of NCD cases was found to be higher in the age group > 80 years and followed by 66-80 years.

Distribution of NCDs by Age groups

Table 1 Distribution of NCDs by Age group

Age groups	Total no. of patients	Total NCD
35-50 years	5235	1169 (22.33)
51-65 years	4229	1827 (43.20)
66-80 years	2049	1132 (55.24)
above 80 years	388	215 (55.41)
Total	11901	4343 (36.5)

Distribution of various NCDs by Age groups

Table 2 shows the distribution of NCDs by age group. Proportion of CVD and cancer was found to be higher in the age group 35-50 years. Similarly, COPD and DM were found to be higher in age group above 80 years and 51-65 years respectively.

Table 2 Distribution of NCDs by Age groups

Age groups	CVD	COPD	DM	Cancer	Total NCD
35-50 years	517 (44.22)	222 (18.99)	115 (9.83)	315 (26.94)	1169
51-65 years	659 (36.0)	631 (34.5)	181 (9.90)	356 (19.46)	1827
66-80 years	400 (35.33)	484 (42.47)	103 (9.09)	145 (12.8)	1132
Above 80 years	84 (39.06)	100 (46.5)	18 (8.37)	13 (8.37)	215
Total	1660	1437	417	829	4343

Distribution of NCDs by ethnic group

Ethnicity of cases was classified in seven groups according to the government classification of ethnicity. Table 3 shows that most of the patients were from upper caste groups followed by disadvantage janajati population while very few were from religious minorities. The proportion of relatively advantaged suffering from NCDs was highest than the other ethic groups.

Table 3 Distribution of NCDs by ethnic group

Types of ethnic groups	Total no. of patients	Total NCD
Dalit	872	327 (37.5)
Disadvantaged Janajati	2117	724 (34.2)
Disadvantaged non dalit, terai caste group	723	220 (30.4)
Religious minorities	363	120 (33)
Relatively advantaged janajati	1066	558 (52.34)
Upper caste group	5237	1960 (37.42)
Other caste	1523	434 (28.5)
Total	11901	4343

The proportion of relatively advantaged janajati was found to be more suffering more from heart diseases, diabetes and cancer with (22.33%, 5.16% and 14.73% respectively) while dalit suffered more from COPD which was reported 16.97 %.(Table 4)

Table 4 Distribution of various NCDs among ethnic group

Types of ethic groups	Heart diseases	COPD	DM	Cancer	Total NCD
Dalit	126 (38.53)	148 (45.25)	23 (2.64)	30 (7.03)	327
Disadvantaged Janajati	289 (39.9)	191 (26.28)	73 (10.08)	171 (23.61)	724
Disadvantaged non Dalit, Terai Caste Group	92 (41.81)	80 (36.36)	19 (8.63)	29 (13.18)	220
Religious Minorities	33 (27.5)	47 (39.1)	9 (7.5)	31 (25.8)	120
Relatively Advantaged Janajati	238 (42.67)	108 (19.3)	55 (9.85)	157 (28.1)	558
Upper Caste Group	721 (36.78)	701 (35.76)	185 (9.43)	353 (18.01)	1960
Other caste	161 (37.09)	162 (37.3)	53 (12.21)	58 (13.46)	434

Distribution of NCDs by sex

Table 5 shows that among total sample population female population was higher than male population. Similarly proportion of female was found to be more suffered from NCDs in comparison to male.

Table 5 Distribution of NCDs by sex

Sex	Total no. of patients	Total NCD
Male	5734	2064 (47.52)
Female	6167	2279 (52.47)
Total	11901	4343

In table 6, it is observed that among different NCDs, there were more males suffering from heart diseases and COPD than female and females suffered more from DM and cancer than male.

Table 6 Distribution of NCDs by sex

Sex	Heart diseases	COPD	DM	Cancer	Total NCD
Male	865 (41.9)	687 (33.3)	240 (4.19)	272 (11.6)	2064
Female	795 (34.83)	750 (32.9)	177 (5.13)	557 (24.4)	2279

Distribution of NCDs by developmental region

Table 7 shows that most of the study population was from Central Development Region followed by western Development Region whereas comparatively few from Far Western Development Region. Similarly proportion of NCDs was found to be higher in CDR and WDR.

Table 7 Distribution of NCDs by developmental region

Developmental Region	Total no. of patients	Total NCD
CDR	5021	2017 (46.44)
EDR	1631	429 (9.87)
FWDR	1309	394 (9.07)
MWDR	1615	526 (12.11)
WDR	2325	977 (22.49)
Total	11901	4343

Distribution of different NCDs in different developmental region

Table 8 shows that distribution of different NCDs by the development regions. The study revealed that people from WDR were found to suffer more from heart diseases and DM which account for 44.93% and 11.25% respectively. Similarly people from FWDR and MWDR were found to be suffering more from COPD (55.5 % and 50.5%) and EDR from cancer (31.46%).

Table 8 Distribution of different NCDs in different developmental region

Developmental Region	Heart Diseases	COPD	DM	Cancer	Total NCD
CDR	806 (39.96)	553 (27.41)	206 (10.21)	452 (22.40)	2017
EDR	132 (30.76)	124 (28.90)	38 (8.85)	135 (31.46)	429
FWDR	125 (31.72)	219 (55.5)	27 (6.85)	23 (5.83)	394
MWDR	158 (30.03)	266 (50.57)	36 (6.84)	66 (12.54)	526
WDR	439 (44.93)	275 (28.14)	110 (11.25)	153 (15.66)	977
Total	1660 (13.95)	1437 (12.07)	417 (3.50)	829 (6.97)	4343

Distribution of CVDs in different health institutions

Figure7 shows that the proportion of heart disease except from specialized center (Sahid Gangalal Heart Center) was seen highest in the College of Medical Science, Bharatpur (37%) followed by Manipal teaching hospital, Pokhara (32%).

Institution	Value
BP Koirala Center Hospital	0
Bhakatapur Center Hospital	3
Janaki Medical College	4
Janakpur Zonal Hospital	4
Mechi Zonal Hospital	4
Rapti Sub Reagional Hospital	4
Hetuda Hospital	5
Koshi Zonal Hospital	5
TUTH	5
KUTH	6
Bheri Zonal Hospital	7
BPKISHDharan	7
Mahakali Zonal Hospital	7
Nepalgung Medical College	7
Western Regional Hospital	7
United Mission Hospital	8
Team hospital	10
Nobel Medical College	11
Kathamandu Medical College	11
Seti Zonal Hospital	12
National Medical College	12
Narayani Sub Regional Hospital	13
Bharatpur Hospital	15
Lumbini Zonal Hospital	17
Mid Western Regional Hospital	20
Sagarmatha Zonal Hospital	23
Universal College of Medical Science	25
Medicare	28
Manipal Teaching Hospital	32
College of Medical Science	37
Sahid Gangalal National Heart Center	83
Nation	14

findings of Key informant interview

Key informant interview was done in each of the selected hospital to get information regarding infrastructure, treatment facilities, referral system, problems faced while providing NCDs services. Suggestions regarding delivery of quality services for NCDs were also collected.

1. *Infrastructure of hospital for NCDs*

Regarding infrastructure of hospital, there was no separate OPD room,bed, ward and waiting room for non communicable diseases in Regional, Sub-regional, Zonal, Mission hospitals and medical colleges except in the central hospital, TUTH and in BPKIHS.

2. *Diagnostic and treatment facilities*

DIABETES:

Blood sugar test (Fasting, PP and random) were available in all the selected health institutions for the diagnosis of diabetes mellitus. These heath institutions also had oral medicine and insulin injection to treat diabetes patients.

COPD:

Similarly, diagnostic facilities such as radiography, pulse oxymeter, blood investigations, sputum examination, PFT were available in all selected health institutions for the detection of COPD while medical colleges, TUTH and BPKIHS had additional diagnostic tests like PEFR,spirometery test, chest x-ray, ABG etc. These institutions had oxygen therapy, nebulizer, steroid injection and antibiotics to treat COPD cases.

CANCER:

Likewise, zonal, regional and sub regional hospitals had x-ray and histopathology services to detect cancers. The diagnostic centers (BP Koirala Cancer Hospital, Bhaktapur Cancer Hospital, BPKIHS, Dharan, Manipal Teaching Hospital, and TUTH) had other diagnostic investigations like hematology, immunoserology, cytopathology, immunohistichemistry, CT scan, mammography, ultrasorgraphy, various types' of x-rays, bronchoscopy, endoscopies, gastrocopy, laryngoscopy, colonoscopy, cystoscopy, sigmoidscopy and other endoscopy. Palliative care, surgery, chemotherapy and radiology services were available for the treatment of cancer cases. In case of the medical colleges they had the facilities of histopathology and CT scan for diagnosis and chemotherapy for the treatment.

HEART DISEASEASE:

For the diagnosis of heart problems, zonal, regional and sub-regional hospitals were provided with facilities of ECG, X-ray, Echo, TMT, and EMG. On the

other hand the specialized center had additional diagnostic facilities likeTangiography, PTMC, TMT, Holtor, Autonomic Function Test (AFT), Brain Evoked Response Activities (BERA), Visual Evoked Potential (VEP), Nerve Conduction Test (NCT), ECG Electrocardiogram) ECHO (Echo cardiogram) ABP, EPS and PFA. Angioplasty, pacemaker, surgery, medication and other treatment facilities were available in specialized center to treat the cardiac cases.

3. Referral system

Most of the health institutions treated the diabetes and respiratory problems themselves. The patients were referred to the central hospitals only in severe conditions. On the other hand, almost all health institutions referred the cases of cancer and heart problem to the BPKIHS, Bhaktapur Cancer Hospital and Sahid Gangalal National Heart Center respectively.

4. Human resources

There were only general physicians (either MD, Internal Medicine or MD, General Practitioner) at zonal, regional and sub-regional hospitals to treat the cases of non communicable diseases. Only the diagnostic center of cancer had an oncologist and only few medical colleges had cardiologists and diabetes specialists along with general physicians.

5. Problems faced while providing services to NCD patients

1   .Most of the health institutions had limited and untrained human resources regarding NCD along with inadequate infrastructures.
2.   The majority of the diagnostic tests of NCD are expensive and the treatment these diseases has to be continued for a long time due to which most of the patients cannot afford the cost of medical test,medication and travel to the health facility.
3.   Counseling to the patients is a big task in the medical treatment because most of the patients visit hospital in late stage of the disease and request for discharge without the completion of treatment course.

6. Suggestions

1.   Physicians and health workers should be routinely trained and re-trained on the prevention and control measures of NCDs.
2.   There should be provision of supply of low cost drugs to the diabetic patients by the GoN.
3.   Preventive part of non communicable disease should be emphasized and given high priority in treating NCDs
.   4.   Health promotional activities using media should be of priority.
5.   Most of the health institutions do not have separate unit for NCDs where a patient could receive a quality treatment. There should have separate unit for NCDs patients at least at the tertiary level health facilities.

Results of Case Control Study

Descriptive finding

Socio demographic characteristics of respondents The socio-demographic characteristic of the respondents is shown in Table 9. Mean age of cases and controls is 60 and 58 years respectively.

Out of the total participants, nearly 60% were females and 40% were male in both the study groups. Age was categorized in four groups. The majority of the patients suffering from NCDs belonged to the age group 35-65 years were in the age group 51-65 years

Castes were categorized in 7 groups according to governmental classification where the majority of the subjects belong to the upper caste in both the study groups.

In terms of educational status, majority of the research participants were illiterate. Among the cases and controls, 66% and 55% were illiterate respectively. Mean year of schooling of cases and controls was 5.57 years and 7 years respectively. Nearly 90% of the participants in both the groups were married. Nearly two third of respondents (case: 74%, control: 69%) were living in rural area. Mean incomes, of cases and controls were Rs 6,992 and 6,201 per month respectively.

Most of the research participants along with their spouse were engaged in some kind of occupational activities among which majority were engaged in agriculture whereas only a few percent held service.

Table 9 Socio Demographic characteristics of the respondents

Characteristics	Frequency	
	Cases (n=111)	Controls (n=111)

Sex
        Female
        Male
	66 (60)
	45 (40)
		65 (59)
		46 (41)

Age groups 35-50years 51-65 years 66-80 years Above 81	27 (24) 55 (50) 25 (23) 4 (3)	38 (34) 49 (44) 22 (20) 2 (2)
Mean age (year)	60	58
Caste/janajati Dalit Disadvantage janajati Disadvantage non dalit, terai caste Religious advantaged janajati Relatively advantage janajati Upper caste Other caste	10 (9) 26 (23) 5 (5) 3 (3) 17 (15) 39 (35) 11 (10)	10 (9) 26 (23) 5 (5) 3 (3) 17 (15) 39 (35) 11 (10)

Educational status Illiterate Literate	73 (66) 38 (34)	61 (55) 50 (45)
Marital Status Married Widow/widower	98 (88) 13 (12)	101(91) 10 (9)

Characteristics	Frequency	
	Cases (n=111)	Controls (n=111)
Mean Daily Income	6992	6201
Residential Status Rural Urban	82 (74) 29 (26)	77 (69) 34 (31)
Mean Schooling Year Mean Family Size	5.57 7.06	7 7.73
Occupation Agriculture Housewife Business Army/Police Teacher Service holder Constructive work Others	57 (52) 31 (28) 9 (8) 6 (5) 3 (3) 1 (1) 2 (2) 2 (1)	53 (48) 36 (32) 5 (5) 4 (4) 4 (3) 2 (2) 5 (4) 2 (2)
Spouse Occupation Agriculture Housewife Business Army/Police Teacher Service holder Constructive work Others	69 (62) 22 (20) 9 (8) 4 (4) 3 (3) 0 (0) 3 (2) 1(1)	67 (61) 20 (18) 9 (8) 5 (5) 3 (2) 2 (2) 2 (2) 2 (2)

Distribution of diseases among cases

Distribution of diseases among cases is shown in table 9. A total of 111 cases and controls were enrolled. All cases suffered from one of the four NCDs. Out of them, 27% each suffered from heart diseases and COPD while 23% each suffered from diabetes and cancer.

Table 10 Distribution of diseases among cases

Types of NCD	Frequency	Percentage
Heart Diseases	30	27
COPD	31	27
DM	25	23
Cancer	25	23
Total	111	100

Analytical finding

Association between risks factors and Non Communicable Diseases

Table 11 shows the association between different risks factors and NCDs. Odds of developing NCDs among smokers is 1.6 times more than those who do not smoke. This shows that attribution of smoker in development of NCDs is 60%.

Odds of developing NCDs among alcoholic is 1 which suggests that there is no association between alcohol and NCDs.

Odds of developing NCDs among physically inactive group (vigorous and moderate) are 4.39 and 3.5 times more than those who are physically active group. It shows that physically inactive group is 4.39% and 3.50% more at risk than physically active group.

Table 11 Association between risks factors and Non Communicable Diseases

Risk Factors		Case (%) (n=111)	Control (%) (n=111)	Odds ratio	95% CI
Smoking	Yes	48	36	1.6	0.9-2.7
	No	52	64		
Alcohol	Yes	23	23	1	0.5-1.8
	No	77	77		
Vigorous physical activities	No	28	8	4.39	1.9-9.7
	Yes	72	92		
Moderate physical activities	No	28	10	3.5	1.6-7.4
	Yes	72	90		

Logistic regression analysis of Risks factors and NCDs

Table 11 shows the Logistic Regression Analysis of risk factors and NCDs. It shows that there is a significant association between alcohol and NCDs after the adjustment for various confounders. Vigorous physical activities and moderate physical activities with NCDs remained significant even after adjustment of confounding factors. In conclusion, alcohol, and physical in activities are the independent risk factors for developing the NCDs.

Table 12 Logistic regression analysis of Risks factors and NCDs

Risks Factors	P value	Adjusted odds Ratio (β)	95%C
Smoking	0.206	0.7	0.4-1.2
Alcohol	0.006	1.8	1.1-2.7
Vigorous Physical activities	0.001	0.2	0.1-0.5
Moderate physical activities	0.004	0.3	0.1-0.6

Association between risks factors and Cardiovascular Diseases

Table 12 shows the association between risks factors and cardiovascular diseases. The odds of developing CVDs among smoker are 1.4 times more than those who didn't smoke.

The odds of developing CVDs among alcohol consumption group are 1.29 times more than those who didn't consume alcohol. However there was no association between alcohol and cardiovascular diseases.

The odds of developing CVDs among physically inactive group (vigorous and moderate) are 1.8 and 1.36 times more than those who are physically active group. It shows that physically inactive group is more at risk than physically active group.

Table 13 Association between risks factors and Cardiovascular Diseases

Risk Factors		Case (%) (n=111)	Control (%) (n=111)	Odds ratio	95% CI
Smoking	Yes	50	40	1.4	0.6-3.1
	No	50	60		
Alcohol	Yes	27	22	1.2	0.5-3.1
	No	73	78		
Vigorous physical activities	No	27	17	1.8	0.7-4.4
	Yes	73	83		
Moderate physical activities	No	23	18	1.3	0.5-3.4
	Yes	77	82		

Association between risks factors and Cancer

Table 13 shows association between risks factors and cancer. The odds of developing cancer among smoker are less than those who do not smoke. This may be because of small sample size and inclusion of all types of cancer where the lung cancer is nominal in number and it could also be because the smokers did not tell the truth about their smoking habit.

The odds ratio indicates that alcohol habit reduces the odds of developing cancer. This may again be because of small sample size. However confidence interval suggests that there is no significant association between alcohol and cancer.

The odds of developing cancer among physically inactive group are 1.8 and 4.2 times more than those who are physically active group. It shows that physically inactive group (vigorous and moderate) is more at risk than physically active group.

Table 14 Association between risks factors and Cancer

Risk Factors		Case (%) (n=111)	Control (%) (n=111)	Odds ratio	95% CI
Smoking	Yes	32	43	0.6	
	No	68	67		
Alcohol	Yes	20	23	0.8	0.3-2.3
	No	80	77		
Vigorous physical activities	No	28	17	1.8	0.74-4.99
	Yes	72	83		
Moderate physical activities	No	44	16	4.2	1.74-10.12
	Yes	56	84		

Association between risks factors and Diabetes Mellitus

Table 14 shows the association between risk factors and DM. The odds of developing DM among smoker are 1. 9 times more than those who do not smoke. It clearly shows that attribution of smoker in development of DM is 90%. But confidence interval suggests that there is no significant association between smoking and DM.

The odd of developing DM among alcohol consumption group is 0.62 which suggests that DM is less likely to occur in alcohol consumption group. Confidence Interval suggests that there is no association between alcohol and DM.

The odds of developing NCDs among physically inactive group are 1.5 and 1.8 times more than those who are physically active group. It shows that
physically inactive group is more at risk than physically active group. However confidence interval suggests that there is no significant association between physical activities and DM.

Table 15 Association between risks factors and Diabetes Mellitus

Risk Factors		Case (%) (n=111)	Control (%) (n=111)	Odds ratio	95% CI
Smoking	Yes	56	40	1.9	0.8-4.4
	No	44	60		
Alcohol	Yes	16	23	0.6	0.2-1.9
	No	84	77		
Vigorous physical activities	No	24	17	1.51	0.5-4.0
	Yes	76	83		
Moderate physical activities	No	28	18	1.8	0.6-4.6
	Yes	72	82		

Association between risks factors and COPD

Table 15 shows the association between risk factors and COPD. The odds of developing COPD are 1.7 times more among smoking group than those who do not smoke. It clearly shows that attribution of smoker in development of COPD is 70%. However Confidence interval suggests that there is no significant association between smoking and COPD.

The odds of developing COPD are 1.29 times more among alcohol consuming group than those who do not consume the alcohol. However confidence Interval suggests that there is no significant association between alcohol and COPD.

Odds of developing COPD among vigorous physical inactive group are 2.25 times more than those who are vigorous physical active group.
Odds of developing COPD among moderate physical inactive group are 0.838 which suggest that COPD is less likely occurs among moderate physical inactive group than active group. However no significant association was found between physical activities and COPD.

Table 16 Association between risks factors and COPD

Risk Factors		Case (%) (n=111)	Control (%) (n=111)	Odds ratio	95% CI
Smoking	Yes	53	40	1.7	0.7-3.7
	No	47	60		
Alcohol	Yes	27	22	1.2	0.5-3.12
	No	73	78		
Vigorous physical activities	No	30	16	2.2	0.9-5.3
	Yes	70	84		
Moderate physical activities	No	17	19	0.8	0.3-2.3
	Yes	83	81		

Discussion

A non communicable disease or NCD is a disease which is not contagious. Associated factors such as person's lifestyle, genetics or environment are known to determine the likelihood of certain non-communicable diseases. Of these three risk factors, 50% of all non communicable diseases are a result of poor lifestyle choices such as drug use, alcohol and tobacco use, diet, lack of exercise or stress management. (33)

This study was conducted in 31 health institutions (Regional, Sub Regional, Zonal, medical colleges, specialized centers and Central hospital) of Nepal to identify the hospital based prevalence of non communicable diseases. The main purpose of the study is to assess the burden of non communicable diseases in Nepal.

The study revealed that the most of the patients suffering from non communicable diseases belonged to the age group 35-65 years According to the report released by Mauritius on Non Communicable Diseases indicated the most commonly affected that age group by NCD is 25-74 years. (34)

Our study revealed that, out of the 3,294 NCD cases, majority of the cases (43%) had COPD and 40% had heart diseases followed by DM (12%) and Cancer (4%). The reason behind such a high proportion of COPD cases could be due to the use of traditional cooking stoves and combustion of solid biomass fuels (animal dung, crop residue, and wood) which are the main sources of indoor air pollution.

The consumption of non filtered cigarettes could be another reason for the high prevalence of COPD. According to the WHO report on Non Communicable Diseases in South East Asia Region, according to the hospital based study COPD is leading NCD followed by CVD, cancer and diabetes in Nepal.(35)

The study revealed that breast, cervix and ovarian cancer are the main cancers at national level accounting for 44% of distribution which suggests that the female is more vulnerable to these cancers. A hospital based retrospective study conducted in two hospitals namely Bhaktapur Cancer Care Center and Om Hospital and Research Center had also reported similar trends. It was observed that female (56.4 %) had more number of cases of cancer than male and accounted for about 43.5% of the total cases of malignancy. Top five malignancies included: breast (17.31%), lung (17.03%), NHL (Non-Hodzkin's Lymphoma) (8.38%), stomach (7.54%) and ovarian (7.54%) cancers respectively. It was found that stomach and lung cancer is the most common cancer that occurs in digestive and respiratory system respectively, NHL in the lymphatic system and breast cancer in female reproductive system. (36)

Higher prevalence of hypertension (47%) followed by CVA, CCF, IHD, RHD and MI is similar as that of WHO report in Non Communicable Diseases in South East Asia Region which has showed the highest number of cases of rheumatic heart disease followed by stroke and IHD in Nepal. (37)

The present study states that the heart disease is more likely to incur to the people who consume alcohol, but the dose-response relationship could not be established. Similarly, the study conducted by Center for Diseases Control and Prevention (CDC) in United States reported that excess alcohol intake has been associated with an elevated risk of liver disease, heart failure, some cancers and accidental injury and is a leading cause of death in industrialized countries. (38)

On the other hand, American Heart Association has reported that "More than a dozen prospective studies have demonstrated a consistent, strong, dose-response relation between alcohol consumption and incidence of CHD. The data are similar in men and women in a number of different geographic and ethnic groups. Consumption of one or two drinks per day is associated with a reduction in risk of approximately 30% to 50 %". (39)

A population based cohort study of the association between alcohol intake and cancer of upper respiratory tract showed that a moderate intake of wine probably does not increase the risk of upper digestive tract cancer, whereas a moderate intake of beer or spirits considerably increases the risk. (40) Our study showed that alcohol habit reduces the odds of developing cancer, but the dose-response relationship has not been established.

Our study revealed that cancer is less likely to occur in smoking group. This may be because of small sample size and inclusion of all types of cancer where lung cancer is nominal in number. On contrary, a study conducted by Dr. Richard Doll and Professor A. Bradford Hill "found that there is an association between smoking and carcinoma of the lung".(41)According to the study of The study revealed that odds of developing COPD are more likely to occur in smoking group. Similarly a study conducted by M. Movahed & N. Milne showed that increasing in length and amount of smoking is associated with increase risk for chronic cough and sputum production consistent with dose dependent negative effect of chronic smoking.(42)

In our study most of the respondents of both cases and control had taken less than standard serving fruits. It also revealed that there is no association between serving fruits and occurrence of NCDs.behavioral risk factor of non communicable diseases, the majority (58%) of the study participants consumed fruit only one to two times per week, while 43% had only one serving of vegetables per day. This is much less than the WHO recommended intake of 400 to 500 grams per day. A higher level of fruit and vegetable intake of 2 to 3 servings per day have been observed amongst urban slum dwellers of Ballabhgarh in the state of Haryana. (43)

A number of studies conducted in India have shown a significant association with a low intake of fruits and vegetables and the risk of non communicable diseases. It has been estimated that 2.7 million lives could be potentially saved if the consumption of fruits and vegetables were sufficiently increased.(44)

Our study revealed that heart diseases is more likely to occur in those who have habitual consumption of saturated oils where as American Journal of Clinical Nutrition states

that diets rich in vegetables and use of mustard oil could contribute to the lower risk of IHD among Indians. (45) Similarly, in a study done in IHD showed that a maximum number of the respondents (63.8%) used refined vegetable oil for cooking followed by mustard oil usage by 21% which contain significant level of poly unsaturated fatty acids shown to be protective against coronary artery disease.(46)

Hence, the findings observed in the present study point toward an urgent need of developing strong community-based intervention programs to address the increasing burden of these diseases.

Conclusion

This cross sectional study was carried out to estimate the hospital based prevalence of non communicable diseases. In parallel, case control study was done to ascertain the associated factors of the non communicable diseases in Nepal.

This hospital based cross sectional study revealed that there were 36.7% of the cases diagnosed with any of the four NCDs (heart diseases, COPD, diabetes and cancer) in the fiscal year 2065/66. Breast, cervix and ovarian cancer are the main cancers at national level accounting for 44% of distribution. Majority of the cases were of HTN (47%) followed by CVA, CCF, IHD, RHD and MI. It reflects that Nepal is also facing the surging burden of non communicable diseases similar to other developing nations of south East Asia.

Case control study showed that there is certain degree of association between exposure factors (smoking, alcoholism and physical inactivity) and NCDs. This association was stronger in relation to physical inactivity and the occurrence of NCDs. This association was stronger in relation to odds of developing CVDs among physically inactive, vigorous and moderate group are 1.8 and 1.36 times more than those who are physically active group. In case of cancer, physically inactive groups, vigorous and moderate group are 1.8 and 4.2 times respectively more likely to develop cancer than physically active group.

In conclusion, the magnitude of non communicable disease is substantial in Nepal and is regarded as a public health problem. Although evidence for the pandemic of non communicable chronic diseases is irrefutable, as also seen in this study, there is a paucity of program to detect, manage and prevent these diseases in Nepal. The governmental, non-governmental and community based organizations are still fighting to tackle the burden of infectious diseases. Unless urgent and specific focus on preventing, treating and control of NCDs are targeted, the burden of the NCDs will be unbearable to the poor nation like Nepal. This study had provided a background data on NCD and the concern organizations should focus and contribute in the prevention, control and reduction of NCDs burden and its risk factors.

Recommendation

Given the complex causality of NCDs, its prevention requires an integrated action across a range of sectors at local, regional and national levels. Each individual sector can perform a specific role to contribute from their level. Health care and public health must play a fundamental role in providing care and support for the patients but also in applying the unique public health models to prevent the associated risk of NCDs.

Recording and Reporting System

Poor recording system was observed in most of the hospitals. There was no uniform format to record the patient's details. Various characteristics of the patients such as caste, address and even diagnosis were not clearly written on record book in many hospitals' inpatient register due to which, it became difficult to get the information concerning patient and the diagnosis.

Some of the medical colleges and government hospitals used computer based software to record the patients' data, but the software and format differ from hospital to hospital. So there is an immense need of uniform recording and reporting format and if possible the data should be maintained in an electronic version. Data based system should be established to centralize the data and to properly maintain the data at different level of health system.

Ministry of Health and Population

Ministry of Health could develop priority based infrastructures and modules to prevent and control the NCDs at different stages. It should develop a national level policy and plan of action for good planning and implementing the collaborative action between the health sector and other donor agencies to emphasize on clinical as well as preventive measures for the control of NCDs.

- Capacity building programs to the medical personnel like in service training should be provided to update the knowledge and to promote the skills.
- Most of the health institutions especially in rural part of the country, lack efficient and new technology along with the expert manpower due to which the patients are forced to move to the urban areas for quality health care. Ministry should equally distribute the resources, equipments and experts to such health centers where people are deprived of service.
- It should establish the surveillance system of NCDs as like other disease surveillance or need to establish the integrated surveillance system.There is mportant role of surveillance for NCDs in the Region which can prompt the countries to establish sustainable databases for NCDs and their risk factors. This would greatly facilitate in policy development and planning for NCD prevention and control.
- Advocacy campaigns such as awareness raising programs, street dramas, concerts should be conducted for the general people on how to prevent from the risk of developing NCDs. The Involvement of the public figures at the local and national media in these events can boost the impact.

Population level

Health is an individual issue and initiation from an individual level should be done to be free from NCDs. NCDs result from genetic, behavioral and environmental factors and the interactions between them

.

At the population level, a high prevalence of risk factors at community level can be reduced by developing healthy life style which includes healthy dietary intake (less intake of fried, oily, junk food), regular physical activity, low intake of salt, caloric balance, psychological stress etc. Alcoholic and smoking habit are the associated detrimental factors that are responsible for different types NCDs so such habits should be restrained. Children should be encouraged to amend the healthy life styles and behaviors to promote health in order to reduce the burden of NCDs in the next generation.

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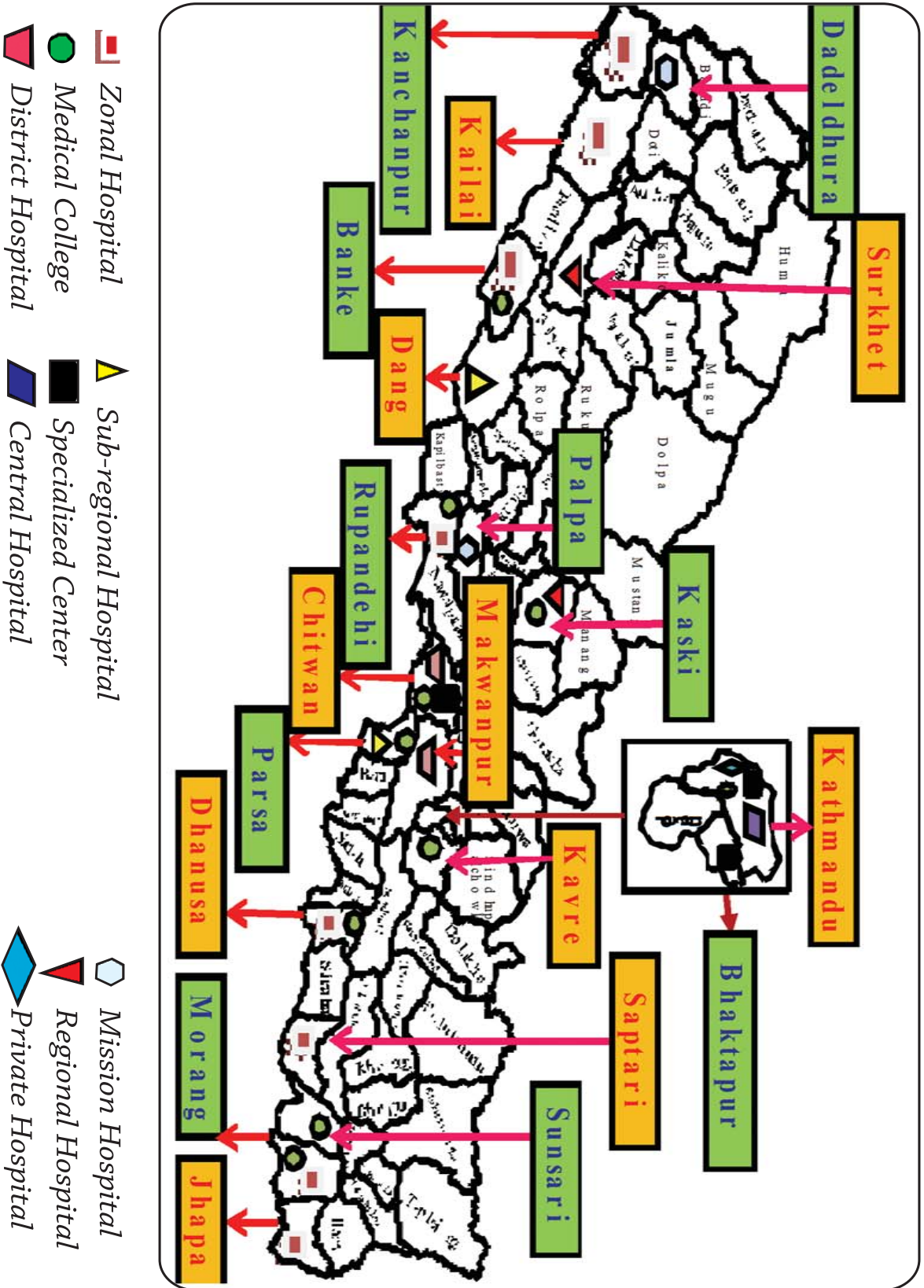
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Annex I: List of selected Health Institutions

SN.	Health institution	Category	Region	District
1	Mechi Zonal Hospital, Bhadrapur	Zonal Hospital	Eastern Region	Jhapa
2	Koshi Zonal Hospital, Biratnagar	Zonal Hospital	Eastern Region	Morang
3	Nobel Medical College, Biratnagar	Medical College	Eastern Region	Morang
4	BPKIHS	Medical College	Eastern Region	Sunsari
5	Sagarmatha Zonal Hospital	Zonal Hospital	Eastern Region	Saptari
6	Janaki Medical College, Janakpur	Medical College	Eastern Region	Dhanusha
7	Janakpur Zonal Hospital	Zonal Hospital	Central Region	Dhanusha
8	Narayani Sub-regional Hospital	Sub-Regional Hospital	Central Region	Birjung
9	National Medical College	Medical College	Central Region	Birjung
10	Teaching Hospital	Central Hospital	Central Region	Kathmandu
11	Sahid Gangalal National Heart Center, Bansbari	Specialized Center	Central Region	Kathmandu
12	Medicare Hospital	Private Hospital	Central Region	Kathmandu
13	Kathmandu Medical College	Medical College	Central Region	Kathmandu
14	Bhaktapur Cancer Hospital	Specialized Center	Central Region	Bhaktapur
15	BP Koirala Memorial Cancer Hospital	Specialized Center	Central Region	Chitwan
16	KUMS, Dhulikhel	Medical College	Central Region	Kavre
17	Hetuda District Hospital	District Hospital	Central Region	Makwanpur
18	Mahendra Adarsha Chikitshalaya (Bharatpur Hospital)	District Hospital	Central Region	Chitwan
19	College of Medical Sciences (CMS)(Bharatpur Medical College)	Medical College	Central Region	Chitwan
20	Western Regional Hospital	Regional Hospital	Western Region	Kaski
21	Manipal Teaching Hospital	Medical College	Western Region	Kaski
22	Universal collage of Medical Science	Medical College	Western Region	Rupandehi
23	United Mission Hospital	Mission Hospital	Western Region	Palpa
24	Lumbini Zonal Hospital, Butwal	Zonal Hospital	Western Region	Rupandehi
25	Mid Western Regional Hospital	Regional Hospital	Mid-Western Region	Surkhet
26	Nepalgunj Medical College	Medical College	Mid-Western Region	Banke
27	Bheri Zonal Hospital	Zonal Hospital	Mid-Western Region	Banke
28	Seti Zonal Hospital	Zonal Hospital	Far-Western Region	Kailali
29	HDCS-Team Hospital	Mission Hospital	Far-Western Region	Dadeldhura
30	Mahakali Zonal Hospital	Zonal Hospital	Far-Western Region	Kanchanpur
31	Rapti Sub-regional Hospital	Sub-regional Hospital	Mid-Western Region	Dang

Legend:

- Zonal Hospital
- Medical College
- District Hospital
- Sub-regional Hospital
- Specialized Center
- Central Hospital
- Mission Hospital
- Regional Hospital
- Private Hospital

Districts labeled: Dadeldhura, Kailai, Kanchanpur, Surkhet, Banke, Dang, Palpa, Rupandehi, Chitwan, Kaski, Makwanpur, Parsa, Dhanusa, Kavre, Kathmandu, Bhaktapur, Saptari, Morang, Sunsari, Jhapa

Research Team

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Mr. Ramji Bhandari   -   Enumerator

Ms. Prativa Basnet   -   Enumerator

Ms. Numa Karki   -   Enumerator

Ms. Bandana Dahal   -   Enumerator

Tool used for cross sectional study

Nepal Health Research Council
Tool for a Cross-Sectional Study on Non Communicable Diseases
Hospital:...........................

SN	Name	Age	Sex	Address (VDC &District)	Ethnicity	Diagnosis	Treatment

Tool used for case control study Team

Nepal Health Research Council
Tool for the Case Control Study on Non Communicable Diseases

Name of Health Institution: Enumerator: ....

                                                    Date: ....

A. Demographic Profile

Name: Age: Sex: Male/ Female

Ethnicity: Religion:

Marital Status:

Address: VDC/NP/M: .... District: ....

Residence: ☐ Urban / ☐ Rural   Family Size:

Education level: Year of schooling/ Education:

Occupation:

       Occupation of Spouse:

Monthly income of family:

B. Case Control Status

i.   Case of: ....

ii. Height (cm): ....

iii. Weight (Kg): ....

iv. BMI ....

C. Family History

1) Does any of your family members suffering from same disease?

   ☐ Yes ☐ No

2) If yes, who are suffering from these diseases?

       i.   Father

       ii. Mother

       iii. Brother/Sister

       iv. Spouse

       v.   Others ....

D. Tobacco Consumption:

I. Smoking

   1. Have you ever smoked >100 cigarette/bidi/kankat/choor over lifetime?

          Yes ☐   No ☐   (If No go to question no.)

   2. If yes, list consumption, excluding times when the subject did not smoke (Report any change of more or less than 50%, e.g. from 10 to 15 cigarettes per day):

SN.	Product	From (_) Age	To (_) Age	Quantity per day
i.	Cigarettes (With filter)			
ii.	Cigarettes (Without filter)			
iii.	Bidi			
iv.	Hooka/Pipe			
v.	Hashish			
vi.	Others			

1. Do the other person of the family smoke in the home or work place regularly?

Yes ☐   No ☐

4. If answered "NO", go to question II

5 If yes, who smoke?
   i.   Father
   ii.   Mother
   iii. Brother/Sister
   iv.   Husband
   v.   Other ....

I. Chewing Habits

Have you ever consumed chewing products (e.g. Pan, Surti, Khaini, Zarda, Pan masala) at least once a week for at least six months?

1) Yes   2) No

Type of Chewing Product	Yes/No	From Age	To Age	No. Per Day	Placement Duration (min.)
With Tobacco Pan with tobacco Khaini Surti (tobacco with/without lime) Zarda Pan masala with tobacco Zarda, kiwam Other...........................…...					
Without Tobacco Pan without tobacco Pan masala without tobacco Supari Lwang Other					

II. Snuffing Habit

Have you ever snuffed naswar or tobacco? (At least once a week for at least six months)

(1) Yes   2) No

Type	Yes/No	From Age	To Age	No. Per Day
Nasal snuff Naswar Other ………………………………				
Oral snuff Naswar Toothpaste Other ………………………………				

IV Smoking quit

1) Have you ever thought of giving up or cut-down tobacco use?
   i.   Not yet
   ii. Thought previously
   iii. Thinking now
   iv. Quit completely
2) What made you think of stopping or cutting down?
   i.   Long term health effects
   ii. Short term/cosmetic effects
   iii. Economic impact of self/family
   iv. Moral or religious reasons
   v.   Negative perception of tobacco use: Foolish
   vi. Pressure from family or friends
   vii. Others…..………………………

Knowledge on Tobacco

1) Do you know that tobacco use is harmful?

   Yes   No

2) If yes, do you know any health effects of tobacco?

   Yes   No

3) Do you know that passive smoking is harmful?

   Yes   No

4) If yes, do you know any health effects of passive smoking?

   Yes   No

I. Alcohol consumption

1. Have you ever consumed alcoholic beverages? (at least once a week for at least six months)

   Yes   No

Alcoholic Beverage	Yes/No	From ( ) Age	To (_) Age	Unit/Day*	Days/Week
Week Beer (bottle of,0.75L)					
Whisky/Rum (glass of)					
Vodka (glass of)					
Local Rakshi (glass of)					
Local Rakshi (glass of)					
Thongba					
Others					

V. Diet

1) Do you prepare your food?
   i. Never
   ii. Rarely
   iii. Often
   iv. Most of the times

2) Which fuel do you use while preparing food?
   i. Clay stove using firewood
   ii. Dung
   iii. LPG gas
   iv. Heater
   v. Kerosene Stove
   vi. Others ....

3) What kind of food, do you take frequently?

SN.	Type of Cooking	Vegetables	Meat	Fish
1.	Shallow frying			
2.	Deep frying			
3.	Boiling			
4.	Steaming			
5.	Other……………………			

4) Which type of oil used for cooking food?

SN.	Product	Yes/No	Family Consumption (Per Wk.)
1.	Mixed vegetable oils		
2.	Sunflower oils		
3.	Cornflower oil		
4.	Soya oil		
5.	Mustard oil		
6.	Coconut oil		
7.	Vegetable ghee		
8.	Animal ghee		

5) In a week, how many days do you eat fruits?

..........…day/week

6) How many serving of fruit do you eat on one of those days? (Please mention the amount in cup)

…………........ /day

7) In a week, how many days do you eat Vegetables?

........day/week

8) How many serving of vegetables do you eat on one of those days? (Please mention the amount in   cup)

VI.   Occupational history

1) At what age did you start working full time [more than 20 hours a week? _ _

2) At what age did you stop working full time? _ _

3) How many years did you work in all? _ _

4) List all jobs in which the subject has been employed _ _

for at least one year, starting from the first job: _ _

VII.   Physical activities:

Vigorous-intensity activities

1) Does your work involve vigorous-intensity activities like carrying or lifting heavy loads or construction work?

Yes   No

2) In a week, how many days do you do vigorous-intensity activities as part of your work?

……….day/week

3) In a day, How much time do you spend doing vigorous-intensity activities at work
…………...min/day

Moderate-intensity activities

1) Does your work involve moderate-intensity activities like cleaning room/ washing clothes/ lifting light loads?
Yes   No

2) In a week, how many days do you do moderate -intensity activities as part of your work?
……….day/week

3) In a day, How much time do you spend doing moderate -intensity activities at work
………..min/day

Recreational activities:

Vigorous-intensity recreation activities:

1) Do you do vigorous-intensity sport, fitness, or recreational activities like running, football at least for 10 minute?

2) In a week, how many days do you do vigorous -intensity recreational activities?
……….day/week

3) In a day, How much time do you spend vigorous -intensity recreational activities
………..min/day

Moderate-intensity recreation activities

1) Do you do moderate -intensity sport, fitness, or recreational activities like cycling, swimming, and volleyball at least for 10 minute?

2) In a week, how many days do you do moderate -intensity recreational activities?
………day/week

3) In a day, How much time do you spend moderate -intensity recreational activities?
………..min/day

Sedentary Behavior

1) How much time do you usually spend sitting or reclining on a day?
……….hours……….minute

Observation Tool

Nepal Health Research Council
Observation tool for the Cross-Sectional Study on Non Communicable Diseases

Name of hospital:

1.	Total no. of patient of all disease in a fiscal year (2065/66)	Emergency .... OPD…….…..…… IPD…..……..…… Total…..………..
2.	Total no. of patient with Cancer	Lung ☐ Prostate ☐ Breast ☐ Cervical ☐ Others ☐
3.	Total no. of patient with Cardiac diseases	Stroke ☐ HTN ☐ MI ☐ Others ☐
4.	Total no. of patient with Diabetes Mellitus	Type 1 ☐ Type 2 ☐
5.	Total no. of patient with COPD	

SN.	Availability of Diagnostic Tests	
1.	**For Cancer**	
	i. Histopathology	☐
	ii. Imaging (x-ray machine, CT Scan, MRI)	
	iii. Others …..…………………………	
2.	**For Heart Diseases**	
	i. Angiography	☐
	ii. ECG	☐
	iii. Echocardiogram	☐
	iv. Others …..…..….……………………	
3.	**For Diabetes Mellitus**	
	i. Blood Sugar Test	☐
	ii Others………………….…..…….……	
4.	**For COPD**	
	i. Spirometry test	☐
	ii Others.……………….…...…………	

List of Available Doctors for proving the NCD

1.	Number of General Physician	
2.	Number of Oncologist/Oncosurgeon	
3.	Number of Cardiologist	
4.	Number of Diabetologist	

Tool for doctor

Nepal Health Research Council
A Cross-Sectional Study on Non Communicable Diseases
Name of Hospital ....

Name: **Sex:**

Academic Qualification

SN	Academic background	Year of Completion	Specialization	Remarks
1.	MBBS			
2.	MD/MS			
3.	Other PG Degree (s)			
4.	....			

Experience

Date (from ....to......)	Name of Hospital	Department

Training Received

SN	Title of Training (only related to 4 NCD)	Institution	Year	Remarks
1.				
2.				
3.				

Observation Tool

Nepal Health Research Council
Observation tool for the Cross-Sectional Study on Non Communicable Diseases
Key Informant Interview

Name of Health Institution:

Name of Key Informant:

Post:

Question related to Infrastructure:

Infrastructure for the diabetes cases: (No of OPD room, ward/unit and bed, waiting area)

Infrastructure for the cancer cases: (separate OPD room, ward/unit, No of bed, waiting area)

Infrastructure for the COPD cases: (separate OPD room, ward/unit, No of bed, waiting area)

Infrastructure for the Heart cases: (separate OPD room, ward/unit, No of bed, waiting area)

Question related to diagnostic procedure:

What kinds of diagnostic procedure are done for the diabetes cases?

What kinds of diagnostic procedure are done for the cancer cases?

What kinds of diagnostic procedure are done for the COPD cases?

What kinds of diagnostic procedure are done for the Heart cases?

Question related to Treatment

Treatment facilities for Diabetes:

Treatment facilities for COPD:

Treatment facilities for cancer:

Treatment facilities for Heart disease:

Referral system of NCD (Diabetes, COPD, Cancer and Heart diseases)

What are the main problems/constraints to deliver the services for the NCD cases?

Some recommendation for providing the quality care to NCD cases:

Tool for doctor

Nepal Health Research Council
A Cross-Sectional Study on Non Communicable Diseases
Name of Hospital ....

Name: **Sex:**

Academic Qualification

SN	Academic background	Year of Completion	Specialization	Remarks
1.	MBBS			
2.	MD/MS			
3.	Other PG Degree (s)			
4.	....			

Experience

Date (from ....to......)	Name of Hospital	Department

Training Received

SN	Title of Training (only related to 4 NCD)	Institution	Year	Remarks
1.				
2.				
3.				

Standard used for Alcohol

Types of Alcohol	Concentration of alcohol	1 standard drink
Beer, Jaand and Tongba	5%	341
Local Raksi, whisky, Vodka (Spirit)	40%	43
Wine (red and white)	12%	142

1 standard drinks=13.6gram alcohol

Standard of fruits and vegetable

5 standard serving fruits and vegetable is required in a day
1 serving fruits and vegetable contain: 80mg

Standard of serving fruits and vegetable

1 serving fruits	1 serving vegetables
1 medium fruit	½ cup of cooked vegetables
2 small size fruits	½ cup vegetable juice
One portion of big size fruits	1 cup of raw vegetables
½ fruits juice	
½ cup chopped fruits	

1 cup: 250ml fruits and vegetables

Standard for physical activities

Moderate-intensity Physical Activity (Approximately 3-4 METs) Requires a moderate amount of effort and noticeably accelerates the heart rate	Vigorous physical activities Physical Activity (Approximately > 6 METs) Requires a large amount of effort and causes rapid breathing and a substantial increase in heart rate
Examples of moderate-intensity exercise include:	Example of vigorous-intensity exercise include:
• Brisk walking	• Running
• Dancing	• Walking/climbing brisky up a hill
• Gardening	• Fast cycling
• Housework and domestic chores	• Aerobics
• Traditional hunting and gathering	• Fast swimming
• Active involvement in games and sports with children/walking domestic animals	• Competitive sports and games (e.g. Traditional Games, Football, Volleyball, Hockey, Basketball)
• General building tasks (e.g. roofing, thatching, painting)	• Heavy shoveling or digging ditches
• Carrying/moving moderate loads (20kg)	• Carrying/moving heavy loads (>20kg)

Adults (18-65 years old)
- 30 minutes of moderate-intensity physical activity 5 days per week; (

OR

- 20 minutes of vigorous-intensity physical activity 3 days per week;

OR

- an equivalent combination of moderate- / vigorous-intensity physical activity;

AND

- 8-10 muscular strengthening exercises (8-12 repetitions) at least 2 days per week.

PREVALENCE OF NON COMMUNICABLE DISEASE IN NEPAL HOSPITAL BASED STUDY

2010

Nepal Government   **Nepal Health Research Council**