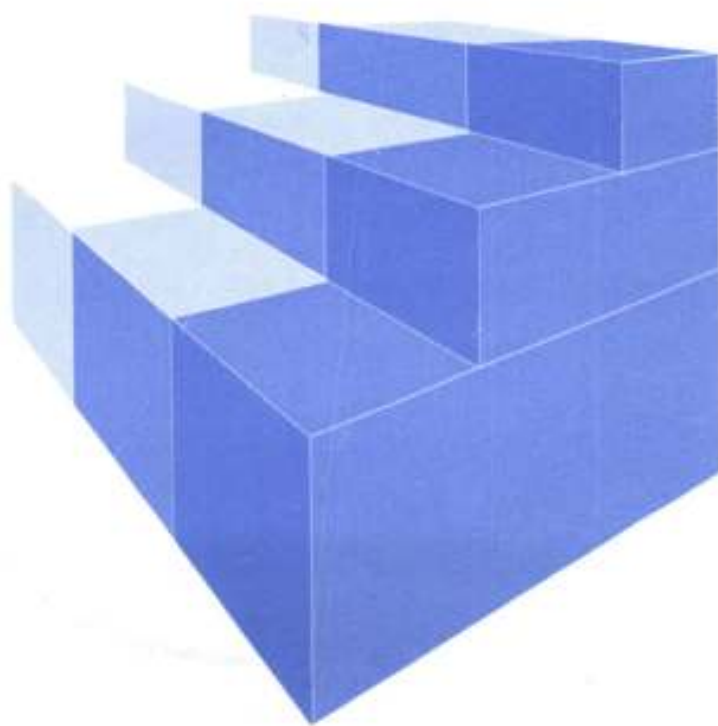


Surveillance of Risk Factors for Non-Communicable Diseases in Nepal

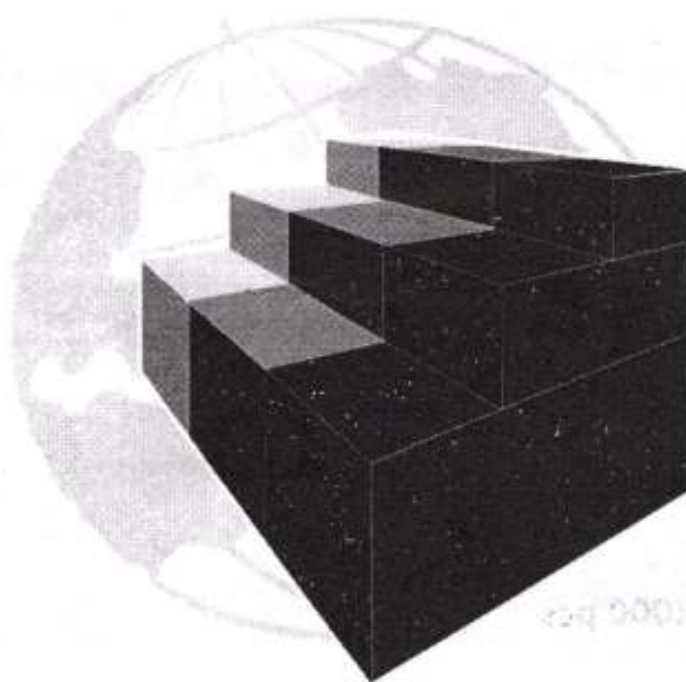
(Report from Kathmandu Metropolitan City)



Printed- June 2010

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Surveillance of Risk Factors for
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Nepal
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Published by

Ministry of Health and Population

Ramshah Path, Kathmandu

June

Printed copy: 2000 pcs

Printed by

Saugat Press Pvt. Ltd.

Anamnagar, Kathmandu

Ph: 4233474

Acknowledgement

This study is the outcome of the sincere efforts of the many institutions and individuals. The WHO STEPwise approach to surveillance of risk factors for non-communicable diseases in Nepal was implemented by Society for Local Integrated Development Nepal (SOLID Nepal) in 2003 with the technical and financial support from South East Asia Regional Office, World Health Organization.

We would like to express our sincere thanks to Dr. Ananda Krishnan, NCD expert from SEARO, WHO, New Delhi and Dr Paramita Sudharto from WHO Country Office, Nepal for their valuable technical support in every steps of the study.

Our sincere gratitude goes to Mr. Rabindra Poudel, Engineer, and Valley Mapping Programme Kathmandu Metropolitan City for providing us detail map of the study area. Likewise, it is unfair, if we do not give our sincere thanks to Mr. Damodar Dahal, cartographer, Central of Bureau of Statistics (CBS), GoN Nepal for providing the cluster map of wards of Kathmandu Metropolitan City.

We would like to express our thankful appreciation to Food Technology and Quality Control Department, GoN, Nepal for providing standardisation of alcohol contents in home made beverages without which it would have been impossible to work in this area. We are indebted to ward secretaries of concerned wards of the Kathmandu Metropolitan City for enabling the environment for survey. Heartfelt thanks to all the respondents who helped by providing the relevant information to the study team. At last Ministry likes to thank Dr Ram Prasad Shrestha, the then focal point and NCD Surveillance team principal investigator and Dr Khem Karki, Executive Director, Solid Nepal for their contribution to complete this study project.

List of Abbreviations

CBS	Central Bureau of Statistics
CVD	Cardio Vascular Diseases
COPD	Chronic Obstructive Pulmonary Diseases
GDP	Gross Domestic Products
GON	Government of Nepal
ICD	International Classification of Diseases
MOH	Ministry of Health
mmHg	Millimeter of Mercury
NCD	Non-communicable diseases
NGO	Non-governmental Organization
NHRC	Nepal Health Research Council
SEAR	South East Asia Region
SEARO	South East Asia Regional Office
SOLID Nepal	Society for Local Integrated Development Nepal
WHO	World Health Organization

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Executive Summary

1. Introduction

According to WHO, nearly 52 percent deaths and 38 percent of diseases burden in South East Asia Region (SEAR) are related to non-communicable diseases (NCDs). Particularly, cardiovascular disorders, cancer, diabetes mellitus and conditions arising from injuries are prioritised top in the region, out of them; ischemic heart disease and cerebrovascular disease are two main conditions. Cancer, CVD, neuropsychiatric disorders, diabetes mellitus and hypertension are reported major NCDs in Nepal. Information on distribution and determinants of risk factors especially for NCDs in population provide basis for selecting strategies for effective prevention and control. Such strategies aim to promote healthy behaviour and lower risk in the entire population. Thus, it is essential to quantify and access distribution of risk factors.

2. Objective aim of the study

Main objective of this study is to identify and describe the level of selected NCD risk factors by age and sex among 25-64 aged populations, using recommended WHO definitions and to provide appropriate and sufficient information needed for design and implementation of NCD risk factors prevention and control interventions.

3. Research methodology

The selected variables for this study were tobacco, alcohol, physical inactivity, nutrition, weight, height, waist girth and blood pressure. WHO STEPwise approach was used. In this study, informations were collected through interview (STEP 1) and physical measurements (STEP 2).

The study area of this survey was Kathmandu metropolitan city. A sample size of approximately 2000 (men and women) between 25 to 64 years were selected through Probability Proportion to size (PPS) sampling method, which could detect magnitude of selected risk factors by age and sex. Among the 35 wards of the Kathmandu Metropolitan city, only 5 wards were chosen. They were 2, 7, 14, 18 and 32 wards. Sample households were drawn from the selected wards by using cluster sampling. Among the clusters, two clusters from each ward were selected using simple random sampling method. Collected data were computerised and analysed using EPI-2002, Epidata 2.1b and SPSS 10 versions.

4. Major Findings

4.1 Demographic Information

Altogether 2030 samples were collected with 1010 men and 1020 women. Of the eligible population, 86 percent had responded our questionnaire and participated in physical

measurement and rest of others were absentees. There was no refusal. Only one woman had not participated for the hip girth measurement.

The majority of the respondents (73%) had received some level of education. Among them, only 39 percent of the women and 14.5 percent of men were illiterate. Majority of the women (72%) responded that they involved in core household work like cooking, washing clothes, etc where as men were self employed (42.6%) or employed in NGO (33 %) and Government services (9.5%).

4.2 Tobacco use

Present study showed that 33 percent of the total respondents were having either form of tobacco (smoke and smokeless).

Most of the respondents (77%) do not smoke any tobacco products. A few are occasional smokers (2.52%) and 20 percent of the total respondents with 30 percent men 10 percent women smoke tobacco products daily. The data shows that women had started smoking earlier (17.86 Year) as compared to their counter parts- men (20.11 year). Women have been smoking for 22 years men for 20.53 years. However, in total of the respondents, there was 20.94 years of smoking in average. Almost all (98 %) daily smokers take manufactured cigarettes. Present study revealed that average consumption of the manufactured cigarettes by men is 9.47 sticks per day and by women, is 7.28 sticks per day. The study also revealed that 25.54 percent of male respondents and 0.88 percent of the female respondents were current smokeless tobacco users. Data showed that the younger the age, higher the rate of consumption of smokeless tobacco was observed in both genders. It indicates that smokeless tobacco is quite popular among young adults. Similarly, 4.16 percent of the male respondents and 0.59 percent of the female respondents were ex-daily users of the smokeless tobacco. Out of total smokeless tobacco users (267) , 81.6 percent (218) chewed tobacco followed by Panparag containing tobacco i.e. 10.4 percent.

4.3 Alcohol Consumption

In total, about half of the surveyed population (48 percent) had ever consumed alcohol in their life time. Out of total, 63 percent male and 33 percent female were alcohol consumers. Out of male 59 percent and among female 26 percent were current consumers. Current consumers were those who consumed one or more standard drinks of any type of alcohol in the 12 months preceding the survey.

Among the current consumers, amount of alcohol taken during the past seven days of the survey by male was around 6 standard drinks and by female it was 1.73 standard drinks. The binge drinking for male was 49 days per year and for female was 28 days a year

The largest number of drinks consumed on a single occasion during the past 12 months was 5.32 standard drinks in average for male and 2.52 standard drinks for female.

The alcohol consumption per drinking day by male and female during the past 12 months was also studied. Among male respondents, 3.5 percent had taken six or more than 6 standard drinks; about 28 percent had taken 4-5 standard drinks ;46 percent had taken 2 to 3 standard drinks per day . Out of total male respondents about 20 percent had consumed alcohol only up to one standard drinks per day.

Similarly, the majority of the women respondents (60 percent) had taken up to one standard

drinks only. Out of total, about 36 percent of the respondents had had 2-3 standard drinks per day and around 6 percent had consumed 4 to 5 drinks per day. Data also showed that there was no single woman having more than 6 drinks per day.

According to risk categories for the consumption of alcohol, of total male respondents 55 percent had low risk, 2 percent each had medium and high risk consumption pattern of alcohol. Likewise, 26 percent of the female respondents had low risk followed by 0.2 percent having medium risk.

4.5 Diet

Respondents had low fruit and vegetable intake. In average 2 to 3 days in a week, people took fruits. In this study, data shows that most of the respondents (53% male and 61 % female) had consumed only one serving per day and 30.9% male and 24.4 % female took 2 to 4 serving per day. Only 0.4 percent of the male respondents had consumed five or more than five servings per day.

The vegetable taken by both men and women with their staple food was 5-6 days in a week. Data shows that 51.4 % male and 59.2% female had consumed only one serving and 47.7 % male and 39.2% female took 2 to 4 serving per day. Only a very few participants had responded that they had consumed five or more than five servings per day.

4.6 Physical Activity

People who worked mostly sitting or standing, with walking for no more than 10 minutes at a time were categorised as physically inactive. Study shows that 73.56 percent of male respondents and 90.98 percent of female respondents were inactive. It clearly indicates that most of the people are vulnerable to non-communicable diseases. Of the male respondents, 92.28 percent and among female 96.76 percent were physically inactive during their leisure time. Study reveals that only 4.65 percent of male respondents and 2.84 percent of female respondents had involved in moderate type of physical activity like cycling, swimming, gardening, painting/ plastering, etc. Only about 3 percent of the male respondents and 0.39 percent of female respondents were involved in vigorous physical activity during their leisure time. In total 3.74 percent had involved in moderate level of physical activity and where as 1.72 percent in vigorous activity in their leisure time.

If person spends at least two and half hours (150 minutes) per week for moderate level of physical activity, it is taken as good for health. Thus, in this study, involvements of the respondents in physical activity for at least 150 minutes per week had been calculated. According to the study, only 25.45 percent of male respondents and 8.82 percent of female respondents had involved in physical activity for at least 150 minutes per week.

But, in transportation, majority of the respondents had physically active life. Data revealed that 79 percent of the male respondents and 65.78 percent of the female respondents had active physical activity during transportation.

4.7 Physical Measures

BMI of men ranged from 22 to 23.62 kg/m² where as BMI of women ranged from 23.56 to 26.64 kg/m² with mean of 22.82 kg/m² for men and 24.56 kg/m² for women.

The study revealed that 63.56 percent of men and 52.61 percent of women were within normal weight category. However, 9.7 percent of men and 5.52 percent of women were

underweight. Rest of others (26.73 % of men and 41.86% of women) were found overweight with 24.75 percent of men and 31.22 percent of women in grade 1 overweight. Data also shows that about 10 percent of women were found grade 2 overweight. The study revealed that the obesity increased with the increment of age.

Systolic blood pressure for male and female were 126.78 mmHg and 122.43 mmHg respectively. Similarly, diastolic blood pressures were 81.53 and 79.59 respectively while including hypertensive patients. Excluding hypertensive ones, systolic blood pressure of men and women were 125.46 mmHg and 121.03 mmHg respectively. Likewise diastolic blood pressure of men and women were 80.95mmHg and 78.96 mmHg respectively. According to WHO definitions, 38.71 percent of the men and 30.19 percent of women were found in risk categories ranging from high normal to Grade 3 Hypertension. Data revealed that 20.29 percent male and 17.35 female were found hypertensive. In total 18.81 percent of the total respondents were found hypertensive.

In this study, only 9.70 percent men had waist hip ratio more than 1 in women 70.68 percent had more than 0.85. It clearly indicates that women were more obese than their counter part.

5. Opportunities for intervention and action

- This study is done in metropolitan city. It only expresses the level of risk factors for non-communicable diseases among urban people. It can not characterize the national scenario of the level of risk factors. So there is an opportunity to expand the study to the rural areas so that the prevalence of risk factors between rural and urban can be compared as well as surveillance will be at national level. Then, this research will become a concrete background document for preparing policy and plan to prevent and control risk factors for non-communicable diseases in Nepal.
- The research shows that use of tobacco has been started from the upper part of the teenage. Most of them use either manufactured cigarettes or chewing tobacco. Similarly, 59% of men and 26 % women have consumed alcohol to that amount, which is risky for their health. So, it is of urgent need to create an extensive awareness on risk of tobacco and alcohol use among the people from the early teenage period. It is equally important to reduce availability of tobacco and alcohol products. It can be recommended that the government should stop factories of alcohol and cigarettes production and farming of tobacco. Also government can increase taxes to the products as well as restriction on retail selling keeping some provision so that open distribution and sale will be cut down and majority of the people will have less access to alcohol and cigarettes.
- The research also shows that majority of the people do not take sufficient amount of vegetables and fruits. Obviously, the higher the amount of vegetable and fruits consumed, the lesser the risk of non-communicable diseases has been observed. So, people should be encouraged to take vegetables and fruits. The different measures to increase the availability of vegetables and fruits should be implemented.
- Research also significantly shows that the majority of the people have sedentary life style as 7 out of 10 men and 9 out of 10 women are physically inactive. It has

definitely increased the risk for non-communicable diseases like diabetes mellitus, stroke, ischemic heart diseases, etc. So, an extensive awareness programme to encourage the physical activity should be promoted.

6. Conclusion

This type of research is first time done in Nepal. Findings of this research represent the level of risk factors for non-communicable diseases in urban population. Consumption of significant amount of tobacco and alcohol has been found in the noticeable percentage of population. Majority of the population are physically inactive and do not consume required amount of vegetables and fruits for their healthy life.

Research has also identified that overweight is increasing especially in women. Around 10 percent people have history of hypertension and 20 percent are identified as hypertensive during our study and around 4 percent of people have history of diabetes mellitus.

It is an alarming situation and indicates that country will have a big burden of non-communicable diseases in very near future. So, it is an urgent need of planning and implementing the effective programmes to reduce the risk factors for non-communicable diseases. On the other hand, it has also clearly showed that the existing programmes in reducing risk factors are not much effective. It would be worthwhile reviewing the existing programmes and developing continuous follow up mechanism for NCD risk factors through effective surveillance system under government machineries.

Chapter 1

1.1 Introduction and Background of STEPS Surveillance

Nepal is one of the least developed countries with the total population of 23.2 million and annual population growth rate of 2.3 percent in South Asia. About 80 percent of the population rely on agriculture for their livelihood and annual GDP of US\$ 244 remains one of the lowest in the South East Asia. In addition, literacy rates of 69.6 and 35.3 percent for male and female reflect a wide education gap between men and women (a).

Though, systematic data on various aspects of NCDs are not available, WHO estimates NCDs known to be increasing at an alarming pace in SEAR member countries. Moreover, traditional problems of poverty such as, under nutrition and infectious diseases make the problem worse in the region. According to WHO, nearly 52 percent deaths and 38 percent of diseases burden in SEAR are related to NCDs. Particularly, cardiovascular disorders, cancer, diabetes mellitus and conditions arising from injuries are prioritised top in the region. Out of them, ischemic heart disease and cerebro-vascular disease are two main conditions (b).

Similarly, cancer, CVD, neuro-psychiatric disorders, diabetes mellitus and hypertension are reported major NCDs in Nepal. Though, COPD was the only NCD listed among the top ten leading causes of morbidity. COPD, heart diseases and cancers related deaths contributed for 4, 1.9 and 0.8 percents of deaths subsequently for 1997/1998 in Nepal. In addition, CVD prevalence was found to be 5.6 percent in mountain area, 1.5 percent in the hills, and 5 percent in Terai. The prevalence of hypertension found to be 5-20 percent and diabetes mellitus 15 percent in urban and 2 percent in rural areas (2).

Moreover, risk transition is causing an alarming increase in risk factors in middle and low-income countries where as multinational companies making main targets in low and middle-income countries are marketing tobacco, alcohol and some processed foods globally. As people with low income and education suffer the most from the greatest burden of diseases, focus of WHO, international organizations and governments is on trying to redress this imbalance - by directly tackling poverty, concentrating on risk to health among the disadvantaged and hence overall economic growth (c).

Information on distribution and determinants of risks especially for NCDs in population provide basis for selecting strategies for effective prevention and control. Such strategies aim to promote healthy behaviours and lower risks in the entire population. Thus, it is essential to quantify and access distribution of risk factors to redress the imbalance that leaves the poor and the disadvantaged with the greatest burden of disease (3). However, scarcity and poor quality of data is regarded as one of the major hindrances in strengthening cost effective prevention and control of major NCDs in the region. Specifically, developing countries, the most in need, like Nepal, lack data on NCDs and their risk factors (4).

Though, annual report of MOH is the main source of NCD related mortality and morbidity information in Nepal, it is not free from bias caused by misreporting and under reporting of events due to poor accessibility of health services and difficulties in establishing diagnosis as classification of diseases is not based on ICD (2).

Thus, appropriate step toward initiating NCD surveillance is to conduct a desired survey of sufficient sample size to have the power to detect meaningful change over the time. Well-designed surveys can provide important information for determining priorities for intervention, and for raising public and political awareness of public health problems.

1.2 Research Objectives

- To identify and describe the level of selected NCD risk factors by age and sex among 25-64 years of population, using recommended WHO definitions.
- To provide basis for ongoing monitoring and surveillance of selected NCD risk factors.
- To provide appropriate and sufficient information needed for design and implementation of NCD risk factors prevention and control interventions.

1.3 Survey Methods and operations

WHO STEPwise approach emphasizes small amounts of good quality data over large amounts of poor quality data. Thus, this descriptive study of 2000 sample of men and women between 25-64 years in Kathmandu Metropolitan, based on WHO STEPwise tools and strategies had produced valid and reliable baseline data on selected risk factors, which would definitely contribute initiation of NCD surveillance in Nepal. In this study, information were collected through interview (step 1) and physical measurements (step 2) methods covering core and expanded core variables (d) as described in the table below.

Sampling of the 5 Wards by PPS

Ward No.	Population	Cumulative Populations
1	8464	8464
2	13655	22119
3	20782	42901
4	29539	72440
5	15340	87780
6	39316	127096
7	39530	166626
8	9434	176060
9	29263	205323
10	25977	231300
11	15244	246544
12	10313	256857
13	29721	286578
14	34488	321066
15	32441	353507
16	45450	398957
17	19876	418833
18	8065	426896
19	7400	434298
20	8240	442538
21	122369	454907
22	5840	460747
23	8289	469036
24	5272	474308
25	4310	478618
26	3764	482382
27	7789	490171
28	5462	495633
29	24543	520176
30	9896	530072
31	14502	544574
32	24355	568929
33	21597	590526
34	46136	636662
35	35184	671846
	Total	671846

- No of wards to be selected (n) =5
- Sampling interval (S1) = 134369.2
- Random number(Ran) = 0.0162915
- Random Start (Rs) = 21890.7 (First ward)
- First ward +S1 = 156259.9(Second ward)
- Second ward + S1 = 290629.1 (Third ward)
- Third ward + S1 = 424998.3(Fourth Ward)
- Fourth Ward + S1= 559367 (fifth Ward)

Modules	Levels	
	Step 1 Questionnaire based	Step 2 Physical measurements
Core	Socio economic and demographic variables, tobacco(both smoking and smokeless), alcohol, physical inactivity, nutrition	Weight, Height, Waist girth, Blood Pressure
Expanded core	Dietary patterns, education, household indicators	Hip girth

Key definitions

Risk factor:

It refers to any attribute, characteristic, or exposure of an individual, which increases the likelihood of developing non communicable diseases (4).

Selected NCD risk factors:

Alcohol, tobacco, obesity, physical inactivity, raised blood pressure, blood glucose and blood lipids are considered as selected NCD risk factors. This study assessed these all except blood glucose and blood lipids.

Risk assessment:

A systematic approach to estimating the burden of disease and injury due to different risks is risk assessment.

1.3.1 Study population and exclusions

The study area of this survey was Kathmandu metropolitan city. Only the population aged 25 to 64 years were targeted for this study. According to the census of 2001, there were 671,846 people, out of which the people aged 25 to 64 years were 244,552 in our study area.

Among the 35 wards of the Kathmandu Metropolitan city, only 5 wards were chosen for this study which had the total population of 120093 and the population aged 25 to 64 years was 44,505. Among them only 2030 people aged 25 to 64 years were taken as sample for this study.

1.3.2. Sampling Design

The study was designed to measure prevalence of the risk factors in the study population. Though, such studies are cheap and useful to assess study factors and outcome, at the same time, it would be inefficient to estimate cause and effect relationships. Thus the proposed study would be exploratory and descriptive in nature.

A sample size of approximately 2000 (men and women) between 25 to 64 years were selected through Probability Proportion to size (PPS) sampling method, which could detect magnitude of selected risk factors by age and sex. Using PPS method, likelihood of a community (ward) being selected was proportional to its population size i.e. larger wards are more likely to be selected than smaller ones (e). Out of the 35 wards, the five wards were selected by this method. Those wards were ward no 2, 7, 14, 18 and 32.

Sampling Steps

1. The best available census data of each ward of Kathmandu Metropolitan City was obtained.
2. A list with three columns - the first column contains lists of the wards (Community), Second column contains the total population of each ward and the third column contains the cumulative population was prepared.
3. A sampling interval (r) was obtained by dividing the total population by the number of wards desired (here 5 wards).
4. A random number from computer was obtained and multiplied it by sampling interval that became the first starting number (a). The ward having population corresponding to that number is the first selected ward. In this study ward no 2 was the first ward.
5. The sampling interval (r) was added to the selected number (a) to get second sum. The ward corresponding to that sum was the second ward to select and did so on to get five wards.
6. Since there was no household list available from Central Bureau of Statistics (CBS), GON Nepal and other authorized organizations, sample households were drawn from the selected wards by using cluster sampling. The cluster map of the selected wards was obtained from CBS. It had just given us the idea of the clusters. CBS made clusters were large and not practicable for the interest of this study. So, each ward was divided into numerous clusters containing 150-200 households. It was done by surveyors themselves because no such clusters existed prior to this study. Clusters had well defined boundaries. Among the clusters, two clusters from each ward were selected using simple random sampling method. (See annex 1 for detail of the selected clusters)

The detailed information of the total households of the selected clusters was taken using the WHO STEPwise approach instruments.

Men and women below 25 and above 64 years were excluded in the study. Pregnant mothers were also excluded for physical measurements except height. The number of people living together using same kitchen at least from six-months was taken as one Household. The family members in between 25 to 64 years of age interviewed as well as physical measurement of them was taken. If sampled households were industries, hospitals, offices, firms and any other institutions, they were excluded from our study.

1.3.3 survey Operational Activities

Core and Supervisory Committee formulation

An agreement in between Principal Investigator (PI) Focal Point of NCD, Ministry of Health and Society for Local Integrated Development Nepal (SOLID NEPAL) in order to conduct a surveillance of risk factors for non-communicable diseases in Nepal had been signed on 20th April 2003. A Core and Supervisory Committee was formulated by Ministry of Health, which was actively involved in planning, implementing, monitoring and evaluation of the survey work. (see Annex 2 for detail of the Core and Supervisory committee).

Ethical Approval for the survey

This study followed NHRC research guidelines, which emphasizes on respect to study subjects, their justice, informed consent and control of possible risks to the subjects in the study (1). Informed consent was obtained from each perspective study subject. There was no risk to the subject as there was no intervention in the study. Supervisors and enumerators were trained on making informed consent, steps in interview and physical measurements. If the subject was found having non-communicable disease or problem such as Hypertension during our survey, s/he was referred to near by health institutions with referral slip. There were 65 cases referred for the needful management of their hypertension as they had first time noticed during the physical measurement.

Questionnaire Adaptation and Translation

Altogether there were nine meetings held for the planning of the NCD surveillance in Nepal. The participants of those meetings were from Core supervisory and Monitoring Committee, Ministry of Health, WHO and SOLID NEPAL. (See Annex 3 for the name list of the participants and dates of the Meetings.)

During our series of planning meetings, we discussed thoroughly the WHO STEP wise Questionnaire (Version 1.3) and made some changes considering the Nepalese context. We translated the questionnaire into Nepali version. A survey instruction manual had been prepared in both Nepali and English Languages following the WHO STEP wise survey manual.

Recruitment of the Field Supervisors and Enumerators

As per the requirement of the project, SOLID NEPAL selected and recruited the field supervisors and enumerators by May 15, 2003. The selected candidates were further interviewed by the Core Supervisory and Monitoring Committee, NCD Surveillance, Ministry of Health for the final selection on May 21, 2003. Upon the recommendation of the committee, the candidates were selected for the project. (See Annex 4 for the name list of the selected Enumerators and Supervisors). Field supervisors were selected from among health assistants or staff nurses and enumerators from among Community Medical Auxiliaries (CMA) and Auxiliary Nurse Midwife (ANM). There were 2 supervisors and 10 enumerators, selected with equal proportion of gender.

Training for Field Enumerators and Supervisors

Three days training for supervisors and enumerator was organized from 1st to 3rd June 2003. Dr. R.P. Shrestha (PI), Dr. Ananda Krishnan, Resource person from SEARO, WHO, Dr. Paramita Sudharto, from WHO country office Nepal, Dr. Khem Karki and Arjun Prakash Ragmi, from SOLID Nepal, Naresh Khatiwada and Gopal Giri, from Ministry of Health had facilitated the workshop. Participants were well equipped in survey activities. Detail discussion on questionnaire and practical exercise for using equipments of physical measurement such as weighing machine, digital blood pressure scale, height scale, etc were done. The participants had actively participated on the training and learnt the practical know-how for the research. (See annex 5 for the schedule of the training Programme). Show cards for vegetables and fruits and alcohol were prepared and discussed.

Field Test of the survey instruments

After the completion of the three day long training, supervisors and enumerators were sent to the field on June 5, 2003 for the pilot testing of the questionnaire, show cards and the equipments. They used the Nepali version questionnaire, weight scale, digital blood pressure instrument, height scale and measuring tape in the field. Field test was done outside of our original field site. Subsequent to pilot test, feedback Meeting was organized on June 7, 2003. The enumerators and supervisors had shared the experiences on using the instruments. The difficulties, which they had faced in using the instruments (especially in questionnaire), were considered very positively and necessary modifications on questionnaire were made to finalise. (See annex 6 for detail of the instruments and show cards).

Cluster visits from WHO Country Office Staff

As mentioned earlier, selected wards were divided into desired clusters and the boundaries of them were documented. Of them, ten clusters (two from each ward) were selected by simple random sampling. Selected clusters were visited by Dr. Paramita Sudharto, from WHO Country Office, Mr. Gopal Giri, Ministry of Health and SOLID Nepal on 1st July, 2003. Main aim of this visit was to introduce Dr. Paramita about the research site and the process of the clusters selection.

Data Collection

Data collection was started from 11th July, 2003. The enumerators and supervisors had been allocated for specified clusters. Data collection had completed on 12 August 2003. Altogether, 2030 data were collected from different clusters. All the target people (25 to 64 years of age) of the cluster were asked using the STEP1 questionnaire and physical measurements of them were taken using WHO standard instruments

Supervision of the field work

During the enumerating period the core team members from MOH and SOLID Nepal had been supervising the enumeration activities on the field. Dr. RP Shrestha, Gopal Giri, Naresh Khatiwada, Dr. Khem Karki, Sudha Viadhyia, Arjun Prakash Regmi had visited the field on 19th and 20th July, 2003. During supervision, quality of the data collection was assured and the various problems faced by the enumerators and supervisors were discussed and corrected as far as possible.

Data ENTRY PROCESSING and analysis

WHO special software for data entry and analysis, EPI INFO 2002, and Epi-data 2.1b, were installed. Data entry file was prepared and tested in Epi-data 2.1b. Manual data editing and coding were done. Data entry was started in the second week of the August and finished in second week of September. Data was transferred to EPI INFO 2002 for analysis. Analysis was done in EPI INFO 2002 and SPSS 10. Frequency table of all variables was obtained and checked for consistency. Second entry of 10 percent of total data was also carried out and compared to original data. It was consistent to original data. During data entry, members of the core team and staff from WHO country office had visited and provided the necessary comments and suggestions.

Validity and Reliability

Modified WHO STEPwise surveillance questionnaire (8) was tested, updated and used to ensure validity in the study. Orientation training was provided using WHO manuals and instruments on data collection to all supervisors and enumerators, emphasizing on interview skills and taking physical measurements through role-play, practical sessions and field-testing of questionnaire. To ensure quality in the study, supervisors were recruited from among Health Assistants and Staff Nurses and enumerators from at least CMA or ANM qualification. Frequent supervisions were done during data collection. Data was also cross checked by second entry of the 10 percent of the total data. Second entry was done by different person. During data entry and analysis, frequent supervision, discussions were carried out. These all, have maintained the validity and reliability of the data.

Limitations

This survey was done only in city. It might not convey the actual national scenario of the prevalence of the risk factors as there is vast difference in life styles of the people in city and the villages. Sample size was quite small. This type of study was first time in Nepal. So, we were inexperienced about the research. There were frequent changes in survey tools.

(Endnotes)

- a. MOH, *New Era and ORC Macro Nepal Demographic and Health Survey, Nepal 2001*
- b. World Health Organization, *Surveillance of Major Non-communicable Diseases in the South East Asia Region, WHO/SEARO, New Delhi 2001.*
- c. World Health Organization, *World Health Report 2002, WHO*
- d. World Health Organization, *Summary of Surveillance of risk factors for non-communicable diseases: the WHO STEPwise approach, Geneva: WHO 2001*
- e. Sullivan KM, Houston R, Gorstein J, Cervinkas J. Editors. *Monitoring Universal Salt Iodisation Programs, UNICEF/WHO 1995*
- f. Acharya GP, Gyawali K, Adhikari RK, Thaler JI. Editors. *National Ethical Guidelines for Health Research in Nepal: NHRC Kathmandu, Nepal 2001*
- g. World Health Organization. *Instruments; Surveillance of Risk Factors for Non- Communicable Diseases, the WHO STEPwise Approach. 2002*

Chapter 2

2. Demographic Information

2.1 Response Rate of the Sample Population

Table 2.1: STEPS 1 Response Percentage: Men and Women

Age	Eligible	Men Participated		Eligible	Women Participated	
	N	N	%	N	n	%
25 --- 34	609	524	86.11	588	503	85.59
35 --- 44	281	242	86.09	292	253	86.60
45 --- 54	161	139	86.08	179	156	87.39
55 --- 64	122	105	86.11	125	108	86.42
25 -- 64	1173	1010	86.11	1183	1020	86.20

Table 2.1 shows about the response rate of the participants in STEP 1 i.e questionnaire about the tobacco use, alcohol consumption, diet and physical activities. Of the eligible population, 86 percent had responded our questionnaire and rest of others were absentees. There was no refusal.

Table 2.2: STEP 2 Response Percentage: Men and Women

Age	Eligible	Men Participated		Eligible	Women Participated	
	N	N	%	N	N	%
25 --- 34	609	524	86.11	588	503	85.59
35 --- 44	281	242	86.09	292	253	86.60
45 --- 54	161	139	86.08	179	156	87.39
55 --- 64	122	105	86.11	125	108	86.42
25 -- 64	1173	1010	86.11	1183	1020	86.20

Same as in STEP 1 about 86 percent had participated in the STEP 2 i.e physical measurement of height, weight, waist and hip girth and blood pressure . Only one woman had not participated for the hip girth measurement.

2.2 Age and Sexwise Distribution of the survey population

Figure 2.1: Age and Sexwise Distribution of 25-64 Years age group of Population in 2001 census

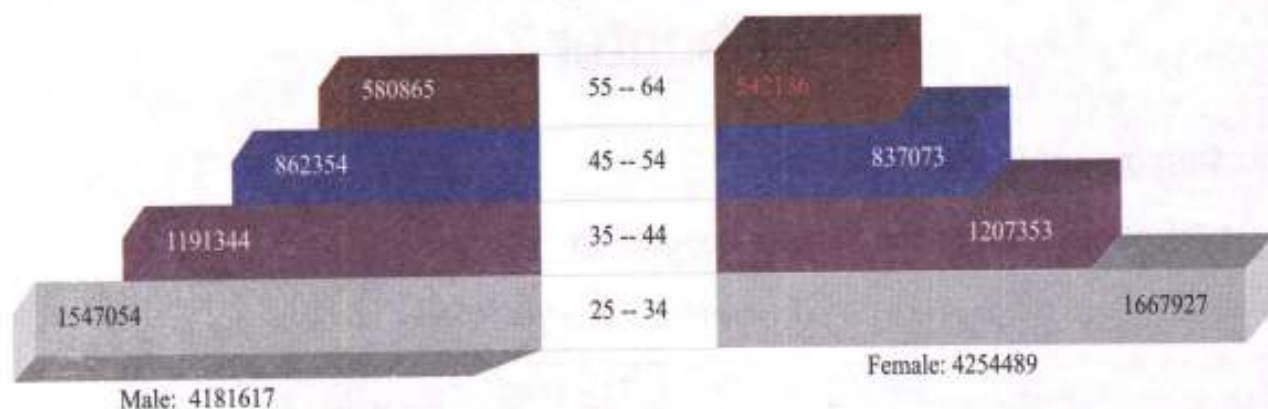


Figure 2.2: Age and Sexwise Distribution of the STEPS Survey Population in Kathmandu Metropolitan City



2.3 Years Spent for Education

Table 2. 3: Years Spent in School: Men and Women

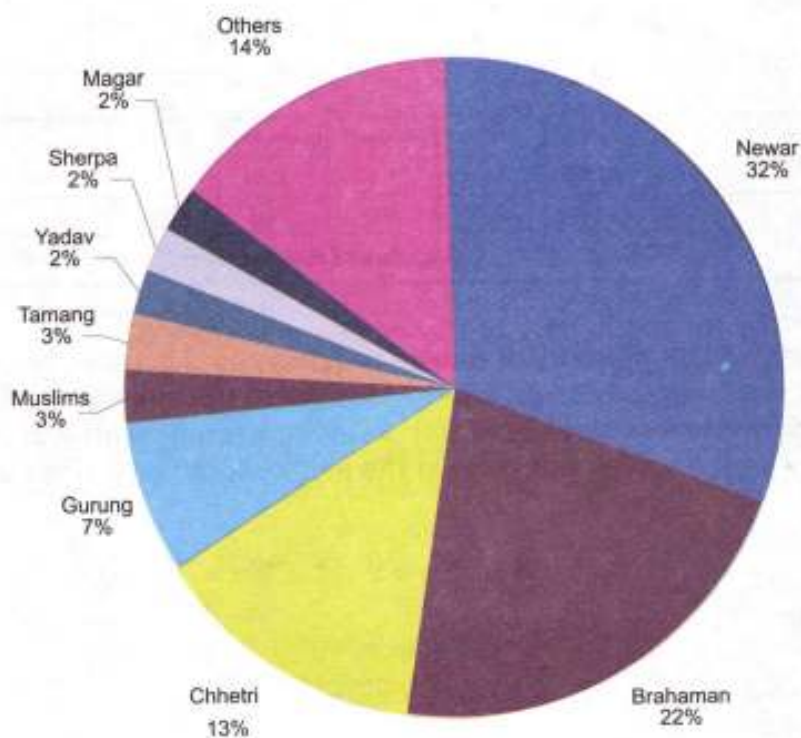
Age	Number	Men Mean	S.E	Women Mean	N	S.E
25 --- 34	466	10.65	0.18	9.77	378	0.19
35 --- 44	205	10.55	0.31	9.71	146	0.36
45 --- 54	118	11.44	0.4	9.83	72	0.45
55 --- 64	74	10.64	0.55	8.35	26	0.81
25 -- 64	863	10.73	0.14	9.7	622	0.16

Table 2.4 shows the total years spent in schools or academic institutions by those respondents who had attended the educational institutions. Average years spent by men in school is 10.73 years whereas by women is 9.7. It indicates men have got better educational opportunities than women.

2.4 Caste and Ethnicity

As the survey had been conducted in the Kathmandu metropolitan city, around one third of the total respondents (32 percent) were Newar followed by Brahman (22 percent) and Chhetri (13 percent). Significant number of Gurung (7 percent), Muslims (3 percent), Tamang (3 percent) had also participated in our research.

Figure 2. 3: Caste and Ethnicity of the Respondents



2.5 Level of Education

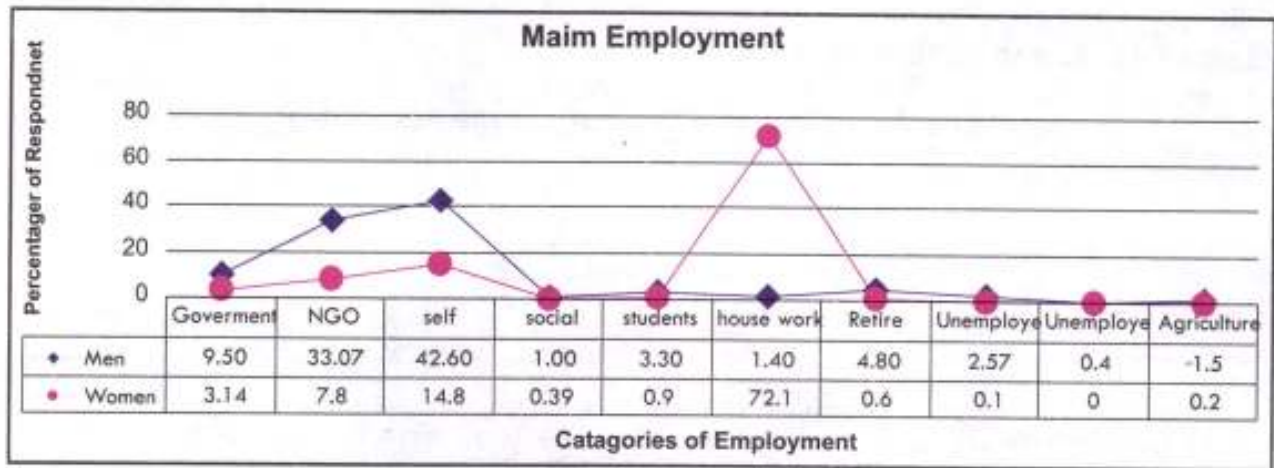
Table 2. 4: Highest Level of Education: Men and Women in Percentage

	Never attended	up to grade 5	Grade 6 -- 10	Certificate level	Technical Training	Bachelor level	Masters and over
Women	39.02	11.6	29.4	9.8	0.6	6.8	2.8
Men	14.55	14.8	31.4	14.1	0.6	17.5	7.1
Total	26.85	13.15	30.39	11.92	0.59	12.12	4.98

Table 2.4 shows that majority of the respondents (73%) had received some level of education. More men than women were educated as a whole. Majority had studied up to the school level education (43.5%). A few respondents had technical education. Around one-fourth of the total (27%) never attended any educational institutions. Among them, 39 percent of women and 14.5 percent of men were illiterate.

2.6 Main Employment status

Figure 2 4: Main Employment Status: Men and Women in Percentage



Present study revealed that majority of women respondents (72%) performed core household work like cooking, washing clothes, etc where as men were self employed (42.6%) or employed in NGO (33 %) and government services (9.5%). A very few respondents were found working in agricultural sector as the survey was done in the metropolitan city. (Figure 2.4)

Chapter 3

3. Tobacco Use

Introduction

Use of tobacco is one of the major risk factors for non-communicable diseases. Tobacco is used for smoking, chewing or snuff. Smoking causes substantially increased risk of mortality from lung cancer, upper aero-digestive cancer, several other cancers, heart diseases, stroke, chronic respiratory diseases and a range of other medical causes.

Smoking also harms others - there are definite health risks from passive smoking. Smoking during pregnancy adversely affects the fetal development. Worldwide attributable fractions for tobacco use are about 12 percent for vascular diseases, 66 percent for cancers of trachea, bronchi and lungs and 38 percent for chronic respiratory diseases.(3)

Among industrialised countries smoking is estimated to cause 90 percent of lung cancer in men and 70 percent of lung cancer among women. In addition, in these countries the attributable fractions are 56- 80 percent for chronic respiratory diseases and 22 percent of cardiovascular diseases. Worldwide, it is estimated that tobacco causes 8.8 percent of deaths- 4.9 million (3). In these days, it is found that smoking has largely increased in developing countries especially among males.

This study has attempted to find out the prevalence of tobacco use in terms of consumers age, gender, and types of the tobacco.

3.1 Current Smoking Status

Table 3.1: Current Smoking Status: Men and Women

Gender	N	Daily Smokers		Non-daily smokers		Non-smokers	
		N	%	n	%	n	%
Men	1010	302	29.9	42	4.16	666	65.94
Women	1020	106	10.39	9	0.88	905	88.73
Total	2030	408	20.10	51	2.51	1571	77.39

The research revealed that most of the respondents (77%) did not smoke any tobacco products. A few were occasional smokers (2.52%) and 20 percent of the total respondents smoke tobacco products daily. Daily smokers here are those people who smoke any tobacco product at least once a day. Table 3.1 shows that around 30 percent men and 10 percent women were smoking daily. In this study, it is found that men smokers more than female smokers as a whole.

3.2 Age started Smoking

Table 3.2: Age Started Smoking, for Current Smokers: Men and Women

Age	N	Men Mean	N	Women Mean
25 --- 34	135	18.92	33	15.61
35 --- 44	75	20.83	43	17.42
45 --- 54	51	22.2	22	21.09
55 --- 64	41	20.1	8	20.62
25--64	302	20.11	106	17.86

Duration of exposure to the tobacco has significant contribution to cause the diseases. In this present study, age at which smoking was started was asked to the respondents. Table 3.2 shows that women had started smoking earlier (17.86 Year) as compared to their counter part- men (20.11 year). This study also shows that younger respondents (25-34 age group) had started smoking earlier than older ones (mean age for men is 18.92 and for women 15.61). It clearly indicates that smoking is increasing in teen age population. In total, the mean age started for smoking is 19.52 year.

3.3 Years of Smoking

Table 3.3: Years of smoking for current smokers

Age	N	Men Mean	N	Women Mean
25 --- 34	135	12.59	33	12.97
35 --- 44	75	19.49	43	23.67
45 --- 54	51	28.29	22	28.18
55 --- 64	41	38.95	8	34.88
25--64	302	20.53	106	22.12

The more exposure to tobacco, the more chances, a person has to suffer from non-communicable diseases. Table 3.3 shows the years of smoking for current users. It revealed that women had been smoking for 22 years and men for 20.53 years. However, in total of the respondents, there was 20.94 years of smoking in average.

3.4 Types of Cigarettes in Current Smokers

Most of the current smokers were having manufactured cigarettes. Out of the total current daily smokers, 98 percent smoked manufactured cigarettes. A very few of the total respondent (2 percent) had smoked other varieties of the cigarettes like kakkat, Huka, cigars and bidi. (Table 3.4)

Table 3.4: Smoking various types of cigarettes, for current smokers: Men and Women

Gender	Current Daily Smokers	Manufactured Cigarettes		Kakat		Huka		Cigars		Bidi	
		N	%	n	%	n	%	n	%	n	%
Men	302	297	98.34	2	0.66	2	0.66	1	0.33	0	-
Women	106	103	97.17	1	0.94	1	0.94	0	-	1	0.94
Total	408	400	98.04	3	0.74	3	0.74	1	0.25	1	0.25

3.5 Consumption of Manufactured Cigarettes

Present study revealed that average consumption of manufactured cigarettes by men is 9.47 sticks per day and by women is 7.28 sticks per day. Data shows that majority of the respondents had consumed 5- 20 sticks per day of manufactured cigarettes. Men of the age group of 35 -54 years had consumed more cigarettes per day compared to others whereas in women, the age group of 25-44 years had more consumption rate (Table 3.5).

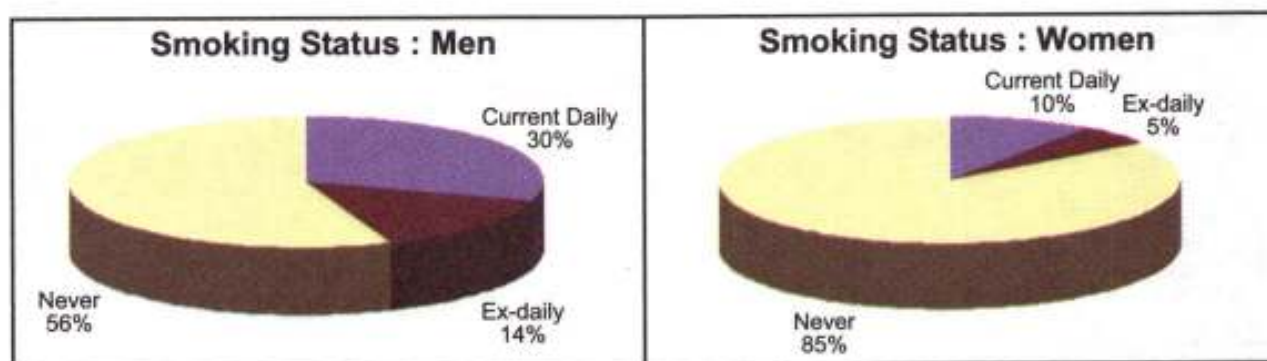
Table 3.5: Consumption of manufactured cigarettes/day, for current smokers of manufactured cigarettes: Men and Women

	Male	Men Mean	SE	Female	Female Mean	SE
25 --- 34	134	7.64	0.54	32	6.91	1.32
35 --- 44	74	11.07	1.2	42	8.74	1.2
45 --- 54	50	11.46	1.19	22	5.64	0.59
55 --- 64	39	10.15	1.27	7	5.43	1.07
25----64	297	9.47	0.47	103	7.28	0.66

3. 6 Smoking Status

In this study, respondents were asked to express their smoking status. In general, smoking status was classified into three categories i.e. current daily smokers, non daily smokers, ex-daily smokers and never smokers. Daily smokers are those respondents who smoke any tobacco product at least once a day. People who smoke every day with rare exceptions such as not on days of religious fasting or during acute illness are also classified as daily smokers. Data showed that 30 percent of the male respondents and 10 percent of the female respondents were current daily smokers. Non-daily smokers are those people who smoke occasionally but not every day. The study revealed that 4 percent of the male respondents and about 1 percent of the female respondents were occasional smokers. Ex-daily smokers are those who were former daily smokers but currently do not smoke at all. In this study, 14 percent men and 5 percent women were ex-daily smokers. (Figure 3.1)

Figure 3 1: Smoking status: Men and Women



Data also shows that ex-daily smokers had quit smoking for a long period of time. Average years since cessation for men were 19 years and for women about 21 years.

3.7 Use of Smokeless Tobacco

There are varieties of smokeless tobacco products in the market. In this study, chewing tobacco, consumption of gutkha with tobacco, tobacco containing pan and Panparag were taken as smokeless tobacco users. The study revealed that 25.54 percent of male respondents and 0.88 percent of the female respondents were current smokeless tobacco users.

Data shows that the younger the age, higher the rate of consumption of smokeless tobacco was observed in both genders. It indicates that smokeless tobacco is quite popular among young adults. Similarly, 4.16 percent of the male respondents and 0.59 percent of the female respondents were ex-daily users of the smokeless tobacco. Out of the total smokeless tobacco users (N = 267) , 81.6 percent (n = 218) chewed tobacco.

Likewise, 10.4 percent of the total smokeless tobacco users took Panparag containing tobacco. Interestingly, no single woman had taken pan containing tobacco and gutkha. All users of pan containing tobacco and gutkha are male (27 out of 267 i.e 10.46 percent). Among current daily smokeless tobacco users, 6 respondents are multi-users that means they took at least two varieties of the smokeless tobacco products.

Consumption of chewing tobacco and gutkha on average was 7 to 8 times per day whereas pan containing tobacco was 4 times a day for both sexes and Pan parag containing tobacco was 5.42 times for male and 10.5 times for female.

Chapter 4

4 Alcohol Consumption

The relationship between alcohol consumption and health and social outcomes is complex and multidimensional. Average volume of alcohol consumed was linked to more than 60 disease conditions in a series of recent meta-analyses including liver cirrhosis, several cancers (liver, laryngeal, oesophageal and oro-pharyngeal cancers), injuries and haemorrhagic strokes^(a). There is increasing evidence that patterns of drinking are relevant to health as well as volume of alcohol consumed, binge drinking being hazardous. Worldwide, alcohol causes 3.2 percent of death (1.8 million) and 4 percent of DALYs (58.3 million). Besides the direct effects of intoxication and addiction resulting in alcohol use disorders, alcohol is estimated to cause about 20-30 percent of each of the disorders namely oesophageal cancer, liver cancer, cirrhosis of the liver, homicide, epilepsy and motor vehicle accidents.⁽³⁾

This study had attempted to find out the consumption patterns and amount of consumption of the different alcoholic products. There were a large number of respondents who had had home made alcohol namely *Raksi*, *Jaand*, *Chhyang* and *Tongba*. The alcoholic contents of the home made alcohol were standardised by government authorised Food and Beverages Research Centre. According to the report provided by the authority, soft *raksi* contains 25.5% of alcohol, hard *raksi* contains 29% of alcohol and *Jaand chhyang* and *Tongba* contains 5% of alcohol. So, the core team of research decided to take average of 27% of alcohol in *raksi* and 5% in *Jaand*, *Chhyang* and *Tongba* (See Annex 7 for detail of the report).

4.1 Alcohol Consumption Status

This study had revealed the alcohol consumption status of the surveyed population. In total, about half of the surveyed population (48 percent) had ever consumed alcohol in their life time. Another study done by CWIN revealed that the overall alcohol prevalence rate is 39 percent with 47.8 percent for males and 39 percent for females. More females in rural areas than in urban areas drink alcohol. ^(b).

Table 4. 1: Alcohol Consumption Status: Men and Women

Age	Men					Women				
	Total N	Ever consumed		Never consumed		N	Ever consumed		Never consumed	
		N	Percent	N	Percent		N	Percent	N	Percent
25 --- 34	524	312	59.5	212	40.5	503	140	27.8	363	72.2
35 --- 44	242	167	69.0	75	31.0	253	99	39.1	154	60.9
45 --- 54	139	94	67.6	45	32.4	156	54	34.6	102	65.4
55 --- 64	105	63	60.0	42	40.0	108	46	42.6	62	57.4
25--64	1010	636	63.0	374	37.0	1020	339	33.2	681	66.8

Table 4.1 shows that majority of the male respondents (63 percent) were alcohol consumers in their life time whereas only one third (33 percent) of the female respondents were ever alcohol consumers. In total, only 48 percent of the respondents were taking alcohol. It only shows the prevalence of the use of alcohol among the respondents. Data also shows men aged above 35 were more in number having alcohol than the men aged below 35 years of age. On the other hand, women aged between 35 to 44 and 55-64 were more in number compared to women of other age group.

Table 4. 2: Consumers of alcohol during the past 12 months: Men and Women

Age	N	Men current consumers			N	Women current consumers		
		n	Percent	SE		n	Percent	SE
25 --- 34	524	297	56.7	0.01	503	112	22.3	0.03
35 --- 44	242	157	64.9	0.02	253	86	34.0	0.03
45 --- 54	139	87	62.6	0.03	156	43	27.6	0.06
55 --- 64	105	56	53.3	0.04	108	28	25.9	0.07
25 -- 64	1010	597	59.1	0.01	1020	269	26.4	0.02

Out of the total male respondents, only 59 percent were current consumers whereas in female 26 percent of the total respondents were current consumers. Current consumers were those who consumed one or more standard drinks of any type of alcohol in 12 months preceding the survey.

Among the current consumers, male had taken around 6 standard drinks during the past seven days of the survey and female had taken 1.73 standard drinks for the same duration. Standard drinks for this study was defined as a drink containing 13 gram of alcohol i.e. 330 ml of beer, *Jaand and chyang*, 140 ml of wine, 40 ml of spirit and 65 ml of *local Raksi*.

In this study, number of days of binge drinking during past 12 months was also asked to the participants. Data revealed that male were taking the binge drinking for 49 days per year and female were taking 28 days a year. The study also revealed that the higher the age group, the more number of days of the binge drinking were observed for men but for women it was just overturned i.e. the smaller the age group, the more the number of days of binge drinking were observed. The binge drinking here means that five or more than five standard drinks per day for men and four or more than four standard drinks per day for women.

Respondents were also asked about the largest number of drinks consumed on a single occasion during the past 12 months. Data revealed that male had 5.32 standard drinks in average and female had 2.52 standard drinks on a single occasion. It also shows that more drinks were taken by younger respondents in both sexes.

4.2 Quantity of Drinking

Quantity of alcohol drinks are directly related with the morbidities caused by alcohol. In this study, alcohol consumption per drinking day during the last 12 months were asked to the respondents. The table 4.3 shows about the alcohol consumption per drinking day during the past 12 months for current consumers. The data made known that 3.5 percent of total male respondents had taken six or more than 6 standard drinks. Likewise, about 28 percent

were taking 4-5 standard drinks per day and 46 percent were having 2 to 3 standard drinks. Out of the total male respondents about 20 percent had consumed alcohol only up to one standard drinks per day.

Table 4. 3: Alcohol consumption per drinking day during the past 12 months, for current consumers of Alcohol: Men

Age	N	Standard drinks per day									
		Up to 1		2 -- 3		4 -- 5		6 -- 7		8 +	
		N	Percent	n	Percent	N	Percent	n	Percent	N	Percent
25 --- 34	280	47	16.8	130	46.4	86	30.7	9	3.2	8	2.9
35 --- 44	154	28	18.2	62	40.3	52	33.8	11	7.1	1	0.6
45 --- 54	84	22	26.2	45	53.6	12	14.3	1	1.2	4	4.8
55 --- 64	55	17	30.9	27	49.1	9	16.4	2	3.6		0.0
24--64	573	114	19.9	264	46.1	159	27.7	23	4.0	13	2.3

Similarly, table 4.4 shows about the alcohol consumption per drinking day by women during the past 12 months. The data revealed that majority of the women respondents (60 percent) had taken up to one standard drinks only. Out of the total, about 36 percent of the respondents had had 2-3 standard drinks per day and around 6 percent had consumed 4 to 5 drinks per day. Data also shows that there was no single woman having more than 6 drinks per day.

Table 4. 4: Alcohol consumption per drinking day during the past 12 months for current consumers: Women

Age	Total N	Standard drinks per day									
		Up to 1		2 -- 3		4 -- 5		6 -- 7		8 +	
		N	Percent	n	Percent	N	Percent	n	Percent	n	Percent
25 --- 34	80	42	52.5	32	40.0	6	7.5				
35 --- 44	65	36	55.4	27	41.5	2	3.1				
45 --- 54	26	18	69.2	6	23.1	2	7.7				
55 --- 64	24	17	70.8	6	25.0	1	4.2				
24-- 64	195	113	57.9	71	36.4	11	5.6				

4.3 Risk Categories

The data had also been analysed to find out the risk categories for the consumption of alcohol during past 7 days. Risk categories had been calculated as per the consumption of ethanol per day. It has been categorised as Low (1-40 grams of ethanol per day), Medium (41-60 grams per day), High (61-100 grams per day) and very High (\geq 100 grams per day)

Figure 4.1 and 4.2 show about the risk categories for the consumption of alcohol. Of the total male respondents 55 percent had low risk , 2 percent each had medium and high risk consumption pattern of alcohol. Likewise, 26 percent of the female respondents had low risk followed by 0.2 percent having medium risk. The majority of female respondents did not consume alcohol.

Figure 4 1: Risk Categories for consumption of alcohol during past 7 days: Men

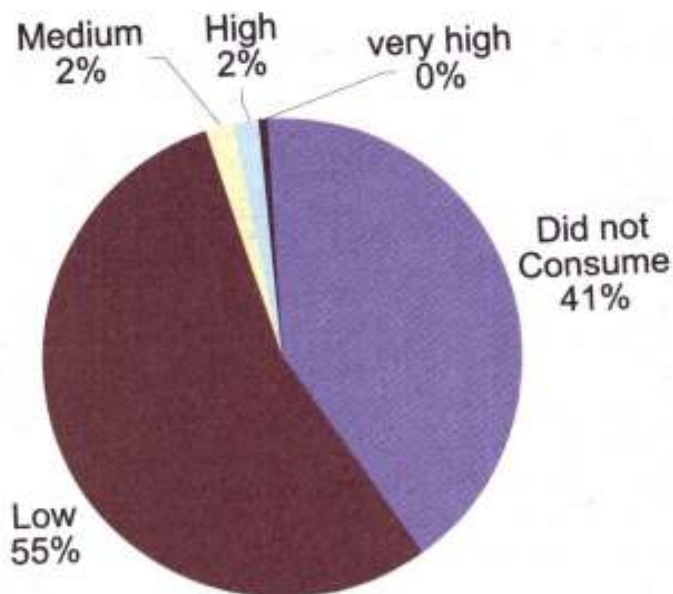
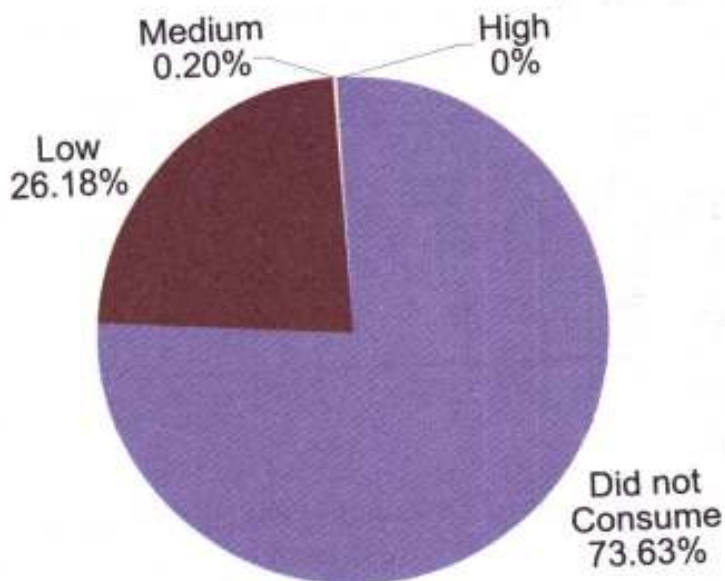


Figure 4 2: Risk Categories for consumption of alcohol during past 7 days: Women



(Endnotes)

- a. WHO, Non-communicable Diseases and Mental Health Framework, Surveillance of risk factors for noncommunicable diseases WHO, 2002.
- b. Dhital R, et al Alcohol and Drug Use un Nepal , Child Workers in Nepal Concerned Centre , 2001

Chapter 5

5. Diet

Fruit and vegetables are important components of healthy diet. Accumulating evidence suggests that they could help prevent major diseases such as cardiovascular diseases and certain cancers principally of the digestive systems.

Low intake of fruit and vegetables is estimated to cause about 19 percent gastrointestinal cancer, and about 31 percent of ischemic heart diseases and 11 percent stroke worldwide. Overall 2.7 million (4.9 percent) deaths and 26.7 million (1.8 percent) DALYs are attributable to low fruit and vegetable intake (3).

In this study, the participants were asked about the intake pattern and amount of green vegetables and fruits. All kinds of fruit (fresh, canned, dried and frozen) eaten at mealtimes or for snacks were included in the fruit intake. Fruit juice is excluded. One serving of fruit is defined as one medium piece or 2 small pieces of fruit or one cup of diced pieces. Likewise, vegetable intake means all kinds of vegetables (raw, cooked, canned and frozen) eaten both at mealtimes and for snacks have to be counted. A serving of the vegetables is defined as half cup cooked vegetables or one cup salad vegetables. Added vegetables (garniture) in mixtures, such as in sandwiches, omelettes, casseroles, stews, soups etc were excluded (7).

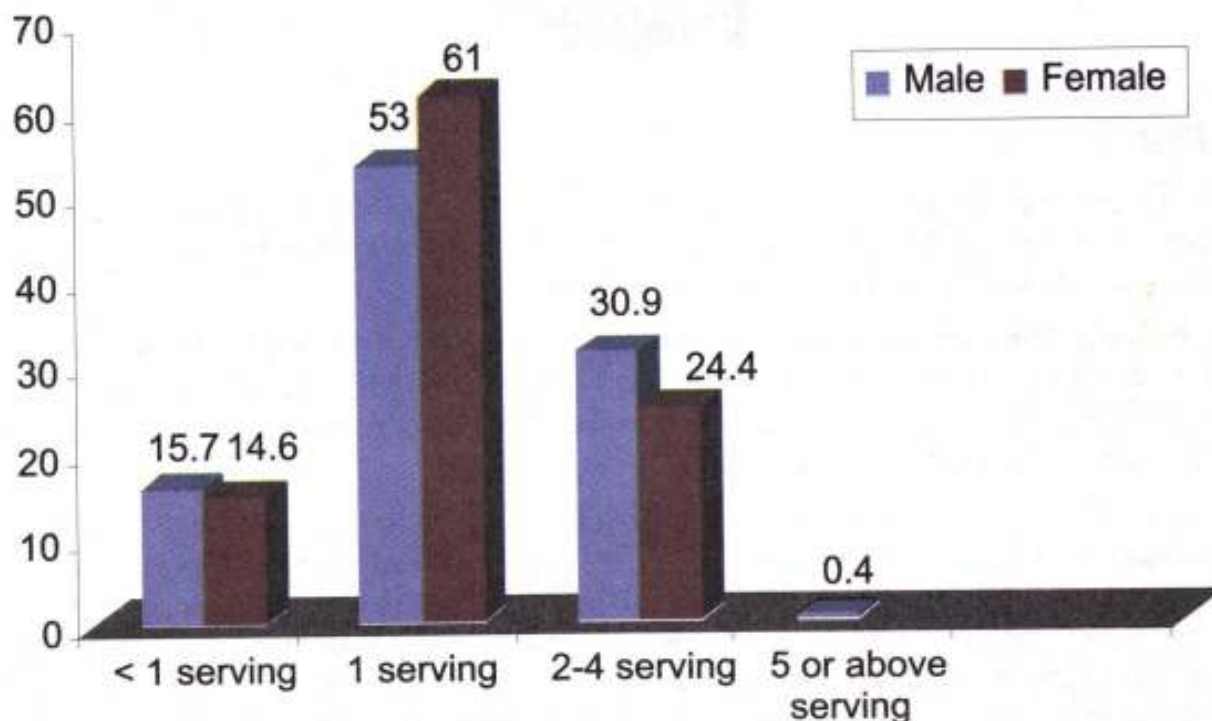
Table 5. 1: Number of Days fruit is consumed per Week: Men and Women

Age	Number	Men Mean	N	Women Mean
25 --- 34	524	2.53	503	3.01
35 --- 44	242	2.53	253	2.82
45 --- 54	139	2.86	156	3.09
55 --- 64	105	3.37	108	2.76
25 -- 64	1010	2.66	1020	2.95

Table 5.1 shows that respondents had low fruit intake. In average 2 to 3 days in a week, people took fruits. Intake of the fruits is not a daily practice for general people in our society as they do not have sufficient resource to buy fruits.

5.1 Fruit Intake

Figure 5. 1: Servings of fruit consumed per day: Men and Women in percentage



In this study, serving of the fruits were calculated as per the guidelines provided by WHO. According to WHO, five or more than five servings per day is good for health but Figure 5.1 shows that most of the respondents had consumed only one serving(53 percent male and 61 percent female) per day followed by 2 to 4 servings (30.9 percent male and 24.4 percent female) per day. Data also shows that 15.7 percent male and 14.6 percent female consumed less than one serving per day. Only 0.4 percent of the male respondents had consumed five or more than five serving per day.

Table 5. 2: Number of days vegetables are consumed per week: Men and Women

Age	Men in Number	Men Mean	Women Mean	Women in number
25 --- 34	524	5.35	5.4	498
35 --- 44	242	5.77	5.38	252
45 --- 54	138	5.82	5.47	152
55 --- 64	103	5.8	5.51	107
25 - 64	1007	5.56	5.42	1009

Table 5.2 shows that respondents had consumed vegetables most of the days in a week. Both men and women had consumed vegetables with their staple food for 5-6 days in a week.

Chapter 5

5. Diet

Fruit and vegetables are important components of healthy diet. Accumulating evidence suggests that they could help prevent major diseases such as cardiovascular diseases and certain cancers principally of the digestive systems.

Low intake of fruit and vegetables is estimated to cause about 19 percent gastrointestinal cancer, and about 31 percent of ischemic heart diseases and 11 percent stroke worldwide. Overall 2.7 million (4.9 percent) deaths and 26.7 million (1.8 percent) DALYs are attributable to low fruit and vegetable intake (3).

In this study, the participants were asked about the intake pattern and amount of green vegetables and fruits. All kinds of fruit (fresh, canned, dried and frozen) eaten at mealtimes or for snacks were included in the fruit intake. Fruit juice is excluded. One serving of fruit is defined as one medium piece or 2 small pieces of fruit or one cup of diced pieces. Likewise, vegetable intake means all kinds of vegetables (raw, cooked, canned and frozen) eaten both at mealtimes and for snacks have to be counted. A serving of the vegetables is defined as half cup cooked vegetables or one cup salad vegetables. Added vegetables (garniture) in mixtures, such as in sandwiches, omelettes, casseroles, stews, soups etc were excluded (7).

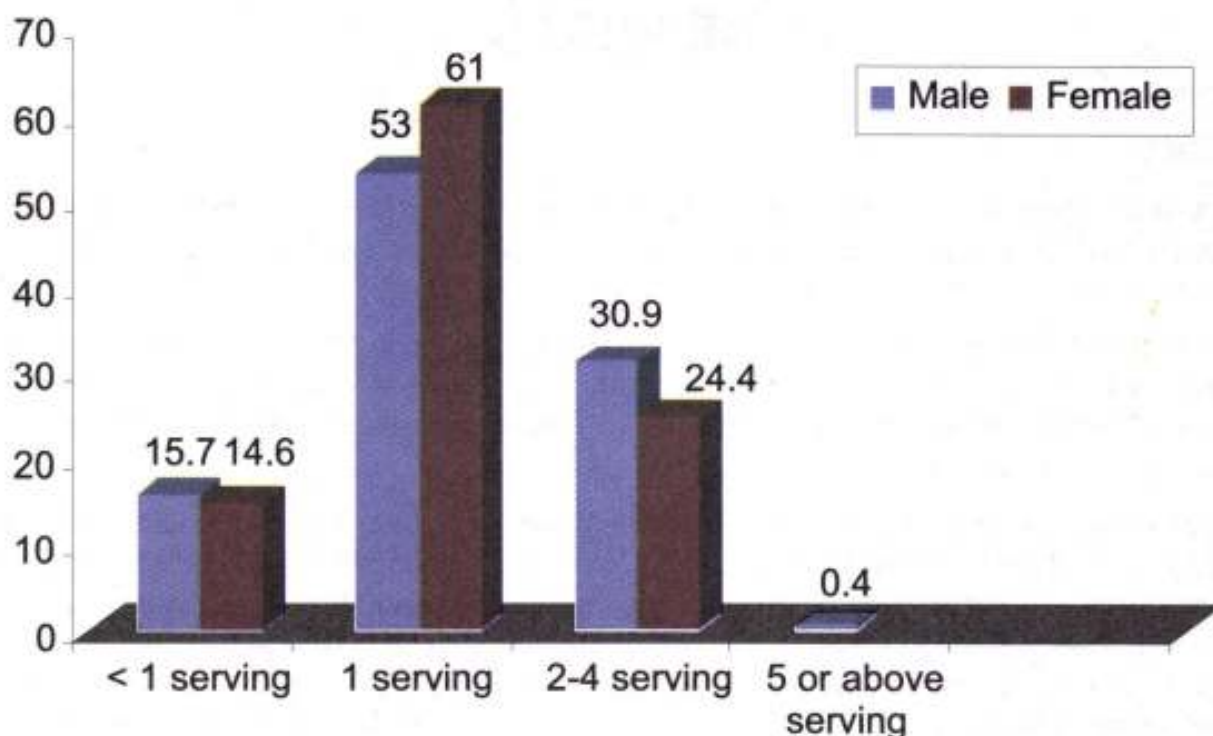
Table 5. 1: Number of Days fruit is consumed per Week: Men and Women

Age	Number	Men Mean	N	Women Mean
25 --- 34	524	2.53	503	3.01
35 --- 44	242	2.53	253	2.82
45 --- 54	139	2.86	156	3.09
55 --- 64	105	3.37	108	2.76
25 -- 64	1010	2.66	1020	2.95

Table 5.1 shows that respondents had low fruit intake. In average 2 to 3 days in a week, people took fruits. Intake of the fruits is not a daily practice for general people in our society as they do not have sufficient resource to buy fruits.

5.1 Fruit Intake

Figure 5. 1: Servings of fruit consumed per day: Men and Women in percentage



In this study, serving of the fruits were calculated as per the guidelines provided by WHO. According to WHO, five or more than five servings per day is good for health but Figure 5.1 shows that most of the respondents had consumed only one serving(53 percent male and 61 percent female) per day followed by 2 to 4 servings (30.9 percent male and 24.4 percent female) per day. Data also shows that 15.7 percent male and 14.6 percent female consumed less than one serving per day. Only 0.4 percent of the male respondents had consumed five or more than five serving per day.

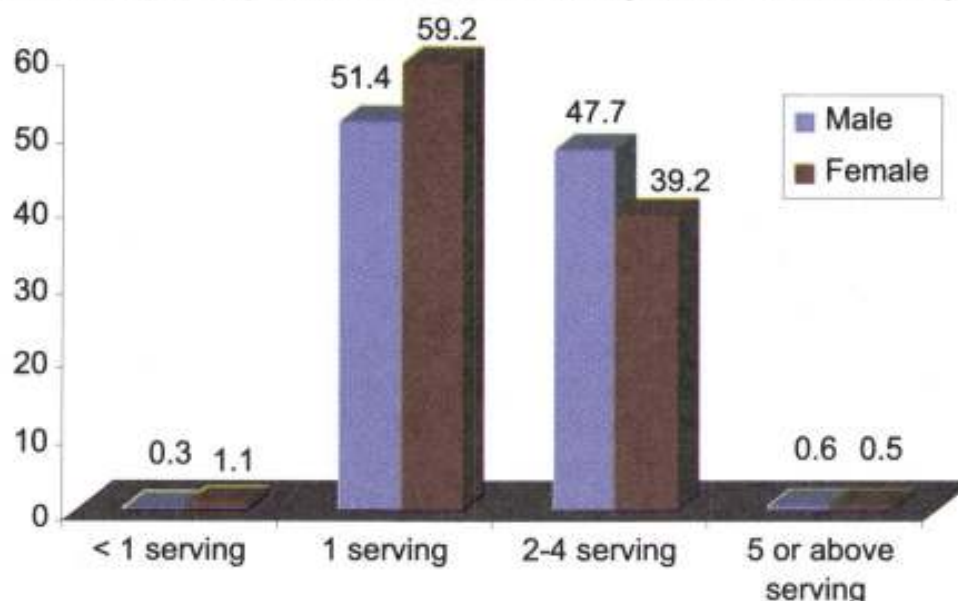
Table 5. 2: Number of days vegetables are consumed per week: Men and Women

Age	Men in Number	Men Mean	Women Mean	Women in number
25 --- 34	524	5.35	5.4	498
35 --- 44	242	5.77	5.38	252
45 --- 54	138	5.82	5.47	152
55 --- 64	103	5.8	5.51	107
25 - 64	1007	5.56	5.42	1009

Table 5.2 shows that respondents had consumed vegetables most of the days in a week. Both men and women had consumed vegetables with their staple food for 5-6 days in a week.

5.2 Vegetable Intake

Figure 5. 2: Serving of Vegetables Consumed Per day: Men and Women in percentage



As in fruits, serving of the vegetables were calculated as per the guidelines provided by WHO. According to WHO, five or more than five servings per day is good for health but the data shows that most of the respondents had consumed only one serving (51.4 percent male and 59.2 percent female) followed by 2 to 4 serving per day (47.7 percent male and 39.2 percent female). A very few participants had responded that they had consumed less than one serving and five or more than five servings per day (Figure 5.2)

Table 5. 3: Servings of fruit & vegetables consumed per day: Men and Women

Age	Men			Women		
	N	<5	>=5	N	<5	>=5
		N	n		n	n
25-34	524	516	8	503	500	3
35-44	242	239	3	253	251	2
45-54	139	139		156	156	
55-64	105	105		108	108	
25-64	1010	999	11	1020	1015	5

Table 5.3 shows that the number of servings of vegetables and fruit consumed per day. A few respondents had consumed vegetables and fruit five or more than five serving per day. It is less than one percent (0.7 %) of the total respondents which indicates that people consumed fewer amounts of vegetables and fruit.

5.3 Type of oil use in preparing Meals

Almost all respondents (99 percent) prepared their meals themselves. Of the total, 97 percent of male and 98.6 percent of female responded that they use vegetable oil while preparing meals. A few (less than 1%) participants use lard or suet in preparing meals. Use of other type of oils such as butter/ghee and margarine is very negligible.

Chapter 6

6. Physical Activity

There is no internationally agreed definition or measure of physical activity. Therefore, a number of direct and indirect data sources and a range of survey instruments and methodologies were used to estimate activity levels. There are four main domains of peoples' day to day lives: at work, for transport (eg. walking or cycling to and from work), in domestic duties (Housework or gathering fuel) or in leisure time (eg sports or other recreational activities). Most of data available were for leisure time activity, with fewer direct data available on occupational activity and activity relating to transport and domestic tasks. Almost all report estimates the physical inactivity among young people aged 15 year and above. The global estimates for physical inactivity among adults is 17 percent ranging from 11 to 24 percent across sub regions. Estimates for prevalence of some but insufficient activity (< 2.5 hours per week of moderate activity) ranged from 31 to 51 percent with a global average of 41 percent (3).

Physical activity reduces the risk of cardiovascular diseases, some cancers and type 2 diabetes. In general physical activity improves glucose metabolism, reduces body fat and lowers blood pressure. Physical activity may reduce the risk of colon cancer by effects on prostaglandins, reduced intestinal transit time and higher antioxidant levels. Physical activity is also associated with lower risk of breast cancer which may be the result of effects on hormonal metabolism (3).

Overall physical inactivity was estimated to cause 1.9 million deaths and 19 million DALYs globally. Physical inactivity is estimated to cause, globally, about 10-16 percent of cases each of breast cancer, colon and rectal cancers and diabetes mellitus and about 22 percent of Ischemic Heart Diseases(3).

In this study, WHO standard questionnaire were asked to cover all four domains of physical activity. Information were analysed and interpreted with the WHO definitions.

6.1 Physical Inactivity

The target people were asked about their physical activity status. People who worked mostly sitting or standing, with walking for no more than 10 minutes at a time were categorised as physically inactive. Table 6.1 shows that 73.56 percent of male respondents and 90.98 percent of female respondents were inactive. It clearly indicates that most of the people are vulnerable to non-communicable diseases.

6.2 Physical Activity at Work

Table 6. 1: Physically inactive: Men and Women

Age Group	Men			Women		
	N	n (Inactive)	%	N	n(Inactive)	%
25-34	524	369	70.42	503	454	90.26
35-44	242	180	74.38	253	227	89.72
45-54	139	105	75.54	156	145	92.95
55-64	105	89	84.76	108	102	94.44
25-64	1010	743	73.56	1020	928	90.98

Levels of physical activity at work

Table 6.2 shows about the levels of physical activity at work. The levels of the work had been classified into three major groups: Inactive, moderate and vigorous. If peoples' work mostly involve sitting or standing, with walking for no more than 10 minutes at a time is categorised as inactive; if people involve in a physical effort like cleaning, farming, painting/plastering, gardening, swimming and climbing stairs for at least 10 minutes are grouped into moderate level of work and if people involve in forceful work like heavy lifting of the different goods, digging a land or shovelling, sawing wood, running, strenuous sports, etc for at least 10 minutes are grouped as vigorous. Data revealed that out of the total male respondents only 18.22 percent had involved in moderate level of work and 8.22 percent respondents had involved in vigorous work. On the other hand, only 7.75 percent of the total female respondents had involved in moderate level of work and 1.27 percent female had involved in vigorous work. The higher the age group, the lesser the physical activity was observed in both men and women participants. It indicates that younger people have involved in physical activity to some extent.

Table 6. 2: Levels of physical activity at work: Men and Women

Age	Men						Women							
	Inactive		Moderate		Vigorous		Inactive		Moderate		Vigorous			
	N	n	%	n	%	n	%	N	n	%	n	%		
25 --- 34	524	369	70.42	112	21.37	43	8.21	503	454	90.26	43	8.55	6	1.19
35 --- 44	242	180	74.38	39	16.12	23	9.50	253	227	89.72	24	9.49	2	0.79
45 --- 54	139	105	75.54	21	15.11	13	9.35	156	145	92.95	8	5.13	3	1.92
55 --- 64	105	89	84.76	12	11.43	4	3.81	108	102	94.44	4	3.70	2	1.85
25-64	1010	743	73.56	184	18.22	83	8.22	1020	928	90.98	79	7.75	13	1.27

6.3 Physical activity during Transportation

In this study, respondents were asked about the way they travel to and from places. The participants who walked and used bicycle for at least 10 minutes continuously to get to and from places were categorised as active, otherwise inactive. Table 6.3 shows about the levels of physical activity during transportation. Data revealed that 79 percent of the male respondents and 65.78 percent of the female respondents had active physical activity during transportation.

Table 6. 3: Levels of physical activity during transportation: Men and Women

Age	N	Men				Women				
		Inactive		Active		Inactive		Active		
		N	%	n	%	N	n	%	n	%
25 --- 34	524	107	20.42	417	79.58	503	190	37.77	313	62.23
35 --- 44	242	56	23.14	186	76.86	253	81	32.02	172	67.98
45 --- 54	139	32	23.02	107	76.98	156	42	26.92	114	73.08
55 --- 64	105	17	16.19	88	83.81	108	36	33.33	72	66.67
25-64	1010	212	20.99	798	79.01	1020	349	34.22	671	65.78

6.4 Physical Activity during leisure Time

In this study, respondents were asked to explore their involvement in leisure time. Data revealed that most of them involve mostly sitting, reclining or standing, with no physical activity lasting for more than 10 minutes at a time. They all were grouped as inactive. Of the male respondents 92.28 percent and among female 96.76 percent were physically inactive during their leisure time. Table 6.4 shows that only 4.65 percent of male respondents and 2.84 percent of female had involved in moderate type of physical activity like cycling, swimming, gardening, painting/ plastering, etc. Only about 3 percent of the male respondents and 0.39 percent of female respondents had involved in vigorous physical activity during their leisure time. In total 3.74 percent had involved in moderate level of physical activity and whereas 1.72 percent in vigorous activity in their leisure time. Rest of others (94.53 percent) were inactive as per the WHO definitions.

Table 6. 4: Levels of physical activity during leisure time: Men and Women

Age	N	Men						Women						
		Inactive		Moderate		Vigorous		Inactive		Moderate		Vigorous		
		N	%	N	%	n	%	N	n	%	n	%	n	%
25 --- 34	524	485	92.56	19	3.63	20	3.82	503	488	97.02	13	2.58	2	0.40
35 --- 44	242	218	90.08	17	7.02	7	2.89	253	241	95.26	11	4.35	1	0.40
45 --- 54	139	128	92.09	9	6.47	2	1.44	156	152	97.44	3	1.92	1	0.64
55 --- 64	105	101	96.19	2	1.90	2	1.90	108	106	98.15	2	1.85	-	-
25 -- 64	1010	932	92.28	47	4.65	31	3.07	1020	987	96.76	29	2.84	4	0.39

6.5 Involvement in Physical Activity

If person spends at least two and half hours (150 minutes) per week for moderate level of physical activity, it is taken as good for health. Thus, in this study, involvements of the respondents in physical activity for at least 150 minutes per week had been calculated. Table 6.5 shows that only 25.45 percent of male respondents and 8.82 percent of female respondents had involved in physical activity for at least 150 minutes per week.

In other words, more than two third men and above 90 percent women had inactive life style.

Table 6. 5: Involvement in physical activity for at least 150 minutes per week:

Age	Men Active			Women Active		
	N	N	%	N	n	%
25 --- 34	524	149	28.44	503	48	9.54
35 --- 44	242	59	24.38	253	25	9.88
45 --- 54	139	33	23.74	156	11	7.05
55 --- 64	105	16	15.24	108	6	5.56
25 --- 64	1010	257	25.45	1020	90	8.82

Chapter 7

7. History of High Blood Pressure and Diabetes

7.1 High Blood Pressure

As expanded variables, questionnaires related to history of high blood pressure and diabetes were asked to the respondents. The study revealed that more than half of the respondents (50 % of men and 59% of women) had measured their blood pressure within past 12 months. Altogether 28 percent of men and 19 percent of women had never measured blood pressure during their life time. Of the total men, 9.70 percent and among women 11.18 percent had been confirmed or newly diagnosed as hypertensive by a health worker within the year. Data showed that the prevalence of hypertension had increased along with the increment in age of the respondents. The prevalence of hypertension in men aged 25 to 34 years was 3.24 percent, and 55-64 years was 27.62 percent. Similarly, in women, prevalence of hypertension was 4.17 in 25-34 years age group and 31.38 in 55-64 years age group. (Table 7.1)

Table 7. 1: Confirmed or new diagnosis of hypertension by health worker in past 12 Months: Men and Women

Age	Number	Men HTN	percent	N	Women HTN	percent
25 --- 34	524	17	3.24	503	21	4.17
35 --- 44	242	20	8.26	253	26	10.28
45 --- 54	139	32	23.02	156	33	21.15
55 --- 64	105	29	27.62	108	34	31.48
25 -- 64	1010	98	9.70	1020	114	11.18

HTN = Hypertension or High Blood Pressure

Among the hypertensive men, only five percent had been taking antihypertensive drugs and in women, only seven percent of them were under antihypertensive drugs. Almost all were advised to control diet, reduce weight, stop smoking and do exercise.

7.2 Diabetes

The study revealed that 16 percent of men and 21.6 percent of women had history of blood sugar measurement in the last 12 months. Of them, 4.3 percent men and 3.5 percent of women were diagnosed cases of diabetes. In total, there were 3.8 percent diabetic cases among the respondents. Like in hypertension, the prevalence rate of diabetes was in increasing trend with the increment of age. (Table 7.2) Among them, 11.63 percent had been taking insulin and 65.12 percent were under oral hypoglycaemic drugs. Almost all of them (97 percent of men and 94 percent of women) had been advised for diabetic diets. Similarly, they were also advised for reducing weight and promoting exercises.

Table 7. 2: Diagnosis of Diabetes: Men and Women

Gender	Age Distribution	Yes (n)	No(n)	Total	Yes (%)	No (%)
Male	25 --- 34	3	521	524	0.6	99.4
	35 --- 44	5	237	242	2.1	97.9
	45 --- 54	20	119	139	14.4	85.6
	55 --- 64	15	90	105	14.3	85.7
	25 -- 64	43	967	1010	4.3	95.7
Female	25 --- 34	2	501	503	0.4	99.6
	35 --- 44	7	246	253	2.8	97.2
	45 --- 54	10	146	156	6.4	93.6
	55 --- 64	17	91	108	15.7	84.3
	25 -- 64	36	984	1020	3.5	96.5

Chapter 8

8. Physical Measurements

8.1 Weight, Height and BMI

According to WHO STEPwise approach, physical measurements of the respondents were taken. In this study, height, weight, BMI, blood pressure, waist circumference, hip girth were measured using the WHO standardised machines sent by WHO, SEARO Office. Physical measurement is one of the major variables to identify the risk factors for non-communicable diseases like diabetes mellitus, stroke and ischemic heart diseases. According to the WHO world health report 2002, approximately 58 percent of diabetes mellitus, 21 percent of ischemic heart diseases and 8-42 percent of certain cancers were attributable to BMI above 21kg/m².

The present study revealed that mean height of the men and women was 1.63 metre and 1.51 metre respectively. Similarly the mean weight of men was 60.69 kg and of women it was 55.57 kg. Pregnant women were excluded for taking weight. The study had also calculated the body mass index (BMI) using the formula of weight in kg divided by square of height in metre. According to the calculation, BMI of men ranged from 22 to 23.62 kg/m² where as BMI of women ranged from 23.56 to 26.64 kg/m² with mean of 22.82 kg/m² for men total and 24.56 kg/m² for women total. (see table 8.1). Globally, adult mean BMI levels of 20-23 Kg/m² are found in Africa and Asia, while levels are 25-27 Kg/m² across North America and Europe (3).

Table 8 1: Body mass index (kg/m²): Men and Women*

Age	N	Men Mean	SE	N	Women Mean	SE
25 --- 34	524	22.17	0.14	479	23.56	0.1684
35 --- 44	242	23.51	0.23	253	24.88	0.2545
45 --- 54	139	23.62	0.34	156	25.65	0.3814
55 --- 64	105	23.40	0.34	108	26.64	0.6189
25--64	1010	22.82	0.11	996	24.56	0.1411

*Pregnant females excluded

8.2 Risk Categories According to BMI

According to WHO definitions, respondents were classified in to underweight (< 18.5), normal weight (18.5-24.9), Grade 1 overweight(25-29.9), Grade 2 overweight(30-39.9), Grade 3 overweight (≥ 40.0). The study revealed that 63.56 percent of men and 52.61 percent of women were within normal weight category. However, 9.7 percent of men and 5.52 percent of women were underweight. Rest of others (26.73 % of men and 41.86% of women) were found overweight with 24.75 percent of men and 31.22 percent of women in

grade 1 overweight. Data also shows that about 10 percent of women were found in grade 2 overweight. The study revealed that the obesity increased with the increment of age. (See table 8.2 and 8.3)

Table 8 2 Risk categories for body mass index (kg/m²): Men

Age	N	Under weight		Normal weight		Grade 1		Grade 2		Grade 3	
		N	%	n	%	n	%	n	%	n	%
25 --- 34	524	56	10.69	363	69.27	103	19.66	2	0.38	0	0
35 --- 44	242	17	7.02	139	57.44	79	32.64	7	2.89	0	0
45 --- 54	139	13	9.35	80	57.55	37	26.62	9	6.47	0	0
55 --- 64	105	12	11.43	60	57.14	31	29.52	2	1.90	0	0
25--64	1010	98	9.70	642	63.56	250	24.75	20	1.98	0	0

Table 8 3: Risk categories for Body mass Index: Women*

Age	N	Underweight		Normal weight		Grade 1		Grade 2		Grade 3	
		N	%	n	%	n	%	n	%	n	%
25 --- 34	479	31	6.47	297	62.00	127	26.51	23	4.80	1	0.21
35 --- 44	253	9	3.56	128	50.59	90	35.57	25	9.88	1	0.40
45 --- 54	156	14	8.97	55	35.26	56	35.90	31	19.87	0	-
55 --- 64	108	1	0.93	44	40.74	38	35.19	22	20.37	3	2.78
25-64	996	55	5.52	524	52.61	311	31.22	101	10.14	5	0.50

* Pregnant females excluded

In this present study, waist circumference of the respondents was also taken. Pregnant female were excluded for the waist girth measurement. Data revealed that more or less both men and women had the same average waist circumference. Waist circumference of men and women varied from 80 to 87 cm and 84 to 88 cm respectively with average mean of 83.36 cm for men and 83.19 cm for women (Table 8.4).

Table 8 4: Waist circumference (cm): Men and Women*

Age	N	Men Mean	SE	N	Women Mean	SE
25 --- 34	524	80.69	0.41	479	80.55	0.45
35 --- 44	242	85.30	0.62	253	84.15	0.73
45 --- 54	139	87.13	0.98	156	86.17	0.98
55 --- 64	105	87.26	1.01	108	88.38	1.20
25-64	1010	83.36	0.32	996	83.19	0.36

* Pregnant females excluded

8.3 Measurement of the Blood Pressure

Blood pressure is a measure of the force that the circulating blood exerts on the walls of the main arteries. Raised blood pressure is almost always without symptoms. However, the elevated blood pressure produces a variety of structural changes in the arteries that

supply blood to the brain, heart, kidneys and elsewhere. In recent decade it has become increasingly clear that the risks of stroke, ischemic heart diseases, renal failure and other diseases are not confined to a subset of the population with particularly high levels of blood pressure but rather continue among those with average and even below average blood pressure. However, different estimates indicate that about 62 percent of cardiovascular disease and 49 percent of ischemic heart diseases are attributable to suboptimal blood pressure (systolic >115 mmHg) with little variation by sex. Worldwide, high blood pressure is estimated to cause 7.1 million deaths i.e. about 13 percent of the total (3).

In this study, resting blood pressure of all respondents was taken for at least two readings. Then average of two readings was calculated and analysed by age and sex. Table 8.5 shows that mean of systolic blood pressure for male and female were 126.78 mmHg and 122.43 mmHg respectively. Similarly, mean of diastolic blood pressure were 81.53 mmHg and 79.59 mmHg respectively. In this study, hypertensive patient under medication were also included. But in table 8.6 hypertensive patients were excluded. Altogether 54 men and 69 women were hypertensive. Excluding hypertensive ones, mean of systolic blood pressure for men and women were 125.46 mmHg and 121.03 mmHg respectively. Likewise mean diastolic blood pressure for men and women were 80.95mmHg and 78.96 mmHg respectively.

Table 8.5: Resting blood pressure (mmHg): Men and Women including Hypertensive respondents

Sex	N	Systolic Mean	Diastolic Mean
Men	1010	126.78	81.53
Women	1020	122.43	79.59

Table 8.6: Resting blood pressure (mmHg): Men and Women excluding hypertensive respondents

Sex	N	Systolic Mean	Diastolic Mean
Men	956	125.46	80.95
Women	951	121.03	78.96

8.4 Blood Pressure Risk Categories

Risk categories for blood pressure were grouped as optimal (<120/<80 mmHg), Normal (120 -129/80 - 84 mmHg), High Normal (130 - 139/85 - 89 mmHg), Grade 1 Hypertension (140 - 159/ 90 - 99 mmHg), Grade 2 Hypertension(160 - 179 / 100 - 109 mmHg) and grade 3Hypertension (>=180/>=110 mmHg) as per the systolic and diastolic blood pressure range. Figure 8.1 and 8.2 show that 38.71 percent of the men and 30.19 percent of women were found in risk categories ranges from high normal to Grade 3 Hypertension. Data revealed that 20.29 percent male and 17.35 female were found hypertensive. In total 18.81 percent of the total respondents were found hypertensive.

Figure 8 1: Blood Pressure Risk Categories: Men and women including hypertensive

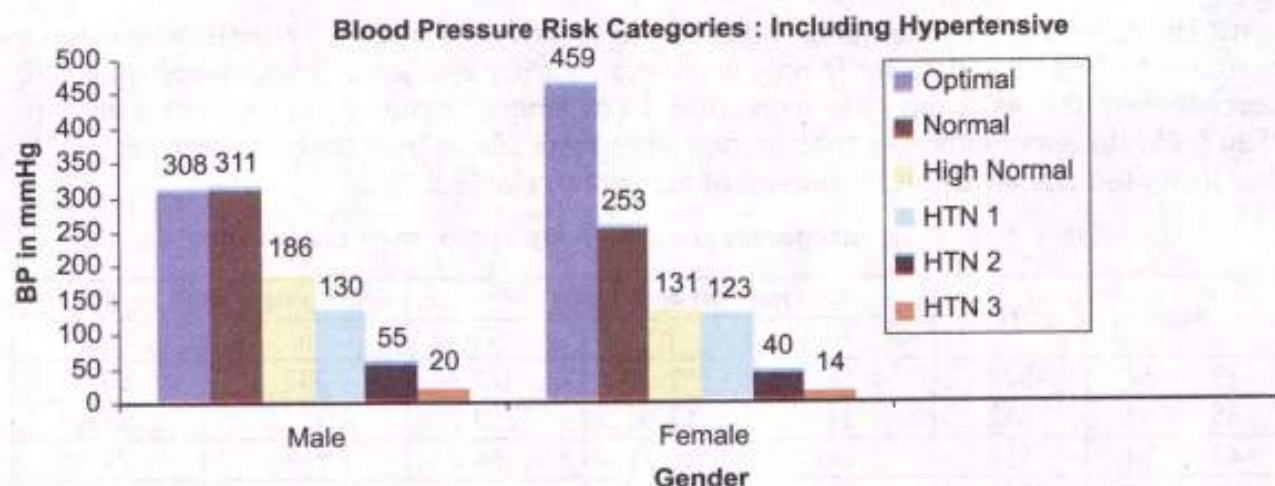
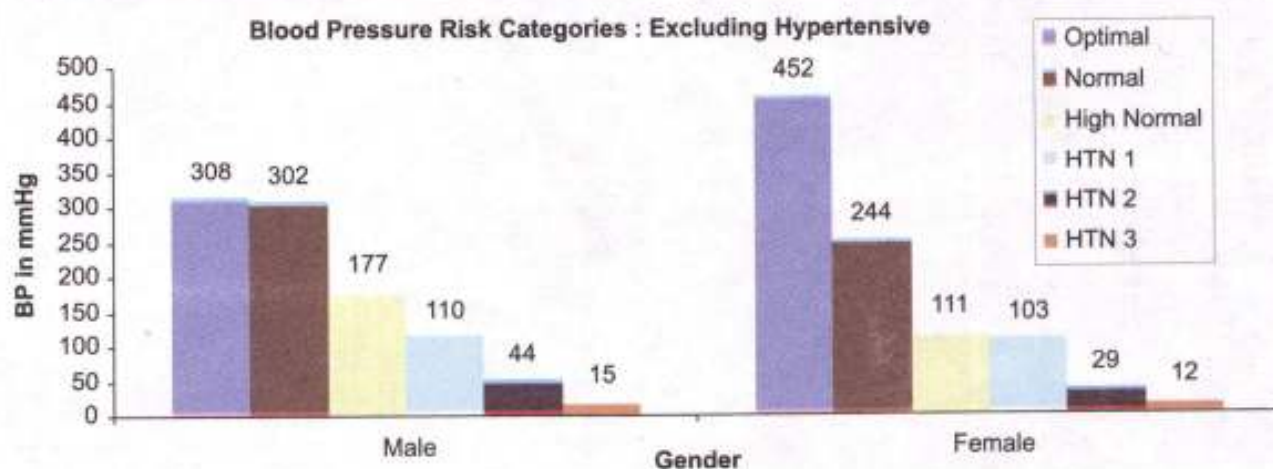


Figure 8 2: Blood Pressure Risk Categories : Men and Women excluding Hypertensive



8.5 Heart Rate

In this study, resting heart rate was also recorded. Table 8.7 shows that men had 75.95 beats per minute in average ranging from 74.99 to 76.73 beats and women had 79.57 beats per minute ranging from 77.94 to 80.07 in all age group. It almost coincides with international standard.

Table 8 7: Resting heart rate (beats/min): Men and Women

Age	N	Men Mean	SE	N	Women Mean	SE
25 --- 34	524	74.99	0.47	503	80.07	0.47
35 --- 44	242	76.27	0.74	253	79.37	0.66
45 --- 54	139	78.38	0.96	156	79.41	0.78
55 --- 64	105	76.73	1.11	108	77.94	0.96
25-- 64	1010	75.95	0.35	1020	79.57	0.33

8.6 Waist-Hip Ratio

Waist Hip ratio is one of the major indicators to identify the obesity. Waist-hip ratio more than one for male and 0.85 for female is taken as obesity indicator. In this study, only 9.70 percent men had waist hip ratio more than 1 but among women 70.68 percent had more than 0.85. It clearly indicates that women were more obese than their counter part. WHR was increased alongwith the increment of age group. (Table 8.7)

Table 8. 8: Risk categories for waist-hip ratio :men and women

Age	N	Men WHR (>1.00)			Women WHR (>.85)	
		n	%	N	n	%
25 --- 34	524	12	2.29	479	332	69.31
35 --- 44	242	31	12.81	253	172	67.98
45 --- 54	139	26	18.71	156	111	71.15
55 --- 64	105	29	27.62	108	89	82.41
25 -- 64	1010	98	9.70	996	704	70.68

Chapter 9

9.1 Implications and Recommendations

- This study is done in metropolitan city. It only expresses the level of risk factors for non-communicable diseases among urban people. It can not characterize the national scenario of the level of risk factors. So there is an opportunity to expand the study to the rural areas so that the prevalence of risk factors between rural and urban can be compared as well as surveillance will be at national level. Then, this research will become a concrete background document for preparing policy and plan to prevent and control risk factors for non-communicable diseases in Nepal.
- The research shows that use of tobacco has been started from the upper part of the teenage. Most of them use either manufactured cigarettes or chewing tobacco. Similarly, 59% of men and 26 % women have consumed alcohol to that amount, which is risk for their health. So, it is urgent need to create an extensive awareness on risk of tobacco and alcohol use from the early teenage. It is equally important to reduce availability of tobacco and alcohol products. It can be recommended that government should stop factories of alcohol and cigarettes production and farming of tobacco. Also government can increase taxes to the products as well as restriction on retail selling keeping some provision so that open distribution and sale will be cut down and majority of the people will have less access to alcohol and cigarettes.
- The research also shows that majority of the people have not taken sufficient amount of vegetables and fruits. Obviously, higher the amount of vegetable and fruits consumed, lesser the risk of non-communicable diseases has been observed. So, people should be encouraged to take vegetables and fruits. The different actions to increase the availability of vegetables and fruits should be implemented.
- Research also significantly shows that the majority of the people have sedentary life style as 7 out of 10 men and 9 out of 10 women are physically inactive. It has definitely increased the risk for non-communicable diseases like diabetes mellitus, stroke, ischemic heart diseases, etc. So, an extensive awareness programmes to encourage the physical activity should be promoted.

9.2 Conclusion

This type of research is first time done in Nepal. Findings of this research represent the level of risk factors for non-communicable diseases in urban population. Consumption of significant amount of tobacco and alcohol has been found in the noticeable percentage of

population. Majority of the population are physically inactive and do not consume required amount of vegetables and fruits for their healthy life.

Research has also identified that overweight is increasing especially in women. Around 10 percent people have history of hypertension and 20 percent are identified as hypertensive during our study and around 4 percent of people have history of diabetes mellitus.

It is an alarming situation and indicates that country will have a big burden of non-communicable diseases in very near future. So, it is an urgent need of planning and implementing the effective programmes to reduce the risk factors for non-communicable diseases. On the other hand, it has also clearly showed that the existing programmes in reducing risk factors are not much effective. It would be worthwhile reviewing the existing programmes and developing continuous follow up mechanism for NCD risk factors through effective surveillance system under government machineries.

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