Ministry of Health & Family Welfare
Government of India

INTEGRATED DISEASE SURVEILLANCE PROJECT (IDSP)

NON-COMMUNICABLE DISEASE RISK FACTORS SURVEY

2007-08

Uttarakhand

Chhatrapati Shahuji Maharaj Medical University
Lucknow

(State Survey Agency)

All India Institute of Medical Sciences
New Delhi

(Regional Resource Centre)

National Institute of Medical Statistics
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(National Nodal Agency)

National Institute of Communicable Diseases
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(IDSP Central Surveillance Unit)

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(National Implementing Agency)

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Foreword

Globally, non-communicable diseases (NCDs) are the major cause of morbidity and mortality. According to WHO Report 2004, they account for almost 60% of deaths and 47% of the global burden of disease. In India, estimated deaths due to non-communicable diseases were double than those from communicable diseases. A progressive rise in the disease pattern of NCD foretells a serious public health issue. The major risk factors for non-communicable diseases are tobacco and alcohol abuse, a sedentary lifestyle, and an unhealthy diet. It is believed that about half of non-communicable disease-related premature deaths could be prevented through healthy diet, regular physical activity and by avoiding tobacco and alcohol.

Envisaging the magnitude of the public health problem of chronic diseases, the Government of India through National Institute of Communicable Disease, MoHFW and Indian Council of Medical Research initiated NCD risk factors survey, phase-I in seven states of India. It is a well planned large community based survey providing state wise estimates of major NCD risk factors in different strata of population. It is needless to mention that the estimated NCD risk factors are important input for targeted prevention of NCD and effective health care planning. The National Technical Advisory Committee (NTAC) and National Monitoring Committee constituted by MoHFW, provided valuable technical guidance and support to complete the study.

The Indian Council of Medical Research through its Division of Non-communicable Diseases has implemented the study with all the partners including the National Institute of Medical Statistics as a National Nodal Agency, Regional Resource Centers and State Survey Agencies.

I congratulate the Team for successfully completing the survey and bringing out Phase-I report of NCD Risk Factors which would be of immense use for prevention and control of non-communicable diseases.

(Dr. V.M. Katoch)

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वैज्ञानिक 'जी' एवं प्रमुख
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Preface

Non-Communicable Diseases (NCD) account for a large proportion of morbidity and mortality amongst the adult population of our country. The high prevalence of major risk factors viz. tobacco and alcohol consumption, inappropriate diet, physical inactivity, high blood pressure, high blood glucose and dyslipidemias are driving the epidemic of NCDs. The Division of Non-Communicable Diseases at ICMR was identified as the nodal point for surveillance of NCDs and their risk factors by the World Health Organization, and multi-site studies helped us in developing a sound strategy for NCD risk factor surveys at the national level under IDSP. The survey methodology developed by ICMR was incorporated by IDSP into the overall survey protocol provided to ICMR for implementation.

The Indian Council of Medical Research signed a Memorandum of Understanding (MOU) with IDSP for the standardization and quality assurance of the NCD risk factor surveys under the World Bank funded IDSP on behalf of Ministry of Health, Govt. of India. As per IDSP plan, these surveys were to be carried out in three phases so as to cover all States and UTs of the country. In the present Phase I, the State based estimates of the risk factors in seven States (Andhra Pradesh, Kerala, Madhya Pradesh, Maharashtra, Mizoram, Tamil Nadu and Uttarakhand) were arrived at through the IDSP identified seven State Survey Agencies, five Regional Research Centers and a National Nodal Agency under the overall guidance and supervision of ICMR Headquarters through the National Technical Advisory Committee. I am grateful to the Director General, ICMR for supporting the Division of Noncommunicable Diseases ICMR to implement the surveys. The untiring effort of our partner agencies is commendable and is duly acknowledged.

This report marks an important milestone in surveillance activities for NCDs in the country. The results would be useful for planning and monitoring an effective response in a coordinated manner by the Government. It should also stimulate further analysis and research in the area.

(Dr. Bela Shah)

Acknowledgements

National Institute of Medical Statistics   (*Arvind Pandey*)
ICMR, New Delhi   Director

Definitions

Current Smoker / Smokeless Tobacco User: Someone who at the time of the survey, smokes / uses tobacco in any form either daily or occasionally.

Current Daily Smoker / Smokeless Tobacco User: Someone who smokes / uses tobacco everyday with rare exceptions such as not on days of religious fasting or during acute illness.

Past- Daily Smokers / Smokeless Tobacco User: These are those individuals who were smoking daily in past, but have not smoked ever in one year preceding the survey.

Non-Smoker / Never Used Smokeless Tobacco: These are those individuals who have never smoked / used smokeless tobacco in the lifetime.

Current Drinker: Those who consumed one or more than one drink of any alcohol in the year preceding the survey.

Former Drinker: Those who have consumed alcohol but those who did not consume one or more drink during the year preceding the survey.

Lifetime Abstainer: Those who have never consumed one or more drink of any type of alcohol in lifetime.

High Risk Drinker (Binge Drinker): Those who drink more than 5 (for women 4) standard drinks on any single day.

Standard Drink: It is defined as any standard drink with net alcohol content of 10 gm ethanol.

Standard Serving: One standard serving of fruits and vegetables is equivalent to 80 grams, translated into different units of cups depending on type of vegetables and fruits.

Metabolic Equivalent (MET): MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1 kcal/kg/hour. It is estimated that, compared to sitting quietly, a person's caloric consumption is four times as high when being moderately active, and eight times as high when being vigorously active.

Central Obesity: Central obesity (measured as waist circumference or waist to hip ratio) is more strongly associated with coronary heart disease than BMI. Waist measurement is taken at the level of mid point between the inferior margin of the rib and crest of the ileum in the mid-axillary plane, using a non-stretchable tape, without clothing, that is, directly over the skin (or over light clothing). A cut-off level of 102 cms in males and 88 cms in females have been recommended for developed countries (ATP 3 Guidelines), however, much lower cut-off levels are appropriate for Indians of 90 cms in males and 80 cms in females (South Asia Pacific Guidelines).

Hypertensive Stage I : The upper and lower limit of the systolic and diastolic blood pressure for hypertensive stage I is 140-159 mm Hg systolic or 90-99 mm Hg for diastolic.

Hypertensive Stage II : The upper and lower limit of the systolic and diastolic blood pressure for hypertensive stage II is $\geq$160 mm Hg systolic or $\geq$100 mm Hg for diastolic.

Under Weight: The person with BMI less than 18.5 kg/m^2 is categorised as under weight.

Normal Weight: The person whose BMI is between 18.5 to 24.9 kg/m^2 is categorized as normal weight

Over Weight: The person whose BMI is 25 kg/m^2 or more is categorized as over weight

Acronyms

AYUSH	Ayurveda Unani Shidha and Homeopathy
AIIMS	All India Institute of Medical Science
BMI	Body Mass Index
BP	Blood Pressure
CEB	Census Enumeration Block
CSMMU	Chhatrapati Shahuji Maharaj Medical University
DHO	District Health Officer
ICMR	Indian Council of Medical Research
IDSP	Integrated Disease Surveillance Project
LPG	Liquid Petroleum Gas
MET	Metabolic Equivalent
NCD	Non-communicable Diseases
NICD	National Institute of Communicable Diseases
NIMS	National Institute of Medical Statistics
NMC	National Monitoring Committee
NNA	National Nodal Agency
NTAC	National Technical Advisory Committee
PSU	Primary Sampling Unit
RRC	Regional Resource Centre
SSA	State Survey Agency
WC	Waist Circumference
WHO	World Health Organization

Tables

Figures

IDSP-NCD Risk Factor Survey
Fact Sheet - Uttarakhand

Population		*Any form of Tobacco use*	27
Household covered	4932	Male	48
Individual covered	5443	Female	7
Household Characteristics(%)		**Mean age of Initiation (in years)**	
Religion		*Smoking*	19
Hindu	88	Male	19
Muslim	11	Female	19
Access to piped drinking water	65	*Smokless tobacco*	20
Urban	85	Male	20
Rural	58	Female	20
Sanitation		**Alcohol Consumption**	
Flush Toilet	33	*Consumed Alcohol (last 30 days)*	12
Urban	76	Male	24
Rural	18	Female	*
Source of Lighting		*Consumed Alcohol (last 12 Months)*	16
Electricity	75	Male	32
Urban	99	Female	0.2
Rural	67	**Consumed alcohol (in last 7 days)**	
Type of House		*Binge Drinkers*	52
Pucca house	58	Male	52
Urban	90	Female	*
Rural	47	**Mean age of Initiation Alcohol (in years)**	
Semi Pucca house	28	Male	22
Urban	8	Female	*
Rural	35	**Fruits and Vegetables consumed**	
Fuel use for Cooking		*Less than five servings per day*	89
LPG/Gas	36	Urban	88
Urban	82	Rural	90
Rural	20	**Physical Activity**	
Wood	57	*Low Physical Activity*	67
Urban	13	Urban	92
Rural	72	Rural	58
Separate Kitchen		**Hypertension**	
Urban	82	*Pre hypertension*	49
Rural	55	Urban	48
Own Agricultural land		Rural	49
Urban	12	*Stage I and II hypertension*	19
Rural	71	Urban	23
Individual Characteristics (%)		Rural	24
Education -Illiterate	26	**Physical Measurement - BMI**	
Urban (Male)	9	*Under weight*	28
Urban (Female)	22	Urban	19
Rural (Male)	17	Rural	32
Rural (Female)	44	*Over weight (grade I,II,III)*	14
Behavioural Information(%)		Urban	28
Current Tobacco users		Rural	10
Smokers	20	*Central Obesity*	18
Male	35	Urban	33
Female	5	Rural	12
Smokeless tobacco users	12		
Male	21		
Female	2		

*figure not shown, based on fewer than 25 unweighted cases

Executive Summary

Introduction

The Government of India through the Ministry of Health & Family Welfare (MOHFW) initiated a decentralized, state based Integrated Disease Surveillance Project (IDSP) in the country with the assistance of the World Bank in the year 2004. The component of non communicable disease surveillance planned periodic community based surveys of population aged 15-64 to provide data on the risk factors. It is in line to help the state health administrators to plan strategies for the control of non communicable diseases by modifying the risk factors. All Indian states were proposed to be surveyed in a phased manner under the project. The first phase of the survey included seven states namely Andhra Pradesh, Kerala, Madhya Pradesh, Maharashtra, Mizoram, Tamil Nadu and Uttarakhand.

The overall objective of the NCD risk factor survey was to improve the information available to the Government health services and care providers on a set of high-priority risk factors, with a view to improve the quality health care and services. The survey also aimed to establish the baseline database of NCD risk factors needed to monitor trends in population health behavior and risk factors for chronic diseases over time. This would provide evidence for evolving strategies and interventions for identified risk factors in the community to reduce the burden of non-communicable diseases.

A National Technical Advisory Committee was constituted to provide the technical guidance to the survey including taking care of certain administrative and logistic difficulties and the National Monitoring Committee for monitoring the overall progress of the project. Indian Council of Medical Research through the division of non-communicable disease, was the implementing agency while the National Institute of Medical Statistics (NIMS) was appointed as the National Nodal Agency (NNA) for coordinating the survey; the Department of Community Medicine, All India Institute of Medical Sciences, New Delhi as a Regional Resource Centre (RRC) for monitoring the quality of data collection and technical support to State Survey Agency (SSA) for the state of Uttarakhand.

Survey Methodology

WHO STEPS methodology for NCD Risk Factor Surveillance has been adopted for the survey after carrying out suitable modifications, based on a multisite ICMR-WHO collaborative initiative for NCD risk factor surveillance[1]. The survey was designed to provide prevalence estimates of risk factors for each 10 years age group (15-24 through 55-64) by sex and place of residence (urban/rural). The survey used uniform sample design, bilingual schedules (English and Hindi in case of Uttarakhand), field protocol for data collection and physical measurements to facilitate comparability across states and also to ensure high quality data. For the present survey, appropriate sampling weights for households were used for urban and rural areas of the state. From each selected household, one member aged 15-54 was selected using the KISH Method and all members aged 55-64 were selected. Such post stratification was used for improvement of efficiency of the estimators. Post stratification weights for individuals were constructed using the state age distributions for both sex, which are available on the population level.

Two types of questionnaire - one at household level and another at individual level were used for the survey. At household level, information was elicited on religion, household facilities, ownership of agricultural land and livestock, and possession of durable goods for each selected household. The Individual questionnaire collected the information from all the selected eligible household individuals regarding demographic, behavioral and physical measurements. The individual questionnaire was divided into two segments based on WHO STEPS methodology. The first section (step 1) collected the demographic information of individuals including age, sex, marital status, education, and occupation. In the behavioural information section, information about tobacco use, alcohol consumption, diet, physical activity, history of raised blood pressure and history of diabetes were collected. In the second section (Step 2), physical measurements of individual such as height, weight, waist circumference (not measured for pregnant women), blood pressure, and pulse rate were recorded.

CHARACTERISTICS OF SURVEY POPULATION

A total of 5000 households were contacted in urban and rural area of Uttarakhand. Among them seventy

households refused to participate in the survey. The overall response for the survey was therefore over 98 percent. More than four-fifth (88%) of the households was Hindu and about 10 percent were Muslim. Eighty-four percent of the households used drinking water from a piped or hand pump. Almost all households had flush or pit toilet facility. Seventy-two percent of households had electricity. LPG was a major source of cooking fuel in urban area and wood was main source of fuel in rural area. Three-fourth of the households possessed agricultural land, whereas it was only 12% in case of urban area.

About one-third of the respondents (30%) were illiterate. It was pronounced in rural area where almost half of females were illiterate. The results emphasize the need of taking female literacy program of the Government. About three-quarter of the respondents were currently married. Majority of the respondents in rural area were engaged in domestic work. More than 80% of females in urban area were looking after domestic work; the males were engaged in others work followed by manual worker and services/sales.

BEHAVIOURAL RISK FACTORS FOR NCD

Tobacco Smoking

As per the WHO STEPS guidelines, the smokers are categorized into three categories *Current Smokers*, *Current Daily Smokers*, *Past Daily Smokers* and those who have never smoked in lifetime were classified as *Non-Smokers*. The survey finds that about one fifth of respondents (35 percent men and about 5 percent women) in Uttarakhand were current smokers.

The urban and rural prevalence was 15% and 22% respectively for the current smokers. The mean number of smoking *bidis* and manufactured cigarette in a day was 14 and 5 respectively. The average age of onset of smoking was around 19 years among young urban and rural respondents aged 15-34 years. The mean age of cessation of smoking for all those who stopped smoking was 34 years. Among non-smokers, about 43% of respondents were exposed to tobacco smoke at home or work place.
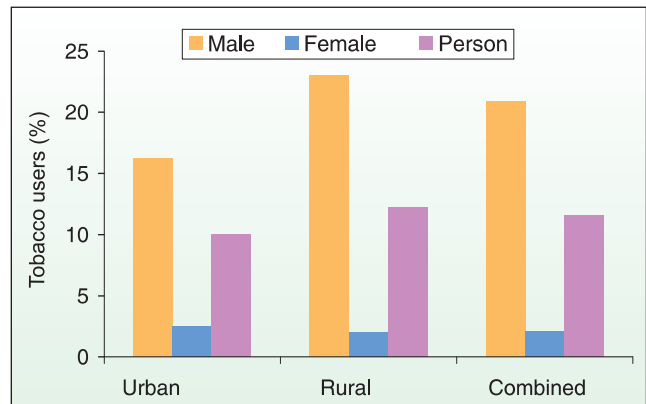
Figure 2. Current daily smokeless tobacco users (%) by sex and residence

Above one-tenth (12%) of respondents were current users of smokeless tobacco. The mean frequency of chewing tobacco in a day was around 6 for men and 5 for women tobacco chewer. The mean frequency of chewing pan with tobacco was 4 per day. The mean age of initiation of smokeless tobacco use was 20 years for the young respondents aged 15-34 years and it was 26 years for the respondents in the age group of 35-64 years. The over all mean age of quitting smokeless tobacco was 32 years. About 27% of the respondents were using tobacco in either form (smoking and smokeless) whereas about 4% were using tobacco in both the forms.

Alcohol Consumption

In the survey, 32% of the male respondents report to have consumed alcohol in past 12 months and 24% consumed in last 30 days preceding the survey. Around 5% of male respondents were past drinkers. The habit of alcohol consumption was mainly among men and negligible among women. The average number of drinks on a drinking day was 9 drinks. About quarter of current drinkers were binge drinkers (high drinking). The mean age of initiation of alcohol consumption regularly was 21 years for the respondents in the age group 15-34 years and 26 years for the respondents in the age group

Figure 1. Current smokers (%) by sex and residence

of 35-64 years. The percentage of current drinkers was higher for respondents whose main occupation was Agriculture and Manual Work.
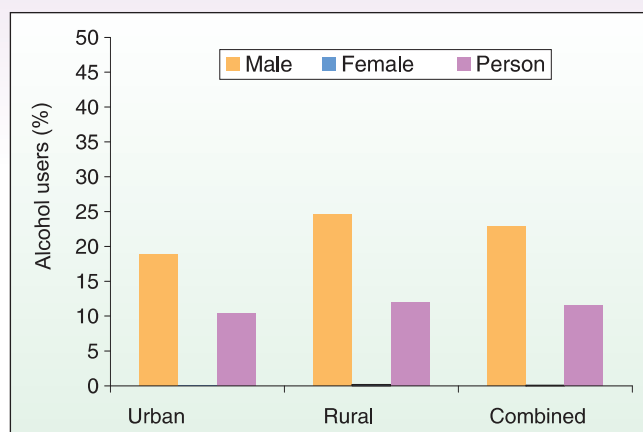
Figure 3. Alcohol consumplion (%) by sex and residence

Fruits and Vegetables Consumption

In a week, people consumed vegetables 5 days and fruits only 3 days. The mean number of days when fruits were consumed was higher in urban population (3 days) as compared to that in rural (2 days). Only one-tenth of population consumed five or more servings of fruits and vegetables per day.
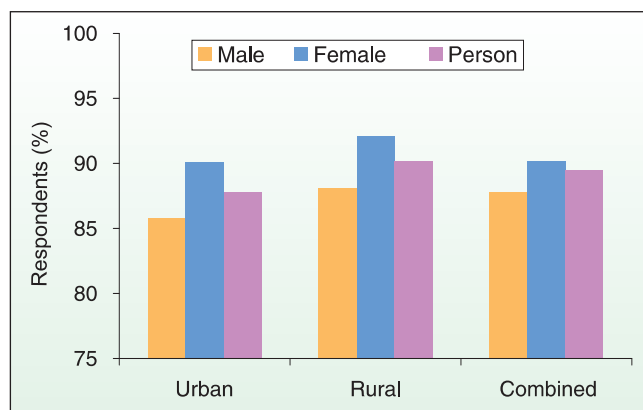
Figure 4. Less than 5 servings of fruits & vegetables consumption (%) by sex and residence

In respect of consumption of specific food habits, 20% population consumes eggs, 5% consume fish, and 13% consume red meat and fried local food at least once a week. Cheese/butter was consumed daily by 24% of the population. Cake pastries or other bakery items including chips/*namkeen* are consumed daily by 8% of population.

Most common edible oil used for cooking among households in Uttarakhand was mustard oil (81%), followed by soyabean oil (14%) and sunflower oil (3%).
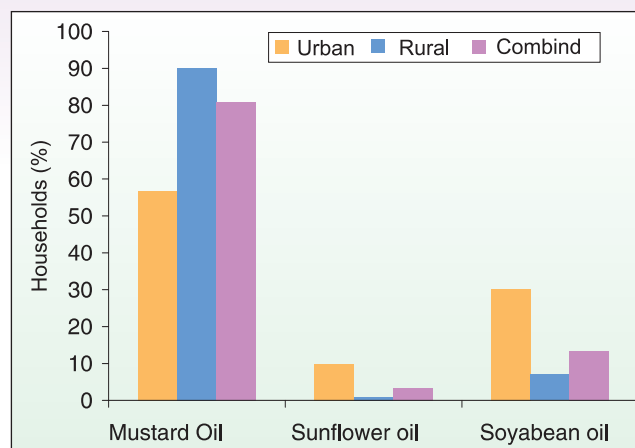
Figure 5. Major oil consumption among households (%) by residence

Physical Activity

The lack of physical activity leads to obesity, hyperlipidemia, diabetes mellitus, hypertension, and coronary heart disease. In this respect survey finds that in Uttarakhand, the mean time spent in different sub groups on work related physical activity range between 85 to 221 minutes per day. The mean duration of total physical activity was 1309 MET minutes per day. Most of the time spent related to work and travel (walks and bicycle). Around 69 minutes and 15 minutes were spent per day for travel and recreational activities respectively.
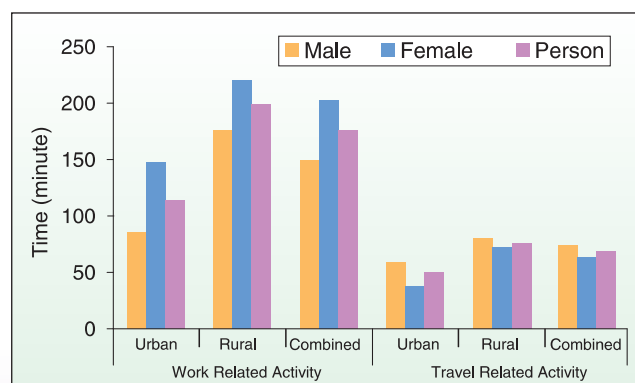
Figure 6. Mean time spent on physical activity per day (minutes) by sex and residence

As per the WHO guidelines, the total physical activity of the individual has been categorized as low, medium and high. About 67% of respondents report low

level of physical activity, while 25% and 8% of respondents report medium and high level of activity, respectively. Majority of respondents (87%) spent more than four hours in sedentary activities.
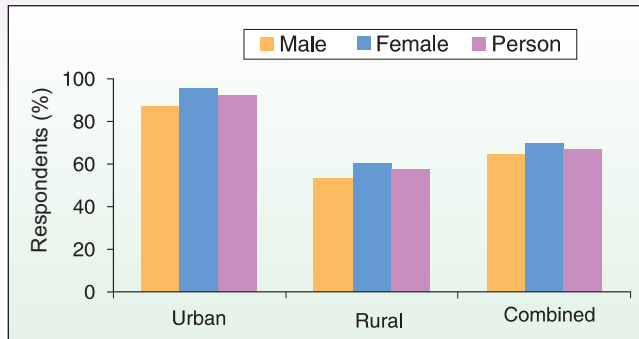
Figure 7. Low physical activity of respondents (%) by sex and residence

HYPERTENSION AND DIABETES

Hypertension

The blood pressure is an important determinant of risk of cardiovascular and ischemic heart diseases, congestive cardiac failure and renal failure. In the survey, 4% respondents report to have been diagnosed as hypertensive by health professionals (4% for males and 5% for females; 8% for urban and 3% for rural population). Among those who were diagnosed for hypertension, 46% were on prescribed drugs, 67% of diagnosed were advised dietary modification, and 21% consulted AYUSH practitioner of which 81% were taking treatment from the same. The survey also carried out measurement of blood pressure as a part of step-2 of individual questionnaire. The mean systolic blood pressure in the population was around 126 mm Hg and mean diastolic blood pressure was 78 mm Hg. By categories of
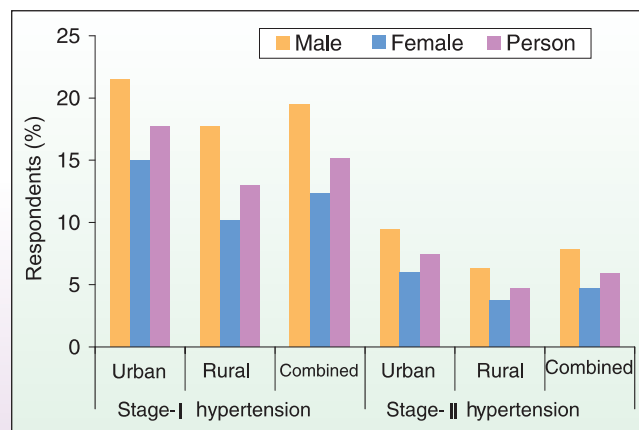
Figure 8. Stage I & II hypertension (%) by sex and residence

hypertension, 32% report to be normal, 46% in pre hypertension, 15% in stage I hypertension and 6% in stage II hypertension. Pre-hypertension, Stage I & II hypertension was more pronounced in men (80%) as compared to women (59%).

Diabetes

Diabetes mellitus is an important marker of risk for the arterial disease of the coronary, cerebral and peripheral arterial trees, and for micro vascular disease leading to blindness and renal failure. The survey also included information on history of diabetes. Around 1% of the respondents reported to have history of raised blood sugar of which 31% were taking insulin and 79% were on oral drugs. A large number of them were advised life style modification such as diet modification, reducing weight and increasing physical activity. About 30% (of the diagnosed) had consulted AYUSH practitioners for the elevated blood sugar levels and majority of them were taking the treatment from the system.
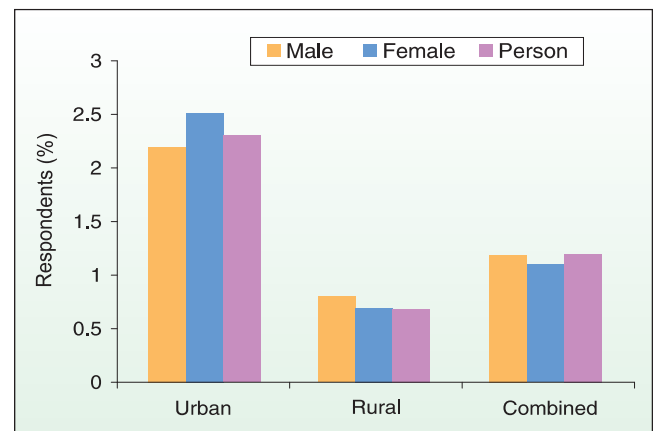
Figure 9. History of raised blood sugar (%) by sex and residence

PHYSICAL MEASUREMENTS

Body Mass Index (BMI)

World wide researches have shown that there is a strong association between BMI and health risk. On the other hand low BMI was an indicator of risk to health, often being associated with tobacco, alcohol use and drug addiction. The survey recorded height, weight and waist circumference. The mean BMI was around 21 kg/m^2 with mean height 158 cm (164 cm for men, 152 cm for women) and mean weight 52.7 kg (56 kg for men and 49 kg for women). According to the survey, 28% of
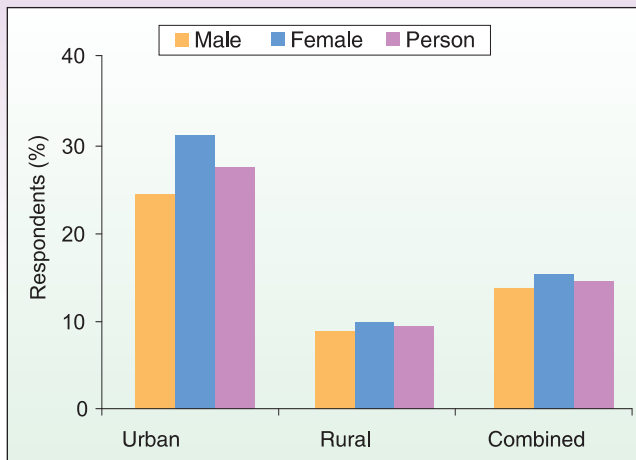
Figure 10. Overweight respondents (%) by sex and residence in Uttarakhand

the respondents were under weight and about 15% were overweight which was 27% in urban and 9% in rural population. Overall 57% of the respondents were in the normal category of BMI.

SOCIO-DEMOGRAPHIC DIFFRENTIALS

Tobacco is mainly used either in the form smoking or smokeless (chewing tobacco with lime or *Pan*) in Uttarakhand. The prevalence of smoking was high among urban as well as rural male population. The increasing pattern of prevalence of smoking was recorded with increasing age group of respondents. But, it was declining with increasing level of education. Prevalence of smoking among female respondents was very low compare with males across all the socio-demographic categories, which shows gender differentials. Occupation is an important socioeconomic indicator. The differences in prevalence of smoking were higher form one category of occupation to another. Prevalence of smoking in the occupational categories of agriculture and manual work was high compare with other categories. A similar pattern of increasing in prevalence with age and decreasing with level of education was also observed with smokeless tobacco users. The prevalence of current alcohol drinkers was also showing an increasing pattern with age groups. But, the pattern of prevalence was decreasing with increasing level of education. The habits of tobacco and alcohol use starts at early young age which contributes to the high risk of NCD at productive stage of life or as grown older with such habits.

The fruits and vegetable consumption and regular physical activity reduce the risk of non-communicable diseases. But, the study indicates high proportion of population taking inadequate amount of fruits and vegetables (less than five servings of fruits and vegetables per day). Prevalence of low consumption was high in all the age groups, level of education and occupation by sex and residence with marginal differences in between some of the groups. Besides that, two-third of the population was found in the category of doing low physical activity. The differences in the pattern of low physical activity by age, sex, education, occupation and residence were also observed. Among the older (55-64) and younger age groups (15-24), the people were doing less physical activity as compare with other age groups. Female respondents were more in low physical activity compare with males across all the age groups. However, rural people were doing more physical work than urban, but the pattern was similar across all age groups and sex. The physical activity by education was observed low among higher level education whereas it was comparatively high among lower level education people. Occupational difference in physical work activity was also observed across all the categories. The people whose occupation was agriculture or manual work were doing more physical work compare with other occupational categories. Low physical activity was high among the occupation of service, executive and business, and domestic work.

Hypertension is a major non-communicable disease risk factor especially related to cardiovascular disease. The increasing pattern of prevalence of hypertension (stage I & II) was recorded with increasing age group of people across all the subgroups of population (sex and urban-rural). It was prevalent in all the level of education with marginal differences with one another. Hypertension was prevalent in all the occupational categories across residence and sex with some differences between the subgroups.

Overweight (obesity) is a major risk factor of Non-communicable diseases. High prevalence of overweight was recorded in all the age groups except the younger age (15-24). Prevalence of overweight was higher among females compare with males across all the age groups. The prevalence of overweight among urban population was higher comparing with rural. However, prevalence of overweight was low among illiterate whereas it was high among higher level of education. Similarly, prevalence was also recorded low among the people

whose occupation was agriculture or manual work whereas it was high in other categories of occupation.

Overall, NCD risk factors were prevalent across all the socioeconomic and demographic categories of population in Uttarakhand.

The results generated through this IDSP-NCD survey would certainly focus on major issues in bringing about change or initiate various programs related to control of non-communicable diseases.

Introduction

1.1 BACKGROUND OF SURVEY

In response to a long felt need expressed by various expert committees, the Government of India through the Ministry of Health & Family Welfare initiated a decentralized, state based Integrated Disease Surveillance Project (IDSP) in the country with the assistance of the World Bank in the year 2004. The project envisaged detecting early warning signals of impending outbreaks; initiate an effective response in a timely manner. Unlike communicable diseases, most non-communicable diseases are latent type and they occur after a prolonged exposure to life style risk factors like smoking, raised blood sugar, raised blood pressure and hyper-cholestremia. Public health action would be primarily directed against preventive strategies for the disease and hence the priority was to monitor risk factors rather than non-communicable diseases themselves.

Periodic community based surveys covering representative adult population were planned under the IDSP to provide data on NCD risk factors at state level enabling states to develop strategies and activities to prevent and control the non-communicable diseases. It was taken up as a collaborative project of the Ministry of Health & Family Welfare, Govt. of India's National Institute of Communicable Diseases and the Indian Council of Medical Research with National Institute of Medical Statistics (NIMS) as the National Nodal Agency (NNA) and Regional Resource Centres (RRCs). The State Survey Agencies (SSAs) were identified based on their experience and knowledge about the local conditions. The division of non communicable diseases at ICMR coordinated the overall activities and guided in the project development, implementation, monitoring and evaluation.

The NIMS provided the technical assistance at all stages of the survey including development of survey protocol, sampling methodology, survey questionnaire etc. with the approval of the National Technical Advisory Committee (NTAC). The survey was supervised and monitored by the RRCs for quality assurance. The RRCs were identified in order to provide training to the field investigators, monitoring of data collection and technical support to the field agencies particularly for the anthropometrical and blood pressure measurements. All states were proposed to be covered in a phased manner. The first phase states included Andhra Pradesh, Kerala, Madhya Pradesh, Uttarakhand, Mizoram, Tamil Nadu and Uttarakhand. The present treatise is the survey report of the state of Uttarakhand. Chhatrapati Shahuji Maharaj Medical University (CSMMU), Lucknow was the SSA in the state while All India Institutes of Medical Sciences (AIIMS), New Delhi was the RRC.

1.2 OBJECTIVES

The overall objective of the NCD-risk factors survey was to improve the information available to the Government health services and care providers on a set of high-priority risk factors, with a view to improve on-the-ground responses to such risk factors. It also aimed to provide essential data to monitor progress of on going disease control programs and reallocate health resources more optimally. The specific objectives of the survey were to:

1. Assess the prevalence of NCD risk factors in different strata of population in the states;

2. Establish a baseline database of NCD risk factors needed to monitor trends in population health behavior and risk factors for chronic diseases over a period of time in the states ; and

3. Provide evidence for evolving strategies and interventions for identified risk factors in the community to reduce the burden of Non-Communicable Diseases in the population

1.3 NON-COMMUNICABLE DISEASE (NCD) RISK FACTORS

A "risk factor" refers to any attribute, characteristic, or exposure of an individual, which

increases the likelihood of developing a non-communicable disease. The major (modifiable) behavioural risk factors identified in the World Health Report 2002[2] are tobacco use, harmful alcohol use, unhealthy diet (low fruit and vegetable consumption) and physical inactivity. On the other hand, the major biological risk factors identified are overweight and obesity, raised blood pressure, raised blood glucose and raised total cholesterol. These major behavioural and biological risk factors were included in non-communicable disease risk factors survey except raised blood sugar and total cholesterol, because they have the greatest impact on non-communicable disease mortality and morbidity, and modification is possible through effective prevention

Dietary patterns that include higher intakes of fruits and vegetables are associated with several health benefits, including a decreased risk for some types of cancer. Low consumption of fruit and vegetables has been identified as a risk factor in the development of a range of chronic diseases, including coronary heart disease, stroke and many forms of cancer. Research has indicated that the required intake of fruit for optimal health benefits is five daily servings of fruit and vegetable.

Lack of physical activity leads to obesity, dyslipidemia (lower high-density lipoprotein levels), insulin resistance, diabetes mellitus and high blood pressure levels. Physical inactivity is a well-established risk factor for coronary heart disease(CHD) and is associated with about a twofold increase in risk of CHD.

RISK FACTORS COMMON TO MAJOR NCD'S

Risk factor	Non-communicable Disease			
	CVD	Diabetes	Cancer	Respiratory
Smoking/tobacco	+	+	+	+
Alcohol	+	+	+	
Nutrition	+	+	+	+
Physical Inactivity	+	+	+	+
Raised BP	+	+	+	
Raised blood Sugar	+	+		
Obesity	+	+	+	+
Blood lipids*	+	+	+	

+ Corresponds to Risk Factor;

* Not being included in Phase I; CVD – Cardiovascular Disease

Tobacco use is a known or probable cause of about 25 diseases including heart disease; cancer, stroke, chronic obstructive pulmonary disease and digestive tract disease, as well as, has significant adverse effects on pregnancy. Smokeless tobacco use causes oral cancer in the lip, tongue, mouth, and throat areas and digestive system cancers. The relationship between alcohol consumption and health and social outcomes is complex and multi-dimensional. Alcohol consumption is linked to more than 60 disease conditions including liver cirrhosis, several cancers (liver, laryngeal, esophageal and oropharyngeal cancers), injuries and hemorrhagic strokes.

Consumption of fruits and vegetables reduces the risk of NCDs, like cancers and cardiovascular diseases.

1.4 HEALTH PROFILE OF THE STATE

Uttarakhand is bordering Himachal Pradesh in the north-west and Uttar Pradesh in the south and has international borders with Nepal and China. Uttarakhand was carved out of Uttar Pradesh on 9th Nov 2000. It has an area of 53483 sq. km. and a population of 67569 people (in thousands)[3]. There are 13 districts, 95 blocks and 16826 villages in the state. The State has population density of 158 per sq. km. (as against the national average of 325). The population of the state continues to grow at a lower rate than the national rate. The key population and health indicators for Uttarakhand are presented in Table 1.1 and Table 1.2.

Table 1.1. Demographic and Socioeconomic profile of Uttarakhand as compared to India

S. No	Indicator	Uttarakhand	India
1	Total Population(in thousands)*	67569	1128521
2	Decadal Growth Rate*	24.26	21.52
3	Population ratio (Urban/1000 Rural)*	360	385
4	Crude Birth Rate (Per 1000 Population)**	29.1	23.5
5	Crude Death Rate (Per 1000 Population)**	6.3	7.5
6	Life Expectancy at birth**	57.8(M)	62.3(M)
		57.5(F)	63.9(F)
7	Total Fertility Rate***	4.0	2.9
8	Infant Mortality Rate (Per 1000 live births)**	74	57
9	Maternal Mortality Ratio (Per 1000 live births)†	379	301
10	Sex Ratio (Females/1000 Males)*	919	933
11	Mean Age Of Marriage (Female)††	20.5	20.2
12	Population Below Poverty Line†††	38.3	27.5%
13	Literacy Rate*	63.7	64.8

Source: National Health Profile 2007, Central Bureau of Health Intelligence[4] (*Registrar General, India; **SRS Bulletin, October 2007; †Statistical Report, RGI 2004; ††Statistical Report RGI, 2005; RGI; PCA; †††Planning Commission of India).

Table 1.2. Health Infrastructure, Human Resource available and Health Expenditure

S. No	Indicator	Uttarakhand	India
1	Number of Allopathic Doctors with recognized medical qualifications and registered with State Medical Council*	-	696747
2	Dental Surgeons Registered**	1643	72497
3	Number of Government Allopathic Doctors***	3662	76542
4	Average Population served/Doctor***	18451	-
5	Number of Registered AYUSH Doctors†	57593	725338
6	Total Number of Registered Nurses††	121316	1509196
7	Number of Doctors at the PHCs†††	839	22273
8	Total CHCs Specialists at CHCs†††	49	3979
9	Health Assistant (Male & Female)†††	2242	35330
10	Health Worker (Male & Female)†††	16643	215206

Source: National Health Profile 2007, Central Bureau of Health Intelligence, MOHFW

(* Medical Council of India; ** Dental Council of India; *** Directorate of state health services; † Department of AYUSH, MOH&FW/GOI; †† Indian Nursing Council, Pharmacy Council of India; ††† Bulletin on Rural Health Statistics in India, 2006 – Special Revised Edition, MOHFW)

1.5 SURVEY DESIGN AND IMPLEMENTATION

Sample Size

In order to achieve the aforesaid objectives, it was assumed that we should be able to estimate a parameter that has a level of 15% in a subgroup of population, with a relative precision of 30%, design effect as 1.25 and we would be able to achieve a response rate of 90%. Assuming that NCD risk factors are concentrated in 15-64 years for both males and females, the required sample size for each sex in 10-years age groups was estimated to be about 280. It is a known fact that the proportion of population in the 10 year age groups decrease with increase in age. In any population,

the proportion of population in the age-group 55-64 is lowest and varies in the range of 5-7 percent depending upon the fertility level (it is at the lower end, i.e., 5% in high fertility states, e.g. Uttar Pradesh, Madhya Pradesh, Bihar and Rajasthan, in the middle, i.e. 6% in moderate fertility states and at the upper end, i.e. 7% in low fertility states). Keeping such scenario of population composition in view and in order to have targeted 280 females and 280 males in age group 55-64, a sample of 5000 households was considered to be adequate for the survey.

Sample Design

A uniform sample design with equal allocation in

urban and rural area was adopted in all states. In each state, the rural sample was selected in two stages: the selection of Primary Sampling Units (PSUs), which are villages with probability proportional to population size (PPS) at the first stage, followed by the random selection of households within each PSUs at second stage using systematic random sampling. In urban areas, a three-stage procedure was followed. In the first stage, wards were selected with PPS sampling. In the second stage, one Census Enumeration Block (CEB) was randomly selected from each sample ward. In the final stage households were randomly selected within each CEB using the systematic random sampling procedure. From each selected PSU in rural area and from each selected Census Enumeration Block (CEB) in urban area, 50 households were selected. From each selected household, one individual was selected from those who fall in the 15-54 age range by using KISH method[5] whereas all who fall in the age group 55-64 were included in the sample.

Sample Selection in Rural Areas

In rural area, the 2001 Census list of villages served as the sampling frame[3]. The list was stratified by a number of variables. The first level of stratification was geographic with villages classified into five contiguous regions. In each region, villages were further stratified by village size and the percentage of the population belonging to scheduled castes or scheduled tribes. The final level of stratification was implicit for all strata consisting of an ordering of villages within each stratum in ascending and descending order alternatively by the level of female literacy. From the list of villages so arranged, villages were selected systematically with probability proportional to the population of the village. Small villages with <75 households were linked with one or more adjoining villages to form PSUs. Villages with fewer than 5 households were excluded from the sampling frame.

In each selected sample PSU, a mapping and household listing was carried out prior to the data collection that provided the necessary frame for selecting households at the second stage. The household listing operation involved preparing up-to-date location map and layout sketch maps of each selected PSU, assigning numbers to structures, recording addresses or the location of these structures, identifying residential structures, and listing the names of the heads of all the households in residential structures in selected PSUs. The household listing operation was carried out by independent teams.

A complete listing of households was carried out in the villages with household up to 400 households. In case of villages with more than 400 households were divided into at least three segments of 150-300 households as average size of each segment and two segments were selected for households listing using the systematic random sampling method. In each selected PSU, 50 households were selected from the household list using systematic random sampling.

Sample Selection in Urban Areas

The 2001 Census list of wards was used as the sampling frame. All wards were stratified by geographic regions, size of ward and percentage of SC/ST population. Female literacy was used for implicit stratification. A sample of wards was selected systematically with probability proportional of ward. One Census Enumeration Block (CEB), consisting of approximately 150-200 households, was selected from each selected ward using the PPS sampling method. The household listing operation was carried out in each selected census enumeration block similarly as in the village in rural area, which provided the necessary frame for selecting 50 households from the CEB.

Sample Weights

Appropriate sampling weights for households were used for urban and rural areas of the state. In urban sector it consisted of factors reflecting ward selection probabilities, Census enumeration block (CEB) selection probabilities within wards; and household selection probabilities within CEB; and household non-response adjustments. In rural sector, the element of weight consisted of factors reflecting probability of selection of PSU, household selection probability within the PSU, and household non-response adjustments.

From each selected household one member aged 15-54 was selected using the KISH method and all members aged 55-64 were selected. Since objective of the study was to obtain estimates for each age group (15-24 through 55-64) and by sex, post stratification was used for improvement of efficiency of the estimators. Post stratification weights for individuals are constructed using the state age distributions for both sexes of the urban and rural sector, which are available on the population level (Appendix-A)[6].

Sample Implementation

During the survey, information collected from a random sample of 4932 households covering 2487

households from rural and 2445 from urban areas. From these households, a total of 5444 respondents were contacted out of which 5443 completed the Step-1, and 5433 completed the Step-2 survey. The overall individual non-response rate for the survey was less than 1% (Table 1.3)

listed all usual residents age 12 years and above, in each sample household. For each listed members, survey collected basic information on age, sex and relationship to the head of the household. The residential status (whether present in the household or temporary away from household) was gathered. The above information

Table 1.3 Sample coverage and response rate of household, step-1 and step-2 individual response rate by place of residence, Uttarakhand, 2007- 08

| | Residence | | |
Respons	Urban	Rural	Combined
Households interview			
Households contacted	2500	2500	5000
Households interviewed	2445	2487	4932
Households response rate (%)	97.8	99.4	98.6
Eligible Participants Step-1			
Individual contacted	2694	2750	5444
Individual interviewed	2694	2749	5443
Response rate (%)	100.0	99.9	99.9
Eligible Participants Step-2			
Step-2 completed	2693	2742	5433
Overall Individual response rate (%)	99.9	99.7	99.8

Against the target sample size of 280, there is low turnout in certain age groups and high turn out in other (it may be seen in the subsequent table 2.2). It might be due to either misreporting of age or replacement of the individual who was selected but not available at the time of interview affecting the use of Kish method to give the required sample size. In fact, the Kish method was used in each selected household to select one respondent amongst those who were aged 15-54. It was done by the field investigator after listing of members of the household and arranging them according to age, sex and then selecting one respondent for the interview. There is possibility that some respondents in the age group15-54 particularly males were not available at home during the survey (10AM to 5 PM) and thereby might have been replaced by those household members who were present at the time of survey.

1.6 SURVEY INSTRUMENTS

The survey used two types of questionnaire, the Household Questionnaire and the Individual Questionnaire (Appendix-B). The overall content and format of the questionnaires were determined through a series of workshops and meetings held in 2006-07. The questionnaires for each state were bilingual with questions in both the English and principal language of the state which was Hindi in the present case. It first

was used to identify the eligible individual for the survey in the age group 15-64 years, for administering individual questionnaire. The Household Questionnaire also collected information on religion, ownership of a house, type of house with number of rooms, main source of drinking water, type of toilet facility, main source of lighting, types of cooking fuel, type of oil/cooking medium, ownership of agricultural land, ownership of livestock and possession of durable goods.

The Individual Questionnaire included questions seeking information from all the selected individuals (men and women) in the age group 15-64. The Individual Questionnaire covered information on demographic, behavioural and physical measurements under STEP- I and STEP-II with a number of sections into them. The first section of STEP-I included questions regarding the demographic information of individual, i.e., age, sex, marital status, education, and occupation. The behavioural information section included questions on tobacco use, alcohol consumption, diet, physical activity, history of raised blood pressure and history of diabetes.

Tobacco Use (Smoking & Smokeless): Questionnaire was used to elicit information on current and past use of tobacco (smoking & smokeless), age when used tobacco for first time, past history of tobacco use, and age when stopped using tobacco.

Alcohol use: Questionnaire collected information on whether the individual was currently using alcohol, use of alcohol in past 12 months, frequency of drinks in past 12 months, average number of drinks consumed in one day, alcohol consumed within past 30 days, number of standard alcoholic drinks consumed per day in past 7 days, past history of alcohol consumption, and age when started consuming alcohol regularly.

The contents and format of these questionnaires were though largely governed by the WHO STEPS guidelines but they were finalized through a series of consultative meetings held at the Indian Council of Medical Research.

Diet: Questions were asked to collect information on number of days in a week when fruits were consumed, number of serving of fruits consumed in a day, number of days in a week when vegetables were consumed, number of serving of vegetables consumed in a day, frequency of consumption of cheese and butter, fried local food, red meat, eggs, chicken, fish, aerated soda, sweetened drinks, pizza/burger/French fries, cakes/pastries or other bakery items, chips/*namkeen*.

Physical Activity: Questions were asked about the intensity of physical activity in the daily work, frequency of doing physical activity of varying intensity, time spent in doing physical activity of varying intensity per day, mode of travel to and from places, time spent walking or bicycling, type of vigorous/moderate intensity sports for recreation being practiced, frequency of doing such vigorous/moderate intensity sports in a week, time spent doing vigorous/moderate intensity sports per day, practice of yoga, frequency of practicing yoga, duration of time spent per day in yoga, time spent sitting or reclining etc.

History of Raised Blood Pressure: Questions were asked on history of hypertension, medicines prescribed by a doctor and the advice given regarding diet, weight loss, smoking and nature of physical activity undertaken.

History of Diabetes: Questions covering history of diabetes, medicines prescribed by a doctor and advice given regarding diet, weight lose, smoking and physical activities were asked.

Individual questionnaire included several biomarker measurements in Step-2. The height of the eligible individual participant was taken in centimeter by using a portable height measuring board and also measured weight in kilogram using a portable electronic weighting scale. Waist circumference (not measured for pregnant women) was taken two times to provide additional information on overweight and obesity. Constant tension tape (Figure finder tape) measure was used for waist circumference measurements. The measurement was taken without clothing, that is, directly over the skin or over light clothing. The privacy area was maintained for this measurement.

Blood pressure of the individual participants was taken three times using automated blood pressure measuring instrument (OMRON®) and pulse rate was also measured three times using an automated blood pressure device.

1.7 TRAINING

In order to maintain uniform survey procedure across the country, a manual dealing with various aspects of the survey were prepared by NIMS, ICMR. There are five sections: (1) Project Protocol, (2) Survey Methodology, (3) Coordinator's Guide, (4) Trainers Guide and (5) Interviewer's Guide. The Interviewer's Guide consists of guidelines to the interviewers regarding interviewing procedure, field procedures and method on asking each question and recording answers. The Coordinator's Guide contains a detail description of the role and responsibilities of the state coordinators. The Trainer's Guide include training guidelines for the training of the field staff including survey methodology, survey instruments, mapping and list of households, preparation and collection of data.

The representatives of State Survey Agencies (SSAs) and Regional Resource Centres (RRCs) were trained in the Training of Trainers workshop and Data Entry & Management Workshop organized by NIMS at the beginning of the data collection (18-20 July 2007). The purpose of the former workshop was to explain the objective of the NCD Risk Factors Survey and ensure uniform application of survey material to collect good quality of data. The survey documents such as training manuals, survey instruments, list of selected rural and urban PSUs etc. was provided to them for conducting the survey. The equipments required for survey was procured centrally by ICMR and distributed to the SSAs and RRCs. The personnel trained in these workshops subsequently trained the field staff in their respective states.

Training of Field Staff

As mentioned, the field staff recruited for the survey in Uttarakhand was trained by Department of Community Medicine, Chhatrapati Shahuji Maharaj Medical University (CSMMU), UP., Lucknow, and the

officials of NIMS, New Delhi, supervised the training process. The training was conducted from 15-17 October, 2007 at Department of Community Medicine, Chhatrapati Shahuji Maharaj Medical University (CSMMU), Lucknow. The training consisted of lectures, classroom training, demonstration, practice interviews and field based training. A total of 28 participants were trained, 4 were faculty, 5 were assistant coordinators (PGs), 4 were supervisors and 15 were interviewers. It was ensured that each survey team comprised of at least one male and one female member.

Each trainee was given a training kit at the beginning of training, the training kit comprised of an interviewers guide, household and individual schedules in Hindi, consent form, IEC message, set of Show Cards (e.g. Diet chart, Alcohol chart) and reference forms (e.g. Kish table, table of random numbers), flow chart of activities in field, identity card and supporting letters from Government mentioning purpose of visit. A field visit to urban slum of Alambagh in Lucknow district was also arranged as part of practical training of investigators in field activities and procedure for conducting a survey and as part of pre-test. After the completion of training, letters were issued through Directorate of Health Services to DHOs, Municipal corporations and Municipalities across the State, and Deputy Director of Health Services requesting their cooperation in smooth conduction of the survey.

Data Entry Training

Data entry software in Epi-info with its manual was developed by the NIMS, ICMR. A two-days data entry workshop cum hands on training was organized by NIMS, ICMR during 10-11 December 2007 for the statisticians and date entry personnel of the state survey agencies (SSAs). The purpose of the workshop was to familiarize the participants with the software. Emphasis was made on double data entry in order to ensure high accuracy in data entry and to minimize data entry errors. All the participants were provided with the Data Entry Software and its Manual.

1.8 DATA PROCESSING AND ANALYSIS

Following the data entry by the state survey agency (SSA), the validity and consistency check was carried out by the NIMS, ICMR for final analysis. Analysis plan in terms of dummy tables was finalized in consultation with ICMR Review Groups.

Prevalence of current smokers, current daily smokers and past daily smokers was calculated among the respondents by sex and place of residence. Those who smoke tobacco daily, the mean number of tobacco products (*bidis, cigarettes, pipes, cigars,* etc.,) used daily was calculated taking denominator as all daily smokers. Though the age of initiation of smoking was collected from all daily smokers in completed years but for the past smokers it was calculated by imputation because it was not recorded. Finally average age of initiation of smoking was calculated in two age groups of smokers, 15-34 years and 35-64 years. The same procedure was followed for the calculation of average age of initiation of smokeless tobacco. Prevalence of alcohol consumption was calculated for last twelve month, last thirty days and last seven days and presented as percentage. The mean age of initiation of alcohol consumption was also calculated. Mean number of servings fruit, vegetables, and combined (fruit and vegetables) consumed per day was computed.

Mean physical activity per day was computed by combining all types of physical activity (vigorous, moderate-intensity, travel and recreational) using METs (Metabolic Equivalent) score. Prevalence of reported cases of blood pressure and diabetes were also calculated. Measurement of height, weight and waist circumference of individual respondent was used to compute BMI (body mass index) and central obesity.

1.9 QUALITY CONTROL MEASURES

A uniform project protocol, survey methodology, training manuals, survey instruments and data-management modules were developed and adopted across all the states including Uttarakhand. It was executed by the Department of Community Medicine, CSMMU, Lucknow (SSA) and was monitored by the Department of Community Medicine, AIIMS, New Delhi (RRC). The Division of Non-Communicable Diseases, Indian Council of Medical Research and the National Institute of Medical Statistics coordinated and supervised the survey in the state along with other states. In addition, an independent check by collecting data in randomly drawn sample of 10% of PSUs was carried out by RRC. High concordance was recorded between the survey by SSA and independent checked by RRC on some key indicators like smoking, alcohol consumption and physical activity with an overlapping of 95% confidence intervals. Various activities hitherto were to maintain the highest level of the quality of data.

Background Characteristics of the Households and Respondents

This chapter presents the demographic and socio-economic characteristics of the sample households and the respondents from these households in the survey population of Uttarakhand. It also describes facilities in the households.

2.1 HOUSEHOLD CHARACTERISTICS

Table 2.1 provides the percentage distribution of households in rural and urban areas by various characteristics of the surveyed households. Majority of the households (88%) were Hindu followed by Muslim (11%) and Buddhist (1.3%). Hindu constitutes 81% of urban households and 90% of rural households. Sixty five percent of sample households had piped drinking water supply followed by 21% from hand pump, 13% from surface water and a small fraction (1.2%) from well and other sources. It was found that 84% of urban households and 58% of rural households had piped drinking water supply. Regarding the sanitation facility, 33% of the households had flush toilets and 67% had pit toilets. While about 0.2% of the households do not had any toilet facility. The urban households were more likely to have access to the flush toilets (76%) as compared to rural households (18%) in Uttarakhand.

Over seventy five percent (75%) households used electricity as main source of lighting which was higher

Table 2.1 Percentage distribution of households in rural and urban area according to the background characteristics, Uttarakhand, 2007- 08

Characteristics	Residence		Combined
	Urban	Rural	
Religion of household head			
Hindu	81.4	90.0	87.8
Muslim	16.2	9.0	10.9
Buddhist	2.0	1.0	1.2
Other	0.3	0.0	0.1
Total	100.0	100.0	100.0
Source of Drinking Water			
Piped	84.4	57.8	64.6
Hand pump	14.2	23.4	21.0
Well water	0.0	0.7	0.5
Surface water	1.0	17.4	13.2
other	0.4	0.7	0.7
Total	100.0	100.0	100.0
Sanitation Facility			
Flush Toilet	75.7	18.2	33.0
Pit Toilet	24.0	81.4	66.8
No facility	0.3	0.2	0.2
Total	100.0	100.0	100.0
Main source of lighting			
Electricity	98.5	66.9	75.0
Kerosene	1.4	31.5	23.9
Gas/Oil	0.0	0.4	0.3
Others	0.1	1.2	0.8
Total	100.0	100.0	100.0

Type of House			
Pucca	90.0	47.2	58.2
Semi-Pucca	7.7	34.6	27.7
Kachha	2.3	18.2	14.1
Total	100.0	100.0	100.0
Cooking fuel			
LPG	82.3	19.7	35.8
Wood	13.3	72.0	57.0
Kerosene	2.3	0.1	0.6
Others	2.1	8.2	6.6
Total	100.0	100.0	100.0
Separate kitchen room			
Yes	81.8	55.0	61.9
No	18.2	45.0	38.1
Total	100.0	100.0	100.0
Agriculture land			
Own agriculture land (%)	11.8	71.4	56.1
Number	2445	2487	4932

in urban area (99%) than that in the rural area (67%). In the state, 58% households had *pucca* house, 28% households have *semi-pucca* house and 14% households have *kaccha* house. High percentage of households in the urban area (90%) had *pucca* houses compared to the rural area (47%). Several types of fuel were used for cooking in Uttarakhand, wood as the most common type (72%) in the rural area and L.P.G. was most common (82%) in urban area. In the state as whole, 57% households usage wood followed by L.P.G. (36%) and kerosene (2%).

Four in every ten households in Uttarakhand had no own agricultural land. One-fourth households in rural area had no own agricultural land compared to 88% in urban area. The proportion of households having separate kitchen was 62%. This percentage was 82 in urban area against 55 in rural area.

2.2 BY AGE AND SEX COMPOSITION

A total of 5433 individual with 2147 males and 3286

females from urban and rural areas were contacted and interviewed in the survey. They are presented in 10 years age groups 15-24, 25-34, 35-44, 45-54 and 55-64. The distribution of the number of respondents across the five age groups is depicted for both males and females as well as for both sex together, separately for urban and rural areas and combined in Table 2.2. It may be seen that the number of respondents was least, i.e. 721, in the age group 55-64 and maximum, i.e., 1379 in age group 25-34 years.

2.3 EDUCATION LEVEL

Table 2.3 presents the percentage of the respondents according to their literacy levels by sex and place of residence. Twenty six percent of the total respondents were illiterate whereas 28% were with primary or middle, 33% were secondary or in higher secondary, while 13% were educated up to college and above. In the sample, 38% females and 14% males were illiterate. The proportion of illiterate respondents

Table 2.2 Age and sex-wise distribution of respondents by type of residence (unweighted), Uttarakhand, 2007- 08

	Residence						Combined		
	Urban			Rural					
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total
15 – 24	289	333	622	262	412	674	551	745	1296
25 – 34	235	451	686	224	469	693	459	920	1379
35 – 44	235	338	573	215	323	538	450	661	1111
45 – 54	165	277	442	176	308	484	341	585	926
55 – 64	189	181	370	157	194	351	346	375	721
15 - 64	1113	1580	2693	1034	1706	2740	2147	3286	5433

among rural females was as about the twice as high than that among urban females. A higher percentage of males than of females had completed almost each level of schooling excepting the primary level where slightly lower percentage of males, than females, had such education level. Education levels were much higher for urban respondents than rural respondents.

2.4 MARITAL STATUS

The second panel of Table 2.3 shows the percentage of respondents according to the three marital categories by sex and place of residence. Two third of the respondents were currently married, 29% were never marriedand 4% were widowed divorced or separated. The proportion of respondents who were currently married did not vary much by urban and rural residents.

2.5 OCCUPATION

Table 2.3 provides information on the current occupation of the respondents. In the sample about three-fourth females (76%) were currently engaged in domestic works. Individuals involved in agricultural activities was about 20% in case of males and 8% in case of females. About 9% individuals were engaged in work related to sales and services and only 13% of the total respondents were engaged in some kind of manual work.

Table 2.3 Percentage of respondents according to background characteristics, sex and place of residence, Uttarakhand, 2007- 08

| Characteristic | Residence | | | | | | Combined | | |
| | Urban | | | Rural | | | | | |
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Education									
Illiterate	8.9	22.0	14.8	16.8	44.1	30.8	14.4	38.4	26.3
Primary	8.7	8.8	8.7	11.9	13.1	12.5	10.9	12.0	11.5
Middle	12.3	12.6	12.4	21.2	16.3	18.7	18.5	15.3	16.9
Secondary	21.4	15.2	18.6	24.7	12.2	18.3	23.7	12.9	18.3
Higher Secondary	21.5	16.6	19.3	15.6	9.3	12.3	17.4	11.1	14.3
College & above	27.2	24.8	26.2	9.8	5.0	7.4	15.1	10.2	12.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Marital status									
Never married	37.8	23.2	31.2	35.5	19.8	27.4	36.2	20.6	28.5
Married	61.2	72.1	66.1	62.2	73.2	67.9	61.9	72.9	67.4
Widowed/Divorced/ Separated	1.0	4.7	2.7	2.3	7.0	4.7	1.9	6.5	4.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Occupation									
Executive/Business	16.4	0.6	9.2	5.8	0.4	3.0	9.0	0.4	4.7
Agriculture	1.6	0.3	1.0	27.7	10.5	18.9	19.7	7.9	13.8
Domestic Work	0.7	76.8	35.1	1.0	75.6	39.3	0.9	75.9	38.1
Services/Sales	28.0	5.4	17.8	10.3	1.6	5.9	15.7	2.6	9.2
Manual Worker	21.5	1.3	12.4	25.1	2.2	13.3	24.0	2.0	13.2
Other	31.8	15.6	24.5	30.1	9.7	19.6	30.7	11.2	21.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	1113	1580	2693	1034	1706	2740	2147	3286	5433

Behavioural Risk Factors

This chapter presents the prevalence of certain behavioural risk factors for the non-communicable diseases in the survey population. The survey questionnaire asked questions about certain life style of respondents which could be considered as the behavioural risk factors for non-communicable diseases.

3.1 TOBACCO SMOKING AND CHEWING

As per the WHO STEPS guidelines to measure the prevalence of smoking habit among the respondents, the smokers are categorized as c*urrent smokers*, c*urrent daily smokers*, p*ast daily smokers* and those who have never smoked in lifetime were classified as n*on-smokers*.

Table 3.1.1 presents the percentage of respondents, both male and female as well as combined in various categories of smokers and non-smokers according to the place of residence (rural or urban). Two in every ten respondents in the survey was current smoker. They were mostly current daily smokers. The prevalence of smoking was more among men (35%) than among women (5%). By place of residence, 15% of urban respondents and 22% of rural respondents were current daily smokers. The percentage of past daily smokers was very low (2%).

Table 3.1.2 presents the mean number of tobacco products smoked daily among those respondents who were current daily smoker of any form of tobacco.

Among those who were current daily smokers of different product of tobacco, the mean number of smoking per day was 14 in case of *bidis* and 5 for manufactured cigarettes. There was marked difference between male and female respondents in the frequency of smoking being bidi or manufactured cigarette. The frequency of smoking bidi per day was 14 for rural and urban respondents. In case of manufactured cigarettes however, the mean number of smoking was little higher among urban respondents (6 per day) as compared to rural respondents (5 per day).

Table 3.1.1 Percentage of respondents classified by smoking status across sex and place of residence, Uttarakhand, 2007- 08

Residence/ Sex	Smoking Status							
	Current smokers		Current daily smokers		Past daily smokers		Never smoked	
	P (%)	95% CI	P (%)	95% CI	P (%)	95% CI	P (%)	95% CI
Urban								
Male	27.3	(24.2, 30.3)	26.7	(23.8, 29.7)	3.7	(2.8, 4.8)	69.0	(65.5, 72.3)
Female	0.6	(0.1, 1.0)	0.6	(0.3, 1.2)	0.3	(0.1, 0.8)	99.1	(98.3, 99.5)
Total	15.2	(13.6, 17.0)	14.9	(13.3, 16.6)	2.1	(1.6, 2.8)	82.7	(80.5, 84.5)
Rural								
Male	38.7	(34.1, 43.6)	38.1	(33.5, 42.9)	3.7	(2.7, 5.0)	57.6	(53.0, 62.1)
Female	6.5	(4.7, 8.7)	6.2	(4.4, 8.5)	0.8	(0.5, 1.5)	92.7	(90.1, 94.6)
Total	22.1	(19.3, 25.2)	21.7	(18.9, 24.8)	2.2	(1.7, 2.9)	75.7	(72.5, 78.5)
Combined								
Male	35.2	(31.9, 38.7)	34.6	(31.3, 38.1)	3.7	(3.0, 4.6)	61.1	(57.7, 64.3)
Female	5.0	(3.7, 6.6)	4.8	(3.5, 6.5)	0.7	(0.4, 1.2)	94.3	(92.4, 95.7)
Total	20.2	(18.1, 22.4)	19.8	(17.7, 22.0)	2.2	(1.8, 2.7)	77.6	(75.3, 79.7)

Table 3.1.2 Mean number of tobacco products smoked (per day) by daily smokers according to sex and place of residence, Uttarakhand, 2007- 08

Residence/ Sex	Type of smoking			
	Bidi		Manufactured Cigarettes	
	Mean	95% CI	Mean	95% CI
Urban				
Male	14.2	(12.6, 15.8)	5.7	(4.8, 6.6)
Female	7.4	(4.4, 10.4)	*	
Total	14.0	(12.5, 15.6)	5.7	(4.8, 6.6)
Rural				
Male	15.0	(13.8, 16.2)	5.0	(4.0, 6.0)
Female	9.8	(7.9, 11.6)	*	
Total	14.2	(13.1, 15.4)	5.0	(4.0, 6.0)
Combined				
Male	14.9	(13.9, 15.9)	5.3	(4.7, 6.0)
Female	9.7	(7.9, 11.5)	*	
Total	14.2	(13.3, 15.2)	5.3	(4.7, 6.0)

* No observation

Table 3.1.3 presents the mean age of initiation, age at stopped of smoking and the percentage of non-smoker respondents exposed to tobacco smoke by sex and the place of residence.

The mean age for initiation of smoking among young respondents aged 15-34 years was 19 years and among all respondents aged 35-64 years was 20 years. The mean age of cessation of smoking for all those who stopped smoking was 34 years. On an average, for both rural and urban respondents in Uttarakhand, age at initiation of smoking was 20 years among all those respondents whose current age was 35-64 years. The mean age of initiating smoking for an urban male in the age group 15-34 years was 19 years whereas it was 20 years for a rural male; the age of initiation of smoking for rural females was 19 years. There was negligible number of urban women, who were smoking tobacco. The age of initiation of smoking tobacco in the age group 35-64 years was 20 years for rural male and 28 years for rural female respondents whereas among the urban smokers the mean age of initiation for males was 20 years and 22 years for females. The mean age of cessation of smoking for rural male was 33 years and for urban male it was 37 years; mean age of cessation of smoking for female was 35 years.

Table 3.1.3 Mean age of initiation, age at stopped smoking and percentage of respondents (non-smokers) exposed to tobacco smoke by sex and place of residence, Uttarakhand, 2007- 08

Residence/ Sex	Smokers						Non-smokers	
	Age of Initiation (15-34 years)		Age of Initiation (35-64 years)		Age at Stopped		Exposed to tobacco smoke at Home or Work	
	Mean	95% CI	Mean	95% CI	Mean	95% CI	P (%)	95% CI
Urban								
Male	19	(18.5, 20.5)	20	(19.5, 22.5)	37	(33.7, 40.4)	34.3	(29.3, 39.2)
Female	*	*	22	(16.5, 40.5)	*	*	29.2	(25.3, 33.1)
Total	19	(18.5, 20.5)	20	(19.5, 22.5)	36	(32.9, 39.6)	31.6	(28.1, 35.1)
Rural								
Male	20	(18.5, 20.5)	20	(19.5, 20.5)	33	(29.1, 38.6)	49.2	(42.7, 55.7)
Female	19	(13.5, 22.5)	28	(24.5, 30.5)	*	*	46.0	(40.3, 51.8)
Total	19	(18.5, 20.5)	20	(19.5, 22.5)	33	(29.9, 37.2)	47.2	(42.0, 52.5)
Combined								
Male	19	(18.5, 20.5)	20	(19.5, 20.5)	34	(31.4, 37.1)	44.1	(39.6, 48.7)
Female	19	(15.5, 22.5)	27	(23.5, 30.5)	35	(26.5, 45.0)	41.5	(37.3, 45.8)
Total	19	(18.5, 20.5)	20	(19.5, 21.5)	34	(31.6, 37.1)	42.6	(38.9, 46.3)

*figure not shown, based on fewer than 10 unweighted cases

About 43% respondents of those who never smoked were exposed to tobacco smoke at home or work place. It was 44% in case of men and 42% in case of women. Over 32% of the urban respondents and 47% of the rural respondents are exposed to tobacco smoke at home or work place.

Table 3.1.4 provides percentage of smokeless tobacco users by sex and place of residence of the respondents.

About 12% of the respondents were current user of smokeless tobacco with 21% among men and 2% among women. A small percentage of men and women (less than 2%) were past daily users. The prevalence of smokeless tobacco use was higher in rural area (12%) as compared to that of the urban area (10%). More men

(23% in rural area and 16% in urban area) than women (2% in rural area and 3% in urban area) were current daily users of smokeless tobacco.

The mean number of consumptions per day of various smokeless tobacco products such as tobacco chewing, pan with tobacco, snuff by mouth, snuff by nose and others are provided in Table 3.1.5. The mean number of times chewing tobacco per day in Uttarakhand was about 6 (6 for men and 5 for women). There was no urban-rural differential in frequency of chewing tobacco. For those who chew pan with tobacco was 4 for men and 5 for women. The mean number of times chewing pan with tobacco for urban female was 5, for urban male was 3, for rural male was 4 and for rural female it was 5.

Table 3.1.4 Percentage of smokeless tobacco users by sex and place of residence, Uttarakhand, 2007- 08

Residence/ Sex	Smokeless tobacco user							
	Current user		Current daily user		Past daily user		Never used	
	P (%)	95% CI	P (%)	95% CI	P (%)	95% CI	P (%)	95% CI
Urban								
Male	16.2	(13.1, 19.4)	15.9	(12.8, 19.1)	1.8	(1.1, 2.9)	82.0	(78.6, 85.5)
Female	2.5	(1.5, 3.4)	2.3	(1.4, 3.2)	*	*	97.3	(96.2, 98.3)
Total	10.0	(8.1, 11.9)	9.8	(7.9, 11.7)	1.1	(0.7, 1.7)	88.9	(86.9, 91.0)
Rural								
Male	23.2	(19.5, 27.3)	23.0	(19.3, 27.1)	1.7	(1.0, 2.9)	75.2	(71.2, 79.0)
Female	2.2	(1.3, 3.5)	1.9	(1.1, 3.3)	0.1	(0.0, 0.4)	97.7	(96.7, 98.9)
Total	12.4	(10.2, 14.9)	12.1	(10.0, 14.7)	0.9	(0.5, 1.4)	86.7	(84.5, 89.2)
Combined								
Male	21.0	(18.3, 24.1)	20.8	(18.1, 23.8)	1.8	(1.2, 2.5)	77.3	(74.7, 80.3)
Female	2.2	(1.6, 3.2)	2.0	(1.4, 3.0)	0.1	(0.0, 0.3)	97.7	(97.0, 98.6)
Total	11.7	(10.1, 13.5)	11.5	(9.9, 13.3)	0.9	(0.6, 1.3)	87.4	(85.9, 89.2)

*Percentage not shown, based on fewer than 10 unweighted cases

Table 3.1.5 Mean frequency of smokeless tobacco use (per day) by the daily smokeless tobacco users according to sex and place of residence, Uttarakhand, 2007- 08

Residence/ Sex	Type of smokless tobacco			
	Chewing tobacco		Pan with tobacco	
	Mean	95% CI	Mean	95% CI
Urban				
Male	6.0	(5.3, 6.8)	3.1	(1.9, 4.3)
Female	4.9	(3.4, 6.4)	5.3	(4.5, 6.1)
Total	5.9	(5.3, 6.6)	3.9	(2.9, 4.9)
Rural				
Male	5.7	(5.1, 6.2)	4.1	(1.3, 6.9)
Female	4.5	(3.0, 6.1)	4.7	(3.8, 5.6)
Total	5.6	(5.1, 6.2)	4.5	(3.5, 5.4)
Combined				
Male	5.7	(5.3, 6.2)	3.5	(2.2, 4.8)
Female	4.7	(3.6, 5.8)	4.8	(4.2, 5.5)
Total	5.7	(5.3, 6.1)	4.2	(3.6, 4.9)

The mean age of initiation and stopped using of smokeless tobacco use by sex and place of residence of respondents was provided in Table 3.1.6. The mean age of initiation of smokeless tobacco use for those who use smokeless tobacco and were aged 15-34 years, was 20 years for both males and females. Rural female appears to initiate smokeless tobacco slightly earlier (19 years) than rural males (20 years). For respondent aged 35-64 years, the mean age of initiation of smokeless tobacco use was 26 years (25 years for males and 30 years for females). The mean age of quitting smokeless tobacco use was 32 years; it was 33 years in case of urban men. The mean age of quitting smokeless tobacco use for urban respondents was 33 years against 32 years for rural respondents.

Table 3.1.7 presents the percentage of smokers and smokeless tobacco users by sex and the place of residence. It shows that 27% of respondents were either smoking or using smokeless tobacco whereas 4% of the respondents were using both forms of tobacco, i.e. smoking and also smokeless tobacco. The use of either smoking or smokeless tobacco was 22% for urban and 29% for rural. The use of both the forms of tobacco (smoking as well as smokeless tobacco) was 3% for urban and 5% for rural. The percentage of respondents either smoking or using smokeless tobacco among men (48%) was as high as the seven times of that among women (7%).

Table 3.1.6 Mean age of initiation, age at stopped smokeless tobacco use by daily smokeless tobacco user according to sex and place of residence, Uttarakhand, 2007- 08

Residence/ Sex	Smokeless tobacco users					
	Age of Initiation (15-34 years)		Age of Initiation (35-64 years)		Age at Stopped	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Urban						
Male	20	(19.5, 20.5)	26	(24.5, 30.5)	32.7	(29.2, 36.2)
Female	*	*	30	(24.5, 32.5)	*	*
Total	20	(19.5, 20.5)	29	(25.5, 30.5)	32.9	(29.6, 36.2)
Rural						
Male	20	(18.5, 20.5)	25	(22.5, 28.5)	31.9	(26.4, 37.4)
Female	19	(15.5, 25.5)	30	(25.5, 35.5)	*	*
Total	20	(18.5, 20.5)	25	(22.5, 30.5)	31.7	(26.7, 36.8)
Combined						
Male	20	(19.5, 20.5)	25	(24.5, 28.5)	32.1	(28.4, 35.9)
Female	20	(15.5, 27.5)	30	(25.5, 32.5)	*	*
Total	20	(19.5, 20.5)	26	(25.5, 30.5)	32.2	(28.8, 35.6)

*figure not shown, based on fewer than 10 unweighted cases

Table 3.1.7 Percentage of tobacco users by sex and place of residence, Uttarakhand, 2007- 08

Residence/ Sex	Tobacco Use							
	Smokeless tobacco users only		Smokers only		Both (Smoking and smokeless)		Any form (Smoking or smokeless)	
	P (%)	95% CI	P(%)	95% CI	P (%)	95% CI	P (%)	95% CI
Urban								
Male	11.1	(8.9, 13.7)	21.8	(19.0, 24.9)	4.9	(3.7, 6.4)	37.7	(33.5, 42.1)
Female	2.3	(1.6, 3.3)	0.6	(0.3, 1.1)	*	*	2.9	(2.0, 4.1)
Total	7.1	(5.8, 8.7)	12.2	(10.7, 13.9)	2.7	(2.0, 3.6)	22.0	(19.5, 24.8)
Rural								
Male	13.9	(11.4, 16.9)	29.1	(25.2, 33.2)	9.0	(6.6, 12.1)	52.0	(47.6, 56.4)
Female	1.6	(0.9, 2.9)	5.9	(4.2, 8.1)	*	*	7.8	(5.8, 10.4)
Total	7.6	(6.2, 9.4)	17.1	(14.8, 19.7)	4.5	(3.3, 6.2)	29.3	(26.3, 32.5)
Combined								
Male	13.1	(11.2, 15.2)	26.8	(24.1, 29.8)	7.8	(6.0, 9.9)	47.7	(44.3, 51.0)
Female	1.8	(1.2, 2.7)	4.5	(3.3, 6.2)	*	*	6.6	(5.1, 8.4)
Total	7.5	(6.4, 8.8)	15.8	(14.1, 17.6)	4.0	(3.1, 5.2)	27.2	(25.0, 29.6)

*Percentage not shown; based on fewer than 10 observation.

Tobacco is one of the major risk factors of non-communicable diseases. About 35% of male population smoked tobacco daily whereas smoking among females was low (5%). Overall 12% of the population used smokeless tobacco whereas 21% of men and only 2% of women used smokeless tobacco. Twenty seven percent of population in Uttrakhand used tobacco in any form (i.e. smoking or smokeless). This prevalence was 48% among males and 7% among females. The mean age of initiation of tobacco use among young age (15-34 years) people was 19 years for male and female smokers, and 20 years for male and female smokeless tobacco users. These findings emphasize the need of implementing the tobacco control programme for prevention of NCD.

3.2 ALCOHOL CONSUMPTION

Table 3.2.1 presents the percentage of respondents who consumed alcohol in past 30 days and 12 months by sex and place of residence. About 12% respondents have consumed alcohol in past 30 days and 16% consumed in past 12 months. Only 2% respondents were past drinker. Twenty four percent men consumed alcohol in past 30 days and about one third (32%) men consumed alcohol in past 12 months. Women were not involved in consumption of alcohol. Percentage of lifetime abstainer to alcohol was higher among urban men (68%) as compared to that among rural men (64%). Rural men were more likely to consume alcohol (26% in past 30 days and 33% in past 12 months) than urban men (19% in past 30 days and 28% in past 12 months).

Table 3.2.2 presents the percentage of those who consume alcohol according to frequency of consuming alcohol in past 12 months, mean number of standard drinks consumed on a drinking day, frequency of

Table 3.2.1 Percentage of Alcohol consumption by sex and place of residence, Uttarakhand, 2007- 08

Residence/ Sex	Alcohol Consumption							
	Consumed alcohol (Last 30 days)		Consumed alcohol (Last 12 months)		Past drinker		Life time abstainer	
	P (%)	95% CI	P (%)	95% CI	P (%)	95% CI	P (%)	95% CI
Urban								
Male	18.9	(15.0,23.5)	27.8	(23.5,32.5)	4.4	(3.0,6.5)	67.8	(64.4,74.2)
Female	*	*	*	*	*	*	99.9	(99.5,100.0)
Total	10.4	(8.3,13.0)	15.3	(12.9,17.9)	2.1	(1.4,3.0)	82.6	(80.4,85.8)
Rural								
Male	25.5	(21.5,29.9)	33.3	(28.8,38.1)	5.0	(3.4,7.4)	63.5	(59.5,69.3)
Female	*	*	*	*	*	*	99.7	(99.4,99.9)
Total	12.5	(10.4,14.9)	16.3	(14.1,18.8)	2.0	(1.4,2.9)	81.7	(80.0,85.1)
Combined								
Male	23.5	(20.4,26.8)	31.6	(28.3,35.2)	4.8	(3.6,6.4)	63.6	(61.7,69.0)
Female	*	*	*	*	*	*	99.8	(99.5,99.9)
Total	11.9	(10.3,13.7)	16.0	(14.3,17.9)	2.0	(1.5,2.6)	82.0	(80.5,84.3)

*Percentage not shown; based on fewer than 10 unweighted cases.

Table 3.2.2 Percentage of drinkers (past 12 months) according to the frequency of drinking, mean number of standard drinks per day and pattern of drinking in the last seven days by sex and place of residence, Uttarakhand, 2007- 08

Alcohol consumption	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Frequency of drinking in past 12 months (%)									
5-7 days per week	17.2	*	17.2	12.0	*	11.9	13.4	*	13.3
1-4 days per week	15.3	*	15.3	14.3	*	14.6	14.6	*	14.8
1-3 days per month	30.9	*	31.0	37.7	*	37.5	35.9	*	35.8
Less than once per month	36.6	*	36.6	36.0	*	35.9	36.1	*	36.1

Mean number of drinks on a drinking day	8.7	*	8.7	8.1	*	8.1	8.2	*	8.2
Drinks during last 7 days									
Alcohol consumed on 4+days (%)	23.1	*	23.0	15.9	*	16.0	17.6	*	17.7
**Binge drinking on any day (%)	49.2	*	51.7	52.3	*	52.3	51.6	*	51.6
20+ drinks in 7 days (%)	30.1	*	30.3	24.9	*	24.9	26.1	*	26.2
Average standard drinks per day	3.4	*	3.4	3.1	*	3.1	3.2	*	3.2

*Percentage not shown; based on fewer than 10 unweighted cases. **5+ Drinks on any day for male; and 4+ drinks on any day for female

consuming alcohol in past one week and the average standard drinks per day.

Of the current drinkers, 37% in urban area, 36% in rural area and 36% in the combined sample consumed alcohol on less than one occasion in a month. Further, 31% respondents in urban area and 38% respondents in rural area consumed alcohol 1-3 days per month in past one year. About 15% of the current drinkers of urban and rural areas both consumed alcohol 1-4 days every week and about 17 % current drinkers of urban and 12% of the rural area consumed alcohol 5-7 days per week in the past one year. The average numbers of drinks consumed on a drinking day was 8 drinks.

The respondents who were current drinker were also asked about their behaviour in terms of the number of days and number of drinks per day they took in the past 7 days preceding the survey. The survey found that 23% male respondents of urban, 16% male respondents of rural and 18% of males in combined sample consumed alcohol at least 4 days a week. About 52% of current drinkers were in high risk drinking zone (binge drinking); there was no urban-rural differential, but it was concentrated among men. The average standard drink consumed per day was calculated using the data collected for alcohol consumption by current drinkers in the week preceding the survey which was about 3 drinks.

Table 3.2.3 presents the mean age of initiation of alcohol use by sex and the place of residence among current drinkers and past drinkers in the age group 15-34 year and 35-64 years. The mean age of initiation of alcohol consumption regularly in the age group of 15-34 years was 21 years with 20 years for urban and 22 years for rural respondents. They were mostly men. The mean age of initiation in the age group 35-64 years was 26 years.

Table 3.2.4 presents the percentage of current daily smokers and smokeless tobacco users and current drinkers by age, education and occupation. The percentage of daily smokers was high in the age group 35-44 years (28%), among illiterates (34%) and manual worker (28%). Similarly, percentage of smokeless tobacco

Table 3.2.3 Mean age of initiation of alcohol use by sex and place of residence, Uttarakhand, 2007-08

Residence/ Sex	Alcohol users			
	Age of Initiation (15-34 years)		Age of Initiation (35-64 years)	
	Mean	95% CI	Mean	95% CI
Urban				
Male	20	(20.5, 22.5)	28	(25.5, 30.5)
Female	*	*	*	
Total	20	(20.5, 22.5)	28	(25.5, 30.5)
Rural				
Male	22	(21.5, 22.5)	25	(25.5, 28.5)
Female	*	*	*	*
Total	22	(21.5, 22.5)	25	(25.5, 28.5)
Combined				
Male	21	(21.5, 22.5)	26	(25.5, 28.5)
Female	*	*	*	*
Total	21	(21.5, 22.5)	26	(25.5, 28.5)

*Figure not shown; based on fewer than 10 un-weighted cases.

Table 3.2.4 Percentage of current daily smokers, daily smokeless tobacco user and current drinkers across age, education and occupation, Uttarakhand, 2007- 08

Characteristic	Daily smoker	Daily smokeless tobacco user	Current drinker
Age group			
15-24	8.3	20.3	8.7
25-34	21.8	32.4	26.6
35-44	28.4	24.9	27.7
45-54	25.6	12.3	22.9
55-64	15.9	10.1	14.1
Total	100.0	100.0	100.0
Education			
Illiterate	33.8	25.6	18.1
Primary	17.3	12.2	14.9
Middle	17.8	21.6	19.0
Secondary	16.6	21.1	23.5
Higher Secondary	7.6	10.8	11.7
College & above	7.0	8.8	12.8
Total	100.0	100.0	100.0
Occupation			
Executive/Business	6.7	9.2	11.3
Agriculture	29.0	20.0	28.6
Domestic Work	10.3	8.3	0.6
Services/Sales	13.7	13.1	21.0
Manual Worker	27.8	33.1	27.0
Other	12.5	16.2	11.5
Total	100.0	100.0	100.0
Number	900	513	498

users was high in the age group 25-34 years (32%), among illiterates (26%) and manual work occupation (33%). The percentage of current drinkers was high (28%) in the age group 35-44, among secondary educated (24%) and those who report their occupation as agriculture (29%).

Interesting observations of alcohol consumption was that about 32% of men consumed alcohol at least once in last one year whereas 24% of men in last one month. The alcohol consumption among females was low. Those who consumed alcohol in last seven days, 52% of them were binge drinkers. The mean age of initiation of alcohol consumption by young age (15-34 years) men was 21 years.

3.3 FRUITS AND VEGETABLES CONSUMPTION

Survey asked questions about the number of days in a typical week on which fruits and vegetables were consumed by the respondents and the number of servings of fruits and vegetables consumed on one of

those days. Table 3.3.1 presents mean number of days of such consumptions by sex and place of residence. In Uttarakhand, mean number of days people consumed vegetables was 5 days and fruits 3 days a week. The mean number of days when fruits consumed was slightly higher in case of urban (3 days) as compared to that of rural population (2 days).

About 89% of respondents report that they had less than five servings of fruits and vegetables per day on those days when they consumed. It was almost same in urban and rural areas. From Table 3.3.2, it can be seen that the mean number of servings of fruits was less than one where as it was more than one in case of vegetables across the sex and place of residence.

Nutritional inadequacy is the major risk factor of many non-communicable diseases. Overall, 89% of population in Uttarakhand consumed less than five servings of fruits and vegetables per day, which was inadequate as per WHO recommended standards. This

Table 3.3.1 Mean number of days in a week fruit and vegetable consumed by the respondents according to sex and place of residence, Uttarakhand, 2007- 08

Fruits and vegetable consumption per week	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Mean Number of days fruits consumed	3.3	3.4	3.3	2.2	2.1	2.2	2.6	2.4	2.5
Mean Number of days Vegetables consumed	5.8	5.9	5.9	5.2	5.0	5.1	5.4	5.3	5.4
Less than five servings of fruits & vegetables consumed per day(%)	85.8	90.1	87.7	86.7	91.4	89.1	86.4	91.1	88.7

Table 3.3.2 Mean number of servings of fruits, vegetables consumed in one particular day by sex and place of residence, Uttarakhand, 2007- 08

Number of servings of fruits/vegetables/both per day	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Servings of fruit	0.8	0.8	0.7	0.6	0.6	0.6	0.7	0.6	0.7
Servings of vegetable	1.8	1.7	1.7	1.5	1.4	1.5	1.6	1.5	1.5
Servings of fruit and vegetable	2.6	2.4	2.5	2.3	2.1	2.2	2.4	2.2	2.3

is an important health issues and needs to be address with more emphatically.

Food and Oil Consumption

The percentage of respondents according to the intake of specific food items at least once a week by place of residence is provided in Table 3.3.3. The specific food items include cheese/butter, fried local foods, red meat, eggs, chicken, aerated soda, sweetened drinks, pizza/burger/French fries, cakes/ pastries or other bakery items, chips/*namkeen* etc. Over 25% population consumed eggs, 18% consumed red meat, 17% consumed cheese/butter, 14% consumed fried local foods, 10% consumed chicken and sweetened drinks at least once a week. Cheese/butter is the only item which was consumed daily by 27% population. Eggs and fried

Table 3.3.3 Percentage of respondents according to the intake of specific food items by sex and place of residence, Uttarakhand, 2007- 08

Specific Food Items	Residence				Combined	
	Urban		Rural			
	Daily	At least once in a week	Daily	At least once in a week	Daily	At least once in a week
Cheese/ Butter	40.5	15.7	21.0	17.5	26.5	17.0
Fried local foods	3.4	17.7	1.3	12.0	1.9	13.6
Red Meat	1.1	22.0	0.6	16.9	0.7	18.3
Eggs	4.3	29.8	1.8	22.8	2.5	24.8
Chicken	0.4	12.9	0.4	9.5	0.4	10.4
Fish	0.3	8.1	0.6	6.8	0.5	7.2
Aerated Soda	1.0	9.5	0.7	3.7	0.8	5.3
Sweetened drinks	2.8	13.9	1.4	8.7	1.8	10.2
Pizza/ burgers/ French fries etc.	0.3	3.1	0.1	0.4	0.1	1.1
Cakes, Pastries or other bakery items	0.2	4.3	0.1	0.7	0.1	1.7
Chips, Namkeen etc.	19.4	41.9	5.8	32.7	9.6	35.3

local foods were also consumed daily by 2% of the population.

Table 3.3.4 presents the type of edible oil used for cooking by the sample households in rural and urban residence. It shows that the use of mustard oil for cooking was highest (81% households with 57% in urban and 89% in rural households) followed by soyabean oil (14% households with 30% in urban and 8% in rural households) and sunflower oil (3.4% households with 10% in urban and 1% in rural households).

Table 3.3.4 Percentage of households according to type of Oil consumption, Uttarakhand, 2007- 08

Type of oil	Residence		Combined
	Urban	Rural	
Mustard oil	56.7	89.1	80.8
Coconut oil	0.6	0.7	0.7
Groundnut oil	0.5	0.0	0.1
Sunflower oil	10.4	1.0	3.4
Soyabean oil	29.9	7.9	13.5
Palm oil	0.4	0.0	0.1
Vanaspati oil	1.1	1.1	1.1
Pure ghee	0.4	0.0	0.1
Total	100.0	100.0	100.0

3.4 PHYSICAL ACTIVITY

It is well known that lack of physical activity leads to obesity, hyperlipidemia, diabetes mellitus, hypertension and coronary heart disease. An account of physical activities of respondents in terms mean time spent (in minutes) in doing physical activity at work, while traveling for work and recreation by sex and the place of residence, is provided in Table 3.4.1. On an average, people in Uttarakhand, were doing some physical activity for duration of 1309 MET minutes per day (771 MET minutes per day for urban and 1518 MET minutes per day for rural respondents). Men, on an average, spent 1312 MET minutes a day while women spent 1305 MET minutes a day on physical activity. The mean time spent in work related physical activity was 175 minutes per day which was 113 minutes per day for urban and 199 minutes per day for rural respondents. The time spent in work related physical activity was more among women (202 minutes per day) than men (149 minutes per day).

The mean time spent in travel related activity (cycling/walking) was found to be 67 minutes per day, it was higher in rural (76 minutes per day) than urban area (50 minutes per day). It was more among men (74 minutes per day) as compared to women (64 minutes per day). The survey also reports that the mean time

Table 3.4.1 Mean time spent (in minutes) on physical activity (MET) per day by gender and residence, Uttarakhand, 2007- 08

Physicl Activity	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Total Physical Activities(MET)									
Mean	748.9	797.2	770.8	1559.6	1478.2	1517.8	1312.3	1304.6	1308.5
95% CI Lower	666.3	725.2	702.9	1412.1	1309.6	1372.8	1210.6	1174.5	1201.3
Upper	831.6	869.2	838.6	1707	1646.8	1662.8	1413.9	1434.8	1415.7
Work Related Activity									
Mean	85.1	147.2	113.2	176.4	220.6	199.2	148.6	201.9	175.1
95% CI Lower	72.5	136.1	102.4	159.0	202.0	182.2	136.3	187.4	162.4
Upper	97.6	158.3	123.9	193.0	239.3	216.1	160.8	216.4	187.8
Travel Related Activities									
Mean	58.6	38.8	49.7	80.3	72.1	76.1	73.7	63.6	68.7
95% CI Lower	52.8	33.5	44.7	73.2	63.0	68.6	68.6	56.6	63.1
Upper	64.4	44.2	54.7	87.4	81.2	83.6	78.8	70.6	74.3
Recreational Activities									
Mean	19.8	11.3	16.0	21.1	7.1	13.9	20.7	8.2	14.5
95% CI Lower	15.5	6.3	12.0	15.9	3.7	10.4	16.9	5.4	11.7
Upper	24.2	16.3	19.9	26.3	10.6	17.5	24.5	11.0	17.3
Number	1113	1580	2693	1034	1706	2740	2147	3286	5433

spent in recreational activities was 15 minutes per day, 16 minutes per day in urban and 14 minutes per day in rural respondents. Men spent more time (21 minutes per day) than women (8 minutes per day) in recreational activities.

According to Who Global Physical Activity Questionnaire Analysis Guidelines[7], the respondents were classified under three categories low, medium and high on the basis of duration for which they perform physical activities of varying intensity. The percentage of respondents according to three categories of physical activity by sex and place residence is presented in Table 3.4.2.

Majority of the respondents (67% overall, 92% in urban and 58% in rural respondents) recorded low physical activity, 25% of respondents (8% in urban and 32% in rural) recorded medium physical activity and only 8% of respondents (1% in urban and 11% in rural) recorded a high level of physical activity.

Table 3.4.3 presents the percentage of respondents according to their category of time spent in physical activity by age and sex. High physical activity was recorded among the people aged 45-54 and 35-44 year compare to the younger age population. The total time spent daily in sedentary activities was also recorded and provided in Table 3.4.4. Majority of the respondents (87%) spent more than 4 hours in sedentary activities.

Table 3.4.2 Percentage of respondents classified in three categories of total physical activity per day (P & 95% CI) by sex and place of residence, Uttarakhand, 2007-08

| Physical Activity | Residence | | | | | | Combined | | |
| | Urban | | | Rural | | | | | |
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Low	87.9	96.1	91.6	54.4	60.6	57.6	64.6	69.7	67.1
95% CI									
Lower	84.4	92.7	89.3	48.3	52.5	51.1	60.3	63.2	62.3
Upper	90.7	97.9	93.4	60.3	68.2	63.8	68.6	75.4	71.6
Medium	10.8	3.8	7.6	33.2	29.9	31.5	26.4	23.2	24.8
95% CI									
Lower	8.3	2.0	5.9	28.9	24.6	27.5	23.3	19.2	21.9
Upper	14.0	7.2	9.8	37.8	35.7	35.8	29.7	27.8	28.0
High	1.3	0.1	0.8	12.4	9.5	10.9	9.0	7.1	8.1
95% CI									
Lower	0.6	0.0	0.4	8.9	7.8	7.8	6.6	4.7	5.8
Upper	3.0	0.5	1.7	17.0	15.1	15.1	12.2	10.7	11.1

Note: WHO STEPs guideline used to calculate the cut off value of low, medium and high for total physical activity.

Table 3.4.3 Percentage of respondents (with 95% confidence interval) according to three categories of total physical activity by age group and sex, Uttarakhand, 2007-08

| Age group | Gender | | | | | | | | |
| | Men | | | Women | | | Both Sex | | |
	Low	Medium	High	Low	Medium	High	Low	Medium	High
15-24	71.6 (65.4,77.1)	21.7 (17.2,27.0)	6.7 (3.9,11.1)	76.8 (70.1,82.3)	19.7 (15.0,25.4)	3.6 (2.1,6.1)	74.1 (68.7,78.9)	20.7 (17.0,25.0)	5.2 (3.3,8.1)
25-34	59.8 (54.2,65.1)	30.5 (25.2,36.3)	9.7 (6.6,14.1)	66.7 (59.3,73.4)	25.1 (19.8,31.3)	8.2 (5.2,12.8)	63.3 (57.9,68.5)	27.7 (23.6,32.2)	9.0 (6.4,12.4)
35-44	57.6 (50.9,64.1)	31.2 (25.7,37.3)	11.2 (7.8,15.8)	62.8 (54.8,70.1)	27.7 (22.0,34.1)	9.6 (5.6,15.9)	60.2 (54.1,66.0)	29.5 (25.1,34.2)	10.4 (7.2,14.8)
45-54	59.4 (52.3,66.0)	28.1 (23.6,33.0)	12.6 (8.4,18.5)	64.3 (55.5,72.3)	24.6 (19.8,30.1)	11.1 (6.9,17.3)	61.8 (55.3,67.9)	26.4 (22.7,30.4)	11.8 (8.1,17.0)
55-64	72.9 (65.2,79.3)	21.0 (15.3,28.2)	6.1 (2.9,12.3)	74.3 (64.4,82.2)	19.8 (14.3,26.8)	5.9 (3.0,11.3)	73.6 (66.3,79.8)	20.4 (16.0,25.7)	6.0 (3.1,11.2)

Note: WHO Steps guidelines used to calculate the cut off value of low, medium and high for total physical activity.

Table 3.4.4 Sex wise percentage of respondents classified according to total time spent in sedentary activity per day by type of residence, Uttarakhand, 2007-08

Time spent sitting/ reclining	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Less than 1 hours	0.3	0.7	0.5	0.7	1.0	0.9	0.6	0.9	0.8
1-2 hours	1.5	1.1	1.3	2.2	4.0	3.2	2.0	3.3	2.6
2-3 hours	3.2	2.4	2.9	5.1	4.3	4.7	4.5	3.9	4.2
3-4 hours	4.7	2.2	3.6	8.0	5.5	6.7	7.0	4.7	5.8
More than 4 hours	90.2	93.7	91.8	84.0	85.0	84.5	85.9	87.3	86.6

3.5 SOCIO-DEMOGRAPHIC PATTERN

The socio-demographic patterns of behavioural risk factors of NCD (tobacco, alcohol, fruits and vegetable consumption, and physical activity) by residence are presented in Table 3.5.1, Table 3.5.2, and Table 3.5.3.

Tobacco

Tobacco is mainly used as smoking and other forms of smokeless tobacco among urban and rural residents of Uttarakhand. The prevalence and pattern of smoking among urban male respondents was increasing with age from 11% in 15-24 to 46% in 45-54. But, it was decreasing with increasing level of education (56% among illiterate to 18% among college & above). Prevalence of smoking among female respondents was very low compare with males across all the categories. Occupation is an important socioeconomic indicator and differences in prevalence of smoking tobacco were observed form one category of occupation to another. Prevalence of smoking among occupational categories of agriculture (45%) and manual worker (43%) was high compare with other categories of occupation. A similar pattern of increasing in prevalence with age and decreasing with level of education was also observed with smokeless tobacco users. The prevalence of smokeless tobacco users among urban respondents was also increasing with age (6% in 15-24 to 11% in 55-64). Prevalence of smokeless tobacco users among females was recorded low (3%), but the pattern was increasing with age. By education, the prevalence among urban male respondents was showing a declining pattern with increasing level of education (26% among primary to 10% among college and above). In the occupational categories, prevalence of smokeless tobacco users was high among the occupation of manual work (24%). Among urban male respondents, smokers were higher (27%) than smokeless tobacco users (16%), but the pattern was similar in both.

Rural-urban differences in the prevalence of smoking and smokeless tobacco users were observed across all the socio-demographic categories. Prevalence of smoking among rural male respondents was high (39%) compare with urban males (27%). Overall, pattern of smoking and smokeless tobacco users in urban and rural subgroups of population remain similar across age, education and occupation. The prevalence of smoking among rural male respondents shows the increasing pattern with age (9% in 15-24 to 68% in 45-54). Prevalence of smoking among occupational categories of agriculture (55%) and manual worker (46%) of rural male respondents was high compare with other. Similar pattern of smoking and smokeless tobacco users was observed in the combined urban and rural population (Table 3.5.3).

Alcohol

The prevalence of current alcohol drinkers was 28% among urban male respondents, and it was varying with age groups (13% in 15-24, 36% in 25-34, 37% in 35-44, 34% in 45-54 and 31% in 55-64 age groups). It was comparatively low among younger age (15-24). An increasing pattern of prevalence with age was observed up to age group of 35-44 among urban males, than the pattern declined with increasing age groups (in older age). Prevalence of drinking alcohol among male respondents was recorded high in lower level of education such as illiterate (27%), Primary (36%) and Middle (30%), and then the pattern was declining in higher levels of education (25% to 28%). Prevalence of drinking alcohol among male urban respondents was high among the occupation of service (39%) and agriculture (24%). It was very low among the female urban respondents (Table 3.5.1). Among the rural male respondents, current alcohol users were high in the adult age groups (43% in 25-34, 47% in 35-44, 51% in 45-54 and 48% in 55-64). By education, the pattern prevalence was decreasing with increasing level of education (44%

Table 3.5.1 Percentage of respondents in the category of some high risk factors of NCD (current daily smokers, daily smokeless tobacco user, current drinkers, low fruits and vegetables intake and low physical activity) across age, education, occupation and sex, urban, Uttrakhand, 2007-08

Characteristic	Smoker			Smokeless tobacco user			Current drinkers			Less than five servings of fruits & vegetables consumed per day			Low physical activity		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Age group															
15-24	10.8	0.0	6.1	10.5	0.3	6.0	13.2	0.0	7.4	86.5	89.3	87.7	88.6	98.2	92.8
25-34	25.5	0.5	13.6	21.9	1.5	12.3	35.9	0.2	19.0	85.1	90.7	87.8	87.9	95.4	91.4
35-44	43.8	0.0	23.8	19.2	4.0	12.3	37.4	0.0	20.3	86.0	92.1	88.8	86.0	92.1	88.8
45-54	45.9	1.6	26.6	17.8	4.6	12.1	33.6	0.0	19.0	85.0	88.3	86.4	84.7	97.0	90.1
55-64	27.8	3.9	17.0	13.1	7.9	10.7	31.4	0.1	17.3	85.5	89.6	87.3	95.9	98.6	97.1
Total	27.3	0.6	15.2	16.2	2.5	10.0	27.8	0.0	15.3	85.8	90.1	87.7	87.9	96.1	91.6
Education															
Illiterate	55.8	2.5	20.0	18.4	8.4	11.7	26.9	0.0	8.9	92.8	93.5	93.2	69.9	95.8	87.3
Primary	48.4	0.7	26.6	25.7	3.5	15.5	35.6	0.0	19.3	91.4	93.2	92.2	60.5	97.5	77.4
Middle	40.3	0.0	21.9	21.4	0.4	11.9	30.4	0.0	16.5	88.8	89.2	89.0	86.8	98.0	92.2
Secondary	20.5	0.0	12.9	18.6	0.2	11.9	25.4	0.0	16.1	84.9	92.9	87.9	91.3	96.3	93.1
Higher Secondary	17.9	0.0	10.9	14.5	1.1	9.3	25.7	0.2	15.7	80.9	88.3	83.8	92.8	92.3	92.6
College & above	18.1	0.0	10.4	9.6	0.4	5.6	27.9	0.1	16.0	84.9	86.1	85.4	96.4	97.0	96.7
Total	27.3	0.6	15.2	16.2	2.5	10.0	27.8	10.3	15.3	85.8	90.1	87.7	87.9	96.1	91.6
Occupation															
Executive/Business	21.8	**	21.1	17.1	**	16.9	33.9	**	33.2	81.9	**	82.1	93.2	**	93.0
Agriculture	51.5	0.0	44.6	8.4	0.0	7.2	37.0	0.0	32.0	59.8	100.0	65.2	77.5	85.6	78.6
Domestic Work	**	0.7	0.9	**	2.8	2.8	**	0.0	0.4	**	90.0	90.1	**	96.1	96.0
Services/Sales	32.4	0.0	28.0	17.0	1.9	15.0	38.6	0.0	33.3	84.1	85.4	84.3	93.4	95.4	93.7
Manual Worker	44.6	3.1	42.6	24.9	8.3	24.1	28.3	0.0	26.9	92.4	100.0	92.8	72.2	90.3	73.0
Other	12.9	0.4	9.3	10.0	0.6	7.3	14.1	0.0	10.1	85.7	91.3	87.3	91.7	97.1	93.3
Total	27.3	0.6	15.3	16.2	2.5	10.0	27.8	0.1	15.3	85.8	90.1	87.7	88.0	96.1	91.6
Number (n)	1112	1578	2690	1112	1578	2690	1112	1578	2690	1112	1578	2690	1112	1578	2690

** Figure not shown; based on fewer than 15 unweighted cases

among primary to 21% among higher secondary) in rural male population. However, prevalence in the occupation categories of service and sales (44%) and executive and business (44%) were high compare with others (Table 3.5.2). A similar pattern of prevalence of alcohol use was observed in the combined (rural and urban) population across age, education and occupation (Table 3.5.3).

Fruits and Vegetables

Though fruits and vegetable consumption reduces the risk of non-communicable diseases, but the survey showed larger proportion of population consumed inadequate amount of fruits and vegetables (i.e. less than five servings of fruits and vegetables per day). Prevalence of low (inadequate) consumption was recorded high (88%) among urban population with marginal differences between age groups (88% in 15-24 to 87% in 55-64). Inadequate consumption of fruits and vegetables was also high in all the education level (93% among illiterate to 84% among higher secondary). Prevalence of low consumption was high (93%) among manual worker whereas it was varying from 65% to 90% in rest of the occupation categories (Table 3.5.1). A similar pattern of inadequate consumption of fruits and vegetables was observed among rural population. Prevalence of inadequate consumption was high among all the age groups (87% in 15-24 to 94% in 55-64). Prevalence by education was varying between 95% among illiterate to 74% in college and above. The low (inadequate) consumption of fruits and vegetables was high among the occupational categories of manual work (94%). It was comparatively low (79%) among service and sales category (Table 3.5.2). Overall, prevalence and pattern of consumption of fruits and vegetables by age, education and occupation was high with similar pattern as recorded in rural and urban population of Uttarakhand (Table 3.5.3).

Physical Activity

The differences in the prevalence of low physical activity were recorded across age, sex, education and occupation in urban population (Table 3.5.1). Large proportion of urban respondents was recorded in the category of low physical activity (92%) and it was varying with age groups (93% in 15-24, 91% in 25-34, 89% in 35-44, 90% in 45-54 and 97% in 55-64). Prevalence of low physical activity was high among old and young age respondents. Low physical activity by sex was recorded high (96%) among female respondents compare with males (88%), and such differences remain across all the age groups (Table 3.5.1). The pattern of low physical activity was varying with level of education (87% of illiterate, 77% of primary, 92% middle, 93% of secondary and higher secondary, and 97% of college and above). Accordingly, low physical activity was recorded high among the occupation of domestic work (96%), service (94%), executive and business (93%). The people in the occupation categories of agriculture and manual work were doing more physical work activity (Table 3.5.1).

Urban-rural comparison of low physical activity demonstrated that rural people (58%) were doing more physical work than urban (92%) and such differences observed across all age groups and sex (Table 3.5.2). Low physical activity by education was observed more among higher level of education (79% in college and above) compare with lower level (51% among illiterate) in rural population. Similarly, occupational differences in low physical activity were also observed across all the categories. The occupational categories of agriculture and manual worker people were doing more physical work compare with others (Table 3.5.2). Overall, low physical activity was high among service and sales occupation (88%) in the combined rural and urban population and pattern of prevalence was similar with age and education (Table 3.5.3).

Physical inactivity is one of the important risk factors of NCD. Most important point to be noted that 67% of adult population was categorized into low level of physical activity. This invites special attention to health planner.

Table 3.5.2 Percentage of respondents in the category of some high risk factors of NCD (current daily smokers, daily smokeless tobacco user, current drinkers, low fruits and vegetables intake and low physical activity) across age, education, occupation and sex, rural, Uttrakhand, 2007-08

Characteristic	Smoker			Smokeless tobacco user			Current drinkers			Less than five servings of fruits & vegetables consumed per day			Low physical activity		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Age group															
15-24	9.3	1.1	5.1	14.5	0.9	7.6	8.4	0.0	4.2	83.8	90.6	87.2	64.2	69.6	66.9
25-34	41.4	2.1	20.6	34.9	1.9	17.4	42.7	0.0	20.0	86.8	91.6	89.4	46.7	56.0	51.6
35-44	56.3	8.2	31.6	28.6	3.6	15.8	47.0	0.0	22.9	86.5	89.0	87.8	44.0	51.6	47.9
45-54	68.1	15.1	41.3	16.4	3.6	9.9	50.5	0.2	25.0	89.1	94.1	91.7	48.4	53.7	51.1
55-64	59.1	19.3	38.5	25.9	2.2	13.6	47.8	2.2	24.1	93.1	94.5	93.8	65.4	68.3	66.9
Total	38.7	6.5	22.1	23.2	2.2	12.4	33.3	0.2	16.3	86.7	91.4	89.1	54.4	60.6	57.6
Education															
Illiterate	64.8	12.9	26.6	31.1	4.2	11.3	41.4	0.4	11.3	97.1	94.0	94.9	34.4	57.5	51.4
Primary	64.2	3.2	31.4	24.3	1.5	12.0	44.1	0.0	20.4	92.3	94.1	93.3	42.6	59.8	51.9
Middle	36.2	2.2	21.0	27.8	0.0	15.4	31.8	0.4	17.8	90.6	91.1	90.8	52.5	60.4	56.0
Secondary	31.6	0.0	20.8	20.9	0.8	14.0	32.0	0.0	21.0	84.6	87.5	85.6	52.8	64.2	56.7
Higher Secondary	18.0	0.0	11.1	14.3	0.0	8.8	20.9	0.0	12.8	80.9	85.0	82.5	70.5	68.5	69.7
College & above	19.1	0.0	12.3	17.8	0.0	11.5	32.5	0.0	21.0	68.1	83.9	73.7	85.3	67.9	79.1
Total	38.7	6.5	22.1	23.2	2.2	12.4	33.3	0.2	16.3	86.7	91.4	89.1	54.4	60.6	57.6
Occupation															
Executive/Business	39.0	**	36.7	30.6	**	28.8	46.5	**	43.7	83.8	**	83.9	73.5	**	72.3
Agriculture	55.0	9.0	41.9	23.0	1.2	16.8	43.3	0.8	31.2	89.6	97.0	91.7	36.6	28.9	34.4
Domestic Work	**	6.9	7.1	**	2.6	2.8	**	0.1	0.3	**	90.6	90.6	**	63.0	62.9
Services/Sales	38.7	0.0	33.1	21.0	0.0	18.0	51.6	0.0	44.2	77.3	90.1	79.1	81.5	73.3	80.4
Manual Worker	46.1	6.1	42.6	34.1	2.1	31.3	36.7	2.3	33.8	93.9	100.0	94.4	37.0	49.7	38.1
Other	18.0	1.7	13.8	13.6	0.0	10.1	12.4	0.6	9.4	81.7	91.8	84.3	71.9	77.4	73.3
Total	38.6	6.5	22.1	23.1	2.2	12.4	33.1	0.2	16.2	86.7	91.6	89.2	54.3	60.7	57.6
Number (n)	1031	1700	2731	1031	1701	2732	1031	1701	2732	1031	1701	2732	1031	1701	2732

** Figure not shown; based on fewer than 15 unweighted cases

Table 3.5.3 Percentage of respondents in the category of some high risk of factors NCD (current daily smokers, daily smokeless tobacco user, current drinkers, low fruits and vegetables intake and low physical activity) across age, education, occupation and sex, combined, Uttrakhand, 2007-08

Characteristic	Smoker			Smokeless tobacco user			Current drinkers			Less than five servings of fruits & vegetables consumed per day			Low physical activity		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Age group															
15-24	9.7	0.8	5.4	13.3	0.7	7.2	9.9	0.0	5.1	84.6	90.2	87.4	71.6	76.8	74.1
25-34	36.4	1.7	18.5	30.8	1.8	15.9	40.5	0.1	19.7	86.3	91.3	88.9	59.8	66.7	63.3
35-44	52.2	5.9	29.3	25.5	3.7	14.7	43.9	0.0	22.1	86.4	89.9	88.1	57.6	62.8	60.2
45-54	61.4	11.8	37.2	16.8	3.8	10.5	45.4	0.1	23.3	87.9	92.7	90.2	59.4	64.3	61.8
55-64	51.5	16.2	33.8	22.8	3.3	13.0	43.7	1.7	22.6	91.3	93.5	92.4	72.9	74.3	73.6
Total	35.2	5.0	20.2	21.0	2.2	11.7	31.6	0.2	16.0	86.4	91.1	88.7	64.6	69.7	67.1
Education															
Illiterate	63.1	11.4	25.6	28.7	4.8	11.4	38.7	0.4	10.9	96.3	93.9	94.6	41.1	63.1	57.0
Primary	60.4	2.7	30.4	24.6	1.9	12.8	42.0	0.0	20.2	92.1	93.9	93.1	47.0	66.9	57.3
Middle	37.1	1.8	21.2	26.5	0.1	14.6	31.5	0.3	17.5	90.3	90.7	90.4	59.5	68.3	63.5
Secondary	28.5	0.0	18.6	20.3	0.6	13.4	30.2	0.0	19.6	84.7	89.1	86.3	63.4	73.8	67.1
Higher Secondary	18.0	0.0	11.0	14.4	0.4	9.0	22.7	0.0	13.9	80.9	86.2	83.0	78.9	77.5	78.4
College & above	18.6	0.0	11.2	13.3	0.2	8.1	30.0	0.2	18.1	77.3	85.3	80.5	91.4	86.0	89.2
Total	35.2	5.0	20.2	21.0	2.2	11.7	31.6	0.2	16.0	86.4	91.1	88.7	64.6	69.7	67.1
Occupation															
Executive/Business	29.4	**	28.2	23.1	**	22.3	39.5	**	38.0	82.7	**	82.9	84.4	66.5	83.7
Agriculture	54.9	8.9	41.9	22.7	1.2	16.6	43.2	0.8	31.2	88.9	97.0	91.2	37.6	29.5	35.3
Domestic Work	**	5.3	5.5	**	2.7	2.8	**	0.1	0.3	**	90.4	90.4	**	71.5	71.5
Services/Sales	35.3	0.0	30.4	18.9	1.0	16.4	44.6	0.0	38.3	81.0	87.6	81.9	88.0	85.0	87.6
Manual Worker	45.7	5.6	42.6	31.6	3.1	29.4	34.4	1.9	32.0	93.5	100.0	94.0	46.7	56.4	47.4
Other	16.4	1.2	12.3	12.5	0.2	9.2	12.9	0.4	9.6	83.0	91.6	85.3	78.2	84.4	79.9
Total	35.2	5.0	20.2	21.0	2.3	11.7	31.5	0.2	16.0	86.4	91.2	88.8	64.6	69.7	67.1
Number (n)	2143	3278	5421	2143	3279	5422	2143	3279	5422	2143	3279	5422	2143	3279	5422

** Figure not shown; based on fewer than 15 unweighted cases

Hypertension and Diabetes

This chapter focuses on the prevalence of hypertension and diabetes in the study population along with the information regarding history of hypertension and diabetes and the nature of treatment advised by the treating physician.

4.1 HYPERTENSION

The blood pressure is an important determinant of the risk of cardiovascular diseases, ischemic heart disease, congestive cardiac failure and renal failure. In the survey the blood pressure of the respondents was measured using automated blood pressure measuring instrument (OMRON®). Table 4.1.1 provides percentage of respondents with history of raised blood pressure, treatment and life style modification advised, seeking consultation and treatment from AYUSH by sex and place of residence. Over all 4% respondents, 4% men and 5% women were found to have been diagnosed hypertension by the health professional. In the urban area, the prevalence of hypertension was 8% with 6% among men and 10% among women. In rural area, 4% of males and 3% of females were hypertensive.

Of those who were diagnosed hypertension, majority of them (46%) were taking the prescribed medicine. About 57% of the urban and 37% of rural hypertensive respondents, 47% of male and 46% of female hypertensive respondents were taking medicines for the hypertension. About 67% of those who were diagnosed hypertension, were advised dietary modification including low salt intake; 28% were advised to lose weight and 39% advised to increase physical activity. If the respondent was a smoker, 20% were advised to quit smoking. The percentage of those who received dietary advice including low salt intake was slightly higher for women (75%) than for men (57%), more for urban (74%) than rural (60%) hypertensive respondents.

Over one-fifth (21%) of those who were diagnosed hypertensive, had consulted AYUSH with 16% in urban area and 25% in rural area. By sex, 19% such men against 23% women were consulting AYUSH. Among these respondents who had consulted AYUSH, four-fifth were taking the treatment from the AYUSH practitioner which was 87% in case of rural area and 71% in case of urban area.

Table 4.1.1 Percentage of respondents with history of raised blood pressure, treatment and lifestyle modification advised, seeking consultation and treatment from an AYUSH practitioner by sex and place of residence, Uttarakhand, 2007- 08.

	Residence						Combined		
	Urban			Rural			Combined		
Hypertension	Male	Female	Total	Male	Female	Total	Male	Female	Total
Hypertension diagnosed by health professional (all respondents	5.7	9.6	7.5	3.5	3.0	3.2	4.2	4.7	4.4
Diagnosed Hypertensive									
Currently taking drugs	52.7	59.8	56.8	42.6	30.5	36.9	46.9	45.9	46.3
Advised dietary modifications	65.5	79.8	73.7	51.1	70.0	60.1	57.2	75.1	66.6
Advised to lose weight	36.5	43.8	40.7	17.6	14.7	16.2	25.6	30.0	27.9
Advised to quit smoking	27.8	16.8	21.5	32.1	3.8	18.7	30.2	10.7	20.0
Advised to increase physical activity	49.1	53.7	51.8	29.0	24.2	26.7	37.5	39.7	38.7
Consulted AYUSH practitioner	12.4	19.4	16.4	23.1	26.5	24.7	18.6	22.7	20.8
Taking treatment from AYUSH practitioner	52.1	80.2	71.4	89.6	84.1	86.8	79.2	82.3	81.0

Table 4.1.2 presents the mean systolic and diastolic blood pressure by sex and place of residence. The mean systolic blood pressure was 126 mm of mercury while mean diastolic blood pressure was 78 mm of mercury in the survey population. These averages were little higher for urban than rural respondents and also little higher for males than females.

According to WHO STEPS guidelines, the population was categorized into four categories namely, normal, pre-hypertensive, Stage-I hypertensive and Stage-II hypertensive on the basis of their blood pressure level[8]. In the present survey, this categorization was done after recording the resting blood pressure for each study subject. The upper and the lower limit of the systolic and diastolic blood pressure for each category has been given in Table 4.1.3

Table 4.1.4 presents the percentage of respondents according to categories of hypertension by sex and place

Table 4.1.2 Mean Systolic and Diastolic blood pressure by sex and place of residence, Uttarakhand, 2007- 08

| Blood Pressure | Residence | | | | | | Combined | | |
| | Urban | | | Rural | | | | | |
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Systolic blood pressure	130.0	123.0	126.9	128.8	121.4	125.0	129.2	121.8	125.5
95% CI									
Lower	128.4	121.7	125.6	127.6	120.6	124.1	128.2	121.1	124.8
Upper	131.5	124.2	128.1	130.1	122.2	125.9	130.2	122.5	126.2
Diastolic blood pressure	81.0	77.9	79.6	78.8	75.7	77.1	79.5	76.3	77.9
95% CI									
Lower	79.8	77.1	78.7	77.9	75.0	76.3	78.8	75.7	77.3
Upper	82.2	78.7	80.6	79.8	76.4	78.0	80.2	76.8	78.4

Table 4.1.3 Categories of Hypertension

Category	Systolic Blood Pressure (mm Hg)		Diastolic Blood Pressure (mm Hg)
Normal	< 120	and	< 80
Pre-hypertension	120-139	or	80-89
Stage-I hypertension	140-159	or	90-99
Stage-II hypertension	≥ 160	or	≥ 100

Table 4.1.4 Percentage of respondents according to category of hypertension by sex and place of residence (P & 95% CI), Uttarakhand, 2007- 08

| Category of hypertension | Residence | | | | | | Combined | | |
| | Urban | | | Rural | | | | | |
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Normal	20.5	41.8	30.0	22.0	43.9	33.3	21.5	43.4	32.4
95% CI									
Lower	16.6	38.0	26.4	19.0	41.0	30.7	19.1	41.0	30.3
Upper	25.1	45.7	33.7	25.2	46.8	35.9	24.1	45.7	34.5
Pre – Hypertension	52.1	41.2	47.2	55.2	44.1	49.4	54.2	43.4	48.8
95% CI									
Lower	48.4	38.3	44.5	51.9	41.0	46.9	51.8	40.9	46.8
Upper	55.7	44.1	50.0	58.4	47.2	52.0	56.7	45.8	50.8
Stage-1 Hypertension	19.8	12.5	16.6	17.1	8.9	12.8	17.9	9.8	13.9
95% CI									
Lower	17.2	10.5	14.7	14.9	7.6	11.5	16.2	8.7	12.7
Upper	22.6	14.9	18.6	19.5	10.4	14.4	19.7	11.0	15.1
Stage-2 Hypertension	7.6	4.5	6.2	5.8	3.2	4.5	6.4	3.5	4.9
95% CI									
Lower	5.8	3.5	5.0	4.4	2.4	3.6	5.2	2.8	4.2
Upper	10.0	5.7	7.7	7.7	4.2	5.6	7.8	4.3	5.8

and residence. Overall, 32% respondents were normal, 49% were in the category of pre-hypertension, 14% in stage I hypertension and only 5% were in stage-II hypertension. Among males, 22% were normal, 54% were in the category of pre-hypertension, 18% were in stage I hypertension and only 6% were in stage-II hypertension. For females, 43% were normal, 43% pre-hypertension, 10% stage I hypertension and 4% stage-II hypertension. The composition appears to be same in urban and rural areas.

4.2 SOCIO-DEMOGRAPHIC PATTERN OF HYPERTENSION

Hypertension is a major NCD risk factors especially related to cardiovascular disease. The socio-demographic patterns of respondents in the category of hypertension (stage I & II) are presented in Table 4.2. Overall, prevalence of hypertension was 23% among the urban population and its pattern was increasing with age (10% in 15-24, 17% in 25-34, 30% in 35-44, 44% in 45-54 and 52% in 55-64). The prevalence among male respondents was high (27%) compare with females (17%), but the increasing pattern with age was observed in both sexes (Table 4.2). Prevalence of hypertension by education was 22% among illiterate, 27% of primary, 18% of middle, 20% of secondary, 22% of higher secondary and 27% of college and above. In the occupational categories, the prevalence was high among occupation of service and sales (34%), executive and business (30%). Low prevalence of hypertension was recorded among the occupation of domestic work and agriculture (19%). Overall, prevalence among rural population was 17% and the pattern was increasing with age (10% in 15-24 to 40% in 55-64). Similarly, high prevalence was

Table 4.2 Percentage of respondents in the category of stage I & stage II hypertension across age, education, occupation and by sex and residence, Uttrakhand, 2007- 08

Characteristic	Stage I & II hypertensive								
	Urban			Rural			Combined		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Age group									
15-24	13.3	5.8	10.0	16.7	3.2	9.9	15.7	3.9	9.9
25-34	23.8	9.6	17.1	16.1	5.9	10.7	18.7	6.9	12.5
35-44	34.8	23.3	29.7	24.2	12.3	18.1	27.6	15.2	21.5
45-54	47.0	38.3	43.5	35.1	24.5	29.7	38.6	27.2	33.2
55-64	53.8	49.9	52.0	41.3	39.4	40.3	44.0	41.2	42.6
Total	27.4	17.0	22.8	22.9	12.1	17.3	24.2	13.3	18.8
Education									
Illiterate	23.0	21.1	21.7	19.4	18.0	18.3	20.0	18.4	18.8
Primary	32.2	19.6	26.6	21.8	11.5	16.3	24.4	13.0	18.4
Middle	21.0	15.2	18.4	20.3	6.0	13.9	20.5	7.9	14.8
Secondary	19.8	19.5	19.7	21.6	5.3	16.0	21.1	9.4	17.0
Higher Secondary	28.4	12.7	22.3	29.3	5.0	19.9	29.0	7.9	20.8
College & above	35.5	14.9	26.8	28.7	10.7	22.2	32.4	13.3	24.8
Total	27.4	17.0	22.8	22.9	12.1	17.3	24.2	13.3	18.8
Occupation									
Executive/Business	30.7	**	29.9	29.2	**	28.3	30.0	10.7	29.2
Agriculture	18.8	18.1	18.8	24.2	11.9	20.7	24.1	12.0	20.6
Domestic Work	**	19.1	19.1	**	13.1	13.0	8.6	14.6	14.5
Services/Sales	36.4	21.4	34.4	32.4	8.1	28.8	34.6	14.9	31.8
Manual Worker	22.5	24.2	22.6	22.2	9.5	21.1	22.3	11.9	21.5
Other	21.5	6.1	17.0	18.0	5.7	14.9	19.1	5.9	15.6
Total	27.3	17.1	22.8	22.8	12.1	17.3	24.1	13.3	18.8
Number (n)	1059	1462	2521	1011	1684	2695	2070	3146	5216

** Figure not shown; based on fewer than 15 unweighted cases

observed among college and above education (22%), whereas it was low (14%) among middle level. Among the occupational categories, the prevalence was high among service and sales (29%), executive and business (28%). But, it was low among occupation of domestic work (13%). Overall, prevalence of hypertension was 19% among rural and urban population of Uttarakhand, but the pattern of prevalence with age, education and occupation was similar (Table 4.2).

Most striking observations of blood pressure measurements was that only around a third of the adult population surveyed had normal blood pressure. While half of the adult population was categorized into pre-hypertension group, another 14% were found in stage-I hypertension with the remaining 5% in stage-II. On the contrary, only 4% of population reported history of hypertension, which requires urgent attention for intervention.

4.3 DIABETES

Diabetes mellitus is an important marker of risk for the arterial disease of the coronary, cerebral and peripheral arterial trees, and for micro vascular disease leading to blindness and renal failure. In the survey, the history pertaining to diabetes was elicited from the respondents. Table 4.3 deals with the percentage of respondents with history of raised blood sugar, a treatment and life style modification advised by sex and place of residence. Over all, 1% of respondents both in urban and rural areas had reported having raised blood sugar level in past 12 months. This percentage was high among urban (2.3) than rural respondents (0.7). Amongst those who diagnosed diabetes, 31% (27% in urban and 37% in rural respondents) were currently taking insulin; about 79% of diagnosed diabetic respondents (68% in urban and 92% in rural respondents) were taking oral hypoglycemic drugs. A good proportion of respondents reported to have received advice from the treating physicians on their life style modification — 86% for dietary advice, 46% to reduce weight and 61% to increase physical activity.

Table 4.3. Percentage of respondents with history of raised blood sugar, treatment and lifestyle modification advised, seeking consultation and treatment from an AYUSH practitioner by sex and place of residence, Uttarakhand, 2007- 08

	Residence						Combined		
	Urban			Rural			Combined		
Blood sugar	Male	Female	Total	Male	Female	Total	Male	Female	Total
Raised blood sugar diagnosed (All respondents)	2.2	2.5	2.3	0.8	0.7	0.7	1.2	1.1	1.2
Diagnosed diabetics									
Currently taking insulin	27.6	26.5	27.0	32.1	36.4	36.7	29.6	33.2	31.4
Currently taking Oral drugs	63.3	72.6	67.9	100.0	83.8	92.1	79.8	77.6	78.7
Advised dietary modifications	80.5	90.0	85.2	91.6	83.3	87.6	85.5	87.0	86.2
Advised to lose weight	42.9	43.5	43.2	50.5	48.0	49.3	46.3	45.5	45.9
Advised to increase physical activity	60.8	55.5	58.2	71.5	55.9	64.0	65.7	55.7	60.8
Consulted AYUSH practitioner	20.2	25.6	22.8	39.3	40.4	39.8	28.6	32.2	30.3
Taking treatment from AYUSH practitioner	91.5	77.3	83.5	78.7	80.4	79.5	83.8	79.0	81.3

Physical Measurements

This chapter describes various physical measurements such as height, weight, waist circumference and body mass index (BMI), which are key indicators for surveillance of non-communicable diseases. Weight of an individual is directly related to the Body Mass Index (BMI), waist circumference, blood pressure and probability of developing diabetes mellitus-2.

5.1 WEIGHT

Having weight more than the ideal weight for age and height is a risk factor for development of colorectal cancer, uterine cancer, coronary artery disease and it would also exacerbate the symptoms of osteoarthritis. The weight is a continuous variable, reflecting the body mass of an individual in light clothing; it is used for calculating BMI.

5.2 HEIGHT

Height is another key variable required for calculation of body mass index (BMI). Height is a continuous variable measured with the individual standing on a firm leveled surface, without wearing any foot wear, and stand with feet together, with heels, calves, buttocks, dorsal spine and head in same plane.

5.3 BODY MASS INDEX (BMI)

BMI is a valid indicator for finding out whether the body weight of an individual is appropriate for the height of the individual. It is calculated from height and weight measurements as body weight per meter^2. Worldwide researches have shown that there is a strong association between BMI and health risk. The excess of adipose tissue in the adults is associated with excess morbidity and mortality from a large number of health conditions like diabetes, hypertension, hypercholesterolemia, carcinomas of colon and breast, gall bladder stones and osteoarthritis. On the other hand low BMI is an indicator of risk to health, often being associated with tobacco, alcohol use and drug addiction (Table 5.1).

5.4 WAIST CIRCUMFERENCE

The waist circumference is one of the sensitive indicators for abdominal obesity. Abdominal obesity has got a stronger association with coronary heart diseases as compared to BMI. The waist measurement is taken at the level of mid point between the inferior margin of the rib and crest of ileum in the mid auxiliary plane, using a non-stretchable measuring tape, without clothing. A cut-off level of 102 cm. in males and 88 cm. in females have been recommended for developed countries (ATP3 Guidelines), however lower cut-off levels are appropriate for Indians- 90 cm in males and 80 cm in females (The Asia Pacific Guidelines)[9].

Table 5.2 presents the BMI, mean height, weight and waist circumference by sex and the place of residence. The mean BMI in Uttarakhand was 21 (23 for urban and 21 for rural area, 21 for males and females). The mean height in the survey population was 158 centimeter (159 centimeter in urban area, 157 centimeter in rural area, 164 centimeter for males and 152 centimeter for females). The mean weight was 52.7 kg with 58 kg in urban area, 51 kg in rural. By sex, the mean weight was 56 kg for males and 49 kg for females.

Table: 5.1 Categories of BMI

Body Mass Index (BMI)	Category of Relative Weight
<18.5	Under Weight
18.5- 24.9	Normal Weight
25.0- 29.9	Grade-1 Over Weight
30-39.9	Grade-2 Over Weight
≥ 40	Grade-3 Over Weight

Source: WHO Step-wise approach to NCD surveillance

Table 5.2 Mean value for body mass index (BMI), height, weight and waist circumference by sex and place of residence, Uttarakhand, 2007- 08

| Physical Measurement | Residence | | | | | | Combined | | |
| | Urban | | | Rural | | | | | |
	Male	Female	Total	Male	Female	Total	Male	Female	Total
BMI (kg/m^2)	22.5	23.4	22.9	20.5	20.7	20.6	21.1	21.4	21.3
95% CI									
Lower	21.8	22.8	22.4	19.9	20.2	20.2	20.7	21.0	20.9
Upper	23.3	23.5	23.5	21.0	21.2	21.0	21.5	21.8	21.6
Height (cm.)	164.9	152.6	159.3	163.2	151.4	157.1	163.7	151.7	157.8
95% CI									
Lower	164.2	152.2	158.8	162.4	151.1	156.6	163.1	151.4	157.3
Upper	165.5	153.0	159.8	164.0	151.7	157.0	164.3	152.0	158.2
Weight (kg.)	60.8	55.0	58.1	53.9	47.3	50.6	56.1	49.3	52.7
95% CI									
Lower	59.1	53.4	56.9	53.0	46.0	49.5	55.2	48.1	51.9
Upper	62.5	56.5	59.4	54.9	48.1	51.3	56.8	50.0	53.4
Waist circum. (cm.)	82.7	77.1	80.2	77.0	67.7	72.3	78.8	70.1	74.4
95% CI									
Lower	81.4	75.4	79.0	75.2	66.6	71.2	77.4	69.1	73.7
Upper	84.1	78.8	81.4	78.9	68.7	73.3	80.1	71.1	75.3

The average waist circumference was 74 centimeters with 80 centimeter in urban respondents and 72 centimeters in rural respondents. The average waist circumference for male and female respondents was 79 centimeters and 70 centimeters respectively.

Table 5.3 presents the percentage of respondents according to their BMI category and central obesity by sex and the place of residence. In the survey, it was found that 28% respondents were under-weight, which was 19% for urban and 32% for rural. By sex, 29% males

Table 5.3 Percentage of respondents according to BMI categories by sex and place of residence, Uttarakhand, 2007- 08

| Category of BMI | Residence | | | | | | Combined | | |
| | Urban | | | Rural | | | | | |
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Under weight(<18.5)	21.0	15.5	18.6	32.5	31.5	32.0	29.0	27.4	28.2
95% CI									
Lower	17.9	13.2	16.3	28.6	27.7	28.6	26.1	24.5	25.7
Upper	24.6	18.1	21.0	36.6	35.6	35.5	32.0	30.5	30.8
Normal weight (18.5-24.9)	54.6	53.3	54.1	58.5	58.5	58.5	57.3	57.2	57.3
95% CI									
Lower	50.6	51.0	51.4	54.2	54.9	55.3	54.1	54.4	54.9
Upper	58.7	55.7	56.7	62.8	62.0	61.7	60.5	59.9	59.6
Grade-1 over weight (25.0-29.9)	19.6	21.6	20.5	8.0	7.3	7.7	11.5	11.0	11.3
95% CI									
Lower	16.5	19.5	18.3	6.2	5.7	6.3	9.9	9.6	10.1
Upper	23.1	23.8	22.8	10.3	9.4	9.4	13.4	12.6	12.6
Grade-2 over weight (30.0-39.9)	3.8	9.1	6.2	0.7	2.3	1.5	1.7	4.1	2.8
95% CI									
Lower	2.6	7.6	5.0	0.4	1.3	0.9	1.2	3.1	2.3
Upper	5.3	11.0	7.5	1.4	4.1	2.5	2.3	5.3	3.6

Grade-3 over weight (≥ 40.0)	1.0	0.5	0.8	0.3	0.3	0.3	0.5	0.3	0.4
95% CI									
Lower	0.5	0.2	0.5	0.1	0.1	0.1	0.3	0.2	0.3
Upper	2.0	0.9	1.3	0.9	0.7	0.7	0.9	0.6	0.7
Central Obesity WC ≥ k*	27.3	40.5	33.2	9.7	14.6	12.2	15.1	21.2	18.1
95% CI									
Lower	23.5	36.6	30.0	7.4	11.5	9.9	13.0	18.5	16.1
Upper	31.4	44.5	36.7	12.5	18.4	15.0	17.3	24.2	20.3

*K=90 cm for males and K=80 cm for females

and 27% females were underweight. Over 14% population was over weight (27% for urban respondents and 9% for rural respondents). Overall the central obesity was 18% (27% among urban males, 41% among urban females; 10% among rural males, 15% among rural females).

5.5 SOCIO-DEMOGRAPHIC PATTERN OF OVERWEIGHT

Overweight (obesity) is a major risk factor of NCD. The socio-demographic patterns of respondents in the category of overweight (grade I, II & III) by residence

Table 5.4 Percentage of respondents in the category of overweight (Grade I, II & III) across age, education, occupation and by sex and residence, Uttrakhand, 2007- 08

Characteristic	Overweight (Grade I, II & III)								
	Urban			Rural			Combined		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Age group									
15-24	7.3	7.8	7.5	4.3	2.8	3.5	4.3	2.8	3.5
25-34	30.2	32.0	31.0	8.9	10.2	9.6	8.9	10.2	9.6
35-44	32.3	43.5	37.4	9.8	14.4	12.2	9.8	14.4	12.2
45-54	36.0	55.8	44.6	13.9	15.1	14.5	13.9	15.1	14.5
55-64	40.2	48.0	43.7	17.0	16.4	16.7	17.0	16.4	16.7
Total	24.4	31.2	27.4	9.0	10.0	9.5	9.0	10.0	9.5
Education									
Illiterate	10.1	27.1	21.3	3.8	9.3	7.8	3.8	9.3	7.8
Primary	21.8	33.9	27.3	5.8	10.1	8.0	5.8	10.1	8.0
Middle	13.2	24.6	18.3	8.7	8.3	8.6	8.7	8.3	8.6
Secondary	18.4	30.8	22.9	6.3	8.3	7.0	6.3	8.3	7.0
Higher Secondary	24.3	28.2	25.8	15.3	12.6	14.2	15.3	12.6	14.2
College & above	39.6	39.4	39.5	19.5	21.5	20.2	19.5	21.5	20.2
Total	24.4	31.2	27.4	9.0	10.0	9.5	9.0	10.0	9.5
Occupation									
Executive/Business	38.8	**	39.8	22.1	**	21.7	22.1	15.3	21.7
Agriculture	23.6	**	22.3	9.4	4.2	7.9	9.4	4.2	7.9
Domestic Work	**	33.8	33.8	**	11.6	11.5	6.9	11.6	11.5
Services/Sales	22.5	48.5	34.7	21.7	20.9	21.6	21.7	20.9	21.6
Manual Worker	17.0	36.1	17.9	4.4	3.0	4.3	4.4	3.0	4.3
Other	14.7	11.7	13.8	5.8	4.0	5.4	5.8	4.0	5.4
Total	24.4	31.2	27.4	9.0	10.0	9.5	9.0	10.0	9.5
Number (n)	1112	1526	2638	1031	1657	2668	1031	1657	2668

** Figure not shown; based on fewer than 15 unweighted cases.

are presented in Table 5.4. Overall, prevalence of overweight was 27% among the urban population and its pattern was found increasing with age (8% in 15-24, 31% in 25-34, 37% in 35-44, 45% in 45-54 and 44% in 55-64). The prevalence among female respondents was high (31%) compare with males (24%), but the increasing pattern with age was observed in both sexes (Table 5.4). In educational categories, the prevalence was varying with the level of education (21% of illiterate, 27% of primary, 18% of middle, 24% of secondary, 26% of higher secondary and 40% of college and above). It shows the high prevalence of hypertension among higher level of education and its pattern was increasing with middle level onwards. Occupational categories, the prevalence was high among the occupation of executive and business (40%), and service and sales (35%). Low prevalence of overweight was recorded among occupation of manual work (18%) and agriculture (22%). Overall, prevalence among rural population was 10% and it was varying with age (4% in 15-24 to 17% in 55-64).

Similarly, prevalence in the educational categories was 8% among illiterate and primary, 9% in middle, 7% in secondary, 14% in higher secondary and 20% in college and above. In the occupational category, the prevalence was high among the occupation of executive and business, service and sales (22%), whereas it was low among the occupation of manual worker (4%) and agriculture (8%). Overall, prevalence of overweight was 15% among the combined rural and urban population and the pattern of prevalence was increasing with age. Except the younger age group, the overweight peoples were prevalent in all age groups, education levels and occupation (Table 5.4).

In the category of BMI and central obesity, about 15% of adult population surveyed was overweight or categorized into central obesity, constituting a high-risk group for NCD. It is also to be noted that one-fourth of adult population was recorded as under weight which is also an important issue for health planner.

CHAPTER 6

Summary and Conclusions

The NCD risk factors survey in Uttarakhand collected information from a random sample of 4932 households covering 2487 households from rural and 2445 from urban areas. From these households, 5433 individuals selected randomly were interviewed to collect behavioural information and also to carry out physical measurements. The analysis of the survey data have been presented and discussed in the present report providing information about the proportion of population or subgroup of population under the risk of non-communicable diseases.

In Uttarakhand, majority of households (88%) are Hindu followed by Muslim (11%). Two-third of households had access to piped drinking water with 85% in urban and 58% in rural households. Three-fourth of the urban households had flush toilet facility against 81% of rural households having pit toilet facility. Three-quarter households (99% in urban area and 67% in rural area) used electricity as main source of lighting. About 72% of rural households were still using wood as a main source of cooking fuel. LPG was used as a main source of cooking fuel by 82% of households in urban area. In the rural area, 80% households resided in *kachha* houses. The literacy rate in the state was 74% and there existed sex and rural-urban differential in educational attainment.

Tobacco is one of the major risk factors of non-communicable diseases. About 35% of men and 5% women in Uttarakhand smoked tobacco daily. Over one-fifth of men (21%), 2% of women and 12% of both men and women used smokeless tobacco. In the state, 27% of population used tobacco in any form, either smoking or smokeless. This prevalence was 48% among males and 7% among females. The mean age of initiation of tobacco use among young adults age 15-34 was 19 years for male and female smokers and 20 years for male and female smokeless tobacco users.

The alcohol consumption is a known risk factor of many non-communicable diseases. In Uttarakhand, about one-third men (32%) consumed alcohol at least once in last one year whereas one-quarter (24%) men in

last one month. The alcohol consumption among females was quite low. Those who consumed alcohol in last seven days, 52% were binge drinkers. The mean age of initiation of alcohol consumption by young adults age 15-34 was 21 years for men.

Nutritional inadequacy is the major risk factors of many non-communicable diseases. Large percentage of population in Uttarakhand (89%) consumed less than five servings of fruits and vegetables per day, which was inadequate as per WHO recommended standards. On an average only three days in a week people consumed fruits against vegetables 5 days a week.

Physical inactivity is the leading cause of diabetes, hypertension and coronary heart disease. In Uttarakhand, 67% of population (92% of urban and 58% of rural respondents) was in low category of physical activity. About 46% of the population was detected with pre-hypertension stage and one-fifth was in stage-I and stage-II hypertension. According to BMI, 15% of population was in the category of over weight and 28% of population was recorded as under weight. However, 18% of population with 21% of females and 15% of males in Uttarakhand was in the category of central obesity.

Overall, prevalence of smoking and smokeless tobacco users among female population was low compare with males. The increasing pattern of prevalence was recorded with increasing age of people. A declining pattern of prevalence was observed with increasing level of education. Prevalence among the occupation of agriculture and manual work was high compare with others. A similar pattern of increasing prevalence with age and decreasing with level of education was also observed with current alcohol drinkers. The habits of tobacco and alcohol use starts at early young age which contributes to the high risk of NCD at later age. High proportion of population was taking inadequate amount of fruits and vegetables which increases the risk of NCD. Its distribution across all age groups, education and occupation by sex and residence was found very high with marginal differences. Besides that, two-third of population was found in the category of low physical

activity. More female respondents were in the category of low physical activity as compare with males across all the age groups. Rural population was doing more physical work than urban. The increasing pattern of prevalence of hypertension was recorded with increasing age of people. It was prevalent in all education levels and occupational categories. High prevalence of overweight was recorded in all the age groups except the younger age. It was prevalent in both sexes, but higher in urban population compare with rural. High prevalence of overweight was recorded among higher level of education as well as in the occupation of executive and service categories. Overall, NCD risk factors were prevalent across all the socio-demographic categories of population in Uttarakhand.

These are the major health issues related to non-communicable diseases of people in the state.

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Appendix - A

SAMPLE WEIGHTS

First, appropriate sampling weights for households were constructed for each state data set separately for Urban and Rural sectors. The element weight consisted of factors reflecting ward selection probabilities, Census enumeration block (CEB) selection probabilities within wards; and household selection probabilities within CEB; and household non-response adjustments.

For Urban area of a state, the weight HWT_{ijk} for the household k in CEB j of ward i, can be expressed as follows

$$\mathbf{HWT}_{ijk} = \mathbf{w}_{1i} \times \mathbf{w}_{2j|i} \times \mathbf{w}_{3k|i,j} \qquad i = 1, \ldots\ldots, 50, \ j=1 \ , k=1, \ldots, 50$$

where $\mathbf{w}_{1i} = \dfrac{\mathbf{1}}{\boldsymbol{\pi}_i}$: the reciprocal of the inclusion probability π_i of ward i

where $\pi_i = \dfrac{a \ x \ \text{Population of ward i}}{\text{Total Urban Populaltion}}$ and

a (=50) is the total number wards to be selected from the urban sector

$\mathbf{w}_{2j|i} = \dfrac{\mathbf{1}}{\boldsymbol{\pi}_{j|i}}$: the reciprocal of the conditional probability of selection of CEB j in ward i

where $\pi_{j|i} = \dfrac{\text{Population of selected CEB j within ward i}}{\text{Populaltion of selected ward i}}$

$W_{3k|i,j} = \dfrac{1}{\pi_{k|i,j} \times \bar{\theta}_{k|i,j}}$: the reciprocal of the product of conditional inclusion probability $\pi_{k|i,j}$ of household k in the jth selected CEB of the ith ward and estimated conditional response probability $\bar{\theta}_{k|i,j}$ of household k from within the jth selected CEB of ward i.

where $\pi_{k|I,j} = \dfrac{\text{Number of households sampled from selected CEB j of ward i}}{\text{Number of households in selected CEB j of ward i}}$

$$HWT_{ijk} = \dfrac{\text{Size of Urban Population}}{50 \ X \ \text{Population of selected CEB from ward i}} \ X$$

$$\dfrac{\text{Number of households in selected CEB of ward i}}{\text{Number of households sampled from selected CEB of ward i with HH Re sult code completed}}$$

In rural sector, from the lists of villages , 50 villages(or cluster of villages) were selected with probability proportional to size and from each village 50 household were selected using systematic sampling.

Proceeding as above it can be shown the weight for the kth selected household of the ith selected village, HWT_{ik},

$$HWT_{ijk} = \dfrac{\text{Size of Rural Population}}{50 \ X \ \text{Population of ith selected village}} \ X$$

$$\dfrac{\text{Number of households in ith selected village}}{\text{Number of households selected from ith village with HH Re sult code complete}}$$

INDIVIDUAL WEIGHTS

From each selected household one member aged 15-54 is selected using the Kish Method and all usual members aged 55-64 were selected. Since objective of the study is to obtain estimates for each age group (15-24 through 55-64) and sex groups, post stratification is used for improvement of efficiency of the estimators.

Post stratification weights for individuals were constructed using the state age distributions for both sexes of the urban sector which are available on the population level. We first divide the target population of persons age 15-64 in 10 age – sex post strata with five age group (15-24 through 55-64) and two sex groups (male and female).

In the subsequent lines the symbol l is used to denote the age group [15 + (l – 1)*10, 15 +10*l], l = 1,2, …, 5 and m for sex, m = 1 if sex is male and m=2 if sex is female.

For Urban,

Define :

$$\delta_{ijknlm} = \begin{cases} 1 & \text{if } n^{th} \text{ selected respondent of the } k^{th} \text{ household of the } j^{th} \text{ CEB of the } i^{th} \\ & \text{ward belongs to age group l and of sex m.} \\ 0 & \text{otherwise} \end{cases}$$

$$\widehat{N}_{lm} \begin{cases} \text{estimated number of persons of age group l and sex m if one person from the list of persons age} \\ \text{15-54 is selected from household of the population (l =1,2,3,4, m=1,2)} \\ \\ \text{estimated number of the persons belonging to the age group l and sex group m (l =5, m=1,2)} \end{cases}$$

$\widehat{N}_{lm}$ is obtained as

$$\widehat{N}_{lm} = \frac{1}{\widehat{\theta}_{l,m}} \sum_{\substack{over\ all \\ all\ possible \\ values\ of \\ i,j,k,n}} HWT_{ijk} \times \delta_{ijknlm} \quad \text{where} \quad \widehat{\theta}_{lm} \text{ is the estimated group response rate.}$$

Calibrated Individual weight

$$IWT_{ijklm} = \frac{N_{lm}}{\widehat{N}_{lm}} \times HWT_{ijk}$$

Denoted by

N_{lm} = Number of person of sex m belonging to age group l in the urban sector of the population (l = 1,2 ,3,4,5 and sex m =1,2)

y_{ijkn}, = the observed value of the study variable for the respondent n belonging to household k, CEB j and ward i.

Estimate of the population total of sex group m and age group l is

$$\widehat{Y}_{l,m} = \sum_{\substack{over\ all \\ all\ possible \\ values\ of \\ i,j,k,n}} \delta_{ijknlm} \times IWT_{ijklm}$$

$$\widehat{N}_{l\cdot} = \widehat{N}_{l1} + \widehat{N}_{l2} \quad , \qquad \widehat{Y}_{l\cdot} = \widehat{Y}_{l1} + \widehat{Y}_{l2} \quad , \qquad l = 1, .., 5$$

$$\widehat{N}_{\cdot m} = \widehat{N}_{1m} + \dots\dots + \widehat{N}_{5m}, \qquad \widehat{Y}_{\cdot m} = \widehat{Y}_{1m} + \dots\dots + \widehat{Y}_{5m} , \quad m = 1,2$$

$$\widehat{N} = \sum_{l=1}^{5} \sum_{m=1}^{2} N_{l,m} \quad , \qquad \widehat{Y} = \sum_{l=1}^{5} \sum_{m=1}^{2} \widehat{Y}_{l,m}$$

Estimate of the mean of the study variable for sex group m and age group l, $\hat{Y}_{lm}$ and for and overall are $\dfrac{\hat{Y}_{lm}}{\hat{N}_{lm}}, \dfrac{\hat{Y}_{m.}}{\hat{N}_{m.}}, \dfrac{\hat{Y}_{.l}}{\hat{N}_{.l}}, \dfrac{\hat{Y}}{\hat{N}}$, respectively.

For Rural,

Define :

$$\delta_{iknlm} = \begin{cases} 1 & \text{if n}^{\text{th}} \text{ selected respondent of the k}^{\text{th}} \text{ household of the i}^{\text{th}} \text{ village} \\ & \text{belongs to age group l and of sex m.} \\ 0 & \text{otherwise} \end{cases}$$

$$\hat{N}_{lm} \begin{cases} \text{estimated number of persons of age group l and sex m if one person from the list of persons age 15-54 is selected from household of the population (l =1,2,3,4, m=1,2)} \\ \\ \text{estimated number of the persons belonging to the age group l and sex group m (l =5, m=1,2)} \end{cases}$$

$\hat{N}_{lm}$ is obtained as

$$\hat{N}_{lm} = \frac{1}{\hat{\theta}_{l,m}} \sum_{\substack{over\ all \\ all\ possible \\ values\ of \\ i,j,k,n}} HWT_{ik} \times \delta_{ijknlm}, \quad \text{where } \bar{\theta}_{lm} \text{ is the estimated group response rate.}$$

Calibrated Individual weight

$$IWT_{iklm} = \frac{N_{lm}}{\hat{N}_{lm}} \quad x \quad HWT_{ik}$$

Denoted by

N_{lm} = Number of person of sex m belonging to age group l in the rural sector of the population (l = 1,2 ,3,4,5 and sex m =1,2)

y_{ikn}, = the observed value of the study variable for the respondent n belonging to household k of village i.

Estimate of the population total of sex group m and age group l is

$$\hat{Y}_{l,m} = \sum_{\substack{over\ all \\ all\ possible \\ values\ of \\ i,j,k,n}} \delta_{ijknlm} \times y_{ikn} \times IWT_{ijklm}$$

Estimate of the mean of the study variable for age-sex group l and m, sex group m, age group l and overall mean can be obtained.

Appendix - B

INTEGRATED DISEASE SURVEILLANCE PROJECT (IDSP)

NCD RISK FACTORS SURVEY (PHASE -I), INDIA

(Name of State   Year -2007)

HOUSEHOLD QUESTIONNAIRE

IDENTIFICATION	
STATE :	☐☐
DISTRICT :	☐☐
TEHSIL/TALUK	☐☐☐
CITY/TOWN/VILLAGE:	☐☐☐☐☐☐☐
URBAN/RURAL (*URBAN=1, RURAL =2, URBAN SLUM -3*)	☐
PSU NUMBER …………………………………….	☐☐☐
SEGMENT NUMBER:	☐
Household Number	☐☐☐☐

Name of Household Head: _____

Address oF HOUSEHOLD: _____

_____

INTERVIEWER VISITS					
	1	2	3	FINAL VISIT	
Date	_____	_____	_____	Day	☐☐
				Month	☐☐
Interviewer's Name	_____	_____	_____	Year	2 0 ☐☐
				Interviewer Code	☐☐
Result	_____	_____	_____	Result*	☐
Next Visit: Date Time	_____	_____		Total Number of Visits	☐

*RESULT CODES: 1. COMPLETED
2. NO HOUSEHOLD MEMBER/ NO COMPETENT RESPONDENT AT HOME AT THE TIME OF VISIT
3. ENTIRE HOUSEHOLD ABSENT FOR EXTENDED PERIOD
4. POSTPONED
5. REFUSED

6. DWELLING VACANT OR ADDRESS NOT A DWELLING
7. DWELLING DESTROYED
8. DWELLING NOT FOUND
9. OTHER_____
(SPECIFY)

NAME DATE	SUPERVISOR	EDITED & CHECKED BY	KEYED BY
	……………… ☐☐	……………… ☐☐	……………… ☐☐

HOUSEHOLD STRUCTURE (HS)

List of all household members who usually live in your household aged 12 years and above

LINE NO.	NAME	RELATION-SHIP	SEX	AGE IN COMPLETED YEARS	RESIDENTIAL STATUS	RECRUITED FOR SURVEY
	Please give me names of the persons who usually live in your household (may be temporarily away from home)	(With head of household)	Male-1 Female-2		(Present-1; temporarily away from home-2)	Put a tick mark against one member age 15-54 selected below by kish method and all members age 55-64
(1)	(2)	(3)	(4)	(5)	(6)	(7)
01						
02						
03						
04						
05						
06						
07						
08						
09						
10						
11						
12						

Codes for Q.3
Relationship to Head of Household:

01 – HEAD,
02 – WIFE OR HUSBAND,
03 – SON OR DAUGHTER
04 – SON IN LAW OR DAUGHTER IN LAW
05 - GRANDCHILD
06 - PARENT
07 – PARENT IN LAW

08 – BROTHER OR SISTER
09 – BROTHER IN LAW OR SISTER IN LAW
10 – NIECE OR NEPHEW
11 – OTHER RELATIVE
12 – ADOPTED OR FOSTER CHILD
13 – NOT RELATED

LIST ALL USUAL MEMBERS OF THE HOUSEHOLD AGE 15 – 54 IN THE HOUSEHOLD*.

Line No.	Sex	Age	Adult Number	Select one member (R) by using Kish Table	Enter a specific Kish Table used for selection of one member below. (A or B1 or B2 or C……. as assigned for each randomly selected household 1 to 50)

*Arrange all the members aged 15-54 in the following order - oldest male, next oldest male, and so on for all males followed by oldest female, next oldest female, etc. Then use selection table assigned to the household to choose R individual RESPONDENT.

GENERAL HOUSEHOLD INFORMATION		
Questions	**RESPONSE**	**SKIP**
1. Number of members who usually live in the household		
2. Religion of the head of the household:	Hindu .... 01 Muslim .... 02 Christian .... 03 Sikh .... 04 Buddhist/neo buddhist .... 05 Jain .... 06 Jewish.. 07 Parsi .... 08 No religion .... 09 Other .... 96 (Specify)	

3. What is the main source of drinking water?	PIPED WATER
	   Piped into
	      Residence 11
	      Public Tap 12
	GROUND WATER:
	      Hand Pump in Residence 21
	      Public Hand Pump 22
	WELL WATER
	   Well in Residence
	      Covered well 31
	      Open well 32
	   Public Well
	      Covered well 33
	      Open well............................. 34
	SURFACE WATER:
	      Spring 41
	      River/Stream 42
	      Pond 43
	      Dam 44
	      Rainwater 51
	      Tanker Truck 61
	      Any other 96
	(specify)	

4. What kind of toilet facilities do you have?	Flush Toilet
	      Own Flush Toilet 11
	      Shared Flush Toilet 12
	      Public Flush Toilet 13
	Pit Toilet/Latrine
	      Own Pit Toilet 21
	      Shared Pit Toilet 22
	      Public Pit Toilet 23
	      No facility/Bush/Field............... 31
	      Other 96
	(Specify)	

5.	What is the **main** source of lighting for your household?	Electricity .... 1 Kerosene .... 2 Gas .... 3 Oil .... 4 Other .... 6 (Specify)	
6.	What is the type of **house**?	Pucca .... 1 Semi-Pucca .... 2 Kachha 3	
7.	How many **rooms** are there in your household?	Rooms	
8.	Do you have a separate room, which is used as **kitchen**?	Yes .... 1 No 2	
9.	What type of **fuel** does your household **mainly use** for cooking?	Wood .... 01 Crop Residue .... 02 Dung Cakes .... 03 Coal/Coke/Lignite .... 04 Charcoal .... 05 Kerosene .... 06 Electricity .... 07 Liquid Petroleum Gas (LPG) .... 08 Bio-Gas .... 09 Others .... 96 (Specify)	
10.	Does this household **own this house** or any other house?	Yes .... 1 No 2	
11.	Does this household **own any agriculture land**?	Yes .... 1 No 2	If No, go to 14
12.	How much **agriculture land** does this household own?	Acres None	
13.	Out of this land, how much is **irrigated**?	Acres None	
14.	Does the household own any livestock?	Yes .... 1 No 2	
15.	Does the household own any of the following: *(READ ALL THE OPTIONS AND RECORD THE RESPONSE)*	Yes No A mattress? 1 2 A pressure cooker? 1 2 A chair? 1 2 A cot or bed? 1 2 A table? 1 2 A clock or Watch? 1 2 An electric fan? 1 2 A bicycle? 1 2 A radio or transistor? 1 2 A sewing machine? 1 2 A telephone or Mobile? 1 2 A refrigerator? 1 2 A television? 1 2 A moped, scooter, or motorcycle? 1 2 A car? 1 2 A water pump? 1 2 A bullock cart? 1 2 A thresher? 1 2 A tractor? 1 2	

| 16. | What is the type of oil/cooking medium **most commonly** used in the house?

(CHOOSE ONLY ONE IDENTIFIED BY

MAXIMUM CONSUMPTION) | Cooking Oil
   Mustard oil 01
   Coconut oil 02
   Groundnut oil 03
   Sunflower oil 04
   Soyabean oil 05
   Palm oil 06
   Vanaspati oil 07
   Pure Ghee 08
   Butter 09
   Others 96
                 (Specify) | |

INTEGRATED DISEASE SURVEILLANCE PROJECT (IDSP)
NCD RISK FACTORS SURVEY (PHASE -I), INDIA

(Name of State   Year -2007)
INDIVIDUAL QUESTIONNAIRE

IDENTIFICATION	
STATE CODE:	☐☐
DISTRICT CODE	☐☐
TEHSIL/TALUK	☐☐☐
CITY/TOWN/VILLAGE	☐☐☐☐☐☐☐
SEGMENT NUMBER:	☐☐
URBAN/RURAL (URBAN=1, RURAL =2, URBAN SLUM = 3)	☐
PSU NUMBER	☐☐☐
HOUSEHOLD NUMBER	☐☐☐
LINE NUMBER OF PARTICIPANT NAME: _____	☐☐

CONSENT	RESPONSE
CONSENT HAS BEEN READ OUT TO PARTICIPANT	YES ....1 NO ....2 IF NO, READ CONSENT
CONSENT HAS BEEN OBTAINED	YES ....1 NO ....2 IF NO, END

	1	2	3		FINAL VISIT	
Date Interviewer's Name & Code (Step 1 & Step 2) Technician's Name & Code (Step 3)	_____ _____ _____	_____ _____ _____	_____ _____ _____		Day Month Year Interviewer's Code Result* (Step-1) Result* (Step- 2) Result* (Step- 3)	☐☐ ☐☐ 2 0 ☐☐ ☐☐ ☐ ☐ ☐
Next Visit Date/ Time	_____	_____			Total Number of Visits	☐

*RESULT CODES: 1. COMPLETED   2. NOT AT HOME   3. POSTPONED   4. REFUSED   5. PARTLY COMPLETED   6. NOT ELIGIBLE
9. OTHER (SPECIFY) _____

NAME DATE	SUPERVISOR	EDITED & CHECKED BY	KEYED BY
	.... ☐☐	.... ☐☐	.... ☐☐

STEP- I DEMOGRAPHIC INFORMATION		
QUESTIONS AND FILTERS	**Response**	**Skip**
101. Sex	Male .... 1 Female 2	
102. Age	Age in completed Years	
103. What is your **current marital** status?	Never married .... 1 Currently .... Married .... 2 Married but gauna not performed.......... 3 Widowed/Divorced/Separated 4	
104. Have you ever attended school?	Yes .... 1 No 2	If no, go to 107
105. **if yes,** what is the **highest grade** of education you completed?	Grade*............	
106. **Check 105** Grade 0-5 ▢ ↓	Grade 6 & above ▢ → Go to 108	
107. Can you read and write?	Yes .... 1 No 2	
108. What is your main work/ occupation?	Professional/Executive/Manager/ Big business .... 1 Clerical/Medium business .... 2 Sales .... 3 Agriculture/Self-employed .... 4 Agriculture employer .... 5 Household and domestic work .... 6 Services .... 7 Skilled manual .... 8 Unskilled manual .... 9 Other (Specify) .... 10 Do not work 11	
GRADE FOR DIFFERENT LEVEL OF COMPLETED EDUCATION	**EDUCATION LEVEL** **GRADE** CLASS I TO XII : 1 TO 12 YEARS = 1 TO 12 GRADE BACHELOR'S DEGREE : 15 YEARS (12+3) = 15 GRADE **MASTER'S DEGREE** : **17 YEARS (12+3+2)** = **17 GRADE** ENGINEERING : 16 YEARS (12+4) = 16 GRADE MBBS : 17 YEARS (12+5) = 17 GRADE POLYTECHNIC : 13 YEARS (10+3) = 13 GRADE ITI : **11 YEARS (10 +1)** = **11 GRADE** PH. D. : 20 YEARS (12+3+2+3) = 20 GRADE	

STEP- I BEHAVIOURAL INFORMATION

Now I am going to ask you some questions about various health behaviours. This includes things like smoking, drinking alcohol, eating fruits and vegetables and physical activity. Let's start with tobacco

Smoking Tobacco use

	Questions	Response	Skip
201.	Do you **currently smoke** any tobacco products, such as bidis, cigarettes, cigars or pipes, hookah or any other local tobacco products?	Yes .... 1 No... 2	If No, go to 205
202.	**If Yes**, do you smoke **daily?**	Yes .... 1 No... 2	if No, go to 205
203.	On an average, **how many (number of times in case of hookah)** of the following do you smoke each day? *(RECORD FOR EACH TYPE)* *RECORD 88, IF ANY PRODUCT IS NOT USED INSTEAD OF LEAVING BLANK IN THE PRODUCT CATEGORIES).* *(RECORD FOR ANY NEW FORM OF TOBACCO USE REPORTED BY THE RESPONDENT e.g. REVERSE SMOKING etc.)*	Number Bidis ☐☐ Manufactured Cigarettes ☐☐ Hand-rolled Cigarettes ☐☐ Pipes ☐☐ Cigars, Cheroots ☐☐ Hookah ☐☐ Other local smoked tobacco products…...................... ☐☐ (SPECIFY)	
204.	How old were you at that time when you **first started** using the tobacco product(s) **daily?**	Age in completed years ☐☐ Don't remember 7 7	Go to 208
205.	In the past, did you **ever smoke** tobacco products such as bidis, cigarettes, cigars or pipes **daily?**	Yes .... 1 No 2	If No, go to 207
206.	How **old** were you when you **stopped smoking** daily?	Age in completed years ☐☐ Don't remember 7 7	
207.	Are you **currently exposed** to tobacco smoke at your home or workplace **daily?**	Yes .... 1 No 2	

Smokeless Tobacco use

	Questions	Response	Skip
208.	Do you **currently use** any **smokeless tobacco**, such as (chewing tobacco, *tuibu* snuff, betel, gutka, pan masala, etc.)?	Yes ....1 No 2	if No, go to 212
209.	**If yes,** Do you **currently use smokeless tobacco** products **daily?**	Ye ....1 No 2	if No, go to 212
210.	On average, **how man**y times a day do you use... *(RECORD FOR EACH TYPE)* *SPECIFY 77 IF NO PRODUCTS WERE USED IN EACH CATEGORY INSTEAD OF LEAVING CATEGORIES BLANK.*	Chewing tobacco ☐☐ Pan with tobacco ☐☐ *Tuibu*, Tobacco Snuff, by mouth ☐☐ Snuff, by nose ☐☐ Other ☐☐ Other (specify).........................	
211.	How old were you at that time when you **first started** using smokeless tobacco **daily?**	Age in completed years ☐☐	Go to 214
212.	If you are not using currently, in the past did you **ever use** smokeless tobacco products **daily** such as chewing tobacco, tuibu, snuff, betel, gutka, etc.?	Yes ....1 No 2	if No, go to 214
213.	How **old** were you when you **stopped** using smokeless tobacco products **daily?**	Age in completed years ☐☐	

Alcohol Consumption

The next questions ask about the consumption of alcohol.

	Questions	Response	Skip
214.	Have you consumed any alcoholic products (such as beer, wine, whisky, locally prepared alcohol, etc.) within the **past 12 months?**	Yes ....1 No 2	if No, go to 219
215	In the past 12 months, **how frequently** have you had at least one drink?	5-7 days per week ....1 1-4 days per week ....2 1-3 days per month ....3 Less than once per month 4	
216.	When you drink alcohol, **on average**, how many **standard drinks** do you have during one day? *(USE SHOWCARD)*	Number ☐☐	
217.	Have you consumed alcohol (such as beer, wine, spirits, or any locally prepared wine, etc.) within the **past 30 days?**	Yes ....1 No 2	If No go to 220
218.	During each of the past 7 days, how many **standard drinks** of any alcoholic drink did you have each day? *(USE SHOWCARD)*	Monday ☐☐ Tuesday ☐☐ Wednesday ☐☐	Go to 220

		Thursday ☐☐	
		Friday ☐☐	
		Saturday ☐☐	
		Sunday ☐☐	
219.	**If answer to Question 214 is No, then** Have you **ever** (past user) **consumed** alcohol (such as beer, wine, spirits, or any local wine product)?	Yes .... 1 No 2	if No, go to 221
220.	How **old** were you when you **started** consuming alcohol **regularly?**	Age in years ☐☐ Don't Remember 7 7	

Diet

The next questions ask about the fruits and vegetables that you usually eat. I have a nutrition card here that shows you some examples of local fruits and vegetables. Each picture represents the size of a serving. As you answer these questions please think of **a 'typical' or a 'usual' week.**

Questions		Response	Skip
221.	In a typical week, on how many days do you **eat fruit?**	Number of days ☐	If zero days, go to 223
222.	How many **servings** of fruit do you eat on **one of those days?** *(USE SHOWCARD)*	Number of servings ☐	
223.	In a typical week, how many days do you **eat vegetables?** *(USE SHOWCARD)*	Number of days ☐	If zero days, go to 225
224.	How many **servings** of vegetables do you eat on **one** of those days? *(USE SHOWCARD)*	Number of servings ☐	
225.	How often do you consume each of the following ? **(**USE CODE: DAILY – 1; AT LEAST ONCE IN A WEEK – 2; ONCE IN A MONTH –3; OCCASIONALY OR RARELY - 4; NEVER – 5)	Butter/Ghee ☐	
		Fried local foods (Samosa, Kachori, etc.) ☐	
		Red meat ☐	
		Eggs ☐	
		Chicken ☐	
		Fish ☐	
		Aerated drinks ☐	
		Sweetened drinks ☐	
		Pizza/burgers/French fries etc ☐	
		Cakes, Pastries or other bakery items ☐	
		Chips, Namkeen etc ☐	

Physical Activity

Next I am going to ask you about the time you spend doing different types of physical activity in a **typical week.** Please answer these questions even if you do not consider yourself to be a physically active person.

Think first about the time you spend doing work. Work includes things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment.

In answering the following questions **'Vigorous -Intensity activities'** are activities that require hard physical effort and cause large increase in breathing or heart rate, **'Moderate-Intensity activities'** are activities that require effort and cause small increases in breathing or heart rate.

	Questions	Response	Skip
226.	Does your work involve **vigorous-intensity activity** that causes large increases in breathing or heart rate like (carrying or lifting heavy loads, digging or construction work etc.) for **at least 10 minutes continuously?**	Yes .... 1 No 2	If No, go to 229
227.	In a typical week, on how many days do you do **vigorous-intensity activities** as part of your work?	Number of days ☐	
228.	How much time do you spend doing **vigorous-intensity** activity at home/work on a typical day?	Hours : minutes ☐☐ : ☐☐ Hours minutes	
229.	Does your work involve **moderate -intensity** activity that causes small increases in breathing or heart rate for **at least 10 minutes** continuously (such as brisk walking or carrying loads, manual washing of clothes, dry sweeping of floor, wet mopping of floor, drawing water from well, carrying water from tap, carrying water from river or well, manual grinding or pounding of cereals, gardening at home, carrying groceries from market, etc.) ?	Yes .... 1 No 2	If No,go to 232
230.	In a typical week, on how many days do you do **moderate-intensity** activities as part of your work?	Number of days ☐	
231.	How much time do you spend doing **moderate-intensity** activity at work on a typical day?	Hours : minutes ☐☐ : ☐☐ Hours minutes	

Travel (related to Physical Activity) to and from places

The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship etc.

232.	Do you **walk** or use **a bicycle** (pedal cycle) for **at least 10 minutes** continuously to get to and from places?	Yes .... 1 No 2	If No, go to 235
233.	In a typical week, on **how many days** do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days ☐	
234.	How **much time** do you spend walking or bicycling for travel on a typical day?	Hours : minutes ☐☐ : ☐☐ Hours minutes	

Recreational Activity			
235.	Do you do any **vigorous**-intensity **sports**, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like (running or football,...) for **at least 10 minutes continuously?**	Yes .... 1 No 2	If No, go to 238
236.	In a typical week, on **how many days** do you do vigorous-intensity sports, fitness, or recreational activity?	Number of days ☐	
237.	How **much time** do you spend doing vigorous-intensity sports, fitness or recreational (leisure) activities on **a typical day?**	Hours : minutes ☐☐ : ☐☐ Hours minutes	
238.	Do you do any **moderate**-intensity **sports**, fitness or recreational (leisure) activities that cause small increases in breathing or heart rate such as brisk walking (cycling, swimming, volleyball etc.) for **at least 10 minutes continuously?**	Yes .... 1 No 2	If No, go to 241
239.	In atypical week, on **how many days** do you do moderate-intensity sports, fitness, or recreational activity?	Number of days ☐	
240.	How **much time** do you spend doing moderate-intensity sports, fitness, or recreational activities on a typical day?	Hours : minutes ☐☐ : ☐☐ Hours minutes	
Yoga Activity			
241.	Do you regularly practice **Yogic Exercise /*Yogasan?***	Yes .... 1 No 2	If No, go to 244
242.	If **yes**, **how many days** in a week?	Number of days ☐	
243.	How much **time** do you spend doing Yoga in a **typical day?**	Hours : minutes ☐☐ : ☐☐ Hours minutes	
Sedentary Behaviour			
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent [sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television], but do not include time spent sleeping.			
244.	How **much time** do you usually spend **sitting or reclining** on a **typical da**y?	Hours : minutes ☐☐ : ☐☐ Hours minutes	

	Questions	Response	Skip
History of Raised Blood Pressure			
245.	When was your blood pressure last **measured** by a **health professional?**	Within past 12 months .... 1 1-5 years ago .... 2 More than 5 years ago .... 3 Never 4	
246.	Have you ever been told by a doctor or other health worker that you have **raised (high) blood pressure** or hypertension?	Yes .... 1 No 2	If No, go to 248
247.	Are you currently receiving any of the following treatments/advice for raised (high) blood pressure prescribed by a doctor or other health worker as well as **any advice?**		
	Drugs (medication) that you have taken in the last 2 weeks	Yes .... 1 No 2	
	Special prescribed **diet**	Yes .... 1 No 2	
	Advice or treatment to lose weight	Yes .... 1 No 2	
	Advice or treatment to stop smoking	Yes .... 1 No .... 2 Not Applicable 8	
	Advice to start or do **more physical activity**	Yes .... 1 No 2	
248.	During the **past 12 months** have you visited to an AYUSH Practitioner for high blood pressure or hypertension?	Yes .... 1 No 2	If No, go to 250
249.	Are you currently taking any treatment/medicine from an **AYUSH Practitioner** for your high blood pressure?	Yes .... 1 No 2	
History of Diabetes			
250.	Has your blood sugar been **measured** in the last **12 months?**	Yes .... 1 No 2	
251.	Have you ever been **told** by a doctor or health worker that you have **diabetes?**	Yes .... 1 No 2	If No, go to 253
252.	Are you currently receiving any of the following treatments/advice for diabetes prescribed by a doctor or other health worker as well as **any advice?**		
	Insulin	Yes .... 1 No 2	
	Oral **drug** (medication that you have taken in the last 2 weeks).	Yes .... 1 No 2	
	Special Prescribed **diet**	Yes .... 1 No 2	
	Advice or treatment to **lose weight**	Yes .... 1 No 2	
	Advise to start or do **more exercise**	Yes .... 1 No 2	
253.	During the past 12 months have you visited/ seen an **AYUSH Practitioner** for diabetes?	Yes .... 1 No 2	If No, go to 301
254.	Are you currently taking **any treatment/medicine** from an AYUSH Practitioner for your diabetes?	Yes .... 1 No 2	

STEP 2. Physical Measurement			
Questions		**Response**	**Skip**
301.	Technician / Interviewer ID		
302.	Device ID for height and weight	Height....... ☐☐ Weight...... ☐☐	
303.	Height	In Centimeter(cm)... ☐☐☐.☐	
304.	Weight	In Kilograms (kg).... ☐☐☐.☐	
305.	(For Women) Are you pregnant?	Yes .... 1 No 2	If Yes, go to 309
Waist Measurement			
306.	Device ID for waist	☐☐	
307.	Waist circumference Reading 1	In Centimeter (cm)... ☐☐☐.☐	
308.	Waist circumference Reading 2	In Centimeter (cm)... ☐☐☐.☐	
Blood Pressure and Pulse Rate			
309.	Technician ID	☐☐	
310.	Device ID for Blood Pressure	☐☐	
311.	Cuff Size Used	Small .... 1 Medium .... 2 Large 3	
312.	B.P. Reading 1	Systolic (mmHg) ☐☐☐ Diastolic (mmHg) ☐☐☐	
313.	Pulse Rate Reading 1	☐☐☐	
314.	B.P. Reading 2	Systolic (mmHg) ☐☐☐ Diastolic (mmHg) ☐☐☐	
315.	Pulse Rate Reading 2	☐☐☐	
316.	B. P. Reading 3	Systolic (mmHg) ☐☐☐ Diastolic (mmHg) ☐☐☐	
317.	Pulse Rate Reading 3	☐☐☐	

Appendix - C

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