Ministry of Health & Family Welfare
Government of India

INTEGRATED DISEASE SURVEILLANCE PROJECT (IDSP)

NON-COMMUNICABLE DISEASE RISK FACTORS SURVEY

2007-08

Maharashtra

Pune Health Care Management Research Centre, Pune
(State Survey Agency)

Regional Medical Research Centre for Tribals, Jabalpur
(Regional Resource Centre)

National Institute of Medical Statistics
New Delhi
(National Nodal Agency)

National Institute of Communicable Diseases
New Delhi
(IDSP Central Surveillance Unit)

Indian Council of Medical Research
New Delhi
(National Implementing Agency)

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सचिव, भारत सरकार
(स्वास्थ्य अनुसंधान विभाग)
स्वास्थ्य एवं परिवार कल्याण मंत्रालय एवं
महानिदेशक, आई सी एम आर

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(स्वास्थ्य अनुसंधान विभाग)
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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)

डॉ बेला शाह एम.डी.
वैज्ञानिक 'जी' एवं प्रमुख
असंचारी रोग प्रभाग

Dr. Bela Shah MD
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भारतीय आयुर्विज्ञान अनुसंधान परिषद
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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

The National Institute of Medical Statistics was identified as National Nodal Agency (NNA) to conduct the IDSP-NCD Risk Factors Survey Phase-I in India. The survey was carried out with the joint efforts of all partner organizations including Division of Non-Communicable Diseases of Indian Council of Medical Research as the implementing agency; and Center for Community Medicine, All India Institute of Medical Sciences, New Delhi; Regional Medical Research Centre for Tribal, Jabalpur; National Institute of Epidemiology, Chennai; Sri Chitra Tirunal Institute of Medical Sciences and Technology, Thiruvanathapuram; Regional Medical Research Centre, Dibrugarh as Regional Resource Centers; Department of Community Medicine of Chhatrapati Shahuji Maharaj Medical University, Lucknow; Government Medical College, Nagpur; Pune Health Care Management and Research Centre, Pune; Indian Institute of Health and Family Welfare, Hyderabad; Madras Diabetes Research Foundation, Chennai; Clinical Epidemiology Unit, Medical College, Thiruvanathapuram; Regional Institute of Medical Sciences, Imphal, Manipur as State Survey Agencies respectively.

We sincerely acknowledge the Ministry of Health and Family Welfare (MoHFW), Government of India for granting us responsibility of conducting the IDSP NCD Risk Factors Survey Phase-I in India. We acknowledge the World Bank for providing financial support to conduct the Phase-I survey in seven states. We gratefully acknowledge the technical support and valuable guidance provided by Dr. N.K. Ganguly, Chairman and all members of National Technical Advisory Committee (NTAC) and Dr. Shiv Lal, Special Director General Health Services, Director NICD and all the members of National Monitoring Committee. Thanks go to Dr. G. Ramana and J. Gowrinath Sastry from World Bank; Dr. Cherian Varghese, WHO; Dr. D. Bachani, Dr. R.L. Ichhpujani, Dr. A.C. Dhariwal, Dr. Shah Hossain and Dr. Pradeep Khasnobis from IDSP Central Surveillance Unit, NICD for their support in undertaking the survey. We are grateful to Dr. L.M. Nath and Dr. K. Anand, AIIMS, New Delhi and Dr. B.N. Bhattacharya, Indian Statistical Institute, Kolkatta for their technical guidance and review of the reports. We are extremely thankful to Dr. Bela Shah and her colleagues Dr. D.K. Shukla and Dr. Prashant Mathur at ICMR for providing leadership to implement the survey.

The team of NIMS including Dr. H.K. Chaturvedi, Dr. D. Sahu, Dr. Tulsi Adhikari, Dr. Atul Juneja, Mr. Jiten Kumar Singh and all other supporting staff involved in the study deserve appreciation and acknowledgement. We are grateful to Regional Medical Research Centre for Tribal, Jabalpur being the Regional Resource Center for Maharashtra and Pune Health Care Management and Research Centre, Pune involved as State Survey Agency for supervising, data collection and data entry of survey in Maharashtra.

The hard work of all the field investigators, field supervisors and data entry operators are highly appreciable and acknowledged. Last but not the least, I express my heartiest thanks to all the respondents and other peoples including local health administrators of districts and state who helped in completing the survey.

National Institute of Medical Statistics
ICMR, New Delhi

(*Arvind Pandey*)
Director

Definitions

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

Current Daily Smoker / Smokeless Tobacco User: Some one 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
BMI	Body Mass Index
BP	Blood Pressure
CEB	Census Enumeration Block
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
PHCMRC	Pune Health Care Management & Research Centre
PSU	Primary Sampling Unit
RMRCT	Regional Medical Research Center for Tribals
RRC	Regional Resource Centre
SSA	State Survey Agency
WC	Waist Circumference
WHO	World Health Organization

Tables

Figures

IDSP-NCD Risk Factor Survey

Fact Sheet - Maharashtra

Population	
Household covered	4997
Individual covered	6091
Household Characteristics(%)	
Religion	
Hindu	86
Muslim	9
Access to piped drinking water	82
Urban	97
Rural	71
Sanitation	
Flush Toilet	54
Urban	73
Rural	38
Source of Lighting	
Electricity	93
Urban	95
Rural	92
Type of House	
Pucca House	37
Urban	56
Rural	21
Semi-Pucca House	49
Urban	35
Rural	61
Fuel use for Cooking	
LPG/Gas	54
Urban	85
Rural	28
Wood	41
Urban	8
Rural	68
Separate Kitchen	
Urban	86
Rural	68
Own Agricultural land	
Urban	6
Rural	66
Individual Characteristics(%)	
Education -Illiterate	24
Urban - Male	6
Urban -Female	18
Rural -Male	24
Rural -Female	48
Behavioural Information(%)	
Current Tobacco users	
Smokers	10
Male	16
Female	3
Smokeless tobacco users	33
Male	41
Female	24
Any form of Tobacco use	37
Male	48
Female	24
Mean age of Initiation (in years)	
Smoking	20
Male	20
Female	20
Smokeless tobacco	20
Male	20
Female	20
Alcohol Consumption	
Consumed Alcohol (last 30 days)	10
Male	16
Female	3
Consumed Alcohol (last 12 Months)	14
Male	24
Female	3
Consumed alcohol (in last 7 days)	
Binge Drinkers	7
Male	7
Female	3
Mean age of Initiation Alcohol (in years)	
Male	21
Female	21
Fruits and Vegetables consumed	
Less than five servings per day	76
Urban	74
Rural	77
Physical Activity	
Low Physical Activity	81
Urban	86
Rural	77
Hypertension	
Pre Hypertension	47
Urban	50
Rural	45
Stage I and II Hypertension	20
Urban	18
Rural	22
Physical Measurement - BMI	
Under weight	23
Urban	18
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Urban	17
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Urban	19
Rural	10

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 IDSP 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 and the National Monitoring Committee for monitoring the overall progress of the project. Indian Council of Medical Research 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 Regional Medical Research Centre, Jabalpur as a Regional Resource Centre (RRC) for monitoring the data collection and technical support to Pune Health Care Management and Research Centre, Pune , the State Survey Agency (SSA) for the state of Maharashtra.

Survey Methodology

WHO STEPS methodology for NCD Risk Factor Surveillance has been adopted for the survey after carrying out suitable modifications, based on a multi-site 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 Marathi in case of Maharashtra), field protocol for data collection and physical measurements to facilitate comparability across states and also to ensure high quality data. 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 specific distributions for both sex, which are available on the population level.

Two types of questionnaires - one at household level and another for 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 Step methodology. The first section (Step1) 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 Maharashtra. Among them only three households refused to participate in the survey. The overall individual response rate for the survey was over

99 percent. More than four-fifth (86%) of the households were Hindu and about 9 percent were Muslim. Ninety-three percent of the households used drinking water from a piped or hand pump. Almost all households had flush or pit toilet facility. Ninety-three 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. As envisaged, two-third of the households in rural possessed agricultural land, where as it was only 6% in case of urban.

About one-quarter of the respondents (24.3%) 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 more emphatically. About three-quarter of the respondents were currently married. Majority of the respondents in rural area were engaged in agricultural work. More than 70% of females in urban area were looking after domestic work; the males were engaged in services/sales work followed by executive and business positions.

BEHAVIOURAL RISK FACTORS FOR NCD

Tobacco Smoking

As per the WHO STEPs guidelines, the smokers were 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*. While eliciting the information on smoking it was observed that 16% of males in Maharashtra (14 % in urban and 18% in rural) were current smokers. Only 3% of females were currently smoking.

The mean number of *beedis*, manufactured cigarette and hand rolled cigarette smoked in a day was 3, 2 and less than one respectively. In the young age group (15-34) of smokers, the average age of onset of smoking was 19 years for rural and 21 years for urban. The mean age of cessation of smoking for all those who stopped smoking was 29 years. Among non-smokers, about 6% of respondents were exposed to tobacco smoke at home or work place.

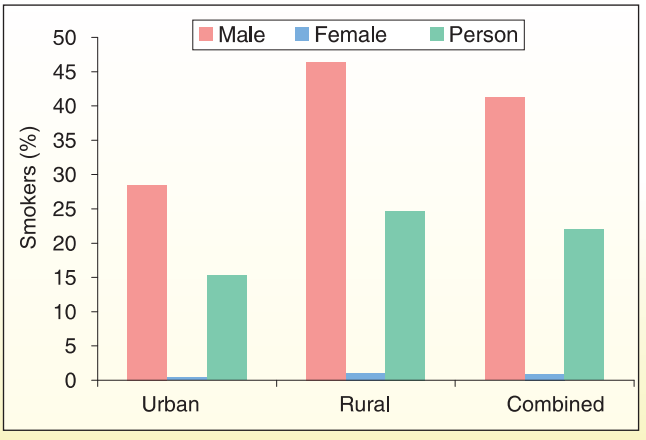

Figure 1. Current smokers (%) by sex and residence

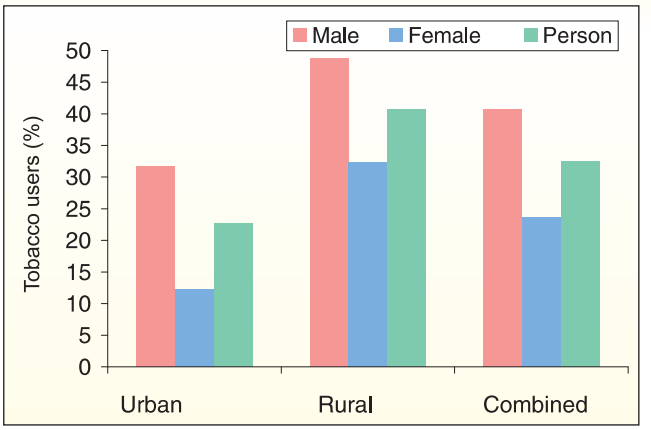

Figure 2. Current daily smokeless tobacco users (%) by sex and residence

One-third (33%) of respondents were current users of smokeless tobacco. The mean frequency of chewing tobacco in a day was around 4, with 5 for men and 2 for women tobacco chewer. The mean frequency of chewing pan with tobacco, snuff by mouth/nose was less than one. The mean age of initiation of smokeless tobacco use was 20 years for the young respondents aged 15-34 years and it was 23 years for the respondents in the age group of 35-64 years. The over all mean age of quitting smokeless tobacco was 35 years. About 37% of the respondents were using tobacco in either form (smoking or smokeless) whereas about 5% were using tobacco in both the forms.

Alcohol Consumption

In the survey, 14% of the respondents reported to have consumed alcohol in past 12 months and 10% consumed in last 30 days preceding the survey. Only 1% of respondents were past drinkers. The habit was higher among men with 24% consuming alcohol in past 12 months as compared to only 3% among women. The average number of drinks on a drinking day was 2 drinks. About 7% 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 25 years for the respondents in the age group of 35-64 years. Sixteen percent of men and only 3 percent of women report to

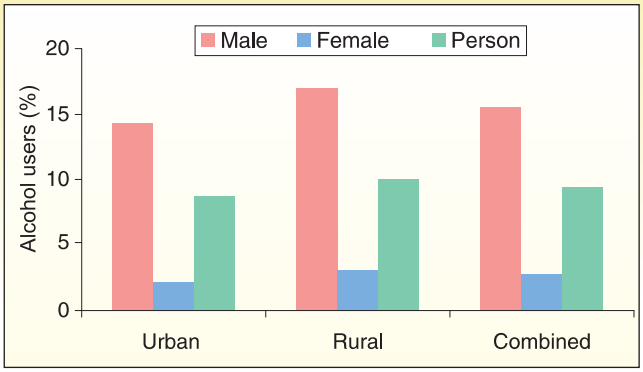

Figure 3. Alcohol consumplion (%) by sex and residence

have consumed alcohol in past 30 days. The percentage of current drinkers was high among the respondents whose main occupation was agriculture.

Fruits and Vegetables Consumption

In a week, people in Maharashtra consumed vegetables 4 days and fruits on an average 2 days. The mean number of days when fruits were consumed was marginally higher for urban population (3 days) as compared to that for rural population (2 days). Only one-quarter of population consumed five or more servings of fruits and vegetables per day.

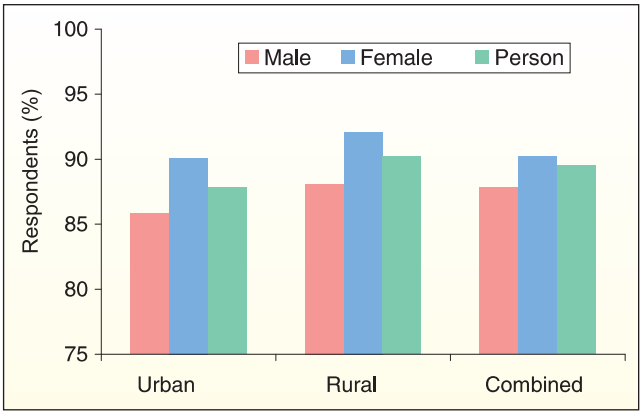

Figure 4. Less than five servings of fruits & vegetables consumption (%) by sex and residence

Food and Oil Consumption

In respect of consumption of specific food habits, 32% population consumed eggs, 22% consumed fish and red meat and 20% fried local food at least once a week. Cheese/butter was consumed daily by 5% of the population. Cake pastries or other bakery items including chips/*namkeen* were consumed daily by 3% of urban population.

Most common edible oil used for cooking among the households in Maharashtra was soybean oil (40%), followed by groundnut oil (23%), palm oil (18%) and sunflower oil (15%).

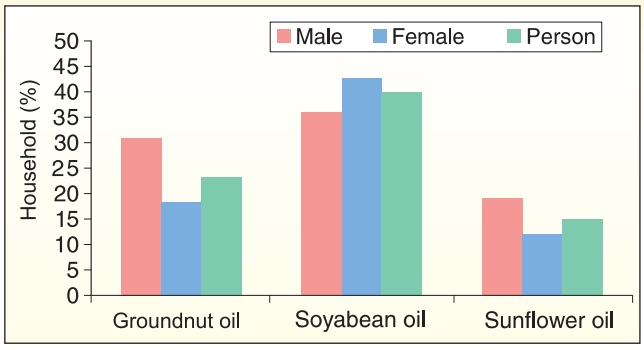

Figure 5. Major oil consumption among households (%) by residence

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 Maharshtra, the mean time spent in different sub groups of work related physical activity range between 109 to 143 minutes per day. The mean duration of total physical activity was 924 MET minutes per day. Most of the time spent related to work and travel (walks and bicycle). Around 48 minutes were spent for travel and 8 minutes for recreational activities per day.

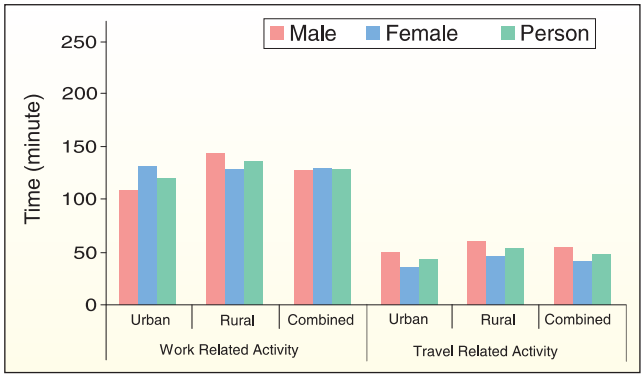

Figure 6. Mean time spent on physical activity per day (minutes) by sex and residence

As per the WHO guidelines, the total physical activity of the individual has been categorized as low, medium and high. About three-fourth of respondents report low level of physical activity, while 16% and 3% of respondents report medium and high level of activity, respectively. About 67% of the respondents spent 1-3 hours in sedentary activities.

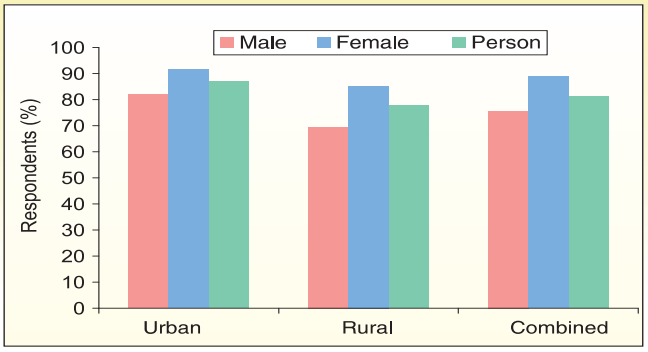

Figure 7. Low physical activity of respondents (%) by sex and residence

HYPERTENSION AND DIABETES

Hypertension

The blood pressure is an important determinant of risk of cerebrovascular and ischemic heart diseases, congestive cardiac failure and renal failure. In the survey, 5% respondents reported to have been diagnosed as hypertensive by health professionals (4% of males and 6% of females; 7% of urban and 3% of rural population). Among those who were diagnosed for hypertension, 77% were on prescribed drugs, more than half were advised dietary modification, and 22% consulted AYUSH practitioner of which three-fourth were taking treatment from them. 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 123 mm Hg and mean diastolic blood pressure was 80 mm Hg. By categories of hypertension, 33% recorded to be normal, 47% in pre hypertension, 17% in stage I hypertension and 3% in stage II hypertension. Stage I & II hypertension was more pronounced in men (22%) as compared to women (18%).

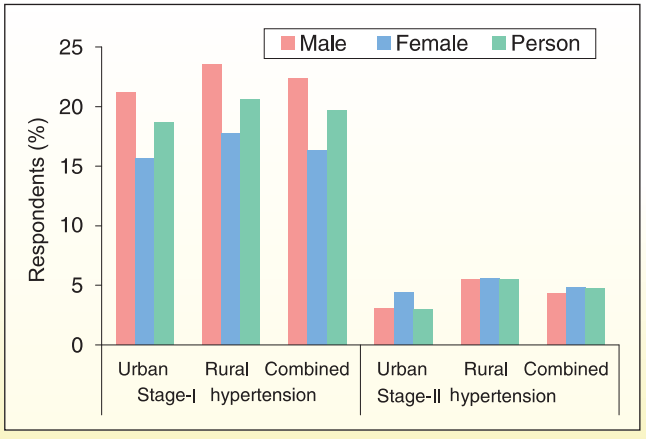

Figure 8. Stage I & II hypertension (%) by sex and residence

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 46% were taking insulin and 75% 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 31% (of the diagnosed) had consulted AYUSH practitioners for the elevated blood sugar levels and majority of them were taking the treatment from the system.

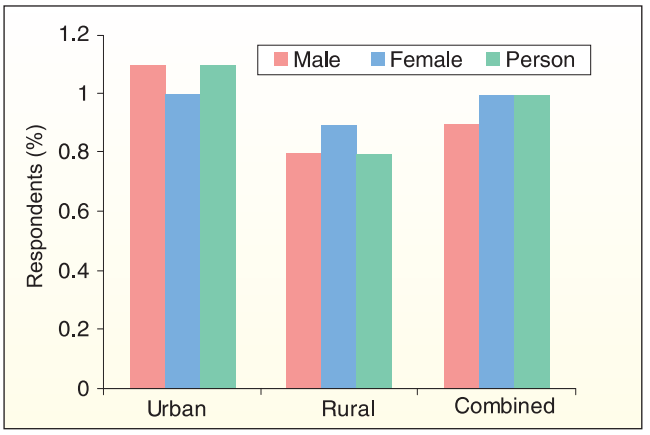

Figure 9. History of raised blood sugar (%) by sex and residence

PHYSICAL MEASUREMENTS

Body Mass Index (BMI)

Worldwide researches have shown that there is a strong association between BMI and health risk. On the other hand low BMI is an indicator of risk to health, often being associated with tobacco, alcohol use and drug addiction. The survey recorded on height, weight and waist circumference. The mean BMI was around 21 kg/m^2 with mean height 158 cm (163 cm for men, 152 cm for women) and mean weight 53 kg (57 kg for men and 49 kg for women). According to the survey, 23% of the respondents were under weight and about 13% were overweight, which was 17% for urban and 10% for rural population. Overall 64% of the respondents were in the normal category of BMI.

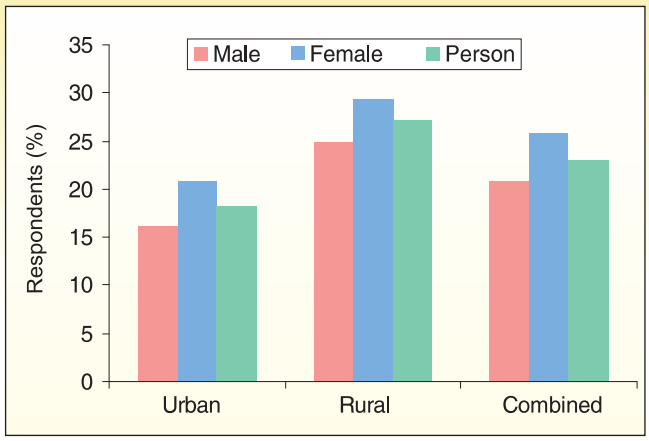

Figure 10. Overeight respondents (%) by sex and residence in Maharashtra

SOCIO-DEMOGRAPHIC DIFFRENTIALS

Tobacco is mainly used either in the form smoking or smokeless (chewing tobacco with lime or *Pan*) in Maharashtra. 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, 80% 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 executive 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 Maharashtra.

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

Chapter 1

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 Medical Research Centre for Tribals (RMRCT), Jabalpur as the Regional Resource Centres (RRCs). Pune Health Care Management & Research Centre (PHCMRC), Pune was identified as State Survey Agency 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, Maharashtra, Mizoram, Tamil Nadu and Uttarakhand. The present treatise is the survey report of the state of Maharashtra.

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[1] 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.

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. Dietary patterns that include higher intakes of fruits and vegetables are associated with several health benefits, including a decreased risk for some types of

1.4 HEALTH PROFILE OF THE STATE

The state of Maharashtra is located in the north centre of Peninsular India. It is the third largest state in India both in terms of area and population. It has an area of 307,713 sq. km. and a population of 106386 people (in thousand)[2]. The state is bounded by the Arabian sea in the west, Gujarat in the north-west, Madhya Pradesh in the north and the east, Andhra Pradesh in the south-east and Karnataka and Goa in the south. There are 37 districts, 358 blocks and 43711 villages in the state. The population density is 315 per sq. km. (as against the national average of 325). The population of the state has been growing with the decadal growth rate of 22.73% against 21.52% for the country. The key population and health indicators for Maharashtra are presented in Table 1.1 and Table 1.2.

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

S. No	Indicator	Kerala	India
1	Total Population (in thousand)*	106386	1128521
2	Population Ratio (Urban /1000 Rural)*	737	385
3	Decadal Growth Rate*	22.73	21.52
4	Crude Birth Rate (Per 1000 Population) **	18.5	23.5
5	Crude Death Rate (Per 1000 Population) **	6.7	7.5
6	Life Expectancy at Birth**	65.8(M) 68.1(F)	62.3(M) 63.9(F)
7	Total Fertility Rate***	2.2	2.9
8	Infant Mortality Rate (Per 1000 Live Births)**	35	57
9	Maternal Mortality Ratio (Per 100000 Live Births) †	149	301
10	Sex Ratio (Females/1000 Males)*	922	933
11	Mean Age at Marriage (Female)††	20.1	20.2
12	Population Below Poverty Line†††	30.7%	27.5%
13	Literacy Rate*	76.9%	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	Kerala	India
1	Number of Allopathic Doctors with recognized medical qualifications and registered with State Medical Council*	100428	696747
2	Dental Surgeons Registered**	6857	72497
3	Number of Government Allopathic Doctors***	5061	76542
4	Average Population served/Doctor***	19765	-
5	Number of Registered AYUSH Doctors †	105516	725338
6	Total Number of Registered Nurses ††	118724	1509196
7	Number of Doctors at the PHCs †††	1191	22273
8	Total CHCs Specialists at CHCs †††	448	3979
9	Health Assistant (Male & Female) †††	3518	35330
10	Health Worker (Male & Female) †††	15695	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-year age groups was estimated to be about 280. It is a known fact that the proportion of population in the 10-year age groups decreases 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 level fertility (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 sex 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 4997 households covering 2497 households in urban and 2500 households in rural areas. From these households, a total of 6124 respondents were contacted out of which 6092 completed the Step-1, and

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

Response	Residence		
	Urban	Rural	Combined
Households interview			
Households contacted	2500	2500	5000
Households interviewed	2497	2500	4997
Households response rate (%)	99.8	100.0	99.9
Eligible Participants Step-1			
Individual contacted	2968	3156	6124
Individual interviewed	2949	3143	6092
Response rate (%)	99.3	99.5	99.4
Eligible Participants Step-2			
Step-2 completed	2949	3142	6091
Overall individual response rate (%)	99.3	99.5	99.4

6091 completed the Step-2 survey. The overall non-response for the survey was less than 1% (Table 1.3)

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 (10 AM 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 Marathi in the present case. It first 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 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, type 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-1 and Step-2 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 started tobacco daily, past history of tobacco use, and age when stopped using tobacco.

Alcohol use: Questionnaire collected information on whether the individual was currently consuming 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 STEP 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 servings 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 listing 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 Maharashtra was trained by PHCMRC, Pune and the officials of RMRCT, Jabalpur, supervised the training process. The training was conducted from 11-13 September 2007 at IEB Bureau, Arogya Bhavan, Pune. The training consisted of lectures, classroom training, demonstration, practice interviews and field based training. A total of 27 participants were trained, of these 27 trainees 22 were part of the 9 survey teams and 5 were the supervisors for the survey teams. It was

ensured that each survey team comprised of 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 Marathi, 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 village Wadki, Pune 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-day 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 error. All the participants were provided with the Data Entry Software and it's 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 Group.

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 months, 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 Maharashtra. It was executed by Pune Health Care Management Research Centre, Pune (SSA) and was monitored by regular visits by the Regional Medical Research Centre for Tribals, Jabalpur (RRC). The division of non-communicable disease, Indian Council of Medical Research with 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 by the 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.

CHAPTER 2

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 Maharashtra. It also describes facilities in the households. The overall prevalence of various risk factors are presented for the ages 15-64 years.

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 (86%) were Hindu followed by Muslim (9%) and Buddhist (3%). Hindu constituted 80% of urban households and 90% of rural households. Eighty two percent of sample households had piped drinking water supply followed by 11% from hand pump, 6% from well and a small fraction (0.3%) from surface. It was found that 97% of urban households and 71% of rural households had piped drinking water supply. Regarding the sanitation facility, 54% of the households had flush toilets and about 1% of the households did not have any toilet facility while other had pit toilets facility. About 73% of the urban households and 38% of the rural households had access to the flush toilets in Maharashtra.

Overall 93% of households used electricity as main source of lighting which was slightly higher for urban (95%) than for rural households (92%). In the state, 37% of households had *pucca* house, 49% households had *semi-pucca* house and 14% households had *kaccha* house. About 56% of urban households and 21% of the rural households had *pucca* house. Several types of fuel were used for cooking in Maharashtra, with wood as the most common type (68%) in the rural, L.P.G. was most common (85%) for urban households. In the state as a whole, 54% households usage L.P.G. followed by wood (41%) and kerosene (5%).

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

Characteristics	Residence		Combined
	Urban	Rural	
Religion of household head			
Hindu	79.8	90.7	85.8
Muslim	12.8	5.2	8.6
Buddhist	5.1	1.9	3.4
Christian	1.3	1.1	1.2
Other	1.0	1.1	1.0
Total	100.0	100.0	100.0
Source of Drinking Water			
Piped	96.6	70.7	82.4
Hand pump	2.9	17.7	11.0
Well water	0.5	10.9	6.3
Surface water	0.0	0.7	0.3
Total	100.0	100.0	100.0
Sanitation Facility			
Flush toilet	73.2	37.6	53.7
Pit toilet	26.3	61.4	45.5
No facility	0.5	1.0	0.8
Total	100.0	100.0	100.0

Main source of lighting			
Electricity	94.7	92.4	93.4
Kerosene	1.7	7.5	4.9
Gas	3.6	0.1	1.7
Total	100.0	100.0	100.0
Type of House			
Pucca	56.0	21.3	37.0
Semi-Pucca	35.2	61.2	49.4
Kachha	8.8	17.5	13.6
Total	100.0	100.0	100.0
Cooking fuel			
LPG	84.6	28.4	53.8
Wood	7.7	67.5	40.5
Kerosene	6.6	3.1	4.7
Others	1.1	1.0	1.0
Total	100.0	100.0	100.0
Separate kitchen room			
Yes	86.4	68.4	76.6
No	13.6	31.6	23.4
Total	100.0	100.0	100.0
Agriculture land			
Own agriculture land (%)	6.1	66.0	38.9
Number	2497	2500	4997

Three in every five households in Maharashtra had no agricultural land. One-third households of rural had no agricultural land compared to 94% of urban households. The proportion of households having separate kitchen was 77%. This percentage was 86 for urban and 68 for rural households.

2.2 AGE AND SEX COMPOSITION

A total of 6091 with 3084 males and 3007 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. 956, in the age group 45-54 and maximum, i.e., 1381 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 four percent of the total respondents were illiterate whereas 28% were with primary or middle, 36% were secondary or in higher secondary, while 12% were educated up to college and above. In the sample, 34% females and 15% males were illiterate. The proportion of illiterate respondents among rural females was about three times higher than

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

	Residence						Combined		
	Urban			Rural					
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total
15 - 24	332	290	622	292	276	568	624	566	1190
25 - 34	332	378	710	312	359	671	644	737	1381
35 - 44	367	260	627	331	289	620	698	549	1247
45 - 54	260	209	469	215	272	487	475	481	956
55 - 64	265	256	521	378	418	796	643	674	1317
15 - 64	1556	1393	2949	1528	1614	3142	3084	3007	6091

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

Characteristic	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Education									
Illiterate	5.5	18.4	11.6	24.0	48.1	36.4	14.6	34.3	24.3
Primary	8.0	10.4	9.2	16.0	11.7	13.7	11.9	11.1	11.5
Middle	13.5	17.9	15.6	16.4	17.7	17.1	15.0	17.8	16.3
Secondary	29.2	26.6	28.0	24.0	16.1	19.8	26.5	21.0	23.8
Higher Secondary	18.6	14.4	16.6	12.6	3.9	8.2	15.6	8.8	12.2
College & above	25.2	12.3	19.0	7.0	2.5	4.8	16.4	7.0	11.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Marital status									
Never married	25.2	15.5	20.6	19.6	9.2	14.3	22.4	12.1	17.3
Married	73.1	72.0	72.6	77.6	76.5	77.0	75.4	74.4	75.0
Widowed/Divorced / Separated	1.7	12.5	6.8	2.8	14.3	8.7	2.2	13.5	7.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Occupation									
Executive/Business	20.4	2.4	11.9	6.6	1.0	3.6	13.6	1.5	7.6
Agriculture	4.0	1.2	2.7	50.3	28.4	39.0	27.0	15.8	21.5
Domestic work	1.0	72.3	34.5	1.6	58.0	30.5	1.1	64.5	32.4
Services/Sales	37.4	7.5	23.3	10.9	1.4	6.0	24.3	4.2	14.4
Manual worker	16.2	4.0	10.4	16.2	3.7	9.8	16.2	3.9	10.1
Other	21.0	12.6	17.2	14.4	7.5	11.1	17.8	10.1	14.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	1,556	1,393	2,949	1,528	1,614	3,142	3,084	3,007	6,091

urban females. A higher percentage of males than of females had completed almost each level of schooling excepting the middle 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. Three quarter of the respondents, both male and female were currently married, 17% were never married and 8% were widowed, divorced or separated. The proportion of respondents who were currently married does not vary, much by urban rural residents.

2.5 OCCUPATION

Table 2.3 provides information on the current occupation of the respondents. In the sample about two-third females (65%) were engaged in domestic works. It was followed by individuals involved in agricultural activities, which were about 27% in case of males and 16% in case of females. About 14% individuals were engaged in work related to sales and services and only 10% of the total respondents were engaged in some kind of manual work.

CHAPTER 3

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 *current smokers*, *current daily smokers*, *past daily smokers* and those who have never smoked in lifetime are classified as *non-smokers*.

Table 3.1.1 presents the percentage of respondents, both males and females as well as combined in various categories of smokers and non-smokers according to the place of residence (rural or urban). One in every ten respondents in the survey was a current smoker. They were mostly current daily smokers. The prevalence of smoking was more among men (15%) than among women (2%). By place of residence, 8% of urban respondents and 10% of rural respondents were current daily smokers. The past daily smokers were less than one percent of respondents.

Table 3.1.2 presents the mean number smoking among those respondents who were current daily smoker of any form of tobacco. Among those who were current daily smokers of different products of tobacco, the mean number of smoking per day was 3 in case of *bidis*, 2 for manufactured cigarettes and less than one for hand-rolled cigarettes. There was no marked difference between male and female respondents in the frequency of smoking being bidi or manufactured cigarette. The frequency of smoking *bidi* was slightly higher for rural respondents (3 per day) as compared to urban respondents (2 per day). In case of manufactured cigarettes, the mean number of smoking was higher for urban respondents (3 per day) as compared to rural respondents (1 per day).

Table 3.1.3 presents the mean age of initiation, age at stopped 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

Table 3.1.1 Percentage of respondents classified by smoking status across sex and place of residence, Maharashtra, 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	13.7	(11.0, 16.9)	13.1	(10.4, 16.5)	1.4	(0.7, 2.6)	84.9	(81.5, 87.8)
Female	2.3	(1.5, 3.6)	2.3	(1.5, 3.6)	*		97.7	(96.4, 98.5)
Total	8.5	(6.8, 10.5)	8.2	(6.5, 10.3)	0.8	(0.4, 1.4)	90.7	(88.7, 92.5)
Rural								
Male	17.9	(14.0, 22.6)	16.8	(13.1, 21.3)	1.2	(0.7, 2.0)	80.9	(76.0, 85.1)
Female	2.7	(1.7, 4.4)	2.2	(1.3, 3.6)	*		97.3	(95.6, 98.3)
Total	10.4	(8.0, 13.5)	9.6	(7.4, 12.4)	0.6	(0.3, 1.0)	89.0	(85.9, 91.5)
Combined								
Male	15.9	(13.4, 18.8)	15.0	(12.7, 17.9)	1.3	(0.8, 1.9)	82.8	(79.8, 85.4)
Female	2.5	(1.8, 3.5)	2.2	(1.6, 3.1)	*		97.5	(96.5, 98.2)
Total	9.5	(8.0, 11.4)	8.9	(7.5, 10.7)	0.7	(0.4, 1.0)	89.8	(87.9, 91.4)

*no observation

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

Residence/ Sex	Type of smoking							
	Bidi		Manufactured Cigarettes		Hand-rolled Cigarettes		Other	
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Urban								
Male	2.2	(1.1, 3.4)	3.1	(2.2, 4.0)	0.3	(0.0, 0.5)	0.1	(0.0, 0.3)
Female	2.1	(0.9, 3.2)	2.8	(1.2, 4.4)	0.3	(0.1, 0.7)	*	
Total	2.2	(1.1, 3.3)	3.1	(2.2, 4.0)	0.3	(0.0, 0.5)	0.1	(0.0, 0.3)
Rural								
Male	3.2	(2.4, 3.9)	1.1	(0.7, 1.4)	0.1	(0.0, 0.3)	0.3	(0.0, 0.6)
Female	3.1	(1.9, 4.3)	0.9	(0.4, 1.3)	0.2	(0.0, 0.4)	0.2	(0.1, 0.6)
Total	3.2	(2.4, 3.9)	1.0	(0.7, 1.4)	0.1	(0.0, 0.3)	0.3	(0.0, 0.6)
Combined								
Male	2.8	(2.1, 3.4)	1.9	(1.5, 2.3)	0.2	(0.0, 0.3)	0.2	(0.0, 0.4)
Female	2.6	(1.8, 3.5)	1.7	(1.0, 2.5)	0.2	(0.1, 0.4)	0.1	(0.1, 0.3)
Total	2.8	(2.1, 3.4)	1.9	(1.4, 2.3)	0.2	(0.1, 0.3)	0.2	(0.0, 0.4)

*no observation

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, Maharashtra, 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	21	(20, 22)	24	(22, 25)	31	(26, 35)	8	(3.0, 13.0)
Female	20	(17, 25)	25	(21, 30)	*	*	1	(0.0, 4.0)
Total	21	(20, 22)	24	(22, 25)	31	(26, 35)	5	(1.0, 8.0)
Rural								
Male	19	(17, 20)	21	(20, 24)	28	(22, 33)	11	(6.0, 16.0)
Female	20	(15, 20)	22	(20, 25)	*	*	4	(1.0, 7.0)
Total	19	(17, 20)	21	(20, 25)	28	(22, 33)	7	(4.0, 10.0)
Combined								
Male	20	(19, 22)	22	(21, 24)	29	(26, 33)	9	(6.0, 13.0)
Female	20	(19, 22)	25	(21, 27)	*	*	3	(1.0, 5.0)
Total	20	(19, 21)	22	(21, 24)	29	(26, 33)	6	(4.0, 8.0)

*no observation

respondents aged 15-34 years was 20 years and among other respondents aged 35-64 years was 22 years. The mean age of cessation of smoking for all those who stopped smoking was 29 years. On an average, a rural resident in Maharashtra, whose current age was 35-64 years, initiated smoking at the age of 21 years as compared to their urban counterpart who initiated it at the age of 24 years. The mean age of initiating smoking for an urban male in the age group 15-34 years was 21 years whereas it was 19 years for a rural male; the age of initiation of smoking for urban and rural females was 20 years. The age of initiation of smoking in the age group 35-64 years was 21 years for rural male and 22 years for rural female respondents whereas the mean age of initiation for urban smokers was 24 years for males and 25 years for females. The mean age of cessation of smoking for rural male was 28 years and for urban male it was 31 years.

About 6% respondents of those who never smoked were exposed to tobacco smoke at home or work place. It was over 9% in case of men against about 3% in case of women. Five per cent of the urban respondents and 7% of the rural respondents were exposed to tobacco smoke at home or work place.

Table 3.1.4 Percentage of smokeless tobacco users by sex and place of residence, Maharashtra, 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	31.5	(25, 37)	31.2	(25, 36)	0.4	(0.0, 0.8)	68.1	(62.5, 73.8)
Female	12.3	(8, 16)	12.3	(8, 16)	0.3	(0.0, 0.8)	87.4	(83.4, 91.4)
Total	22.7	(18, 26)	22.6	(18, 26)	0.3	(0.0, 0.7)	77.0	(72.6, 81.3)
Rural								
Male	48.8	(43, 53)	48.7	(43, 53)	0.5	(0.1, 0.9)	50.7	(45.9, 55.4)
Female	32.3	(26, 38)	31.8	(25, 37)	0.3	(0.0, 0.5)	67.4	(61.3, 73.6)
Total	40.7	(36, 45)	40.3	(35, 44)	0.4	(0.1, 0.6)	58.9	(54.5, 63.4)
Combined								
Male	40.7	(37, 44)	40.5	(36, 44)	0.5	(0.2, 0.7)	58.8	(55.3, 62.4)
Female	23.6	(19, 27)	23.3	(19, 27)	0.3	(0.0, 0.5)	76.1	(72.3, 80.0)
Total	32.5	(29, 35)	32.3	(29, 35)	0.4	(0.2, 0.6)	67.1	(64.0, 70.1)

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

One-third of the respondents were current user of smokeless tobacco with 41% among men and 24% among women. A small percentage of men and women (less than 1%) were found to be past daily users. The prevalence of smokeless tobacco use was higher among rural respondents (41%) as against urban respondents (23%). More men (49% rural, 31% urban) than women (32% rural and 12% urban) 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 and others are provided in Table 3.1.5.

The mean number of times chewing tobacco per day in Maharashtra was about 4 (5 for men and 2 for women). There was no urban-rural difference in frequency of chewing tobacco among men whereas it varies by place of residence among women. The mean number of times chewing tobacco per day was 3 for urban women and 2 for rural women. For those who chew pan with tobacco, snuff by mouth or others of such kind, the average daily frequency of such consumption was quite less.

The mean age of initiation and age at stopped using of smokeless tobacco use by sex and place of residence of respondents is provided in Table 3.1.6.

In the young age group (15-34 Years), the mean age of initiation of smokeless tobacco use was 20 years for both males and females, whereas there was no

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, Maharashtra, 2007- 08

Residence/ Sex	Type of smokless tobacco							
	Chewing tobacco		*Pan* with tobacco		Snuff by mouth*		Others	
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Urban								
Male	4.8	(4.1, 5.5)	0.6	(0.3, 0.8)	0.1	(0.0, 0.2)	0.7	(0.3, 1.0)
Female	3.1	(2.3, 3.9)	0.4	(0.2, 0.6)	0.3	(0.1, 0.5)	1.5	(0.9, 2.1)
Total	4.4	(3.7, 5.0)	0.5	(0.3, 0.7)	0.2	(0.1, 0.3)	0.9	(0.6, 1.2)
Rural								
Male	4.8	(4.4, 5.3)	0.6	(0.4, 0.8)	0.2	(0.1, 0.3)	0.2	(0.1, 0.3)
Female	1.6	(1.2, 2.0)	0.3	(0.0, 0.5)	0.3	(0.1, 0.5)	2.2	(1.6, 2.8)
Total	3.6	(3.2, 4.0)	0.5	(0.3, 0.6)	0.2	(0.1, 0.3)	1.0	(0.7, 1.3)
Combined								
Male	4.8	(4.4, 5.2)	0.6	(0.4, 0.7)	0.2	(0.1, 0.2)	0.3	(0.2, 0.5)
Female	1.9	(1.6, 2.3)	0.3	(0.1, 0.5)	0.3	(0.1, 0.4)	2.1	(1.6, 2.5)
Total	3.8	(3.5, 4.2)	0.5	(0.3, 0.6)	0.2	(0.1, 0.3)	0.9	(0.7, 1.2)

* Tooth powder or tooth paste prepared using tobacco

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, Maharashtra, 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	19	(18, 20)	22	(21, 24)	32	(23.2, 40.9)
Female	20	(18, 20)	25	(21, 26)	34	(27.7, 43.1)
Total	20	(19, 20)	22	(21, 24)	33	(28.9, 37.5)
Rural						
Male	20	(18, 20)	22	(21, 22)	33	(26.8, 39.5)
Female	20	(19, 20)	25	(24, 25)	43	(31.3, 54.4)
Total	20	(19, 20)	23	(22, 24)	36	(30.8, 41.6)
Combined						
Male	20	(19, 20)	22	(21, 22)	33	(27.8, 37.6)
Female	20	(19, 20)	25	(25, 24)	39	(33.1, 45.7)
Total	20	(19, 20)	23	(22, 24)	35	(31.3, 38.5)

residential difference in mean age of initiation. Among the urban respondents the mean age of initiation of smokeless tobacco use was 19 years for male and 20 years for female. For the residents aged 35-64 years, the mean age of initiation of smokeless tobacco use was 23 years (22 years for males and 25 years for females) both for urban and rural. The mean age of quitting smokeless tobacco use was 35 years; it was 33 years in case of men and 39 years in case of women. The mean age of quitting smokeless tobacco use for urban respondents was 33 years against 36 years for rural respondents.

Table 3.1.7 presents the percentage of smokers and users of smokeless tobacco by sex and the place of residence. It shows that 37% of respondents were either smoking or using smokeless tobacco whereas 5% 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 28% for urban respondents as compared to 44% for rural respondents. The use of both the forms of tobacco (smoking as well as smokeless tobacco) was 3% for urban and 6% for rural respondents. The percentage of respondents, either smoking or using smokeless tobacco was 48% for men and 24% for women.

Tobacco is one of the major risk factors of non-

Table 3.1.7 Percentage of tobacco users by sex and place of residence, Maharashtra, 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	26.5	(21.0, 31.9)	8.4	(5.8, 10.9)	4.8	(3.1, 6.4)	39.6	(34.1, 45.0)
Female	11.7	(7.8, 15.5)	1.7	(0.7, 2.6)	0.7	(0.3, 1.1)	14.0	(10.2, 17.8)
Total	19.7	(15.4, 23.9)	5.3	(3.7, 7.0)	2.9	(2.0, 3.8)	27.9	(23.8, 32.0)
Rural								
Male	37.7	(33.5, 42.0)	5.9	(3.9, 7.9)	11.0	(7.3, 14.6)	54.6	(49.5, 59.6)
Female	30.3	(24.7, 35.9)	0.7	(0.2, 1.2)	1.5	(0.4, 3.0)	32.5	(26.4, 38.6)
Total	34.1	(30.4, 37.7)	3.3	(2.2, 4.4)	6.3	(4.0, 8.6)	43.7	(39.0, 48.3)
Combined								
Male	32.4	(29.1, 35.8)	7.0	(5.4, 8.6)	8.0	(6.0, 10.1)	47.5	(43.9, 51.2)
Female	22.2	(18.7, 25.7)	1.1	(0.6, 1.6)	1.1	(0.5, 1.7)	24.4	(20.6, 28.2)
Total	27.6	(24.9, 30.2)	4.2	(3.3, 5.2)	4.7	(3.4, 6.0)	36.5	(33.4, 39.6)

communicable diseases. About 15% of men in Maharashtra smoked tobacco daily. The prevalence was very low among women. One-third of adult population was smokeless tobacco users with 41% of men and 24% of women. The mean age of initiation of tobacco use either smoking or smokeless tobacco among young age (15-34 years) people was 20 years for both male and female, smoking or smokeless tobacco use. 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 10% of the respondents have consumed alcohol in past 30 days and 14% consumed in past 12 months. Only 1% respondents were past drinker. Sixteen percent men consumed alcohol in past 30 days and about a quarter (24%) men consumed in past 12 months as compared to very less among women (3%). Percentage of lifetime abstainer to alcohol was high in urban (87%) as compared to that of rural respondents (84%). Rural men were more likely to consume alcohol (17% in past 30 days and 27% in past 12 months) than urban men (14% in past 30 days and 20% in past 12 months).

Table 3.2.2 presents the percentage of those who consumed alcohol according to frequency of consuming alcohol in past 12 months, mean number of standard drinks consumed on a drinking day, frequency of consuming alcohol in past one week and the average standard drinks per day.

Of the current drinkers, 40% of urban, 43% of rural respondents and 42% in the combined sample consumed alcohol on less than one occasion in a month. Further,

Table 3.2.1 Percentage of Alcohol consumption by sex and place of residence, Maharashtra, 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	14.3	(10.0, 18.0)	20.2	(15.0, 24.0)	0.8	(0.0, 1.0)	79.0	(74.0, 83.0)
Female	2.1	(1.0, 3.0)	3.0	(1.0, 4.0)	0.0	(0.0, 0.1)	97.0	(95.0, 98.0)
Total	8.7	(6.0, 11.0)	12.3	(9.0, 15.0)	0.4	(0.0, 0.7)	87.3	(84.0, 89.0)
Rural								
Male	17.0	(11.0, 22.0)	27.0	(21.0, 32.0)	2.0	(0.0, 3.0)	71.0	(66.0, 76.0)
Female	3.1	(1.0, 4.0)	3.8	(1.0, 5.0)	0.1	(0.0, 0.2)	96.1	(94.0, 98.0)
Total	10.2	(6.0, 13.0)	15.6	(12.0, 19.0)	0.9	(0.0, 1.0)	83.5	(80.0, 87.0)
Combined								
Male	15.7	(12.0, 19.0)	23.8	(20.0, 27.0)	1.4	(0.0, 2.0)	74.8	(71.0, 78.0)
Female	2.7	(1.0, 3.0)	3.4	(2.0, 4.0)	0.1	(0.0, 0.1)	96.5	(95.0, 97.0)
Total	9.5	(7.0, 11.0)	14.1	(10.0, 16.0)	0.7	(0.0, 1.0)	85.2	(82.0, 87.0)

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 gender and place of residence, Maharashtra, 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	9.7	9.5	9.6	9.5	3.0	8.7	9.6	5.4	9.5
1-4 days per week	16.3	15.7	16.3	17.6	14.4	17.2	17.1	14.9	16.8
1-3 days per month	33.2	36.5	33.6	29.5	38.4	30.5	31.0	37.7	31.7
Less than once per month	40.6	38.1	40.4	43.3	44.1	43.4	42.3	41.9	42.2

Mean number of drinks on a drinking day	2.0	1.8	2.0	2.1	1.6	2.1	2.1	1.7	2.0
Drinks during last 7 days									
Alcohol consumed on 4+days (%)	21.1	28.9	22.0	32.1	20.6	30.3	27.4	23.5	26.9
**Binge drinking on any day (%)	2.0	0	1.7	11.0	4.9	10.1	7.2	3.2	6.6
20+ drinks in 7 days (%)	2.8	0	2.5	4.4	0	3.8	3.8	0	3.2
Average standard drinks per day	0.7	0.6	0.7	0.9	0.5	0.8	0.8	0.5	0.8

**5+ drinks on any day for male; 4+ drinks on any day for female

34% respondents in urban area and 31% respondents in rural area consumed alcohol 1-3 days per month in past one year. In urban and rural areas, 16-17 percent of current drinkers consumed alcohol 1-4 days every week and 9-10 percent current drinkers consumed alcohol 5-7 days per week in the past one year. The average numbers of drinks consumed on a drinking day was 2 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 22% respondents in urban area, 30% respondents in rural area and 27% in combined sample respondents consumed alcohol at least 4 days a week. About 7% of current drinkers were in high risk drinking zone (binge drinking); it was about 10% in rural area against 2% in urban area and 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 one drink.

Table 3.2.3 presents the mean age 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 irrespective of the sex and place of residence. The mean age of initiation in the age group 35-64 years was 25 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 (26%) and agriculturist (30%). Similarly, percentage of smokeless tobacco users was high in the age group 25-34 years (27%) and 35-44 years (27%), among illiterates (30%) and agriculturists (33%). The percentage of current drinkers was high (31%) in the age group 35-44, among illiterates (31%) and those who report their occupation as agriculture (35%).

Interesting observations of alcohol consumption was that one-fourth of male population consumed alcohol at least once in last one year whereas 16% of men in

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

Residnece/ Sex	Alcohol users			
	Age of Initiation (15-34 years)		Age of Initiation (35-64 years)	
	Mean	95% CI	Mean	95% CI
Urban				
Male	22	(20, 23)	25	(24, 25)
Female	21	(19, 22)	24	(21, 29)
Total	21	(20, 22)	25	(24, 25)
Rural				
Male	21	(20, 23)	25	(24, 25)
Female	20	(18, 27)	22	(20, 25)
Total	21	(20, 23)	25	(24, 25)
Combined				
Male	21	(20, 23)	25	(24, 25)
Female	21	(20, 23)	23	(21, 25)
Total	21	(20, 22)	25	(24, 25)

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

Characteristic	Smoker	Smokeless tobacco user	Current drinkers
Age group			
15-24	6.6	14.3	10.5
25-34	25.9	26.7	27.3
35-44	28.2	26.6	30.6
45-54	24.2	18.5	20.5
55-64	15.1	13.9	11.1
Education			
Illiterate	26.0	30.3	30.8
Primary	15.5	15.9	14.4
Middle	16.5	18.0	13.2
Secondary	24.0	21.8	24.1
Higher Secondary	9.5	8.6	8.9
College & above	8.5	5.4	8.6
Occupation			
Executive/Business	2.4	0.6	1.3
Clerical/Sales	9.8	7.6	9.2
Agriculture	29.8	32.6	34.8
Domestic Work	10.3	21.6	7.9
Services/Sales	18.0	13.8	21.6
Manual Worker	21.8	16.4	18.5
Other	7.9	7.4	6.7

last one month. The alcohol consumption among females was very low. Those who consumed alcohol in last seven days, one-fourth of them consumed on more than 3 days a week. The mean age of initiation of alcohol consumption by young age people 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 are 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 a week, mean number of days people in Maharashtra consumed vegetables was 4 days and fruits 2 days. The mean number of days consumed fruits was slightly higher in case of urban (3 days per week) as compared to that of rural population (2 days week).

Three-quarter of respondents reported that they had less than five servings of fruits and vegetables per day on those days when they consumed it. It was almost same among urban and rural respondents. The

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, Maharashtra, 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	2.5	2.5	2.5	2.0	2.0	2.0	2.2	2.2	2.2
Mean number of days vegetables consumed	3.7	3.7	3.7	3.8	3.7	3.7	3.7	3.7	3.7
Less than five servings of fruits & vegetables consumed per day (%)	74.1	78.3	76.0	74.6	76.3	75.5	74.4	77.2	75.7

Table 3.3.2 Mean number of servings of fruits, vegetables consumed in one particular day by sex and place of residence, Maharashtra, 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	0.7	0.7	0.7	0.5	0.5	0.5	0.6	0.6	0.6
Servings of vegetable	1.1	1.0	1.1	1.1	1.0	1.1	1.1	1.1	1.1
Servings of fruit and vegetable	1.8	1.7	1.8	1.6	1.6	1.6	1.7	1.6	1.7

mean number of servings of fruits and vegetables in a day was about 2 across the sex and place of residence (Table 3.3.2).

Nutritional inadequacy is the major risk factor of many non-communicable diseases. Overall, 76% of population in Maharashtra consumed less than five servings of fruits and vegetables per day, which was inadequate as per WHO recommended standards. On an average only two days in a week people consumed fruits against vegetables consumed on 4 days. This 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. Almost 32% population consumed eggs, 22% consumed fish and red meat, 22% consumed cakes/ pastries or other bakery items, 20% consumed fried local foods and 17% consumed chicken at least once a week. Cheese/butter was consumed daily that too only by 5% population. Cakes/pastries or other bakery items, chips, *namkeen* etc. were also consumed daily by 3% of the population particularly in urban area.

Table 3.3.4 presents the type of edible oil used for cooking by the sample households by the place of residence. It shows that the use of soybean oil for cooking was high (40% households with 36% in urban and 43% of rural households) followed by groundnut oil (23% households with 31% of urban and 18% of rural households), palm oil (18% households with 9% of urban and 23% of rural) and sunflower oil (15% households with 19% of urban and 12% of rural households).

Table 3.3.3 Percentage of respondents according to the intake of specific food items by gender and place of residence, Maharashtra, 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	9.1	20.7	1.2	12.3	4.8	16.1
Fried local foods	1.6	30.3	0.1	11.7	0.8	20.1
Red Meat	0.5	20.8	0.1	22.4	0.3	21.7
Eggs	1.4	29.4	0.3	33.2	0.8	31.5
Chicken	0.1	17.5	0.1	16.7	0.1	17.0
Fish	1.0	21.7	1.8	22.9	1.4	22.3
Aerated Soda	0.5	10.9	0.0	5.7	0.3	8.0
Sweetened drinks	0.3	12.0	4.3	27.6	0.1	7.8
Pizza/ burgers/ French fries etc.	0.2	7.2	0.0	1.0	0.1	3.8
Cakes, Pastries or other bakery items	3.3	27.5	0.3	16.8	1.7	21.6
Chips, *Namkeen* etc.	4.3	22.6	0.2	8.2	2.1	14.7

Table 3.3.4 Percentage of households according to type of oil used for cooking, Maharashtra, 2007- 08

Type of oil	Residence		Combined
	Urban	Rural	
Mustard oil	1.9	0.4	1.0
Coconut oil	1.1	0.0	0.4
Groundnut oil	30.5	18.0	22.9
Sunflower oil	19.0	12.4	15.0
Soyabean oil	35.8	42.9	40.1
Palm oil	9.1	23.0	17.5
Vanaspati oil	0.1	0.1	0.1
Others	2.5	3.2	3.0
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 Maharashtra were engaged in some physical activity for 924 MET minutes per day (792 MET minutes per day in urban and 1033 MET minutes per day in rural). Men, on an average, spent 1022 MET minutes a day while women spent 817 MET minutes a day on physical activity. The mean time spent in work related physical activity by the respondents was 128 minutes per day which was 119 minutes per day for urban and 136 minutes per day for rural respondents. The time spent in work related physical activity was more among women (129 minutes per day) than men (127 minutes per day).

The mean time spent in travel related activity (cycling/walking) was found to be 48 minutes per day, 43 minutes for urban and 53 minutes per day for rural respondents. It was more among men (55 minutes per day) as compared to women (41 minutes per day). The survey also reports that the mean time spent in recreational activity was 8 minutes per day, both for urban and rural respondents. Men spent more time (11 minutes per day) than women (3 minutes per day) in recreational activity.

According to WHO Global Physical Activity Questionnaire Analysis Guidelines[7], the total physical activity of the respondents is 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

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

Physical Activity		Residence						Combined		
		Urban			Rural					
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Total Physical Activity(MET)										
Mean		837.7	738.8	792.4	1184.3	877.1	1033.1	1021.7	817.0	924.1
95% CI	Lower	70.7.5	647.5	691.5	1056.6	774.4	929.8	932.4	747.6	852.3
	Upper	967.8	830.2	893.3	1312.1	979.9	1136.3	1110.9	886.4	996.3
Work Related Activity Mean		109.4	131.0	119.3	143.0	127.9	135.6	127.2	129.3	128.2
95% CI	Lower	89.0	109.1	100.8	124.4	112.7	120.0	113.8	116.6	116.3
	Upper	129.8	152.8	137.8	161.5	143.2	151.1	140.7	141.9	140.1
Travel Related Activity Mean		49.2	34.7	42.6	59.6	45.9	52.9	54.7	41.1	48.2
95% CI	Lower	41.6	28.7	36.1	54.1	41.6	48.3	50.2	37.5	44.4
	Upper	56.7	40.8	49.0	65.0	50.3	57.4	59.2	44.6	52.0
Recreational Activity Mean		11.8	4.0	8.3	10.9	2.5	6.8	11.4	3.2	7.5
95% CI	Lower	9.1	2.4	6.3	7.3	0.9	4.3	9.1	2.0	5.8
	Upper	14.6	5.7	10.3	14.6	4.0	9.3	13.7	4.3	9.1
	Number	1556	1393	2949	1528	1614	3142	3084	3007	6091

three categories of physical activity by sex and place residence is presented in Table 3.4.2.

Majority of the respondents (81% overall, 86% of urban and 77% of rural respondents) reported low physical activity, 16% respondents (13% of urban and 19% of rural respondents) reported medium physical activity and only 3% of respondents (2% of urban and 4% of rural respondents) reported 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 (4%) among 25-34 age group respondents. The total time spent daily in sedentary activity is also recorded and provided in Table 3.4.4. Majority of

Table 3.4.2 Percentage of respondents classified in three categories of total physical activity per day (P & 95% CI), Maharashtra, 2007-08

Physical Activity	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Low	82.2	90.7	86.1	69.4	85.3	77.2	75.4	87.7	81.2
95% CI									
Lower	75.8	86.6	81.4	63.1	79.8	72.1	71.1	84.2	77.9
Upper	87.1	93.7	89.7	75.0	89.6	81.7	79.2	90.5	84.2
Medium	15.6	8.7	12.5	25.0	12.9	19.2	20.8	11.0	16.1
95% CI									
Lower	11.2	5.8	9.1	21.1	9.1	15.7	17.7	8.5	13.7
Upper	21.4	12.8	16.8	30.1	17.9	23.3	24.3	14.2	19.0
High	2.2	0.6	1.5	5.3	1.8	3.6	3.8	1.3	2.6
95% CI									
Lower	1.2	0.3	0.8	3.0	0.8	2.0	2.5	0.7	1.7
Upper	4.1	1.4	2.7	9.1	3.9	6.1	5.9	2.4	4.0

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

Age group	Sexs								
	Men			Women			Both Sex		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
15-24	80.9 (76.3,84.8)	16.7 (13.2,21.0)	2.4 (1.1,5.1)	92.2 (88.6,94.7)	7.3 (4.9,10.6)	0.5 (0.1,2.6)	86.1 (82.6,88.9)	12.4 (10.0,15.3)	1.5 (0.7,3.3)
25-34	73.0 (67.2,78.0)	21.0 (17.1,25.5)	6.1 (3.7,9.7)	84.7 (79.8,88.5)	13.5 (10.0,18.0)	1.9 (0.9,3.6)	78.7 (74.5,82.4)	17.3 (14.4,20.6)	4.0 (2.5,6.3)
35-44	69.6 (63.2,75.3)	26.1 (21.0,31.9)	4.3 (2.6,7.2)	83.5 (77.4,88.1)	14.3 (10.0,20.0)	2.3 (1.2,4.4)	76.2 (70.8,80.8)	20.5 (16.4,25.3)	3.4 (2.1,5.3)
45-54	72.4 (66.2,77.8)	23.6 (18.9,29.0)	4.0 (2.1,7.5)	86.0 (81.5,89.6)	13.2 (9.8,17.5)	0.8 (0.3,2.1)	78.8 (74.3,82.6)	18.8 (15.3,22.7)	2.5 (1.3,4.7)
55-64	81.0 (76.3,85.0)	17.8 (14.1,22.1)	1.2 (0.3,2.6)	93.4 (90.4,95.6)	6.1 (4.1,8.8)	0.5 (0.2,1.5)	87.6 (84.6,90.2)	11.5 (9.2,14.4)	0.8 (0.4,1.7)

Note: WHO Steps guidelinesusedto calculate thecut off valueof low, medium and highfor total physical activity.

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

Time spent sitting/ reclining	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Less than 1 hours	5.8	1.0	3.6	9.6	7.1	8.4	7.8	4.5	6.2
1-2 hours	30.8	22.7	27.1	42.3	35.6	39.0	36.9	30.0	33.6
2-3 hours	33.7	34.3	34.0	33.1	32.9	33.0	33.4	33.5	33.5
3-4 hours	15.9	22.1	18.7	11.4	16.7	14.0	13.5	19.0	16.1
More than 4 hours	13.8	19.9	16.6	3.5	7.8	5.6	8.3	13.1	10.6

the respondents (67%) spent 1-3 hours in sedentary activity.

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 Maharashtra. The prevalence and pattern of smoking among urban male respondents was increasing with age from 2% in 15-24 to 26% in 55-64. But, it was decreasing with increasing level of education (24% among illiterate to 10% 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 executive (16%) and manual worker (15%) 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 (12% in 15-24 to 33% in 55-64 aged respondents). Prevalence of smokeless tobacco users among females was recorded low (12%), 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 (57% among illiterate to 20% among college and above education. In the occupational categories, prevalence of smokeless tobacco users was high among the occupation of manual work (39%) and agriculture (32%). Among urban male respondents, smokeless tobacco users were higher (23%) than smokers (9%), 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 (18%) compare with urban males (14%). 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 (5% in 15-24 to 33% in 55-64). Prevalence of smoking among occupational categories of manual worker (25%) and agriculture (19%) of rural male respondents was high compare with other. Similar pattern of smoking and smokeless tobacco users was observed in the combined population (Table 3.5.3).

Alcohol

The prevalence of current alcohol drinkers among urban male respondents was high among the adults (26% in 25-34, 31% in 35-44, 30% in 45-54 and 23% in 55-64 age groups). It was comparatively low among younger age (4% in 15-24). An increasing pattern of prevalence with age was observed up to age group of 45-54 among urban males, than the pattern declined with increasing age (older age groups). Prevalence of drinking alcohol among male respondents was recorded high in lower level of education such as illiterate (41%), Primary (25%) and Middle (28%). The pattern of prevalence was declining with increasing level of education (16% among collage and above). Prevalence of drinking alcohol in occupational categories of male urban respondents was high among service (25%) and manual worker (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 (29% in 25-34, 39% in 35-44, 42% in 45-54 and 38% in 55-64). By education, the pattern prevalence was decreasing with increasing level of education (50% among illiterate to 15% among college and above) in rural male population. However, prevalence in the occupation categories of manual work (30%) and service (24%) 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 3.5.2 & 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 (76%) among urban population with marginal differences between age groups (75% in 15-24 to 83% in 55-64). Inadequate consumption of fruits and vegetables was also high in all the education level (79% among illiterate to 72% among college and above). Prevalence of low consumption was high (80%) among

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, Maharashtra, 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	1.6	0.4	1.1	15.9	6.8	11.9	4.4	2.8	3.7	75.5	74.2	74.9	83.9	94.5	88.6
25-34	13.7	3.1	8.7	36.2	10.7	24.2	25.5	4.1	15.5	73.6	76.5	75.0	80.8	88.6	84.5
35-44	20.4	4.3	13.0	37.6	16.6	28.0	30.6	2.0	17.5	71.8	82.6	76.7	78.3	87.1	82.3
45-54	25.8	1.0	14.7	43.7	15.4	31.1	30.1	2.7	17.8	72.3	79.7	75.6	82.5	89.1	85.5
55-64	26.0	3.9	15.1	43.1	22.9	33.2	23.2	3.3	13.4	79.5	87.2	83.3	90.2	95.8	93.0
Total	13.7	2.3	8.5	31.5	12.3	22.7	20.3	3.0	12.4	74.1	78.3	76.0	82.2	90.7	86.1
Education															
Illiterate	24.2	3.1	7.4	57.1	25.9	34.3	40.6	2.3	12.6	74.2	80.4	78.7	55.3	82.2	75.5
Primary	26.3	2.9	14.7	49.3	22.9	35.0	25.1	1.9	12.6	88.5	91.6	90.2	68.1	89.8	79.8
Middle	19.7	3.6	11.2	47.7	15.1	30.4	28.2	2.0	14.3	80.2	78.9	79.5	74.3	89.1	82.1
Secondary	11.6	2.2	7.4	31.2	6.3	20.2	18.6	2.9	11.6	73.4	73.6	73.5	79.6	92.4	85.3
Higher Secondary	11.7	1.1	7.4	24.3	6.8	17.3	17.6	3.3	11.8	72.2	78.1	74.6	84.8	94.1	88.5
College & above	10.0	1.3	7.2	20.2	6.2	15.8	15.6	5.6	12.4	69.6	76.4	71.8	95.6	94.4	95.3
Total	13.7	2.3	8.5	31.5	12.3	22.7	20.3	3.0	12.4	74.1	78.3	76.0	82.2	90.7	86.1
Occupation															
Executive/Business	17.7	0.0	15.9	35.3	3.1	32.1	21.5	2.6	19.6	72.6	80.9	73.5	88.2	97.3	89.1
Agriculture	15.3	0.0	12.1	35.7	15.6	31.5	22.3	6.5	19.0	74.4	74.5	74.4	72.0	73.7	72.4
Domestic Work	**	3.0	3.1	**	13.2	13.4	**	2.6	2.6	**	78.6	78.6	**	92.2	92.3
Services/Sales	14.0	0.5	12.1	35.8	7.5	31.7	25.4	3.9	22.3	67.3	79.5	69.0	86.3	87.3	86.5
Manual Worker	18.6	0.0	15.4	42.5	22.5	39.0	24.4	3.0	20.6	80.3	75.5	79.5	49.2	56.5	50.5
Other	5.4	1.5	4.0	12.1	9.0	11.0	7.8	4.5	6.6	81.4	77.1	79.9	96.2	95.4	95.9
Total	13.7	2.3	8.5	31.5	12.3	22.7	20.3	3.0	12.4	74.1	78.3	76.0	82.2	90.7	86.1
Number (n)	1556	1393	2949	1556	1393	2949	1556	1393	2949	1556	1393	2949	1556	1393	2949

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

manual worker whereas it was varying from 69% to 79% 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 (76% in 15-24 to 78% in 55-64). Prevalence by education was varying between 82% among illiterate to 63% in college and above. The low (inadequate) consumption of fruits and vegetables was high among the occupational categories of manual work (80%). It was comparatively low (71%) among executive and bussiness 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 Maharashtra (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 (Table3.5.1). Large proportion of urban respondents were recorded in the category of low physical activity (86%) and it was varying with age groups (89% in 15-24, 85% in 25-34, 82% in 35-44, 86% in 45-54 and 93% in 55-64). Prevalence of low physical activity was high among old and young age respondents. Low physical activity by sex was recorded high (91%) among female respondents compare with males (82%), and such differences remain across all the age groups (Table 3.5.1). The pattern of low physical activity was increasing with level of education (76% of illiterate to 95% of college and above). Accordingly, low physical activity was recorded high among the domestic work (92%), executive and business (89%), and service (87%) categories of occupation. Those occupation was 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 (77%) were doing more physical work than urban (86%) 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 (90% in college and above) compare with lower level (75% 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. Overall, low physical activity was high among domestic worker (92%) in the rural and urban population (Table 3.5.3).

Physical inactivity is one of the important risk factors of NCD. Most important point to be noted that eight out of ten individual adult population of Maharashtra 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, Maharashtra, 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	4.7	1.7	3.3	22.5	12.8	18.0	7.7	1.7	4.9	75.1	77.6	76.3	78.3	90.3	83.9
25-34	18.1	2.7	10.3	55.8	27.6	41.5	29.1	4.5	16.6	75.2	75.6	75.4	65.2	81.3	73.4
35-44	22.2	2.7	12.6	63.6	40.8	52.4	39.4	5.6	22.8	75.6	74.3	75.0	61.9	80.7	71.1
45-54	31.6	5.7	19.2	62.1	49.7	56.2	42.2	4.7	24.2	71.0	75.3	73.0	63.8	83.7	73.4
55-64	33.4	1.7	15.7	68.7	55.5	61.3	38.2	3.7	18.9	75.3	79.6	77.7	74.8	92.2	84.5
Total	17.9	2.7	10.4	48.8	32.3	40.7	27.0	3.9	15.6	74.7	76.4	75.5	69.4	85.3	77.2
Education															
Illiterate	35.1	4.2	14.4	67.0	51.4	56.6	50.4	7.9	22.0	81.2	82.3	81.9	59.9	82.6	75.1
Primary	23.5	2.5	14.2	64.6	41.2	54.3	37.5	2.7	22.1	77.8	74.1	76.2	64.0	84.5	73.0
Middle	15.2	0.9	7.5	54.7	23.5	37.9	24.8	0.2	11.5	77.6	73.9	75.6	62.1	82.3	73.0
Secondary	11.8	2.6	7.8	39.4	11.6	27.3	18.0	2.0	11.0	70.9	75.2	72.8	72.1	90.8	80.2
Higher Secondary	10.3	1.4	8.1	35.1	14.4	30.0	15.0	1.9	11.7	74.9	57.7	70.6	79.7	87.8	81.7
College & above	10.6	0.0	7.6	26.9	4.9	20.6	15.2	0.0	10.8	61.2	68.3	63.3	86.5	97.9	89.8
Total	17.9	2.7	10.4	48.8	32.3	40.7	27.0	3.9	15.6	74.7	76.4	75.5	69.4	85.3	77.2
Occupation															
Executive/Business	13.1	6.4	12.5	47.7	9.7	44.1	20.7	0.0	18.7	70.2	73.5	70.5	92.4	88.1	92.0
Agriculture	19.4	2.6	13.2	57.2	40.5	51.1	31.0	6.8	22.2	73.6	68.8	71.8	59.3	69.5	63.1
Domestic Work	**	2.8	3.5	**	31.3	31.6	**	3.3	4.2	**	79.9	80.1	**	91.6	91.2
Services/Sales	15.4	0.0	13.7	37.5	7.1	34.1	27.5	0.0	24.4	69.8	78.5	70.8	87.9	96.9	88.9
Manual Worker	25.3	4.4	21.8	60.0	40.1	56.6	35.0	3.0	29.6	82.5	68.5	80.1	58.2	76.9	61.3
Other	8.8	1.6	6.5	23.2	16.4	21.0	8.9	0.0	6.0	73.6	79.6	75.6	85.9	94.3	88.7
Total	17.9	2.7	10.4	48.8	32.3	40.7	27.0	3.9	15.6	74.7	76.4	75.5	69.4	85.3	77.2
Number (n)	1528	1614	3142	1528	1614	3142	1528	1614	3142	1528	1614	3142	1528	1614	3142

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

Table 3.5.3 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, combined, Maharashtra, 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	3.3	1.1	2.3	19.5	10.1	15.2	6.2	2.2	4.4	75.3	76.1	75.6	80.9	92.2	86.1
25-34	15.9	2.9	9.5	46.0	19.9	33.3	27.3	4.3	16.1	74.4	76.0	75.2	73.0	84.7	78.7
35-44	21.3	3.4	12.8	51.4	30.3	41.4	35.3	4.0	20.4	73.8	78.0	75.8	69.6	83.5	76.2
45-54	29.0	3.7	17.2	53.6	35.0	45.0	36.6	3.9	21.4	71.6	77.2	74.2	72.4	86.0	78.8
55-64	30.4	2.5	15.5	58.3	44.3	50.9	32.1	3.5	16.9	77.0	82.2	79.8	81.0	93.4	87.6
Total	15.9	2.5	9.5	40.7	23.6	32.5	23.9	3.5	14.2	74.4	77.2	75.7	75.4	87.7	81.2
Education															
Illiterate	32.1	3.9	12.9	65.1	45.4	51.7	48.6	6.6	19.9	79.9	81.9	81.2	59.0	82.7	75.2
Primary	25.0	2.7	14.4	60.0	34.2	47.7	33.8	2.4	18.9	81.0	80.8	80.9	65.2	86.5	75.3
Middle	17.0	2.0	8.9	51.9	20.2	34.9	26.2	0.9	12.6	78.6	75.8	77.1	67.0	84.9	76.6
Secondary	11.7	2.4	7.6	35.4	9.0	23.8	18.3	2.4	11.3	72.1	74.4	73.1	75.8	91.6	82.7
Higher Secondary	11.1	1.2	7.7	29.3	9.0	22.4	16.4	2.9	11.8	73.4	72.2	73.0	82.5	92.2	85.8
College & above	10.1	1.0	7.3	22.0	5.9	17.0	15.5	4.3	12.0	67.4	74.4	69.6	93.2	95.3	93.8
Total	15.9	2.5	9.5	40.7	23.6	32.5	23.9	3.5	14.2	74.4	77.2	75.7	75.4	87.7	81.2
Occupation															
Executive/Business	16.4	1.7	15.0	38.7	4.8	35.4	21.3	1.9	19.3	72.0	79.0	72.7	89.4	94.9	89.9
Agriculture	19.1	2.5	13.1	55.6	39.7	49.9	30.4	6.8	22.0	73.6	69.0	72.0	60.2	69.7	63.6
Domestic Work	**	2.9	3.3	**	22.6	22.9	**	2.9	3.4	**	79.3	79.4	**	91.9	91.7
Services/Sales	14.4	0.4	12.5	36.2	7.4	32.4	26.0	3.1	22.9	67.9	79.3	69.5	86.7	89.4	87.1
Manual Worker	22.3	2.4	18.9	52.0	31.8	48.5	30.1	3.0	25.5	81.5	71.9	79.8	54.1	67.4	56.4
Other	7.0	1.5	5.1	17.3	12.2	15.5	8.3	2.5	6.3	77.8	78.2	77.9	91.4	94.9	92.6
Total	15.9	2.5	9.5	40.7	23.6	32.5	23.9	3.5	14.2	74.4	77.2	75.7	75.4	87.7	81.2
Number (n)	3084	3007	6091	3084	3007	6091	3084	3007	6091	3084	3007	6091	3084	3007	6091

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

CHAPTER 4

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 5% respondents (4% men and 6% women) were found to have been diagnosed hypertension by the health professional. In the urban area, the prevalence of hypertension was 7% with 6% among men and 9% among women. In rural area, 3% of males as well as females were hypertensive.

Of those who were diagnosed hypertension, majority of them (77%) were taking the prescribed medicine. A higher percentage of men (80%) than women (74%) were taking medicine. The phenomenon appears to be more common in rural area where 78% men against 66% women taken medicine after they were diagnosed with hypertension. Over half of those who were diagnosed hypertension, were advised dietary modification including low salt intake; 44% were advised to lose weight and 39% were advised to increase physical activity. For smokers, 16% were advised to quit smoking. The percentage of those who received dietary advice including low salt intake was slightly higher for women (56%) than for men (50%), more for urban (56%) than rural (46%) respondents.

Over one-fifth (22%) of those who were diagnosed hypertensive, had consulted AYUSH with 19% of urban and 29% of rural respondents. By sex, 25% such men against 19% women were consulting AYUSH. Among those respondents who had consulted AYUSH, three-quarter were taking the treatment from the AYUSH practitioner, which was 94% in case of rural and 61% in case of urban.

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, Maharashtra, 2007- 08.

Hypertension	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Hypertension diagnosed by health professional (all respondents)	6.1	8.6	7.2	2.6	3.0	2.8	4.2	5.5	4.8
Diagnosed Hypertensives									
Currently taking drugs	80.4	78.0	79.1	78.3	66.2	71.9	79.7	74.3	76.8
Advised dietary modifications	52.6	59.3	56.3	45.3	46.9	46.2	50.2	55.5	53.1
Advised to lose weight	40.0	49.9	45.4	38.5	45.8	42.4	39.5	48.6	44.4
Advised to quit smoking	19.6	6.9	12.7	22.5	23.0	22.8	20.6	11.9	15.9
Advised to increase physical activity	39.0	35.1	36.8	53.3	39.5	46.0	43.7	36.5	39.8
Consulted AYUSH practitioner	21.2	16.2	18.5	33.4	24.1	28.5	25.2	18.7	21.7
Taking treatment from AYUSH practitioner	56.7	65.7	61.0	97.2	89.8	93.9	74.3	75.4	74.8

Table 4.1.2 presents the mean systolic and diastolic blood pressure by sex and place of residence. The mean systolic blood pressure was 123 mm Hg while mean diastolic blood pressure was 80 mm Hg in the survey population. These averages were almost same for rural and urban respondents, but higher for males than females.

According to WHO STEP guidelines, the population is 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 is 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 have been given in Table 4.1.3.

Table 4.1.4 gives the percentage of respondents according to categories of hypertension by sex and place of residence. Over all, 33% respondents were

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

Blood Pressure	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Systolic blood pressure	123.7	120.4	122.2	125.0	121.2	123.1	124.4	120.8	122.7
95% CI Lower	122.5	119.2	121.1	123.6	119.6	121.8	123.5	119.8	121.8
Upper	124.9	121.6	123.3	126.2	122.8	124.4	125.3	121.9	123.6
Diastolic blood pressure	80.9	78.6	79.8	80.7	78.6	79.6	80.8	78.6	79.7
95% CI Lower	79.9	77.6	78.9	79.6	77.5	78.7	80.0	77.8	79.0
Upper	81.8	79.6	80.7	81.7	79.7	80.6	81.5	79.3	80.4

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), Maharashtra, 2007- 08

Category of hypertension	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Normal	25.3	40.1	32.0	24.7	41.4	32.9	25.0	40.8	32.5
95% CI									
Lower	21.2	35.2	27.8	20.8	36.0	28.7	22.2	37.1	29.5
Upper	29.8	45.3	36.5	29.0	46.9	37.4	28.0	44.7	35.7
Pre - hypertension	54.4	44.6	49.9	50.9	39.6	45.3	52.5	41.7	47.4
95% CI									
Lower	49.9	39.8	45.9	47.0	35.6	41.8	49.6	38.7	44.8
Upper	58.7	49.5	53.9	54.8	43.7	48.9	55.4	44.8	50.0
Stage-I hypertension	18.2	12.6	15.7	20.4	15.1	17.8	19.4	14.1	16.9
95% CI									
Lower	14.9	10.5	13.3	17.7	12.7	15.6	17.3	12.4	15.3
Upper	22.0	15.0	18.4	23.5	17.9	20.3	21.8	15.9	18.6
Stage-II hypertension	2.1	2.7	2.4	4.0	3.9	3.9	3.1	3.4	3.2
95% CI									
Lower	1.5	1.9	1.8	2.9	3.0	3.2	2.5	2.8	2.8
Upper	3.1	3.7	3.1	5.4	5.0	4.9	3.9	4.2	3.8

normal, 47% were in the category of pre-hypertension, 17% in stage I hypertension and only 3% in stage-II hypertension. Among males, 25% were normal, 53% were in the category of pre-hypertension, 19% in stage I hypertension and only 3% in stage-II hypertension. For females, 41% were normal, 42% pre-hypertension, 14% stage I hypertension and 3% stage-II hypertension. The composition appears to be same for urban and rural.

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. Among the urban population, the prevalence of hypertension was 18% and pattern of prevalence was recorded as increasing with age (7% in 15-24, 14% in 25-34, 27% in 35-44, 29% in 45-54 and 44% in 55-64). The prevalence among male respondents was high (20%) compare with females (15%), but the increasing pattern with age was observed in both sexes (Table 4.2). Prevalence of hypertension by education was 27% among illiterate and 17% among college and above. In the occupational categories, the prevalence was high among occupation of manual work (23%). and agriculture (23%). Low prevalence of hypertension was recorded among the domestic workers (17%). Overall, prevalence among rural population was 22% and the pattern was increasing with age (12% in 15-24 to 42% in 55-64). Similarly, high prevalence was observed among illiterate (28%), whereas it was low (15%) among secondary level. Among the occupational categories, the prevalence was high among executive and business class (31%). But, it was low

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

Characteristic	Stage I & II hypertensive								
	Urban			Rural			Combined		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Age group									
15-24	8.5	4.3	6.6	12.9	11.7	12.4	10.9	8.4	9.8
25-34	17.9	9.1	13.8	23.7	10.9	17.2	20.9	10.1	15.6
35-44	30.6	23.2	27.2	28.4	20.5	24.5	29.4	21.7	25.7
45-54	28.9	28.9	28.9	34.9	31.0	33.0	32.3	30.1	31.3
55-64	42.0	45.9	43.8	43.2	41.2	42.1	42.7	42.6	42.7
Total	20.4	15.3	18.1	24.4	19.0	21.8	22.5	17.5	20.1
Education									
Illiterate	27.9	27.2	27.4	31.2	26.5	28.1	30.6	26.5	27.9
Primary	25.6	25.8	25.7	27.5	17.6	23.2	27.0	20.6	24.0
Middle	21.0	16.7	18.8	27.7	17.6	22.2	25.0	17.3	20.9
Secondary	19.4	12.9	16.5	18.1	11.8	15.4	18.7	12.4	15.9
Higher Secondary	16.2	10.0	13.7	23.5	10.2	20.1	19.6	10.0	16.4
College & above	21.8	5.5	16.6	20.4	12.0	17.9	21.4	7.1	17.0
Total	20.4	15.3	18.1	24.4	19.0	21.8	22.5	17.5	20.1
Occupation									
Executive/Business	20.8	7.2	19.4	31.2	23.7	30.5	23.6	11.7	22.4
Agriculture	27.9	2.9	22.7	26.1	23.5	25.1	26.2	22.8	25.0
Domestic Work	**	17.2	17.3	**	17.9	17.9	**	17.6	17.7
Services/Sales	21.9	14.4	20.8	21.2	13.7	20.4	21.7	14.2	20.7
Manual Worker	22.9	23.0	22.9	28.4	23.9	27.6	25.9	23.5	25.5
Other	14.0	7.1	11.6	15.5	11.0	14.0	14.7	8.8	12.7
Total	20.4	15.3	18.1	24.4	19.0	21.8	22.5	17.5	20.1
Number (n)	1450	1263	2713	1483	1560	3043	2933	2823	5756

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

among occupation of domestic work (18%). Overall, prevalence of hypertension was 20% among rural and urban population of Maharashtra, 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 17% were found in stage I hypertension with the remaining 3% in stage-II. On the contrary, only 5% 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 advises 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 same in males and females. Amongst those who were diagnosed diabetes, 46% of then (41% in urban and 52% in rural area) were currently taking insulin; three-quarter (81% in urban and 68% in rural area) were taking oral hypoglycemic drugs. A good proportion of respondents reported to have received advice from the treating physicians on their life style modification— 68% for dietary advice, 56% to reduce weight and 60% 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, Maharashtra, 2007- 08

Blood sugar	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Raised blood sugar diagnosed (All respondents)	1.1	1.0	1.1	0.8	0.9	0.8	0.9	1.0	1.0
Diagnosed diabetics									
Currently taking insulin	49.2	28.7	40.5	64	41.5	51.9	55.6	35.7	46.0
Currently taking oral drugs	84.0	75.7	80.5	58.9	76.5	68.4	73.1	76.2	74.6
Advised dietary modifications	53.6	51.7	52.8	82.4	84.0	83.3	66.1	69.4	67.7
Advised to lose weight	45.3	27.9	37.9	74.4	73.6	74.0	57.9	52.9	55.5
Advised to increase physical activity	49.5	41.5	46.1	74.5	73.6	74.0	60.3	59.1	59.7
Consulted AYUSH practitioner	36.8	20.8	30	26.1	37.2	32.1	32.2	29.8	31.0
Taking treatment from AYUSH practitioner	92.7	100	94.8	88.3	92.0	90.7	91.1	94.6	92.7

Chapter 5

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 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 axillary 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 Maharashtra was 21.3 kg/m^2 (22 of for urban, 21 for rural, 22 for males and 21 for females). The mean height in the survey population was 158 centimeter (159 centimeter for urban, 157 centimeter for rural, 163 centimeter for males and 153 centimeter for females). The mean weight was 53.2 kg with 55.4 kg for urban, and 51.3 kg for rural. By sex, the mean weight was 57.1 kg for males and

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, Maharashtra, 2007- 08

Physical measurements	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
BMI (kg/m^2)	22.0	21.7	21.9	21.0	20.7	20.9	21.5	21.2	21.3
95% CI									
Lower	21.5	21.3	21.5	20.6	20.1	20.5	21.2	20.8	21.0
Upper	22.5	22.1	22.3	21.4	21.3	21.3	21.8	21.5	21.6
Height (cm.)	164.4	153.3	159.3	162.6	152.0	157.3	163.4	152.5	158.2
95% CI									
Lower	163.5	152.4	158.6	161.7	151.3	156.8	162.8	152.0	157.8
Upper	165.1	154.2	159.9	163.5	152.6	157.9	164.0	153.1	158.6
Weight (kg.)	59.1	50.9	55.4	55.3	47.2	51.3	57.1	48.8	53.2
95% CI									
Lower	57.9	49.8	54.2	54.3	46.4	50.5	56.3	48.2	52.5
Upper	60.3	52.1	56.3	56.3	48.1	52.1	57.8	49.5	53.8
Waist circum. (cm.)	78.0	72.8	75.6	73.6	67.7	70.7	75.6	69.9	72.9
95% CI									
Lower	76.3	71.5	74.2	72.1	66.5	69.5	74.5	69.0	72.0
Upper	79.7	74.1	77.0	75.0	69.0	71.8	76.7	70.8	73.8

49 kg for females. The average waist circumference of respondents was 73 centimeters with 76 centimeters for urban respondents and 71 centimeters for rural respondents. The average waist circumference for male and female respondents was 76 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, we found that 23% respondents were under-weight, which was 18%

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

Category of BMI	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Under weight(<18.5)	16.2	20.8	18.4	24.9	29.4	27.1	20.8	25.7	23.1
95% CI									
Lower	13.3	17.0	15.4	21.4	25.1	23.6	18.5	22.7	20.8
Upper	19.7	25.5	21.8	28.7	34.0	30.8	23.4	28.9	25.6
Normal weight (18.5-24.9)	68.1	60.3	64.5	65.1	61.5	63.3	66.4	60.9	63.9
95% CI									
Lower	64.2	55.5	60.8	61.0	57.3	59.7	63.7	57.9	61.3
Upper	71.7	64.6	68.0	68.7	65.5	66.7	69.1	63.9	66.3
Grade-1 over weight (25.0-29.9)	13.8	15.4	14.6	8.6	7.3	8.0	11.0	10.9	11.0
95% CI									
Lower	11.0	12.5	11.8	6.6	5.8	6.4	9.3	9.3	9.4
Upper	17.2	18.9	17.7	11.1	9.1	9.8	13.0	12.6	12.6
Grade-2 over weight (30.0-39.9)	1.7	3.4	2.5	0.9	1.4	1.1	1.2	2.3	1.7
95% CI									
Lower	1.0	2.4	1.7	0.5	0.8	0.7	0.9	1.7	1.3
Upper	2.7	4.8	3.5	1.5	2.4	1.7	1.8	3.0	2.3

Grade-3 over weight (≥ 40.0)	0.2	0.1	0.2	0.6	0.5	0.5	0.5	0.3	0.4
95% CI									
Lower	0.1	0.0	0.0	0.3	0.2	0.3	0.2	0.1	0.2
Upper	1.0	0.2	0.5	1.8	1.4	1.2	1.1	0.8	0.7
Central Obesity WC ≥ K*	14.5	23.9	18.8	8.1	11.5	9.7	11.1	16.9	13.9
95% CI									
Lower	10.8	20.0	15.5	6.1	9.2	7.9	9.0	14.7	12.0
Upper	19.3	28.2	22.6	10.6	14.3	12.0	13.6	19.3	15.9

*K=90 cm for male and 80 cm for female

for urban and 27% for rural. By sex, 21% males and 26% females were underweight. Over 13% population was over weight (17% of urban and 10% of rural respondents). Overall the central obesity was 14% (15% of urban males, 24% of urban females; 8% of rural males, 12% of rural females).

5.5 SOCIO-DEMOGRAPHIC PATTERN OF OVERWIGHT

Overweight (obesity) is a major risk factor of NCD. The socio-demographic pattern of respondents in the category of overweight (grade I, II & III) across age, education, occupation and sex are presented in Table

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

Characteristic	Overweight (Grade I, II & III)								
	Urban			Rural			Combined		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Age group									
15-24	6.7	4.1	5.6	5.4	4.2	4.8	6.0	4.1	5.2
25-34	12.4	16.2	14.1	10.7	7.0	8.8	11.5	11.2	11.4
35-44	21.3	26.7	23.7	11.3	9.0	10.2	16.0	16.7	16.3
45-54	31.7	34.2	32.8	14.8	16.4	15.6	22.6	24.0	23.3
55-64	22.2	38.9	30.4	15.9	17.6	16.9	18.4	24.9	21.9
Total	15.7	18.9	17.1	10.2	9.2	9.7	12.8	13.4	13.1
Education									
Illiterate	4.0	16.8	13.3	8.9	10.6	10.0	8.0	12.0	10.8
Primary	6.6	20.9	14.3	10.8	8.5	9.8	9.5	13.3	11.3
Middle	16.7	19.3	18.1	8.9	10.4	9.7	12.0	13.9	13.0
Secondary	12.9	18.2	15.3	8.3	7.0	9.7	10.6	12.7	11.5
Higher Secondary	14.8	17.8	16.0	11.4	7.2	10.4	13.3	14.8	13.8
College & above	23.8	22.0	23.2	18.4	5.1	14.6	22.3	17.9	21.0
Total	15.7	18.9	17.1	10.2	9.2	9.7	12.8	13.4	13.1
Occupation									
Executive/Business	23.9	14.2	22.9	22.0	17.8	21.6	23.4	15.1	22.6
Agriculture	13.9	8.3	12.7	9.9	7.6	9.1	10.2	7.7	9.3
Domestic Work	**	22.4	22.3	**	10.9	10.8	**	16.4	16.3
Services/Sales	19.8	23.1	20.3	10.8	6.3	10.3	17.4	19.4	17.7
Manual Worker	7.0	2.3	6.2	7.7	4.7	7.7	7.7	3.6	7.0
Other	8.6	6.9	8.0	7.7	4.3	6.6	8.2	5.7	7.4
Total	15.7	18.9	17.1	10.2	9.2	9.7	12.8	13.4	13.1
Number (n)	1556	1383	2939	1528	1598	3126	3084	2981	6065

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

5.4. The prevalence of overweight among the urban population was 17% and its pattern was found increasing with age (6% in 15-24, 14% in 25-34, 24% in 35-44, 33% in 45-54 and 30% in 55-64). The prevalence among female respondents was high (19%) compare with males (16%), but the increasing pattern with age was observed in both sexes (Table 5.4). In educational categories, the prevalence was varying with 13% among illiterate to 23% among higher level (College). Occupational categories, the prevalence was high among the occupation of executive and business (23%), and domestic work (22%). Low prevalence of overweight was recorded among occupation of manual work (6%) and agriculture (13%). Overall, prevalence among rural population was 10% and it was varying with age (5% in 15-24 to 17% in 55-64). Similarly, prevalence in the educational categories was 10% among illiterate, primary and middle, 8% in secondary and 15% among college and above. In the occupational category, the prevalence was high among the occupation of executive and business (22%) and domestic work (11%), whereas it was low among the occupation of agriculture (9%) and manual worker (8%). Overall, prevalence of overweight was 13% 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, 13% of adult population surveyed was overweight and 14% was categorized into central obesity, constituting a high-risk group for NCD. It is also to be noted that 23% of adult population was recorded as under weight which is also an important health issue.

Chapter 6

Summary and Conclusions

The NCD risk factors survey in Maharashtra collected information from a random sample of 4997 households covering 2497 households in urban and 2500 households in rural areas. From these households, 6091 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.

Majority households in Maharashtra (86%) are Hindu followed by Muslim (9%). About 97% of urban households (97%) had access to piped drinking water against 71% rural households. In every 10 households, 4 households in rural area and 7 households in urban area had flush toilet facility. Electricity was used as main source of lighting in majority of households (92% in rural area, 95% in urban area and 93% over all). More than two-third households in rural area and 8% households in urban area were still using wood as a main source of cooking fuel. LPG was used as the main source of cooking fuel in majority of households (85%) in urban area. One-tenth of urban households and one-fifth of rural households resided in *kachha* houses. Three-quarter of population in Maharashtra was literate, but there existed sex and rural-urban differentials in educational attainment.

Tobacco is one of the major risk factors of non-communicable diseases. In Maharashtra, 37% of population used tobacco in any form (smoking or smokeless tobacco). This prevalence was 40% among urban males and 55% among rural males. One in every six men in rural area and one in every eight men in urban area smoked tobacco daily. The prevalence was very low among women. One-third of population with 41% of men and 24% of women used smokeless tobacco. Use of smokeless tobacco was high among rural population compare to urban. The mean age of initiation of tobacco use either smoking or smokeless tobacco among young adult age 15-34 was 20 years for both men and women

The alcohol consumption is a known risk factors of non-communicable diseases. In Maharashtra, one-quarter of male population consumed alcohol at least once in last one year and 16% consumed at least once in last one month. Those who consumed alcohol in last seven days, one-fourth of them consumed on more than 3 days a week. The mean age of initiation of alcohol consumption by young adults age 15-34 was 21 years.

Nutritional inadequacy is highly related to the health of people especially the risk of non-communicable diseases. One-quarter of population in Maharashtra consumed five servings of fruits and vegetables per day, as per WHO recommended standards. On an average, people consumed fruits only two days in a week against vegetables 4 days a week. One-third of urban population consumed fried local foods (junk foods) at least once in a week.

Physical inactivity is the leading cause of diabetes, hypertension and coronary heart disease. In Maharashtra, 81% of both male and female population was in low category of physical activity. About half of population was detected with pre-hypertension stage and one-quarter population was in stage-I and stage-II hypertension. According to BMI, 13% of population was in the category of over weight and one-fourth was under weight. One in every seven persons 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, 80% 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. Low prevalence of overweight was recorded among illiterates as well as among the people working in agriculture or manual worker. Overall, NCD risk factors were prevalent across all the socio-demographic categories of population in Maharashtra.

These are major health issues of non-communicable diseases in Maharashtra.

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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 $\pi_i = \dfrac{\text{a x Population of ward i}}{\text{Total Urban Populaltion}}$ 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 j^{th} selected CEB of the i^{th} ward and estimated conditional response probability $\bar{\theta}_{k|i,j}$ of household k from within the j^{th} selected CEB of ward i.

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

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

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

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 k^{th} selected household of the i^{th} selected village, HWT_{ik},

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

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

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 :

δ_{ijknlm} = 1 if n^{th} selected respondent of the k^{th} household of the j^{th} CEB of the i^{th} ward belongs to age group l and of sex m.

0 otherwise

$\hat{\mathbf{N}}_{lm}$ { 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)

estimated number of the persons belonging to the age group l and sex group m (l =5, m=1,2)

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

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

Calibrated Individual weight

$IWT_{ijklm} = \frac{\mathbf{N}_{lm}}{\hat{\mathbf{N}}_{lm}} \times HWT_{ijk}$

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

$$\hat{\mathbf{Y}}_{l,m} = \sum_{\substack{over\ all\ all\ possible\ values\ of\ i,j,k,n}} \boldsymbol{\delta}_{ijknlm} \times \mathbf{IWT}_{ijklm}$$

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

$$\hat{N}_{\cdot m} = \hat{N}_{1m} + ... + \hat{N}_{5m} \, , \quad \hat{Y}_{\cdot m} = \hat{Y}_{1m} + ... + \hat{Y}_{5m} \quad , \quad m = 1,2$$

$$\hat{N} = \sum_{l=1}^{5} \sum_{m=1}^{2} \mathbf{N}_{l,m} \quad , \quad \hat{Y} = \sum_{l=1}^{5} \sum_{m=1}^{2} \hat{Y}_{l,m}$$

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

For Rural,

Define :

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

$\widehat{\mathbf{N}}_{lm}$ { 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)

estimated number of the persons belonging to the age group l and sex group m (l =5, m=1,2)

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

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

Calibrated Individual weight

$$IWT_{iklm} = \frac{\mathbf{N}_{lm}}{\widehat{\mathbf{N}}_{lm}} \quad x \quad HWT_{ik}$$

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

$$\widehat{\mathbf{Y}}_{l,m} = \sum_{\substack{over\ all \\ all\ possible \\ values\ of \\ i,j,k,n}} \boldsymbol{\delta}_{ijknlm} \times y_{ikn} \times \mathbf{IWT}_{ijklm}$$

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.

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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 / Year 2 0
Interviewer's Name	_____	_____	_____	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)	

CONFIDENTIAL
For Research Purpose Only

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 2 0 Interviewer's Code Result* (Step-1) Result* (Step- 2) Result* (Step- 3)
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 many** 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 day**?	Hours : minutes ☐☐ : ☐☐ Hours minutes	

History of Raised Blood Pressure			
	Questions	**Response**	**Skip**
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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