Ministry of Health & Family Welfare
Government of India

INTEGRATED DISEASE SURVEILLANCE PROJECT (IDSP)

NON-COMMUNICABLE DISEASE RISK FACTORS SURVEY

2007-08

Madhya Pradesh

Government Medical College
Nagpur
(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 Madhya Pradesh and Government Medical College, Nagpur involved as State Survey Agency for supervising, data collection and data entry of survey in Madhya Pradesh.

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-auxiliary 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 categorized 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
GMC	Government Medical College
IDSP	Integrated Disease Surveillance Project
LPG	Liquid Petroleum Gas
MET	Metabolic Equivalent
NCD	Non-communicable Diseases
NICD	National Institute of Communicable Diseases
NIMS	National Institute of Medical Statistics
NMC	National Monitoring Committee
NNA	National Nodal Agency
NTAC	National Technical Advisory Committee
PSU	Primary Sampling Unit
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 - Madhya Pradesh

Population	
Household covered	4998
Individual covered	5853
Household Characteristics(%)	
Religion	
Hindu	92
Muslim	6
Access to piped drinking water	26
Urban	69
Rural	10
Sanitation	
Flush Toilet	15
Urban	48
Rural	2
Source of Lighting	
Electricity	68
Urban	97
Rural	57
Type of House	
Pucca House	23
Urban	60
Rural	10
Kachha House	52
Urban	18
Rural	64
Fuel use for Cooking	
LPG/Gas	19
Urban	59
Rural	4
Separate Kitchen	
Urban	56
Rural	26
Own Agricultural land	
Urban	16
Rural	62
Individual Characteristics(%)	
Education -Illiterate	44
Urban (Male)	12
Urban (Female)	32
Rural (Male)	37
Rural (Female)	71
Behavioural Information(%)	
Current Tobacco users	
Smokers	22
Male	41
Female	1
Smokeless tobacco users	39
Male	54
Female	23
Any form of Tobacco use	47
Male	68
Female	23
Mean age of Initiation (in years)	
Smoking	19
Male	*
Female	19
Smokeless tobacco	20
Male	20
Female	15
Alcohol Consumption	
Consumed Alcohol (last 30 days)	14
Male	24
Female	3
Consumed Alcohol (last 12 Months)	19
Male	33
Female	4
Consumed alcohol (in last 7 days)	
Binge Drinkers	13
Male	14
Female	4
Mean age of Initiation Alcohol (in years)	20
Male	20
Female	18
Fruits and Vegetables consumed	
Less than five servings per day	83
Urban	71
Rural	88
Physical Activity	
Low Physical Activity	42
Urban	68
Rural	32
Hypertension	
Pre Hypertension	46
Urban	46
Rural	46
Stage I and II Hypertension	21
Urban	24
Rural	20
Physical Measurement - BMI	
Under weight	39
Urban	27
Rural	44
Over weight (grade I,II,III)	8
Urban	20
Rural	4
Central Obesity	11
Urban	22
Rural	7

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

Executive Summary

Introduction

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

The overall objective of the NCD risk 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 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 for Tribals, Jabalpur as a Regional Resource Centre (RRC) for monitoring the quality of data collection and technical support to Government Medical College, Nagpur, the State Survey Agency (SSA) for the state of Madhya Pradesh.

Survey Methodology

WHO STEPS methodology for NCD Risk Factor Surveillance has been adopted for the survey after carrying out suitable modifications, based on a multisite ICMR-WHO collaborative initiative for NCD risk factor surveillance[1]. The survey was designed to provide prevalence estimates of risk factors for each 10 years age group (15-24 through 55-64) by sex and place of residence (urban/rural). The survey used uniform sample design, bilingual schedules (English and Hindi in case of Madhya Pradesh), 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 distributions for both sexes, which are available on the population level.

Two types of questionnaire - 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 (Step 1) collected the demographic information of individuals including age, sex, marital status, education, and occupation. In the behavioural information section, information about tobacco use, alcohol consumption, diet, physical activity, history of raised blood pressure and history of diabetes were collected. In the second section (Step 2), physical measurements of individual such as height, weight, waist circumference (not measured for pregnant women), blood pressure, and pulse rate were recorded.

Characteristics of survey population

A total of 5000 households were contacted in urban and rural area of Madhya Pradesh. Among them only

one household refused to participate in the survey. The overall individual response rate for the survey was 99 percent. Of the surveyed households, more than 90% of the households were Hindu and about 6% were Muslim. Seventy-three percent of the households used drinking water from a piped or hand pump. Almost all households had flush or pit toilet facility. Sixty eight 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. Overall 50% of the households possessed agricultural land, which was only 16% in case of urban area.

About 44% of the respondents were illiterate. It was pronounced in rural area where almost half of surveyed population was illiterate. The results emphasize the need of taking female literacy program of the Government more emphatically. About three-quarter of respondents were currently married. Majority of the respondents in rural area were engaged in agricultural work. More than 50% of females in urban area were looking after domestic work; the males were engaged in manual work (35%) followed by executive and business positions (11%).

BEHAVIOURAL RISK FACTORS FOR NCD

Tobacco Smoking

As per the WHO STEPS guidelines, the smokers are categorized into three categories *Current Smokers*, *Current Daily Smokers*, *Past Daily Smokers* and those who have never smoked in lifetime were classified as *Non-Smokers*. The survey finds that about one fifth of respondents (41 percent men and about one percent women) in Madhya Pradesh were current smokers.

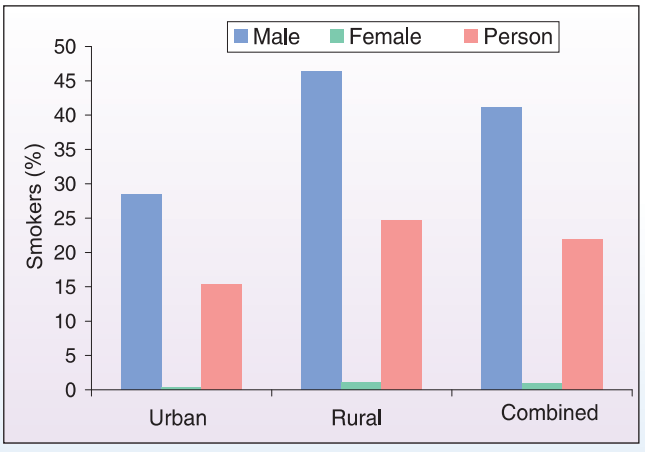

Figure 1. Current smokers (%) by sex and residence

The urban and rural prevalence was 15 and 25% for the current smokers. The mean number of smoking *beedi* and manufactured cigarette in a day was 12and less than one respectively. There was no marked difference between men and women in frequency of any type of smoking. The average age of onset of smoking was around 19 years for young rural and urban respondents. The mean age of cessation of smoking for all those who stopped smoking was 29 years. Among non-smokers, about 50% of respondents were exposed to tobacco smoke at home and work.

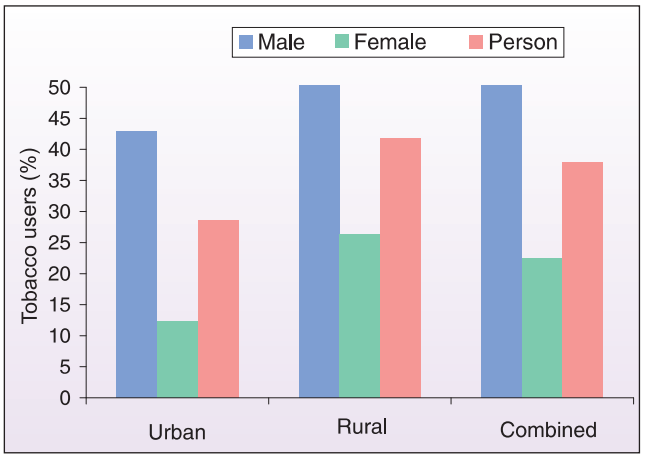

Figure 2. Current daily smokeless tobacco users (%) by sex and residence

About 40% 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 3 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 21 years for the respondents in the age group of 35-64 years. The over all mean age of quitting smokeless tobacco was 29 years. About 47% of the respondents were using tobacco in either form (smoking and smokeless) whereas about 12% were using tobacco in both the forms.

Alcohol Consumption

In the survey, 19% of the respondents report to have consumed alcohol in past 12 months and 14% consumed in last 30 days preceding the survey. Twenty four percent of men and only 3% of women report to have consumed alcohol in past 30 days. About 4% of respondents were past drinkers. The habit of drinking was higher among men with 33% consuming alcohol in past 12 months as compared to only 4% among women. The average

number of drinks consumed on a drinking day was two drinks. About one tenth of current drinkers were binge drinkers (high drinking). The mean age of initiation of alcohol consumption regularly was 20 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. The percentage of current drinkers was highest for respondents whose main occupation was manual work & agriculture.

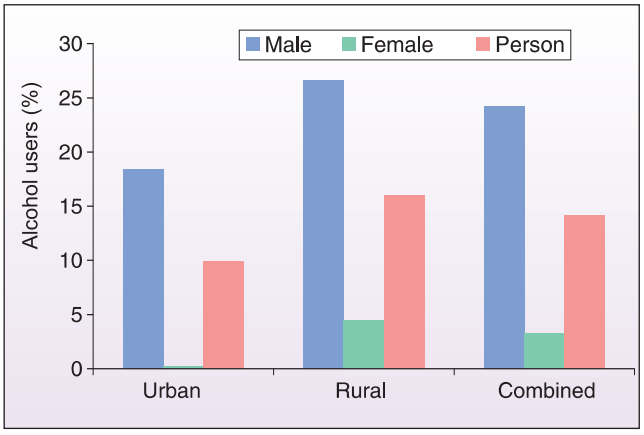

Figure 3. Alcohol consumption (%) by sex and residence

Fruits and Vegetables Consumption

In a week, people in Madhya Pradesh consumed vegetables 5 days and fruits on an average 2 days. The mean number of days when fruits were consumed was higher for urban population (2 days) as compared to that for rural population (1 day). Only 17% of population consumed five or more servings of fruits and vegetables per day.

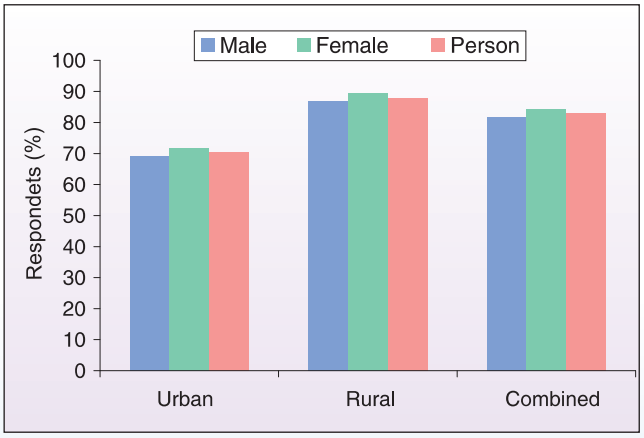

Figure 4. Less than five servings of fruits & vegetables consumption (%) by sex and residence

In respect of consumption of specific food habits, 17% population consumed eggs, 10% consumed fish, and 13% consumed red meat and (20%)fried local food at least once a week. Cheese/butter was consumed daily by 9% of the population. Cake pastries or other bakery items including chips/*namkeen* are consumed daily by 6% of population.

The most common oil used for cooking among the households in Madhya Pradesh was soyabean oil (60%), followed by mustard oil (36%) and groundnut oil (4%).

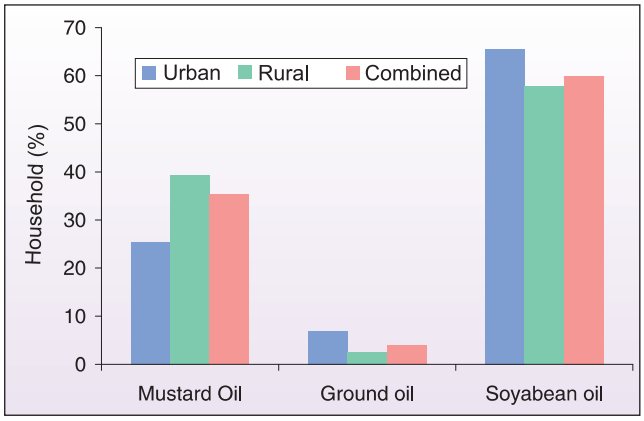

Figure 5. Major oil consumption among households/nut (%) by residence

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 Madhya Pradesh, the mean time spent in different sub groups on work related physical activity range between 191-332 minutes per day. The mean duration of total physical activity was 2106 MET minutes per day. Most of the time spent related to work and travel (walks and bicycle). Around 67 minutes and 12 minutes were spent per day for travel and recreational activities respectively.

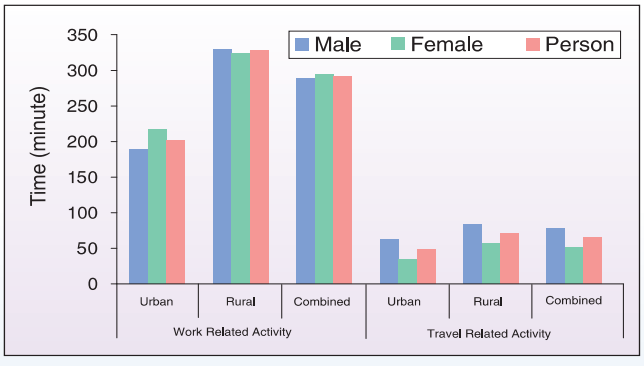

Figure 6. Mean time spent on physical activity per day (minutes) by sex and residence

As per the WHO guidelines, the total physical

activity of the individual has been categorized as low, medium and high. About 42% of respondents recorded low level of physical activity, while 20% and 38% of respondents recorded medium and high level of activity, respectively. Majority of respondents spent 1-3 hours in sedentary activities (60%). About 20% spent more than 4 hours in sedentary activity.

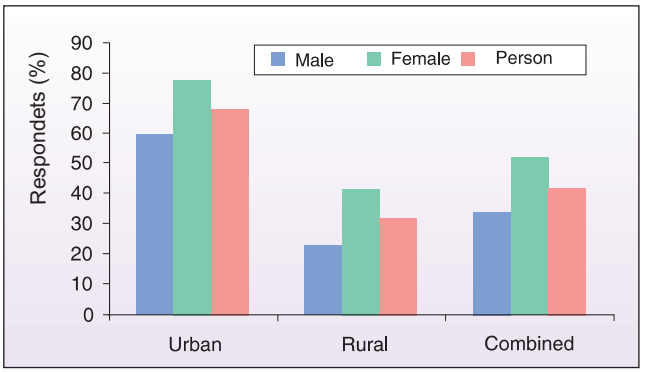

Figure 7. Low of physical activity of respondents (%) by sex and residence

HYPERTENSION AND DIABETES

Hypertension

The blood pressure is an important determinant of risk of cardiovascular and ischemic heart diseases, congestive cardiac failure and renal failure. In the survey, 2% respondents report to have been diagnosed as hypertensive by health professionals (2% for males and 3% for females; 6% for urban and 1% for rural population). Among these who were diagnosed for hypertension, 60% were on prescribed drugs, 67% were advised dietary modification, and 1% consulted AYUSH practitioner of which one-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 around 126 mm Hg and mean diastolic blood pressure was 78 mm Hg. By categories of hypertension, 33% recorded to be normal, 46% in pre hypertension, 16% in stage-I hypertension and 5% in stage-II hypertension. Stage I &II hypertension was more pronounced in men (24%) as compared to women (18%).

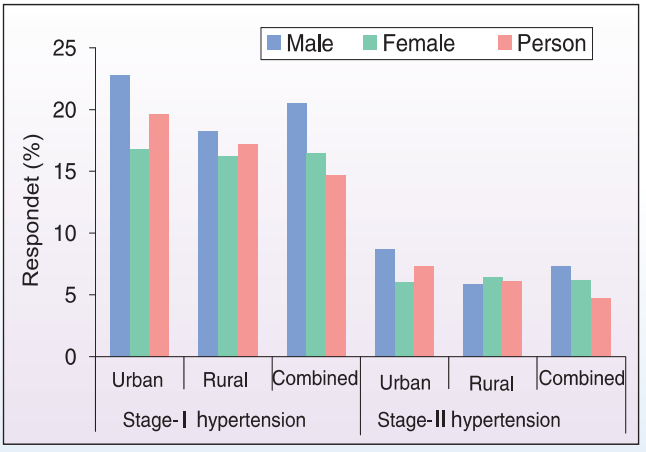

Figure 8. Stage I & II hypertension (%) by sex & residence

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 17% were taking insulin and 77% were on oral drugs. A large proportion of them were advised life style modification such as diet modification, reducing weight and increasing physical activity. About 20% (of the diagnosed) had consulted AYUSH practitioners for the elevated blood sugar levels and majority of them were taking the treatment from the system.

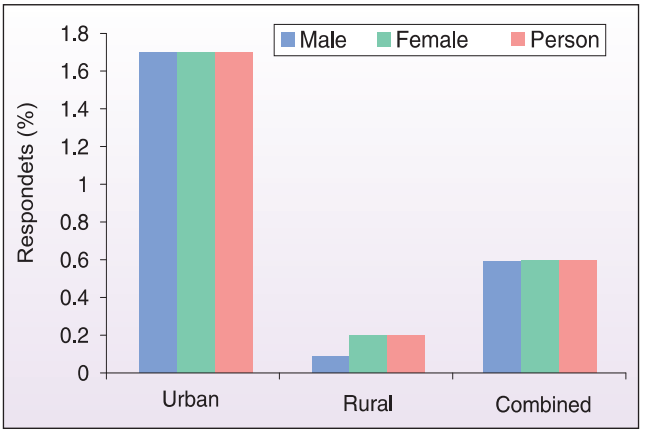

Figure 9. History of raised blood sugar (%) by sex and residence

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 height, weight and waist circumference. The mean BMI was around 20 kg/

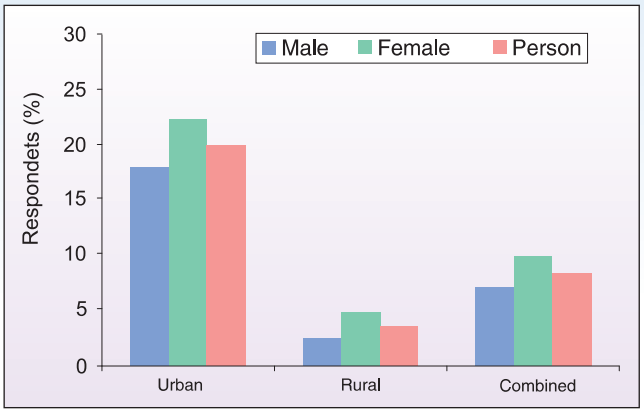

Figure 10. Overweight respondents (%) by sex and residence in Madhya Pradesh

m^2 with mean height 158 cm (165 cm for men, 152 cm for women) and mean weight 50 kg (53 kg for men and 47 kg for women). According to the survey, 39% of the respondents were under weight and about 8% were overweight, which was 20% of urban and 4% of rural population. Overall 53% of the respondents were in the normal category of BMI.

SOCIO-DEMOGRAPHIC DIFFRENTIALS

Tobacco is mainly used either in the form of smoking or smokeless (chewing with lime or *Pan*) in Madhya Pradesh. 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, about half 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 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 Madhya Pradesh.

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 Center for Tribal, Jabalpur as the Regional Resource Centres (RRCs). Government Medical College, Nagpur was identified as the State Survey Agencies (SSAs) 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 Madhya Pradesh. Government Medical Collage, Nagpur was the State Survey Agency (SSA) in the state while Regional Medical Research Centre for Tribals (RMRCT), Jabalpur was the Regional Resource Centre (RRC).

1.2 OBJECTIVES

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

1. Assess the prevalence of NCD risk factors in different strata of population in the states;
2. Establish a baseline database of NCD risk factors needed to monitor trends in population health behavior and risk factors for chronic diseases over a period of time in the states ; and
3. Provide evidence for evolving strategies and interventions for identified risk factors in the community to reduce the burden of Non-Communicable Diseases in the population

1.3 NON-COMMUNICABLE DISEASE (NCD) RISK FACTORS

A "risk factor" refers to any attribute,

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

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

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

RISK FACTORS COMMON TO MAJOR NCD'S

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

+ Corresponds to Risk Factor;
* Not being included in Phase I; CVD – Cardiovascular Disease

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

Consumption of fruits and vegetables reduces the risk of NCDs, like cancers and cardiovascular diseases. Dietary patterns that include higher intakes of fruits

1.4 HEALTH PROFILE OF THE STATE

The state of Madhya Pradesh is located in the central part of India. It is the largest state in India both in terms of area and population. It is bounded by the states of Rajasthan to the north-west, Uttar Pradesh to the north, Chhattisgarh to the east, Maharashtra to south and Gujarat to the west. It has an area of 308,144 sq. km. and a population of 67569 people (in thousand).[2] There are 48 districts, 313 blocks and 55393 villages in the state. The population density was 196 per sq. km. (as against the national average of 325). The population of the state has been growing faster with the decadal growth rate of 24.3% against 21.5% for the country. The key population and health indicators for Madhya Pradesh are presented in Table 1.1 and Table 1.2.

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

S. No	Indicator	Madhya Pradesh	India
1	Total Population(in thousand)*	67569	1128521
2	Decadal Growth Rate*	24.26	21.52
3	Population ratio (Urban/ 1000 Rural)**	360	385
4	Crude Birth Rate (Per 1000 Population)**	29.1	23.5
5	Crude Death Rate (Per 1000 Population)**	6.3	7.5
6	Life Expectancy at Birth**	57.8(M) 57.5(F)	62.3(M) 63.9(F)
7	Total Fertility Rate***	4.0	2.9
8	Infant Mortality Rate (Per 1000 Live Births)**	74	57
9	Maternal Mortality Ratio (Per 100000 Live Births)†	379	301
10	Sex Ratio (Females/1000 Males)*	919	933
11	Mean Age Of Marriage (Female)††	20.5	20.2
12	Population Below Poverty Line†††	38.3	27.5%
13	Literacy Rate*	63.7	64.8

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

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

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

Source: National Health Profile 2007, Central Bureau of Health Intelligence, MOHFW,
(* Medical Council of India; ** Dental Council of India; *** Directorate of state health services; † Department of AYUSH, MOH&FW/ GOI; †† Indian Nursing Council, Pharmacy Council of India; ††† Bulletin on Rural Health Statistics in India, 2006 – Special Revised Edition, MOHFW)

1.5 SURVEY DESIGN AND IMPLEMENTATION

Sample Size

In order to achieve the aforesaid objectives, it was assumed that we should be able to estimate a parameter that has a level of 15% in a subgroup of population, with a relative precision of 30%, design effect as 1.25 and we would be able to achieve a response rate of 90%. Assuming that NCD risk factors are concentrated in 15-64 years for both males and females, the required sample size for each sex in 10-years age groups was estimated to be about 280. It is a known fact that the proportion of population in the 10 year age groups decrease with increase in age. In any population, the proportion of population in the age-group 55-64 is lowest and varies in the range of 5-7 percent depending upon the fertility level (it is at the lower end, i.e., 5% in high fertility states, e.g. Uttar Pradesh, Madhya Pradesh, Bihar and Rajasthan, in the middle, i.e. 6% in moderate fertility states and at the upper end, i.e. 7% in low fertility states). Keeping such scenario of population composition in view and in order to have targeted 280 females and 280 males in age group 55-64, a sample of 5000 households was considered to be adequate for the survey.

Sample Design

A uniform sample design with equal allocation in urban and rural area was adopted and same was followed

in Madhya Pradesh. In the 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 households 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 randomly selected for household listing. 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 were constructed using the state age distributions for both sexes of the urban and rural sector, which are available on the population level (Appendix-A)[6].

Sample Implementation

During the survey, information collected from a

random sample of 4998 households covering 2500 households from rural and 2498 from urban areas. From these households, a total of 5922 respondents were contacted out of which 5874 completed the Step-1, and 5853 completed the Step-2 survey. The overall individual non-response for the survey was 1.2% (Table 1.3).

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

Response	Residence		
	Urban	Rural	Combined
Households interview			
Households contacted	2500	2500	5000
Households interviewed	2498	2500	4998
Households response rate (%)	99.9	100.0	99.9
Eligible Participants Step-1			
Individual contacted	3004	2918	5922
Individual interviewed	2992	2882	5874
Response rate (%)	99.6	98.8	99.2
Eligible Participants Step-2			
Step-2 completed	2980	2873	5853
Overall Individual response rate (%)	99.2	98.4	98.8

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

1.6 SURVEY INSTRUMENTS

The survey used two types of questionnaire, the Household Questionnaire and the Individual Questionnaire (Appendix-B). The overall content and format of the questionnaires were determined through a series of workshops and meetings held in 2006-07. The questionnaires for each state were bilingual with questions in both the English and principal language of the state which was Hindi in the present case. It first 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, types of cooking fuel, type of oil/cooking medium, ownership of agricultural land, ownership of livestock and possession of durable goods.

The Individual Questionnaire included questions seeking information from all the selected individuals (men and women) in the age group 15-64. The Individual Questionnaire covered information on demographic, behavioural and physical measurements under Step-1 and Step-2 with a number of sections into them. The first section of Step-1 included questions regarding the demographic information of individuals, viz., age, sex, marital status, education, and occupation. The behavioural information section included questions on tobacco use, alcohol consumption, diet, and physical activity, history of raised blood pressure and history of diabetes.

Tobacco Use (Smoking & Smokeless): Questionnaire was used to elicit information on current and past use of tobacco (smoking & smokeless), age when used

tobacco for first time, past history of tobacco use, and age when stopped using tobacco.

Alcohol use: Questionnaire collected information on whether the individual was currently 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 STEPS guidelines but they were finalized through a series of consultative meetings held at the Indian Council of Medical Research.

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

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

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

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

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

1.7 TRAINING

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

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

Training of Field Staff

As mentioned, the field staff recruited for the

survey in Madhya Pradesh was trained at the Department of PSM, Government Medical College, Nagpur, and the officials of RMRCT, Jabalpur, supervised the training process. The training was conducted from 8-10 December 2007. The training consisted of lectures, classroom training, demonstration, practice interviews and field based training. A total of 23 participants were trained, of these 23 trainees, 10 were part of the 5 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 Hindi, consent form, IEC message, set of show cards (e.g. diet chart, alcohol chart) and reference forms (e.g. Kish table, table of random numbers), flow chart of activities in field, identity card and supporting letters from Government mentioning purpose of visit. A field visit 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 errors. All the participants were provided with the Data Entry Software and its manual.

1.8 DATA PROCESSING AND ANALYSIS

Following the data entry by the state survey agency (SSA), the validity and consistency check was carried out by the NIMS, ICMR for final analysis. Analysis plan in terms of dummy tables was finalized in consultation with ICMR Review 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 (*biddies, cigarettes, pipes, cigars,* etc.,) used daily was calculated taking denominator as all daily smokers. Though the age of initiation of smoking was collected from all daily smokers in completed years but for the past smokers it was calculated by imputation because it was not recorded. Finally average age of initiation of smoking was calculated in two age groups of smokers, 15-34 years and 35-64 years. The same procedure was followed for the calculation of average age of initiation of smokeless tobacco. Prevalence of alcohol consumption was calculated for last twelve month, last thirty days and last seven days and presented as percentage. The mean age of initiation of alcohol consumption was also calculated. Mean number of servings fruit, vegetables, and combined (fruit and vegetables) consumed per day was computed.

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

1.9 QUALITY CONTROL MEASURES

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

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 Madhya Pradesh. It also describes facilities in the households.

2.1 HOUSEHOLD CHARACTERISTICS

Table 2.1 provides the percentage distribution of households in rural and urban areas by various characteristics of the surveyed households. Majority of the households (92%) were Hindu followed by Muslim (6%). Hindu constitutes 81% of urban households and 97% of rural households. Forty seven percent of sample households were using hand pump water followed by 26% from piped supply & well water and a small fraction (0.3%) from surface. It was found that 69% of urban households and only 10% of rural households had piped drinking water supply. Regarding the sanitation facility, only 15% of the households had flush toilets and majority had pit toilets (85%). All the households had some kind of toilet facility. Forty eight percent of the urban respondents and 2% of rural respondents had access to the flush toilets in Madhya Pradesh.

Sixty eight percent households use electricity as main source of lighting which was much higher in urban (97%) than that in the rural (57%). In the state, 23% households had *pucca* house, 25% households had *semi-pucca* house and 52% households had *kaccha* house. Higher percentage of households in urban (60%) compared to the rural (10%) had *pucca* houses. Several types of fuel were used for cooking in Madhya Pradesh, with wood as the most common type (87%) in the rural. L.P.G. was the most common (59%) fuel in urban. In the state as a whole, 72% households used wood as fuel followed by L.P.G. (19%) and kerosene only 1%.

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

Characteristics	Residence		Combined
	Urban	Rural	
Religion of household head			
Hindu	80.7	96.6	92.3
Muslim	15.5	2.6	6.1
Christian	0.8	0.4	0.5
Buddhist	0.9	0.1	0.3
Other	2.1	0.3	0.8
Total	100.0	100.0	100.0
Source of drinking water			
Piped	68.9	10.1	26.2
Hand pump	23.7	55.7	46.9
Well water	6.5	33.4	26.1
Surface water	0.0	0.4	0.3
Others	0.9	0.3	0.5
Total	100.0	100.0	100.0
Sanitation Facility			
Flush toilet	48.4	2.1	14.7
Pit toilet	51.6	97.9	85.3
Total	100.0	100.0	100.0

Main source of lighting			
Electricity	96.7	57.2	67.9
Kerosene	3.1	42.7	32.0
Gas/Oil	0.2	0.1	0.1
Total	100.0	100.0	100.0
Type of House			
Pucca	59.9	9.6	23.3
Semi-Pucca	21.9	26.0	24.9
Kachha	18.2	64.4	51.8
Total	100.0	100.0	100.0
Cooking fuel			
LPG	59.0	3.9	18.9
Wood	32.5	86.6	71.9
Kerosene	3.2	0.2	1.0
Others	5.3	9.3	8.2
Total	100.0	100.0	100.0
Separate kitchen room			
Yes	56.1	26.0	34.2
No	43.9	74.0	65.8
Total	100.0	100.0	100.0
Agriculture land			
Own agriculture land (%)	16.2	61.8	49.4
Number	2498	2500	4998

About half of surveyed population own agricultural land in Madhya Pradesh, which was 62% for rural as compared to 16% for urban households. The proportion of households having separate kitchen was 34%. This percentage was 56 for urban against 26 for rural households.

2.2 AGE AND SEX COMPOSITION

A total of 5833 individuals with 2857 males and 2996 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. The number of respondents was least, i.e. 765, in the age group 45-54 and maximum, i.e., 1472 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. Forty four percent of the total respondents were illiterate whereas 30% were with primary or middle, 18% were secondary or in higher secondary, while 8% were educated up to college and above. In the sample, 60% females and 30% males were

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

Age	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
15 - 24	378	309	687	312	266	578	690	575	1265
25 - 34	311	413	724	377	371	748	688	784	1472
35 - 44	300	334	634	321	275	596	621	609	1230
45 - 54	159	213	372	175	218	393	334	431	765
55 - 64	250	313	563	274	284	558	524	597	1121
15 - 64	1398	1582	2980	1459	1414	2873	2857	2996	5853

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

Characteristic	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Education									
Illiterate	11.9	31.7	21.2	37.0	71.0	53.3	29.7	59.9	44.1
Primary	9.3	9.1	9.2	13.9	9.4	11.7	12.5	9.3	11.0
Middle	18.5	17.7	18.1	25.2	12.1	18.9	23.3	13.7	18.7
Secondary	16.9	13.9	15.5	13.9	4.9	9.6	14.8	7.4	11.3
Higher Secondary	14.7	9.1	12.1	6.4	2.0	4.3	8.4	4.0	6.5
College & above	28.7	18.5	23.9	3.6	0.6	2.2	10.9	5.7	8.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Marital status									
Never married	36.0	18.9	28.0	26.6	11.9	19.6	29.4	13.9	22.0
Married	62.8	75.4	68.7	70.5	81.2	75.6	68.2	79.6	73.6
Widowed/Divorced/ Separated	1.2	5.7	3.3	2.9	6.9	4.8	2.4	6.5	4.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Occupation									
Executive/Business	18.5	2.0	10.8	7.3	3.4	5.5	10.6	3.0	7.0
Agriculture	13.2	7.3	10.5	41.2	22.3	32.1	33.0	18.1	25.9
Domestic work	0.5	55.5	26.2	0.3	30.6	14.9	0.4	37.7	18.1
Services/Sales	15.0	4.1	9.9	1.9	1.0	1.5	5.7	1.9	3.9
Manual worker	28.9	11.3	20.6	37.6	29.6	33.8	35.0	24.4	30.0
Other	23.9	19.8	22.0	11.7	13.1	12.2	15.3	14.9	15.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	1398	1582	2980	1459	1414	2873	2857	2996	5853

illiterate. The proportion of illiterate respondents among rural females was as about the twice as high than that among urban females. A higher percentage of males than of females had completed almost each level of schooling. 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, 26% were never married and 4% were widowed, divorced or separated. The proportion of respondents who were currently married was 69% in urban and 76% in rural residents.

2.5 OCCUPATION

Table 2.3 provides information on the current occupation of the respondents. In the sample about 38% women were currently engaged in domestic work. It was closely followed by individuals involved in manual work, which were about 35% in case of males and 24% in case of females. About 4% individuals were engaged in work related to sales and services and only 7% of the total respondents were engaged executive/business set-ups.

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 grouped into three categories *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). About one in every five respondents in the survey was a current smoker. They were mostly current daily smokers. The prevalence of smoking was more among men (41%) than among women (1%). By place of residence, 14% of urban respondents and 23% of rural respondents were current daily smokers. Only 2% of respondents were past daily smokers.

Table 3.1.2 presents the mean number of tobaco products smoked daily among those respondents who were current daily smokers 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 12 in case of *bidis*, and less than one for manufactured cigarettes. There was marked difference between male and female respondents in the frequency of smoking being bidi i.e. 12 per day for male and 8 for female. The mean number of smoking bidi was marginally higher among rural respondents (13 per day) as compared to urban respondents (10 per day). In case of manufactured cigarettes however, the mean number of smoking was higher among urban respondents (2 per day) as compared to rural respondents (<1 per day).

Table 3.1.1 Percentage of respondents classified by smoking status across sex and place of residence, Madhya Pradesh, 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	28.5	(24.5, 32.8)	25.2	(21.5, 29.3)	5.1	(3.6, 7.1)	69.7	(65.9, 73.3)
Female	0.4	(0.2, 0.8)	0.3	(0.1, 0.8)	0.1	(0.0, 0.4)	99.6	(99.0, 99.8)
Total	15.3	(13.2, 17.7)	13.5	(11.6, 15.8)	2.7	(1.9, 3.8)	83.7	(81.6, 85.6)
Rural								
Male	46.4	(41.7, 51.2)	43.7	(38.6, 48.9)	3.9	(2.7, 5.6)	52.4	(47.2, 57.6)
Female	1.1	(0.6, 2.0)	0.8	(0.5, 1.5)	0.2	(0.1, 0.6)	98.9	(98.1, 99.4)
Total	24.7	(22.0, 27.7)	23.1	(20.2, 26.3)	2.2	(1.5, 3.1)	74.7	(71.4, 77.7)
Combined								
Male	41.2	(37.6, 44.9)	38.3	(34.5, 42.2)	4.2	(3.3, 5.5)	54.6	(53.5, 61.3)
Female	0.9	(0.5, 1.5)	0.7	(0.4, 1.2)	0.2	(0.1, 0.5)	98.9	(98.6, 99.4)
Total	22.0	(20.0, 24.2)	20.4	(18.2, 22.7)	2.3	(1.8, 3.0)	75.7	(74.9, 79.5)

Table 3.1.2 Mean number of tobacco products smoked (per day) by daily smokers age 15-64 according to sex and place of residence, Madhya Pradesh, 2007- 08

Residence/ Sex	Type of smoking			
	Bidi		Manufactured Cigarettes	
	Mean	95% CI	Mean	95% CI
Urban				
Male	10.5	(9.0, 11.9)	1.7	(0.7, 2.7)
Female	4.6	(2.9, 6.3)	*	*
Total	10.4	(8.9, 11.8)	1.7	(0.7, 2.7)
Rural				
Male	12.8	(10.9,14.6)	0.1	(0.0, 0.1)
Female	8.9	(3.6, 14.3)	*	*
Total	12.7	(10.9,14.6)	0.1	(0.0, 0.1)
Combined				
Male	12.4	(10.8,13.8)	0.4	(0.2, 0.6)
Female	8.4	(3.8, 12.9)	*	*
Total	12.2	(10.8,13.8)	0.4	(0.2, 0.6)

* 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, Madhya Pradesh, 2007- 08

Residence/ Sex	Smokers						Non-smokers	
	Age of Initiation (15-34 years)		Age of Initiation (35-64 years)		Age at Stopped		Exposed to tobacco smoke at Home or Work	
	Mean	95% CI	Mean	95% CI	Mean	95% CI	P (%)	95% CI
Urban								
Male	19	(18.5, 20.5)	20	(19.5,22.5)	29	(26.9, 32.1)	56	(48.3, 63.0)
Female	*	*	31	(25.5,38.5)	23	(22.4, 24.8)	30	(24.3, 37.1)
Total	19	(18.5, 20.5)	21	(20,22.5)	29	(26.8, 32.0)	42	(36.2, 48.0)
Rural								
Male	18	(17.5, 20.5)	20	(19.0,20.5)	29	(26.0, 31.9)	58	(50.2, 65.8)
Female	*	*	20	(12.5,30.5)	28	(12.8, 44.1)	49	(41.1, 56.8)
Total	19	(18.5, 20.5)	20	(19.5,20.5)	28	(26.2, 31.7)	53	(45.4, 59.5)
Combined								
Male	19	(18.5, 20.5)	20	(19.5,22.5)	29	(27.1, 31.2)	57	(51.7,62.9)
Female	*	*	25	(16.5,32.5)	27	(15.2, 39.7)	44	(37.9,49.7)
Total	19	(18.5, 20.5)	20	(19.5,21.5)	29	(27.1, 31.0)	49	(44.1,54.4)

* no observation

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 respondents aged 15-34 as well among 35-69 yrs was 19 and 20 years respectively. The mean age of cessation of smoking for all those who stopped smoking was 29 years. On an average, rural resident in Madhya Pradesh whose current age was 35-64 years, initiated smoking at the age of 20 years as compared to urban counterpart who initiated it at the age of 21 years. The mean age of initiating smoking for urban and rural males in the age group 15-34 years was 19 and 18 years respectively. There were no women smokers among surveyed population in 15-34 years. The age of initiation of smoking in the age group 35-64 years was 20 years for rural male and female whereas among the urban smokers the mean age of initiation for males was 20 years and 31 years for females. The mean age of cessation of smoking for rural and urban male was 29 years.

About half of respondents of those who never smoked were exposed to tobacco smoke at home or work place. It wast 57% in case of men against 44% in

case of women. Over 42% of the urban respondents and 53% of the rural respondents were exposed to tobacco smoke at home or work place.

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

The mean number of consumptions per day of various smokeless tobacco products such as tobacco chewing, pan with tobacco, snuff by mouth, snuff by nose and others are provided in Table 3.1.5. The mean number of times chewing tobacco per day in Madhya Pradesh was about 4 (5 for men and 3 for women). The

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

Residence/ Sex	Smokeless tobacco user							
	Current users		Current daily users		Past daily users		Never used	
	P (%)	95% CI	P (%)	95% CI	P (%)	95% CI	P (%)	95% CI
Urban								
Male	43.7	(38.4,49.1)	42.9	(37.4,48.5)	2.9	(1.9,4.5)	53.4	(48.9,59.4)
Female	12.4	(9.4,16.3)	12.3	(9.3,16.2)	0.7	(0.4,1.4)	86.9	(82.9,90.2)
Total	29.0	(25.1,33.3)	28.6	(24.6,32.9)	1.9	(1.3,2.7)	69.1	(65.3,73.5)
Rural								
Male	58.0	(52.5,63.3)	56.1	(50.3,61.7)	2.4	(1.6,3.7)	39.6	(36.3,47.0)
Female	26.6	(21.7,32.2)	26.3	(21.4,31.9)	0.5	(0.2,1.2)	72.9	(67.6,78.2)
Total	43.0	(38.6,47.4)	41.8	(37.3,46.4)	1.5	(1.0,2.2)	55.5	(52.3,61.0)
Combined								
Male	53.8	(49.7,57.9)	52.2	(47.9,56.6)	2.6	(1.9,3.5)	43.6	(41.2,49.3)
Female	22.6	(18.9,26.8)	22.4	(18.7,26.5)	0.5	(0.3,1.0)	76.9	(72.9,80.8)
Total	39.0	(35.7,42.4)	38.0	(34.6,41.6)	1.6	(1.2,2.2)	59.4	(57.0,63.7)

About 39% of the respondents were current user of smokeless tobacco with 54% among men and 23% among women. A small percentage of men and women (1.6%) were found to be past daily users. The prevalence of smokeless tobacco use was higher among rural respondents (42%) as against urban respondents (29%). More men (56% of rural and 43% of urban men) than women (26% of rural and 12% of urban women) were current daily users of smokeless tobacco.

frequency of chewing tobacco was 5 for men whereas it was 3 for women. It did not vary much by place of residence. The mean number of times chewing tobacco per day was 3 for urban women and 4 for rural women. For those who chew pan with tobacco, snuff by mouth, snuff by nose 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 smokeless tobacco by sex and place of residence of

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, Madhya Pradesh, 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	4.3	(3.8, 4.8)	0.6	(0.2, 0.9)	0.1	(0.0, 0.1)	1.7	(0.9, 2.5)
Female	2.7	(2.1, 3.3)	0.6	(0.3, 0.9)	0.6	(0.3, 0.8)	0.6	(0.2, 0.9)
Total	4.0	(3.5, 4.5)	0.6	(0.3, 0.8)	0.2	(0.1, 0.3)	1.4	(0.8, 2.1)
Rural								
Male	5.1	(4.7, 5.5)	0.4	(0.2, 0.7)	0.1	(0.0, 0.2)	0.4	(0.2, 0.5)
Female	3.6	(3.1, 4.1)	0.2	(0.1, 0.3)	0.6	(0.4, 0.8)	0.1	(0.0, 0.2)
Total	4.6	(4.2, 5.0)	0.4	(0.2, 0.6)	0.2	(0.1, 0.4)	0.3	(0.1, 0.4)
Combined								
Male	4.9	(4.6, 5.2)	0.5	(0.3, 0.7)	0.1	(0.0, 0.2)	0.7	(0.4, 0.9)
Female	3.4	(3.0, 3.9)	0.3	(0.2, 0.4)	0.6	(0.4, 0.7)	0.2	(0.1, 0.3)
Total	4.5	(4.2, 4.8)	0.4	(0.2, 0.6)	0.2	(0.1, 0.3)	0.5	(0.3, 0.7)

* Tooth powder or tooth paste prepared using tobacco

respondents is provided in Table 3.1.6. The mean age of initiation of smokeless tobacco use among those who use smokeless tobacco and were aged 15-34 years was 20 years for males and 15 years for females where as there was no residential differential in mean age of initiation of smokeless tobacco use. For respondent aged 35-64 years, the mean age of initiation of smokeless tobacco use was 21 years (21 years for males and 25 years for females). It was 25 years for urban population as compared to 20 year for rural. The mean age of quitting smokeless tobacco use among those who did so was 29 years; it was 29 years for both men and women. The mean age of quitting smokeless tobacco use for urban respondents was 31 years against 27 years for rural respondents.

Table 3.1.7 presents the percentage of smokers and smokeless tobacco users by sex and the place of residence. It shows that 47% of respondents were either smoking or using smokeless tobacco whereas 12% 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 35% in urban area as compared to 51% in rural area. The use of both the forms of tobacco (smoking as well as smokeless tobacco) was 7% for urban and 13% for rural respondents. The percentage of either smoking or using smokeless tobacco among men (68%) was as high as the thrice of that among women (23%).

Tobacco is one of the major risk factors of non-

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, Madhya Pradesh, 2007- 08

Residence/ Sex	Smokeless tobacco users					
	Age of Initiation (15-34 years)		Age of Initiation (35-64 years)		Age at Stopped	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Urban						
Male	20	(19.5, 21.5)	25	(22.5,25.5)	31	(27.5, 35.7)
Female	15	(14.5, 18.5)	30	(25.5,30.5)	32	(27.4, 37.1)
Total	20	(19.5, 21.5)	25	(23.0,26.5)	31	(28.5, 34.9)
Rural						
Male	20	(19.5, 19.5)	20	(19.0,20.5)	27	(23.9, 31.5)
Female	13	(11.5, 20.5)	21	(20.5,25.5)	28	(19.1, 37.3)
Total	20	(18.5, 22.5)	20	(17.0,22.5)	27	(24.3, 31.2)
Combined						
Male	20	(18.5, 21.5)	21	(20.5,21.5)	29	(26.2, 31.8)
Female	15	(14.5, 18.5)	25	(23.5,25.5)	29	(24.0, 35.6)
Total	20	(18.5, 22.5)	21	(20.5,22.5)	29	(26.6, 31.6)

Table 3.1.7 Percentage of tobacco users by sex and place of residence, Madhya Pradesh, 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	29.2	(25.5,33.1)	11.5	(9.4,14.1)	13.7	(10.4,17.8)	54.4	(49.2,59.5)
Female	12.3	(9.2,16.1)	0.3	(0.1,0.7)	0.1	(0.0,0.3)	12.6	(9.5,16.5)
Total	21.3	(18.3,24.5)	6.2	(5.1,7.6)	7.3	(5.5,9.6)	34.8	(30.8,39.0)
Rural								
Male	30.1	(26.1,34.3)	17.7	(14.2,21.8)	26.0	(21.3,31.3)	73.7	(69.7,77.5)
Female	26.1	(21.2,31.7)	0.6	(0.3,1.2)	0.2	(0.1,0.7)	26.9	(22.1,32.4)
Total	28.2	(24.5,32.2)	9.5	(7.6,11.8)	13.6	(11.1,16.6)	51.3	(47.5,55.1)
Combined								
Male	29.8	(26.8,33.0)	15.9	(13.3,18.9)	22.4	(18.9,26.3)	68.1	(64.8,71.2)
Female	22.2	(18.5,26.3)	0.5	(0.3,1.0)	0.2	(0.1,0.5)	22.9	(19.3,27.0)
Total	26.2	(23.4,29.2)	8.6	(7.2,10.2)	11.8	(10.0,14.0)	46.6	(43.6,49.6)

communicable diseases. About 38% of male population of Madhya Pradesh smoked tobacco daily whereas smoking among females was low. Overall 39% of the population use smokeless tobacco with 54% of men and 23% of women. Forty seven percent of population in Madhya Pradesh used tobacco in any form (i.e. smoking or smokeless). The mean age of initiation of tobacco use among young age (15-34 years) people was 19 years for male smokers, and 20 years for male smokeless tobacco users. These findings emphasize the need of implementing the tobacco control programme for prevention of NCD.

3.2 ALCOHOL CONSUMPTION

Table 3.2.1 presents the percentage of respondents who consumed alcohol in past 30 days and 12 months by sex and place of residence. About 14% respondents had consumed alcohol in past 30 days and 19% consumed in past 12 months. Only 4% respondents were past drinker. A quarter (24%) men consumed alcohol in past 30 days and about one third (33%) men consumed in past 12 months as compared to very less among women (4%). Percentage of lifetime abstainer to alcohol was higher for urban (83%) as compared to that for rural respondents (75%). More rural men consumed alcohol (27% in past 30 days and 35% in past 12 months) than urban men (18% in past 30 days and 26% 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, 37% of urban, 31% of rural respondents and 33% 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, Madhya Pradesh, 2007- 08

Residence/ Sex	Alcohol Consumption							
	Consumed alcohol (Last 30 days)		Consumed alcohol (Last 12 months)		Past drinker		Life time abstainer	
	P (%)	95% CI	P (%)	95% CI	P (%)	95% CI	P (%)	95% CI
Urban								
Male	18.4	(14.5,22.9)	26.3	(22.1,31.0)	6.8	(4.6,10.0)	66.9	(63.5,73.4)
Female	0.2	(0.1,0.7)	0.5	(0.2,1.4)	0.3	(0.1,0.7)	99.2	(98.1,99.7)
Total	9.9	(7.8,12.4)	14.2	(11.9,16.8)	3.3	(2.3,4.7)	82.5	(80.1,85.6)
Rural								
Male	26.6	(20.9,33.2)	35.2	(29.0,41.9)	8.3	(5.8,11.8)	56.5	(52.8,65.8)
Female	4.5	(1.8,10.7)	5.8	(2.6,12.4)	1.2	(0.5,3.1)	93.0	(86.4,96.6)
Total	16.0	(12.1,20.8)	21.1	(16.8,26.1)	4.2	(3.0,6.1)	74.7	(70.5,80.0)
Combined								
Male	24.2	(20.0,28.9)	32.6	(28.1,37.5)	7.8	(5.9,10.3)	59.6	(57.3,66.8)
Female	3.3	(1.4,7.7)	4.3	(2.0,9.0)	0.9	(0.4,2.2)	94.8	(90.1,97.3)
Total	14.2	(11.4,17.7)	19.1	(16.0,22.7)	3.9	(3.0,5.2)	77.0	(74.1,80.9)

Table 3.2.2 Percentage of drinkers (past 12 months) according to the frequency of drinking, mean number of standard drinks per day and pattern of drinking in the last seven days by sex and place of residence, Madhya Pradesh, 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	13.1	0.0	12.9	6.8	6.1	6.7	8.3	5.9	8.0
1-4 days per week	16.3	24.8	16.4	29.6	42.0	31.2	26.5	41.5	28.1
1-3 days per month	34.1	13.9	33.8	31.2	27.3	30.7	31.9	26.9	31.3
Less than once per month	36.5	61.3	36.9	32.4	24.6	31.4	33.4	25.8	32.5

Mean number of drinks on a drinking day	2.0	1.1	2.0	2.0	1.6	1.9	2.0	1.6	2.0
Drinks during last 7 days									
Alcohol consumed on 4+days (%)	13.2	*	13.0	10.4	12.0	10.6	11.0	11.8	11.1
**Binge drinking on any day (%)	8.7	*	8.6	15.1	3.6	13.6	13.7	3.6	12.6
20+ drinks in 7 days(%)	6.0	0.0	6.0	5.0	1.7	4.6	5.2	1.7	4.9
Average standard drinks per day	1.0	0.4	1.0	1.1	0.5	1.1	1.1	0.5	1.0

* no observation **5+ drinks on any day for male; and 4+ drinks on any day for female

34% respondents of urban and 31% respondents of rural consumed alcohol 1-3 days per month in past one year. Twenty eight percent of current drinkers consumed alcohol 1-4 days every week and 8 percent current drinkers consumed alcohol 5-7 days per week in the past one-year in both rural and urban. 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 13% respondents of urban, 11% respondents of rural and 11% in combined sample respondents consumed alcohol at least 4 days a week. About one-tenth of current drinkers were in high risk drinking (binge drinking); it was about 14% in rural area against 9% 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 20 years irrespective of the place of residence. The mean age of initiation in the age group 35-64 years was around 25 years. The age of initiation among rural women (15-34) was 18 years. There was no urban woman reported to be consuming alcohol.

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 (26%), among illiterate (41%) and agriculturist (42%). Similarly, percentage of smokeless tobacco users was highest in the age group 25-34 years (27%), among illiterate (47%) and manual workers (43%). The percentage of current drinkers was high (27%) in the age group 25-34 and 35-44, among illiterate (47%) and those who report their occupation as manual worker (46%).

Interesting observations of alcohol consumption was that about 33% of men consumed alcohol at least

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

Residence/ Sex	Alcohol users			
	Age of Initiation (15-34 years)		Age of Initiation (35-64 years)	
	Mean	95% CI	Mean	95% CI
Urban				
Male	20	(19.5, 21.5)	25	(24.0,25.5)
Female	*	*	30	(15.5,37.5)
Total	20	(19.5, 21.5)	25	(24.0,26.5)
Rural				
Male	20	(18.5, 22.5)	21	(20.5,25.5)
Female	18	(16.5, 22.5)	25	(20.5,30.5)
Total	20	(17.5, 23.5)	22	(21.5,25.5)
Combined				
Male	20	(17.0, 21.5)	25	(22.5,25.5)
Female	18	(16.5, 22.5)	26	(21.5,30.5)
Total	20	(17.0, 22.5)	25	(23.5,25.5)

* no observation

Table 3.2.4 Percentage of current daily smokers, daily smokeless tobacco users and current drinkers across age, education and occupation, Madhya Pradesh, 2007- 08

Characteristic	Smoker	Smokeless tobacco user	Current drinkers
Age group			
15-24	17.9	24.5	16.8
25-34	25.3	27.1	26.6
35-44	26.4	22.4	26.6
45-54	18.9	14.6	19.2
55-64	11.5	11.4	10.8
Total	100.0	100.0	100.0
Education			
Illiterate	40.5	46.9	46.8
Primary	20.5	14.3	16.6
Middle	20.7	19.6	18.5
Secondary	9.7	9.2	8.1
Higher Secondary	4.4	5.3	5.2
College & above	4.2	4.7	4.8
Total	100.0	100.0	100.0
Occupation			
Executive/Business	9.8	9.4	14.0
Agriculture	41.8	28.7	32.6
Domestic Work	0.3	7.4	0.7
Services/Sales	2.8	2.9	3.7
Manual Worker	40.6	42.9	45.9
Other	4.7	8.7	3.1
Total	100.0	100.0	100.0
Number	1175	2087	750

once in last one year whereas 24% of men in last one month. The alcohol consumption among females was low. Those who consumed alcohol in last seven days, 13% of them were binge drinkers. The mean age of initiation of alcohol consumption by young age (15-34 years) men was 20 years.

3.3 FRUITS AND VEGETABLES CONSUMPTION

Survey asked questions about the number of days in a typical week on which fruits and vegetables were consumed by the respondents and the number of servings of fruits and vegetables consumed on one of those days. Table 3.3.1 presente mean number of days of such consumptions by sex and place of residence.

In Madhya Pradesh, mean number of days people consumed vegetables was 5 days and fruits 2 days a week. The mean number of days when fruits consumed was higher for urban (2.4 days) as compared to that of rural (1.3 days).

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, Madhya Pradesh, 2007- 08

Fruits and vegetables consumption per week	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Mean number of days fruits consumed	2.4	2.4	2.4	1.3	1.3	1.3	1.6	1.6	1.6
Mean number of days vegetables consumed	5.3	5.2	5.3	4.4	4.2	4.3	4.7	4.5	4.6
Less than five servings of fruits & vegetables consumed per day	69.3	71.8	70.5	86.9	89.3	88.0	81.8	84.3	83.0

More than three-quarter of respondents report that they had less than five servings of fruits and vegetables per day on those days when they consumed it. It was 70% in urban and 88% in rural areas. From Table 3.3.2, it can be seen that the mean number of servings of fruits and vegetables each in one particular day was about 1 and 2 respectively. The mean number of servings fruits and vegetables was 3 for urban and 2 for rural respondents.

Nutritional inadequacy is the major risk factor of many non-communicable diseases. Overall, 83% of population in Madhya Pradesh 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 5 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 sex and place of residence is provided in Table 3.3.3. The specific food items include cheese/butter, fried local foods, red meat, eggs, chicken, aerated soda, sweetened drinks, pizza/burger/French fries, cakes/ pastries or other bakery items, chips/*namkeen* etc. Over 17% population consumed eggs, 10% consumed fish, 6% consumed cakes/pastries or other bakery items, 13% consumed red meat and 20% fried local foods and 15% consumed chicken at least once a week. Cheese/butter was consumed daily only by 9% population. Fried local food, cakes/pastries or other bakery items, chips, *namkeen* etc. each, were consumed daily by around 3% of the population.

Table 3.3.4 presents the type of edible oil used for cooking by the sample households in the rural

Table 3.3.2 Mean number of servings of fruits, vegetables consumed in on a typical day by sex and place of residence, Madhya Pradesh, 2007- 08

Number of servings of fruits/vegetables/both per day	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Servings of fruit	0.8	0.7	0.7	0.5	0.4	0.4	0.6	0.5	0.5
Servings of vegetable	2.0	1.8	1.9	1.4	1.3	1.4	1.6	1.5	1.5
Daily no. of serving of fruits and vegetable	2.8	2.6	2.7	2.0	1.8	1.9	2.3	2.1	2.2

Table 3.3.3 Percentage of respondents according to the intake of specific food items by sex and place of residence, Madhya Pradesh, 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	10.4	14.0	8.5	9.0	9.1	10.5
Fried local foods	6.5	30.7	1.3	16.1	2.8	20.3
Red Meat	0.9	18.3	0.1	10.7	0.4	12.9
Eggs	1.5	21.8	0.3	15.3	0.6	17.1
Chicken	0.3	17.4	0.1	13.6	0.2	14.7
Fish	0.3	12.7	0.2	8.8	0.2	9.9
Aerated Soda	0.2	8.3	0.1	9.9	0.1	9.4
Sweetened drinks	0.6	1.8	0.1	0.2	0.2	0.7
Pizza/ burgers/ French fries etc.	0.2	2.4	0.2	1.1	0.1	0.9
Cakes, Pastries or other bakery items	6.6	12.8	0.7	3.1	2.4	5.9
Chips, Namkeen etc.	6.2	29.3	2.0	16.4	3.2	20.1

Table 3.3.4 Percentage of households according to type of oil consumption, Madhya Pradesh, 2007- 08

Type of oil	Residence		Combined
	Urban	Rural	
Mustard oil	24.7	40.2	36.0
Coconut oil	0.0	0.1	0.1
Groundnut oil	7.3	2.5	3.8
Sunflower oil	1.5	0.0	0.4
Soyabean oil	65.7	56.9	59.3
Others	0.7	0.2	0.4
Total	100.0	100.0	100.0

and urban area. It shows that the use of soybean oil for cooking was highest (60% households with 66% of urban and 58% of rural) followed by mustard oil (36% households with 25% of urban and 40% of rural), groundnut oil (4% households with 7% of urban and 3% of rural). Sunflower oil was being used by less than 1% of the households population.

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 Madhya Pradesh, used to do some physical activity for duration of 2106 MET minutes per day, 1310 MET minutes per day for urban and 2427 MET minutes per day for rural. Men, on an average, spent 2339 MET minutes a day while women spent 1851 MET minutes a day on physical activity. The mean time spent in work related physical activity was 293 minutes per day and it was 204 minutes per day for urban and 329 minutes per day for rural. The time spent in work related physical activity was more among women (296 minutes per day) than men (291 minutes per day).

The mean time spent in travel related activity (cycling/walking) was found to be 52 and 73 minutes per day for urban and rural respondents respectively. It was more among men (80 minutes per day) as compared to women (53 minutes per day). The survey also report that the mean time spent in recreational activities was 12 minutes per day, with 11 minutes per day for urban and 13 minutes per day for rural respondents. Men spent more time (21 minutes per day) than women (3 minutes per day) in recreational activities.

According to the 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

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

Physical Activity	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Total Physical Activity (MET)									
Mean	1463.5	1136.4	1310.3	2698.5	2131.9	2427.0	2388.7	1850.6	2106.3
95% CI Lower	1268.9	1026.9	1171.6	2528.4	1944.8	2273.0	2202.4	1713.4	1988.0
Upper	1658.2	1245.9	1449.0	2868.6	2319.1	2581.1	2474.9	1987.8	2224.5
Work Related Activity									
Mean	191.1	218.9	204.1	331.7	325.7	328.9	290.8	295.5	293.0
95% CI Lower	156.9	199.4	180.3	306.9	303.4	308.1	270.2	278.5	279.4
Upper	225.4	238.4	228.0	356.6	348.1	349.6	311.3	312.5	309.7
Travel Related Activity									
Mean	65.0	37.0	51.9	85.9	59.9	73.4	79.8	53.4	67.2
95% CI Lower	56.7	31.0	45.3	75.3	52.1	64.9	72.0	47.7	60.9
Upper	73.4	43.0	58.4	96.5	67.6	81.9	87.6	59.1	73.5
Recreational Activity									
Mean	19.1	2.1	11.1	21.4	3.2	12.7	20.7	2.9	12.2
95% CI Lower	15.8	1.0	9.2	14.6	0.8	8.1	15.9	1.2	8.9
Upper	22.3	3.1	13.0	28.2	5.6	17.3	25.6	4.6	15.6
Number	1398	1582	2980	1459	1414	2873	2857	2996	5853

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

Physical Activity	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Low	59.8	77.9	68.3	22.7	41.7	31.8	33.5	52.0	42.3
95% CI									
Lower	52.3	72.6	62.6	18.5	35.6	27.1	29.7	47.2	38.6
Upper	67.0	82.5	73.5	27.6	48.2	36.9	37.6	56.6	46.2
Medium	21.9	16.9	19.5	18.8	22.5	20.5	19.7	20.9	20.3
95% CI									
Lower	17.3	12.8	15.9	15.8	18.2	17.8	17.9	17.6	18.0
Upper	27.2	22.0	23.8	22.2	27.3	23.6	22.5	24.6	22.7
High	18.3	5.2	12.1	58.5	35.8	47.6	46.8	27.1	37.4
95% CI									
Lower	14.1	3.1	9.2	52.4	29.1	42.0	42.3	22.4	33.4
Upper	23.3	8.5	15.8	64.3	43.1	53.3	51.3	32.5	41.7

duration for which they perform physical activities of varying intensity. The percentage of respondents according to three categories of physical activity by sex and residence is presented in Table 3.4.2.

Majority of the respondents (42% of the overall respondents, 78% of urban respondents and 32% of rural respondents) recorded low physical activity, 20% respondents (20% of urban and 21% of rural respondents) recorded medium physical activity and 37% respondents (12% of urban and 48% of rural respondents) recorded a high level 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. About 28% of old age (55-64) respondents was recorded in high physical activity where as it was 44% in age groups 25-34 and 35-44 years. The total time spent daily in sedentary activities is also recorded and provided in Table 3.4.4. Majority of the respondents (32%) spent 2-3 hours in sedentary activities followed by 30% of the respondents spent 1-2 hours.

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

Age group	Gender								
	Men			Women			Both Sex		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
15-24	43.7 (38.0,49.6)	20.1 (16.3,24.7)	36.1 (30.1,42.6)	61.8 (55.1,68.0)	19.3 (14.8,24.9)	18.9 (13.2,26.1)	52.0 (47.3,56.8)	19.8 (16.5,23.5)	28.2 (23.4,33.5)
25-34	25.4 (21.3,30.1)	17.8 (14.8,21.4)	56.7 (51.4,61.9)	47.6 (41.7,53.5)	22.3 (18.3,26.9)	30.2 (24.3,36.8)	36.4 (32.1,40.9)	20.0 (17.3,23.1)	43.6 (38.7,48.6)
35-44	25.8 (21.4,30.7)	21.3 (17.6,25.5)	52.9 (47.1,58.6)	42.2 (35.7,48.9)	22.3 (17.8,27.5)	35.5 (28.7,43.0)	33.5 (29.1,38.1)	21.8 (18.8,25.0)	44.8 (39.7,49.9)
45-5	30.1 (24.3,36.7)	18.6 (13.4,25.1)	51.3 (43.4,59.1)	45.6 (38.6,52.8)	21.5 (16.1,28.2)	32.9 (26.2,40.4)	37.3 (31.9,43.0)	19.9 (16.0,24.6)	42.8 (36.8,48.9)
55-64	42.7 (36.2,49.5)	21.1 (16.7,26.2)	36.2 (30.3,42.7)	61.3 (55.6,66.7)	18.3 (14.5,22.8)	20.4 (,15.5)26.4	52.3 (47.0,57.5)	19.6 (16.4,23.6)	28.1 (23.6,33.1)

Note: WHO Steps guidel(36.2,49.5)ines used to calculate the cut off value of low, medium and high for total physical activity.

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

Time spent sitting/ reclining	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Less than 1 hours	8.8	5.1	7.1	8.6	7.9	8.3	8.7	7.1	7.9
1-2 hours	27.6	19.6	23.9	32.8	30.9	31.9	31.3	27.7	29.6
2-3 hours	29.0	29.7	29.3	33.7	32.7	33.2	32.3	31.9	32.1
3-4 hours	11.1	15.5	13.2	8.5	10.2	9.3	9.2	11.7	10.4
More than 4 hours	23.5	30.0	26.6	16.4	18.3	17.3	18.5	21.6	20.0

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 use among urban and rural residents of Madhya Pradesh. The prevalence and pattern of smoking among urban male respondents was increasing with age from 14% in 15-24 to 41% in 35-44 and than declining to 35% among older age group (45-64). But, it was decreasing with increasing level of education (54% among illiterate to 16% 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 manual worker (40%) and agriculture (39%) 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 (20% in 15-24 to 35% 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 (61% among illiterate to 28% among college and above education. In the occupational categories, prevalence of smokeless tobacco users was high among the occupation of manual work (55%) and agriculture (39%). Among urban male respondents, smokeless tobacco users were higher (44%) than smokers (29%), 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 (46%) compare with urban males (29%). 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 (28% in 15-24 to 65% in 45-54). Prevalence of smoking among occupational categories of agriculture (54%) and manual worker (51%) 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 (32% in 25-34, 33% in 35-44, 35% in 45-54 and 24% in 55-64 age groups). It was comparatively low among younger age (16% 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 (43%), Primary (37%) and Middle (33%). The pattern of prevalence was declining with increasing level of education (18% among collage and above). Prevalence of drinking alcohol in occupational categories of male urban respondents was high among manual worker (38%) and agriculture (30%). Prevalence of drinking alcohol 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 (39% in 25-34, 43% in 35-44,

Table 3.5.1 Percentage of respondents in the category of some high risk factors of NCD (current daily smokers, daily smokeless tobacco user, current drinkers, low fruits and vegetables intake and low physical activity) across age, education, occupation and sex, urban, Madhya Pradesh, 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	14.2	0.0	7.8	33.6	3.9	20.1	15.5	0.0	8.5	57.4	71.1	69.1	67.1	84.7	75.1
25-34	32.2	0.0	16.4	54.6	10.3	32.9	31.6	0.5	16.4	70.7	73.3	72.0	54.7	73.4	63.9
35-44	40.7	0.6	22.0	47.1	18.1	33.6	33.1	0.6	18.0	70.5	70.7	70.6	49.2	70.2	58.9
45-54	35.1	1.3	19.9	43.7	20.8	33.4	34.8	1.0	19.6	68.0	68.9	68.4	61.1	76.1	67.8
55-64	35.2	1.0	18.1	43.9	26.4	35.1	23.6	1.4	12.5	72.5	76.3	74.4	72.3	88.4	80.4
Total	28.5	0.4	15.3	43.7	12.4	29.0	26.3	0.5	14.2	69.3	71.8	70.5	59.8	77.9	68.3
Education															
Illiterate	53.5	0.9	16.2	61.4	23.6	34.6	42.5	1.1	13.2	81.9	74.8	76.9	25.9	61.4	51.0
Primary	46.6	0.3	25.1	58.6	19.1	40.2	37.0	0.3	19.9	74.1	80.7	77.1	41.6	74.6	57.0
Middle	36.9	0.0	20.0	57.2	11.9	36.5	33.8	0.3	18.5	76.5	76.7	76.6	42.9	79.4	59.6
Secondary	23.5	0.3	13.8	43.9	3.2	26.8	20.9	0.0	12.1	69.4	73.8	71.3	64.3	87.7	74.1
Higher Secondary	17.2	0.0	11.1	33.7	3.7	23.0	20.4	0.0	13.1	62.2	58.4	60.9	78.2	87.3	81.5
College & above	15.6	0.0	10.0	27.9	1.8	18.5	17.6	0.3	11.3	61.7	62.2	61.9	78.4	94.1	84.1
Total	28.5	0.4	15.3	43.7	12.4	29.0	26.3	0.5	14.2	69.3	71.8	70.5	59.8	77.9	68.3
Occupation															
Executive/Business	26.8	0.0	24.4	43.4	5.6	40.0	24.6	0.0	22.1	61.6	46.5	60.3	77.9	97.6	79.6
Agriculture	39.2	1.3	26.8	51.2	15.2	39.4	30.0	0.4	20.3	67.5	67.1	67.3	27.6	25.9	27.1
Domestic Work	**	0.4	0.4	**	10.9	11.0	**	0.4	0.3	**	68.1	67.9	**	83.5	83.7
Services/Sales	25.5	0.0	20.5	34.2	7.5	29.0	27.6	2.8	22.8	66.0	67.2	66.3	71.2	74.9	72.0
Manual Worker	39.7	0.3	29.7	63.8	27.1	54.5	38.4	1.3	29.0	80.7	94.4	84.2	34.5	47.1	37.7
Other	12.6	0.0	7.3	21.9	9.0	16.4	10.9	0.0	6.3	65.2	74.4	69.1	86.5	97.5	91.1
Total	28.5	0.4	15.3	43.7	12.4	29.0	26.3	0.5	14.2	69.3	71.8	70.5	59.8	77.9	68.3
Number (n)	1398	1582	2980	1398	1582	2980	1398	1582	2980	1398	1582	2980	1398	1582	2980

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

49% in 45-54 and 39% in 55-64). By education, the pattern prevalence was decreasing with increasing level of education (47% among illiterate to 16% among college and above) in rural male population. However, prevalence in the occupation categories of executive and business (44%), and manual work (29%) was 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 (71%) among urban population with marginal differences between age groups (69% in 15-24 to 74% in 55-64). Inadequate consumption of fruits and vegetables was also high in all the education level (77% among illiterate to 62% among college and above). Prevalence of low consumption was high (84%) among manual worker whereas it was varying from 60% to 68% 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 (88% in 15-24 to 92% in 55-64). Prevalence by education was varying between 79%in higher secondary to 92% in secondary with marginal differences. The low (inadequate) consumption of fruits and vegetables was high among the occupational categories of manual work (96%). It was comparatively low (79%) among agriculture 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 recoded in rural and urban population of Madhya Pradesh (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 (68%) and it was varying with age groups (75% in 15-24, 64% in 25-34, 59% in 35-44, 68% in 45-54 and 80% in 55-64). Prevalence of low physical activity was high among old and young age respondents. Low physical activity by sex was recorded high (78%) among female respondents compare with males (60%), 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 (51% of illiterate to 84% of higher level). Accordingly, low physical activity was recorded high among the domestic work (84%), executive and business (80%), and service (72%) categories of occupation. Those working in agriculture and doing manual work were doing more physical work activity (Table 3.5.1).

Urban-rural comparison of low physical activity demonstrated that rural people (32%) were doing more physical work than urban (68%) 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 (58% in college) compare with lower level (27% 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 (77%) 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 four out of ten individual adult population was categorized into low level of physical activity. This invites special attention to health planner.

Table 3.5.2 Percentage of respondents in the category of some high risk factors of NCD (current daily smokers, daily smokeless tobacco user, current drinkers, low fruits and vegetables intake and low physical activity) across age, education, occupation and sex, rural, Madhya Pradesh, 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	27.7	0.4	15.1	51.4	14.3	34.2	20.9	3.5	12.9	84.2	91.3	87.5	33.6	52.2	42.2
25-34	46.0	1.1	23.7	60.7	25.6	43.3	38.6	3.9	21.3	88.7	87.6	88.1	13.8	37.6	25.6
35-44	58.4	1.4	31.7	59.8	33.9	47.7	42.8	8.8	26.8	87.8	86.4	87.2	15.9	30.5	22.7
45-54	64.9	2.6	35.6	61.9	34.8	49.1	49.3	8.0	29.9	86.6	88.3	87.4	17.2	33.9	25.1
55-64	61.3	1.4	30.3	64.6	41.9	52.8	39.0	9.5	23.7	89.7	94.5	92.2	32.9	52.8	43.2
Total	46.4	1.1	24.7	58.0	26.6	43.0	35.2	5.8	21.1	86.9	89.3	88.0	22.7	41.7	31.8
Education															
Illiterate	58.2	1.2	21.3	66.7	30.8	43.5	47.3	7.7	21.7	88.2	88.7	88.5	12.4	34.2	26.5
Primary	62.9	2.7	40.8	58.7	30.3	48.5	45.0	0.8	28.7	84.9	88.4	86.1	18.2	44.7	27.9
Middle	38.3	0.0	26.6	57.9	11.4	43.7	26.9	1.7	19.2	86.1	92.3	88.6	27.2	64.3	38.9
Secondary	29.0	0.0	21.9	44.0	6.3	34.8	20.1	0.0	15.2	91.4	93.9	92.0	33.6	68.5	42.1
Higher Secondary	24.0	0.0	19.3	50.0	11.3	41.3	19.8	4.4	16.4	78.0	81.5	78.8	33.4	73.6	42.4
College & above	22.0	**	19.0	38.8	**	33.6	16.3	**	14.1	80.9	**	83.5	51.5	**	58.1
Total	46.4	1.1	24.7	58.0	26.6	43.0	35.2	5.8	21.1	86.9	89.3	88.0	22.7	41.7	31.8
Occupation															
Executive/Business	47.9	**	33.5	65.9	55.5	62.8	54.2	18.6	43.6	95.4	**	96.8	26.5	**	20.0
Agriculture	53.6	1.9	36.4	54.6	23.2	44.1	32.2	9.5	24.7	78.0	76.4	77.5	12.5	18.7	14.6
Domestic Work	**	0.7	0.8	**	18.8	18.9	**	1.0	1.0	**	88.8	88.6	**	72.3	72.1
Services/Sales	16.7	0.0	11.3	34.2	20.0	29.7	18.7	0.0	12.7	72.4	93.2	79.0	46.6	66.5	53.0
Manual Worker	50.7	0.9	29.8	69.5	36.8	55.7	43.9	8.6	29.1	95.7	95.4	95.6	13.8	11.3	12.8
Other	12.6	1.8	7.1	33.2	20.7	26.9	9.2	1.3	5.2	86.8	95.4	91.2	80.1	86.1	83.1
Total	46.4	1.1	24.7	58.0	26.6	43.0	35.2	5.8	21.1	86.9	89.3	88.0	22.7	41.7	31.8
Number (n)	1459	1414	2873	1459	1414	2873	1459	1414	2873	1459	1414	2873	1459	1414	2873

** 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, Kerala, 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	23.6	0.3	12.9	46.0	11.2	30.0	19.3	2.5	11.5	79.1	85.3	82.0	43.7	61.8	52.0
25-34	42.1	0.8	21.7	59.0	21.3	40.3	36.6	2.9	19.9	83.6	83.6	83.6	25.4	47.6	36.4
35-44	53.1	1.1	28.8	56.1	29.3	43.5	39.9	6.3	24.2	82.7	81.8	82.2	25.8	42.2	33.5
45-54	56.2	2.3	31.1	56.5	30.9	44.6	45.0	6.1	26.9	81.1	83.0	82.0	30.1	45.6	37.3
55-64	54.6	1.3	27.3	59.4	38.2	48.5	35.1	7.6	21.0	85.4	90.2	87.9	42.7	61.3	52.3
Total	41.2	0.9	22.0	53.8	22.6	39.0	32.6	4.3	19.1	81.8	84.3	83.0	33.5	52.0	42.3
Education															
Illiterate	57.7	1.2	20.6	66.1	29.7	42.3	46.8	6.7	20.5	87.4	86.7	86.9	14.0	38.2	29.9
Primary	59.5	2.0	37.0	58.7	27.1	46.3	43.3	0.7	26.6	82.6	86.2	84.0	23.1	53.1	34.8
Middle	38.0	0.0	24.8	57.8	11.6	41.7	28.5	1.2	19.0	84.5	86.6	85.2	30.8	69.8	44.4
Secondary	27.2	0.2	18.7	43.9	4.6	31.6	20.4	0.0	14.0	84.1	83.3	83.8	43.8	78.6	54.7
Higher Secondary	21.2	0.0	15.0	42.1	6.4	31.6	20.1	1.6	14.7	70.4	66.7	69.3	55.2	82.4	63.2
College & above	17.1	0.0	11.6	30.5	1.6	21.3	17.3	0.3	11.9	66.2	65.2	65.9	72.1	94.6	79.3
Total	41.2	0.9	22.0	53.8	22.6	39.0	32.6	4.3	19.1	81.8	84.3	83.0	33.5	52.0	42.3
Occupation															
Executive/Business	37.2	0.0	29.5	54.5	45.9	52.7	39.0	15.1	34.1	78.2	89.8	80.6	52.6	22.5	46.4
Agriculture	51.9	1.9	35.3	54.2	22.3	43.6	32.0	8.5	24.2	76.8	75.3	76.3	14.3	19.6	16.0
Domestic Work	**	0.6	0.6	**	15.5	15.6	**	0.7	0.7	**	80.2	80.0	**	77.0	76.9
Services/Sales	23.4	0.0	18.1	34.2	12.2	29.2	25.5	1.8	20.1	67.5	77.0	69.7	65.4	71.8	66.9
Manual Worker	48.1	0.8	29.7	68.1	35.5	55.5	42.6	7.7	29.0	92.1	95.3	93.4	18.8	16.0	17.7
Other	12.6	1.1	7.2	28.0	16.3	22.5	10.0	0.8	5.7	76.9	87.6	81.9	83.0	90.3	86.5
Total	41.2	0.9	22.0	53.8	22.6	39.0	32.6	4.3	19.1	81.8	84.3	83.0	33.5	52.0	42.3
Number (n)	2857	2996	5853	2857	2996	5853	2857	2996	5853	2857	2996	5853	2857	2996	5853

** 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 2% respondents (2% among men, 3% among women) were found to have been diagnosed for hypertension by the health professional. In the urban area, the prevalence of hypertension was 6% with 4% among men and 7% among women.

Of those who were diagnosed for hypertension (1% among both male and female), majority of them (60%) were taking the prescribed medicine. About 62% of the urban respondents and 55% of the rural respondents were taking prescribed medicine after they were diagnosed with hypertension and there was no sex differential. More than 60% of those who were diagnosed with hypertension were advised dietary modification including low salt intake; 37% were advised to lose weight and 52% were advised to increase physical activity. Twenty two percent, who were smokers, were advised to quit smoking. The percentage of those who received dietary advice including low salt intake was slightly higher for men (71%) than for women (65%); more for rural (69%) than urban (66%) respondents.

Only 1% (both in men & women) of the respondents, who were diagnosed for hypertension had consulted AYUSH with 3% for urban and less than 1% for rural. Among those respondents who had consulted AYUSH, about one quarter were taking the treatment from the

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, Madhya Pradesh, 2007- 08.

Hypertension	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Hypertension diagnosed by health professional (all respondents)	3.9	7.3	5.5	0.8	1.6	1.2	1.7	3.2	2.4
Diagnosed hypertensive									
Currently taking drugs	62.3	61.4	61.7	55.8	54.0	54.6	60.1	58.8	59.3
Advised dietary modifications	71.5	63.3	66.4	68.3	68.8	68.7	70.5	65.3	67.2
Advised to lose weight	45.5	42.1	43.4	31.4	21.1	24.7	40.8	34.6	36.9
Advised to quit smoking	42.2	8.0	20.8	51.8	9.4	24.3	45.4	8.5	22.0
Advised to increase physical activity	64.0	52.7	56.9	59.9	31.1	41.2	62.6	45.0	51.5
Consulted AYUSH practitioner	2.4	3.5	2.9	0.3	0.3	0.3	0.9	1.2	1.1
Taking treatment from AYUSH practitioner	23.9	20.3	21.9	25.2	35.9	30.2	24.2	23.0	23.5

AYUSH practitioner, which was 30% in case of rural and 22% in case of urban.

Table 4.1.2 presents the mean systolic and diastolic blood pressure by sex and place of residence. In the survey population the mean systolic blood pressure was 126 mm Hg, mean diastolic blood pressure was 78 mm Hg. These averages were same for rural and urban, both among males and females.

According to WHO STEPS guideline, 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 was done after recording the resting blood pressure for each study subject. The upper and the lower limit of the systolic and diastolic blood pressure for each category has been given in Table 4.1.3.

Table 4.1.4 gives the percentage of respondents

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

Blood Pressure	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Systolic blood pressure	130.1	123.7	127.1	127.1	124.3	125.8	127.9	124.1	126.1
95% CI									
Lower	129.1	122.5	126.2	125.8	123.1	124.7	127.0	123.2	125.4
Upper	131.0	124.9	128.0	128.3	125.6	126.8	128.9	125.1	126.9
Diastolic blood pressure	80.7	77.7	79.3	77.9	77.4	77.7	78.7	77.5	78.1
95% CI									
Lower	79.9	76.8	78.6	77.0	76.3	76.8	78.0	76.7	77.5
Upper	81.5	78.7	80.1	78.8	78.6	78.6	79.3	78.4	78.8

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 gender and place of residence (P & 95% CI), Madhya Pradesh, 2007- 08

Category of hypertension	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Normal	21.3	40.5	30.2	28.1	39.6	33.6	26.2	39.8	32.6
95% CI									
Lower	18.6	36.7	27.5	24.9	35.5	30.9	23.7	36.7	30.6
Upper	24.3	44.4	33.0	31.6	43.9	36.4	28.8	43.1	34.8
Pre - hypertension	50.0	41.5	46.0	50.1	42.2	46.3	50.0	42.0	46.2
95% CI									
Lower	47.0	38.2	43.7	46.2	39.2	43.7	47.2	39.7	44.3
Upper	53.0	44.8	48.4	53.9	45.3	48.9	52.9	44.4	48.2
Stage-I hypertension	21.6	14.0	18.1	16.9	13.5	15.3	18.3	13.7	16.1
95% CI									
Lower	19.3	11.6	16.1	14.4	11.4	13.3	16.3	12.0	14.5
Upper	24.2	16.9	20.2	19.9	15.9	17.5	20.5	15.5	17.8
Stage-II hypertension	7.1	4.0	5.7	4.8	4.7	4.8	5.5	4.5	5.0
95% CI									
Lower	5.8	3.0	4.8	3.5	3.5	3.7	4.4	3.6	4.2
Upper	8.7	5.3	6.7	6.7	6.1	6.1	6.8	5.6	6.0

according to categories of hypertension by sex and place and residence. Over all, 33% respondents were normal, 46% were in the category of pre-hypertension, 16% in stage I hypertension and only 5% were in stage-II hypertension. Among males, 26% were normal, 50% were in the category of pre-hypertension, 18% were in stage I hypertension and only 6% were in stage-II hypertension against females having 40% normal, 42% pre-hypertension, 14% stage I hypertension and 5% stage-II hypertension. The composition appears to be similar 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 24% and pattern of prevalence was recorded as increasing with age (14% in 15-24, 19% in 25-34, 27% in 35-44, 42% in 45-54 and 53% in 55-64). The prevalence among male respondents was high (29%) compare with females (18%), but the increasing pattern with age was observed in both sexes (Table 4.2). Prevalence of hypertension by education was 24% among illiterate and 28% among higher level. However, the prevalence was high among occupational categories of service (33%), executive (30%) and agriculture (25%). Low prevalence of hypertension was recorded among the domestic workers (20%). Overall, prevalence among rural population was 20% and the pattern was increasing with age (11% in 15-24 to 43% in 55-64). Similarly, high prevalence was observed among illiterate (23%) and college (26%), whereas it was low (14%) among secondary level. Among the occupational categories, the prevalence

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

Characteristic	Stage I & II hypertensive								
	Urban			Rural			Combined		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Age group									
15-24	18.8	7.8	13.8	14.7	7.2	11.2	15.9	7.4	12.0
25-34	26.3	10.9	18.8	21.6	13.6	17.6	22.9	12.9	18.0
35-44	29.7	24.3	27.2	22.6	21.8	22.2	24.6	22.5	23.7
45-54	46.8	35.4	41.9	27.5	26.2	26.9	33.0	28.5	30.9
55-64	54.0	51.6	52.8	38.7	46.8	42.9	42.2	47.8	45.0
Total	28.7	18.0	23.8	21.8	18.2	20.1	23.8	18.1	21.1
Education									
Illiterate	30.7	21.0	23.9	25.4	21.5	22.9	26.0	21.4	23.0
Primary	26.4	19.0	23.0	17.9	18.5	18.1	19.6	18.6	19.3
Middle	23.7	16.7	20.6	19.6	7.0	15.8	20.6	10.5	17.1
Secondary	26.2	14.3	21.3	17.3	3.4	13.9	20.2	9.1	16.8
Higher Secondary	28.8	14.5	23.9	24.9	9.6	21.6	26.8	12.8	22.8
College & above	33.6	18.3	28.1	30.2	0.0	26.0	32.8	16.8	27.7
Total	28.7	18.0	23.8	21.8	18.2	20.1	23.8	18.1	21.1
Occupation									
Executive/Business	32.0	**	30.3	32.2	15.7	27.2	32.1	14.9	28.5
Agriculture	30.9	13.9	25.4	20.4	19.9	20.2	21.6	19.3	20.8
Domestic Work	**	20.3	20.2	**	15.9	15.8	11.1	17.7	17.6
Services/Sales	36.8	17.2	33.1	38.7	9.4	30.3	37.2	14.4	32.4
Manual Worker	26.9	17.4	24.5	21.9	18.9	20.7	23.1	18.7	21.4
Other	22.6	14.5	19.3	17.4	20.0	18.7	19.8	18.0	19.0
Total	28.7	18.0	23.8	21.8	18.2	20.1	23.8	18.1	21.1
Number (n)	1343	1468	2811	1449	1398	2847	2792	2866	5658

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

was high among service (30%), executive and business class (27%). But, it was low among occupation of domestic work (16%). Overall, prevalence of hypertension was 21% in Madhya Pradesh and pattern of prevalence was increasing with age (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 16% were found in stage-I hypertension with the remaining 5% in stage-II. On the contrary, only 2% 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 less than 1% of respondents (2% of urban and 0.2% of rural) had reported having raised blood sugar level in past 12 months. This percentage was same for males and females. Amongst those who were diagnosed with diabetes, 17% of the respondents (19% for urban and 10% for rural) were currently taking insulin; three-quarter (80% of urban and 66% of rural respondents) were taking oral hypoglycemic drugs. A good proportion of respondents reported to have received advice from the treating physicians on their life style modification, 91% for dietary advice, 48% to reduce weight and 70 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, Madhya Pradesh, 2007- 08

Blood sugar	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Raised blood sugar diagnosed (All respondents)	1.7	1.7	1.7	0.1	0.2	0.2	0.6	0.6	0.6
Diagnosed diabetics									
Currently taking insulin	13.1	26.3	19.2	22.9	0.0	9.6	14.7	20.0	17.3
Currently taking oral drugs	81.6	77.5	79.7	100.0	41.0	65.7	84.6	68.9	76.9
Advised dietary modifications	92.8	85.1	89.2	0.0	0.0	0.0	94.0	88.6	91.4
Advised to lose weight	49.2	47.5	48.4	0.0	83.1	48.3	41.2	55.9	48.4
Advised to increase physical activity	71.3	67.1	69.3	78.4	65.3	70.8	72.5	66.7	69.6
Consulted AYUSH practitioner	18.1	18.1	18.1	55.5	*	53.3	24.3	13.8	19.1
Taking treatment from AYUSH practitioner	60.0	63.0	61.0	100.0	*	100.0	75.0	63.0	70.7

*no observation

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 BODY MASS INDEX (BMI)

BMI (Body mass Index) 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 (WC)

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

Table 5.2 presents the mean BMI, height, weight and waist circumference by sex and the place of residence. The mean BMI in Madhya Pradesh was 20 kg/m^2 (22 for urban, 19.4 for rural respondents, 19.9 for males and 20.3 for females). The mean height in the survey population was 158 cm (159 cm for urban, 158 cm for rural, 164 cm among males and 152 cm for females). The mean weight was 50 kg with 55 kg for urban, 48 kg for rural. The mean weight was 53.3 kg

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, Madhya Pradesh, 2007- 08

Physical Measurement	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
BMI (kg/m^2)	21.7	22.4	22.0	19.2	19.4	19.4	19.9	20.3	20.1
95% CI									
Lower	20.8	21.2	21.2	18.8	19.2	19.1	19.6	19.9	19.8
Upper	22.6	23.7	22.8	19.6	19.8	19.6	20.3	20.7	20.4
Height	165.4	151.9	159.1	163.5	151.4	157.7	164.0	151.5	158.1
95% CI									
Lower	164.7	151.3	158.5	162.8	150.9	157.0	163.5	151.2	157.6
Upper	166.0	152.5	159.7	164.2	151.9	158.3	164.5	151.9	158.6
Weight	58.8	50.6	55.0	51.1	44.7	48.0	53.3	46.4	50.0
95% CI									
Lower	56.7	49.3	53.4	50.4	44.1	47.4	52.6	45.8	49.4
Upper	60.9	51.9	56.6	51.7	45.2	48.6	54.1	46.9	50.6
Waist circum.	78.3	71.0	74.9	72.4	65.4	69.1	74.1	67.0	70.7
95% CI									
Lower	76.9	69.2	73.4	71.6	64.1	68.2	73.4	65.9	70.0
Upper	79.7	72.7	76.3	73.3	66.7	69.9	74.9	68.0	71.4

for males and 46.4 kg for females. The average waist circumference was 71 centimeters with 75 centimeter for urban and 69 centimeters for rural. The waist circumference for male and female was 74 centimeters and 67 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 39% respondents were under-weight, which was 27% of urban and 44% of rural respondents. By sex,

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

Category of BMI	Residence						Combined		
	Urban			Rural					
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Under weight(<18.5)	28.8	25.2	27.2	43.8	43.2	43.5	39.4	38.1	38.8
95% CI									
Lower	25.1	21.7	24.0	39.5	39.9	40.4	36.2	35.5	36.4
Upper	32.9	29.0	30.6	48.1	46.6	46.7	42.7	40.7	41.2
Normal weight (18.5-24.9)	53.4	52.5	53.0	53.8	52.0	53.0	53.6	52.2	53.0
95% CI									
Lower	49.8	49.8	50.6	49.7	48.9	49.9	50.6	49.8	50.7
Upper	56.8	55.2	55.3	57.8	55.2	56.0	56.7	54.5	55.2
Grade-1 over weight (25.0-29.9)	14.3	16.3	15.2	2.4	3.8	3.0	5.9	7.4	6.6
95% CI									
Lower	11.3	13.9	12.8	1.7	2.7	2.4	4.8	6.3	5.7
Upper	18.0	19.0	18.0	3.3	5.2	3.9	7.1	8.6	7.5
Grade-2 over weight (30.0-39.9)	3.3	5.7	4.4	0.1	0.9	0.4	1.0	2.3	1.6
95% CI									
Lower	2.5	4.3	3.5	0.0	0.5	0.2	0.8	1.7	1.3
Upper	4.4	7.7	5.6	0.3	1.6	0.8	1.3	3.0	2.0

Grade-3 over weight (≥ 40.0)	0.2	0.2	0.2	0.0	0.1	0.1	0.1	0.1	0.1
95% CI									
Lower	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Upper	0.6	0.6	0.4	0.2	0.6	0.2	0.2	0.3	0.2
Central Obesity WC ≥ K*	19.0	24.9	21.8	3.6	10.0	6.6	8.1	14.2	11.0
95% CI									
Lower	15.4	21.3	18.5	2.6	8.1	5.5	6.8	12.5	9.7
Upper	23.2	29.0	25.5	4.8	12.2	8.0	9.5	16.1	12.4

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

39% males and 38% females were underweight. Over 8% people were over weight (20% among urban and 4% among rural population). Overall the central obesity was 11% (19% among urban males, 25% among urban females; 4% among rural males, 10% among 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,

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

Characteristic	Overweight (Grade I, II & III)								
	Urban			Rural			Combined		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Age group									
15-24	7.1	5.3	6.3	0.5	0.4	0.5	2.5	1.9	2.2
25-34	15.2	18.7	16.4	1.9	2.8	2.3	5.7	7.3	6.5
35-44	26.9	35.6	30.9	3.6	7.7	5.5	10.6	15.9	13.1
45-54	30.0	35.5	32.5	2.9	11.0	6.7	10.8	17.7	14.1
55-64	28.6	41.6	35.1	8.0	7.8	7.9	13.1	15.8	14.5
Total	17.8	22.2	19.8	2.5	4.7	3.5	6.9	9.7	8.2
Education									
Illiterate	8.9	16.5	14.2	1.6	5.1	3.8	2.5	6.7	5.2
Primary	10.6	19.8	14.8	1.9	5.1	3.0	3.7	9.4	5.8
Middle	9.5	18.0	13.3	2.5	3.0	2.6	4.1	8.6	5.6
Secondary	13.3	18.9	15.6	0.6	0.0	0.5	4.8	10.5	6.5
Higher Secondary	22.1	27.7	24.1	5.6	10.9	6.8	13.6	21.6	16.0
College & above	29.7	36.7	32.2	15.1	0.0	13.3	26.2	34.2	28.5
Total	17.8	22.2	19.8	2.5	4.7	3.5	6.9	9.7	8.2
Occupation									
Executive/Business	30.9	33.4	31.1	5.2	0.8	3.9	18.3	7.2	16.1
Agriculture	15.9	7.1	13.2	2.8	3.4	3.0	4.3	3.8	4.2
Domestic Work	**	25.2	25.1	**	5.7	5.6	**	13.9	13.8
Services/Sales	29.4	36.0	30.7	10.2	16.0	12.1	24.8	28.5	25.7
Manual Worker	9.1	17.0	11.0	1.7	3.9	2.6	3.5	5.6	4.3
Other	12.1	18.5	14.8	0.8	6.4	3.6	6.0	11.0	8.3
Total	17.8	22.2	19.8	2.5	4.7	3.5	6.9	9.7	8.2
Number (n)	1398	1536	2934	1459	1357	2816	2857	2893	5750

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

education, occupation and sex are presented in Table 5.4. The prevalence of overweight among the urban population was 20% and its pattern was found increasing with age (6% in 15-24, 17% in 25-34, 31% in 35-44, 33% in 45-54 and 35% in 55-64). The prevalence among female respondents was high (22%) compare with males (18%), but the increasing pattern with age was observed in both sexes (Table 5.4). In educational categories, the prevalence was varying with 14% among illiterate to 32% among higher level (College). Occupational categories, the prevalence was high among executive and business class (31%), and service (31%). Low prevalence of overweight was recorded among occupation of manual work (11%) and agriculture (13%). Overall, prevalence among rural population was 4% and it was varying with age (1% in 15-24 to 8% in 55-64). Similarly, prevalence in the educational categories was varying from 4% among illiterate to 13% among higher level of education. In the occupational category, the prevalence was high among service (12%) and domestic work (6%) and it was low among the occupation of agriculture (3%) and manual worker (3%). Overall, prevalence of overweight was 8% among the combined population and the pattern of prevalence was increasing with age. Except the younger age group, the overweight peoples were prevalent in all age groups across educational levels and occupation (Table 5.4).

In the category of BMI and central obesity, one out of ten of adult population surveyed was overweight or categorized into central obesity, constituting a high-risk group for NCD. It is also to be noted that 39% of adult population was recorded as under weight which is also an important issue for health planner.

Chapter 6

Summary and Conclusions

The NCD risk factors survey in Madhya Pradesh collected information from a random sample of 4998 households covering 2500 households from rural and 2498 from urban areas. From these households, 5853 individuals selected randomly were interviewed to collect behavioural information and also to carry out physical measurements. The analysis of the survey data have been presented and discussed in the present report providing information about the proportion of population or subgroup of population under the risk of Non-communicable diseases.

In Madhya Pradesh, majority households (92%) are Hindu followed by Muslim (6%). Forty seven percent of households were using hand pump with 24% in urban and 56% in rural households. One-fourth of households had access to piped drinking water with 69% in urban and 10% in rural households. About half of the urban households had flush toilet facility whereas 98% of rural household had pit toilet facility. Overall 68% households used electricity as main source of lighting with 97% in urban and 57% in rural households. Eighty seven percent of rural households were still using wood as a main source of cooking fuel and 59% of urban households were using LPG. Sixty four percent of rural households resided in kachha houses. About 56% population of Madhya Pradesh 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. About 38% of male population smoked tobacco daily whereas smoking among females was low. Overall 39% of the population uses smokeless tobacco whereas 54% of men and 23% of women use smokeless tobacco. Forty seven percent of population in Madhya Pradesh used tobacco in any form (i.e. smoking or smokeless). This prevalence was 68% among males and 23% among females. The mean age of initiation of tobacco use among young age (15-34 years) people was 19 years for male smokers, and 20 years for male smokeless tobacco users.

The alcohol consumption is a known risk factors of many non-communicable diseases. About 33% of men consumed alcohol at least once in last one year whereas 24% of men in last one month. The alcohol consumption among females was low. Those who consumed alcohol in last seven days, 13% of them were binge drinkers. The mean age of initiation of alcohol consumption by young age (15-34 years) men was 20 years.

Nutritional inadequacy is the major risk factors of many non-communicable diseases. Overall, 83% of population in Madhya Pradesh 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 5 days.

Physical inactivity is the leading cause of diabetes, hypertension and coronary heart disease. Overall, 42% of population in Madhya Pradesh with 68% of urban and 32% of rural population was in low category of physical activity. About 46% of the population was detected with pre hypertension stage and one-fourth was in stage I and stage II hypertension. According to BMI, 8% of population was in the category of over weight and 39% of population was recorded as under weight. However, 11% of population in Madhya Pradesh was in the category of central obesity with 14% among females and 8% among males.

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, about half of the 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 socioeconomic and demographic categories of population in Madhya Pradesh.

These are the major health issues related to Non-communicable diseases of people in Madhya Pradesh.

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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

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

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

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

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

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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Dr. V. Mohan Director, Madras Diabetes Research Foundation, Chennai	Member
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