Mongolian STEPS Survey on the Prevalence of Noncommunicable Disease Risk Factors 2006

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Mongolia

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Abbreviations

ADRA	Adventist Development and Relief Agency International
BMI	Body mass index
CI	Confidence interval
CVD	Cardiovascular disease
DM	Diabetes Mellitus
DBP	Diastolic blood pressure
EU	Elementary unit
IEC	Information, education and communication
IFG	Impaired fasting glucose
IGT	Impaied glucose tolerance
HC	Hip circumference
HDL	High-density lipoprotein
HSUM	Health Science University of Mongolia
HT	Hypertension
KAP	Knowledge, attitude and practice
KNU	Kagawa Nutrition University
LDL	Low-density lipoprotein
MET	Standard metabolic equivalent
MNMRI	Mongolian National Medical Research Institute
NCD	Noncommunicable disease(s)
NHDC	National Health Development Centre
NOCM	National Oncology Centre of Mongolia
PA	Physical activity
PDA	Handheld portable computer
PHI	Public Health Institute
PSU	Primary sampling unit
SCPES	State Committee of Physical Education and Sports
SSU	Secondary sampling unit
SBP	Systolic blood pressure
WC	Waist circumference
WK	Week
WHO	World Health Organization
WHR	Waist-hip ratio
WPRO	Western Pacific Regional Office of WHO
UN	United Nations

Executive Summary

The Mongolian NCD – STEPs survey is a nationwide cross–sectional survey that was carried out in Ulaanbaatar city and other provinces/ aimags from September to October 2005 by using the WHO NCD Stepwise survey methodology. The participants represent the 15-64 year old population of Mongolia. The goal of the survey was to determine the prevalence of major NCD risk factors and to establish the baseline information for the surveillance of NCDs prevention and control. The survey had the following main objectives:

- To determine the prevalence of behavioural (primary) NCD risk factors;
- To determine the prevalence of some NCDs and intermediate NCD risk factors such as blood glucose, cholesterol and triglyceride levels; and
- To conduct a comparative study on the prevalence of major NCD risk factors stratified by age, gender and locality and establish the baseline information on these risk factors.

In accordance with multi-stage cluster sampling for NCD surveillance more than 3000 participants were targeted taking into consideration a non-response rate of 15%. A total of 3600 adults were planned to be randomly selected in order to provide an equivalent distribution of the participants in regard to age groups (10-year age groups) and gender. Survey data were obtained from 3445 individuals with 3411 valid participants aged 15-64 years. For the biochemical measurements, blood samples were taken from a randomly selected sub-population aged 25–64 years.

The overall prevalence of current smokers was 28% of which 24% and 3% were current daily and non-daily smokers, respectively. The proportion of daily smokers in males (43%) was 10 times higher as compared to females (4%). The average age when tobacco-users started smoking was 20 years resulting in an average duration of smoking of 17.5 years. This long duration of smoking is a high risk for regular smokers. Most of the regular smokers use manufactured cigarettes.

Regarding alcohol use, 34% of the surveyed population (25% of the surveyed male and 43% of the surveyed female population) did not consume alcohol at all over the past 12 months. Amongst drinkers, about 60.8% consumed alcohol on an occasional basis (65.1% males and 56.2% females), 5% consumed alcohol moderate often (8.8% males and 1.0% females) and only 0.7% were drinking alcohol frequently (1.1% males and 0.2% females).

In general, there was a low consumption of fruit and vegetables. The average fruit and vegetables intake has been reported as being 3 serving

sizes per day in the surveyed population; thus a consumption of fruit and vegetables is almost 1.5 times lower than the recommended 5 serving sizes or 400 grams of fruit and vegetables intake. For instance, 73% of the surveyed population consumed less than 5 serving sizes of fruit and vegetables. In regard to locality, fruit and vegetables intake was 1.5 times lower (2.6) among rural residents as compared to urban residents (3.9).

About 23% of the surveyed population engaged only in low levels of physical activity, 34% and 30% of the surveyed population did not engage in vigorous and moderate physical activity accordingly at work and recreational settings which might related to sedentary work places. Therefore, actions are needed to be taken at the national level to develop community-based physicial activity programmes matching modern lifestyle needs.

The measured physical fitness scoring was lower in the 15-34 year-olds as compared to the 35-64 year old participants. Young people aged 15-24 years are mainly school drop out children, shepherd children and children engaged in a heavy labour force, and youth who are usually not involved in sport and physical fitness training. There are a range of negative circumstances such as universities, colleges and vocational training centres which have no adequate sport training programmes to give appropriate sport and physical fitness education. In addition activity standards are often outdated, no adequate sport gyms, sport grounds, facilities and equipment available, and the sport environment does often not meet the required criteria. In addition, attitudes towards sport education and sport training at the individual and community levels have become low.

Amongst the biochemical NCD risk indicators (intermediate risk factors) there was a increasing trend of mean blood cholesterol levels with increased age in both sexes. Prevalence of cholesterol risk or hypercholesterolemia (cholesterol level in capillary blood above 5.2 mmol/l) was 7% in both genders. The prevalence of increased hypercholesterolemia (blood cholesterol level above 6.5 mmol/l) was 0.8% and in regards to gender, the proportion in males (1.1%) was 2 times higher as compared to females (0.5%).

In regards to age and gender, there was a trend of increased triglyceride levels in males with increased age. The proportion of people with hypertriglyceridemia (triglyceride level in capillary blood above 2.26 mmol/l) was higher in males (13%) as compared to females (9%).

The mean BMI was 23.3 in men and 24.5 in women. In regard to BMI risk categories, 31.6% of the population aged 15-64 years were overweight and obese of which 21.8% were overweight and 9.8% obese. The proportion of overweight (25.5%) and obese (12.5%) females were

relatively higher as compared to overweight (18.2%) and obese males (7.2%). In addition, the proportion of overweight and obese participants tended to increase with increased age.

The prevalence of central obesity was 2 times higher in females (42.6%) compared to males (20.2%). More than 60% of females aged 35–64 years had central obesity in accordance with the chosen waist girth cut-offs.

The prevalence of hypertension among Mongolians aged 15-64 years was 28.1%. With increased age, the prevalence of hypertension tended to increase in both sexes. Furthermore, there was no apparent difference noted in the prevalence of hypertension in relation to locality. The prevalence of newly diagnosed hypertension was higher by 17.8% as compared to that of the previously diagnosed but uncontrolled and being on medication.

The prevalence of diabetes among Mongolians (8.2%) increased by 5% as compared to the prevalence (3.1%) of 1999 survey. The proportion for impaired fasting glucose was found in 12.5% of the surveyed population which is increased by around 3% as compared to the prevalence of 1999 (9.2%).

In conclusion, the Mongolian NCD STEPs survey of 2006 revealed that **9 in every 10 people** (**90.6%** of the surveyed population) **had at least one risk factors for developing NCDs. One in every five people** (**20.7%** of the surveyed population) **had three and more risk factors** or were **at HIGH risk** and in particular, **one in every two males aged 45 years and above were at high risk** in developing NCDs.

Mongolia STEPS Survey 2005 FACT SHEET

The STEPS NCD survey of chronic disease risk factors in Mongolia was carried out from May, 2005 to October, 2005. Mongolia carried out Step 1, Step 2 and Step 3. Socio demographic and behavioral information was collected in Step 1. Physical measurements such as height, weight and blood pressure and body fitness scores were collected in Step 2. Biochemical measurements were collected on 1133 participants to assess intermediate risk factors such as blood glucose, cholesterol and triglycerides levels in Step 3.

The STEPS survey in Mongolia was a population-based survey of adults aged 15-64 years. A random multistage cluster sample design was used to produce representative data for that age range in Mongolia. A total of 3411 people aged 15-64 years participated in the Mongolian STEPS survey.

A repeat survey is planned for monitoring the impact of the integrated programme for NCD prevention and control if funds permit.

Results for adults aged 15-64 years (incl. 95% CI)	**Both Sexes**	**Males**	**Females**
Tobacco Use			
Percentage who currently smoke tobacco daily	24.2% (±0.1)	43.1% (±0.1)	4.1% (±0.05)
For those who smoke tobacco daily			
Average age started smoking (years)	19.8 (±0.02)	19.1 (±0.04)	27.8 (±0.1)
Average years of smoking	17.5 (±0.03)	17.8 (±0.04)	13.8 (±0.1)
Percentage smoking manufactured cigarettes	89.9% (±0.1)	89.4% (±0.1)	95.5% (±0.2)
For smokers of manufactured cigarettes			
Mean number of manufactured cigarettes smoked per day	12.0 (±0.5)	12.6 (±0.6)	7.5 (±1.1)
Alcohol Consumption			
Percentage of abstainers (who did not drink alcohol in the last year)	33.5% (±0.1)	25.0% (±0.1)	42.6% (±0.1)
Percentage of current occasional drinkers (who drink alcohol on less than 3 days a month)	60.8% (±0.02)	65.1% (±0.2)	56.2% (±0.1)
Percentage of current moderate drinkers (who drink alcohol on 1-4 days per week)	5.0% (±0.02)	8.8% (±0.2)	1.0% (±0.1)
Percentage of current frequent drinkers (who drink alcohol on 5 or more days per week)	0.7% (±0.02)	1.1% (±0.2)	0.2% (±0.1)
For current drinkers who had more often than once per month 4/5 or more drinks on any day			
Percentage of women who had 4 or more drinks on any day on more often than once per month	–	–	0.3% (±0.3)
Percentage of men who had 5 or more drinks on any day on more often than once per month	–	5.1% (±0.1)	–
Fruit and Vegetable Consumption (in a typical week)			
Mean number of servings of fruit consumed per day	1.5 (±0.003)	1.3 (±0.004)	1.8 (±0.01)
Mean number of servings of vegetables consumed per day	1.7 (±0.002)	1.7 (±0.003)	1.6 (±0.003)
Percentage who ate 5 or more combined servings of fruit & vegetables per day	22.3% (±0.1)	19.1% (±0.1)	25.8% (±0.1)
Physical Activity			
Percentage with low levels of activity (defined as <600 MET-minutes/week)	23.1% (±0.1)	20.1% (±0.1)	26.1% (±0.1)
Median time spent in work-related physical activity per day (minutes)	38.6 (0-205.7)	51.4 (0-240)	28.6 (0-171.4)

Continued on next page

Mongolia STEPS Survey 2005 Fact Sheet continued

Median time spent in transport-related physical activity per day (minutes)	60 (21.4-120.0)	60 (21.4-120.0)	51.4 (21.4-120.0)
Median time spent in recreational physical activity per day (minutes)	25.7 (0-77.1)	25.7 (0-68.6)	30.0 (0-90.0)
Physical Measurements			
Mean body mass index - BMI (kg/m^2)	23.8 (± 0.01)	23.3 (± 0.01)	24.5 (± 0.01)
Percentage who are overweight or obese (BMI ≥ 25 kg/m2)	31.6% (± 0.1)	25.5% (± 0.1)	38.0% (± 0.1)
Percentage who are obese (BMI ≥ 30 kg/m^2)	9.8% (± 0.04)	7.2% (± 0.05)	12.5% (± 0.1)
Average waist circumference (cm)	79.9 (± 0.03)	80.6 (v 0.02)	79.2 (± 0.02)
Mean systolic blood pressure - SBP (mmHg)	124.7 (± 0.03)	128.2 (± 0.04)	121 (± 0.04)
Mean diastolic blood pressure - DBP (mmHg)	76.8 (± 0.02)	76.9 (± 0.03)	76.7 (± 0.03)
Percentage with raised BP (SBP ≥ 140 and/or DBP ≥ 90 mmHg)	22.2 (± 0.05)	26.4 (± 0.1)	17.6 (± 0.1)
Percentage with raised BP (SBP ≥ 160 and/or DBP ≥ 100 mmHg)	6.6 (± 0.04)	7.6 (± 0.1)	5.6 (± 0.05)
Biochemical Measurements			
Mean fasting blood glucose (mmol/L)	4.8 (± 0.002)	5.1 (± 0.01)	4.7 (± 0.004)
Percentage with raised blood glucose (≥ 6.1 mmol/L)	5.7% (± 0.02)	7.8% (± 0.01)	3.6% (± 0.01)
Percentage with raised blood glucose (≥ 6.7 mmol/L)	2.6% (± 0.01)	3.7% (± 0.01)	1.5% (± 0.01)
Mean total blood cholesterol (mmol/L)	4.6 (± 0.001)	4.6 (± 0.002)	4.6 (± 0.001)
Percentage with raised total cholesterol (≥ 5.2 mmol/L)	7.0% (± 0.1)	6.8% (± 0.1)	7.2% (± 0.1)
Percentage with raised total cholesterol (≥ 6.5 mmol/L)	0.8% (± 0.01)	1.1% (± 0.1)	0.5% (± 0.02)
Mean total blood triglycerides (mmol/L)	1.6 (± 0.002)	1.6 (± 0.003)	1.6 (± 0.003)
Percentage with raised total triglycerides (≥ 2.26 mmol/L)	11.3 (± 0.01)	13.4 (± 0.05)	9.2 (± 0.05)
Summary of combined risk factors • **current daily smokers** • **less than 5 servings of fruits & vegetables per day** • **low level of activity** (<600 MET -minutes) • **overweight or obese** (BMI ≥ 25 kg/m^2) • **raised BP** (SBP ≥ 140 and/or DBP ≥ 90 mmHg)			
Percentage with no risk (i.e. none of the risk factors included above)	9.4% (± 0.05)	6.8% (± 0.05)	12.2% (± 0.05)
Percentage with risk (1-2 risk factors included above)	69.9% (± 0.05)	66.5% (± 0.1)	73.4% (± 0.1)
Percentage with raised risk (i.e. at least three of the risk factors included above) distributed in the age groups below			
Percentage with high risk, aged 15 to 44 years old	14.5% (± 0.1)	19.5% (± 0.1)	9.2% (± 0.1)
Percentage with high risk, aged 45 to 64 years old	45.4% (± 0.2)	54.5% (± 0.2)	35.5% (± 0.2)

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4. Chapter 1.
Introduction

4.1.1. Geography and climate

Mongolia is located in north-central Asia, bordered with Russia on the north and with China on the other sides. Located far from any ocean, Mongolia has geographically a unique structure with variety of scenery consisting of steppes, semi-deserts, and deserts, with high mountain ranges and alternate dry, lake-dotted basins. Mongolia occupies a total land area of 1 565 000 square kilometres.

The Mongolian climatic conditions are predominantly reflected by its desert - steppe with diverse characters of soil and vegetation patterns, by the ranges of natural biological features, and by its geo-morphological structure. The climate is defined as semi-arid continental with dry and very dry, and cool to warm ranges. It has four seasons, with large annual temperature variations occurring in a single day, month or season. The mean temperature in winter is -300 C and in summer +250 C.

About 80 percent of the Mongolian territory consists of highland, with an average altitude of 1000 meters above sea level, and rivers in the north flow northward into the Arctic Ocean, and in the northeast flow eastward into the Pacific, and those in the western and southern two-thirds draining into interior drainage basins.

4.1.2. Population

According to the statistics of 2004, the resident population of Mongolia reached 2, 533 100 with 50.4% living in urban areas and 49.6% in rural areas [3]. Mongolia is one of the most sparsely populated countries with 1.6 inhabitants per square kilometre.

Mongolia is divided administratively into aimags (21 aimags) in rural areas, with further local subdivisions into soums (336 soums) and bags (the smallest administrative unit in rural areas). In the urban areas the administrative units are divided into districts, with further subdivisions into khoroos/khesegs (the smallest administrative unit in urban areas). More than one third of the total population or 915 531 persons are residing in the capital city Ulaanbaatar.

There are 596 400 households in total, of which 341 372 are located in urban and 255 028 households in rural areas. 50.8 percent of all households live in ger, the traditional house of nomad Mongolians.

Currently, 48.8% of the total population of Mongolia are males and 51.2% are females with a sex ratio of 100 : 95.5. In regard to age groups, the proportion of the population aged under 15 years was 30.3%, for age group 15–64 years was 65.7% and for aged 65 years and over it was 4.0% [3].

As of 2004, the average life expectancy in Mongolia was 64.6 years; in relation to sex, this average was 61.6 for males and 67.8 years for females; thus Mongolia is classified as a country with a moderate level in life expectancy in accordance with one of the human development indicators [3].

4.1.3. Current situation of non-communicable diseases

As disease pattern change globally including in Mongolia and communicable diseases are on decline, the number of people who are affected by noncommunicable diseases (NCDs) increases rapidly which in turn is associated with changes in cultural and lifestyle factors such as diet and nutrition, physical activity, alcohol use, and tobacco use. Furthermore, NCDs affect millions of people and visibly their health thus becoming a hazard to socio-economic development and becoming one of the priority public health problems.

4.1.4. Global epidemic of NCDs

According to the statistics estimated by WHO, 43% of all diseases and 60% of all deaths are due to chronic diseases including cardiovascular diseases, diabetes mellitus and cancer. It is projected that by 2020, the NCDs will account for 60% of the global burden of disease and 73% of all deaths [19].

In 2005, around 35 million people died (60% of all deaths) as a result of NCDs and 80 percent of chronic disease deaths occur in low and middle-income countries.

Many factors contribute to the wide spread of NCDs. As defined in the World Health Report 2002, 10 common risk factors such as unhealthy diet, physical inactivity, smoking, alcohol use, tobacco use, overweight, raised blood pressure, raised total cholesterol levels and raised blood sugar are the most prevalent risk factors among the world population [18]. Furthermore, these common, modifiable risk factors are divided into primary risk factors (unhealthy diet, physical inactivity, alcohol and tobacco use) and intermediate risk factors (overweight, raised blood pressure, raised total cholesterol levels and raised blood sugar).

Nowadays, most countries have been experiencing an increased prevalence of both primary and intermediate risk factors. Hypertension (HT) alone is the main risk factor for developing ischemic hearth disease, stroke, heart and renal failures and peripheral blood vessel's disorders. Hypertension alone accounts for 7.1 million (13%) of all deaths globally.

Raised total cholesterol levels account for 18% of the causes for developing brain vessel's disorders and 56% for ischemic hearth disease. The statistics have also shown that an abuse of alcohol is accounting for increase in developing chronic diseases.

NCD associated risk factors are modifiable thus by identifying and preventing them NCDs such as coronary heart disease and stroke would be prevented by 80%, cancer by 40% and type 2 diabetes by 90%. Projections by experts estimate that an annual reduction of chronic disease death rates by 2% in the next 10 years will account for 36 million lives be saved.

WHO projected that a total of 106 million people will die from NCDs over the next 10 years in the countries of the Western Pacific Region which means that deaths from NCDs will increase by 20% percent as compared to the current situation. The proportion of overweight and obese people tends to increase rapidly amongst the world population. High blood pressure, high cholesterol and tobacco use account for three quarters of CVD caused deaths, a leading cause of all deaths globally as mentioned in the World Health Report 2002 [18].

NCD risk factors are associated with lifestyle factors including "affluent" diet and unhealthy food choices. Each year at least 4 million people die as a result of raised total cholesterol levels, 5 million die as a result of tobacco use, 7 million due to raised blood pressure, and 1.8 million due to alcohol use. Excessive use of saturated fat, sugar, and salt lead to high blood pressure and high cholesterol levels; and low intake of fruit and vegetables account for 19% of gastrointestinal cancers and 31% of ischemic heart disease, in other words low fruit and vegetables intake account for around 3 million deaths each year.

The changes occurred in lifestyle and occupational patterns often lead to physical inactivity; furthermore, physical inactivity is associated with cancers, diabetes, and CVDs accounting for 15% of all deaths caused by these diseases.

As a reflection on the immense changes of lifestyle due to globalization of trade, urbanization, technology development, and ageing of the population, the prevalence of smoking, alcohol use, and physical inactivity has been increasing in most countries.

In fact, many cases of NCDs are occurring at a younger age where prevention action is even more effective. The WHO projections estimate that unless a proper action is taken, 10 million people will die as a result of tobacco use as compared to 5 million deaths a year as of today, and estimated 3 million deaths caused from overweight and obese today will reach up to 5 million deaths by 2020.

Experiences of other countries show that NCDs are preventable. Scientists demonstrate an evidence - based indication that coronary heart disease can be reduced by 80% and type 2 diabetes by up to 90% through change in behaviour like eating healthy choices food, keeping normal body weight, reducing alcohol and tobacco use. In addition, one-third of all cancer could be prevented by eating healthy choices food, maintaining normal weight and being physically active throughout the lifespan.

Evidence-based interventions in many countries showed that prevention of NCDs can be achieved even after a short-term action. For instance, effective tobacco control can possibly reduce deaths caused from ischemic heart disease within one year. Change in diet and regular exercise contribute to preventing the development of clinical manifestations of diabetes by up to 58% in high-risk people with impaired fasting glucose (IFG).

The prevalence of NCDs is constantly increasing with 77% of all deaths and 85% of the global disease burden occurring in the Western Pacific Region of WHO of which Mongolia forms a part. Most cases of NCDs occur in low and middle income countries and the Western Pacific Region (out of 6 WHO Regions) is ranked third after Europe and America in relation to disease burden and mortality rate.

4.1.5. NCDs in Mongolia

Since 1995, diseases of circulatory system and cancer have become the leading causes of death of Mongolian population and the number of deaths caused by these diseases is increasing steadily over the years. By the end of 2004, according to the health statistics, the five leading causes of death per 10 000 population are:

1. Diseases of circulatory system 23.06
2. Cancer 12.16
3. Injury, poison and certain other consequences of external causes 10.34
4. Diseases of digestive system 4.82
5. Diseases of the respiratory system 3.3

Morbidity and mortality rates due to diseases of circulatory system are higher in the central and khangai regions than the mean country rate.

Cardiovascular disease (CVD): According to the health statistics, the mortality rate due to CVDs has been increasing over the years since 1995. For instance, CVDs mortality rate was 7.1 percent in 1950 and reached to 23.4 percent in 1985 (G. Dejeekhuu et al, 1985), with further constant rise reaching 30.8 percent in 1995 and from 2000 it ranged

between 35.3 – 38.0 percents [3]. The latest survey results showed that 52% of all deaths caused by CVDs are related to hypertension and stroke.

Mongolia has been experiencing a specific pattern of the prevalence of CVDs. The mortality ratio of stroke against ischemic heart disease (IHD) is 6:1 while in the most western countries the reverse picture is observed. 41.8% of all CVDs were due to hypertension and 16.8% was due to coronary heart disease.

The survey on risk factors associated with "lifestyle-related" diseases which was carried out in Ulaanbaatar city in 2002 showed that hypertension is more likely to occur in men (29.6%) than in women (25.9%) [8].

Cancer: Cancer is the second leading cause of death in Mongolia and one in five persons die due to cancer. The most common cancers are liver, stomach, lung, oesophagus and cervix uteri cancers and they account for 78% of all cancer.

In Mongolia, there are 135.5 new cases of cancer per 100 000 people per year. The highest incidence rate occurs in the age groups 40-55 years mainly affecting people with at work age.

It is noticeable that 88.2% of all the patients treated in the National Oncology Center are already at the late stages of cancer (Stage III and IV), and 60-65% of the newly diagnosed cases of cancer die within a year after the diagnosis [3].

Diabetes: The results from the 1999 survey diabetes conducted in Ulaanbaatar city and four provinces showed that 3.2% of the surveyed adults aged above 35 years had type 2 diabetes and 9.2% had impaired glucose tolerance (IGT) [7]. By applying this prevalence to the whole population, it is estimated that 180 000 Mongolians are at risk of developing diabetes. In addition, as it is projected by researchers that around 40% of the people with IGT will develop diabetes over the next two decades, this leads to a possibility that 72 000 new cases of diabetes develop until 2020.

4.1.6. NCDs risk factors

Although, there are survey results of smaller surveys on NCD associated risk factors, there is still a lack of evidence in order to give an assessment to the prevalence of NCD risk factors at national level in Mongolia due to different methods used across the past surveys. Also as survey sites, previosly different non-representative localities were selected like the one which covered only Ulaanbaatar city and only some of aimags/soums.

Therefore, within the framework of the NCD prevention and control programme activities, the nationwide NCD STEPs risk factor survey has been organized in order to determine and assess the current status of the NCD associated risk factors in Mongolia and establish a NCD surveillance system.

4.1.6.1. Nutrition

Mongolians have a characteristic diet high in protein and rich in fatty foods of animal origin with predominant use of mutton and beef in the diet, and 80% of all dietary fat derived from saturated animal fat. In addition, climate features like the continental climate affect nutrition variety and accessibility of certain foods as well as the eating patterns of Mongolians. Also, eating habits and food consumption are different between urban and rural populations. Especially the lifestyle and more traditional eating pattern have changed amongst urban residents thus it is necessary to investigate the diet-related NCDs particularly cardiovascular disease, cancer and metabolic disorders and associated common risk factors specific to Mongolia.

According to the results from the Second National Nutrition Survey (1999), the total fat intake was high at 35% of the population and the daily fat intake was 92.1 g in urban and 112.5 g in rural areas, which in turn demonstrates an excessive fat intake as compared to the recommended fat intake of 76.2 g. Of the consumed food fat, 56.1 - 81% have come from animal sources [10].

70% of the population of Mongolia use salted tea and the average daily intake for salt is more than two times higher for Mongolians (15.1 g) than the salt intake (6 g per day) recommended by WHO recommendations.

Due to the specific of continental climate of Mongolia there is less opportunity to grow some types of fruit and vegetables. Therefore, the main supply of fruit and vegetables is from imports thus having a negative impact on the consumption of fruit and vegetables due to the high price. Mongolian people mainly use vegetables like potato, cabbage, carrot, turnip, onion, garlic, tomato and cucumber and its consumption varies between urban and rural consumers. Though, over the past years, the consumption of green leafy vegetables has been increasing in urban areas however, it is still generally not used widely.

Diseases of the circulatory system and cancer are the first 2 leading causes of death among the first five, which is probably associated with a diet low in fruit and vegetables and rich in animal fat.

The fruit and vegetables intake varies between urban and rural residents

with 89.2 g of vegetables and 59.1 g of fruits consumed per household member a day in urban areas as compared to 79.5 g and 32.8 g respectively for vegetable and fruit in rural areas. This demonstrates that intake for fruit and vegetables does not meet WHO recommended intake (400 g per day). This intake is particularly low among rural consumers (4 times lower as compared to the recommended intake for fruit and vegetables).

The joint Public Health Institute (PHI), Mongolia and Kagawa Nutrition University (KNU), Japan survey that was conducted in Ulaanbaatar city in 2002 concluded that the daily intake of fruit and vegetables did not meet the WHO recommendations [5]. The survey also indicated that 23.1 % of the respondents do not consume vegetables and 81.3% of the respondents do not consume fruits daily. In addition, the respondents used excess amounts of saturated fat from animal sources; on the contrary, the intake of dietary fibre was low [5].

4.1.6.2. Overweight and obesity

According to survey results from 1993, 17.3% of the population were overweight (BMI >25-30) and obese (BMI>30). This reached 26.5% in 1999 (2nd Nutrition survey of 1999) and 27% in 2001 (Japan joint survey, 2002). The average height, weight and BMI were 167.4 cm, 67.7 kg and 24.1 for Mongolian men and 154.9 cm, 59.4 kg and 24.7 accordingly for women [5, 10].

In regard to BMI, 31.3% of adults were overweight and 9.4% were obese; 47.7% of adults residing in downtown of Ulaanbaatar city were overweight and obese. In regard to waist-to-hip ratio, 74.2% of women and 24.4% of men had central obesity, thus the prevalence of central obesity was greater in women by almost 50% than in men [5].

4.1.6.3. Tobacco

The import of tobacco products has dramatically increased in the past few years. For instance, the number of manufactured cigarettes imported per person has increased 10 -15 times in 2000 as compared to 1997. In connection with this, tobacco use in the population has increased over the years.

As survey results from 1999 showed, 14.1% of teenagers used to smoke, 66.2% were exposed to second-hand smoke, and 44.8% of children and adolescents used to buy tobacco/cigarettes. The survey of 2000-2003 which was conducted within the 'Tobacco free youth' project activities with support of ADRA International, revealed that in 2000, 40% of the urban residents were smokers, and in regard to gender, that 61.4% of males and 18.9% of females were smokers. As of 2003, the overall

proportion for smokers has increased to 45%; the increase in male smokers was to 65% and in female smokers to 21%.

The joint PHI, Mongolia and KNU, Japan survey of 2002 revealed that 55.6% of men and 16.6% of women of the Ulaanbaatar city were smokers [5].

4.1.6.4. Alcohol

According to the statistics from the Mental Health and Narcology centre, 51.2% of adults use alcohol on a regular basis and a UN survey (1998) indicated that 12.7 % of adults could be identified as heavy drinkers [16].

The KAP survey of 2001 revealed that 43.6% of the respondents consumed 1-3 standard drinks of alcohol and alcoholic beverages a week and 47.5% having consumed more than 3 standard drinks a week [8].

4.1.6.5. Physical inactivity

Nowadays where the socio-economic situation in our country has changed dramatically due to a shift to market economy, the introduction of new developments and technology into public and private sectors the results were in turn an advancement of human knowledge and life requirements. In such a situation, it is necessary to develop evidence-based health and physical fitness education programmes taking into account physical features of Mongolians and today's social environment.

According to 'the test to define physical fitness and body development of the population' performed in 2000, 48.6% of pre-school children, 40.1% of adolescents and 42.6% of adults did not meet the desirable standard levels of physical fitness and body development. The assessment of physical fitness and body development in schoolchildren conducted between 2002 - 2004 revealed that 68.3% of all schoolchildren of Ulaanbaatar city did not meet the required levels.

The joint Mongolian and Japan survey (2002) revealed that 23% of the urban respondents engaged for less than 30 minutes per day in physical activity or were physically inactive; additionally, 51.6 % of the respondents were watching TV for 1-3 hours, 27.7 % for 4-5 hours and 8.5 % for more than 6 hours per day [5].

4.1.6.6. Blood cholesterol levels

The joint Mongolian and Japan survey (2002) which forms a part of the survey for Asia- Pacific countries on nutrition, health and genetics revealed that the mean blood cholesterol for Mongolians was 183

mg/dl for men and 185 mg/dl for women and there was a tendency of increased values at increased age (normal range for blood cholesterol is 139-200 mg/dl) [5].

There is evidence that blood cholesterol level of residents living in flat/apartment was higher as compared to residents living in traditional dwellings or ger. There was no remarkable difference for triglycerides in both men and women, however the level of serum high-density lipoproteins (HDL) was higher in women than in men.

22.7% or one in five persons of the population of Ulaanbaatar city aged 25 and above had high blood cholesterol being at risk and 7.4% were at high risk in developing CVDs [5].

4.1.7. Survey goal

The overall goal of the Mongolian NCD STEPs survey was to determine the prevalence of major NCD risk factors and establish the baseline information for the surveillance of NCDs prevention and control. The survey had the following main objectives:

4.1.8. Survey objectives

1. To determine the prevalence of behavioral (primary) NCD risk factors;
2. To determine the prevalence of some NCDs and intermediate NCD risk factors such as blood glucose, cholesterol and triglyceride levels; and
3. To conduct a comparative study on the prevalence of major NCD risk factors stratified by age, gender and locality; and establish the baseline information on these risk factors.

4.1.9. Survey rationale

Although, previously there were several small-scale surveys in relation to some of NCDs conducted in Mongolia, the results of those (including the Japan joint survey in 2002 and the survey on diabetes in 1999) were not representative and conducted broad enough to represent the total situation of NCDs and associated risk factors in Mongolia. Therefore, the Mongolian NCD STEPs survey was designed to provide information on the prevalences of the major NCDs and their major risk factors in relation to socio-economic and behavioral factors in the total Mongolian population to establish nationwide comprehensive baseline information. In addition, the survey will be used as one of the main evidence based tools for public health decision making; to demonstrate the directions of the prevalences and forms of disease and its risk factors; also the

information on Mongolian NCD surveillance will be included into global information database network; and it will not be restricted by only scientific importance but will also have socio-economic, theoretical and practical impact.

5. Chapter 2.
Survey Methodology

5.2.1. Survey design/scope

The Mongolian NCD STEPs risk factor survey was designed to establish baseline information on the major risk factors for the action plan implemented within the 'Integrated NCD prevention and control programme' in Mongolia.

The Mongolian STEPs risk factor survey was conducted through three subsequent steps after developing a Mongolian NCD STEPs risk factor survey instrument in line with the concept of the WHO STEPwise approach for NCD surveillance taking into account local needs and resources.

1. STEP 1: Questionnaire method - information on tobacco use, alcohol use, fruit and vegetables intake, physical inactivity, previously diagnosed hypertension and diabetes were collected by using questionnaire.

2. STEP 2: Physiological measurements- overweight and obesity (body weight and height, waist and hip circumferences, and body fat (using bio-impedance), blood pressure, and physical fitness scoring were identified by using specific tests/devices relevant to these measurements.

3. STEP 3: Laboratory analysis – capillary blood to determine glucose, cholesterol and triglycerides levels at the data collection sites using dry chemical methods.

The WHO STEPwise questionnaire was used in this survey after translation into Mongolian by keeping a logic behind the questions, after consideration of specific characteristics of the country, and after back-translation for verification and final editing in consultation with the international and local experts.

Table 1: Demographic characteristics (by age, gender and locality)

Locality	Age groups	Males N(%)	Females N(%)	Both sexes N(%)
Urban	15-24	175 (49.7)	177 (50.3)	352 (100)
	25-34	158 (46.6)	181 (53.4)	339 (100)
	35-44	171 (49.3)	176 (50.7)	347 (100)
	45-54	171 (50.1)	170 (49.9)	341 (100)
	55-64	162 (50.2)	161 (49.8)	323 (100)
	Sub-total	**837 (49.2)**	**865 (50.8)**	**1702 (100)**
Rural	15-24	176 (50.7)	171 (49.3)	347 (100)
	25-34	163 (49.4)	167 (50.6)	330 (100)
	35-44	181 (46.5)	208 (53.5)	389 (100)
	45-54	182 (50.1)	181 (49.9)	363 (100)
	55-64	135 (48.2)	145 (51.8)	280 (100)
	Sub-total	**837(49.0)**	**872 (51.0)**	**1709 (100)**
	Total	**1674 (49.1)**	**1737 (50.9)**	**3411 (100)**

Table 2: Selected clusters by urban and rural areas

	Cities/Aimags	Number of Clusters	Proportion of participants aged 15-64 years (N, %)
Urban	Ulaanbaatar	17	1446 (42.4)
	Darkhan	2	170 (5.0)
	Erdenet	1	86 (2.5)
	Total	**20**	**1702 (49.9%)**
Rural	Arkhangai	2	168 (4.9)
	Bayan-Ulgii	1	85 (2.5)
	Bayankhogor	1	84 (2.5)
	Bulgan	1	86 (2.5)
	Dornogobi	1	88 (2.6)
	Dornod	1	87 (2.6)
	Dundgobi	1	84 (2.5)
	Zavkhan	1	85 (2.5)
	Uvurkhangai	1	86 (2.5)
	Umnugobi	1	87 (2.6)
	Sukhbaatar	1	87 (2.6)
	Selenge	1	87 (2.6)
	Tuv	1	84 (2.5)
	Uvs	1	82 (2.4)
	Khovd	1	84 (2.5)
	Khuvsgul	2	172 (5.0)
	Khentii	1	88 (2.6)
	Gobi-Altai	1	85 (2.5)
	Total	**20**	**1709 (50.1%)**

The formal data collection process was conducted between 16 –24 September, 2005 in Ulaanbaatar city and between 24 September and 14 October, 2005 in rural areas.

5.2.2. Survey population and sampling

A total of 3411 people (1674 males and 1737 females) representative of urban and rural residents aged 15-64 years participated in the Mongolian STEPs NCD risk factor survey. In regard to gender and locality, 837 males and 865 females from urban areas (n=1702), and 837 males and 872 females from rural areas (n=1709) participated in this survey (Table 1).

In order provide an equal distribution of participants, the selection process was performed separately for urban and rural areas after taking into account a proportion between urban and rural participants, differences in lifestyle and disease status.

The participants of this survey were selected from 20 soums of 18 aimags to represent rural areas and 6 districts of Ulaanbaatar city, Darkhan and Erdenet cities to represent urban areas. Thus districts of Ulaanbaatar, Darkhan and Erdenet (Orkhon aimag) cities were selected to represent urban areas and aimag/soums were selected to represent rural areas.

The initial planned sample size was designed to involve 3000 persons in accordance with the NCD multi-stage cluster survey method and a

total of 3600 adults was randomly selected in this multi-stage approach in order to provide an equivalent distribution of the participants in regard to age groups and gender after taking into consideration that the estimated potential rate for non-response in each age group and refusals in the next stages would equal to 15% (Table 2).

The survey was designed to cover all geographical areas of Mongolia and a 3-stage sampling process as part of the multi-stage cluster sampling was carried out to randomly select the target population. As primary sampling unit (PSU), districts in urban and soums in rural areas were randomly chosen; for the secondary sampling unit (SSU), khoroo (group of households which belong to a particular doctor) in urban and bag in rural areas were randomly chosen; and for the elementary unit (EU) a household was randomly chosen in both urban and rural areas. All household members of the randomly chosen households aged 15-64 years were invited to participate in this survey.

A total of 40 clusters with 20 clusters each from both urban and rural areas were chosen (Figure 1).

Figure 1: Mongolian NCD STEPs Frame

5.2.3. Training

A training workshop on the STEPs survey methods was organized by the Public Health Institute of the Ministry of Health as a leading organization for this survey in collaboration with MNMRI, HSUM, NHDC, SCPES, and NOCM on 29 – 30 July and 8 – 10 September, 2005 to train 40 national survey workers.

In the first two days of the workshop, the trainees were trained on the WHO cluster sampling methods, on how to collect data on tobacco

use, alcohol use, food intake for some food products, and levels of physical activity using structured questionnaires as part of step 1 including calculation of alcohol consumption by using standard drink classification and how to determine serving sizes for fruit and vegetables. Furthermore, the trainees were trained on the methods of physical measurements followed by practical training on performing physical measurements and their measurement mistakes were identified and assessed. The trainees were also trained in the use of handheld mini computers (PDA) and how to collect data using PDAs and were involved in pilot survey thus practicing the survey technique and methods.

5.2.4. Data collection process

A total of 14 teams with at least 5 members in each worked together to collect data in Ulaanbaatar city and rural areas. A team consisted of a team leader, two interviewers, one person to obtain physical measurements, one laboratory technician, two local assistants. Thus teams worked often with 7-8 people in each team.
About 3-4 days prior to the interview process, an information leaflet on the survey goal and objectives, and consent forms were distributed to the members of randomly selected households. Individuals participated only after giving a written consent.

5.2.4.1. Step 1

Data on behavioural risk factors were collected using a structured questionnaire (form see appendix 3). An interview lasted on average 15 - 20 minutes . Data were collected by an interviewer with the assistance of a PDA-based questionnaire. The participant allowed to participate in the next stage or Step 2 for physical measurements after the interviewer checked on the completeness of the questionnaire and obtained the verification of the signature of the participant.

Methods to assess alcohol consumption: Alcohol use is recognized as one of the risk factors for NCDs. The terminology 'Standard drink' was used in the survey in order to give a comparative assessment on alcohol consumption across different alcoholic beverages. This also provides an easy way to quantify ethanol intake. The volume of one standard drink representing 10 g pure alcohol is approximated to 1 bottle/can (330 ml) of beer with 4-5% of ethanol, 1 glass (100 ml) wine/liquor with 12.5% of ethanol, 1 glass (50 ml) of vodka with 40% of ethanol, 1 cup (100 ml) of home brewed alcohol with 15% of ethanol, or 1 cup (500 ml) of airag (mare's milk) with 5% of ethanol content and show cards illustrating these quantities were used for the assessment (table 3, appendix 4).

The definition of binge drinking for this survey was the consumption of 5 or more standard drinks for males and 4 or more standard drinks for

females per drinking day. In addition, the behaviour of drinking alcohol in mornings and the presence of one or more social and health problems in relation to alcohol consumption were also assessed.

Table 3: Standard drink

Types of alcoholic beverages	Volume	Content of ethanol	Ethanol	Standard drink
Beer	1 bottle/can 330 ml	4-5%	15 g	1.5
Wine/ Liquor	1 glass / 100 ml/	12.5%	12.5 g	1.3
Spirits (Vodka)	1 glass / 50 ml/	40%	20 g	2
Home brewed alcohol	1 cup /100 ml/	15%	15 g	1.5
Mare's milk/Airag	1 cup /500 ml/	5%	25 g	2.5

Methods to assess fruit and vegetables intake: Questions to clarify the number of days per week participants consumed fruits, vegetables, fibre rich whole grains, types of oils used for cooking, and the average number of days required to consume one pack of salt (500 gram) by one household were used to define eating habits of the surveyed population.

The mean intake of fruit and vegetables was assessed on the number of '**serving size(s)**' and the use of 50 commonly used fruits (24 different names from 14 types of fruits), vegetables (16 different names from 11 types of vegetables) and whole grains (8 different names from 6 types of whole grains rich in fiber) illustrated on show cards by serving size.

The respondents were asked about the average number of serving sizes for fruit and vegetables consumed **per usual day** by using **show cards**. The results were presented in accordance with locality, age group and gender difference.

In order to assess fruit and vegetables intake in this survey, one serving size equivalent for 80 grams of fruit and vegetables was considered as equal to 1 middle-sized piece of fresh fruit, 1 glass of fruit juice, 3-5 pieces of small-sized fruits like apricots, ½ cup of dried fruits, 1 slice of water melon, ½ cup of wild berries, 1 cup of raw vegetables, and ½ cup of steamed vegetables.

Method to assess salt intake: Questions to assess salt intake were asked to determine the average number of days required to consume one pack of salt by one household. Thus, 500 grams of salt were divided into the average days of consuming one pack of salt in order to get a daily salt consumption by household; then, the estimated data on the

daily salt consumption by one household was divided into 4.3 members (the Mongolian average number of household members) to get an average daily consumption by one household member (500/number of days/4.3).

Methods to measure physical activity: As defined in the WHO document published in 2002, physical activity was classified as follows:

- Active living by spending a minimum of 10 minutes per day,
- Activity for health when spending at least 30 minutes per day,
- Exercise for fitness which means exercise regularly for more than 20 minutes 3 times per week, and
- Training sport, which requires a training to meet individual needs with particular frequency and time schedule.

Physical activity is defined by using a complex set of 20 questions directed to measure activity and frequency of different types of physical activity performed at work (work setting/home), during transport (go walking, biking and use of different types of active transport) and at recreation (resting time/recreation settings). Data on the number of days, hours and minutes of physical activity performed at work, transport and recreation settings for at least 10 minutes per day were collected. The advantage of this complex set of questions is an opportunity to quantify physical activity and its intensity levels on an individual through measuring hours and minutes spent a day.

The median time of total physical acitivity per day spent for work, transport and recreational activities was measured by using the standard metabolic equivalent time, or MET. This unit is used to estimate the amount of oxygen used by the body for a specific type of physical activity. 1 MET unit is the energy (oxygen) used by the body when one sits quietly. The classification of physical activity was defined by high, moderate and low levels of physical activity and given as follows:

- High levels of physical activity
  - Vigorous-intensity activity on at least 3 days achieving a minimum total physical activity of at least 150 MET-minutes/ week; or
  - 7 or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum total physical activity of at least 3000 MET – minutes/week spent as part of work, during transport or at leisure taken together.
- Moderate levels of physical activity
  - 3 or more days of vigorous activity of at least 20 minutes per day; or
  - 5 or more days of moderate-intensity activity or/and walking of at least 30 minutes per day; or
  - 5 or more days of any combination of walking, moderate-

intensity or vigorous intensity activities achieving a minimum total physical activity of at least 600 MET– minutes/week

- Low levels of physical activity
  - This is the lowest level of physical activity. Those individuals who do not meet criteria for moderate or high and achieving at least 600 MET – minutes/week are considered to be 'Low active' or defined as 'physical inactivity'

5.2.4.2. Step 2

At this stage, physiological measurements on blood pressure, body weight, height, waist and hip circumferences, body fat, and scoring of body development and physical fitness were obtained.

Body weight. Weight was measured in adolescents and adults by weighing them. This is the simplest method to assess nutritional and health status of individuals by calculating weight against age in adolescents and weight against height in adults.

The "UNISCALE" electronic scale was used to measure the weight of participants in the survey. The specific characteristics of the "UNISCALE" are the precision of 100 grams, limited to measure up to 100,000 times, it functions with batteries, and is convenient to use for research purposes.

Body height. Body height is used to derive fitness and nutritional status of individuals.

Body height was measured by using "Somatometre – Stanley 04 - 116" instrument, which has the capacity to measure height up to 2 meters with a precision of a millimeter difference, reading height values in centimeters, and is convent to use for research purposes.

Body mass index (BMI) is then easily calculated by dividing weight (kg) to height (m) with the following formula:

$$BMI = \text{Body weight [kg]} : (\text{Body height [m]})^2$$

BMI is one of the indicators used in adolescents and adults for the assessment of nutritional and health status. BMI and waist circumference (WC) measurements are used for the assessment of body fat. However, by using BMI only without the assessment of body fat location, age of individual and body surface areas, the assessment of nutritional status can be biased.

Waist circumference (WC). A rubber non-stretchy tape with mm(s) precision made from easy to clean linoleum was used to measure waist circumference. Waist circumference is essential for defining body fat and its location around the abdomen.

Depending on the amount and location of body fat, obesity is classified into central (apple-like) and peripheral (pear-like). Central obesity is defined by accumulation of body fat around abdomen while peripheral obesity is defined by fat accumulation around hip area. The impact of these two types of obesity on NCDs varies. Central obesity is recognized as major risk factor in developing cardiovascular disease, diabetes and stroke whereas peripheral obesity poses a letter risk for NCDs.

Hip circumference (HC). Hip circumference is measured in order to calculate waist - hip ratio (WHR) which is another indicator to define central obesity.

WHR is calculated by using the following formula:

$$WHR = WC\ (cm) : HC\ (cm)$$

The NCD risk factors such as BMI, WC and WHR are used as indicators for the assessment of body fat in terms of its amount and location.

Body fat. Excess body fat or obesity is a recognised risk factor for NCDs. Body fat was measured in Step 2 of the survey using the "Body fat analyzer BM 100", CITIZEN Groups, Japan by assessing bioimpedance from hand-to-hand measurements. The proportion of body fat is described in regard to age, sex, weight and height of an individual.

Blood pressure: Blood pressure was measured three times on the right arm in the sitting position using OMRON Model M5 automatic blood pressure equipment. The mean from the second and third measurements were taken for analysis of the systolic and diastolic blood pressure.

The levels of physical fitness and body development: The physical fitness test is designed to determine the levels of physical fitness in people aged 15-64 years (3). The physical fitness testing was undertaken only in the Mongolian STEPs risk factor survey but not in STEPs surveys of other countries. Physical fitness is defined by using 5 quality indicators such as strength, speed, flexibility, endurance and balance. One in every five persons of the population aged 15-64 years were randomly selected and participated for fitness test.

- Strength factor means the ability to resist against external force by using muscle power. This is the basic factor to develop other quality factors in individuals.
- Speed factor means the ability to perform the fastest movement within the shortest period of time. This is an important factor to define physical activity.

- Flexibility factor means the ability to perform any movement by a maximum scope.
- Balance factor means the ability to keep balance in any situation and this ability depends on the function of the balance system of the body.
- Endurance factor means the ability to sustain performance of any movement over a long period.

The physical fitness tests were performed in the surveyed population aged 15 – 64 years using the scoring table given below (Table 4).

Table 4: Assessment of scoring for the physical fitness tests in adults 15-64 years

Score	Number of scores by age groups					Scoring
	15-24	25-34	35-44	45-54	55-64	
À	≥25	≥24	≥21	≥17	≥15	Very sufficient
B	21–24	20–23	17–20	12–16	11–14	Good
C	17–20	16–19	13–16	8–11	6–10	Sufficient
D	13–16	12–15	9–12	4–7	2–5	Neither sufficient or bad
F	≤12	≤11	≤8	≤3	≤1	Not sufficient

5.2.4.3. Step 3

Before the participants of Step 2 were selected for Step 3, an interviewer had to sign the questionnaire form for verification and then in case an individual (one in every three persons were randomly selected) was selected and signed the consent form for the Step 3, he/she underwent laboratory tests. Step 3 (laboratory analyses) of the survey was continued for approximately 15-20 minutes. In one in every three participants of this survey aged 25 – 64 years a blood sample was taken for analysis.

Biochemical factors: The biochemical risk factors for NCDs include fasting blood glucose, total cholesterol, and triglycerides. Accutrend GCT portable equipment (Roche, Switzerland) was used to measure capillary glucose, cholesterol, and triglycerides on a basis of dry chemical methods.

The laboratory personnel of the Public Health Institute trained the trainees on how to use the Accutrend GCT equipment and how to collect blood in terms of regulations and guidelines for safety and the survey methods on biochemicals. This was followed by practicals and practice to take measurements on these biochemical factors. The advantage of this method was to perform and inform participants on the results of analysis in the field during data collection.

The work flow of Step 3 was that after initiating the equipment for measurment a capillary drop of blood from the participant's finger was taken to cover the yellow test pads of the appropriate test strips for glucose, cholesterol, and triglycerides. ,After that the results were documented on paper and the used test strips destroyed before moving to the next analysis.

There were three reasons when the device did not return a numeric value of the measurement but indicated LO (low), HI (high), or (unable to assess):

1. 'Unable to access' reading appeared when the yellow test pads for testing were not covered by a sufficient amount of finger blood.
2. The Accutrend GCT equipment range of readable glucose values is between 1.1 - 33.3 mmol/l, for cholesterol between 3.88 - 7.76 mmol/l and for triglycerides between 0.80 - 6.86 mmol/l. Thus, readings LO (low) or HI (high) were displayed by the device when measurements for glucose, cholesterol, and triglycerides were outside of these ranges.

5.2.5. Summary of combined risk factors for developing NCD

Judgement for having a high risk for NCD was made if the survey participants have at least three of five risk factors presented including current daily smokers, less than 5 servings of fruits and vegetables per day, low level of physical activity, overweight or obese and raised blood pressure. In contrast if less than three of the risk factors were presented then the participants were considered as at risk people.

5.2.6. Data entry and cleaning

The survey data largely consisted of two parts including data from the questionnaire form (for STEP2 and STEP3) and PDA (for STEP1). Data of the questionnaire forms were hand-entered onto an EpiData 3.1 created database, a Microsoft Windows based program. Data were double entered and verified in the same EpiData 3.1 database and merged onto SPSS for Windows 11.5 with the data collected using PDA in the survey field. The survey participants were identified based upon unique identification codes which were created using aimag, district, cluster codes and identification numbers.

The cleaning process of the dataset included range and logical checking.

5.2.7. Weighting of data

Because multi-stage cluster sampling method was used in this survey,

it was necessary to perform weighting of data using a special weighting formula described in the appendix part (Appendix 2, 11). This set of the weighting formulas include three factors related to the probability of selecting the study population using the Mongolian STEPS multi-stage sampling method. The first factor is to accomplish a post-stratification adjustment related to the sample's distribution of location/gender/age groups relative to the total Mongolian population aged 15 to 64 years, the second factor related to the response rate for STEP 1 & 2, and the third factor is the sample's distribution of the STEP3 participants (those who are undergone biochemical test) in regard to locality/gender/age groups relative to the total population of Mongolia.

5.2.8. Data analysis

Data entry and data analysis were performed by the team of 6 people under the guidance of WHO consultant Assoc. Prof. Maximilian de Courten, Monash University, Australia with the help of WHO STEPS templates.

Data analysis was performed by using the Windows based Statistical Package for Social Science (SPSS) version 11.5. Frequency distributions with 95% confidence intervals were calculated using sample frequencies for all categorical variables. Descriptive statistics including sample means with 95% confidence intervals were calculated for all numeric variables. Detailed statistics of sample means were calculated in relation to age groups, gender, ethnicity and locality.

Data analysis on physical activity was performed by generating revised GPAQ 2 formulas in accordance with WHO guidance on physical activity using SPSS version 11.5. The levels of physical activity were determined for setting-specific physical activity performed at work, transport and recreation settings. In addition, levels of total physical activity were determined using categories of total physical activity classified as low, medium and high levels of physical activity.

Prior to the survey implementation, the survey methods of the Mongolian STEPs risk factors survey were re-verified by the survey team and approved by the Scientific Committee of the Public Health Institute on June 14th, 2005. An approval was also taken from the Ethics Committee of MOH and the survey results were presented and verified by the Scientific Committee of the Public Health Institute on April 21st, 2006.

6. Chapter 3.
Survey Results

Since 2002, the Committee of Western Pacific Regional Office (WPRO) of the WHO has supported Mongolia to be included into the list of countries to implement a national NCD prevention and control programme based upon the high prevalence of some NCDs risk factors and morbidity from non-communicable diseases becoming a leading cause of death in Mongolia. Henceforth, the lack of nationwide information data/documents on the major risk factors was a justification for conducting this survey. The survey findings are to become the baseline indicators for evaluating implementation success of the comprehensive integrated NCD prevention and control program.

6.3.1. Description of the sample size

The Mongolian NCD STEPs risk factor survey involved 3411 (1674 females and 1737 females) individuals aged 15 - 64 years from 20 aimags (provinces) and capital city Ulaanbaatar (Table 5 and 6).

Table 5: Weighted and unweighted proportion of the population

Demographic indicators		Survey sample		Survey frame	
		Number	Unweighted proportion	Number	Weighted proportion
Gender	Males	1674	49.1	849735	51.6
	Females	1737	50.9	797964	48.4
Ethnicity	Khalkh	2873	84.2	1385850	84.1
	Kazak	88	2.6	45304	2.7
	Others	450	13.2	216546	13.2
Age group	15-24	699	20.5	546809	33.2
	25-34	669	19.6	424666	25.8
	35-44	736	21.6	344721	20.9
	45-54	704	20.6	216345	13.1
	55-64	603	17.7	115159	7.0
Locality	Urban	1702	49.9	746414	45.3
	Rural	1709	50.1	901286	54.7
	Total	**3411**		**1647700**	

84.1% of the surveyed participants were khalkh, 2.7% kazak and 13.2% from other ethnic groups. In terms of age groups, 699 of the surveyed population were aged between 15 and 24 years, 669 were aged 25-34 years, 736 were aged 35-44 years, 704 were aged 45-54 years and 603 were aged 55-64 years. In terms of locality, 1702 people were from urban and 1709 people from rural areas (Table 6).

Table 6: Distribution of the study sample (by age and gender)

Age group	Males		Females		Total	
	N	*%*	*N*	*%*	*N*	*%*
15-24	351	50.2	348	49.8	699	20.5
25-34	321	48.0	348	52.0	669	19.6
35-44	352	47.8	384	52.2	736	21.6
45-54	353	50.1	351	49.9	704	20.6
55-64	297	49.3	306	50.7	603	17.7
Total	**1674**	**49.1**	**1737**	**50.9**	**3411**	**100.0**

A relatively equal distribution of the participants in number of people and in gender ratio in each age group gives the opportunity to compare and assess data between and within age groups.

6.3.2. Level of education

The average number of years spent in school for both sexes was 10.2 years with males spending 9.8 years and females 10.6 years (Table 7).

Table 7: Total number of years of education (by age and gender)

Age group	Males		Females		Total	
	N	*Mean*	*N*	*Mean*	*N*	*Mean*
15-24	351	8.9	348	9.8	699	9.3
25-34	321	10.2	348	11.1	669	10.6
35-44	352	10.5	384	11.4	736	10.7
45-54	353	10.4	351	11.3	704	10.7
55-64	297	9.8	306	8.9	603	9.5
15-64	**1674**	**9.8**	**1737**	**10.6**	**3411**	**10.2**

According to the survey, 1.0% of the population had no formal schooling, 1.5% had incomplete primary schooling (completed the first three grades or literate), 10.3% had completed primary education, 27.9% had incompleted secondary education, 24.6% had completed secondary education, 33.4% had completed college/university and 1.2% had obtained postgraduate degrees (Table 8).

33.4% of the surveyed population aged 15 – 64 years completed secondary school, vocational training and college/university, however in relation to gender, females (38.1%) were relatively more educated as

Table 8: Level of education by age group

Age group	Level of education – by years													
	No formal schooling		Incompleted primary schooling 1–3		Completed primary 1–4		Incompleted secondary 5–8		Completed secondary 1–10		College/University completed		Post graduate degree	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
15-24	8	1.2	9	1.5	101	15.3	292	42.6	198	26.6	90	12.6	1	0.1
25-34	4	0.6	5	0.8	34	5.4	152	23.6	194	29.0	271	39.5	9	1.1
35-44	7	0.9	14	2.0	20,0	2.8	144	20.0	198	27.0	340	45.5	13	1.7
45-54	4	0.6	10	1.4	73	10.4	135	19.4	115	16.4	349	49.1	18	2.6
55-64	14	2.4	21	3.6	157	26.9	81	13.2	46	7.4	274	44.8	10	1.7
15-64	**37**	**1.0**	**59**	**1.5**	**385**	**10.3**	**804**	**27.9**	**751**	**24.6**	**1324**	**33.4**	**51**	**1.2**

compared to males (29.1%) (Tables 8 and 9).

A comparison of education level by gender has showed that 11.3% of males aged 15 – 64 years had completed primary, 31.2% had not completed secondary, 24.5% had completed secondary education, and 29.1% had vocational and tertiary education (profession), while 9.3% of the surveyed females have completed primary, 24.3% had incompleted secondary, 24.8% had completed secondary education, and 38.1% had

Table 9: Level of education (by age and gender)

	Age group	Level of education–by years													
		With no education		Incompleted primary 1-3		Primary 1-4		Incompleted secondary 5-8		Completed secondary 1-10		College/University completed		Masters level	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Males	15-24	7	2.1	4	1.3	55	16.8	162	46.3	88	23.7	35	9.8	0	0.0
	25-34	1	0.3	5	1.5	21	6.8	82	26.1	100	30.7	110	33.9	2	0.6
	35-44	3	0.9	8	2.3	11	3.2	87	24.8	97	27.7	143	39.9	5	1.4
	45-54	4	1.1	4	1.1	36	10.2	87	24.7	67	19.0	146	41.4	9	2.6
	55-64	4	1.5	9	3.1	81	27.9	37	12.1	20	6.6	139	46.4	7	2.4
	15-64	**19**	**1.2**	**30**	**1.7**	**204**	**11.3**	**455**	**31.2**	**372**	**24.5**	**571**	**29.1**	**23**	**1.0**
Females	15-24	1	0.3	5	1.7	46	13.8	130	38.8	110	29.6	55	15.4	1	0.2
	25-34	3	0.8	0	0.0	13	3.9	70	21.0	94	27.3	161	45.2	7	1.7
	35-44	4	1.0	6	1.6	9	2.4	57	14.9	101	26.3	199	51.7	8	2.1
	45-54	0	0.0	6	1.7	37	10.7	48	13.7	48	13.6	203	57.5	9	2.6
	55-64	10	3.4	12	4.1	76	25.8	44	14.5	26	8.3	135	43.1	3	0.9
	15-64	**18**	**0.8**	**29**	**1.4**	**181**	**9.3**	**349**	**24.3**	**379**	**24.8**	**753**	**38.1**	**28**	**1.4**

vocational and tertiary education (profession). The survey results have shown that in the age group 15-24 years, the proportion of males with incomplete secondary education (46.3%) was higher as compared to females (38.8%), and on the contrary, for the overall population aged 15-64 years, the proportion of females with vocational training and tertiary education (38.1%) was higher as compared to males (29.1%). This might be explained by males tending to complete 8th grade of schooling at later ages having a tendency to be develop later than females. This could restrict further studies and education of men, which needs to be specifically addressed. (Table 9).

6.3.3. Household income and employment

The household income of the surveyed population was assessed based upon average earnings over the past year using questionnaires. 3362 out of the 3411 surveyed participants answered precisely the question "What are average earnings of the household have been in the last year?". Thus the mean reported household earnings per year was 1,174.336.16 tugrigs in the past year. In regard to age groups, highest earnings were reported by the population aged 25-34 years (1,207.800 tugrigs) and the lowest was reported by those aged 55-64 years (1,031.000 tugrigs). Considering that household income consists of joint earnings from working age adults (aged 18 years and above) living together in one household, the average income earned by one adult person a year was 438.486 tugrigs (Table 10à, 10b, Appendix 1.6).

Table 10à: Household income in the past year (by age group)

Earnings	**Age group**					
	15–24	**25–34**	**35–44**	**45–54**	**55–64**	**Total (15–64)**
N	666	667	729	699	601	3362
Household income (tugrigs)	1,189.122.6	1,207.835.4	1,153.700.6	1,182.025.8	1,031.059.1	1,174.336.1

Table 10b: Average annual income per adult person (18 years and above) per year (by age group)

Earnings	**Age group**					
	15–24	**25–34**	**35–44**	**45–54**	**55–64**	**Total (15–64)**
N	666	667	729	699	601	3362
Annual income per adult person (18 years and above) (tugrig)	393,847.6	501,185.9	492,669.6	383,336.9	351,475.8	438,485.7

According to the results, 19.3% of the population were employed in governmental organizations, 8.0% in non-governmental organizations, 18.8% were self-employed and 5.2% engaged in occasional work. In addition, 21.1% of the population were schoolchildren or students, 3.6% were working from home; furthermore 15.2% out of 17.8% of the surveyed population who were unemployed are able-bodied to work (Appendix 1.5 and 1.6).

The survey results revealed that 52.2% (N=1779) of the randomly chosen population aged 15-64 years was employed. About 22.9% of 40.3% of the employed females were working in governmental organizations, on the contrary the surveyed males (10.0%+24.2%=34.2%) were more likely to work in non-governmental and private organizations (10.0%), and were self-employed (24.2%) (Table 11). In other words, in the last years, most of the employed population (59.7%) in particular men tended to choose working in non-governmental organizations and engaged in business (Table 11à, 11b).

Table 11a: Prevalence of employed population (by age and gender)

	Age group	Government employee		Nongovernment employee		Self employed		Not in regular paid employment		Total Employed Population	
		n	%	*n*	%	*n*	%	*n*	%	***n***	%
Males	15-24	19	5.6	22	5.5	14	4.4	36	10.8	91	9.6
	25-34	61	19.5	33	10.0	20	6.3	115	35.6	**229**	**24.0**
	35-44	74	21.1	57	15.9	23	6.6	127	36.1	**281**	**29.5**
	45-54	92	26.1	46	13.1	16	4.5	87	24.5	**241**	**25.3**
	55-64	45	15.5	21	7.1	15	5.4	29	9.5	**110**	**11.6**
	15-64	**291**	**15.9**	**179**	**10.0**	**88**	**5.4**	**394**	**24.2**	**952**	**53.5**
Females	15-24	20	6.1	10	2.4	10	3.3	19	5.8	**59**	**7.1**
	25-34	93	27.8	31	8.2	22	7.2	65	19.2	**211**	**25.5**
	35-44	149	39.0	36	9.3	22	5.8	73	19.0	**280**	**33.8**
	45-54	135	38.6	24	6.9	13	3.8	55	15.5	**227**	**27.4**
	55-64	29	9.4	5	1.6	7	2.5	9	3.0	**50**	**6.0**
	15-64	**426**	**22.9**	**106**	**5.8**	**74**	**4.8**	**221**	**13.1**	**827**	
Sub-total		**717**	**40.3**	**285**	**16.0**	**162**	**9.1**	**615**	**34.6**	**1779**	**100.0**
Total		**717**	**19.3**	**285**	**8.0**	**162**	**4.7**	**615**	**18.0**		**52.2**

*A total survey population was ∑ 3411, *A total of employed population was ∑ 1779 or 52.2%, and *A total of unemployed population was ∑ 1632 or 47.8%

At present, 47.8% (N=1632) of the population was unemployed of which almost 2 in every 3 were on subsidies such as pensioners and schoolchildren/students, and the rest or 1 in every 3 were able-bodied to work however have not engaged in specific occupations.

Table 11b: Prevalence of unemployed population (by age and gender)

	Age group	Schoolchildren/ students		Housewives		Pensioners		Disabled (subsidy)		Able-bodied but unemployed		Total Unemployed Population	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%	***n***	%
Males	15-24	212	60.4	3	0.9	0	0.0	2	0.6	43	12.1	260	36.0
	25-34	10.	3.1	5	1.6	0	0.0	16	5.0	61	19.1	**92**	**12.7**
	35-44	0	0.0	3	0.9	4	1.1	13	3.8	51	14.6	71	9.8
	45-54	0	0.0	3	0.8	31	8.7	24	6.9	54	15.3	**112**	**15.5**
	55-64	0	0.0	7	2.4	141	47.4	20	6.7	19	6.4	**187**	**25.9**
	15-64	**222**	**30.7**	**21**	**2.9**	**176**	**24.4**	**75**	**10.4**	**228**	**31.6**	**722**	**100.0**
Females	15-24	217	61.6	20	5.5	0	0.0	1	0.3	51	15.1	**289**	**31.7**
	25-34	12	3.1	42	11.4	0	0.0	4	1.1	77	21.6	**137**	**15.0**
	35-44	5	1.3	14	3.6	4	1.1	8	2.1	75	19.3	**104**	**11.4**
	45-54	0	0.0	18	5.1	52	14.7	16	4.6	38	10.7	**124**	**13.6**
	55-64	0	0.0	2	0.7	249	81.3	3	0.9	2	0.7	**256**	**28.1**
	15-64	**234**	**25.7**	**96**	**10.5**	**305**	**33.5**	**32**	**3.5**	**243**	**26.7**	**910**	**47.8**
Sub-total		**456**	**27.9**	**117**	**7.2**	**481**	**29.5**	**107**	**6.5**	**471**	**28.9**	**1632**	**100.0**
Total		**456**	**21.1**	**117**	**3.6**	**471**	**6.2**	**107**	**15.2**	**471**	**2.6**		**47.8**

*A total survey population was ∑ 3411, *A total of employed population was ∑ 1779 or 52.2%, and *A total of unemployed population was ∑ 1632 or 47.8%

From those who were able-bodied to work aged 15-64 years one in every three males and one in every four females, and particularly one in every two people in the prime of life (25-54 years) who are able to work are not employed. Thus in Mongolia unemployment has become a regular phenomenon especially amongst the male population.

6.3.4. Behavioural risk factors

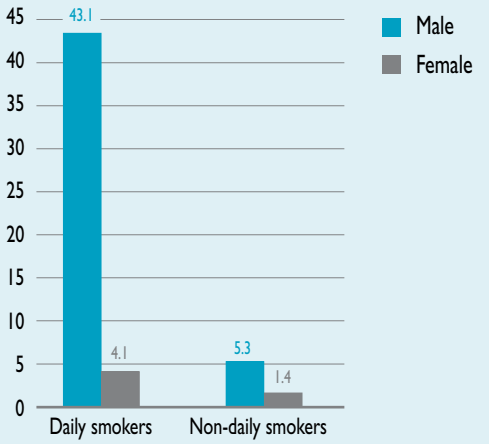
6.3.4.1. Tobacco use

The survey participants were asked questions about current smoking, previous smoking, the age of initiation of smoking, duration of smoking, and the quantity of tobacco smoked daily. Within the objectives of this survey, there was a need to identify and assess the smoking status as one of the risk factors for developing non-communicable diseases among population.

The survey showed that 24.2% (±0.05) of the population aged 15-64 years were current daily smokers, 3.4% (±0.05) non-daily smokers and 72.4% (±0.05) did not smoke which appear that the positive attitude towards smoking is prevailing among general population. However, in regard to gender, the proportion of current daily smokers was 10 times higher in males (43.1%±0.2) as compared to females (4.1%±0.05). Only

5.3% (+0.05) of males and 1.4% (+0.05) of females aged 15-64 years were non-daily smokers (Figure 2).

Figure 2: The frequency of smoking (by gender)



The survey showed that 27.6% (±0.1) of urban residents and 21.4% (±0.1) of rural residents were current daily smokers. In regard to locality, the gender difference was also notable among current daily smokers. Thus, the proportions for both urban (46.1% ±0.2) and rural (40.5%±0.2) males were 10 times higher as compared to urban (7.4%±0.1) and rural (1.5%±0.04) females. Also, in urban areas, the proportion of current daily smokers for both males and females was higher by 6% as compared to rural areas. In summary, smoking is common among males thus 2 in every 5 males smoke daily.

Among smokers, the average age of initiation to smoking was 19.8 (±0.02) years. In regard to gender, males were started smoking from 19.1 (±0.04) and females 27.8 (±0.1) years, accordingly. Their average years of smoking were 17.5 (±0.03) years and appear to be longer in males by 4 years (17.8(±0.04) as compared to females (13.8±0.1). In regard to locality, the average age of initiation to smoking was not different in both urban (19.7±0.03) and rural (19.9±0.03) smokers.

Among current daily smokers, 89.9% (±0.1) have used manufactured cigarettes. By looking at gender difference, the survey revealed that 89.4% (±0.1) of males and 95.5% (±0.2) of females have used manufactured cigarettes. In regard to locality, 98.2% (±0.1) of urban smokers and 80.9% (±0.2) of rural current daily smokers have used manufactured cigarettes.

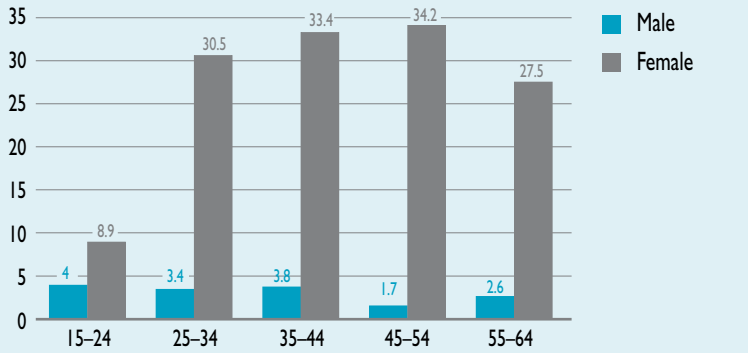
The average number of manufactured cigarettes smoked per day was 12 (±0.5) among current daily smokers; in terms of gender difference, the average number of the manufactured cigarettes smoked per day was 12.6 (±0.6) in male daily smokers and 7.5 (±1.1) in female daily smokers, thus males smoke 4-5 more manufactured cigarettes per day as compared to females.

A frequency of smoking in regard to age group is given as follows:

- The proportion of current daily smokers was the lowest in the

age group 15-24 years;
- A high prevalence of smoking (30.5-34.2%) was observed in the age groups 25-54 years;
- The prevalence of tobacco use (27.5%) tended to decrease in the age group 55-64 years (Figure 3).

Figure 3: Prevalence of tobacco use (by age group)



Discussion

Globally about a third of the male adult global population smokes. Smoking related-diseases kill one in 10 adults globally, or cause four million deaths. Smoking is on the rise in the developing world but falling in developed nations. Among Americans, smoking rates shrunk by nearly half in three decades (from the mid-1960s to mid-1990s), falling to 23% of adults by 1997. In the developing world, tobacco consumption is rising by 3.4% per year. Among WHO Regions, the Western Pacific Region - which covers East Asia and the Pacific and includes Mongolia with nearly two-thirds of men smoking. In China, about 67% of men smoke, and 4% of women, and amongst Chinese youths, about a third of male teens smoke and nearly 8% of females [20].

According to the survey results, 43.1% of males and 4.1% of females were current daily smokers which showed a reduction by 10.2% in males and 9.6% in females in comparison to the data of Ulaanbaatar city survey (56.3% of work-age males) and (17% of work-age females), (S. Tsegmed et al., 2002) [8].

The surveyed males started smoking at 19 and females at 28 years, accordingly. The average years of smoking among current daily smokers were 17.8 for men and 13.8 years for women which demonstrate a later intitation to smoking as compared to the survey results of global youth survey; however, it appeared to present a high risk due to a relatively long duration of smoking (14-18 years).

Conclusion:

1. The overall prevalence of current smokers was 28% of which 24.2% and 3.4% were current daily and non-daily smokers, respectively.
2. There was noted a marked gender difference for current daily smokers, by presenting 10 times higher prevalence in males (43.1%) as compared to females (4.1%).
3. The average age of initiation to smoking was 20 years, however males started smoking at younger age (by 8.1 years earlier) as compared to females.
4. The average duration of smoking was relatively longer (17.5 years) which present a high risk for developing NCDs among smokers.
5. Most of smokers have used manufactured cigarettes.

6.3.4.2. Alcohol consumption

The survey showed that 33.5% (±0.1) of the population or 1 in every 3 persons did not consume alcohol over the past 12 months. In regard to gender, 25.0% (±0.1) of males and 42.6% (±0.1) of females have reported that they never consumed alcohol over the past 12 months, which means that females tended to have a more positive attitude of not drinking alcohol as compared to males.

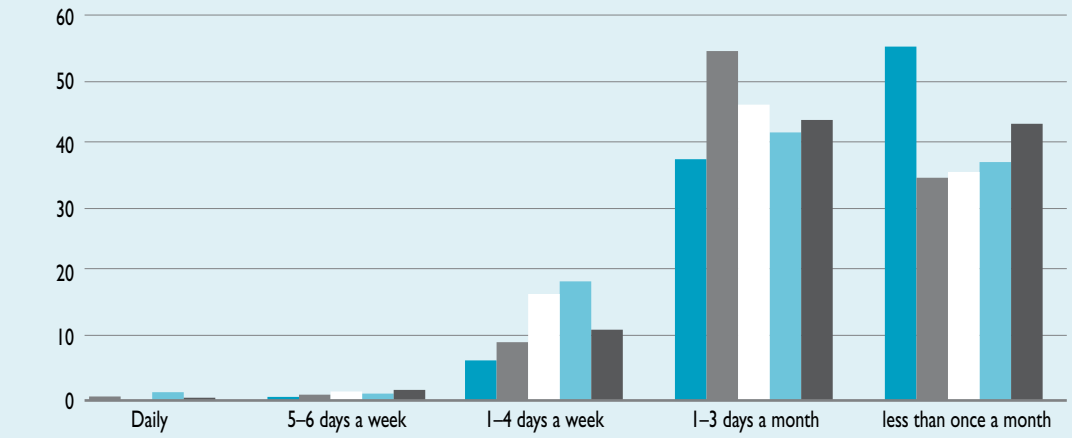
Looking at current drinkers in terms of frequency of their alcohol use and grouping them into occasional (who drink alcohol up to 3 times a month), moderate (who drink alcohol for 1-4 days per week) and frequent (who drink alcohol for 5 or more days per week) drinking, the results showed that about 60.8 (±0.02)% of current drinkers consumed alcohol on an occasional basis (with gender distinctive 65.1% in males and 56.2% in females), 5% consumed alcohol in moderate (8.8% males and 1.0% females) and only 0.7 (±0.04)% were drinking alcohol frequently (1.1% males and 0.2% females). This means that a relatively small proportion of the population tends to drink alcohol frequently and therefore puts itself at high risk.

More detailed analysis of frequency for alcohol use in regard to gender has shown that 0.5% (±0.02) males used alcohol daily, 1.0% (±0.02) used it 5 - 6 days a week, 11.7 % (±0.02) used it 1-4 days a week, 45.7% (±0.02) used it 1-3 days per month, and 41.1% (±0.02) drunk alcohol less often than once in a month. Overall, the results showed that males reported a high frequency of drinking (13.2% of males drink alcohol for more than 4 days per month) thus demonstrated of being at risk.

In addition, in regard to age group, 0.7% of men aged 25-34 years, 0.3% aged 35-44, 1.4% aged 45-54, and 0.4% of men aged 55-64 years reported

drinking alcohol on a daily basis. On the contrary, women of all age groups did not report drinking alcohol daily. Having alcohol for 1-4 days per week or more often increased with age. In particular, one in every three men was at risk in the age group 35-54 years (Figure 4, 5).

Figure 4: Frequency of alcohol consumption for males (by age group)



	Daily	5–6 days a week	1–4 days a week	1–3 days a month	less than once a month
15–24	0	0.6	6.3	37.9	55.2
25–34	0.7	0.8	9.1	54.6	34.8
35–44	0.3	1.4	16.6	46.0	35.7
45–54	1.4	1.0	18.5	41.9	37.3
55–64	0.4	1.6	11.1	43.7	43.2

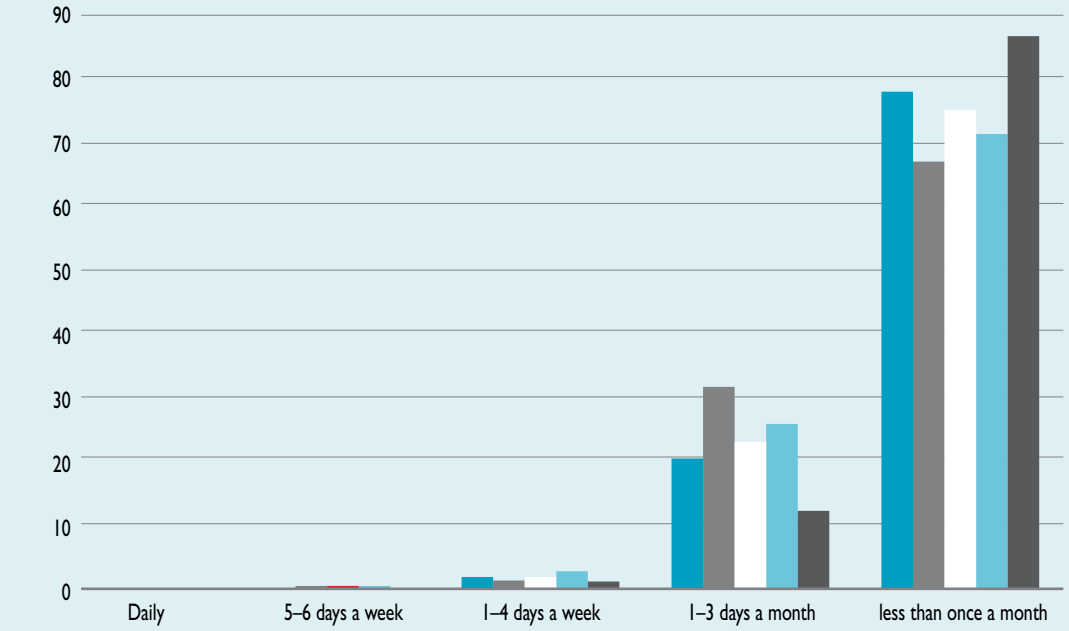
There was a statistically significant difference noted for moderate drinking behavior in females as compared to males, thus 0.3% (±0.02) of female respondents used alcohol for 5-6 days a week, 1.8 % (±0.02) of females used alcohol for 1-4 days in a week, 24.5% (±0.02) of females used alcohol for 1-3 days in a month and 73.4% (±0.02) used alcohol for less than once in a month (Figure 5).

According to WHO recommendations, risk of chronic harm related to alcohol consumption can be assessed in relation to the average amount of alcohol consumed over a long-term period (Table 12).

The survey results are presented as follows:

- Over the past 12 months, 27.4% of the male population or one in every three men were at risk of which 8.4% were classified as being at high risk and 12.8% classified as a medium risk people;
- 10.7% of the female population or one in every ten women were at risk of which 4.5% were classified as high risk, 5% classified as being at a medium risk, and 1.2% were at low risk.

Figure 5: Frequency of alcohol consumption for females (by age group)



15–24	0	0	1.8	20.5	77.7
25–34	0	0.5	1.3	31.5	66.7
35–44	0	0.4	1.9	22.9	74.8
45–54	0	0.5	2.7	25.9	70.9
55–64	0	0	1.4	12.3	86.3

Table 12: Criteria for chronic harm of alcohol consumption (by gender and levels of risk)

Gender	**Levels of risk**					
	Low		**Medium**		**High**	
	g	*%*	*g*	*%*	*g*	*%*
Male	1 – 40 g	6.2	41 – 60 g	12.8	61 + g	8.4
Female	1 – 20 g	1.2	21 – 40 g	5.0	41 + g	4.5

Also, in accordance with the WHO recommendations, high risk days or days for binge drinking were defined for males being at risk by consuming 5 or more standard drinks on one occasion and females being at risk by consuming 4 or more standard drinks per drinking day using the classification for standard drinks (Table 13) and presented as follows:

- In regard to age group, the proportion of binge drinking was the highest among the population aged 35-44 years, where 40.9% (±5.6) of the males reported having consumed 5 or more drinks and 17.4% (±6.0) of the females of this age group consumed 4 or more standard drinks on a drinking occasion

Table 13: Binge drinking high risk days (by gender)

Criteria	Males		Females	
	N	*%*	*N*	*%*
Less than once per month	728	21.6	364	10.0
Less than one per week and more than once per month	184	5.1	15	0.3
More than once per week	44	0.6	2	0.0
Total	**956**	**27.3**	**381**	**10.3**

over the past 12 months.

- 27.3% of the surveyed males engaged in binge drinking of which 21.6% reported so less than once per month, 5.1% less than once per week but more than once per month, and 0.6% more often than one day per week;
- 10.3% of the females engaged in binge drinking of which 10.0% did so less than once per month, 0.3% less than once per week but more than once per month, and there was notably no case for females as compared to males reporting binge drinking more than one day per week.

Conclusion:

1. Over the past 12 months, one in every three persons (25.0% of all males and 42.6% of all females) have reported that they did not consume alcohol. Therefore females tend to have a more positive attitude of not drinking alcohol.
2. Among current drinkers over the past 12 months, the results show that **about 60.8** (±0.02) of the population (65.1% in males and 56.2% in females) were drinking occasionally, **5%** consumed in **moderate** (8.8% males and 1.0% females) and **only 0.7** (±0.04)% were drinking **frequently** (1.1% males and 0.2% females) presenting that a relatively small proportion of the population tends to drink alcohol on a frequent basis and therefore puts itself at high **risk**.
3. 27.3% of the surveyed males were at high risk having had high risk days for binge drinking of which 5.1% having done so less than once per week but more than once per month, and 0.6% having had more than one high risk days per week drinking 5 or more standard drinks per drinking day.
4. 10.3% of the surveyed females were at high risk having had high risk days for binge drinking of which 0.3% having done so less than once per week but more than once per month to drink 4 or more standard drinks per drinking day. In females there was notably no case of having had more than one binge drinking day

per week.

5. The proportion of binge drinking was highest in the surveyed population aged 35-54 years in both sexes with the tendency to increase with age thus demonstrating a higher risk in these age groups as compared to others.

6.3.4.3. Fruit and vegetables intake

In order to assess and evaluate the eating pattern of the surveyed population, the respondents were asked about how often (on how many days per week and serving sizes) they eat fruit and vegetables, and fibre rich grains; type of oils used in food, and for how many days a pack of 500 grams of salt is used in a household.

The survey revealed that the population consume fruits on average on 1.7 (±0.01) days per week, with more days reported by urban residents (2.3±0.01) as compared to rural residents (1.2±0.004). Regarding gender and ethnic groups, males eat fruit on 1.4 (±0.01) days and females on 2.1 (±0.01) days per week; khalkh ethnic group for 1.8 (±0.01) days, kazak for 1.8 (±0.02) days, and other ethnic groups for 1.1 (±0.01) days per week (Table 16).

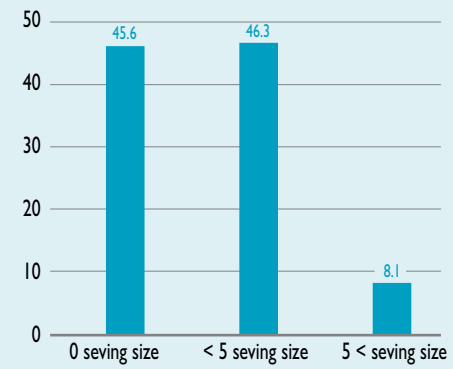
Looking at serving sizes of fruit eaten the survey showed that the mean number of serving sizes reported by the population was 1.5 (±0.003) with locality distinctive for urban population having reported 1.8 (±0.1) serving sizes and for rural population having had 1.1 (±0.1) serving sizes per day. In terms of gender and ethnicity, the mean number of serving sizes were 1.27 (±0.004) for men and 1.8 (±0.01) for women,

Table 14: Fruit intake (by age group, gender and locality)

	Population groups	N	Average days		Average serving sizes	
			Mean	*95% CI*	*Mean*	*95% CI*
Locality	Urban	1702	2.3	±0.01	2.0	±0.01
	Rural	1709	1.2	±0.01	1.2	±0.004
	Total	**3411**	**1.7**	**±0.01**	**1.5**	**±0.003**
Gender	Males	1674	1.4	±0.01	1.3	±0.004
	Females	1737	2.1	±0.01	1.8	±0.01
	Both sexes	**3411**	**1.7**	**±0.01**	**1.5**	**±0.003**
Ethnicity	Khalkh	2873	1.8	±0.01	1.6	±0.004
	Kazak	88	1.8	±0.02	1.8	±0.01
	Others	450	1.1	±0.01	1.0	±0.01
	Total	**3411**	**1.7**	**±0.01**	**1.5**	**±0.003**

1.6 (±0.004) for khalkh, 1.7 (±0.01) for kazak and 1.0 (±0.01) for other ethnic groups (Table 14).

Figure 6: Fruit intake (percent)



The survey revealed that 45.5% (±0.05) of the surveyed population did not consume any fruit and 46.3% (±0.05) reported having consumed less than 5 serving sizes of fruits per day and only 8.1% (±0.05) of the population showed positive attitudes of consuming 5 or more serving sizes of fruits per day.

Looking at fruit intake in regard to age group distinctive, the survey revealed that only 9.0% (±0.1) aged 15-24 years, 10.6% (±0.1) aged 25 – 34 years, 7.5% (±0.01) aged 35 – 44 years, 6.1% (±0.1) aged 45 – 54 years, and 3.3% (±0.1) of the population aged 55 – 64 years consumed more than 5 serving sizes of fruit per day and fruit intake tended to decrease with the increase of age (Table 15).

Table 15: Fruit intake of the population (by age group)

Age group	N	0 serving sizes per day			≤5 serving sizes per day			≥5 serving sizes per day		
		%	*95% CI*	*N*	*%*	*95% CI*	*N*	*%*	*95% CI*	*N*
15-24	699	31.8	±0.2	222	59.2	±0.2	414	9.0	±0.1	63
25-34	669	41.6	±0.2	278	47.8	±0.1	320	10.6	±0.1	71
35-44	736	51.9	±0.2	382	40.6	±0.1	299	7.5	±0.01	55
45-54	704	56.3	±0.2	396	37.6	±0.2	265	6.1	±0.1	43
55-64	603	63.2	±0.3	381	33.5	±0.2	202	3.3	±0.1	20
Total	**3411**	**45.5**	**±0.1**	**1659**	**46.3**	**±0.05**	**1500**	**8.1**	**±0.1**	**252**

As of vegetable intake, the population reported consuming vegetables on average on 5.6 (±0.003) days per week. In regard to locality and gender, there were 6.5 (±0.003) days having reported by urban, 4.9 (±0.01) days by rural, 5.5 (±0.01) days by men, and 5.7 (±0.01) days by women, thus the vegetable intake was higher by 1.6 days among urban than among rural consumers (Table 16).

On average, the surveyed population consumed 1.7 (±0.002) serving sizes of vegetables per day. In regard to locality and gender, urban

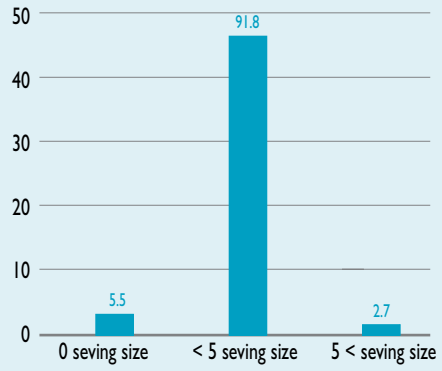
population consumed 1.9 (±0.003), rural population 1.4 (±0.002) serving sizes per day; men and women 1.7 (±0.003) and 1.6 (±0.003) serving sizes per day, accordingly (Table 16).

Table 16: Vegetable intake of the population (by gender, locality and ethnic groups)

	Population groups	N	Average days		Average serving sizes	
			Mean	*95% CI*	*Mean*	*95% CI*
Locality	Urban	1702	6.5	±0.01	1.9	±0.003
	Rural	1709	4.9	±0.01	1.4	±0.002
	Total	**3411**	**5.6**	**±0.01**	**1.7**	**±0.002**
Gender	Males	1674	5.5	±0.01	1.7	±0.003
	Females	1737	5.7	±0.01	1.6	±0.003
	Both sexes	**3411**	**5.6**	**±0.01**	**1.7**	**±0.002**
Ethnicity	Khalkh	2873	5.7	±0.01	1.7	±0.002
	Kazak	88	5.8	±0.001	1.4	±0.01
	Others	450	5.2	±0.01	1.2	±0.01
	Total	**3411**	**5.6**	**±0.001**	**1.7**	**±0.002**

The survey revealed that 91.8% (±0.04) of the respondents reported eating between 1 and 4 serving sizes of vegetables, 2.7% (±0.03) of the population consume 5 or more servings of vegetables per day and 5.5% (±0.01) reported not consuming any vegetables per day (Figure 7).

Figure 7: Vegetable intake (percent)



In regards to age group of respondents, the survey revealed that 2.5% (±0.04) of the participants aged 15-24 years, 2.9% (±0.1) of those aged 25 – 34 years, 3.3% (±0.05) of people aged 35 – 44 years, 2.6% (±0.1) of population aged 45 – 54 years and 1.8% (±0.1) of the population aged 55 – 64 years consumed 5 or more serving sizes of vegetables per day presenting that in all age groups, only a fewer proportion have positive attitudes towards healthy eating (Table 17).

In regard to a combination of fruit and vegetable intakes, the mean number of serving sizes for fruit and vegetables was 3.2 (±0.004) per day.

This mean was 3.87 (±0.01) among urban and 2.63 (±0.01) among rural population; with gender distinctive, men have reported 3.0 (±0.01) and women 3.4 (±0.01) serving sizes per day which present a lower intake in comparison to the recommended dietary intakes for fruit and vegetables (5 serving sizes or 400 grams per day) (Table 18).

Table 17: Vegetable intake (by age group)

Age group	N	0 serving sizes per day			≤5 serving sizes per day			≥5 serving sizes per day		
		%	95% CI	N	%	95% CI	N	%	95% CI	N
15-24	699	4.0	±0.1	28	93.4	±0.01	653	2.6	±0.04	18
25-34	669	4.5	±0.01	30	92.7	±0.01	620	2.8	±0.1	19
35-44	736	6.1	±0.001	45	90.6	±0.01	667	3.3	±0.1	24
45-54	704	6.5	±0.001	46	90.9	±0.01	640	2.6	±0.1	18
55-64	603	7.0	±0.02	42	91.2	±0.02	550	1.8	±0.1	11
Total	**3411**	**5.5**	**±0.01**	**191**	**91.8**	**±0.01**	**3130**	**2.7**	**±0.01**	**90**

Table 18: Fruit and vegetable intake of the population (by gender, locality and ethnic groups)

	Population groups	N	Average days	
			Mean	95% CI
Locality	Urban	1702	3.9	±0.01
	Rural	1709	2.6	±0.01
	Total	**3411**	**3.2**	**±0.004**
Gender	Males	1674	3.0	±0.01
	Females	1737	3.4	±0.01
	Both sexes	**3411**	**3.2**	**±0.004**
Ethnicity	Khalkh	2873	3.4	±0.01
	Kazak	88	3.2	±0.02
	Others	450	2.2	±0.01
	Total	**3411**	**3.2**	**±0.004**

The survey revealed that 72.5% (±0.1) of the respondents consumed less than 5 serving sizes out of the recommended 5 or 400 g per day though, 22.3% (±0.1) of the population or one in every five persons have presented healthy eating behaviour by having consumed 5 or more serving sizes per day and only 5.2% (±0.003) reported not consuming any fruit and vegetables daily (Figure 8).

In regards to age group, the population aged 15-24 years have had 3.4 (±0.01), 25-34 years had 3.5 (±0.02), 35-44 years had 3.1 (±0.01), aged 45-54 years had 2.8 (±0.01), and aged 55-64 years had 2.3 (±0.01) serving sizes per day which in general present that fruit and vegetables

intake tended to decrease with the increase of age.

6.3.4.4. Whole grain intake

Products containing whole grains such as brown bread, bran, oatmeal, and bread and cookies made with wheat grain are considered as foods rich in dietary fiber (complex carbohydrates).

Figure 8: Fruit and vegetable intake (percent)

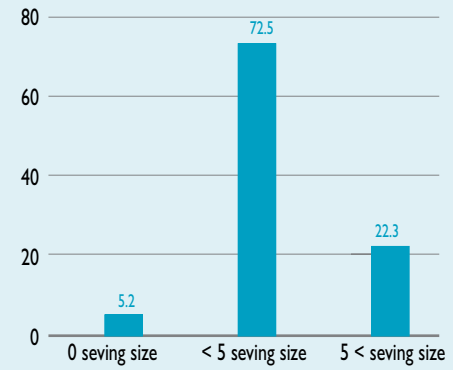


Table 19a: Prevalence of unemployed population (by age and gender)

Population groups	N	Did not consume			Intake per week								
					1-3 days per week			4-6 days per week			Daily		
		%	95%CI	N	%	95%CI	N	%	95%CI	N	%	95%CI	N
Urban	1702	73.2	±0.1	1220	20.5	±0.1	357	1.6	±0.03	32	4.8	±0.05	93
Rural	1709	81.3	±0.1	1388	14.7	±0.1	250	1.3	±0.02	22	2.6	±0.03	49
Total	**3411**	**77.6**	**±0.1**	**2608**	**17.3**	**±0.1**	**607**	**1.5**	**±0.02**	**54**	**3.6**	**±0.02**	**142**
Male	1674	77.5	±0.1	1312	17.6	±0.1	295	1.2	±0.02	21	3.8	±0.04	67
Female	1737	77.8	±0.1	1350	17.1	±0.1	312	1.7	±0.03	33	3.4	±0.04	75
Total	**3411**	**77.6**	**±0.1**	**2608**	**17.3**	**±0.1**	**607**	**1.5**	**±0.02**	**54**	**3.6**	**±0.02**	**142**

22.4% of the population consumes fiber rich foods on average 0.6 days per week, 17.3% on 1-3 days per week, and 1.5% on 4-6 days per week. Only 3.6% of the population consumes fiber rich foods every day, specifically 4.8% of urban and 2.6% of rural respondents. However, 77.6% or most of the population did not consume such foods, which means the intake of fiber-rich whole grain is very low among Mongolians (Table 19a, 19b).

6.3.4.5. Fat and oil intake

Regarding the most frequently used oil for cooking at home, 62.8% (±0.1) of the population reported using vegetable oil, 20.3% (v0.1) fatty meat and 7.2% (±0.04) animal fat for cooking at home.

The proportion of respondents who use vegetable oils more frequently for cooking was almost 2 times lower in rural areas (48.9±0.1) as compared to urban areas (79.6v0.1). 2.2 (±0.03)% of the urban population used animal fat and 10.7 (±0.1)% used fatty meat. On the

Table 19b: Mean days of fiber rich whole grain intake (by gender, ethnic groups and locality)

	Population groups	N	Average days	
			Mean	*95% CI*
Locality	Urban	1702	0.7	±0.1
	Rural	1709	0.5	±0.1
	Total	**3411**	**0.6**	**±0.002**
Gender	Males	1674	0.6	±0.01
	Females	1737	0.6	±0.01
	Both sexes	**3411**	**0.6**	**±0.002**
Ethnicity	Khalkh	2873	0.6	±0.1
	Kazak	88	0.3	±0.01
	Others	450	0.6	±0.01
	Total	**3411**	**0.6**	**±0.002**

contrary, 11.3 (±0.01)% of the rural population used animal fat and 28.2 (±0.1)% fatty meat (Table 20, Figure 9).

The survey revealed that most of the urban population consumes vegetable oils, while rural respondents tended more to have negative consumption patterns by using animal fat by 9.1% and fatty meat by 17.5% higher as compared to the urban respondents.

Table 20: The most frequently used oil and fat for cooking at home (by gender and locality)

	Population groups	N	Vegetable oil			Animal fat			Fatty meat		
			%	*95% CI*	*N*	*%*	*95% CI*	*N*	*%*	*95% CI*	*N*
Gender	Males	1674	56.8	±0.1	932	8.3	±0.1	134	24.5	±0.1	448
	Females	1737	69.2	±0.1	1201	6.0	±0.1	110	15.8	±0.1	281
	Total	**3411**	**62.8**	**±0.1**	**2133**	**7.2**	**±0.04**	**244**	**20.3**	**±0.1**	**729**
Locality	Urban	1702	79.6	±0.1	1332	2.2	±0.03	42	10.7	±0.1	210
	Rural	1709	48.9	±0.1	801	11.3	±0.1	202	28.2	±0.1	519
	Total	**3411**	**62.8**	**±0.1**	**2133**	**7.2**	**±0.04**	**244**	**20.3**	**±0.1**	**729**

Oil and fat intake in regard to locality is shown in Figure 9.

6.3.4.6. Salt intake

The survey results showed that the population consumed on average 10.0 (±0.01) grams of salt per day. Locality and gender difference showed 9.03 (±0.02) and 10.6 (±0.02) grams in urban and rural respondents; and 10.3 (±0.02) and 9.76 (±0.02) grams in males and females, respectively (Table 21).

The salt intake was by 4.5 grams lower in urban and 7.1 grams in rural areas as compared to the results of the previous survey *(13.5 grams in*

urban and 17.7 grams in rural areas according to the "The Nutrition Status of the Mongolian Population 1999) [10].

The current survey revealed that 73.9% of the population drank salted tea on 4.8 (±0.05) days per week.

Figure 9: Oil and fat mainly used for cooking at home

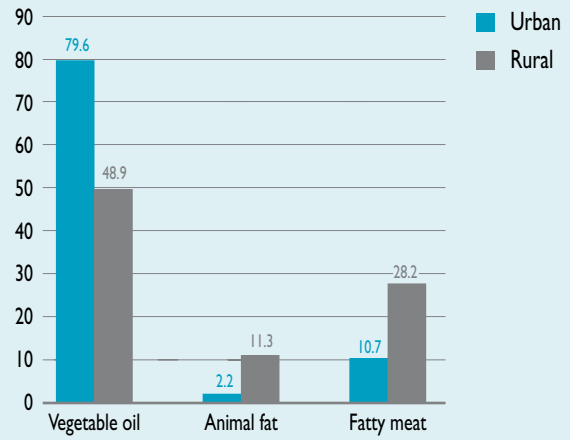


Table 21: Salt intake of the surveyed population (by gender, locality and ethnic group)

	Population groups	N	Salt intake (gram/person/day)			Number of days of using salt tea		
			Mean	*95% CI*	*N*	*Mean*	*95% CI*	*N*
Gender	Males	1674	10.3	±0.02	792	4.9	±0.01	1256
	Females	1737	9.8	±0.02	1068	4.7	±0.01	1256
Locality	Urban	1702	9.0	±0.02	792	4.7	±0.01	1256
	Rural	1709	10.6	±0.02	1068	4.9	±0.01	1256
Ethnicity	Khalkh	2873	9.9	±0.01	1642	4.8	±0.01	2154
	Kazak	88	9.2	±0.1	43	6.0	±0.02	79
	Other	450	11.2	±0.04	175	4.2	±0.01	279
	Total	**3411**	**10.0**	**±0.3**	**1860**	**4.8**	**±0.01**	**2512**

As shown in the table above, there was no difference noted in the number of days drinking salted tea in terms of locality. However, in regard to ethnic groups, khalkh people drank salt tea on 4.8 (±0.01) days per week and kazak people on average on 6 (±0.02) days per week.

The survey revealed that 30% of the population consumed less than 6 grams of salt a day (14.9% consumed 6 – 8 grams, 18.9% consumed 8 – 10 grams of salt a day), and 36.2% of the surveyed consumed 10 and more grams of salt a day. Generally speaking, two in every three people had high salt intake (Table 22). Salt intake was higher in rural areas by 11.6% than in urban and in males higher by 5.1% as compared to females.

Table 22: Salt intake (by locality, gender and ethnic group)

Daily intake (g/person)	Locality - %		Gender - %		Ethnic groups - %			Total population
	Urban	*Rural*	*Males*	*Females*	*Khalkh*	*Kazak*	*Others*	
< 6 grams	36.2	26.2	29.1	30.9	31.2	29.7	18.5	30.0
6–8 grams	15.5	14.5	14.9	15.0	14.4	21.0	17.9	14.9
8–10 grams	19.3	18.6	17.2	20.4	19.7	13.9	12.4	18.9
> 10 grams	29.0	40.6	38.9	33.8	34.6	35.3	51.2	36.2

Conclusion

1. The population consumed on average 3.2 serving sizes of fruit and vegetables per day; thus fruit and vegetables intake is lower by 1.5 serving sizes than the recommended 5 serving sizes or 400 gram of fruit and vegetables. 72.5% or most of the surveyed population consumed less than 5 serving sizes of fruit and vegetables per day.
2. In regard to locality, the mean number of serving sizes of fruit and vegetables was 1.5 times lower (2.6 serving sizes) among rural as compared to urban residents (3.9 serving sizes).
3. 22.4% of the population consumed foods rich in fiber on 0.6 days per week, and 77.6% of the population did not consume them at all. No difference was noted in relation to age groups, gender, locality and ethnicity. However, lower consumption of foods rich in fiber was observed in rural respondents (2.6%) by 2.2% as compared to 4.8% of urban respondents.
4. 62.8% of the population used mainly vegetable oils for cooking at home. The use of vegetable oils for home cooking was higher among females and among urban residents thus demonstrating a healthier diet.
5. Notwithstanding 62.8% of the surveyed population reported using vegetable oils for cooking at home, this indicator is lower in rural areas by 31% as compared to urban areas. In addition, one in every five respondents of this survey mainly used fatty meat with males consuming by 1.5 times more than females and with 2.6 times higher consumption being reported in rural areas as compared to urban areas.
6. Although salt intake has decreased by 4.5 grams in urban residents and 7.1 grams in rural residents as compared to the results of the '2nd National Nutrition Survey' (1999), the average salt intake was 10.0 (±0.004) grams per day and two in every three people (most of the survey population) used more than 6 grams of salt a day thus exceeding the WHO recommended salt intake.

6.3.4.7. Physical activity

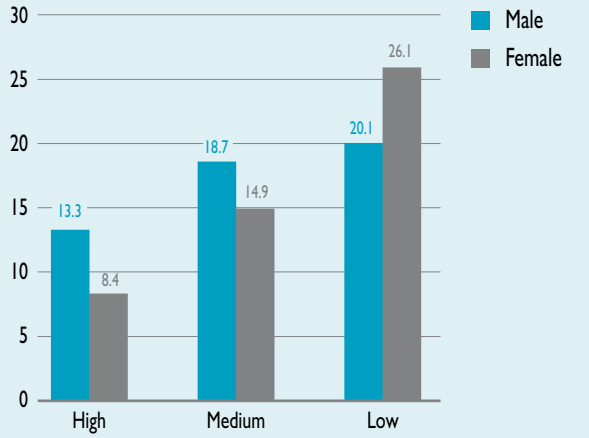
Physical activity was assessed based on intensity, duration and work-related activities. These three main areas were looked at for the total population and in regard to gender, age grouping, and locality difference. The classification of physical activity was defined by high, moderate and low levels of physical activity based upon the level of intensity.

High levels of physical activity. According to the survey, the prevalence of people engaged in high levels of physical activity was 10.9% (±0.05); in relation to gender difference, this prevalence was higher in males (13.3%±0.05) by 5% as compared to females (8.4%±0.05). In terms of locality, people residing in rural areas (13.6±0.1) had a higher prevalence by 6% compared to those who residing in urban areas (7.7±0.05) thus showing a more positive attitude towards undertaking intensive physical activity.

In Mongolia, one in every seven men engaged in high levels of physical activity, with the highest proportion (17.9%) noted in those aged 25-34 years, which further tended to decline with age. Thus, the proportion reduced to 12.4% aged 35-44 years further reaching 8.9% in the population aged 55-64 years or decreased by **2 times** showing a variation between 5.5-9% across age groups.

In comparison, one in every twelve women engaged in high levels of physical activity. In regard to age groups, the proportion of those people aged 15-24 years was 3.9% and reaching a peak (12.5%) in those aged 35-44 years; however, in women aged 55-64 years this proportion (4.7%) decreased by **2.6 times** showing the lowest variation (3.5-7.8%). A relatively stable proportion was noted among women aged **25-44 years** (11.6-12.5%). Thus, the engagement in high levels of physical activity is started to fall in women by 10 years earlier as compared to men (Figure 10,11).

Figure 10: Physical activity (high, medium and low levels by gender)



Medium levels of physical activity. The prevalence of people who engaged in medium levels of physical activity was 16.8% (±0.1). In males, this

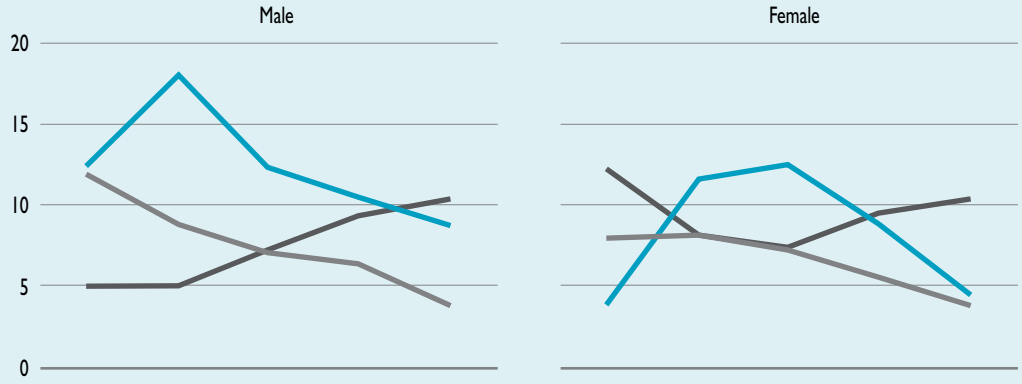
prevalence was higher by 3.8% (18.7%±0.05) as compared to females (14.9%±0.1). In terms of locality, people from rural areas who engaged in medium level of physical activity (19.5 ±0.1) have had higher prevalence by 6% as compared to those who residing in urban area (13.7±0.05) thus overall presenting a progress towards commitment to medium levels of physical activity.

In regard to men, the highest prevalence (12.0%) for those engaged in medium levels of physical activity was noted among those aged 15-24 years with further steady (3.1-0.8%) increase with age in the age groups 25-54 years (8.9%,7.3%,6.5%), however this prevalence (3.9%) decreased by 3 times in people aged 55-64 years.

In general, the proportion of those engaged in medium levels of physical activity was relatively lower in women by 3.6% as compared to men. However, a comparative analysis for age groups showed a stable prevalence (8.1-8.4%) amongst those aged 15-24 years with further increase (7.4-5.8%) in people aged 35-54 years, then in the age group 55-64 years, it decreased (4.1%) by 2 times presenting a natural feature common to ageing (Graph 9,10).

Low levels of physical activity. The prevalence of people who engaged in low levels of physical activity was 23.1% (±0.1) or one in every five people; in females this prevalence (26.1% (±0.2) or one in every four women) was higher by 6.0% as compared to males 20.1% (±0.1). In terms of locality, people from urban areas engaging in low levels of physical activity (29.4±0.2) have had higher prevalence by 11.8% (or one in every three people) compared to those who resided in rural

Figure 11: Physical activity (high, medium, low levels by gender and age group)



	Male					Female				
	15–24	25–34	35–44	45–54	55–64	15–24	25–34	35–44	45–54	55–64
Low	5.0	5.2	7.2	9.5	10.4	12.2	8.1	7.6	9.5	10.6
Medium	12.0	8.9	7.3	6.5	3.9	8.1	8.4	7.4	5.8	4.1
High	12.5	17.9	12.4	10.6	8.9	3.9	11.6	12.5	9.0	4.7

areas (17.6±0.1). In summary, it appears that females were more likely to engage in low levels of physical activity and people residing in urban areas tended to undertake less physical activity.

In regard to age groups and gender, the proportion of those engaged in low levels of physical activity in women aged 15-24 and 55-64 years were 12.2% and 10.6%, respectively and this proportion decreased by 2.7-4.6% in women aged 25-54 years (8.1%,7.6%,9.5%). On the contrary, the proportion in men who engaged in low levels of physical activity aged 15-24 years was 5.0% against 10.4% in age group 55-64 years demonstrating 2 times increase with the increase of age (Figure 10,11).

34.1% (±0.05) of the surveyed population or one in every three people were not engaged in moderate or vigorous physical activity at work which was 29.9% (one in every three men) in males and 38.7% in females (two in every five women). In regard to transport and recreation settings, 8.5% (±0.05) of the population (10% of males or 1 in every 10 men and 6.8% of females) were not engaged in moderate or vigorous physical activity during transport and 29.8% (±0.1) of the population (31% of males and 28.5% of females or one in every three people in both men and women) were not engaged in recreational physical activities, which is a negative health behaviour (Figure 12).

Figure 12: Percentage of people who did not engage in moderate or vigorous physical activity (by gender)

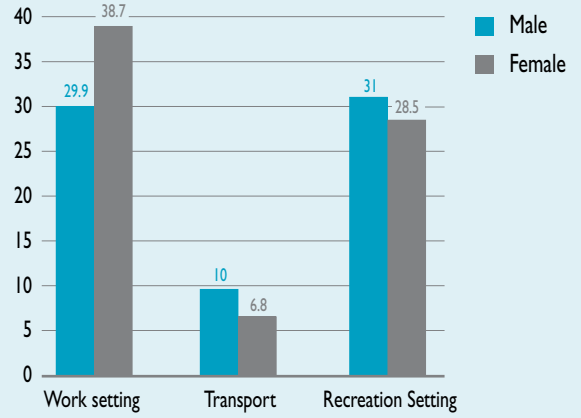
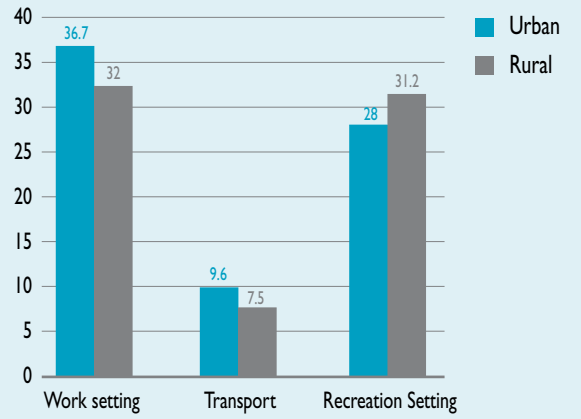


Figure 13: Percentage of people who were not engaged in vigorous and moderate physical activity (by locality



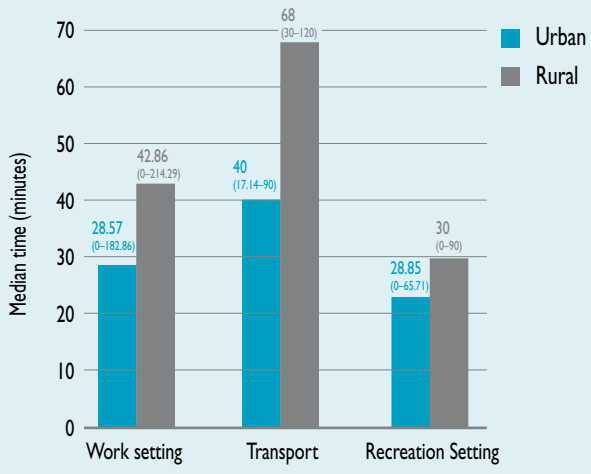
In the next graph, the proportion of people who did not engage in moderate or vigorous physical activity at different settings is shown by difference in locality. In urban areas, the proportion of people who did not engage in moderate or vigorous physical activity was higher at work (36.7%) and during transport (9.6%) by 4.7-2.1% as compared to those in rural areas. On the contrary, in rural areas, the proportion was higher at recreation setting (31.2%) by 3.2% as compared to those in urban areas (Figure 13).

The overall median hours of physical activity per week spent at work, for transport and in recreational settings was 22 (10.3-39), the median for males was relatively higher with 24 (11.7-42) as compared to females with 20.8 (9.3-36.7).

The median minutes spent in these three settings per day were 188.57 (88.57-334.29), with 205.71 (100.00-360.00) in males and 178.57 (80.0-314.29) in females. Furthermore, looking at the data by settings it showed that the average median minutes spent **at work** was 38.57 (0-205.71) minuteswhich means that half of the surveyed population or 1705 people used to spend more than 38 minutes per day by engaging in physical activity at work. The average median minutes spent **during transport** (go walking and biking) was 60 minutes (21.43 -120) and **at recreation setting** it was 25.71 (0-77.14) minutes.

The results stratified by gender revealed that half of males spend more than 51.43 (0-240) minutes per day at work setting which is higher as compared to females who spend more than 28.57 (0-171.43) minutes at work setting; half of males spend less than 60 (21.43-120) and half of females 51.43 (21.43-120) minutes per day during transport. However, at recreation settings, the average median minutes spent for physical activity in females were 30 (0-90) minutes which are higher by 4.29 minutes as compared to that of males which were 25.71 (0-68.57) minutes. In regard to locality, the median minutes spent for moderate or vigorous activity at work were 28.57 (0-182.86) and 42.86 (0-

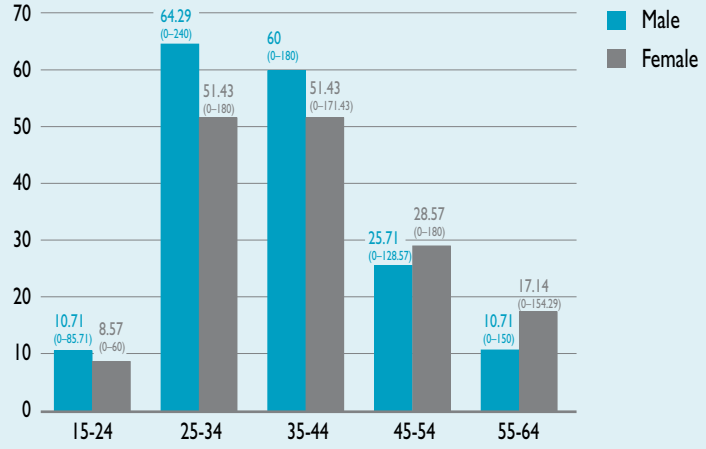
Figure 14: The average median minutes spent for physical activity per day (by different settings)



214.29) minutes respectively in urban and rural areas. It appears that minutes spent at work and during transport were relatively higher in rural areas, however, it is an object to do more detailed analysis taking into account that underreporting on minutes spent at work setting might cause a bias. At recreation setting, the median minutes were higher in rural areas [30 (0-90)] by 7.15 minutes as compared to urban areas [22.85 (0-65.71)], (Figure 14).

The average median minutes per day specific **for work and occupation related activities were considered** in relation to vigorous and moderate intensity physical activity. The average median minutes spent for moderate intensity physical activity for males were 30 (0-171.43), and for females 17.14 (0-128.57) thus presenting that this median was lower in females by 13 minutes compared to males. The average median minutes shown in the graph below stratified into specific age groups and gender present relatively lesser median minutes spent for physical activity in the age groups 15-24 and 55-64 years for both males and females than in the age groups 25-44 years where the median minutes were considerable in relation to age needs of the physical activity with further tendency to decline beginning from age 45 years (Figure 15).

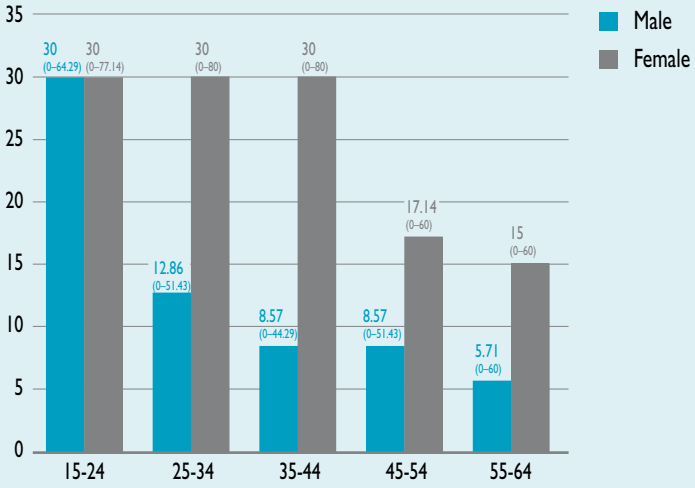
Figure 15: Work-related moderate intensity physical activity (by age group and gender)



The average median minutes specific to work and occupation related vigorous intensity physical activity were 0 (0-2.86) for males, and 0 (0) minutes for females thus females were not involved in the vigorous physical activity for work related activities. The highest average median minutes was noted in the age group 25-44 years for males with the peak of 102.86 minutes. In females aged 15-44 years the highest average median minutes was 8.57 minutes per day.

The average median minutes spent **for recreation related moderate intensity physical activity** were high in females (25.71 [0-77.14]) by 9 minutes than in males (17.14 [0-60.0]).

Figure 16: Recreation-related moderate intensity physical activity (by age group and gender)



In the figure above, the average median minutes spent for recreation related moderate intensity activity in both male and female respondents aged 15-24 years were 30 minutes however, this average median minutes tended to decrease with increasing age. From the results it is apparent that most of female respondents aged 15-44 years used to report relatively higher minutes (30 minutes) for recreation related moderate intensity activity as compared to other age groups.

The survey revealed that the average median minutes spent on vigorous physical activity during recreation time was 0 (0-0) for both males and females presenting that in general, the population is not involved in vigorous sport exercising and recreational activities. Only young males of the age group 15-24 years used to spend up to 17.14 minutes in recreational related vigorous intensity physical activity as compared to both male and female respondents from other age groups.

Conclusion

1. The levels of physical activity and physical inactivity were defined first time in accordance with WHO guidelines. Moreover, the survey results will be important to monitor physical inactivity amongst the population.
2. The finding that 23% of the surveyed population engaged in low levels of physical activity, 34% and 30% of the population

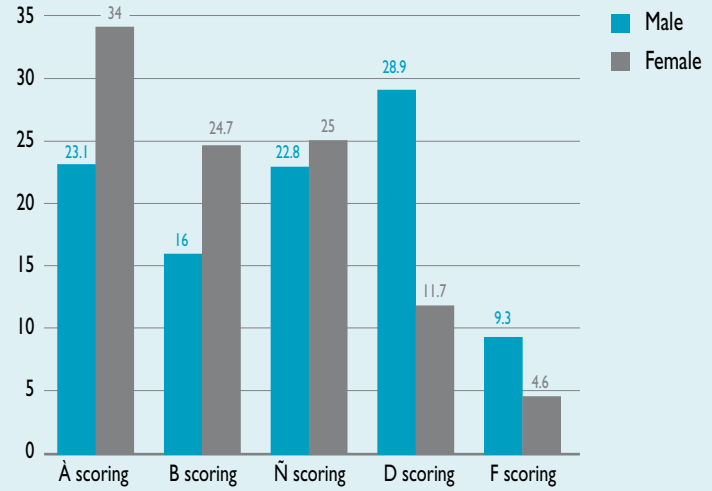
did not engage in vigorous and moderate physical activity respectively at work and recreational settings is related to an increasing number of sedentary work places and indicative that inefficient actions have been taken at the national level to involve the community in physicial activity as well as to initiate it as a healthy behaviour.

3. Notwithstanding the average median minutes for physical activity per day which accumulated from minutes spent in work, transport and recreation settings being higher than the recommended 30 minutes per day, there seems to be a lack of attention towards targeted physical activity programmes **specific to work and recreation settings in order** to improve fitness. Involvement in exercise needs to become a positive lifestyle behaviour. Furthermore, there is a need to develop effective Government policies to create favourable environment to enhance information, education and communication of the benefits of physical activity directed to the public and individuals giving them an opportunity to exercise in order to prevent non-communicable diseases.

6.3.4.8. Physical fitness and development

Physical fitness was assessed on the performance of five body tests in participants and the results were classified into five scores such as A- Very sufficient, B- Good, C- Sufficient, D- Neither sufficient or bad and F- Not sufficient. One in every five persons of the population aged 15-64 years were participated for fitness test. The level of fitness was determined with the sum of scoring of the five tests. Its details is given in the methods section.

Figure 17: Levels of body development and fitness (by gender)

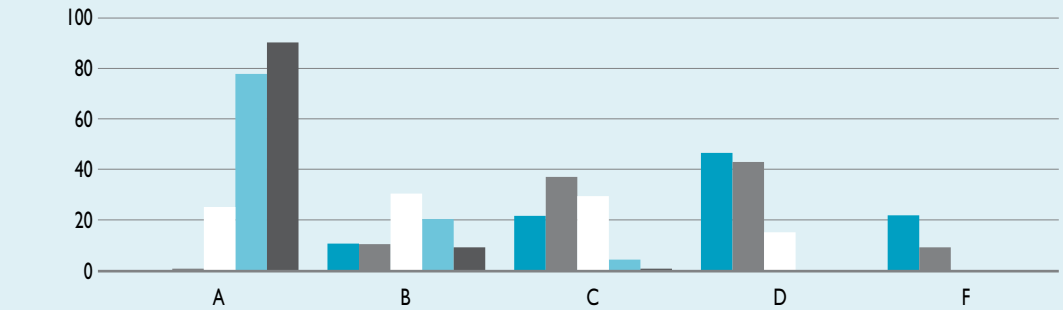


In figure 17, 23.1 (±0.2) % of males and 34 (±0.2)% of females have got "A- Very sufficient" scoring, 16 (±0.2) % of males and 24.7 (±0.3) % of females score "B- Good", 22.8 (±0.2) % of males and 25.0 (±0.2) % of females score "C- Sufficient", 28.9 (±0.1)% of males and 11.7 (±0.1) % of females score "D- Neither sufficient or bad", and 9.3 (±0.1) % of males and 4.6 (±0.1) % of females having got scoring "F-Not sufficient."

According to the survey, 48.2 (±0.2) % of the population scored A or B. There was no gender difference noted and scoring for A and B was found in 39.0 (±0.2) % male participants and 58.7 (±0.2) % female participants. In the graph below, the levels of body development and fitness are shown stratified by age group and gender (Figure 18a, 18b).

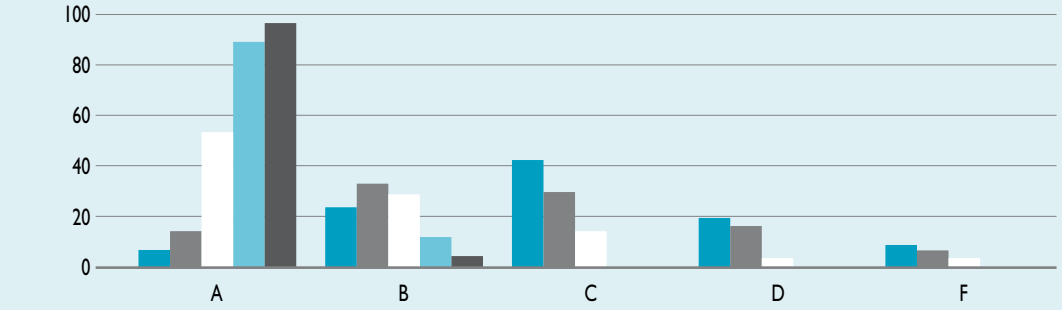
80.2 (±0.2) % of the participants **aged 15-24 years** were scoring C and under. In regard to gender, 89.1 (±0.2) % of the surveyed males and 69.4 (±0.4) % of the surveyed females were scoring C and under. This demonstrates the necessity to take action to improve body development and fitness and education for fitness among young people. Even though C scoring is considered sufficient it is like the yellow light of the road signal meaning a warning. Relating this to the army recruitment criteria, one in five of army age young people does not meet the criteria to take on army service in terms of fitness scoring and one in three young people does not meet health criteria to participate in the army. For instance, for young people to get passed entry standards for military service (soldier and army institutions), this scoring criteria should be one step higher as compared to the surveys conducted among population. Therefore, in accordance with our survey results, those young people aged 15-24 years who received scoring A and B would find it challenging

Figure 18a: Body development and fitness levels by age groups in males



	A	B	C	D	F
15–24	0	10.9	21.4	46.2	21.5
25–34	1.4	10.9	36.2	42.9	8.6
35–44	25.2	29.9	29.6	15.2	0
45–54	76.6	19.2	4.2	0	0
55–64	89.7	8.8	1.5	0	0

Figure 18b: Body development and fitness levels by age groups in females



	A	B	C	D	F
15–24	7.4	23.2	42.3	18.9	8.3
25–34	14.4	33.3	29.8	16.5	6.0
35–44	52.8	27.9	13.9	4.2	1.1
45–54	87.9	12.1	0	0	0
55–64	95.4	4.6	0	0	0

to meet army entry standards in terms of body development and fitness.

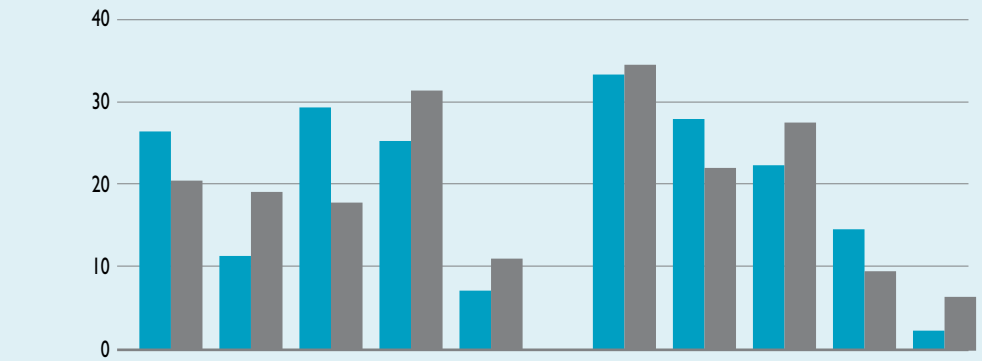
As of those aged 25-34 years, a particular proportion of people are engaged into the occupational activity while other proportion are unemployed. Small number of these age people are studying and involved into education sector. 69.2 (±0.3) % of the surveyed people of this age group were received assessment to scoring C and under. 87.7 (±0.3) of all male participants and 52.3% (±0.4) of all female participants were received scoring C and under. Nowadays, social changes, urbanization and centralization have impact on increase in the number of people living in urban area thus increasing the number of people who are unemployed and the number of people living with low salary and all these contributed to a lack of public buildings and sport gyms for exercising. The existing sport grounds and fitness clubs are expensive to exercise and some of them can not function to meet standard criterias. Also, one of the main issues is to change mind of people towards healthy exercising. In this connection, there is necessity to enhance information, education and communication activities directed towards sport and exercise activities.

Amongst those aged 25-34 years, a certain proportion is engaged in occupational activity while others are unemployed. A smaller number of these people are studying or are involved in the education sector. 69.2 (±0.3) % of the surveyed people of this age group received assessment scoring C and under. 87.7 (±0.3) of all male participants and 52.3% (±0.4) of all female participants received scoring C and under. Nowadays, social changes, urbanization and centralization have an impact on increased number of people living in urban areas thus increasing the number

of people who are unemployed and the number of people living with low salary. In addition there is a lack of public buildings with exercise facilities and sport gyms. The existing sport grounds and fitness clubs are often expensive to use and some of them do not meet standard criterias. Also, one of the main challenges is to change the mind of people towards healthy exercising. In this regard, it is necessary to enhance information, education and communication activities promoting sport and exercise.

People aged 35-64 years, have generally defined their role in life and contribute much of their time towards building the social and family environment. Therefore they give increased attention and care to their own welfare and that of their family members with attention to live healthier which can include attempts to be involved in intensive physical activity to some extent. Thus, 88.4 (±0.3) % of the participants of these people scored A (98.6 (±0.3) % of all males and 80.8 (±0.3)% of all females of this age group), 43.7 (±0.2)% of the participants have received scoring B (60.9 (±0.3)% of all males and 31.1 (±0.2)% of all females). Looking at differences by locality, the proportion of people with A and B scoring were 49.3 (±0.2)% among urban and 47.4 (±0.2)% among rural residents; thus there was no noted difference in overall A and B scoring. In the graph below, A and B scoring are shown stratified by locality and gender (Figure 19).

Figure 19: Body development and fitness scoring (by locality)



	Male					Female				
	A	B	C	D	F	A	B	C	D	F
Urban	26.7	11.5	29.4	25.2	7.2	33.2	28.0	22.2	14.5	2.1
Rural	20.4	19.2	18.0	31.6	10.8	34.6	22.1	27.3	9.4	6.6

Conclusion

1. In accordance with the Mongolian Government Decree No. 97 from May, 2005 which revised and reviewed criterias

for scoring of the "National plan for body fitness of the population" and within the framework of the implementation of this national plan, the NCD risk factor surveillance was of high importance to collect data on body development and fitness at the national level thus becoming the baseline document for the future reference.

2. According to the survey results, scoring for the age groups 15-34 years was lower as compared to 35-64 years. Young people of the age group 15-24 years include school drop out children, herds children and children engaged in heavy labour force who usually not involved into sport and physical fitness activities; also this age group include students from colleges and universities, and vocational training centres in which predominance of the negative circumstances such as no sport classes included into school education programmes or when it is included the programming is insufficient, use of old standards, and no sufficient facilities and equipment for sport classes, no sport gyms and grounds or existing gyms which do not meet required criterias contribute to the low levels fitness scoring as well as there is no initiation and creativeness from the individuals and poor social attitude towards sporting and sport classes.
3. The findings demonstrate the need to establish an environment to promote healthy physical activities through policy and to promote positive attitudes for healthy active living through conducting annual fitness assessment as a systematic approach for monitoring and evaluating body development and fitness thus to set up a national information database.

6.3.5. Biochemical risk factors for NCDs

The prevalences of biochemical risk factors for developing NCD in this survey was identified in fasting capillary blood based upon impaired fasting glucose with blood glucose levels higher than 5.6 mmol/l but not diabetic levels, elevated cholesterol levels greater 5.2 mmol/l or 6.5 mmol/l and above, for elevated triglycerides with levels 2.26 mmol/l and above . In one in every three participants of this survey aged 25 – 64 years a blood sample was taken for analysis.

6.3.5.1. Cholesterol

Elevated blood cholesterol is recognized as an important risk factor for developing coronary heart disease. The mean cholesterol of the surveyed population was 4.59 mmol/l (±0.001) and stratification by gender has showed no difference (Table 23).

Table 23: Mean cholesterol level in capillary blood (mmol/l)

Age group	Males			Females			Both sexes		
	N	*Mean*	*95% CI*	*N*	*Mean*	*95% CI*	*N*	*Mean*	*95% CI*
15-24	5	4.32	±0.001	5	4.39	±0.001	10	4.36	±0.001
25-34	59	4.56	±0.002	55	4.68	±0.004	114	4.61	±0.002
35-44	103	4.76	±0.004	100	4.66	±0.003	203	4.72	±0.003
45-54	92	4.90	±0.01	103	4.75	±0.004	195	4.83	±0.003
55-64	79	4.74	±0.01	98	4.86	±0.01	177	4.80	±0.004
Total	**338**	**4.59**	**±0.002**	**361**	**4.59**	**±0.001**	**699**	**4.59**	**±0.001**

For both males and females, the mean cholesterol levels tended to be higher with increased age. The mean cholesterol was 4.66 (±0.002) mmol/l among urban residents and 4.55 (±0.001) mmol/l among rural residents, thus there was no difference noted.

Prevalence of cholesterol risk category or hypercholesterolemia (cholesterol level 5.2 mmol/l and above) was 7.0% (±0.1) and there was no gender difference noted. In regards to age, this prevalence increased with age in both sexes (Tables 24).

Table 24: Prevalence of cholesterol risk category by age group and gender (cholesterol level in capillary blood 5.2 mmol/l and above)

Age group	Males				Females				Both sexes			
	N	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*
15-24	90	0	0	0	130	0	0	0	0	0	0	0
25-34	103	1.9	±0.1	2	130	7.6	±0.2	10	233	4.7	±0.1	12
35-44	153	15.8	±0.2	25	165	9.9	±0.2	16	318	13.0	±0.1	41
45-54	136	15.7	±0.2	22	151	15.1	±0.3	23	287	15.4	±0.2	45
55-64	123	13.0	±0.3	16	142	17.9	±0.3	27	265	15.3	±0.2	43
Total	**524**	**6.8**	**±0.1**	**65**	**601**	**7.2**	**±0.1**	**76**	**1125**	**7.0**	**±0.01**	**141**

There was no difference noted in the proportion of people of cholesterol risk category (cholesterol level with 5.2 mmol/l and above) in terms of locality (Table 25).

The prevalence of high cholesterol risk category or hypercholesterolemia with 6.5 mmol/l and above was 0.8 (±0.01)%. In regards to gender, the

Table 25: Prevalence of cholesterol risk category by gender and locality (cholesterol level in capillary blood with 5.2 mmol/l and above)

Age group	Males				Females				Both sexes			
	N	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*
Urban	262	7.9	±0.1	36	312	8.2	±0.1	45	574	8.0	±0.05	81
Rural	262	6.0	±0.1	29	289	6.4	±0.1	31	551	6.2	±0.05	60
Total	**524**	**6.8**	**±0.1**	**65**	**601**	**7.2**	**±0.1**	**76**	**1125**	**7.0**	**±0.01**	**141**

proportion of males was 1.1 (±0.1)% and of females 0.5 (±0.02)%, thus presenting higher prevalence by 2 times in males as compared to females. In this risk category, the cholesterol risk was relatively higher in males aged 35-44 years as compared to other age groups (Table 26).

Table 26: Prevalence of cholesterol high risk category by gender (cholesterol level in capillary blood with 6.5 mmol/l and above)

Age group	Males				Females				Both sexes			
	N	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*
15-24	9	0	0	0	13	0	0	0	22	0	0	0
25-34	103	1.0	±0.1	1	130	0.9	±0.1	1	233	0.9	±0.03	2
35-44	153	3.2	±0.1	5	165	0.5	±0.1	1	318	1.9	±0.05	6
45-54	136	0.7	±0.1	1	151	0.8	±0.1	1	287	0.8	±0.05	2
55-64	123	1.7	±0.1	2	142	0.8	±0.1	1	265	1.3	±0.07	3
Total	524	1.1	±0.1	9	601	0.5	±0.02	4	1125	0.8	±0.01	13

6.3.5.2. Triglycerides

The mean triglyceride level in the population was 1.59 (±0.002) mmol/l. This mean triglyceride was 1.61 (±0.003) mmol/l in males and 1.57 (±0.003) mmol/l in females with no differences noted in regard to gender (Table 27).

In regards to age and gender, the mean triglyceride tended to increase in males with increased age, however, in females aged 34-44 years, this mean is lower with further fluctuations at higher ages. For both urban (1.64±0.003) and rural (1.56±0.01) areas there was no statistical difference noted in the mean triglyceride.

The prevalence of hypertriglyceridemia (2.26 mmol/l and above) in the male population was 13.4 (±0.05)% and in the female population

Table 27: Fasting mean triglyceride (by age group and gender)

Age group	Males			Females			Both sexes		
	N	*Mean*	*95% CI*	*N*	*Mean*	*95% CI*	*N*	*Mean*	*95% CI*
15-24	9	1.07	±0.001	13	1.08	±0.002	22	1.08	±0.001
25-34	104	1.75	±0.01	131	1.92	±0.01	235	1.83	±0.005
35-44	153	1.74	±0.02	165	1.57	±0.01	318	1.66	±0.004
45-54	136	1.93	±0.01	151	1.72	±0.01	287	1.82	±0.006
55-64	124	1.77	±0.01	143	1.55	±0.01	267	1.67	±0.005
Total	**526**	**1.61**	**±0.003**	**603**	**1.57**	**±0.003**	**1129**	**1.59**	**±0.002**

9.2 (±0.05) % thus presenting higher prevalence in males by 4.2 % as compared to females (Table 28).

Table 28: Fasting triglyceride high-risk category by age group and gender or prevalence of hypertriglyceridemia (triglyceride level with 2.26 mmol/l and above)

Age group	Males				Females				Both sexes			
	N	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*
15-24	9	0	0	0	13	0	0	0	22	0	0	0
25-34	104	19.6	±0.2	20	131	16.7	±0.02	22	235	18.2	±0.1	42
35-44	153	19.6	±0.2	30	165	12.2	±0.2	20	318	16.0	±0.2	50
45-54	136	20.9	±0.3	28	151	11.8	±0.2	18	287	16.4	±0.2	46
55-64	124	20.8	±0.4	26	143	11.5	±0.3	17	267	16.4	±0.3	43
Total	**526**	**13.4**	**±0.05**	**104**	**603**	**9.2**	**±0.05**	**77**	**1129**	**11.3**	**±0.01**	**181**

Table 29: Fasting triglyceride high-risk category by gender and locality or prevalence of hypertriglyceridemia (triglyceride level with 2.26 mmol/l and above)

Age group	Males				Females				Both sexes			
	N	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*
Urban	259	14.3	±0.1	57	308	10.8	±0.2	46	567	12.7	±0.05	103
Rural	267	12.6	±0.1	47	295	7.8	±0.1	31	562	10.2	±0.05	78
Total	**526**	**13.4**	**±0.05**	**104**	**603**	**9.2**	**±0.05**	**77**	**1129**	**11.3**	**±0.05**	**181**

The proportion of people with hypertriglyceridemia (2.26 mmol/l and above) was higher by 4 per cent in urban (males for 14.3% and females

for 10.8%) areas as compared to rural (males for 12.6% and females for 7.8%) areas for both sexes (Table 29).

Conclusion

1. The prevalence of high risk cholesterol category or hypercholesterolemia was 7% in the population. In regards to age, this increased by increasing age in both sexes. The proportion of people in the high risk cholesterol category (cholesterol level above 5.2 mmol/l) was a little higher in urban areas for both sexes as compared to rural areas. The prevalence of hypercholesterolemia with 6.5 mmol/l and above was 0.8 (±0.01)% and in regard to gender, the proportion in males was 2 times higher as compared to females
2. For both urban (1.64±0.003) and rural (1.56±0.01) areas there was no statistical difference noted in the mean levels of triglyceride. In regard to age and gender, the mean triglyceride tended to increase only in males with increased age
3. Prevalence of hypertriglyceridemia (2.26 mmol/l and above) among surveyed males was 13.4 % and among females was 9.2% thus higher among males as compared to females. The proportion of people with hypertriglyceridemia was higher by 4.2 per cent in urban (males for 14.3% and females for 10.8%) areas as compared to rural (males for 12.6% and females for 7.8%).

6.3.6. Health indicators

6.3.6.1. Overweight and Obesity

Overweight and obesity are recognized intermediate risk factors of NCDs or health indicators in particular for developing diabetes, hypertension and heart problems. Body weight, height, waist and

Table 30: Mean body weight and height (by age and gender)

Age group	Males				Females			
	Weight – kg		Height – cm		Weight – kg		Height – cm	
	Mean	*95%CI*	*Mean*	*95%CI*	*Mean*	*95%CI*	*Mean*	*95%CI*
15-24	58.5	±0.03	167.1	±0.03	54.4	±0.03	158.1	±0.02
25-34	66.5	±0.05	168.4	±0.02	61.5	±0.05	157.7	±0.02
35-44	68.8	±0.1	166.5	±0.03	63.9	±0.05	156.4	±0.03
45-54	70.1	±0.1	166.1	±0.04	65.4	±0.1	155.4	±0.03
55-64	70.3	±0.1	166.0	±0.05	63.0	±0.1	153.1	±0.05
15-64	**65.1**	**±0.02**	**167.1**	**±0.01**	**60.2**	**±0.02**	**156.9**	**±0.01**

hip circumferences were measured by trained staff in the surveyed population (N=3411) aged 15-64 years in accordance with standard methods. Indicators were calculated such as body mass index (BMI), and waist - hip ratio (WHR).

The mean weight of males aged 15 – 64 years was 65.1 (±0.02) kg and the mean height was 167.1 (±0.01) cm. The mean weight of females aged 15 – 64 years was 60.2 (±0.02) kg and the mean height was 156.9 (±0.01) cm (Table 30).

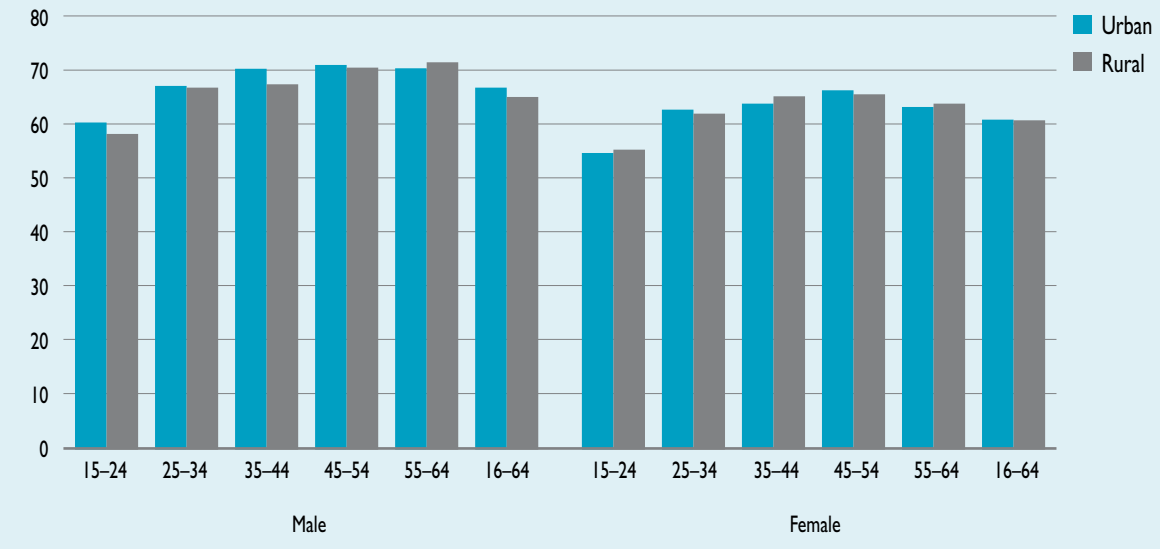
The mean body weight tended to increase with age for both sexes, however in regard to the mean height, there was a tendency to decrease with increasing age.

In the surveyed men aged 15 – 64 years, the mean body weight (66.0 (±0.02) kg) and height (167.8 (±0.02) cm) were higher by 1.7 kg and 1.4 cm, respectively in urban areas as compared to rural areas (weight (64.3±0.4) kg and height (166.5±0.02) cm). As for women aged 15-64

Table 31: Mean body weight and height (by locality and gender)

Age group	Males				Females			
	Weight – kg		Height – sm		Weight – kg		Height – sm	
	Mean	*95%CI*	*Mean*	*95%CI*	*Mean*	*95%CI*	*Mean*	*95%CI*
Urban	66.0	±0.02	167.8	±0.02	60.2	±0.02	157.7	±0.02
Rural	64.3	±0.4	166.5	±0.02	60.2	±0.03	156.3	±0.02

Figure 20: Mean body weight of the population aged 15 – 64 (by locality)

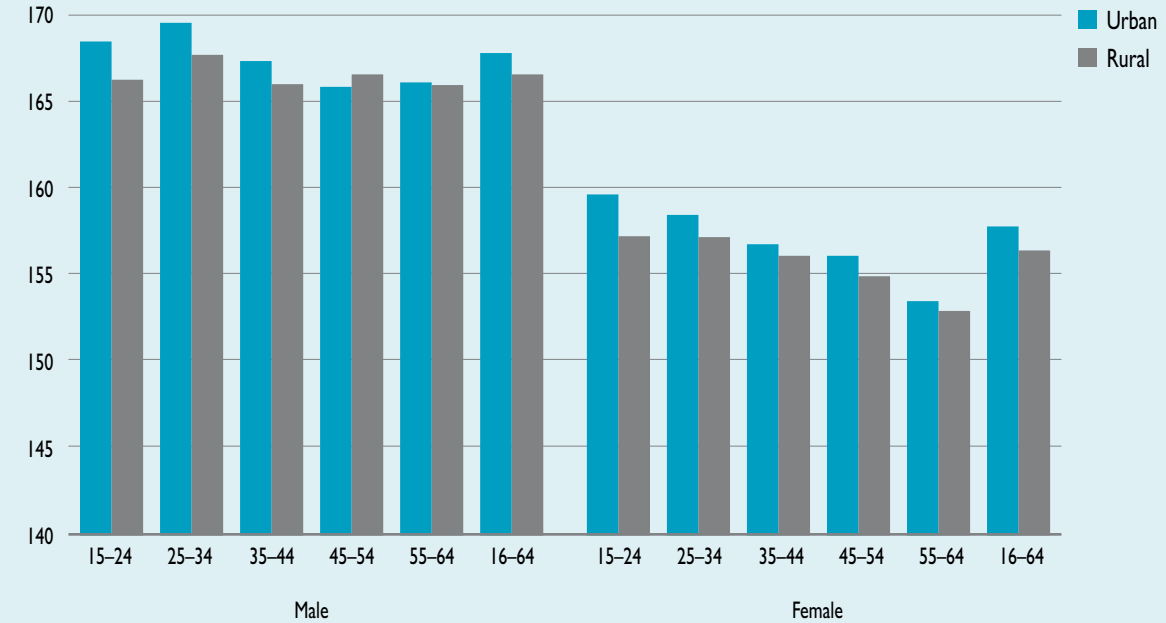


years mean body weight, was not different for those living in urban and rural areas. However, women from urban areas were by 1.4 cm taller in comparison to women from rural areas (Table 31).

The survey revealed that the mean body weight of men (70.5±0.1) aged 35 – 44 years was higher by 3.2 kg in urban areas as compared to rural (67.3±0.1) areas (Figure 20).

The mean body height of the participants aged 15 – 24 years was higher by 2.2 and 2.5 centimetres accordingly in urban areas (males - 168.3, females – 159.5 cm) as compared to rural (males -166.1 cm and females - 157.0 cm) areas (Figure 21).

Figure 21: Mean body height for population aged 15–64 years (by locality)



The mean BMI was 24.5 (±0.01) in women and 23.3 (±0.01) in men. As regard to gender difference, the mean BMI was higher in women as compared to men and it was tended to increase with the increase of age. However, the mean body weight (63.0 (±0.1) kg) and BMI (26.9 (±0.004)) in women aged 55 – 64 years were a little lower compared to the younger age groups (Table 32).

The mean BMI was 23.4 (±0.01) for males and 24.3 (±0.01) for females aged 15-64 years of urban areas; accordingly 23.1 (±0.01) and 24.6 (±0.01) for males and for females of rural areas (Table 33).

Table 32: Mean body mass index (by age and gender)

Age group	Males			Females		
	n	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*
15-24	350	20.9	±0.01	348	21.8	±0.01
25-34	319	23.4	±0.01	348	24.7	±0.02
35-44	351	24.7	±0.01	382	26.2	±0.02
45-54	353	25.4	±0.02	351	27.1	±0.03
55-64	296	25.5	±0.03	306	26.9	±0.04
15-64	**1669**	**23.3**	**±0.01**	**1735**	**24.5**	**±0.01**

As it is shown in table above, there was no difference in the mean BMI of males and females in both urban and rural areas (Table 33).

Table 33: Mean body mass index (by gender and locality)

	Age group	Males			Females		
		n	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*
Urban	15-24	174	20.9	±0.01	177	21.3	±0.01
	25-34	157	23.2	±0.02	181	24.6	±0.02
	35-44	171	25.1	±0.02	175	25.7	±0.03
	45-54	171	25.6	±0.04	170	27.1	±0.04
	55-64	161	25.3	±0.05	161	26.8	±0.05
	15-64	**834**	**23.4**	**±0.01**	**864**	**24.3**	**±0.01**
Rural	15-24	176	20.8	±0.01	171	22.1	±0.01
	25-34	162	23.5	±0.01	167	24.8	±0.02
	35-44	180	24.4	±0.02	207	26.6	±0.03
	45-54	182	25.1	±0.03	181	27.1	±0.04
	55-64	135	25.6	±0.04	145	26.9	±0.06
	15-64	**835**	**23.1**	**±0.01**	**871**	**24.6**	**±0.01**

The survey results on BMI risk categories revealed that 4.9% (±0.4) of the surveyed population (N=3404) aged 15-64 years were classified underweight, 63.5% (±0.1) normal, and 31.6% (±0.1) overweight and obese of which 21.8% (±0.1) were overweight and 9.8% (±0.04) obese (Table 34).

In respect to gender difference, the results on BMI risk categories showed that 25.5% (±0.1) and 12.5% (±0.1) of females and 18.2% (±0.1) and 7.2% (±0.05) of males were accordingly overweight and obese (Table 34).

The survey revealed higher prevalences of overweight and obesity by 12.6 percent among females (38.0%) as compared to males (25.5%), (Figure 22, Table 34).

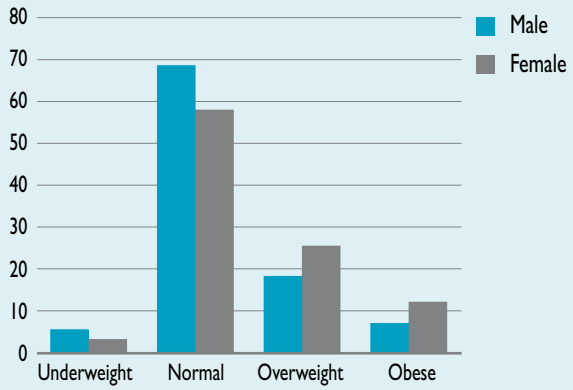
In addition, the proportion of overweight and obese participants were higher among those aged 45 – 64 years. Thus, according to the classification of BMI, the prevalence of overweight and obese was 46.2%

Table 34: BMI risk categories (by gender)

BMI	Males			Females			Both sexes		
	n	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*
Underweight (BMI <18.4)	79	5.9	±0.05	52	3.9	±0.04	131	4.9	±0.4
Normal (BMI 18.5–24.9)	1052	68.6	±0.1	880	58.0	±0.1	1932	63.5	±0.1
Overweight (BMI 25.0–29.9)	381	18.2	±0.1	523	25.5	±0.1	904	21.8	±0.1
Obese (BMI >30.0)	157	7.2	±0.05	280	12.5	±0.1	437	9.8	±0.04

and 48.2% in males and 63.5% and 62.9% in females aged 45 – 54 and 55 – 64 years (Table 35).

Figure 22: Prevalence of overweight and obese (by gender)



The survey revealed that the proportions of overweight and obese in the age group 25 – 34 years for both sexes were sharply increased as compared to the age group 15 – 24 years. Thus, the proportions for overweight and obese in the age group 15 – 24 years were 4.1% in males, 9.9% in females; while in the age group 25 – 34 years

Table 35: The prevalence of overweight and obese (by age and gender)

Age group	Males – %				Females – %			
	Underweight <18.5	*Normal* 18.5-24.9	*Overweight* 25-29.9	*Obesity* >30.0	*Underweight* <18.5	*Normal* 18.5-24.9	*Overweight* 25-29.9	*Obesity* >30.0
15-24	13.73	81.1	4.1	1.1	8.6	80.1	9.9	1.4
25-34	2.45	75.7	15.1	6.7	2.8	57.5	27.9	11.8
35-44	1.41	57.9	31.3	9.4	0.5	44.1	35.1	20.2
45-54	2.01	51.8	29.8	16.4	0.6	35.9	38.4	25.1
55-64	2.76	49.1	34.4	13.8	1.9	35.1	40.2	22.7
15-64	**5.90**	**68.6**	**18.2**	**7.2**	**3.9**	**58.0**	**25.5**	**12.5**

these proportions were increased by 15.1 percent or 3.7 times in males and by 27.9 percent or 2.8 times in females (Table 35, 36).

In the age group 25-34 years, the proportions of overweight and obese in females (39.7%) was nearly two-times higher as compared to (21.8%) males.

The proportion of obesity was highest in the population aged 45 – 54 years, thus 16.4% of males and 25.1% of females had obesity (Figure 23).

The prevalence of overweight (20.3% (±0.1)) and obesity (8.6% (±0.1)) in urban males aged 15 – 64 years was higher as compared to rural males.

Figure 23: Prevalence of BMI categories (by age group)

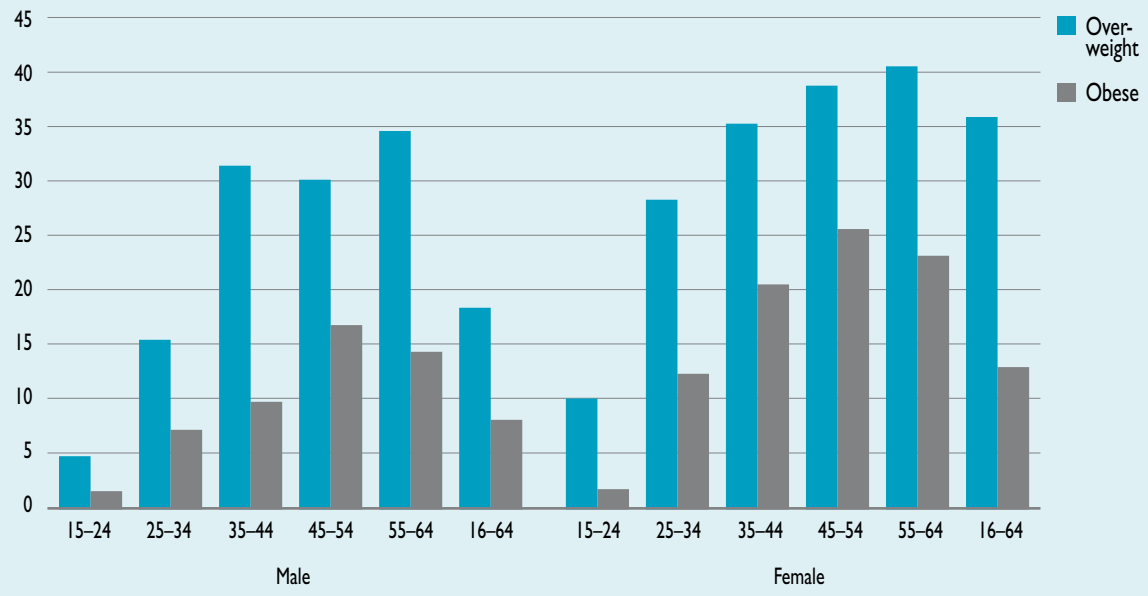


Table 36: BMI risk category (by gender and locality)

BMI	Males – %				Females – %			
	Urban		*Rural*		*Urban*		*Rural*	
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Underweight (BMI <18.4)	7.7	±0.1	4.4	±0.1	5.2	±0.1	2.9	±0.05
Normal (BMI 18.5–24.9)	63.4	±0.2	73.1	±0.1	57.1	±0.1	58.8	±0.2
Overweight (BMI 25.0–29.9)	20.3	±0.1	16.5	±0.1	26.2	±0.1	25.0	±0.1
Obese (BMI >30.0)	8.6	±0.1	6.0	±0.1	11.5	±0.1	13.3	±0.1

However, in females of rural areas, the proportion of obesity (13.3% (±0.1)) was higher compared to urban (11.5% (±0.1)) areas (Table 36).

6.3.6.2. Central obesity

Waist and hip circumferences were measured to calculate the waist - hip ratio (WHR) to define central obesity. Waist - hip ratio is a risk factor in developing cardiovascular disease.

The mean waist circumference was 80.6 (±0.02) cm in males and 79.2 (±0.02) cm in females. This mean tended to increase with age (Table 37).

The survey revealed that the mean waist circumference in the age group 25 – 34 years (80.8 (±0.04) in males and 79.3 (±0.04) in females) for both sexes was extremely high as compared to the age group 15 – 24 years (Table 37).

Table 37: Mean waist and hip circumferences (by age group and gender)

Age group	Males – cm				Females – cm			
	Waist circumference		Hip circumference		Waist circumference		Hip circumference	
	Mean	*95%CI*	*Mean*	*95%CI*	*Mean*	*95%CI*	*Mean*	*95%CI*
15-24	72.8	±0.02	88.4	±0.02	71.9	±0.02	89.9	±0.02
25-34	80.8	±0.04	93.6	±0.02	79.3	±0.04	95.5	±0.03
35-44	85.2	±0.05	94.9	±0.03	83.9	±0.1	98.1	±0.04
45-54	87.7	±0.1	96.1	±0.04	86.3	±0.1	98.9	±0.05
55-64	88.8	±0.05	97.1	±0.1	87.2	±0.05	98.8	±0.1
15-64	**80.6**	**±0.02**	**92.7**	**±0.02**	**79.2**	**±0.02**	**94.8**	**±0.02**

Table 38: The prevalence of central obesity (by age and gender)

Age group	Males				Females			
	WHR		Central obesity (Waist girth ≥90 cm)		WHR		Central obesity (Waist girth ≥80 cm)	
	Mean	*95%CI*	*Mean*	*95%CI*	*Mean*	*95%CI*	*Mean*	*95%CI*
15-24	0.82	±0.002	2.8	±0.1	0.79	±0.002	14.2	±0.1
25-34	0.86	±0.003	16.9	±0.2	0.83	±0.003	42.9	±0.2
35-44	0.89	±0.003	30.5	±0.2	0.85	±0.003	62.4	±0.2

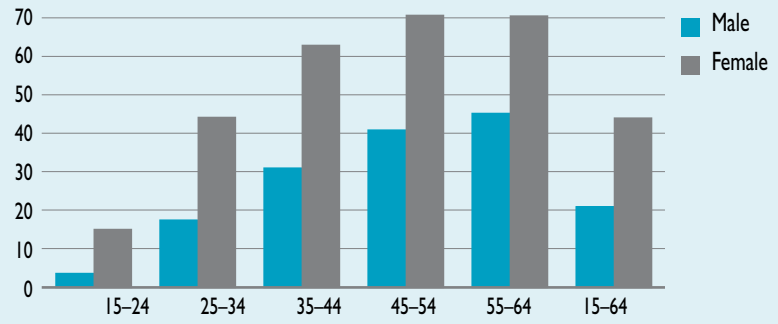
The mean WHR of the population aged 15 – 64 years was within normal range. This mean WHR was 0.87 (±0.001) which is less than 1.0 in males and 0.83 (±0.001) which is less than 0.85 in females (Table 38).

In respect to gender and age, the mean WHR in all age groups for males was less than 0.95 which lies within normal range. However, this mean was greater than 0.85 or lies outside of the normal range for females aged 35 and above (Table 38).

According to the results, the proportion of central obesity (waist girth equal or greater than 90 cm) was 20.2% (±0.1) in males aged 15-64 years. In females, this proportion (central obesity or waist girth equal or greater than 80 cm) was 42.6% (±0.1). Thus, the proportion of female population with central obesity was 2 times higher as compared to the male population. In females in respect to age groups, the prevalence was 69.6% (±0.3) and 69.4% (±0.4) among aged 45 – 54 and 55 – 64 years, 62.4% (±0.2) among aged 35 – 44 years, 42.9 (±0.2) or more than one in every three women aged 25 – 34 years, and 14.2% (±0.1) in aged 15-24 years had central obesity (Table 38).

The highest prevalence of central obesity (waist girth ≥90.0) was observed among males aged 55 – 64 years (43.5%±0.3). In the age group 35-44 years, this prevalence was 30.5% (±0.2) in males (Figure 24).

Figure 24: Central obesity (by age group and gender)



In regards to locality, central obesity was more prevalent among urban males and rural females (Table 39).

Table 39: Central obesity (by locality)

Location	Males			Females		
	n	*Central obesity* (Waist girth ≥90 cm)	*95% CI*	*n*	*Central obesity* (Waist girth ≥80 cm)	*95% CI*
Urban	818	23.4	±0.1	841	41.0	±0.2
Rural	844	17.5	±0.1	882	43.8	±0.1
Total	1662	20.2	±0.1	1723	42.6	±0.1

6.3.6.3. Body fat

In this survey, body fat percent was measured in 3048 participants (1484 males and 1564 females) by using a bioimpedance device. The following reference values were used for the comparative assessment of mean body fat in both sexes (Table 40).

Table 40: Reference values for body fat percent

Gender	Body fat percent			
	Low	*Normal*	*High*	*Very high*
Males	<10.0	10.0–19.9	20.0–24.9	25≤
Females	<20.0	20.0–29.9	30.0–34.9	35≤

Table 41: Mean body fat percent (by age and gender)

Age group	Males			Females		
	n	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*
15-24	314	15.1	±0.02	316	21.9	±0.02
25-34	281	17.7	±0.02	315	25.8	±0.03
35-44	314	19.8	±0.03	335	28.2	±0.04
45-54	315	21.5	±0.04	314	29.3	±0.05
55-64	260	23.3	±0.05	284	29.7	±0.07
15-64	**1484**	**18.2**	**±0.01**	**1564**	**25.7**	**±0.01**

The mean body fat of the population aged 15 – 64 years lay within normal range of reference values and it was 18.2% (±0.01) in males and 25.7% (±0.01) in females (Table 41).

Table 42: The mean body fat percent (by locality)

	Age group	Males		Females	
		Mean–%	*95% CI*	*Mean–%*	*95% CI*
Urban	15-24	15.3	±0.03	21.2	±0.03
	25-34	17.9	±0.03	25.8	±0.04
	35-44	20.2	±0.04	28.3	±0.04
	45-54	21.7	±0.1	29.1	±0.1
	55-64	22.7	±0.1	29.9	±0.1
	15-64	**18.5**	**±0.02**	**25.6**	**±0.02**
Rural	15-24	14.8	±0.02	22.5	±0.02
	25-34	17.5	±0.02	25.8	±0.03
	35-44	19.3	±0.03	28.1	±0.04
	45-54	21.3	±0.04	29.6	±0.05
	55-64	24.1	±0.05	29.7	±0.1
	15-64	**17.7**	**±0.01**	**25.7**	**±0.01**

In regard to age group, the mean body fat was within normal range in males aged 15 - 44 years and in females of all age groups. However, this mean body fat was slightly increased (20% ≤ of the reference values) in males aged 45 – 54 (21.5±0.04) and 55 – 64 (23.3 ±0.05) years (Table 42).

Table 43: Body fat percent risk categories (by gender)

Risk category	Males			Females		
	n	*%*	*95% CI*	*n*	*%*	*95% CI*
Low	89	7.3	±0.1	311	22.9	±0.1
Normal	762	58.6	±0.1	678	47.6	±0.1
High	335	19.5	±0.1	299	16.5	±0.05
Very high	298	14.7	±0.1	276	13.1	±0.05

There was no significant difference in the mean body fat for females in both urban and rural areas. However, in regard to age, this mean was higher by 1.4% in rural males (24.1±0.05) aged

Table 44: Body fat percent risk categories (by age group)

	Age group	Body fat percent							
		Low		Normal		High		Very high	
		%	*95% CI*	*%*	*95% CI*	*%*	*95% CI*	*%*	*95% CI*
Males	15-24	12.9	±0.1	76.0	±0.2	7.5	±0.1	3.6	±0.1
	25-34	6.1	±0.1	63.6	±0.2	21.0	±0.1	9.3	±0.1
	35-44	3.5	±0.1	49.2	±0.2	26.5	±0.2	20.7	±0.2
	45-54	4.1	±0.1	37.8	±0.3	29.2	±0.3	28.9	±0.3
	55-64	2.6	±0.1	27.1	±0.4	29.9	±0.4	40.3	±0.4
	15-64	**7.3**	**±0.05**	**58.6**	**±0.1**	**19.5**	**±0.1**	**14.7**	**±0.1**
Females	15-24	36.6	±0.2	55.8	±0.2	5.8	±0.1	1.9	±0.1
	25-34	19.2	±0.2	51.5	±0.2	17.5	±0.2	11.8	±0.2
	35-44	14.9	±0.2	40.1	±0.3	25.7	±0.3	19.2	±0.2
	45-54	11.1	±0.2	39.2	±0.3	24.9	±0.3	24.9	±0.3
	55-64	15.4	±0.3	30.7	±0.4	21.7	±0.4	32.2	±0.4
	15-64	**22.9**	**±0.1**	**47.6**	**±0.1**	**16.5**	**±0.05**	**13.1**	**±0.1**

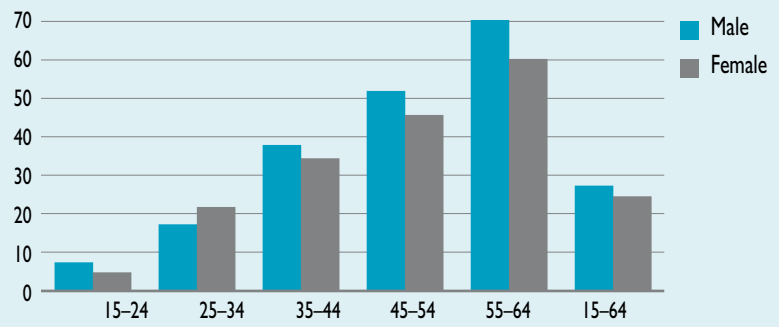
55 – 64 years as compared to urban males (22.7±0.1) of the same age (Table 42).

The survey revealed that high and very high levels of body fat were attributed to 19.5% (±0.1) and 14.7% (±0.1) in males and respectively to 16.5% (±0.05) and 13.1% (±0.05) in females. Thus, the proportion of males with high and very high levels of body fat were relatively higher in (34.1%) males as compared to (29.6%) females (Table 43, 44).

As shown in table above, the levels of body fat in relation to age and gender increased with age in both sexes. Accordingly, the proportion of people with very high level of body fat was highest at increased age, for

instance in age group 55-64 years, this proportion was 40.3% (±0.4) in males and 32.2% (±0.4) in females (Table 44).

Figure 25: The prevalence of very high level of body fat percent (by age and gender)



The proportion of males with very high levels of body fat was relatively higher in all ages except age group 25 – 34 years as compared to the same age groups of females. Accordingly, males of age groups 45 – 54 and 55 – 64 years with very high level of obesity had higher prevalence by 4.0 and 8.1% respectively as compared to the same age groups of females (Figure 25, Table 44).

The prevalence of urban males aged 15 – 54 years with very high level of body fat was relatively high as compared to the same aged rural males. Thus, as of age group 35-44 years, the prevalence of very high level of body fat was 24.4% (±0.3) in urban males and 16.6% (±0.3) in rural males.

Table 45: Body fat percent risk categories (by locality)

	Age group	Low		Normal		High		Very high	
		Urban	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*
Males	15-24	13.8	12.1	71.8	80.1	8.6	6.4	5.8	1.4
	25-34	5.1	7.1	60.4	67.3	24.9	16.8	9.6	8.9
	35-44	2.3	4.8	47.7	51.0	35.5	27.7	24.4	16.6
	45-54	5.8	2.1	35.8	40.0	26.5	32.5	31.8	25.4
	55-64	3.2	2.0	34.0	18.6	24.9	36.2	37.9	43.2
	15-64	**7.1**	**7.4**	**55.7**	**61.7**	**20.2**	**18.7**	**16.9**	**12.2**
Females	15-24	44.0	29.9	48.5	62.3	5.8	5.7	1.7	2.1
	25-34	21.3	17.0	48.9	54.1	19.6	15.5	10.2	13.4
	35-44	14.3	15.5	42.3	37.9	22.4	29.2	20.9	17.4
	45-54	13.0	8.9	37.7	40.8	22.1	27.8	27.1	22.5
	55-64	16.0	14.8	29.8	31.7	19.9	23.6	34.3	29.9
	15-64	**25.6**	**20.1**	**44.4**	**50.7**	**16.1**	**16.8**	**13.8**	**12.4**

In the age group 55 – 64 years, this prevalence was relatively higher in rural males (43.2±0.6) as compared to urban males (38±0.6), (Table 45).

Discussion

Overweight and obesity were more prevalent in females, which was similar to the results of the surveys of 2001 "Assessing nutritional consequences of the dzud in Mongolia" and of 1999 "Assessing the prevalence of diabetes mellitus". Thus, according to the survey results of 2001, 29.4% of women birth giving age were overweight and obese. The survey results on the prevalence of diabetes mellitus revealed that 25.1% of females and 14.5% of males aged 35 and above were obese while current survey revealed that 22.6% of females and 13.1% of males aged 35-64 years were obese.

In regard to central obesity, the results of this STEPs NCD risk factors survey are not fully comparable with the results of the surveys conducted by Health Science University and Public Health Institute in 1999 and 2001, respectively due to different sample size and cut-off points used for the measurement of central obesity across these surveys.

In the joint survey of the Nutrition Research Center of Public Health Institute, Mongolia and Kagawa Nutrition University, Japan (Ulaanbaatar, 2002) body fat percent was determined in 256 persons only, thus it could not represent the whole population of Mongolia and differences on sample size and locality did not allow to make a comparative assessment. Therefore, the Mongolian STEPs NCD risk factor survey provides first time the information on the prevalence of NCD major risk factors of the population of Mongolia aged 15 – 64 years.

Conclusion

1. The mean weight of males aged 15 – 64 years was 65.1 kg and the mean height was 167. cm. The mean weight of females aged 15 – 64 years was 60.2 kg and the mean height was 156.9 cm.
2. The mean BMI was 23.3 for males and 24.5 for females aged 15 – 64 years. In regard to BMI risk categories, 31.6% of the population aged 15-64 years were both overweight and obese of which 21.8% were overweight and 9.8% obese.
3. The proportion of overweight and obese participants tended to increase with age. It was also observed that the proportion of overweight (25.5%) and obese (12.5%) females was relatively higher as compared to males (18.2% for overweight and 7.2% for obese) across all age groups.
4. The prevalence of central obesity was 2 times higher in females as compared to males aged 15 – 64 years (42.6% versus 20.2%). In the age group 35-64 years, more than 60% of females had

central obesity in accordance with the waist girth cut-offs used in this survey.

5. 29.6% of females and 34.1% of males had an increased body fat according to the criterias for high and very high levels of body fat. The body fat tended to increase with age.

6.3.7. Hypertension (High Blood Pressure)

Elevated blood pressure is a recognised intermediate risk factor in developing NCDs in particular stroke and heart attacks. In order to assess the health status of the population, answers to the questions whether blood pressure measurement was taken in the last 5 years and in the past 12 months, and whether the participant was on treatment for high blood pressure were collected (STEP 1 data). Thus, in the STEP 1, information on hypertension was collected including details on whether or not they had previously been told by a doctor or health worker that they had high blood pressure, and on whether or not the participants were currently receiving anti-hypertensive medication. STEP 2 data regarding hypertension included blood pressure measurements as noted in details in the methods section.

To assess the prevalence of hypertension the following definitions were used:

- Those who have previously been told by a health worker that they had high blood pressure and who were currently receiving anti-hypertensive medication were classified as known hypertension, whether or not there blood pressure was currently normal.
- Those who had a mean systolic pressure ≥ 140 mmHg OR a mean diastolic pressure ≥ 90 mmHg were classified with new hypertension.

Note that those who reported as having previously been told by a doctor or health worker that they had high blood pressure, but did not currently take any medication for it, were classified according to their current blood pressure according to the above cut-of levels as new hypertension or normal. This is a more conservative approach than labelling them known hypertension, a practise common to epidemiological surveys.

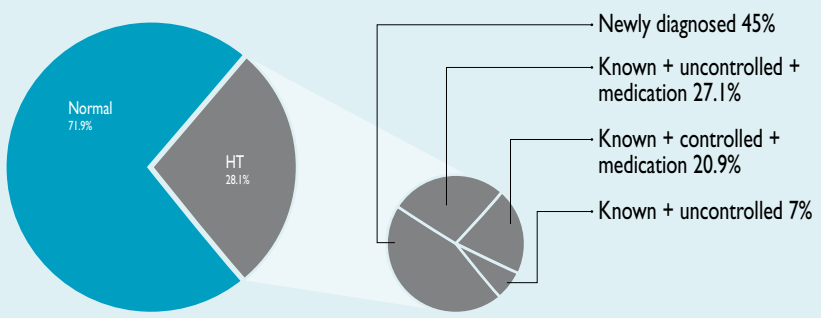
Previous measurement of blood pressure: The results indicated that 61.2 (±0.1) % of the surveyed population had their blood pressure measured within the last five years. In the past 12 months, 41.1 (±0.1)% of males and 63.2 (±0.1)% of females reported having had their blood pressure measured. In regard to gender, it was observed that female participants were more likely to have their blood pressure measured.

Prevalence of hypertension: The mean systolic blood pressure of the population was 124.7 (±0.03) mmHg, with 128.2 (±0.04) mmHg in males and 121 (±0.04) mmHg in females. The mean diastolic blood pressure of the population was 76.8 (±0.02) mmHg. This mean was 76.9 (±0.03) mmHg in males and 76.7 (±0.03) mmHg in females. In regard to age, the mean blood pressure (both systolic and diastolic) was higher with increasing age in both sexes. In particular in the age group 55-64 years, the mean systolic pressure was 144.8 (±0.2) mmHg in males and 140.7 (±0.2) mmHg in females.

In total, 28.1 (±0.1)% (n=1271) of the surveyed population were classified as hypertensive (Graph 25). Reporting by gender, 30 (±0.1) % of males and 26.1 (±0.1) % of females had hypertension. In regard to locality, 28.6 (±0.03)% of urban residents and 27.6 (±0.03) of rural residents have had hypertension demonstrating no difference in terms of the prevalence by locality in both sexes (Table 46).

The survey showed that of all people with hypertension 45 (±0.1) % were newly diagnosed cases; the prevalence of newly diagnosed hypertension is higher by 17.8% as compared to that of the previously diagnosed but uncontrolled and being on medication (Figure 26).

Figure 26: Prevalence of hypertension with distribution of cases by previous diagnosis, treatment status and control



Of all people (n=3411), 30% (±0.03) males and 26.1% (±0.03) females had hypertension of which the prevalence of newly diagnosed hypertension was higher in men (17%) as compared to women (8%), in particular this higher prevalence was obvious in men aged 35-54 years. In regard to locality, the prevalence of newly diagnosed hypertension was slightly higher in rural areas (13.5%) as compared to urban areas (11.5%), (Table 46).

Of all people with hypertension 74.2 (±0.2) % were on anti-hypertensive medication. It is notable that the proportion of females (78.4±0.2) receiving medication was higher than of males (68.5±0.3). Non-medication treatment such as special dieting, advice to lose weight, advice to stop

Table 46: Prevalence of hypertension with status of diagnosis (by gender, age group and locality)

Age group		Prevalence of Hypertension								
		Previously Diagnosed with Hypertension			Newly diagnosed with SBP >= 140 and/or DBP >= 90			Total Prevalence		
		%	CI	n	%	CI	n	%	CI	n
Males	15-24	1.1	±0.1	4	9.7	±0.1	33	10.9	±0.01	37
	25-34	8.9	±0.1	29	13.8	±0.1	44	22.7	±0.01	73
	35-44	15.4	±0.1	54	25.7	±0.1	90	41.0	±0.02	144
	45-54	29.5	±0.1	104	25.0	±0.1	88	54.5	±0.02	192
	55-64	45.5	±0.1	134	20.9	±0.1	63	66.4	±0.02	197
	15-64	13.0	±0.04	325	17.0	±0.04	318	30.0	±0.03	643
Females	15-24	2.5	±0.1	9	3.8	±0.1	12	6.3	±0.01	21
	25-34	10.0	±0.1	35	8.2	±0.1	28	18.1	±0.01	63
	35-44	25.6	±0.1	98	8.6	±0.1	33	34.2	±0.02	131
	45-54	43.2	±0.1	152	14.3	±0.1	50	57.5	±0.02	202
	55-64	55.0	±0.1	168	13.9	±0.1	43	68.9	±0.02	211
	15-64	18.1	±0.04	462	8.0	±0.04	166	26.1	±0.03	628
Locality	Urban	17.1	±0.04	410	11.5	±0.04	230	28.6	±0.03	640
	Rural	14.1	±0.04	377	13.5	±0.04	254	27.6	±0.03	631
	Total	**15.5**	**±0.04**	**787**	**12.6**	**±0.04**	**484**	**28.1**	**±0.03**	**1271**

smoking, engagement in the physical activity and traditional treatment was reported less often as compared to medication (Table 47).

Table 47: Treatment for hypertension

Treatment	N	Males			N	Females		
		%	95% CI	n		%	95% CI	n
Drugs	358	68.5	+0.3	260	532	78.4	+0.2	434
Diet	358	19.8	+0.2	78	532	22.2	+0.2	126
Weight	358	10.3	+0.2	35	532	15.7	+0.2	82
Smoking	190	24.9	+0.4	46	58	28.0	+0.7	15
Physical activity	358	17.2	+0.2	65	532	15.7	+0.2	94
Traditional treatment	358	11.8	+0.2	45	532	11.5	+0.2	61

Conclusion

1. The prevalence of hypertension among Mongolians aged 15-64 years was 28.1 (±0.1)%. With increased age the prevalence of

hypertension was higher in both sexes. There was no apparent difference noted in the prevalence of hypertension in relation to locality.

2. The survey showed that the prevalence of newly diagnosed hypertension was higher by 17.8% as compared to that of the previously diagnosed but uncontrolled and being on medication.
3. In Mongolian men the mean systolic pressure was relatively higher as compared to that of females. Both systolic and diastolic blood pressures were higher with increased age in both sexes.
4. 74.2 (±0.2)% of the people with hypertension were on anti-hypertensive medication; in regard to gender females were more likely to use medication for treatment of hypertension. Non-medication treatment to decrease hypertension was used less often as compared to medication.

6.3.8. Diabetes

Prevalence of diabetes

One in every three of the survey population was randomly chosen to undertake a capillary blood test to determine the level of fasting blood sugar.

The prevalence of diabetes was defined in accordance with WHO guidelines on the classification of diabetes using whole blood from fingerprick analyses.

- Participants with a normal fasting glucose (< 5.6 mmol/l), who previously never had been diagnosed with diabetes, were not taking anti-diabetes medication and no special regime for diabetes were included into the normal group.
- Participants with a fasting blood glucose between 5.6-6.1 mmol/l were included into the group of people with an impaired fasting glucose (IFG) – unless they were previously diagnosed with diabetes and on medical treatment.
- Participants with a fasting glucose greater or equal 6.1 mmol/l, whether or not they had previously been told by a health worker that they had diabetes, and those previously diagnosed with diabetes and on anti-diabetes medication were included into the group of people with Diabetes Mellitus (DM). This group was then divided into
  - Known Diabetes Mellitus (KDM): Participants who had previously been told by a health worker that they had diabetes, and who were taking anti-diabetes medication (drugs or insulin). Their glucose value could have been > 6.1 mmol/l (uncontrolled KDM) or < 6.1 mmol/l (controlled KDM) – or no glucose was measured.

- Newly diagnosed Diabetes Mellitus (NDM): Participants with a fasting glucose greater or equal 6.1 mmol/l, who were not previously been told by a health worker that they had diabetes.

For this survey we classified participants who stated that they were told having diabetes but were not on anti-diabetes medication and had glucose values less than 6.1 mmol/l as normal or IFG depending on their glucose value. This is a conservative approach to calculating diabetes prevalence common to epidemiological studies.

The total prevalence of diabetes in the surveyed population determined by questionnaire and laboratory test methods was 8.2% (±0.1), (N=121). The prevalence of newly diagnosed diabetes (fasting blood glucose level equal or greater 6.1 mmol/l) was 5.5 (±0.05)%. There was a notable gender difference in the newly diagnosed diabetes mellitus with higher prevalence in males (7.5%±0.1) as compared to females (3.3%±0.1) (Table 51). This relates to the higher mean fasting blood glucose values found in men (see next section).

In this survey 1.1% (±0.02) (n= 52 cases) of the participants were previously diagnosed with diabetes mellitus as identified through the questionnaire asking whether they were previously diagnosed with diabetes mellitus or hyperglycemia.

Assessment of blood sugar values. The mean fasting blood glucose taken from capillary whole blood was 4.83 (±0.002) mmol/l among the surveyed people (n=1133). This mean was 5.05 (±0.01) mmol/l in males and 4.65 (±0.004) mmol/l in females (Table 48).

Table 48: The mean fasting glucose (mmol/l) by gender and age group (whole blood, capillary)

Age group	Males			Females			Both sexes		
	N	*Mean*	*95% CI*	*N*	*Mean*	*95% CI*	*N*	*Mean*	*95% CI*
15-24	9	5.0	±0.01	13	4.45	±0.01	22	4.77	±0.002
25-34	104	4.92	±0.01	131	4.5	±0.01	235	4.72	±0.003
35-44	152	5.03	±0.01	166	4.59	±0.01	318	4.83	±0.004
45-54	138	5.17	±0.01	151	4.88	±0.01	289	5.03	±0.01
55-64	126	5.21	±0.02	143	4.93	±0.02	269	5.07	±0.01
Total	**529**	**5.05**	**±0.01**	**604**	**4.65**	**±0.004**	**1133**	**4.83**	**±0.002**

There was a small trend of increased mean fasting glucose with age and in males this mean was higher as compared to that of females. In

regard to locality, the mean fasting glucose was slightly higher in rural participants (4.83±0.002) as compared to urban participants 4.74 (±0.002).

Impaired fasting glucose. Impaired fasting glucose (IFG, as defined by capillary whole blood glucose levels between 5.6-6.1 mmol/l) was found in 12.5 (±0.05)% of the surveyed participants. This prevalence was higher in males (20.1±0.1) by 15.6% as compared to females (4.5±0.05). In regard to locality, the prevalence for IFG was slightly higher in urban (22.2±0.1) males as compared to rural (18.3±0.1) males (Table 49).

Table 49: Impaired fasting glucose category (glucose level 5.6-6.1 mmol/l) by gender and locality

Locality	Males				Females				Both sexes			
	N	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*
Urban	260	22.2	±0.1	26	308	3.3	±0.1	18	568	13.2	±0.08	44
Rural	269	18.3	±0.1	46	296	5.4	±0.1	24	565	11.9	±0.07	70
Total	**529**	**20.1**	**±0.1**	**72**	**604**	**4.5**	**±0.05**	**42**	**1133**	**12.5**	**±0.05**	**114**

Diabetes Screening, Treatment and Control. Only 6.1 (±0.02)% (n=267) of the surveyed population have had their blood sugar measured in the past 12 months. In regard to gender, 5.9 (±0.05) % of males and 6.3 (±0.05) % of females reported to have had their blood sugar measured. In regard to age groups, older people had their blood pressure measured more often (Table 50).

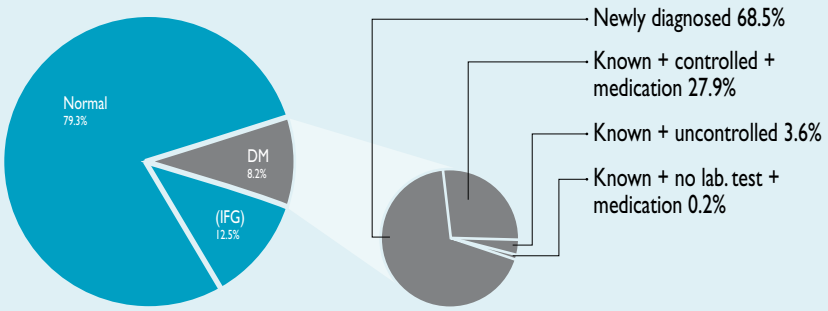
Table 50: Blood sugar measured in the last 12 months by age group and gender

Age group	Males				Females			
	N	*%*	*95% CI*	*n*	*N*	*%*	*95% CI*	*n*
15-24	351	3.1	±0.01	11	348	2.4	±0.05	9
25-34	321	4.3	±0.01	14	348	5.4	±0.1	19
35-44	352	7.3	±0.01	26	384	9.1	±0.1	35
45-54	353	10.2	±0.2	36	351	10.3	±0.2	36
55-64	297	12.6	±0.3	38	306	13.6	±0.3	43
Total	**1674**	**5.9**	**±0.05**	**125**	**1737**	**6.3**	**±0.05**	**142**

The overall picture for diabetes mellitus regarding its control and treatment showed that 68.5 (+0.1) % of those with diabetes were newly diagnosed, 3.6 (+0.05)% of those with diabetes were previously diagnosed and uncontrolled, 27.9% (+0.04) of them previously diagnosed

and controlled, and 0.2 (+0.06) % of them were previously diagnosed and having been on medication however the fasting blood sugar was not tested during this survey (Figure 27).

Figure 27: Prevalence of diabetes with distribution of cases by previous diagnosis, treatment status and control



The prevalence of Diabetes Mellitus in respect to age and gender was 12% (±0.1) in males and 4.1% (±0.1) in females. It was higher in males aged 45-54 years. In regard to locality, the prevalence in rural areas

Table 51: Prevalence of diabetes with status of diagnosis (by gender, age group, and locality)

Age group		Prevalence of Hypertension								
		Previously Diagnosed with diabetes and on Treatment (N = 26)			Newly diagnosed with glucose >= 6.1 mmol/l (N = 95)			Total Prevalence		
		%	CI	n	%	CI	n	%	CI	n
Males	15-24	11.0	0	1	0.0	0	0	11.0	±0.02	1
	25-34	0.3	±0.2	2	8.3	±0.2	8	8.6	±0.05	10
	35-44	0.9	±0.1	2	12.0	±0.1	18	12.9	±0.1	20
	45-54	2.4	±0.1	4	16.1	±0.1	22	18.5	±0.1	26
	55-64	3.7	±0.2	6	9.3	±0.2	12	13.0	±0.1	18
	15-64	4.5	±0.1	15	7.5	±0.1	60	12.0	±0.1	75
Females	15-24	0.0	0	0	0.0	0	0	0.0	0	0
	25-34	0.9	±0.5	1	0.9	±0.5	1	1.8	±0.03	2
	35-44	0.6	±0.2	1	7.7	±0.2	12	8.3	±0.1	13
	45-54	1.5	±0.2	2	8.0	±0.2	12	9.4	±0.1	14
	55-64	3.8	±0.2	7	7.2	±0.2	10	11.0	±0.1	17
	15-64	0.8	±0.1	11	3.3	±0.1	35	4.1	±0.1	46
Locality	Urban	0.7	±0.1	13	3.7	±0.1	37	4.4	±0.1	50
	Rural	4.3	±0.1	13	6.9	±0.1	58	11.2	±0.1	71
	Total	**2.7**	**±0.05**	**26**	**5.5**	**±0.05**	**95**	**8.2**	**±0.1**	**121**

was almost 3 times higher (11.2%±0.1) as compared to urban areas (4.4%±0.1), (Table 51).

Treatment for diabetes

The survey results on treatment for diabetes revealed that 51.3 (±0.7)% of males and 21.9 (±0.8)% of females used anti-diabetes drugs and 11.8 (±1) % of males and 15.8 (±0.9) % of females were on insulin therapy. 41.3 (±1)% of males and 61.1 (±1)% of females had a special diet only for their treatment of diabetes (Table 52). Advice on weight-loss and physical activity was reported by about a quarter of the patients with diabetes, whereas 62% of diabetic women who also reported to smoke received advice for quitting tobacco use. This recommendation was only given to 35% of male diabetics who smoked (details see Table 52).

Table 52: Type of treatment among those with previously diagnosed diabetes by gender

Treatment	N	Males			N	Females		
		%	95% CI	n		%	95% CI	n
Drugs alone	25	51.3	+0.7	13	27	21.9	+0.8	4
Insulin alone	25	11.8	+1	5	27	15.8	+0.9	8
Diet	25	41.3	+1	11	27	61.1	+1	17
Weight loss	25	13.9	+0.7	5	27	26.5	+1	8
Smoking cessation	10	34.7	+1.6	3	2	62.2	+4.3	1
Physical activity	25	26.3	+0.9	9	27	25.7	+0.9	9
Traditional medicine	25	20.8	+0.8	5	27	3.6	+0.4	1

Conclusion

According to this survey, the prevalence of diabetes mellitus amongst adult Mongolians was 8.2%. This represents an increase by about 5% in comparison to the data (3.1%, 95% CI 2.4-4.0) from the survey conducted in 1999. The following explanation for this apparent difference need to be considered before this increase can be interpreted correctly:

1. The WHO diagnostic criteria for diabetes [17] for whole capillary blood concentration of glucose was reduced from 6.7 mmol/l to 6.1 mmol/l late 1999 in comparison to the 1985 WHO classification [World Health Organization. Diabetes Mellitus: Report of a WHO Study Group. Geneva: WHO, 1985. Technical Report Series 727] which was used in the previous survey. This lower diabetes diagnosis threshold invariably increases the prevalence of diabetes observed in a population. Thus, recalculating the current results according to the old threshold (6.7 mmol/l), the prevalence of diabetes would be only 5.1%.

2. The survey from 1999 was designed to identify only people with diabetes mellitus targeting people aged 35 years and above. On the contrary, this survey of 2005 was designed to represent the adult Mongolian population aged 15-64 years. Thus, a recalculation of the current survey results to represent 35 years would increase the results from 5.1% to 7% as diabetes is increasing with the age of a population.
3. The 2005 survey assessed blood glucose concentration in whole blood capillary specimen from fingerprick, whereas the 1999 diabetes survey used venous blood samples to measure 2-hour values in plasma after a 75g oral glucose tolerance test. Therefore both the laboratory procedure of assessing blood glucose as well as the diagnostic method (fasting value only versus OGTT) was different between the 2005 and 1999 survey. The impact of this change on diabetes prevalence cannot be quantified without performing separate control studies.
4. Taking 1 and 2 together the most comparable values between the 1999 survey and the current results on diabetes prevalence would therefore be 3.1% versus 7% representing roughly a doubling in diabetes prevalence over the last 6 years.
5. During 1999-2005, in addition to large changes in the socio-economic development in Mongolia, the rate of diagnosis of diabetes has been increased through improved diagnostic capacity mainly due to the improvement of knowledge and skills of doctors, the development of the new clinical guidelines on diabetes, and awareness activities based upon IEC among the population. Also, the clinical observation of trends in hospital care and services provided shows a three-fold increase of registered diabetes mellitus cases from 1999 (up to 500 people were registered for diabetes mellitus) as compared to 2005 (1650 cases with registered diabetes mellitus).
6. The prevalence of impaired fasting glucose (IFG) in capillary blood of 2005 (12.5%) was higher by 3.3% as compared to the prevalence of impaired glucose tolerance (IGT) from 1999 (9.2%). It seems likely that the 9.2% of the people with identified IGT in 1999 progressed to clinical manifest diabetes.

6.3.9. Prevalence of major risk factors for developing NCDs

Five major risk factors for developing NCDs were used in this analyses as they could be targeted directly by NCD prevention programmes:

1. Tobacco use
2. Alcohol use
3. Overweight and obesity

4. Lack of vegetable and fruit consumption
5. Physical inactivity

If none of the five common risk factors were present, a participant was classified as being at low risk, with less than 3 risk factors out these five classified as at risk and with 3 or more risk factors classified as having high risk for developing NCDs.

According to the study results, 20.7 (±0.05) % of the surveyed population were at high risk in developing NCDs (3 or more risk factors out of 5), 69.9 (±0.05)% of the surveyed were at risk (with less than 3 risk factors) in developing NCDs and only 9.4 (±0.05) % were identified having no NCD risk factors. The survey revealed that 26.6 (±0.1) % of the surveyed males and 14.4 (±0.1) % of the surveyed females were at high risk in developing NCDs.

A comparison of age groups showed that the proportion of high risk people in the age group 45 - 64 years was 45.4 (±0.2)% or 3 times higher prevalence as compared to 14.5 (±0.1) % of the age group 15 – 44 years. More than half of the surveyed males or 54.5 (±0.2) % of the surveyed males aged 45-64 years and 35.5 (±0.2) % of the surveyed females were at high risk for developing NCDs and this proportion tended to increase with age. For example, among high risk males in developing NCDs 19.5 (±0.1) % of males aged 15-44 years were identified against 54.5 (±0.2) % of males aged 45-64 years and for high risk females 9.2 (±0.1) % of those aged 15 – 44 years were identified at high risk against 35.5 (±0.2)% aged 45-64 years).

The population risk factor levels for each surveyed risk factor were as described below:

1. The prevalence of tobacco use was 24.2 % of the surveyed population aged 15 - 64 years. In regard to gender, the proportion of current daily smokers was 10 times higher in males (43%) as compared to females (4%).
2. 5.2% of the surveyed people did not consume any serving size of vegetables and fruits per day, 72.5 % consumed less than 5 serving sizes of vegetables and fruits and 22.3 % consumed 5 or more serving sizes of vegetables and fruits per day.
3. The proportion of people with physical inactivity or with low level of physical activity (at least 600 MET – minutes/week) was 23.1%.
4. 31.6 % of the surveyed population aged 15-64 years were overweight and obese of which 21.8 % were overweight and 9.8 % obese.
5. 22.2% of the surveyed population aged 15-64 years had elevated blood pressure.
6. The prevalence of people with impaired fasting glucose (5.6-6.1

mmol/l) among those who had their fasting blood sugar tested was 12.5%.

7. The prevalence of people with elevated cholesterol level (greater than 5.2 mmol/l) among those who had their blood cholesterol measured was 7.0% and there was no difference noted in regard to gender.
8. The proportion of high risk people increased with increasing age, in particular among aged 45 years and above, one in every three women and one in every two men were at high risk.

Limitations of the Survey

1. Estimation of the non-response rate from randomly selected household members was not accurate due to the limitation of time spent for data collection, the sparsely located population, and the lack of transport facilities particularly in rural areas which led to a potential bias towards selecting locations closer to hospitals/health centers in the data collection process.
2. Risks for developing atherogenic dyslipidemia such as low-density lipoprotein (LDL) and high-density lipoprotein (HDL) were not measured in the survey thus limiting the survey results in defining risks for developing atherogenic dyslipidemia.
3. Diagnosis of diabetes: this was done taking a drop of capillary fasting whole blood from selected survey participants and analysing the sample on a portable glucometer. During the 1999 Diabetes survey (J. Suvdaa et al, 1999) 2-h post oral glucose tolerance test-samples from venous blood (plasma) were analysed. This change in methodology and diagnostic criteria could account for some of the different rates detected and a proper comparison study would need to be undertaken between the two methodologies.
4. Diagnosis of hypertension: for a clinical diagnosis of hypertension the blood pressure would have to be measured (and exceeding hypertensive thresholds) on three different occasions and not on the same day as the survey process had to follow. Hence the presented prevalence data could overestimate the clinical picture. However this survey procedure to determine hypertension is undertaken as standard epidemiological assessment across the world and therefore will produce comparable data between surveys.
5. Classification of central obesity using the waist-to-hip ratio: the evidence behind the applied cut-off levels is not strong in populations other than Europeans. Hence it could be that these results of central obesity are not appropriate measures of risk in Mongolia.

General Conclusions

1. The Mongolian STEPs survey have presented a good practice in organizing a nationwide survey by combining internationally recognized experience along with local capacity namely by joining efforts of collaborating institutions and individuals which will serve as a good example for future surveys and its expansion in Mongolia.
2. The Mongolian STEPs survey revealed that 28.1% of the surveyed population had hypertension, 8.2% had diabetes mellitus and 9.8% were classified as obese. This can be interpreted that the prevalence of cardiovascular disease, cancer and diabetes mellitus is expected to increase in the future.
3. The survey results revealed that **9 in every 10 people** had at least one of the **major risk factors** demonstrating that NCD risk **is widely distributed in Mongolia; and that one in every five people, in particular men were at high risk in developing NCDs**. Accordingly, in regard to gender, the proportion of current daily smokers was 10 times higher in males (43%) as compared to females (4%).
4. The Mongolian STEPs survey results will serve as **baseline information** for the prevalence of major NCDs and their associated risk factors.
5. This survey gives the opportunity to undertake **a comparative analysis** of the prevalence of NCDs major risk factors, **to evaluate the implementation of the National NCD Action Plan**, and to establish a database on **disease prevention and control** at the national level. Furthermore, the results will serve as the **baseline indicators** for evidence-based decision-making in public health.
6. The survey results will serve as indicators to monitor and evaluate the Integrated Programme on NCD prevention and control implemented from 2006.

Recommendations

1. Due to the widely distributed NCD risk factors and their combination among the Mongolian population, there is an urgent need to implement a wide ranging integrated strategy incorporating all social sectors in disease **prevention, and enhance multi-lateral action steps** among the population in order to reduce the prevalence of NCDs and risk factors.
2. Based upon the survey results, the Government should tailor actions directed towards reduction of the proportion of the at-risk population with further control action by incorporating them in the Action Plan for 2006-2009 within the framework of the integrated programme on NCD prevention and control.
3. This survey established the baseline information, which should be repeated every five years in order to establish a sustainable surveillance system and provide sustainable networking for information exchange and evaluation.
4. The information from this Mongolian NCD STEPs survey will be further analysed and disseminated in line with the needs of various stakeholders (decision makers, community and etc.). Further dissemination will be undertaken to the participating organizations and public through all channels of mass media and establishment of a friendly environment for utilization of the information designed towards reducing NCD risks.
5. More in-depth analyses will continue in a more profound investigation of the baseline information focusing on intercorrelation of major risk factors and elaborate description of specific findings applicable to different regions and local areas with further dissemination of the tailored information.

10. Appendix 1.
The Detailed Results

10.1.1. Demographic indicators

Table 1: Mean number of years of education by age and gender

	Age group	N	Mean number of years of education	
			n	*Mean*
Males	15-24	351	351	8.9
	25-34	321	321	10.2
	35-44	352	352	10.5
	45-54	353	353	10.4
	55-64	297	297	9.8
	15-64	**1674**	**1674**	**9.8**
Females	15-24	348	348	9.8
	25-34	348	348	11.1
	35-44	384	384	11.4
	45-54	351	351	11.3
	55-64	306	306	8.9
	15-64	**1737**	**1737**	**10.6**
Both sexes	15-24	699	699	9.3
	25-34	669	669	10.6
	35-44	736	736	10.7
	45-54	704	704	10.7
	55-64	603	603	9.5
	15-64	**3411**	**3411**	**10.2**

Table 2: Mean reported household earnings of participants in the past year (MNT)

Indicator	**Age group**					
	15–24	**25–34**	**35–44**	**45–54**	**55–64**	**Total (15–64)**
N	666	667	729	699	601	3362
Household income (MNT)	1,189.122.6	1,207.835.4	1,153.700.6	1,182.025.8	1,031.059.1	1,174.336.1

Table 3: Annual income per person aged 18 years and above (MNT)

Indicator	Age group					
	15–24	25–34	35–44	45–54	55–64	Total (15–64)
N	666	667	729	699	601	3362
Annual income per adult person (18 years and above) (MNT)	393,847.6	501,185.9	492,669.6	383,336.9	351,475.8	438,485.7

Table 4: Employment in paid work (by age and gender)

	Age group	Government employee		Nongovernment employee		Non-regular employment		Self employed		Not in paid employment	
		N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Total	15-24	39	5.8	32	4	55	8.3	24	3.8	150	8.4
	25-34	154	23.5	64	9.1	180	27.6	42	6.7	440	24.7
	35-44	223	29.6	93	12.8	200	27.9	45	6.2	561	31.5
	45-54	227	32.1	70	10.1	142	20.2	29	4.2	468	26.3
	55-64	74	12.6	26	4.5	38	6.4	22	4.0	160	8.9
Total (employed in paid work)		**717**	**40.3**	**285**	**16.0**	**162**	**9.1**	**615**	**34.6**	**1779**	**100.0**
Total (15-64)		**717**	**19.3**	**285**	**8.0**	**162**	**5.2**	**615**	**18.8**		

Table 5: Unpaid work and unemployment (by age and gender)

Age group	Student		Home-maker		Pensioner		Not able to work (subsidy)		Able to work		Total (unpaid work/ unemployment)	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	***N***	*%*
15-24	429	60.9	23	3.2	0	0.0	3	0.4	94	13.4	549	33.6
25-34	22	3.3	47	7.0	0	0.0	20	3.0	138	20.6	227	14.0
35-44	5	7.0	17	2.3	8	1.1	21	2.9	126	17.1	177	10.8
45-54	0	0.0	21	3.0	83	11.6	40	5.7	92	13.1	236	14.4
55-64	0	0.0	9	1.5	390	63.4	23	3.8	21	3.5	443	27.1
Total (employed in unpaid work/ unemployed)	**456**	**27.9**	**117**	**7.2**	**481**	**29.5**	**107**	**6.5**	**471**	**28.9**	**1632**	**100.0**
Total (15-64)	**456**	**21.1**	**117**	**3.6**	**471**	**6.2**	**107**	**15.2**	**471**	**2.6**		**47.8**

Note: *A total survey population was ∑ 3411, *A total of employed population was ∑ 1779 or 52.2%, and *A total of unemployed population was ∑ 1632 or 47.8%.

Table 6: Highest level of education, by age and gender

Age group	Student		Home-maker		Pensioner		Not able to work (subsidy)		Able to work		Total (unpaid work/ unemployment)	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	***N***	*%*
15-24	429	60.9	23	3.2	0	0.0	3	0.4	94	13.4	549	33.6
25-34	22	3.3	47	7.0	0	0.0	20	3.0	138	20.6	227	14.0
35-44	5	7.0	17	2.3	8	1.1	21	2.9	126	17.1	177	10.8
45-54	0	0.0	21	3.0	83	11.6	40	5.7	92	13.1	236	14.4
55-64	0	0.0	9	1.5	390	63.4	23	3.8	21	3.5	443	27.1
15-64	456	13.4	117	3.4	481	14.1	107	3.1	471	13.8	1632	47.8
Total											**3411**	**100.0**

	Age group	Government employee		Nongovernment employee		Self employed		Non-regular employment		Total (in paid employment)	
		N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Total	15-24	39	5.8	32	4	55	8.3	24	3.8	150	8.4
	25-34	154	23.5	64	9.1	180	27.6	42	6.7	440	24.7
	35-44	223	29.6	93	12.8	200	27.9	45	6.2	561	31.5
	45-54	227	32.1	70	10.1	142	20.2	29	4.2	468	26.3
	55-64	74	12.6	26	4.5	38	6.4	22	4.0	160	8.9
	15-64	717	19.3	285	8.0	615	18.8	162	5.2	1779	52.2
Total										**3411**	**100.0**

Table 7: Highest level of education, by age and gender

Age group		Mean number of years of education													
		No formal schooling		Some primary schooling 1-3		Completed primary 1-4		Incompleted secondary 5-8		Completed secondary 1-10		College/University completed		Postgraduate degree	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Males	15-24	7	2.1	4	1.3	55	16.8	162	46.3	88	23.7	35	9.8	0	0.0
	25-34	1	0.3	5	1.5	21	6.8	82	26.1	100	30.7	110	33.9	2	0.6
	35-44	3	0.9	8	2.3	11	3.2	87	24.8	97	27.7	143	39.9	5	1.4
	45-54	4	1.1	4	1.1	36	10.2	87	24.7	67	19.0	146	41.4	9	2.6
	55-64	4	1.5	9	3.1	81	27.9	37	12.1	20	6.6	139	46.4	7	2.4
	15-64	**19**	**1.2**	**30**	**1.7**	**204**	**11.3**	**455**	**31.2**	**372**	**24.5**	**571**	**29.1**	**23**	**1.0**
Females	15-24	1	0.3	5	1.7	46	13.8	130	38.8	110	29.6	55	15.4	1	0.2
	25-34	3	0.8	0	0.0	13	3.9	70	21.0	94	27.3	161	45.2	7	1.7
	35-44	4	1.0	6	1.6	9	2.4	57	14.9	101	26.3	199	51.7	8	2.1
	45-54	0	0.0	6	1.7	37	10.7	48	13.7	48	13.6	203	57.5	9	2.6
	55-64	10	3.4	12	4.1	76	25.8	44	14.5	26	8.3	135	43.1	3	0.9
	15-64	**18**	**0.8**	**29**	**1.4**	**181**	**9.3**	**349**	**24.3**	**379**	**24.8**	**753**	**38.1**	**28**	**1.4**
Both sexes	15-24	8	1.2	9	1.5	101	15.3	292	42.6	198	26.6	90	12.6	1	0.1
	25-34	4	0.6	5	0.8	34	5.4	152	23.6	194	29.0	271	39.5	9	1.1
	35-44	7	0.9	14	2.0	20,0	2.8	144	20.0	198	27.0	340	45.5	13	1.7
	45-54	4	0.6	10	1.4	73	10.4	135	19.4	115	16.4	349	49.1	18	2.6
	55-64	14	2.4	21	3.6	157	26.9	81	13.2	46	7.4	274	44.8	10	1.7
	15-64	**37**	**1.0**	**59**	**1.5**	**385**	**10.3**	**804**	**27.9**	**751**	**24.6**	**1324**	**33.4**	**51**	**1.2**

10.1.2. Tobacco use

Table 8: Smoking status among total population

	Age group	N	Smoking status								
			Current daily smoker			Current smoker (non-daily)			Does not smoke		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	59	16.2	±0.1	25	7.1	±0.05	267	76.7	±0.2
	25-34	321	182	56.5	±0.2	17	5.2	±0.1	122	38.3	±0.2
	35-44	352	205	58.3	±0.1	17	4.8	±0.1	130	36.9	±0.3
	45-54	353	210	59.6	±0.3	9	2.6	±0.05	134	37.9	±0.3
	55-64	297	127	42.7	±0.4	12	3.9	±0.2	158	53.4	±0.4
	15-64	**1674**	**783**	**43.1**	**±0.2**	**80**	**5.3**	**±0.05**	**811**	**51.6**	**±0.1**
Females	15-24	348	5	1.3	±0.05	3	0.8	±0.05	340	97.9	±0.05
	25-34	348	13	3.2	±0.05	6	1.5	±0.05	329	95.3	±0.05
	35-44	384	24	6.1	±0.1	10	2.6	±0.1	350	91.2	±0.2
	45-54	351	24	6.8	±0.2	3	0.9	±0.05	324	92.4	±0.05
	55-64	306	33	10.6	±0.3	3	1.0	±0.1	270	88.4	±0.3
	15-64	**1737**	**99**	**4.1**	**±0.05**	**25**	**1.4**	**±0.05**	**1613**	**94.5**	**±0.05**
Both sexes	15-24	699	64	8.9	±0.05	28	4.0	±0.05	607	87.1	±0.1
	25-34	669	195	30.5	±0.2	23	3.4	±0.05	451	66.1	±0.2
	35-44	739	229	33.4	±0.2	27	3.8	±0.05	480	62.8	±0.2
	45-54	704	234	34.2	±0.2	12	1.7	±0.05	458	64.1	±0.3
	55-64	603	160	27.5	±0.3	15	2.6	±0.1	428	69.9	±0.3
	15-64	**3411**	**882**	**24.2**	**±0.05**	**105**	**3.4**	**±0.05**	**2424**	**72.4**	**±0.05**

Table 9: Percentage of current daily smokers among smokers

	Age group	N	Percentage of current daily smokers among smokers					
			Current daily smoker			Non-daily smoke		
			n	*%*	*95% CI*	*n*	*%*	*95%*
Males	15-24	351	59	69.5	±0.4	25	30.5	±0.4
	25-34	321	182	91.6	±0.2	17	8.4	±0.2
	35-44	352	205	92.4	±0.2	17	7.6	±0.2
	45-54	353	210	95.9	±0.2	9	4.1	±0.1
	55-64	297	127	91.5	±0.4	12	8.5	±0.4
	15-64	**1674**	**783**	**89.0**	**±0.1**	**80**	**11.0**	**±0.1**
Females	15-24	348	5	62.9	±1.3	3	37.1	±0.3
	25-34	348	13	68.5	±0.9	6	31.5	±0.4
	35-44	384	24	70.2	±0.8	10	29.8	±0.8
	45-54	351	24	88.7	±0.7	3	11.3	±0.7
	55-64	306	33	91.4	±0.7	3	8.6	±0.7
	15-64	**1737**	**99**	**75.3**	**±0.4**	**25**	**24.7**	**±0.4**
Both sexes	15-24	699	64	69.0	±0.4	28	31.0	±0.5
	25-34	669	195	90.0	±0.2	23	10.0	±0.2
	35-44	739	229	89.9	±0.2	27	10.1	±0.2
	45-54	704	234	95.2	±0.2	12	4.8	±0.1
	55-64	603	160	91.5	±0.3	15	8.5	±0.3
	15-64	**3411**	**882**	**87.7**	**±0.1**	**105**	**12.3**	**±0.1**

Table 10: Persentage of smokers who use manufactured cigarettes

	Age group	N	Persentage of smokers who use manufactured cigarettess		
			n	*%*	*95% CI*
Males	15-24	351	58	98.0	±0.2
	25-34	321	166	90.6	±0.2
	35-44	352	182	88.5	±0.2
	45-54	353	186	88.5	±0.2
	55-64	297	97	74.4	±0.5
	15-64	**1674**	**689**	**89.4**	**±0.1**
Females	15-24	348	5	100.0	0
	25-34	348	5	100.0	0
	35-44	384	13	95.7	±0.4
	45-54	351	23	95.7	±0.5
	55-64	306	29	87.2	±0.4
	15-64	**1737**	**93**	**95.5**	**±0.3**
Both sexes	15-24	699	63	98.1	±0.1
	25-34	669	179	91.1	±0.2
	35-44	739	205	89.1	±0.2
	45-54	704	209	89.2	±0.3
	55-64	603	126	76.8	±0.5
	15-64	**3411**	**782**	**89.9**	**±0.1**

Table 11: Mean amount of tobacco used by daily smokers by type

	Age group	N	Mean amount of tobacco used by daily smokers by type								
			Manufactured cigarettes			Hand-rolled cigarettes			Pipes of tobacco		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	58	8.4	±0.1	1	6.0	0	0	0	0
	25-34	321	166	10.9	±0.05	16	7.1	±0.05	1	15.0	0
	35-44	352	182	12.2	±0.05	28	9.5	±0.1	1	15.6	±0.9
	45-54	353	186	14.7	±0.1	27	12.6	±0.2	2	18.5	±1.3
	55-64	297	97	14.9	±0.2	24	16.7	±0.4	8	21.9	±0.5
	15-64	**1674**	**689**	**11.85**	**±0.2**	**96**	**10.3**	**±0.1**	**12**	**18.7**	**±0.4**
Females	15-24	348	5	3.9	±0.1	-	-	-	-	-	-
	25-34	348	13	5.4	±0.1	-	-	-	-	-	-
	35-44	384	23	7.4	±0.1	1	8.0	0	-	-	-
	45-54	351	23	7.5	±0.1	1	30.0	0	-	-	-
	55-64	306	29	8.9	±0.2	4	8.2	±0.4	-	-	-
	15-64	**1737**	**12**	**18.7**	**±0.4**	**93**	**6.9**	**±0.1**	**6**	**12.7**	**±0.5**
Both sexes	15-24	699	63	8.1	±0.04	1	6.0	-	-	-	-
	25-34	669	179	10.6	±0.05	16	7.1	±0.05	1	15.0	0
	35-44	739	205	11.7	±0.05	29	9.5	±0.1	1	15.7	±0.9
	45-54	704	209	14.0	±0.1	28	13.2	±0.1	2	18.5	±1.3
	55-64	603	126	13.6	±0.1	28	15.7	±1.4	8	21.9	±0.5
	15-64	**3411**	**782**	**11.4**	**±0.02**	**12**	**18.7**	**±0.4**	**689**	**11.9**	**±0.01**

Table 12: Average age of initiation and duration, of smoking among current daily smokers

	Age group	N	Average age of initiation			Average age of duration		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	59	16.8	±0.05	59	4.1	±0.03
	25-34	321	182	17.8	±0.03	182	11.6	±0.05
	35-44	352	205	19.5	±0.04	205	19.9	±0.04
	45-54	353	210	20.9	±0.1	210	27.9	±0.1
	55-64	297	127	22.5	±0.1	127	36.9	±0.1
	15-64	**1674**	**783**	**19.1**	**±0.01**	**783**	**17.8**	**±0.04**
Females	15-24	348	5	18.2	±0.1	5	2.7	±0.1
	25-34	348	13	22.3	±0.1	13	8.5	±0.1
	35-44	384	24	28.4	±0.2	24	11.9	±0.1
	45-54	351	24	28.6	±0.2	24	20.7	±0.2
	55-64	306	33	38.2	±0.4	33	21.5	±0.4
	15-64	**1737**	**99**	**27.8**	**±0.1**	**99**	**13.8**	**±0.1**
Both sexes	15-24	699	64	16.9	±0.02	64	4.0	±0.03
	25-34	669	195	18.0	±0.1	195	11.4	±0.03
	35-44	739	229	20.3	±0.04	229	19.2	±0.04
	45-54	704	234	21.6	±0.1	234	27.2	±0.1
	55-64	603	160	25.3	±0.2	160	34.1	±0.1
	15-64	**3411**	**882**	**19.8**	**±0.02**	**882**	**17.5**	**±0.03**

10.1.3. Alcohol consumption

Table 13: Number of standard drinks consumed per drinking day

	Age group	N	Number of standard drinks consumed per drinking day														
			1			2-3			4-5			6 +			Mean		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	48	24.2	±0.4	70	35.7	±0.5	45	23.8	±0.4	32	16.3	±0.4	195	3.2	±0.01
	25-34	321	26	9.5	±0.2	59	21.8	±0.4	87	31.6	±0.4	101	37.1	±0.4	273	5.67	±0.03
	35-44	352	16	5.4	±0.2	55	18.5	±0.4	104	35.2	±0.5	120	40.9	±0.5	295	7.37	±0.04
	45-54	353	21	7.1	±0.3	61	20.5	±0.5	110	36.9	±0.6	105	35.5	±0.6	297	6.15	±0.03
	55-64	297	20	9.1	±0.5	64	28.3	±0.8	75	33.3	±0.8	63	29.3	±0.9	222	5.48	±0.04
	15-64	**1674**	**131**	**11.5**	**±0.2**	**309**	**24.6**	**±0.2**	**421**	**31.5**	**±0.2**	**421**	**32.2**	**±0.1**	**1282**	**5.52**	**±0.04**
Females	15-24	348	66	47.6	±0.7	55	41.2	±0.6	11	9.0	±0.4	3	2.1	±0.2	135	1.63	±0.01
	25-34	348	63	28.8	±0.5	105	48.6	±0.6	33	15.9	±0.4	13	6.6	±0.3	214	2.51	±0.01
	35-44	384	67	26.3	±0.5	118	46.5	±0.6	44	17.4	±0.5	24	9.7	±0.4	253	2.82	±0.02
	45-54	351	68	31.5	±0.7	96	45.3	±0.8	35	16.6	±0.6	14	6.7	±0.4	213	2.54	±0.02
	55-64	306	40	29.8	±0.1	71	53.7	±0.3	18	14.1	±0.9	3	2.5	±0.4	132	2.26	±0.03
	15-64	1737	304	33.2	±0.3	445	46.1	±0.3	141	14.6	±0.2	57	6.1	±0.2	947	2.34	±0.01
Both sexes	**15-24**	**699**	**114**	**33.6**	**±0.4**	**125**	**37.9**	**±0.4**	**56**	**17.9**	**±0.3**	**35**	**10.6**	**±0.2**	**330**	**2.53**	**±0.02**
	25-34	669	89	17.3	±0.2	164	32.6	±0.3	120	25.3	±0.3	114	24.7	±0.3	487	4.37	±0.03
	35-44	739	83	14.2	±0.3	173	30.2	±0.4	148	27.8	±0.3	144	27.9	±0.4	548	5.42	±0.05
	45-54	704	89	16.8	±0.4	157	30.4	±0.5	145	28.8	±0.5	119	23.9	±0.4	510	4.67	±0.05
	55-64	603	60	16.1	±0.5	135	36.9	±0.7	93	26.8	±0.7	66	20.2	±0.6	354	4.30	±0.1
	15-64	**3411**	**435**	**20.3**	**±0.2**	**754**	**33.2**	**±0.2**	**562**	**24.7**	**±0.2**	**478**	**21.7**	**±0.2**	**2229**	**4.19**	**±0.02**

Table 14 Frequency of alcohol consumption in the last year

	Age group	N	Frequency of alcohol consumption in the last year														
			Daily			5-6 days per week			1-4 days per week			1-3 days per month			< once a month		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	-	-	-	1	0.6	±0.9	13	6.3	±0.1	78	37.9	±0.3	115	55.2	±0.3
	25-34	321	2	0.7	±0.04	2	0.8	±0.05	25	9.1	±0.2	149	54.6	±0.2	95	34.8	±0.2
	35-44	352	1	0.3	±0.02	4	1.4	±0.05	50	16.6	±0.2	137	46.0	±0.3	106	35.7	±0.3
	45-54	353	4	1.4	±0.05	3	1.0	±0.05	55	18.5	±0.3	125	41.9	±0.3	112	37.3	±0.4
	55-64	297	1	0.4	±0.6	4	1.6	±0.2	25	11.1	±0.3	97	43.7	±0.5	96	43.2	±0.5
	15-64	**1674**	**8**	**0.5**	**±0.02**	**14**	**1.0**	**±0.1**	**168**	**11.7**	**±0.1**	**586**	**45.7**	**±0.2**	**524**	**41.1**	**±0.1**
Females	15-24	348	-	-	-	-	-	-	3	1.8	±0.05	33	20.5	±0.2	128	77.7	±0.2
	25-34	348	-	-	-	1	0.5	±0.05	3	1.3	±0.05	71	31.5	±0.3	147	66.7	±0.2
	35-44	384	-	-	-	1	0.4	±0.05	5	1.9	±0.1	61	22.9	±0.3	200	74.8	±0.3
	45-54	351	-	-	-	1	0.5	±0.05	6	2.7	±0.2	58	25.9	±0.4	160	70.9	±0.4
	55-64	306	-	-	-	-	-	-	2	1.4	±0.1	18	12.3	±0.4	129	86.3	±0.4
	15-64	**1737**	**-**	**-**	**-**	**3**	**0.3**	**0.0**	**19**	**1.8**	**±0.05**	**241**	**24.5**	**±0.2**	**764**	**73.4**	**±0.2**
Both sexes	15-24	699	0	0.0	±0.001	1	0.3	±0.04	16	4.3	±0.2	111	30.4	±0.3	243	64.9	±0.4
	25-34	669	2	0.4	±0.1	3	0.7	±0.1	28	5.8	±0.3	220	45.0	±0.3	242	48.0	±0.3
	35-44	739	1	0.2	±0.04	5	0.9	±0.1	55	10.3	±0.2	198	36.1	±0.4	306	52.4	±0.4
	45-54	704	4	0.8	±0.1	4	0.8	±0.1	61	11.9	±0.2	183	35.3	±0.5	272	51.1	±0.5
	55-64	603	1	0.2	±0.1	4	1.0	±0.05	27	7.5	±0.4	115	32.2	±0.6	225	58.9	±0.7
	15-64	**3411**	**8**	**0.3**	**±0.02**	**17**	**0.7**	**±0.03**	**187**	**7.5**	**±0.1**	**827**	**36.8**	**±0.2**	**1288**	**54.6**	**±0.2**

Table 15: Number of standard drinks consumed in the 7 days grouped into three categories

	Age group	N	Drank on 4+ days			5+ drinks on any day			20+ drinks in 7 days		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	1	8.1	±0.5	3	18.5	±0.7	5	32.5	±0.9
	25-34	321	4	14.2	±0.5	18	62.4	±0.7	25	86.1	±0.5
	35-44	352	5	9.2	±0.4	46	83.8	±0.4	50	90.9	±0.5
	45-54	353	7	11.2	±0.5	47	75.5	±0.6	55	88.7	±0.5
	55-64	297	5	15.5	±0.9	22	72.8	±1.1	24	79.9	±1.2
	15-64	**1674**	**22**	**11.1**	**±0.3**	**136**	**67.6**	**±0.8**	**159**	**80.8**	**±0.3**
			Drank on 4+ days			**5+ drinks on any day**			**15+ drinks in 7 days**		
Females	15-24	348	-	-	-	-	-	-	-	-	
	25-34	348	1	29.9	±1.9	3	76.6	±1.8	3	76.6	±1.8
	35-44	384	1	16.7	±1.4	5	82.7	±1.5	5	82.7	±1.5
	45-54	351	1	14.5	±1.6	3	43.3	±2.2	3	43.3	±2.2
	55-64	306	-	-	-	1	47.7	±5.2	1	47.7	±5.2
	15-64	**1737**	**3**	**15.1**	**±0.7**	**12**	**52.6**	**±1.2**	**12**	**52.6**	**±1.1**

Table 16: Largest number of drinks consumed during a single occation in the last 12 months

	Age group	N	Largest number of drinks consumed during a single occation in the last 12 months		
			n	*%*	*95% CI*
Males	15-24	351	207	6.2	±0.8
	25-34	321	273	10.7	±0.9
	35-44	352	298	12.6	±1.1
	45-54	353	299	11.5	±1.0
	55-64	297	223	10.0	±1.8
	15-64	**1674**	**1300**	**10.5**	**±0.5**
Females	15-24	348	164	2.6	±0.4
	25-34	348	222	4.2	±0.5
	35-44	384	267	4.6	±0.5
	45-54	351	225	4.7	±1.0
	55-64	306	149	3.0	±0.4
	15-64	**1737**	**1027**	**4.0**	**±0.3**
Both sexes	15-24	699	371	4.6	±0.5
	25-34	669	495	7.8	±0.6
	35-44	739	565	8.8	±0.7
	45-54	704	524	8.6	±0.8
	55-64	603	372	7.2	±0.8
	15-64	**3411**	**2327**	**7.6**	**±0.3**

10.1.4. Fruit and vegetable consumption

Table 17: Number of days fruit and vegetables consumed by age, gender and ethnicity

	Population	N	Fruit		Vegetables		Fruit and vegetables	
			Mean	*95% CI*	*Mean*	*95% CI*	*Mean*	*95% CI*
Age group	15-24	699	2.14	±0.01	5.7	±0.01	7.9	±0.01
	25-34	669	1.8	±0.01	5.6	±0.01	7.5	±0.01
	35-44	736	1.4	±0.01	5.5	±0.01	7.0	±0.01
	45-54	704	1.3	±0.01	5.4	±0.01	6.7	±0.01
	55-64	603	1.1	±0.01	5.2	±0.01	6.4	±0.02
	15-64	**3411**	**1.7**	**±0.01**	**5.6**	**±0.003**	**7.3**	**±0.01**
Gender	Males	1674	1.4	±0.01	5.5	±0.01	6.9	±0.01
	Females	1737	2.1	±0.01	5.7	±0.01	7.7	±0.01
	Both	**3411**	**1.7**	**±0.01**	**5.6**	**±0.01**	**7.3**	**±0.02**
Ethnicity	Khalkh	2873	1.8	±0.01	5.7	±0.01	7.5	±0.01
	Kazak	88	1.8	±0.02	5.8	±0.001	7.6	±0.02
	Other	450	1.1	±0.01	5.2	±0.01	6.3	±0.01
	Total	3411	1.7	±0.01	5.6	±0.001	7.3	±0.01

Table 18: Serving size of fruit and vegetables in typical day by age group and gender

	Age group	N	Fruit		Vegetables		Fruit and vegetables	
			Mean	*95% CI*	*Mean*	*95% CI*	*Mean*	*95% CI*
Males	15-24	351	1.7	±0.003	2.0	±0.01	3.3	±0.01
	25-34	321	1.6	±0.003	2.0	±0.001	3.4	±0.01
	35-44	352	1.5	±0.003	2.0	±0.010	2.8	±0.01
	45-54	353	1.4	±0.003	1.9	±0.002	2.5	±0.01
	55-64	297	1.5	±0.004	1.9	±0.002	2.0	±0.01
	15-64	**1674**	**1.5**	**±0.002**	**2.0**	**±0.001**	**3.0**	**±0.01**
Females	15-24	348	1.8	±0.003	2.0	±0.001	3.6	±0.01
	25-34	348	1.7	±0.003	2.0	±0.001	3.6	±0.01
	35-44	384	1.7	±0.003	2.0	±0.01	3.3	±0.01
	45-54	351	1.6	±0.004	2.0	±0.01	3.1	±0.02
	55-64	306	1.5	±0.01	2.0	±0.003	2.7	±0.02
	15-64	**1737**	**1.7**	**±0.001**	**2.0**	**±0.01**	**3.4**	**±0.01**
Both sexes	15-24	699	1.8	±0.01	1.6	±0.003	3.4	±0.01
	25-34	669	1.7	±0.01	1.7	±0.004	3.5	±0.01
	35-44	736	1.4	±0.01	1.7	±0.004	3.1	±0.01
	45-54	704	1.2	±0.01	1.6	±0.01	2.8	±0.01
	55-64	603	0.9	±0.01	1.5	±0.01	2.3	±0.01
	15-64	**3411**	**1.5**	**±0.003**	**1.7**	**±0.002**	**3.2**	**±0.004**

Table 19: Servings of fruits consumed per day by gender, area and ethnicity

Population	N	0 serving sizes per day			>5 serving sizes per day			5 or more serving sizes per day		
		n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	1674	966	57.7	±0.1	607	36.3	±0.1	101	6.0	±0.05
Females	1737	693	39.9	±0.1	893	51.4	±0.1	151	8.7	±0.1
Both sexes	**3411**	**1659**	**45.6**	**±0.05**	**1500**	**46.3**	**±0.05**	**252**	**8.1**	**±0.05**
Urban	1702	611	35.9	±0.1	932	54.8	±0.1	159	9.3	±0.05
Rural	1709	1048	61.3	±0.2	568	33.2	±0.1	93	5.4	±0.05
Total	**3411**	**1659**	**45.6**	**±0.05**	**1500**	**46.3**	**±0.05**	**252**	**8.1**	**±0.05**
Khalkh	2873	1335	46.5	±0.05	1311	45.6	±0.1	227	7.9	±0.05
Kazak	88	34	38.3	±0.4	50	56.8	±0.4	4	4.5	±0.2
Other	450	290	64.4	±0.2	139	30.9	±0.2	21	4.7	±0.05
Total	**3411**	**1659**	**45.6**	**±0.05**	**1500**	**46.3**	**±0.05**	**252**	**8.1**	**±0.05**

Table 20: Servings of vegetables per day by gender

Gender Population	N	0 serving sizes per day			>5 serving sizes per day			5 or more serving sizes per day		
		n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	1674	106	6.0	±0.05	1518	90.7	±0.1	50	3.2	±0.05
Females	1737	85	4.8	±0.05	1612	93.0	±0.1	40	2.1	±0.05
Both sexes	**3411**	**191**	**5.5**	**±0.05**	**3130**	**91.8**	**±0.1**	**90**	**2.7**	**±0.05**

Table 21: Servings of fruits and vegetables per day by age group and gender

	Age group	N	0 serving sizes per day			>5 serving sizes per day			5 or more serving sizes per day		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	148	4.3	±0.1	522	74.5	±0.1	148	21.2	±0.1
	25-34	321	167	5.9	±0.1	462	69.1	±0.2	167	25.1	±0.2
	35-44	352	117	5.8	±0.1	574	78.3	±0.2	117	15.9	±0.2
	45-54	353	92	8.5	±0.2	549	78.0	±0.2	92	13.5	±0.2
	55-64	297	47	7.9	±0.2	508	84.4	±0.3	47	7.7	±0.2
	15-64	**1674**	**571**	**5.8**	**±0.05**	**2615**	**75.1**	**±0.1**	**571**	**19.1**	**±0.1**
Females	15-24	348	196	3.7	±0.1	475	68.0	±0.2	196	28.3	±0.02
	25-34	348	180	3.7	±0.1	462	69.0	±0.2	180	27.3	±0.02
	35-44	384	191	6.3	±0.1	501	67.8	±0.2	191	25.9	±0.02
	45-54	351	148	4.1	±0.1	528	75.0	±0.3	148	20.9	±0.03
	55-64	306	98	6.3	±0.2	466	77.4	±0.3	98	16.3	±0.30
	15-64	**1737**	**813**	**4.4**	**±0.04**	**2432**	**69.8**	**±0.1**	**813**	**25.8**	**±0.01**
Both sexes	15-24	699	180	4.3	±0.1	522	74.5	±0.1	148	21.2	±0.1
	25-34	669	180	5.9	±0.1	462	69.1	±0.2	167	25.1	±0.2
	35-44	736	156	5.8	±0.1	574	78.3	±0.2	117	15.9	±0.2
	45-54	704	121	8.5	±0.2	549	78.0	±0.2	92	13.5	±0.2
	55-64	603	75	7.9	±0.2	508	84.4	±0.3	47	7.7	±0.2
	15-64	**3411**	**712**	**5.8**	**±0.05**	**2615**	**75.1**	**±0.1**	**571**	**19.1**	**±0.1**

Table 22: Most often consumed oil and fat by age group

Age group	N	Vegetable oil			Animal fat			Fatty meat		
		n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
15-24	699	471	65.1	±0.1	42	6.7	±0.1	107	16.6	±0.1
25-34	669	437	63.7	±0.2	40	6.5	±0.1	126	19.7	±0.1
35-44	736	473	63.6	±0.2	56	7.8	±0.1	148	20.4	±0.1
45-54	704	419	59.1	±0.2	52	7.5	±0.1	181	25.9	±0.2
55-64	603	333	53.0	±0.3	54	9.5	±0.2	167	28.9	±0.2
15-64	**3411**	**2133**	**62.3**	**±0.1**	**244**	**7.2**	**±0.04**	**729**	**20.3**	**±1.5**

Table 23: Salt intake by locality and ethnicity

Population groups		N	Salt consumption per person per day (gr)			Number of days drink Salt tea		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*
Locality	Urban	1677	792	9.0	±0.02	1256	4.7	±0.01
	Rural	1734	1068	10.6	±0.02	1256	4.9	±0.01
	Total	**3411**	**1860**	**10.0**	**±0.01**	**2512**	**4.8**	**±0.01**
Ethnicity	Khalkh	2873	1642	10.0	±0.01	2154	4.8	±0.01
	Kazak	88	43	9.2	±0.1	79	6.0	±0.02
	Other	450	175	11.2	±0.04	279	4.2	±0.02
	Total	**3411**	**1860**	**10.0**	**±0.01**	**2512**	**4.8**	**±0.02**

Table 24: Salt intake by gender and age group

Population	N	Salt consumption per person per day (gr)			Number of days drink Tea with salt		
		n	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	1674	792	10.3	±0.02	1256	4.9	±0.01
Females	1737	1068	9.8	±0.02	1256	4.7	±0.01
Both sexes	**3411**	**1860**	**10.0**	**±0.01**	**2512**	**4.8**	**±0.1**
15-24	699	393	9.3	±0.02	507	4.7	±0.1
25-34	669	365	10.0	±0.03	509	5.0	±0.01
35-44	736	405	10.6	±0.03	531	4.7	±0.01
35-54	704	383	10.7	±0.04	517	4.8	±0.02
55-64	603	314	10.5	±0.1	448	4.8	±0.02
15-64	**3411**	**1860**	**10.0**	**±0.01**	**2512**	**4.8**	**±0.1**

10.1.5. Physical activity

Table 25: Median time of total physical activity per week

	Age group	N	Median (inter-quartile range)		
			n	*Median*	*Inter-quartile range*
Males	15-24	351	290	1470	810-2280
	25-34	321	243	1680	760-2940
	35-44	352	264	1440	630-2805
	45-54	353	271	1260	450-2219
	55-64	297	245	1190	480-2280
	15-64	**1674**	**1313**	**1440**	**700-2520**
Females	15-24	348	320	1020	480-1785
	25-34	348	278	1420	600-2580
	35-44	384	326	1440	700-2380
	45-54	351	297	1380	540-2400
	55-64	306	271	1320	540-2190
	15-64	**1737**	**1492**	**1250**	**560-2200**
Both sexes	15-24	699	610	1200	610-2070
	25-34	669	521	1560	660-2730
	35-44	736	590	1440	680-2540
	45-54	704	568	1260	490-2280
	55-64	603	516	1260	510-2215
	15-64	**3411**	**2805**	**1320**	**620-2340**

Table 26: Levels of total physical activity (by gender)

	Age group	N	Low level of activity			Moderate levels of activity			High level of activity		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	55	16.8	±0.2	81	24.9	±0.2	82	12.5	±0.2
	25-34	321	50	17.7	±0.2	56	19.1	±0.2	69	17.9	±0.2
	35-44	352	65	22.1	±0.2	51	15.4	±0.2	55	12.4	±0.2
	45-54	353	77	26.0	±0.3	44	13.2	±0.2	51	10.6	±0.2
	55-64	297	74	27.6	±0.4	23	8.3	±0.3	32	8.9	±0.3
	15-64	**1674**	**321**	**20.1**	**±0.1**	**255**	**18.7**	**±0.05**	**289**	**13.3**	**±0.1**
Females	15-24	348	103	30.0	±0.2	55	16.8	±0.1	45	3.9	±0.01
	25-34	348	73	23.5	±0.2	53	16.2	±0.2	62	11.6	±0.02
	35-44	384	75	21.4	±0.3	52	14.5	±0.2	66	12.5	±0.1
	45-54	351	89	28.2	±0.3	39	11.6	±0.2	46	9.0	±0.2
	55-64	306	73	26.4	±0.4	24	7.9	±0.3	22	4.7	±0.3
	15-64	**1737**	**413**	**26.1**	**±0.2**	**223**	**14.9**	**±0.1**	**241**	**8.4**	**±0.1**
Both sexes	15-24	699	158	23.5	±0.1	136	20.8	±0.1	127	8.3	±0.01
	25-34	669	123	20.5	±0.1	109	17.7	±0.2	131	14.8	±0.2
	35-44	736	140	21.7	±0.2	103	15.0	±0.2	121	12.4	±0.1
	45-54	704	166	27.1	±0.2	83	12.5	±0.2	97	9.9	±0.2
	55-64	603	147	27.0	±0.3	47	8.1	±0.2	54	6.9	±0.2
	15-64	**3411**	**734**	**23.1**	**±0.1**	**478**	**16.8**	**±0.1**	**530**	**10.9**	**±0.05**

Table 27: Levels of total physical activity (by locality)

	Gender	N	Low level of activity			Moderate levels of activity			High level of activity		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Urban	Males	837	210	26.6	±0.2	110	15.8	±0.1	110	9.0	±0.2
	Females	865	245	32.6	±0.2	88	11.4	±0.1	92	6.3	±0.2
	Total	1702	455	29.4	±0.2	198	13.7	±0.2	202	7.7	±0.2
Rural	Males	837	111	14.1	±0.1	145	21.2	±0.1	179	17.1	±0.1
	Females	872	168	20.9	±0.2	135	17.8	±0.05	149	10.0	±0.2
	Total	1709	279	17.6	±0.2	280	19.5	±0.1	328	13.6	±0.01
Total	Males	1674	321	20.1	±0.1	255	18.7	±0.1	289	13.3	±0.1
	Females	1737	413	26.1	±0.1	223	14.9	±0.05	241	8.4	±0.1
	Total	3411	734	23.1	±0.1	478	16.8	±0.1	530	10.9	±0.01

Table 28: Setting-specific physical activity (by gender)

	Age group	N	Work			Transport			Recreation		
			n	*Median*	*Inter-quartile range*	*n*	*Median*	*Inter-quartile range*	*n*	*Median*	*Inter-quartile range*
Males	15-24	351	333	25.71	0-137.14	314	65.0	30.0-128.57	329	40.0	8.57-85.71
	25-34	321	275	132.86	0-300.0	296	60.0	21.43-120.0	301	17.14	0-60.0
	35-44	352	314	89.29	0-291.43	317	60.0	12.86-120.0	323	15.0	0-51.43
	45-54	353	311	34.29	0-205.71	316	60.0	17.14-120.0	336	12.86	0-60.0
	55-64	297	285	17.14	0-205.71	275	60.0	30.0-120.0	273	8.57	0-60.0
	15-64	**1674**	**1518**	**51.43**	**0-240.0**	**1518**	**60.0**	**21.43-120.0**	**1562**	**25.71**	**0-68.57**
Females	15-24	348	344	11.43	0-68.57	336	42.86	21.43-102.86	334	34.29	0-94.29
	25-34	348	337	68.57	0-214.29	317	60.0	25.71-120.0	311	30.0	0-102.86
	35-44	384	370	60.0	0-214.29	359	60.0	25.71-120.0	355	30.0	0-90.0
	45-54	351	338	42.86	0-214.29	324	60.0	21.43-120.0	322	17.14	0-75.0
	55-64	306	303	25.71	0-180.0	284	60.0	20.0-120.0	292	15.0	0-68.57
	15-64	**1737**	**1692**	**28.57**	**0-171.43**	**1620**	**51.43**	**21.43-120.0**	**1614**	**30.0**	**0-90.0**
Both sexes	15-24	699	677	17.14	0-87.14	650	60.0	25.71-120.0	663	34.29	4.29-90.0
	25-34	669	612	94.29	0-257.14	613	60.0	25.71-120.0	612	22.86	0-68.57
	35-44	736	684	77.14	0-240.0	676	60.0	20.0-120.0	678	20.0	0-68.57
	45-54	704	649	40.0	0-207.14	640	60.0	20.0-120.0	658	17.14	0-62.14
	55-64	603	588	20.0	0-180.0	559	60.0	21.43-120.0	565	11.43	0-64.29
	15-64	**3411**	**3210**	**38.57**	**0-205.71**	**3138**	**60.0**	**21.43-120.0**	**3176**	**25.71**	**0-77.14**

Table 29: No physical activity by setting (age group)

	Age group	N	Work			Transport			Recreation		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	55	16.8	±0.2	81	24.9	±0.2	82	24.3	±0.2
	25-34	321	50	17.7	±0.2	56	19.1	±0.2	69	22.0	±0.2
	35-44	352	65	22.1	±0.2	51	15.4	±0.2	55	15.8	±0.2
	45-54	353	77	26.0	±0.3	44	13.2	±0.2	51	14.5	±0.2
	55-64	297	74	27.6	±0.4	23	8.3	±0.3	32	10.9	±0.3
	15-64	**1674**	**321**	**29.9**	**±0.1**	**255**	**10.0**	**±0.1**	**289**	**31.0**	**±0.1**
Females	15-24	348	103	30.0	±0.2	55	16.8	±0.1	45	13.7	±0.01
	25-34	348	73	23.5	±0.2	53	16.2	±0.2	62	18.1	±0.02
	35-44	384	75	21.4	±0.3	52	14.5	±0.2	66	17.4	±0.1
	45-54	351	89	28.2	±0.3	39	11.6	±0.2	46	13.2	±0.2
	55-64	306	73	26.4	±0.4	24	7.9	±0.3	22	7.2	±0.3
	15-64	**1737**	**413**	**38.7**	**±0.1**	**223**	**6.8**	**±0.05**	**241**	**28.5**	**±0.1**
Both sexes	15-24	699	158	23.5	±0.1	136	20.8	±0.1	127	19.1	±0.01
	25-34	669	123	20.5	±0.1	109	17.7	±0.2	131	20.1	±0.2
	35-44	736	140	21.7	±0.2	103	15.0	±0.2	121	16.5	±0.1
	45-54	704	166	27.1	±0.2	83	12.5	±0.2	97	13.9	±0.2
	55-64	603	147	27.0	±0.3	47	8.1	±0.2	54	9.2	±0.2
	15-64	**3411**	**734**	**34.1**	**±0.05**	**478**	**8.5**	**±0.05**	**530**	**29.8**	**±0.1**

Table 30: No physical activity by setting (locality)

	Gender	N	Work			Transport			Recreation		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Urban	Males	837	837	33.8	±0.2	837	10.1	±0.1	837	30.0	±0.2
	Females	865	865	39.9	±0.2	865	9.1	±0.1	865	25.9	±0.2
	Both sexes	**1702**	**1702**	**36.7**	**±0.1**	**1702**	**9.6**	**±0.05**	**1702**	**28.0**	**±0.1**
Rural	Males	837	837	26.6	±0.1	837	9.9	±0.1	837	31.8	±0.1
	Females	872	872	37.7	±0.2	872	5.0	±0.05	872	30.7	±0.2
	Both sexes	**1709**	**1709**	**32.0**	**±0.1**	**1709**	**7.5**	**±0.05**	**1709**	**31.2**	**±0.1**
Total	Males	1674	1674	29.9	±0.1	1674	10.0	±0.1	1674	31.0	±0.1
	Females	1737	1737	38.7	±0.1	1737	6.8	±0.05	1737	28.5	±0.1
	Both sexes	**3411**	**3411**	**34.1**	**±0.05**	**3411**	**8.5**	**±0.05**	**3411**	**29.8**	**±0.1**

Table 31: Work related physical activity

	Age group	N	Moderate			Vigorous		
			n	*Median*	*Inter-quartile range*	*n*	*Median*	*Inter-quartile range*
Males	15-24	351	347	10.71	0-85.71	337	0	0-17.14
	25-34	321	308	64.29	0-240.0	288	0	0-102.86
	35-44	352	341	60.0	0-180.0	325	0	0-68.57
	45-54	353	344	25.71	0-128.57	322	0	0-8.57
	55-64	297	290	10.71	0-150.0	292	0	0-0
	15-64	**1674**	**1630**	**30.0**	**0-171.43**	**1564**	**0**	**0-34.29**
Females	15-24	348	345	8.57	0-60.0	347	0	0-8.57
	25-34	348	342	51.43	0-180.0	345	0	-4.29
	35-44	384	378	51.43	0-171.43	377	0	0-8.57
	45-54	351	344	38.57	0-180.0	346	0	0-0
	55-64	306	304	17.14	0-154.29	305	0	0-0
	15-64	**1737**	**1713**	**17.14**	**0-128.57**	**1720**	**0**	**0-4.29**
Both sexes	15-24	699	692	8.57	0-77.14	684	0	0-12.86
	25-34	669	650	60.0	0-205.71	633	0	0-42.86
	35-44	736	719	51.43	0-171.43	702	0	0-34.29
	45-54	704	688	34.29	0-154.29	668	0	0-0
	55-64	603	594	17.14	0-154.29	597	0	0-0
	15-64	**3411**	**3343**	**25.71**	**0-154.29**	**3284**	**0**	**0-17.14**

Table 32: Recreational physical activity

	Age group	N	Moderate			Vigorous		
			n	*Median*	*Inter-quartile range*	*n*	*Median*	*Inter-quartile range*
Males	15-24	351	339	30.0	0-64.29	339	0	0-17.14
	25-34	321	313	12.86	0-51.43	310	0	0-0
	35-44	352	332	8.57	0-44.29	340	0	0-0
	45-54	353	342	8.57	0-51.43	346	0	0-0
	55-64	297	285	5.71	0-60.0	284	0	0-0
	15-64	**1674**	**1611**	**17.14**	**0-60.0**	**1619**	**0**	**0-2.86**
Females	15-24	348	335	30.0	0-77.14	347	0	0-0
	25-34	348	319	30.0	0-80.0	339	0	0-0
	35-44	384	362	30.0	0-80.0	375	0	0-0
	45-54	351	332	17.14	0-60.0	341	0	0-0
	55-64	306	294	15.0	0-60.0	304	0	0-0
	15-64	**1737**	**1642**	**25.71**	**0-77.14**	**1706**	**0**	**0-10.71**
Both sexes	15-24	699	674	30.0	0-68.57	686	0	0-0
	25-34	669	632	17.14	0-60.0	649	0	0-0
	35-44	736	694	17.14	0-60.0	715	0	0-0
	45-54	704	674	12.86	0-60.0	687	0	0-0
	55-64	603	579	10.0	0-60.0	588	0	0-0
	15-64	**3411**	**3253**	**20.0**	**0-60.0**	**3325**	**0**	**0-0**

10.1.6. Health indicators

10.1.6.1. Body weight and height

Table 33: Mean body weight and height

	Age group	N	Weight			Height		
			n	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*
Males	15-24	350	350	58.5	±0.03	350	167.1	±0.03
	25-34	319	319	66.5	±0.05	319	168.4	±0.02
	35-44	351	351	68.8	±0.1	351	166.5	±0.03
	45-54	353	353	70.1	±0.1	353	166.1	±0.04
	55-64	296	296	70.3	±0.1	296	166.0	±0.05
	15-64	**1669**	**1669**	**65.1**	**±0.02**	**1669**	**167.1**	**±0.01**
Females	15-24	348	348	54.4	±0.03	348	158.1	±0.02
	25-34	348	348	61.5	±0.05	348	157.7	±0.02
	35-44	382	383	63.9	±0.05	382	156.4	±0.03
	45-54	351	351	65.4	±0.1	351	155.4	±0.03
	55-64	306	306	63.0	±0.1	306	153.1	±0.05
	15-64	**1735**	**1736**	**60.2**	**±0.02**	**1735**	**156.9**	**±0.01**

Table 34: Mean body weight and height by location

		Age group	N	Weight			Height		
				n	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*
Urban	*Males*	15-24	174	174	59.4	±0.03	174	168.3	±0.05
		25-34	157	157	66.7	±0.05	157	169.4	±0.04
		35-44	171	171	70.5	±0.1	171	167.3	±0.04
		45-54	171	171	70.3	±0.1	171	165.6	±0.05
		55-64	161	161	69.9	±0.1	161	166.1	±0.1
		15-64	**834**	**834**	**66.0**	**±0.02**	**834**	**167.8**	**±0.02**
	Females	15-24	177	177	54.1	±0.04	177	159.5	±0.03
		25-34	181	181	61.8	±0.03	181	158.5	±0.04
		35-44	175	175	63.1	±0.02	175	156.7	±0.04
		45-54	170	170	65.8	±0.1	170	155.9	±0.04
		55-64	161	161	62.9	±0.4	161	153.3	±0.07
		15-64	**864**	**864**	**60.2**	**±0.02**	**864**	**157.7**	**±0.02**
Rural	*Males*	15-24	176	176	57.8	±0.04	176	166.1	±0.03
		25-34	162	162	66.3	±0.1	162	167.6	±0.03
		35-44	180	180	67.3	±0.1	180	165.9	±0.04
		45-54	182	182	69.8	±0.1	182	166.5	±0.1
		55-64	135	135	70.7	±0.1	135	165.9	±0.1
		15-64	**835**	**835**	**64.3**	**±0.4**	**835**	**166.5**	**±0.02**
	Females	15-24	171	171	54.6	±0.04	171	157.0	±0.03
		25-34	167	167	61.3	±0.1	167	157.1	±0.03
		35-44	207	207	64.7	±0.1	207	156.0	±0.04
		45-54	181	181	65.0	±0.1	181	154.8	±0.04
		55-64	145	145	63.1	±0.1	145	152.9	±0.1
		15-64	**871**	**871**	**60.2**	**±0.03**	**871**	**156.3**	**±0.02**

10.1.6.2. Body mass index, overweight and obesity

Table 35: Mean body mass index

	Age group	N	BMI		
			n	*Mean*	*95% CI*
Males	15-24	350	350	20.9	±0.01
	25-34	319	319	23.4	±0.01
	35-44	351	351	24.7	±0.01
	45-54	353	353	25.4	±0.02
	55-64	296	296	25.5	±0.03
	15-64	**1669**	**1669**	**23.3**	**±0.005**
Females	15-24	348	348	21.7	±0.01
	25-34	348	348	24.7	±0.02
	35-44	382	382	26.2	±0.02
	45-54	351	351	27.1	±0.03
	55-64	306	306	26.9	±0.04
	15-64	**1735**	**1735**	**24.5**	**±0.01**
Both sexes	15-24	698	698	21.3	±0.01
	25-34	667	667	24.0	±0.01
	35-44	733	733	25.4	±0.02
	45-54	704	704	26.2	±0.02
	55-64	602	602	26.2	±0.03
	15-64	**3404**	**3404**	**23.8**	**±0.01**

Table 36: Mean body mass index by locality

Age group		N	BMI					
			Urban			Rural		
			n	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*
Males	15-24	350	174	20.9	±0.01	176	20.8	±0.01
	25-34	319	157	23.2	±0.02	162	23.5	±0.01
	35-44	351	171	25.1	±0.02	180	24.4	±0.02
	45-54	353	171	25.6	±0.04	182	25.1	±0.03
	55-64	296	161	25.3	±0.05	135	25.6	±0.04
	15-64	**1669**	**834**	**23.4**	**±0.01**	**835**	**23.1**	**±0.01**
Females	15-24	348	177	21.3	±0.01	171	22.1	±0.01
	25-34	348	181	24.6	±0.02	167	24.7	±0.02
	35-44	382	175	25.7	±0.02	207	26.6	±0.03
	45-54	351	170	27.1	±0.03	181	27.1	±0.04
	55-64	306	161	26.8	±0.04	145	26.9	±0.1
	15-64	**1735**	**864**	**24.3**	**±0.01**	**871**	**24.6**	**±0.01**
Both sexes	15-24	698	351	21.1	±0.01	347	21.5	±0.01
	25-34	667	338	23.9	±0.02	329	24.2	±0.01
	35-44	733	346	25.4	±0.02	387	25.5	±0.02
	45-54	704	341	26.3	±0.03	363	26.1	±0.02
	55-64	602	322	26.0	±0.03	280	26.2	±0.03
	15-64	**3404**	**1698**	**23.8**	**±0.01**	**1706**	**23.9**	**±0.01**

Table 37: BMI risk categories

Age group		N	BMI risk categories											
			Underweight			Normal			Overweight			Obesity		
			n	*%*	*95%CI*	*n*	*%*	*95%CI*	*n*	*%*	*95%CI*	*n*	*%*	*95%CI*
Males	15-24	350	50	13.7	±0.1	281	81.1	±0.1	15	4.1	±0.1	4	1.1	±0.4
	25-34	319	8	2.5	±0.1	241	75.7	±0.2	48	15.1	±0.2	22	6.7	±0.1
	35-44	351	5	1.4	±0.05	203	57.9	±0.3	110	31.3	±0.2	33	9.4	±0.1
	45-54	353	7	2.0	±0.1	183	51.8	±0.3	105	29.8	±0.3	58	16.4	±0.2
	55-64	296	9	2.8	±0.1	144	49.1	±0.4	103	34.4	±0.4	40	13.8	±0.3
	15-64	**1669**	**79**	**5.9**	**±0.05**	**1052**	**68.6**	**±0.1**	**381**	**18.2**	**±0.1**	**157**	**7.2**	**±0.05**
Females	15-24	348	32	8.6	±0.1	278	80.1	±0.2	33	9.9	±0.1	5	1.4	±0.0
	25-34	348	10	2.8	±0.1	200	57.5	±0.2	98	27.9	±0.2	40	11.8	±0.1
	35-44	382	2	0.5	±0.03	169	44.1	±0.2	134	35.1	±0.2	77	20.2	±0.2
	45-54	351	2	0.6	±0.05	126	35.9	±0.3	135	38.4	±0.3	88	25.1	±0.3
	55-64	306	6	1.9	±0.1	107	35.1	±0.4	123	40.2	±0.4	70	22.7	±0.4
	15-64	**1735**	**52**	**3.9**	**±0.04**	**880**	**58.0**	**±0.1**	**523**	**25.5**	**±0.1**	**280**	**12.5**	**±0.1**
Both sexes	15-24	698	82	11.2	±0.03	559	80.6	±0.1	48	6.9	±0.1	9	1.2	±0.03
	25-34	667	18	2.6	±0.01	441	66.8	±0.1	146	21.4	±0.1	62	9.2	±0.1
	35-44	733	7	0.9	±0.03	372	51.3	±0.2	244	33.1	±0.1	110	14.5	±0.1
	45-54	704	9	1.3	±0.04	309	44.2	±0.2	240	33.9	±0.2	146	20.6	±0.2
	55-64	602	15	2.4	±0.1	251	42.4	±0.3	226	37.2	±0.3	110	18.0	±0.2
	15-64	**3404**	**131**	**4.9**	**±0.4**	**1932**	**63.5**	**±0.1**	**904**	**21.8**	**±0.1**	**437**	**9.8**	**±0.04**

Table 38: BMI risk categories by location

	Gender	N	BMI risk categories											
			Underweight			Normal			Overweight			Obesity		
			n	*%*	*95%CI*	*n*	*%*	*95%CI*	*n*	*%*	*95%CI*	*n*	*%*	*95%CI*
Urban	Males	834	52	7.7	±0.1	491	63.4	±0.2	204	20.3	±0.1	87	8.6	±0.1
	Females	864	33	5.2	±0.1	440	57.1	±0.1	264	26.7	±0.2	127	11.5	±0.2
	Both sexes	**1698**	**85**	**6.5**	**±0.1**	**931**	**60.4**	**±0.1**	**468**	**23.1**	**±0.1**	**214**	**10.0**	**±0.1**
Rural	Males	835	27	4.4	±0.1	561	73.1	±0.1	177	16.5	±0.1	70	6.0	±0.1
	Females	871	19	2.9	±0.05	440	58.8	±0.1	259	25.0	±0.1	153	13.3	±0.1
	Both sexes	**1706**	**46**	**3.7**	**±0.04**	**1001**	**66.1**	**±0.1**	**436**	**20.7**	**±0.1**	**223**	**9.6**	**±0.1**

Table 39: Mean waist and hip circumference

	Age group	Waist girth			Hip girth		
		n	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*
Males	15-24	349	72.8	±0.02	349	88.4	±0.02
	25-34	315	80.8	±0.04	318	93.6	±0.02
	35-44	350	85.2	±0.05	351	94.9	±0.03
	45-54	352	87.7	±0.1	352	96.1	±0.04
	55-64	296	88.8	±0.05	295	97.1	±0.1
	15-64	1662	80.6	±0.02	1665	92.7	±0.02
Females	15-24	346	71.9	±0.02	346	89.9	±0.02
	25-34	342	79.3	±0.04	344	95.5	±0.03
	35-44	380	83.9	±0.1	381	98.1	±0.04
	45-54	351	86.3	±0.1	351	98.9	±0.05
	55-64	304	87.2	±0.05	304	98.8	±0.1
	15-64	1723	79.2	±0.02	1726	94.8	±0.02

Table 40: Waist hip ratio and central obesity

	Age group	N	Waist hip ratio WHR			Central obesity		
						Male - WHR ≥ 1.0 Female - WHR ≥ 0.85		
			n	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*
Males	15-24	349	349	0.8	±0.002	349	0.5	±0.03
	25-34	315	315	0.9	±0.003	315	2.8	±0.1
	35-44	350	350	0.9	±0.003	350	7.6	±0.1
	45-54	352	352	0.9	±0.004	352	16.3	±0.1
	55-64	295	295	0.9	±0.01	295	15.3	±0.05
	15-64	**1661**	**1661**	**0.9**	**±0.001**	**1661**	**5.7**	**±0.05**
Females	15-24	346	346	0.8	±0.002	346	17.7	±0.2
	25-34	342	342	0.8	±0.003	342	35.5	±0.2
	35-44	380	380	0.9	±0.003	380	49.8	±0.3
	45-54	351	351	0.8	±0.01	351	60.4	±0.3
	55-64	304	304	0.9	±0.01	304	60.8	±0.4
	15-64	**1723**	**1723**	**0.8**	**±0.001**	**1723**	**37.5**	**±0.1**

Table 41: Mean body fat percent

	Age group	N	Body fat percent		
			n	*Mean*	*95% CI*
Males	15-24	314	314	15.1	±0.02
	25-34	281	281	17.7	±0.02
	35-44	314	314	19.8	±0.03
	45-54	315	315	21.5	±0.04
	55-64	260	260	23.3	±0.05
	15-64	**1484**	**1484**	**18.2**	**±0.01**
Females	15-24	316	316	21.9	±0.02
	25-34	315	315	25.8	±0.03
	35-44	335	335	28.2	±0.04
	45-54	314	314	29.3	±0.05
	55-64	284	284	29.8	±0.1
	15-64	**1564**	**1564**	**25.7**	**±0.01**

Table 42: Body fat percent risk categories

	Age group	N	Body fat percent risk categories											
			Low			Normal			High			Very high		
			n	*%*	*95%CI*	*n*	*%*	*95%CI*	*n*	*%*	*95%CI*	*n*	*%*	*95%CI*
Males	15-24	314	41	12.9	±0.1	237	76.0	±0.2	24	7.5	±0.1	12	3.6	±0.1
	25-34	281	17	6.1	±0.1	178	63.6	±0.2	60	21.0	±0.1	26	9.3	±0.1
	35-44	314	11	3.5	±0.1	155	49.2	±0.2	83	26.5	±0.2	65	20.7	±0.2
	45-54	315	13	4.1	±0.1	119	37.8	±0.3	92	29.2	±0.3	91	28.9	±0.3
	55-64	260	7	2.6	±0.1	73	27.1	±0.4	76	29.9	±0.4	104	40.3	±0.4
	15-64	**1484**	**89**	**7.3**	**±0.05**	**762**	**58.6**	**±0.1**	**335**	**19.5**	**±0.1**	**298**	**14.7**	**±0.1**
Females	15-24	316	120	36.6	±0.2	172	55.8	±0.2	18	5.8	±0.1	6	1.9	±0.1
	25-34	315	62	19.2	±0.2	161	51.5	±0.2	56	17.5	±0.2	36	11.8	±0.1
	35-44	335	50	14.9	±0.2	135	40.1	±0.3	86	25.7	±0.3	64	19.2	±0.2
	45-54	314	35	11.1	±0.2	123	39.2	±0.3	78	24.9	±0.3	78	24.9	±0.3
	55-64	284	44	15.4	±0.3	87	30.7	±0.4	61	21.7	±0.4	92	32.2	±0.4
	15-64	**1564**	**311**	**22.9**	**±0.1**	**678**	**47.6**	**±0.1**	**299**	**16.5**	**±0.05**	**276**	**13.1**	**±0.1**

Table 43: Body fat percent risk categories by locality

	Age group	N	Body fat percent risk categories											
			Low			Normal			High			Very high		
			n	*%*	*95%CI*	*n*	*%*	*95%CI*	*n*	*%*	*95%CI*	*n*	*%*	*95%CI*
Urban	Males	826	51	7.1	±0.1	414	55.1	±0.2	181	19.9	±0.1	180	16.7	±0.2
	Females	858	190	25.4	±0.2	358	44.1	±0.2	153	16.0	±0.1	157	13.7	±0.2
Rural	Males	658	38	5.8	±0.1	348	48.6	±0.1	154	14.7	±0.1	118	9.6	±0.1
	Females	706	121	16.2	±0.2	320	40.9	±0.2	146	13.5	±0.2	119	10.0	±0.1

10.1.7. High blood pressure

Table 44: Blood pressure

	Age group	N	Systolic blood pressure (mmHg)			Diastolic blood pressure (mmHg)		
			n	*Mean*	*95% CI*	*n*	*Mean*	*95% CI*
Males	15-24	351	348	120.3	±0.002	348	68.6	±0.03
	25-34	321	318	126.4	±0.003	318	75.6	±0.1
	35-44	352	352	131.1	±0.003	352	82.2	±0.1
	45-54	353	351	137.2	±0.004	351	85.6	±0.1
	55-64	297	291	144.8	±0.01	291	88.6	±0.05
	15-64	**1674**	**1660**	**128.2**	**±0.001**	**1660**	**76.9**	**±0.05**
Females	15-24	348	348	112.8	±0.002	348	71	±0.2
	25-34	348	347	116.9	±0.003	347	75.2	±0.2
	35-44	384	383	124.9	±0.003	383	80.6	±0.3
	45-54	351	348	133.9	±0.005	348	84.1	±0.3
	55-64	306	304	140.7	±0.01	304	84.9	±0.4
	15-64	**1737**	**1730**	**121**	**±0.001**	**1730**	**76.7**	**±0.1**
Both sexes	15-24	699	696	116.6	±0.003	696	69.7	±0.03
	25-34	669	665	121.8	±0.004	665	75.4	±0.03
	35-44	736	735	128.1	±0.1	735	81.4	±0.04
	45-54	704	699	135.6	±0.1	699	84.9	±0.1
	55-64	603	594	142.8	±0.1	594	86.8	±0.1
	15-64	**3411**	**3389**	**124.7**	**±0.03**	**3389**	**76.8**	**±0.02**

Table 45: Raised blood pressure

	Age group	N	SBP ≥ 140 and/or DBP ≥ 90 mmHg			SBP ≥ 160 and/or DBP ≥ 100 mmHg		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	35	10.3	±0.1	3	0.9	±0.04
	25-34	321	59	18.3	±0.2	6	1.8	±0.1
	35-44	352	129	36.8	±0.2	34	9.7	±0.1
	45-54	353	171	48.5	±0.3	66	18.7	±0.2
	55-64	297	172	57.9	±0.4	97	32.4	±0.4
	15-64	**1674**	**566**	**26.4**	**±0.1**	**206**	**7.6**	**±0.1**
Females	15-24	348	14	4.4	±0.1	0	0	0
	25-34	348	38	11.1	±0.1	8	2.4	±0.1
	35-44	384	85	22.1	±0.2	25	6.5	±0.1
	45-54	351	143	40.8	±0.3	56	16.0	±0.2
	55-64	306	154	50.3	±0.4	70	22.6	±0.4
	15-64	**1737**	**434**	**17.6**	**±0.1**	**159**	**5.6**	**±0.05**
Both sexes	15-24	699	49	7.4	±0.1	3	0.5	±0.02
	25-34	669	97	14.8	±0.1	14	2.1	±0.04
	35-44	736	214	29.8	±0.2	59	8.2	±0.1
	45-54	704	314	44.9	±0.2	122	17.4	±0.2
	55-64	603	316	54.3	±0.3	167	27.8	±0.3
	15-64	**3411**	**1000**	**22.2**	**±0.1**	**365**	**6.6**	**±0.04**

Table 46: Diagnosis and treatment on hypertension

	Age group	N	Raised blood pressure diagnosed by doctor or health worker in last 12 months			Currently taking blood pressure drugs prescribed by doctor or health worker		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	8	2.2	±0.05	4	51.9	±1
	25-34	321	38	11.5	±0.1	21	56.4	±0.6
	35-44	352	61	17.4	±0.2	41	67.4	±0.5
	45-54	353	113	32.0	±0.3	77	68.2	±0.5
	55-64	297	138	46.8	±0.4	117	84.4	±0.4
	15-64	**1674**	**358**	**14.9**	**±0.1**	**260**	**68.5**	**±0.3**
Females	15-24	348	15	4.4	±0.1	9	56.0	±0.9
	25-34	348	47	13.2	±0.1	33	70.9	±0.5
	35-44	384	119	31.0	±0.2	94	79.1	±0.4
	45-54	351	176	50.2	±0.3	140	79.4	±0.4
	55-64	306	175	57.4	±0.4	158	90.1	±0.3
	15-64	**1737**	**532**	**21.7**	**±0.1**	**434**	**78.4**	**±0.2**
Both sexes	15-24	699	23	3.3	±0.05	13	54.6	±0.7
	25-34	669	85	12.3	±0.1	54	64.0	±0.4
	35-44	736	180	23.9	±0.1	135	74.7	±0.3
	45-54	704	289	40.7	±0.2	217	74.9	±0.3
	55-64	603	313	51.8	±0.3	275	87.4	±0.3
	15-64	**3411**	**890**	**18.2**	**±0.1**	**694**	**74.2**	**±0.2**

Table 47: Lifestyle advice on hypertension

	Age group	N	Advised or treated by doctor or health worker to lose weight			Advised or treated by doctor or health worker to stop smoking			Advised or treated by doctor or health worker to start or do more exercise		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	2	25.8	±1.1	2	53.8	±1.8	3	36.8	±1.2
	25-34	321	4	10.2	±0.4	5	27.7	±0.8	5	13.7	±0.4
	35-44	352	4	6.6	±0.3	10	27.4	±0.6	8	13.0	±0.4
	45-54	353	15	13.4	±0.4	11	15.9	±0.5	19	16.9	±0.4
	55-64	297	10	7.1	±0.3	18	28.0	±0.8	30	21.1	±0.5
	15-64	**1674**	**35**	**10.3**	**±0.2**	**46**	**24.9**	**±0.4**	**65**	**17.2**	**±0.2**
Females	15-24	348	0	0	0	1	100.0	0	2	13.6	±0.6
	25-34	348	9	19.6	±0.5	1	19.1	±1.5	3	6.2	±0.3
	35-44	384	23	19.8	±0.3	5	32.9	±1.2	17	14.4	±0.3
	45-54	351	27	15.2	±0.3	3	19.8	±1.2	33	18.9	±0.3
	55-64	306	23	12.4	±0.4	5	22.6	±1.3	39	21.8	±0.5
	15-64	**1737**	**82**	**15.7**	**±0.1**	**15**	**28.0**	**±0.7**	**94**	**15.7**	**±0.2**
Both sexes	15-24	699	2	8.8	±0.4	3	62.6	±1.6	5	21.5	±0.6
	25-34	669	13	15.1	±0.3	6	26.1	±0.7	8	9.8	±0.3
	35-44	736	27	14.7	±0.2	15	28.8	±0.6	25	13.9	±0.2
	45-54	704	42	14.4	±0.2	14	16.5	±0.4	52	18.1	±0.3
	55-64	603	33	9.9	±0.2	23	26.7	±0.7	69	21.5	±0.3
	15-64	**3411**	**117**	**13.4**	**±0.1**	**61**	**25.6**	**±0.3**	**159**	**16.4**	**±0.2**

Table 48: Treatment and advice by traditional healer

	Age group	N	Seen a traditional healer in the last 12 months			Currently taking herbal or traditional remedy for high blood pressure		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	1	14.9	±0.9	0	0	0
	25-34	321	3	8.0	±0.3	3	7.7	±0.3
	35-44	352	4	6.6	±0.3	6	9.9	±0.3
	45-54	353	21	18.6	±0.4	22	19.4	±0.4
	55-64	297	16	11.8	±0.4	14	10.2	±0.4
	15-64	**1674**	**45**	**11.8**	**±0.4**	**45**	**11.8**	**±0.2**
Females	15-24	348	1	8.0	±0.5	1	8.0	±0.5
	25-34	348	7	15.8	±0.4	6	12.2	±0.4
	35-44	384	10	8.5	±0.2	11	9.3	±0.3
	45-54	351	27	15.3	±0.3	28	15.9	±0.3
	55-64	306	20	11.3	±0.4	15	8.7	±0.3
	15-64	**1737**	**65**	**12.2**	**±0.2**	**61**	**11.5**	**±0.2**
Both sexes	15-24	699	2	10.3	±0.5	1	5.3	±0.3
	25-34	669	10	12.1	±0.3	9	10.0	±0.3
	35-44	736	14	7.8	±0.2	17	9.5	±0.2
	45-54	704	48	16.7	±0.3	50	17.4	±0.3
	55-64	603	36	11.5	±0.3	29	9.4	±0.2
	15-64	**3411**	**110**	**12.0**	**±0.1**	**106**	**11.6**	**±0.1**

10.1.7. Diabetes

Table 49: History of diabetes diagnosis and treatment

	Age group	N	Diabetes diagnosed by doctor or health worker in last 12 months			Currently taking insulin prescribed for diabetes by doctor or health worker			Currently taking other drugs prescribed for diabetes by doctor or health worker		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	3	0.9	±0.03	0	0	0	1	36.6	±1.9
	25-34	321	1	0.3	±0.03	0	0	0	1	100.0	0
	35-44	352	4	1.1	±0.05	0	0	0	2	50.3	±2.2
	45-54	353	9	2.6	±0.1	1	11.8	±1.2	4	45.1	±1.8
	55-64	297	8	2.7	±0.1	4	48.6	±2.5	5	64.0	±2.4
	15-64	**1674**	**25**	**1.1**	**±0.03**	**5**	**11.8**	**±0.7**	**13**	**51.3**	**±1**
Females	15-24	348	0	0	0	-	-	-	-	-	-
	25-34	348	4	1.3	±0.05	1	26.5	±1.7	0	0	0
	35-44	384	3	0.8	±0.04	0	0	0	1	33.0	±2.6
	45-54	351	10	2.9	±0.1	1	10.4	±1.1	2	20.0	±1.5
	55-64	306	10	3.2	±0.2	2	20.9	±2.0	5	49.2	±2.4
	15-64	**1737**	**27**	**1.1**	**±0.03**	**4**	**15.8**	**±0.8**	**8**	**21.9**	**±0.9**
Both sexes	15-24	699	3	0.5	±0.02	0	0	0	1	36.6	±1.9
	25-34	669	5	0.8	±0.03	1	20.71	±1.4	1	21.7	±1.4
	35-44	736	7	1	±0.04	0	0	0	3	43.4	±1.7
	45-54	704	19	2.7	±0.1	2	11.09	±0.8	6	32.3	±1.2
	55-64	603	18	3.0	±0.1	6	34.28	±1.6	10	56.3	±1.7
	15-64	**3411**	**52**	**1.1**	**±0.01**	**9**	**13.69**	**±0.5**	**21**	**37.4**	**±0.7**

Table 50: Diabetes lifestyle advice

	Age group	N	Advised or treated by doctor or health worker to lose weight			Advised or treated by doctor or health worker to stop smoking			Advised or treated by doctor or health worker to start or do more exercise		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	0	0	0	-	-	-	0	0	0
	25-34	321	0	0	0	0	0	0	0	0	0
	35-44	352	0	0	0	2	100.0	0	1	25.1	±1.9
	45-54	353	3	33.1	±1.8	0	0	0	4	44.6	±1.9
	55-64	297	2	23.8	±2.1	1	19.0	±2.4	4	46.7	±2.4
	15-64	**1674**	**5**	**13.9**	**±0.7**	**3**	**34.7**	**±1.6**	**9**	**26.3**	**±0.9**
Females	15-24	348	-	-	-	-	-	-	-	-	-
	25-34	348	0	0	0	-	0	0	0	0	0
	35-44	384	2	66.3	±2.6	-	0	0	1	33.3	±2.6
	45-54	351	3	30.2	±1.7	1	100.0	0	3	30.2	±1.7
	55-64	306	3	29.9	±2.2	0	0	0	5	50.5	±2.3
	15-64	**1737**	**8**	**26.5**	**±1.0**	**1**	**62.2**	**±4.3**	**9**	**25.7**	**±0.9**
Both sexes	15-24	699	0	0	0	-	-	-	0	0	0
	25-34	669	0	0	0	0	0	0	0	0	0
	35-44	736	2	26.5	±1.5	2	100.0	0	2	28.4	±1.5
	45-54	704	6	31.6	±1.2	1	32.8	±3.0	7	37.3	±.2
	55-64	603	5	27.0	±1.5	1	16.0	±2.1	9	48.7	±1.7
	15-64	**3411**	**13**	**19.9**	**±0.6**	**4**	**38.3**	**±1.5**	**18**	**26.0**	**±0.6**

Table 51: Advice by traditional healer on diabetes

	Age group	N	Counselling by Traditional Healer for Diabetes during last 12 months			Current Herbal or traditional treatment for Diabetes		
			n	*%*	*95% CI*	*n*	*%*	*95% CI*
Males	15-24	351	0	0	0	0	0	0
	25-34	321	0	0	0	0	0	0
	35-44	352	3	74.9	±1.9	3	74.9	±1.9
	45-54	353	1	11.8	±1.2	1	11.8	±1.2
	55-64	297	1	11.8	±1.6	1	11.8	±1.6
	15-64	1674	5	20.8	±0.8	5	20.8	±0.8
Females	15-24	348	-	-	-	-	-	-
	25-34	348	0	0	0	0	0	0
	35-44	384	1	33.0	±2.5	0	0	0
	45-54	351	1	10.4	±1.1	1	10.4	±1.1
	55-64	306	1	9.8	±1.4	0	0	0
	15-64	1737	3	10.6	±0.7	1	3.6	±0.4
Both sexes	15-24	699	0	0	0	0	0	0
	25-34	669	0	0	0	0	0	0
	35-44	736	4	58.1	±1.7	3	44.9	±1.7
	45-54	704	2	11.1	±0.8	2	11.1	±0.8
	55-64	603	2	10.8	±1.04	1	5.7	±0.8
	15-64	3411	8	16.0	±0.5	6	12.7	±0.5

11. Appendix 2.
Weighting Formulae

1. Adjustment for different probabilities of selection (sampling weights)

   W1 = Total Stratum population/(Number of Clusters * S1part)

   W2 = W1 * (S3elig / S3part)

   Note: S1part = Number of STEP 1&2 participants
   Note: S3part = Number of STEP 3 participants
   Note: S3elig = number of eligible persons to participate in STEP 3 = S1part as everyone participating in STEP 1 had the same chance to get (randomly) selected to participate in STEP 3.

2. Adjustments for non-representativeness

   STEP1&2:
   W3_S12 = Total pop per 10 yr age sex group / Sum of weights per 10 yr age sex group

   = POP/SUMWPS12

   STEP3:
   W3_S3 = Total pop per 10 yr age sex group / Sum of weights per 10 yr age sex group

   = POP/SUMWPS3

3. Total Weighting Formulae

   a. Total weighting for STEP 1&2

   WT12 = W1 * W3
   = W1 * W3_S12

   b. Total weighting for STEP 3

   WT3 = W2 * W3
   = W2 * W3_S3

12. Appendix 3.

Mongolian NCD STEPS Risk Factor Survey Instrument

STEP I.

I. General information

N	Code		Code Column
1	I1	Aimag/city code	___
2	I2	Soum/district code	___
3	I3	Name of bag, khoroo	
4	I4	Cluster Code	___
5	I5	Interviewer code	____
6	I6	Date of completion of the instrument	__ Day __ Month ____ Year

Participant ID Number _____

II. Consent form

N	Code		Response	Code Column
7	I7	Has she/he taken the consent form?	Yes 1 No 2	__ if no, please read consent
8	I8	Agreed or not after familiarizing with consent form (oral or paper)	Yes 1 No 2	__ if no, END
9	I9	Interviewer language	Mongolian -1 Kazakh - 2	__

III. Demographic Information

N	Code		Response	Code Column	Skips
12	C1	Sex	Male - 1 Female - 2	__	
13	C2	Date of birth	____ Year __ Month __ Day Do not know - 77		If known go to C4
14	C3	Age	Years	___	
15	C4	How long have you studied in the school (exclude preschool education)?	Years	___	
16	C5	What is your ethnic group?	Khalkh 01 Kazakh 02 Other 03 _____	__	

Continued on next page

Demographic Information continued

17	C6	What is the highest level of education you have completed?	(Specify) No formal schooling 01 Less than primary school 02 Primary school completed 03 Secondary school completed 04 High school completed 05 College completed 06 University completed 07 Post graduate degree 08	⌊__⌋⌊__⌋	
18	C7	Which of the following best describes your main work in last year?	Governmental organization 01 Non governmental organization 02 Self employed 03 Non paid 04 Student 05 House work 06 Retired 07 Unemployed (able to work) 08 Unemployed (unable to work) 09	⌊__⌋⌊__⌋	
19	C8.	How many people older than 18 years, including yourself, live in your household?	Number of people	⌊__⌋⌊__⌋	
20	C9	What are average earnings of the household have been in the last year?	Per week ⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋ C9a OR Per month ⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋ C9b OR Per year ⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋⌊__⌋ C9c Refused 8 ⌊__⌋⌊__⌋ C9d Do not know 77 ⌊__⌋⌊__⌋⌊__⌋ C9e		
21	C10	How long have you been living in this area?	Less than 3 months 01 Up to 1 year 02 1 year and more than 1 year 03	⌊__⌋⌊__⌋	
22	C11	Housing condition	Private house/Apartment 01 Ger 02 House 03 Other 04	⌊__⌋⌊__⌋	

IV. Tobacco use

N	Code		Response	Code Column	Skips
23	T1	Do you currently smoke?	Yes – 1 No – 2	|__|	If No, go to T6
24	T2	If yes. Do you currently smoke daily?	Yes – 1 No – 2	|__|	If No, go to T6
25	T3	How old were you, when you first started smoking daily?	Age (years) Don't remember – 77	|__|__|	If Known, go to T5
26	T4	Do you remember how long ago it was?	Year Don't remember 777 OR in Month OR in Week	|__|__|__| |__|__| |__|__|	
27	T5	On average, how many of the following do you smoke each day? (Record for each type)	Industry made cigarettes Hand - Rolled Pipe Other_____ (please specify)	|__|__| |__|__| |__|__| |__|__|	If Other, go to T5 other
28	T6	Are you exposed to indoor tobacco smoke at home?	Yes – 1 No – 2		
29	T7	About how many hours per day are you exposed to indoor tobacco smoke at your workplace?	1 = I do not work outside the home 2 = Almost never 3 = Less than one hour a day 4 = 1-5 hours a day 5 = More than 5 hours a day		

V. Alcohol Consumption

N	Code		Response	Code Column	Skips
30	A1	Have you consumed alcohol (*such as beer, wine, vodka, fermented milk) within the last year? (USE SHOWCARDS)	Yes 1 No 2	|__|	If No go to D1
31	A2	In the last year, how frequently have you had at least one drink?	Daily 1 5-6 days per week 2 1-4 days per week 3 1-3 days per month 4 Less than once a month 5	|__|	
32	A3	When do you drink alcohol, on average, how many drinks do you have during one day?	Number Don't know – 77	|__|__|	

Continued on next page

Alcohol Consumption continued

		(USE SHOWCARDS)			
33	A4	In the past 12 months what was the largest number of drinks you had on a single occasion, counting all types of drinks together? (USE SHOWCARDS)	_____Largest number	|__|__|	
34	A5	**For men only:** In the past 12 months, on how many days did you have **five or more** standard drinks in a single day?	The number of days	|__|__|	
35	A6	**For women only:** In the past 12 months, on how many days did you have **four or more** standard drinks in a single day?	The number of days	|__|__|	
36	A7	After you drink any alcohol, does your face or neck become red?	Yes 1 No 2	|__|	
37	A8	When you drink alcohol, do you have a hang over the following morning?	Yes 1 No 2	|__|	
38	A9	How old were you, when you start to drink alcohol at least once a month?	Age (years) Don't remember – 77 I drink alcohol less often than once a month – 88	|__|__|	

VI. Diet

N	Code		Response	Code Column	Skips
39	D1	In a typical week, how many days do you eat fruit?	Number of days	|__|__|	If Zero days, go to D3
40	D2	How many servings of fruit do you eat on one of those days? (USE SHOWCARDS)	Number of servings	|__|__|	
41	D3	In a typical week, how many days do you eat vegetables?	Number of days	|__|__|	If Zero days, go to D5
42	D4	How many servings of vegetables do you eat on one of those days? (USE SHOWCARDS)	Number of servings	|__|__|	
43	D5	What type of oil or fat is most often used for meal preparation in your household? (USE SHOWCARDS for Options)	Tallow 01 Butter, Margarine 02 Cream 03 Mayonnaise 04	|__|__|	If Zero days go to D8

Continued on next page

Diet continued

			Horse and marmot fat 05 Vegetable oil 06 Lard 07 Fatty meat 08		
44	D6	In a typical week, how many days do you eat barley, bran, millet, porridge and other products made from less processed flour?	The number of days	|__|__|	
45	D7	Typically, how many days, does 500gr of salt used in your household?	The number of days Don't know – 77	|__|__|	
46	D8	In a typical week, on how many days do you drink tea with salt?	Number of days	|__|	
47	D9	In a typical week, on how many days do you use acetic/salted/-canned food?	Number of days	|__|	

STEP 2.

VII. Physical activity

N	Code		Response	Code Column	Skips
Activity at work					
48	P1	Does your work involve vigorous intensity activity that causes large increase in breathing or heart rate for at least 10 minutes? (USE SHOWCARDS AS AN EXAMPLE)	Yes – 1 No – 2	|__|	If No, go to P4
49	P2	In a typical week, on how many days do you do vigorous–intensity activities as part of your work?	Number of Days	|__|	
50	P3	How much time do you spend doing vigorous–intensity activities at work on a typical day?	Hour: Minutes	hrs |__|__|: mins |__|__|	
51	P4	Does your work involve moderate- intensity activity that causes large increase in breathing or heart rate for at least 10 minutes? (USE SHOWCARDS AS AN EXAMPLE)	Yes – 1 No – 2	|__|	If No, go to P7
52	P5	In a typical week, on how many days do you do moderate –intensity activities as part of your work?	Number of Days	|__|	
53	P6	How much time do you spend doing moderate –intensity activities at work on a typical day?	Hour: Minutes	hrs |__|__|: mins |__|__|	

Continued on next page

Physical activity continued

Travel to and from places

54	P7	Do you walk or use a bicycle for at least 10 minutes continuously to get to and from places?	Yes – 1 No – 2	__	If No, go to P10
55	P8	In a typical week, how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of Days	__	
56	P9	How much time do you spend walking or bicycling for travel on a typical day?	Hour: Minutes	hrs ___: mins ___	

Recreational Activities

57	P10	Do you do any vigorous intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate, for at least 10 minutes continuously?	Yes – 1 No – 2	__	If No, go to P13
58	P11	In a typical week, on how many days do you do vigorous –intensity sports, fitness or recreational activities?	Number of days	__	
59	P12	How much time do you spend doing vigorous –intensity sports, fitness or recreational activities on a typical day?	Hour: Minutes	hrs ___: mins ___	
60	P13	Do you do any moderate- intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate, for at least 10 minutes continuously?	Yes – 1 No – 2	__	
61	P14	In a typical week, on how many days do you do moderate –intensity sports, fitness or recreational activities?	Number of days	__	
62	P15	How much time do you spend doing moderate– intensity sports, fitness or recreational activities on a typical day?	Hour: Minutes	hrs ___: mins ___	

VIII. Blood pressure

N	Code		Response	Code Column	Skips
63	H1	When was your blood pressure last measured by a health professional?	Within last 12 month 01 1-5 years ago 02 Not past 5 years 03		
64	H2	During the past 12 months have you been told by a doctor or other health worker that you have elevated blood pressure or hypertension?	Yes – 1 No – 2		If No skip to H6
65	H3a	Are you currently taking drugs for the treatment of blood pressure?	Yes – 1 No – 2		
	H3b	Are you currently on diet to decrease blood pressure?	Yes – 1 No – 2		
	H3c	Are you currently trying to lose your weight to control high blood pressure?	Yes – 1 No – 2		
	H3d	Are you currently trying to stop smoking?	Yes – 1 No – 2		Skipped if non-smoker
	H3e	Are you currently trying to do any exercise or increase your physical activity?	Yes – 1 No – 2		
66	H4	During the past 12 months have you seen a traditional healer for elevated blood pressure or hypertension?	Yes – 1 No – 2		
67	H5	Are you currently taking any herbal or traditional remedy for your high blood pressure?	Yes – 1 No – 2		

IX. Diabetes

N	Code		Response	Code Column	Skips
68	H6	Have you had your blood sugar measured in the last 12 months?	Yes – 1 No – 2		
69	H7	During the last 12 months, have you ever been told by doctors that you have diabetes?	Yes – 1 No – 2		If not skip to Measurement
70	H8a	Are you currently using insulin for your diabetes?	Yes – 1 No – 2		
	H8b	Have you taken any oral drug to decrease blood sugar in last 2 weeks?	Yes – 1 No – 2		
	H8c	Are you currently on a special diet?	Yes – 1 No – 2		
	H8d	Are you currently trying to lose your weight for	Yes – 1		

Continued on next page

Diabetes continued

		controlling diabetes?	No – 2		
	H8e	Are you currently trying to stop smoking?	Yes – 1 No – 2	|_|_|	Skipped if non-smoker
	H8f	Are you currently trying to do any exercise or increase your physical activity?	Yes – 1 No – 2	|_|_|	
71	H9	During the past 12 months have you seen a traditional healer for diabetes?	Yes – 1 No – 2	|_|_|	
72	H10	Are you currently taking any herbal or traditional remedy for your diabetes?	Yes – 1 No – 2	|_|_|	

STEP 3.

X. Check up

N	Code		Response	Code Column	Skips
Physical measurement					
73	M1	Technician ID		|_|_|_|_|	If Yes, go to M9
74	M2a	Device Ids	Height	|_|_|_|	
	M2b		Weight	|_|_|_|	
75	M3	Height	In Centimetres (cm)	|_|_|_|_|, |_|_|	
76	M4	Weight	In Kilograms (kg)	|_|_|_|_|, |_|_|	
77	M5	Are you pregnant?	Yes – 1 No – 2	|_|_|	
Waist					
78	M6	Technician ID		|_|_|_|_|	
79	M7	Device ID for waist		|_|_|_|	
80	M8	Waist circumference (cm)	In Centimetres (cm)	|_|_|_|_|, |_|_|	
81	M9	Hip circumference	In Centimetre	|_|_|_|_|, |_|_|	
Blood Pressure					
82	M10	Technician ID		|_|_|_|_|	
83	M11	Device ID for blood pressure		|_|_|_|	
84	M12	Cuff size used	1.Short 2.Normal	|_|_|	

Continued on next page

Check up continued

			3. Long		
85	M13a	Reading 1 Systolic mmHg		⌊__⌊__⌊__⌊__	
	M13b	Diastolic mmHg		⌊__⌊__⌊__⌊__	
86	M14a	Reading 2 Systolic mmHg		⌊__⌊__⌊__⌊__	
	M14b	Diastolic mmHg		⌊__⌊__⌊__⌊__	
87	M15a	Reading 3 Systolic mmHg		⌊__⌊__⌊__⌊__	
	M15b	Diastolic mmHg		⌊__⌊__⌊__⌊__	

Biochemical measurements

N	Code		Response	Code Column	Skips
Blood glucose					
88	B1	During the last 12 hours have you had anything to eat or drink, other than water?	Yes – 1 No – 2	⌊__⌊	
89	B2	Technician ID		⌊__⌊__⌊__⌊__	
90	B3	Device ID		⌊__⌊__⌊	
91	B4	Time of day blood specimen taken (24 hour clock)	hours minutes	hrs ⌊__⌊__⌊: mins ⌊__⌊__⌊	
92	B5a	Blood Glucose	Mmol/l	⌊__⌊__⌊, ⌊__⌊__⌊	
	B5b		1. Low 2. High 3. Unable to asses	⌊__⌊	
93	B6	Technician ID		⌊__⌊__⌊__⌊__	
94	B7	Device ID		⌊__⌊__⌊	
95	B8a	Total cholesterol	Mmol/l	⌊__⌊__⌊, ⌊__⌊__⌊	
	B8b		1. Low 2. High 3. Unable to asses	⌊__⌊	
96	B9	Technician ID		⌊__⌊__⌊__⌊__	
97	B10	Device ID		⌊__⌊__⌊	
98	B11a	Triglycerides	mmol/l	⌊__⌊__⌊, ⌊__⌊__⌊	
	B11b		1. Low 2. High 3. Unable to asses	⌊__⌊	

Testing table to assess physical fitness

Physical fitness factors	Physical fitness factors	Physical fitness factors	Score
Strength factor	1. Push up	Numbers performed in 30 seconds N	
	2. Jumping	Reach the target within 1 minutes N	
	3. Lift to sit from the lying prone	Lift to sit in 30 seconds N	
Speed factor	4. Jogging	Steps in 10 seconds N	
Flexibility factor	5. Squat	1. 2. ñm ñm	
Balance factor	6. 50 steps with shoulder/arm raise straight forward	Measure length from the first position ñm	
Endurance factor	7. Deep inhale and exhale	Count minutes for exhale sec	

Physical fitness scores

Assessment of physical fitness

5 Very sufficient **4 Good** **3 Sufficient** **2 Neither sufficient or bad** **1 Not sufficient**

References

1. Australian Institute of Health and Welfare, 2001. *Bulletin*, Health, wellbeing and body weight, pp.24.

2. A.V. Chobanian, G.L. Bakris, H. R. Black, W.C. Cushman, L.A.Green, et al., 2003. *JAMA*. The seventh reprot of the joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure, 289., pp. 2560-2572.

3. Ministry of Health, National Center for Health Development, 2004. Annual Health Report, p. 7.

4. Indicators to determine the prevalences of physical fitness and development of the Mongolian population (7-64 years). State Committee of Physical Education and Sports, Ulaanbaatar, 2005.

5. Japan joint survey 2002, Public Health Institute, Mongolia and Kagawa Nutrition University, Japan, 2002.

6. J. A. Whitworth, 2003. *Journal of Hypertension*, 21, pp. 1983-1992. 2003 World Health Organization (WHO)/International Society of Hypertension (ISH) statement on management of hypertension

7. J. Suvdaa, *et al*., 1999. Determination of prevalence of diabetes mellitus, Ulaanbaatar, 1999.

8. Knowledge, attitude and practice towards risk factors of non-communicable diseases, 2002. Public Health Institute, Ulaanbaatar, 2002.

9. National Cholesterol Education Program, 2002. Third report of the national of the expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult treatment panel III). *NIH Pub. No. 02-5215*. pp. 284.

10. The Nutrition Status of the Mongolian Population 1999, The 2nd National Nutrition Survey, 2002. Nutrition Research Center of the Public health Institute, Ulaanbaatar, 2002.

11. STEPS framework for surveillance, The WHO STEPwise approach to Surveillance of noncommunicable diseases, noncommunicable disease and mental health, WHO, 2004.

12. STEPS planning and coordination, The WHO STEPwise approach to Surveillance of noncommunicable diseases, noncommunicable disease and mental health, WHO, 2004.

13. STEPS planning and implementation, The WHO STEPwise approach to Surveillance of noncommunicable diseases, noncommunicable disease and mental health, WHO, 2005.

14. STEPS field manual, The WHO STEPwise approach to Surveillance of noncommunicable diseases, noncommunicable disease and mental health, WHO, 2004.

15. STEPS Conducting the survey, data entry and reporting resulting, The WHO STEPwise approach to Surveillance of noncommunicable diseases, noncommunicable disease and mental health, WHO, 2005.

16. World Health Organization, 2000. International guide for monitoring alcohol consumption and related harm. Department of mental health and Substance Dependence, *NCD and MHC, WHO.* pp.193.

17. World Health Organization, 1999. Definition, diagnosis and classification of diabetes mellitus and its complications. Report of a WHO Consultation.

18. World Health Organization, 2002. World Health Report 2002: Reducing risks, promoting healthy life.

19. World Health Organization, 2005. Preventing chronic diseases: a vital investment, WHO Global Report.

20. WPRO TFI Fact Sheet, http://www.wpro.who.int/sites/tfi/fact_sheets/, http://www.who.int/tobacco/resources/publications/tobacco_atlas/en/

www.wpro.who.int