Prevalence of Cardiovascular Disease Risk Factors among Adults in Slum of Dhaka City

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DECLARATION

I, hereby humbly declare that the thesis work entitled "**Prevalence of Cardiovascular Disease Risk Factors among Adults in Slum of Dhaka City**", a requirement for the degree of Master of Philosophy (M.Phil) in Epidemiology & Biostatistics from Bangladesh Institute of Health Sciences (BIHS), under faculty of Biological Science, University of Dhaka, was carried out by me under the guidance of Dr Saidur Rahman Mashreky, Associate Professor, Department of Epidemiology and Biostatistics, Bangladesh Institute of Health Sciences (BIHS) during the period of June 2014 to July 2015.

No part of the work has been submitted elsewhere for any other purpose.

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CERTIFICATE

This is to certify that the thesis entitled "**Prevalence of Cardiovascular Disease Risk Factors among Adults in Slum of Dhaka City**", submitted by S. M. Zahid Hassan Arefin in partial fulfillment of the requirement for the degree of Master of Philosophy (M.Phil) in Epidemiology & Biostatistics from Bangladesh Institute of Health Sciences (BIHS), University of Dhaka, was carried out under my supervision.

To the best of my knowledge no part of the work has been submitted for another degree or qualification in any other institute.

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The undersigned certify that they have carefully read and examined the student on this thesis and being satisfied, recommended the faculty of Biological Science, University of Dhaka, for acceptance of this thesis entitled "**Prevalence of Cardiovascular Disease Risk Factors among Adults in Slum of Dhaka City**", by S. M. Zahid Hassan Arefin in partial fulfillment of the requirement for the degree of Master of Philosophy (M.Phil) in Epidemiology & Biostatistics for the session 2011-2012.

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Dedicated to

My father late M.A. Quashem, Mother Monwara Begum, My wife Dr. Farhana Jahan, My kids Aruba & Aariz

&

My respected Teacher

Dr Saidur Rahman Mashreky

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Dr. S.M Zahid Hassan Arefin

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CHAPTER 8

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List of Abbreviations

AIDS	Acquired Immuno Deficiency Syndrome
BIHS	Bangladesh Institute of Child Health
BMI	Body Mass Index
BP	Blood Pressure
CHD	Coronary Heart Disease
CI	Confidence Interval
cm	Centimeter
CVD	Cardiovascular disease
DALY	Disability adjusted life year
DBP	Diastolic Blood Pressure
DM	Diabetes Mellitus
gm	Gram
GPAQ	Global Physical Activity Questionnaire
HDL	High Density Lipoprotein
HIV	Human Immuno deficiency Virus
HTN	Hypertension
IHD	Ischemic Heart Disease
Kg	Kilogram
LDL	Low Density Lipoprotein
MET	Metabolic Equivalent
MI	Myocarial Infarction
ml	Mililiter
mmol/L	Milimole per liter
NCD	Non-Communicable Diseases
OR	Odds Ratio
SBP	Systolic Blood Pressure
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
WC	Waist Circumference
WHO	World Health Organization

Abstract

Background: Cardiovascular disease (CVD) is one of the leading causes of death worldwide and hypertension is the leading modifiable risk factor for cardiovascular mortality. Slum living communities are increasingly adopting urban lifestyles and becoming more vulnerable to risk of developing CVD. Few studies have so far focused on this aspect. **Objective**: The aim of this study was to estimate the prevalence of risk factors of cardiovascular disease among adults in a slum of Dhaka city. **Methods:** It was a cross sectional survey conducted on conveniently selected 461 people at Agargaon slum area and this area was selected purposively. Face to face interview was taken by using structured questionnaire. **Results:** Total 461 adult slum people were studied, of them males were 241(52.3%) and females were 220(47.7%). Mean age of the respondents was 43.04 (SD±8.86) years. More than half of study subjects (57%) had no formal education. Majority of the females (81.8%) were house hold worker. About one third (32.8%) males were small businessmen; day laborer was about 12%. Driver and rickshaw pullers were all males, 12% and 7.5% respectively. The mean monthly family income of the respondents was 13754 (SD±4592) taka. Overall prevalence of smoking tobacco and smokeless tobacco use was 39.3% and 47.5% respectively. Based on MET minutes/week, 36.2% of the study subjects fell into low physical activity category. Most of the METs of women were contributed by moderate activities. Almost ninety per cent study subjects (89.6%) were lifetime abstainer of alcohol. None of the study subjects consumed adequate fruit or vegetables on an average day. Nine percent male consumed more than recommended level of oil daily, whereas it was 35.2% in case of female. Mean salt consumption per day was 13.2 (SD± 3.79) grams, which was more than double of the recommended level and 99% participants consume salt in excess of their normal requirement. Mean BMI of respondents was 22.37 (SD±2.92). Prevalence of overweight and obesity was 15.6%. Mean waist circumferences was 79.83 (SD±7.71) cm. The prevalence of high waist circumference was significantly higher in females than in males (45.5% versus 12.4%). Overall prevalence of hypertension was 14.8% and the rates among male and female were 16.6% and 12.7% respectively. The mean systolic blood pressure of male and female was 117.43 (SD±14.69) mmHg and 112.52 (SD±13.28)

mmHg. A little less than one third (26.7%) of the study subjects never measured their blood pressure. Among the currently diagnosed hypertensive, 64.7% were unaware of their high blood pressure. More than one third (37.5%) of subjects who were on antihypertensive treatment, had blood pressure within normal level. Around 87.6% of participants never measured their blood glucose and about 5% of the people were previously diagnosed to have diabetes. Statistical significant association was found between hypertension and advancing age, higher monthly family income, increased BMI, low physical activity, smokeless tobacco use, diabetes and increased waist circumference in male sex. Logistic regression showed increased risk of hypertension among male sex, higher age group, high income group, smokeless tobacco use, low physical activity, high BMI and high waist circumference. **Conclusion:** The study population showed high prevalence of hypertension and other cardiovascular disease risk factors like both smoking and smokeless tobacco use, low physical activity with very minimum exercise and a considerable amount of time of sedentary activity, very minimum fruit and vegetable intake with very high salt intake. Majority of hypertensive patients were unaware about their hypertension status. There is need for greater awareness of hypertension and other cardiovascular disease risk factors in this population.

Chapter 1
Introduction

1.1 Background

Cardiovascular disease (CVD) is a major health problem throughout the world and a common cause of premature morbidity and mortality. According to World Health Organization (WHO), CVDs are the number one cause of death globally. An estimated 17.5 million people died from CVDs in 2012, representing 31% of all global deaths (1). Of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke (1). The number of people who die from CVDs, mainly from heart disease and stroke, will increase to reach 23.3 million by 2030 (2,3). CVDs are projected to remain the single leading cause of death (2). Over 80% of CVD deaths take place in low- and middle-income countries (3). It was found as the leading cause of death in population older than 45 years in sub-Saharan Africa (4). South Asians represent one of the largest and fastest growing ethnic groups in the world and they are experiencing the epidemics of cardiovascular disease. In Bangladesh, CVD accounts for 27% of deaths due to all causes, whereas non-communicable diseases (NCD) are estimated to account for 52% of all deaths (5). Bangladesh national survey on NCD risk factors 2010 showed 17.6% people (both sexes) overweight (BMI) ≥ 25 kg/m2, 21.7% had increased waist circumference (men≥ 94 cm, women ≥ 80 cm, prevalence of hypertension 17.9% and diabetes 3.9% (6). A systematic review and meta-analysis in Bangladesh showed the pooled hypertension and type 2 diabetes mellitus prevalence were 13.7% (12.1%–15.3%) and 6.7% (4.9%–8.6%), respectively (7). Another hospital based study in Bangladesh done among patients with probable cardiovascular disease showed lipid level disorder (47.05%), hypertension (28.05%), heart failure (27.25%), ischemic heart disease (21.55%) and 40.39% were associated with diabetes (8).

Cardiovascular disease (CVD) accounts for half of non-communicable disease deaths worldwide (9). Although CVD risk is perceived to be low in economically developing

countries, ischemic heart disease and stroke were 2 of the 3 leading causes of mortality in such countries in 1990 (10). In China, CVD accounted for nearly 40% of all deaths in 1994 (11). Furthermore, CVD incidence and mortality in China are projected to increase substantially during the next 20 years. Although the prevalence of some CVD risk factors has decreased in economically developed countries, the corresponding prevalence has increased in economically developing countries (11). For example, in China, the prevalence of hypertension increased from 11.3% in 1991 to 27.2% in 2000 (12,13). Furthermore, mean cholesterol levels have increased during the past decade, with the most recent report indicating that 23.8% and 9.0% of the Chinese adult population have a total cholesterol level between 5.2 mmol/L and 6.2 mmol/L and ≥6.2 mmol/L, respectively (14). China is currently undergoing rapid demographic, social, and economic changes that may further increase the burden of CVD.

What is CVD

CVD is a general category of diseases that affects the heart and the circulatory system. CVD is caused by disorders of the heart and blood vessels, and includes coronary heart disease (CHD), congestive heart failure (CHF), stroke, hypertension, peripheral artery disease, and rheumatic heart disease, congenital heart disease, deep vein thrombosis and pulmonary embolism (1,8). CHD alludes to a reduction of blood flow due to thickening and hardening of the arteries that supply the heart muscle. A complete cut off of the blood supply results in the death of heart cells, and a heart attack (MI) occurs. CHF is a disorder where the heart loses its ability to pump blood efficiently. Finally stroke occurs when a blood vessel bringing oxygen and nutrients to the brain bursts or is clogged by a blood clot or some other particle (15).

Some well documented cardiovascular disease risk factors are as follows:

A. Major modifiable risk factors

1. Major behavioral risk factors (16)

The major behavioral risk factors identified in the World Health Report 2002 are:

- Tobacco use
- Unhealthy diet (low fruit and vegetable; high salt and oil consumption)
- Physical inactivity
- Harmful alcohol consumption

2. Major biological risk factors (16)

The major biological risk factors identified in the World Health Report 2002 are:

- Overweight and obesity
- Raised blood pressure
- Raised blood glucose
- Abnormal blood lipids and its subset raised total cholesterol

Another important modifiable risk factor not falling into these two categories-

- low socioeconomic status.

B. Non-modifiable risk factors

- Advancing age
- Heredity or family history
- Gender
- Ethnicity or race

Major behavioral risk factors:

1. Tobacco use

About 1.3 billion people worldwide smoke and the number of smokers continue to rise (16). Among these, about 84% live in developing and transitional economy countries (16,17). Tobacco is the fourth most common risk factor for disease and the second major cause of death worldwide. It is currently responsible for the death of one in ten adults worldwide (about 4.9 million deaths each year) (16). In Bangladesh, overall prevalence of smoking is 26.2% (54.8% in men and 1.3% in women) (6). Overall, smokers have a 70% greater level of CVD risk than nonsmokers; persons who smoke greater than or equal to 2 packs of cigarettes per day have a two- to threefold greater risk for CVD (18). The risk for CVD also increases with greater depth of inhalation and with increasing years of smoking, although persons who stop smoking eventually reduce their risk for CVD to a level approaching that of nonsmokers (18). Cigarette smoking has been reported to act synergistically with other known risk factors for CVD.

2. Unhealthy diet - low fruit and vegetable, high salt and oil consumption

Low intake of fruits and vegetables is estimated to cause about 31% of ischemic heart disease and 11% of stroke worldwide (19). Overall, 2.7 million lives could potentially be saved each year worldwide if fruit and vegetable consumption were increased (20). Of the burden attributable to low fruit and vegetable intake, about 85% was from cardiovascular diseases (19). Adequate consumption of fruit and vegetables reduces the risk for cardio vascular diseases. In our country, 95.7% people do not consume adequate fruit or vegetables on an average day (6). High dietary intakes of saturated fat, trans-fats and salt are linked to cardiovascular risk (21). The amount of dietary salt consumed is an important determinant of blood pressure levels and overall cardiovascular risk. High consumption of saturated fats and trans-fatty acids is linked to heart disease; elimination of trans-fat and replacement of saturated with polyunsaturated vegetable oils lowers coronary heart disease risk (21).

3. Physical Inactivity

Physical inactivity causes about 1.9 million avoidable deaths per year worldwide (19). Physically inactive persons have a 20% to 30% increased risk of all-cause mortality as compared to those who adhere to 30 minutes of moderate intensity physical activity on most days of the week (16). Globally, physical inactivity accounts for 21.5% of ischemic heart disease and 11% of ischemic stroke (16). According to NCD risk factor survey Bangladesh 2010, 27% of Bangladeshi people fall into low physical activity category (6). A review of 43 epidemiologic studies in 1987 indicated that physical activity reduces the risk of CHD (22). The relative risk for CHD associated with physical inactivity is approximately 1.9, slightly lower than the relative risks associated with increased systolic blood pressure (2.1), cigarette smoking (2.5), and elevated serum cholesterol levels (2.4) (18). Several studies indicate that endurance exercise training among patients with documented CHD is associated with reduced morbidity and mortality and that physical activity might improve the likelihood of survival from a myocardial infarction (i.e. heart attack) (23). In addition, evidence documents an association between regular, moderate-intensity physical activity and the lowering of several other risk factors for CVD, including blood lipid levels, resting blood pressure among persons with borderline hypertension, body composition and overweight, and glucose tolerance and insulin sensitivity (24).

4. Harmful alcohol consumption

In 2000, alcohol use caused 3.2% of deaths (1.8 million) worldwide, and 4% of the global disease burden (19). Alcohol consumption is the leading risk factor for disease burden in developing countries and the third largest risk factor in developed countries (25). Heavy alcohol use increases the risk of cardiovascular disease and stroke (16). Though people of our country is very much religious and ninety four per cent adult in Bangladesh are lifetime abstainer of alcohol, the rates of alcohol and drug abuse is relatively high in slums of Dhaka (6,26).

Major biological risk factors:

1. Overweight and obesity

At least 2.6 million people die each year as a result of being overweight or obese (20). The high death rate might occur largely as a consequence of the influence of overweight on blood pressure, blood lipid levels, and the onset of diabetes (27). Risks of coronary heart disease, ischemic stroke and type 2 diabetes mellitus increase steadily with increasing BMI (19). A report from the Framingham Study indicates that overweight is also an independent risk factor for CVD (18). With rare exceptions, overweight develops from eating too much and exercising too little. The prevalence of overweight has increased substantially in the U.S. population during the last 10 years (18). In Bangladesh, proportion of overweight in women (21.6%) exceeded the proportion of those in men (13%) (6). Waist circumference is an approximate index of intra-abdominal fat mass and total body fat. In our country, eight per cent men and 33.7% women (21.7% sexes combined) had increased waist circumference (6). Changes in waist circumference reflect changes in risk factors for cardiovascular disease.

2. Hypertension (Raised blood pressure)

Worldwide, raised blood pressure is estimated to cause 7.1 million deaths, about 13% of the total (16). High blood pressure is a major risk factor for CVD. Some evidence documents that blood pressure-related risk for CVD increases continuously from lowest to highest values for either systolic or diastolic blood pressure (18). Elevated blood pressure is often associated with other well-known risk factors, including dietary intake, elevated blood lipid levels, obesity, smoking, diabetes mellitus, and physical inactivity (18). The prevalence of documented hypertension in Bangladesh was 12.5% (men 10.9% and women 13.9%) (6).

3. Raised blood glucose

It is predicted that the number of people living with diabetes is expected to rise from 366 million in 2011 to 552 million by 2030, if no urgent action is taken (28). The risk for CVD is three times as high among diabetic women as it is among women without

diabetes mellitus. Similarly, the risk for CVD is twice as high among diabetic men as it is among men without diabetes mellitus (18,29). Impaired glucose tolerance and impaired fasting glycaemia, also called pre-diabetes condition are risk categories for future development of diabetes and cardiovascular disease (30). The age-adjusted mortality, mostly due to coronary heart disease in many populations, is 2-4 times higher in diabetic than in the non-diabetic population (16). People with diabetes have a twofold increase risk of stroke (16). In Bangladesh, the age-adjusted prevalence of diabetes and pre-diabetes is quite high, 9.7% and 22.4%, respectively, and there is no significant difference between the sexes (31).

4. Abnormal blood lipids

Raised cholesterol is estimated to cause 18% of the global cerebrovascular disease and 56% of global ischemic heart disease (19). Levels of plasma HDL cholesterol are inversely related to coronary artery disease incidence, and the relationship is independent of total cholesterol, LDL and triglyceride levels (32). Increased triglycerides is an independent risk factor for coronary heart disease after controlling for LDL and HDL cholesterol (33). No study has so far been done in our country regarding the lipid status of our population.

Other modifiable risk factor

1. Low socioeconomic status

There is consistent inverse relationship of lower socioeconomic status with risk of heart disease and stroke (34).

Non-modifiable risk factors

1. Advancing age

Most powerful independent risk factor for cardiovascular disease is older age. Risk of stroke doubles every decade after age 55 (35).

2. Heredity or family history

Increased risk if a first-degree blood relative has had coronary heart disease or stroke before the age of 55 years (for a male relative) or 65 years (for a female relative) (35).

3. Gender

Higher rates of coronary heart disease among men compared with women (premenopausal age); Once past the menopause, a woman's risk is similar to a man's. Risk of stroke is similar for men and women (35).

4. Ethnicity or race

Increased stroke noted for Blacks, some Hispanic Americans, Chinese, and Japanese populations. Increased cardiovascular disease deaths noted for South Asians and American Blacks in comparison with Whites (35).

1.2 Justification

Cardiovascular disease is increasing worldwide. People in low- and middle-income countries are more exposed to risk factors such as less awareness about food and exercise. Prevention effort in low income countries is very few compared to people in high-income countries. People in low- and middle-income countries who suffer from CVDs have less access to effective and equitable health care services. As a result, many people in these countries die from CVDs and other non-communicable diseases, often in their most productive years. At macro-economic level, CVDs place a heavy burden on the economies of low- and middle-income countries. In 2010, the global direct and indirect cost of CVD was approximately US$ 863 billion and is estimated to rise 22% to US$ 1,044 billion by 2030. Overall, the cost for CVD alone could be as high as US$ 20 trillion over the next 20 year period (36). In recent years, several studies in Bangladesh have shown high prevalence of cardiovascular disease and its negative impact on survival but few studies have focused on slum populations. Bangladesh is one of the densely populated countries in the world and Dhaka city's population is about 17.6 million, of which an estimated 3.4 million people live in some 5000 slums (37). These slum population, though they represent a large part of urban population are always neglected. They do not get proper health care and education and they are not even aware of their risk of developing diseases. In this population-based study on persons living in a slum of Dhaka city, we seek to determine the prevalence of risk factors related to cardiovascular disease among slum population, which if properly addressed will help policy makers and health care providers to take appropriate decision regarding this matter. This will also help in future studies on relevant issues.

1.3 Research Question

What are the prevalence of cardiovascular disease risk factors such as tobacco use, unhealthy diet, low physical activity, harmful alcohol consumption, overweight- obesity, hypertension and diabetes among adults in slum of Dhaka city?

1.4 Objectives

1.4.1 General Objective

- To estimate the prevalence of cardiovascular disease risk factors among adults in slum of Dhaka city.

1.4.2 Specific Objectives

- To estimate the prevalence of modifiable risk factors of cardiovascular disease such as tobacco use, low fruit-vegetable and high salt-oil consumption, low physical activity, harmful alcohol consumption, overweight-obesity, hypertension, diabetes and low socioeconomic status as reflected by low monthly family income among adults in a slum of Dhaka city.
- To estimate the prevalence of non modifiable risk factors of cardiovascular disease such as advancing age, male sex and family history of heart attack or stroke among adults in a slum of Dhaka city.
- To see the association between hypertension and various socio-demographic characteristics, modifiable and non-modifiable risk factors.
- To find out the effect of various modifiable and non-modifiable risk factors on hypertension.
- To find out the effect of non-modifiable risk factors on various modifiable risk factors.

Chapter 2
Literature Review

In recent years, the dominance of chronic diseases as major contributors to total global mortality has emerged. By 2005, the total number of cardiovascular disease (CVD) deaths (mainly coronary heart disease, stroke, and rheumatic heart disease) had increased globally to 17.5 million from 14.4 million in 1990 (1). Of these, 7.6 million were attributed to coronary heart disease and 5.7 million to stroke (1). More than 80 percent of the deaths occurred in low and middle income countries (38). The World Health Organization (WHO) estimates there will be about 20 million CVD deaths in 2015, accounting for 30 percent of all deaths worldwide (39). By 2030, researchers project that non-communicable diseases will account for more than three-quarters of deaths worldwide; CVD alone will be responsible for more deaths in low income countries than infectious diseases (including HIV/AIDS, tuberculosis, and malaria), maternal and perinatal conditions, and nutritional disorders combined (40). Thus, CVD is today the largest single contributor to global mortality and will continue to dominate mortality trends in the future (38).

2.1 Global cardiovascular mortality

Globally, there is an uneven distribution of age-adjusted CVD mortality. The lowest age-adjusted mortality rates are in the advanced industrialized countries and parts of Latin America, whereas the highest rates today are found in Eastern Europe and a number of low and middle income countries. Age-standardized mortality rates for CVD are in excess of 500 per 100,000 in Russia and Egypt; between 400 and 450 for South Africa, India and Saudi Arabia; and around 300 for Brazil and China. This is in contrast to rates of between 100 and 200 per 100,000 for Australia, Japan, France, and the United States. Overall, age-adjusted CVD death rates are today higher in major low and middle income countries than in developed countries (41). Examination of coronary heart disease (CHD) mortality trends across countries reveals considerable variability in the shape and magnitude of CHD epidemics since the 1950s. Trends are not consistent even among

countries within the same geographic region. In general, three trending patterns of CHD mortality can be observed: a rise-and-fall pattern where mortality rates increased, peaked, and then fell significantly; a rising pattern, where rates have steadily increased indicating an ongoing epidemic; and a flat pattern, where CHD mortality rates have remained relatively low and stable. The rise-and-fall pattern is most notable in high income Anglo-Celtic, Nordic, and Northwestern Continental European countries as well as in the United States and Australia. In these countries, CHD mortality rates peaked in the 1960s or early 1970s and have since fallen precipitously, by an average of about 50 percent (42). The rising pattern of CHD is most notable in Eastern European and former Soviet countries, where mortality rates have continued to increase at an alarming pace and where the highest mortality rates ever recorded are currently being observed. By contrast, CHD mortality rates in Japan and several European Mediterranean countries have remained relatively low, following the flat pattern (43).

2.2 Cardiovascular disease in India

In developed nations the rise in the burden of CVD occurred over several decades due to a long period of epidemiological transition. In India, perhaps because of the rapid pace of economic development, epidemiological changes have spanned a much shorter time. As a consequence, cardiovascular disease (CVD) has emerged as the leading cause of death all over India, with coronary heart disease (CHD) affecting Indians at least 5-6 years earlier than their western counterparts (44). Current estimates from disparate cross-sectional studies indicate the prevalence of CHD to be between 7-13 per cent in urban and 2-7 per cent in rural India (45). In addition, migration and urbanization have resulted in an increase in the prevalence of risk factors such as diabetes, overweight (46). In India in the past five decades, rates of coronary disease among urban populations have risen from 4% to 11% (47). In India, the leading cause of death is cardiovascular disease. At the same time, it has been found that cardiovascular disease is third overall in the burden of disease, the other two being infectious and parasitic diseases and unintentional injuries. In India, deaths from coronary heart disease rose from 1.17 million in 1990 to 1.59 million in 2000. The prevalence varies by site, age group studied, and diagnostic criteria used,

but an urban prevalence of about 10% in adults aged ≥35 years old is a credible estimate based on several surveys (48).

2.3 Cardiovascular disease in Bangladesh

Cardiovascular diseases are one of the major health problems throughout the world. It is emerging as a serious health problem in Bangladesh and other developing countries. Amongst the heart diseases hypertension, rheumatic fever, rheumatic heart diseases, ischemic heart diseases and congenital heart diseases are common. There is a common belief that heart disease is a disease of rich people, which is not correct. Rheumatic fever and rheumatic heart diseases commonly affects poor people living in overcrowding and poverty. Congenital heart diseases and hypertension can affect both rich and poor people. Poor people are not immune from Ischemic heart disease. Latest survey on cardiovascular diseases carried out in Bangladesh showed prevalence of hypertension in adult population about 20-25% and ischemic heart disease about 10% (49). In Bangladesh, CVD accounts for 27% of deaths due to all causes (5). Bangladesh national survey on NCD risk factors 2010 showed prevalence of hypertension 17.9% and (6). A systematic review and meta-analysis in Bangladesh showed that pooled hypertension prevalence were 13.7% (12.1%–15.3%) (7).

2.4 Coronary heart disease risk of slum dwelling residents

Coronary heart disease (CHD) is the top cause of mortality and morbidity in India. People in slums are generally at a higher risk for CHD than Indians living in more affluent areas mostly because of the higher prevalence of major CHD risk factors such as uncontrolled hypertension and tobacco use amongst them. Knowing their CHD risk perceptions and bringing them into line with the actual CHD risk is a prerequisite for effective CHD risk management. Consequently, there is need to develop tailored interventions focusing medication management and tobacco cessation to reduce growing CHD epidemic among slum dwellers and long-term CHD burden in India (50).

2.5 Individual risks for CVD

Proximal risks for CVD include those associated with consumption patterns (mainly linked to diets, tobacco and alcohol use), activity patterns, and health service use as well as biological risk factors such as increased cholesterol, blood pressure, blood glucose, and clinical disease. The Framingham Study first centered attention on the concept of "risk factors" associated with CVD, and most recently reported substantial 30-year risk data showing the accumulation of risk over time (51). Importantly, risk factors for the incidence of CVD and those associated with CVD severity or mortality are not synonymous. Risk factors for incidence become important starting very early in life and accumulate with behavioral, social, and economic factors over the life course to culminate in biological risks for CVD such as increased cholesterol, blood pressure, blood glucose, and clinical disease. Over the past few decades, the effectiveness of early screening and long-term treatment for biological risks or early disease has contributed to the sharp declines in CVD mortality seen in many countries (52).

Relatively few major behavioral and biological risk factors account for CVD incidence around the world. Tobacco use, diet (including alcohol, total calorie intake, and specific nutrients) and physical inactivity serve as the three major behavioral risks. Between them, they account for a significant proportion of cancer, diabetes, and chronic respiratory disease incidence in addition to CVD (53). Concerted action focused on these behavioral risks, along with biological risks such as high blood pressure, high blood lipids, and high blood glucose, would have a wide impact on the global incidence and burden of disease. High blood pressure, tobacco use, elevated blood glucose, physical inactivity, and overweight and obesity are the five leading factors globally. In middle income countries, alcohol replaces high blood glucose in the top five; in low income countries, a lack of safe water, unsafe sex, and under-nutrition are important.

The Global Burden of Disease and Risk Factors report provides additional analysis of the relative contribution of individual risk factors specifically to CVD burden. Using 2001 data, the report estimates the percentage decrease in IHD and stroke burden that could be expected if population exposure to a risk factor were reduced to zero by calculating the

population attributable fraction for each of the key CVD risk factors. The report found that hypertension, high cholesterol, overweight and obesity, smoking, low fruit and vegetable intake, and physical inactivity were the leading contributors to IHD and stroke burden worldwide (54).

2.6 Major proximal risk factors for CVD

This section described the major risk factors for CVD in more detail. The section begins with behavioral risk factors, including tobacco use, dietary factors, alcohol, and physical activity. This is followed by the major biological risk factors that mediate the role of these behaviors in leading to CVD including obesity, blood pressure, blood lipids, and diabetes. Finally, additional contributing factors are also discussed, including genetics and gender difference.

Tobacco

In the Global Burden of Disease study, Lopez et al. (2006) estimated that in 2000, 880,000 deaths from CHD and 412,000 deaths from stroke were attributable to tobacco (10). These data are based on updated estimates of the relative risk of death among smokers for CHD, stroke, and hypertensive heart disease. The relative risks are highest in young people. However, the most common type of tobacco-related CVD deaths varies around the world. In India, a higher proportion of smokers die from CHD; in China, tobacco kills more through stroke (55).

Smoking cessation has been shown to have significant impacts on reducing CHD. Smoking cessation leads to significantly lower rates of reinfarction within 1 year among patients who have had a heart attack and reduces the risk of sudden cardiac death among patients with CHD. There is consensus in the literature that CVD risk drops precipitously within the first 2 to 3 years of smoking cessation. Although the specific timeline of risk reduction depends on the number of years as a smoker and the quantity of tobacco smoked daily, it is conceivable that, over time, former smoker's CVD risk can drop to levels similar to that of someone who has never smoked (56). Two major trends are of real concern with respect to the future of tobacco-related CVD. First, in most parts of the

world, the smoking rates are higher among the poorest populations. The second worrisome trend is in smoking among girls. In most parts of the developing world, women smoke at a significantly lower rate than men, a disparity that could help explain the lower rates of cardiovascular mortality among women (57). If future generations of girls catch up to boys and smoke at the rates that men do today, CVD and associated tobacco-related death rates will rise sharply.

Dietary Factors

The relationship between CVD and diet is one of the most studied relationships in epidemiology. Several key relationships identified decades ago remain valid, while others have evolved in the light of better-quality research. WHO and FAO reviewed the evidence on the relationship between diet, physical activity, and CVD in the context of a broader review of the impact on all chronic diseases. High dietary intakes of saturated fat, trans-fats and salt; low intake of fruits, vegetables and fish are linked to cardiovascular risk. Approximately 16 million (1.0 per cent) DALYs and 1.7 million (2.8 per cent) of deaths worldwide are attributable to low fruit and vegetable consumption (58). Elimination of trans-fat and replacement of saturated with polyunsaturated vegetable oils lowers coronary heart disease risk (58). A healthy diet can contribute to a healthy body weight, a desirable lipid profile and a desirable blood pressure, leading to reduced risk of CVD.

Oils

The rapid rise in the production and consumption of tropical oils has worried many CVD researchers because of their adverse effects on CVD risk. Healthy oils are those that contain no commercially introduced transfatty acids, are low in saturated fatty acids, and are high in mono- and polyunsaturated fatty acids. Nutritionally, the most important mono- and polyunsaturated fatty acids are oleic acid and linoleic acid, respectively. Olive and canola oils have high concentrations of oleic acid, whereas nonhydrogenated soybean oils and sunflower oils have high concentrations of linoleic acid. All four of these oils are also low in saturated and transfats, but their shelf lives and cooking properties (smoke point, flavor, etc.) vary. High and mid-oleic sunflower oils both have long shelf lives, but

unfortunately they remain relatively expensive and less abundant in many low and middle income countries. In order to be truly effective, low and middle income countries that have high levels of oil consumption will need to develop affordable supplies of healthy oils at prices that are competitive with tropical oils. Transitioning from less healthy tropical oils to more healthy oils could significantly reduce the amount of saturated and trans-fatty acids used in highly processed foods and daily cooking.

Salt

There is a strong and robust base of evidence that excessive sodium intake significantly increases CVD risk and that reduction in sodium intake on a population level decreases CVD burden (59). The most well-established mechanism by which sodium intake increases CVD risk is by increasing blood pressure. Numerous studies have found that there is a continuous and graded relationship between salt intake and blood pressure. This relationship has been confirmed in epidemiological, animal, population, migration, intervention, and genetic studies. Furthermore, population studies have established that reductions in sodium intake lead to declines in systolic and diastolic blood pressure, which in turn leads to a decrease in heart attacks and strokes. For example, since the 1970s, salt intake in Finland has been reduced by approximately one-third. This has led to a reduction in systolic and diastolic blood pressure (BP) by more than 10 mmHg, a pronounced decrease of 75–80% in both stroke and CHD mortality and a remarkable increase of 5–6 years in life expectancy (60). In their recent major review of sodium trends and impact, H E and MacGregor concluded that a reduction in salt from the current global intake of 9 to 12 g/day to the recommended levels of 5 g/day would have a major impact on BP and on CVD (58). Salt's impact on CVD, however, extends beyond blood pressure. Animal and epidemiological studies have found that a diet high in sodium may directly increase risk of stroke, which is independent and additive to salt's effect on BP (59).

Alcohol

The global burden of diseases attributable to alcohol has recently been summarized, leading to the conclusion that alcohol is one the largest avoidable risk factors in low and

middle income countries. It has long been known that excessive alcohol intake is associated with increased risk for hypertension, stroke, coronary artery disease, and other forms of CVD; however, there is also a robust body of evidence in a range of populations that suggests that light to moderate intake of alcohol may reduce the risk of CHD. Indeed, research suggests that the relationship between alcohol intake and CVD outcomes follows a "J" curve, with the lowest rates being associated with low to moderate intakes of alcohol (61). It is important to recognize that, as with any discussion of alcohol and health, the key issues are the quantity of alcohol consumed and the risk or benefit conferred by consumption. Although evidence indicates that low to moderate alcohol use can reduce the risk of CHD, excessive and harmful use clearly increases CVD risk. Alcohol may also contribute to overweight and obesity as it is a significant source of daily calories in many countries (62). It is also important to consider the demonstrated negative health effects of excessive and harmful alcohol use on other diseases such as neuropsychiatric disorders, cirrhosis of the liver, and various cancers.

Physical Activity

WHO highlighted the importance of physical activity as a key determinant of obesity, CVD and diabetes. For decades, evidence of the relationship between physical activity and CVD, independent of effects on weight and obesity, has strengthened. Increasing physical activity—including brisk walking—has been shown to decrease the risk of chronic diseases such as CHD, stroke, some cancers (e.g., colorectal and breast cancer), type 2 diabetes, osteoporosis, high blood pressure, and high cholesterol. Physical activity is also important for weight control and maintenance. In addition, regular physical activity is associated with a decreased risk of depression and improved cognitive function. Moreover, people who are physically active have improved quality of life and reduced risk of premature death (63).

Guthold et al. (2008) recently published new data on levels of physical inactivity in 51 countries, most of which were low or middle income, and observed several trends. Globally, with the exception of several Eastern European countries (Croatia, the Czech Republic, Hungary, Kazakhstan, the Russian Federation, Slovenia, and the Ukraine),

women were more likely to be physically inactive than men. Further, adults over 50 years of age were more likely to be inactive than younger adults, and city dwellers were more likely to be inactive than those who lived in rural areas. Physical inactivity levels were, with a few exceptions, similar in Eastern European, South Asian, and Western Pacific countries. In most of these countries, between 5 and 10 percent of men and between 10 and 16 percent of women were found to be physically inactive. By contrast, there was considerable variation in the levels of physical activity in both men and women within and across African, American, and Eastern European countries. For example, while women in 7 of the 18 African countries surveyed had the lowest levels of physical inactivity (fewer than 10 percent classified as physically inactive), Guthold found that more than 40 percent of women in Namibia, Swaziland, and South Africa were physically inactive. Despite the heterogeneity of the data, the study indicated that levels of physical inactivity in a number of low and middle income countries and among certain subgroups, particularly women aged 60–69 years, are disconcertingly high (64)

Overweight and Obesity

WHO and FAO reviewed the evidence on the relationship between obesity and the risk of CVD and concluded that overweight and obesity confer a significantly elevated risk of CHD (65). Increased body mass index (BMI) is also associated with greater risk of stroke in both Asian and Western populations (65). The association between obesity and CVD is partly, but not completely, mediated through hypertension, high cholesterol, and diabetes. Abdominal or central obesity measured by waist-to-hip ratio or waist circumference is associated with both CHD and stroke independent of BMI and other cardiovascular risk factors. Moreover, obesity is also an independent risk factor for other cardiovascular outcomes, such as congestive heart failure and sudden cardiac death.

Excess energy intake is one of the key contributors to obesity. As highlighted earlier, the lack of data limits policy makers' abilities to focus attention on which dietary components lend themselves to effective interventions that would reduce total calorie intake. In those countries that do have data, the collection methods vary so direct comparisons are not possible; however, a review of the data does indicate that the dietary contributors to total energy intake vary by country. National surveys of calorie intake

from India indicate that in urban areas, cereals account for 56 percent of intake, compared to about 9 percent each for edible oils and dairy, 1 percent for meat and fish, and 0.4 percent for all beverages (66). In China, cereals also dominate and account for 58 percent of total calorie intake compared to meat (13 percent) and cooking oils (17 percent) (67).

In some developing countries, consumption of sugar-sweetened beverages has increased dramatically in recent decades. In Mexico, for example, it is estimated that adolescents consume more than 20 percent of their total energy intake from caloric beverages (68). Because of its excess caloric and sugar content, increasing consumption of sugar-sweetened beverages may have important implications for obesity and cardiometabolic risk. Maintaining the relatively low per capita consumption of sugar-sweetened beverages in countries like India and China is a potential target of prevention programs. In India, all beverages account for less than 0.5 percent of total calories (66). The equivalent figure in the United Kingdom is about 16 percent for all beverages for young adult men between 19 and 24 years of age with sweetened soft drinks accounting for about a third and alcohol the remainder (69).

Hypertension

A recent review of the global burden of high blood pressure found that approximately 54 percent of stroke, 47 percent of IHD, 75 percent of hypertensive disease, and 25 percent of other CVDs were attributable to hypertension. This equates to an annual burden of approximately 7.6 million deaths, or 13.5 percent of the total number of annual global deaths, attributable to high blood pressure (70). Furthermore, Lawes et al. (2008) found that more than 80 percent of the attributable burden of hypertension in 2001 occurred in low and middle income countries, and both another recent review and an analysis commissioned for this report found the prevalence of hypertension to be equally high in developed and developing countries (71).

In Sub-Saharan Africa, hypertension is a predominant driver of CVD. Hypertensive heart disease and stroke, rather than ischemic heart disease, account for the majority of the CVD burden in the region, especially among black Africans (72).

Blood Lipids

Researchers have studied the role of blood lipids in the development of atherosclerosis and the increase of CVD risk for decades. The Framingham Study first demonstrated the link between hypercholesterolemia and increased risk of CHD in the 1960s with the finding that lower levels of high-density lipoprotein (HDL) cholesterol as well as elevated levels of low-density lipoprotein (LDL) cholesterol were associated with increased CHD risk (73). Subsequent studies confirmed these results and further established that elevated triglycerides also increase CVD risk (74). Furthermore, randomized controlled trials have shown that reduction of LDL cholesterol, both in primary and secondary prevention, is associated with reduced coronary event rates (75). Reductions in LDL cholesterol have also been associated with a lowered incidence of stroke, although the data are not as strong as for CHD (76). The INTERHEART study recently confirmed that there was a graded relationship between abnormal lipid levels and risk for CHD in all regions of the world. In fact, the INTERHEART study found that abnormal blood lipids were the most important risk factor for myocardial infarction by odds ratio in all global regions (77).

Diabetes

Around the world, diabetes is growing increasingly common and is a significant contributor to CVD risk. People with diabetes have a more than two-fold greater risk of fatal and nonfatal CVD compared to non-diabetics, with some indication that diabetes mellitus may confer an equivalent risk of having had a cardiovascular event (78). In fact, CVD is the leading cause of morbidity and mortality in people with diabetes (79).

The magnitude of the risk of CVD associated with diabetes is even greater in women and younger individuals. Indeed, there is substantial evidence that diabetes mellitus may erase, or substantially attenuate, the “female advantage” in the risk of CVD observed in non-diabetics, and that having diabetes may be equivalent to aging by at least 15 years with regard to the clinical manifestations of CVD (80).

Diabetes is emerging as a particular concern in Asia, where more than 110 million individuals were living with diabetes in 2007, a large proportion of whom were young and middle aged. Asians tend to develop diabetes at a relatively young age and low BMI,

and by 2025 the number of individuals with diabetes in the region is expected to rise to almost 180 million, of which approximately 70 million will be in India and almost 60 million in China. The reasons for this increased risk are still being fully elucidated; however, "normal weight" Asians often exhibit features of abdominal or central obesity, which is particularly detrimental to insulin resistance and glucose metabolism. Moreover, the increased risk of gestational diabetes combined with exposure to poor nutrition in utero and over-nutrition in later life may contribute to increased diabetes, resulting in a situation of "diabetes begetting diabetes" (81).

The balance of risks and benefits associated with intensive glucose control has been assessed in recent clinical trials, which have convincingly demonstrated beneficial micro-vascular outcomes of diabetes. By contrast, these trials have individually failed to show such an effect on cardiovascular outcomes. However, the extension of the follow-up of the Diabetes Control and Complications Trial in type 1 diabetes and the United Kingdom Prospective Diabetes Study in type 2 diabetes have shown that intensive glucose control substantially lowered the risk of cardiovascular outcomes (82,83). Recently conducted meta-analyses of relevant trials in people with type 2 diabetes have also consistently shown that intensive glucose control reduces the risk of major cardiovascular events by approximately 10 percent, primarily driven by a 10 to 15 percent reduction in the risk of CHD, compared with standard treatment in people with diabetes. Interestingly, this benefit appeared to be independent of concurring cardiovascular risk factors (84).

Genetics

Researchers have recognized for decades that family history of CVD is associated with increased atherosclerotic risk of heart disease, which led to the presumption of a genetic component to CVD. There are several well-characterized single-gene disorders that contribute to CVD, such as certain forms of familial hypercholesterolemia linked to mutations of the apolipoprotein B gene, and during the past few years, there have been major advances in the identification of genetic risk factors for CHD, stroke, and CVD risk factors such as blood pressure, blood lipids, obesity, and diabetes (85). The identification of genetic loci associated with CVD, such as 9p21, has led to major

advances in understanding the pathophysiology of CVD (86). The prevailing view within the research community is that the genetic underpinnings of most common forms of CVD involve a complex interplay of many different genes, and much work remains to develop a more thorough understanding of the complex gene–gene and gene–environment interactions involved in the development of CVD (87).

Indeed, in addition to the investigation of genes that influence CVD and its risk factors, there has recently been a surge in research examining how environmental factors affect gene expression. Although research indicates that gene expression is most sensitive to environmental influence from conception to early life, there is also evidence that environmentally related gene expression changes can occur throughout life (88). This is an important emerging area of research for CVD. Future findings could have implications to help elucidate the physiological processes by which individuals with similar CVD risk profiles have different outcomes. Future research also could conceivably help develop new prevention and treatment strategies aimed at taking advantage of exogenous mechanisms that enhance or suppress the expression of key genes that play a role in mediating the development of CVD.

Gender Differences in CVD Risk

Although CVD has sometimes been considered a disease that predominantly affects men, it is the leading cause of death among both men and women globally (89). There are, however, a number of notable gender differences in CVD incidence, mortality, risk-factor profiles, outcomes, and clinical presentation. These differences remain consistent across populations and regions and are thus important to consider when developing CVD prevention and treatment programs.

In all but the oldest age groups, CVD prevalence, incidence, and mortality rates tend to be higher for men than for women. This finding has remained consistent historically and across countries and regions (90). In addition, women experience their first cardiovascular events later in life than men. The INTERHEART study found that, on average, women experience their first MI 9 years later than men (91).

The reason most often cited for these gender differences is a protective effect of estrogen on the development of CVD risk factors, most notably hypertension and dyslipidemia (92). Estrogen is thought to contribute to premenopausal women's tendency to have lower systolic blood pressure, higher levels of HDL cholesterol, and lower triglyceride levels than men (93). The specific mechanisms of this protection have not been fully elucidated; however, estrogen is known to affect the atherosclerotic and blood-lipid control process in a number of different ways (94). The erosion of this protection that occurs after menopause provides further evidence of estrogen's protective role. Indeed, by age 75, women tend to have higher rates of hypertension and CVD than men (95). Risk of stroke is similar for men and women (35).

Chapter 3
Subjects and Methods

WHO STEPS chronic disease risk factor surveillance guideline was followed in this study. As resource was limited, only first two steps i.e. questionnaire and physical measurements was done for this study.

3.1: Study design: It was a cross sectional survey focused on the prevalence of risk factors of cardiovascular disease among adults in a slum area of Dhaka city.

3.2: Study period: Study duration was one year (from July 2014 to June 2015). Protocol writing took first 2 months. Preparatory activities including questionnaire development, training and piloting were done for 2 month. Data collection period was 4 months. Rest of the time was spent for data processing, analysis and report writing. Besides literature were reviewed during the whole study period.

3.3: Study area: The study was conducted at Agargaon slum area and this area was selected purposively.

3.4: Study population: The study population for this study included slum men and women aged 35 years and above living in Agargaon, Sher-E-Bangla Nagar, Dhaka. In general, the target population of the study may be included individuals residing in all geographic slum areas of the Dhaka city.

3.5: Study sample: Individual adult (may be more than one) from all household (A dwelling in which persons either related or unrelated living together and taking food from the same kitchen) as there was no sampling frame.

3.6: Inclusion criteria

All slum men and women aged 35 years and above living in the slum

3.7: Exclusion criteria

- Not willing to participate in the study
- Having mental disorders
- Pregnant women

3.8: Sample size

A representative sample size of 461 was taken for the study. This sample size has been calculated using the following formula:

$$n = \frac{Z^2 pq}{e^2}$$

Where, Z=1.96

p= prevalence of diabetes was 10% (lowest prevalence among all CVD risk factors (31).

q (1-p) =0.9

e (precision level/ margin of error) =0.05

Initial sample calculation =3.8416*0.9*0.1/0.05*0.05 =138

After multiplying by the design effect and number of age-sex estimates:

n =138*1.5*2 =415

As the resources were extremely limited, age-sex estimates were obtained only for the entire age span of the survey. This was 2 for male and female sexes.

Now, the **final sample size** was obtained by adjusting for expected non-response:

n = 415/0.9 = 461.

3.9: Sampling technique: Non probability convenient sampling was used for data collection on the basis of inclusion and exclusion criteria.

3.10: Data collection techniques/methods

Face to face interview was done by using structured questionnaire. Informed consent was taken prior interview and whole procedure was described prior to start filling of questionnaire. The interviews and measurements were done at household level.

Training for data collectors for 3 days long

⇩

Meeting with slum leaders

⇩

Explaining the importance of this study

⇩

Informed consent obtained

⇩

Data collection started door to door

Along with socio-demographic information, behavioral habit, information on hypertension and diabetes mellitus, anthropometric measurement (height, weight, waist circumference) as well as measurement of blood pressure was done.

Anthropometric measurements:

Height, weight and waist circumference was measured to calculate their body mass index (BMI), thereby obesity. The standing height was measured with a stadiometer with minimal cloths. A stadiometer consist of a metric tape affixed to a vertical surface and a movable headpiece attached to the vertical surface that can be brought down to the crown of the head. Participants will be asked to remove their footwear and head gear, if any, and stand on the board facing the interviewer, feet together, heels against the board, knees straight. Looking straight ahead and not to tilt head up and making sure that eyes are at the same level as the ear. The subjects were asked to inhale deeply and maintain a fully erect position. The headpieces were brought down until it touches the head; sufficient pressure was applied to compress the hair. Three measurements were taken three times and if the difference among reading found to be less than 1 cm, the mean measurement

was taken and recorded to the nearest 0.1 cm. If the reading falls between two values, the lower reading was recorded.

The body weight was measured using a platform beam scale. The beam of the platform scale was graduated so that it can be read from both sides; the calibration of the scale was done before taking the weight. The subjects stand still over the center of the platform with body weight evenly distributed between both feet with light indoor clothing. Weight was recorded to the nearest 0.1 kg.

Waist circumference was measured by plastic measuring tape, maintaining privacy of the participants; inside room or area screened off from other people. This was measured directly on the skin at the end of a normal expiration with the arms relaxed at the sides, at the midpoint between the lower margin of the last palpable rib and the top of the hip bone. Waist circumference was measured to nearest millimeter.

Blood pressure measurement

Blood pressure was measured in sitting position; with calf at the level of the heart. After 5 minute of rest a second reading was taken. If the difference between two readings was more than 5 mm of Hg, a third reading was taken.

3.11: Data collection Tools

- Structured questionnaire- The questionnaire was developed with minor adaptation of WHO STEP wise Surveillance (STEPS) questionnaire. All the core variables along with some expanded variables from step 1 were incorporated. From step 2 physical measurements (height, weight, waist circumference and blood pressure) was included.
- BP machine and stethoscope
- Physical measurements tools (weight machine, height measuring scale, waist measuring non stretch tape)
- Pictorial show cards or measuring cups of different sizes.

3.12: Data analysis

Version 17 of SPSS was used for data entry and analysis. Obtained information was presented in the form of tables and graphs. Descriptive statistics such as mean, SD, frequency, percentage was used. Chi-square test was done to see association. Binomial logistic regression was conducted to identify the effect of risk factors on dependent variables.

3.13: List of variables

3.13.1: Demographic variables

1. Age
2. Sex
3. Education
4. Occupation
5. Religion
6. Marital status
7. Family size
8. Monthly family income
9. House type

3.13.2: Behavioral variables

1. Tobacco use
2. Unhealthy diet
    - 2.1 Low fruit and vegetable consumption
    - 2.2 High salt and oil consumption
3. Physical activity
4. Harmful alcohol consumption

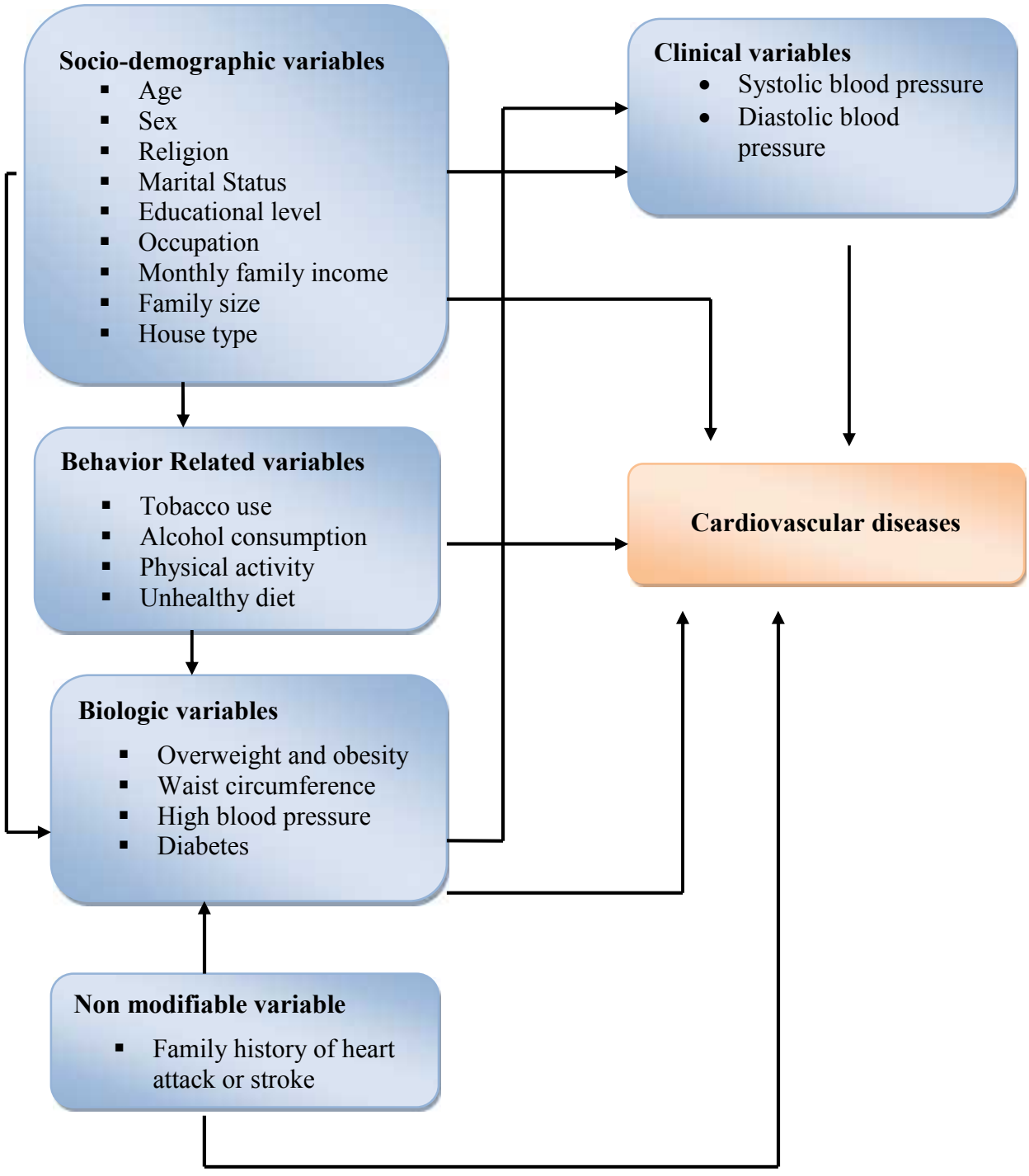
3.13.3: Biologic variables

1. Overweight and obesity
2. Waist circumference
3. High blood pressure
4. Diabetes

3.13.4: Non modifiable variable

1. Family history of heart attack or stroke

3.14: Conceptual Framework



3.15: Operational Definitions

3.15.1: Tobacco use:

Information of tobacco use was collected for both smoking and smokeless forms.

Cut-offs for tobacco use

The two main tobacco indicators that are associated with an increased risk of developing chronic diseases including cardiovascular diseases are:

- Current smoker and
- Daily smoker

The smoking status of the participants was categorized into 'current smoker' those who have smoked tobacco in past 30 days and 'daily smoker' those who smoke any tobacco products every day (6). They were asked about the initiation and duration of use by means of age and year(s) both. Frequency of use of products was also asked. Question was asked to non smokers if he or she were exposed to second hand smoke in last seven days at their home or workplace.

Smoking forms of tobacco includes biri, cigarette (both manufactured and roll your own-RYO), pipe, cigars, water pipe also known as shisha, hookah or hubble-bubble (6).

Smokeless tobacco includes jarda, sada pata, snuff like gul, betel nut, chewing tobacco e.g., plug, loose-leaf, chimo, toombak, guthha or twist, betel leaf etc (6). Show cards were used for different forms of tobacco.

3.15.2: Low fruit and vegetable consumption

Minimum daily total requirement of fruit and vegetable was 5 servings of each. One standard serving size equals to 80 grams (6). Servings were measured by showing the pictorial show cards or measuring cups.

- For raw green leafy vegetables, 1 serving = one cup;
- For cooked or chopped vegetables, 1 serving = ½ cup;
- For fruit (apple, banana, orange), 1 serving = 1 medium size piece;
- For chopped, cooked and canned fruit, 1 serving = ½ cup; and
- For juice from fruit, 1 serving = ½ cup

3.15.3: High salt and oil consumption

***Salt*:** The recommended level of salt intake is 5 grams/day (21).

***Oil*:** For our country, the recommended amount of edible oil to be consumed per day is 5 tsp or 25 ml for men and 4 tsp or 20 ml for women (96).

3.15.4: Physical activity

Physical activity was measured according to Global Physical Activity Questionnaire method (97). The Global Physical Activity Questionnaire (GPAQ) was developed by WHO for physical activity surveillance in countries. It collects information on physical activity in three domains. These domains are:

- Activity at work
- Travel to and from places
- Recreational activities

Physical activity was defined as any bodily movement produced by skeletal muscles that require energy expenditure. Physical activity was categorized into vigorous, moderate and sedentary activity. A vigorous-intensity activity was defined as any activity that causes large increase in breathing or heart rate, if continued for at least 10 minutes (e.g. running, carrying or lifting heavy loads, digging or construction work). Moderate-intensity activity was defined as any activity that causes small increase in breathing or heart rate, if continued for at least 10 minutes (brisk walking or carrying light loads).

Physical activity related to work means whether the work involves vigorous-intensity activity (running, carrying or lifting heavy loads, digging or construction work) or moderate-intensity activity (brisk walking or carrying light loads). Physical activity related to travel to and from places (transportation) means walking or using a bicycle (*pedal cycle*) for at least 10 minutes continuously to get to and from places. Physical activity related to recreational activities means sports, fitness or recreational activities like running or playing football, volleyball, brisk walking, cycling, swimming and can be of vigorous-intensity or moderate-intensity. Continuous activity of at least ten minutes was taken into account.

Physical activities was measured in the survey by asking the respondents about their weekly and daily vigorous and moderate activities during work and leisure time, activities related with transport and time spent in sedentary position. Respondents were asked for number of days they do vigorous and moderate activities in a typical week. In such a day, how much time they spent (in minutes) in these type of activities. Similarly they were asked about time spent on transport related activities. All type of physical activities was transferred in minutes per day. Then the total duration was converted into metabolic equivalents (MET minutes/week). METs were commonly used to express the intensity of physical activities. MET is the ratio of a person's working metabolic rate relative to their resting metabolic rate. One MET was defined as the energy cost of sitting quietly and is equivalent to a caloric consumption of 1 kcal/kg/hour. It is estimated that compared with sitting quietly, a person's caloric consumption is three to six times higher when being moderately active (3-6 METs) and more than six times higher when being vigorously active (>6 METs). However for our study we took four times for moderate and eight times for vigorous-intensity activity than sedentary position (sitting quietly). MET-minute was calculated according to the STEPS protocol as follows: one minute in sedentary position (sitting quietly) equal to 1 MET-minute. One minute in moderate and transport related activities equal to 4 MET-minutes and one minute in vigorous activities equal to 8 MET-minutes. MET values were applied only to vigorous and moderate intensity variables in the work and recreation settings and to transport related activities. All transport related activities were considered as moderate intensity activities. All MET-

minutes for different forms of physical activities was added together to get total physical activities in MET-minutes. Then physical activities were categorized in high, moderate and low type. Those who spent 3000 or more MET-minutes per week, they were categorized as high physical activity group. Those who spend between 600 up to 3000 MET-minutes, they were categorized as moderate physical activity. For those who spent less than 600 MET-minutes, they fall in low activity category.

3.15.5: Alcohol consumption

Alcohol consumption was measured by asking the respondents if they consumed ever, within past 12 months, and within past 30 days. They were also asked about the maximum frequency of "standard" alcoholic drinking in a single occasion in past 12 months and in past 30 days. They were also asked about daily and weekly standard alcoholic drink. One standard drink equals to 10 grams of ethanol and was measured by showing the pictorial show cards of different size drinking glasses (shown in annexure). The terms to be used were listed as follows:

- **Current drinker**: who drank within past 30 days.
- **Daily drinker**: who drink daily.
- **Alcohol consumer**: who drank in past 12 months.
- **Binge drinkers:** 5 or more drinks on a single occasion for men or 4 or more drinks on a single occasion for women, generally within about 2 hours (98).
- **Heavy drinking**: For men, heavy drinking was typically defined as consuming 15 drinks or more per week. For women, heavy drinking was typically defined as consuming 8 drinks or more per week (99).
- **Moderate drinking**: According to the Dietary Guidelines for Americans, moderate alcohol consumption was defined as having up to 1 drink per day for women and up to 2 drinks per day for men (100).

3.15.6: Body mass index: Body mass index was calculated from the body weight and height of the subjects using the following formula: BMI= weight in kg/ height in m^2. BMI was interpreted as follows:

BMI	**Nutritional class**
<16	Severe malnutrition
16-16.9	Moderate malnutrition
17-18.4	Mild malnutrition
18.5-24.9	Normal
25-26.9	Overweight
27-29.9	Obesity
30-34.9	Moderate obesity
35-39.9	Severe obesity
40 or more	Morbid obesity

3.15.7: Waist circumference: Increased when it was ≥94 cm in men and ≥80 cm in women (6).

3.15.8: Hypertension

A person was considered being mildly hypertensive if the systolic value (SBP) ≥ 140 mmHg and/or the diastolic value (DBP) ≥ 90 mmHg. Moderate hypertension has been defined as SBP ≥160 mmHg and/or DBP ≥100 mmHg (101).

Normal	SBP 90-119 and 60-79
Pre-hypertension	SBP 120-139 or DBP 80-89
Stage 1 HTN	SBP 140-159 or DBP 90-99
Stage 2 HTN	SBP ≥160 or DBP ≥100

3.15.9: Diabetes

A person was considered having diabetes if she/he was previously diagnosed by a physician as diabetic and was under treatment or not.

3.15.10: Socio-economic status

Socioeconomic status of study subjects could not be classified. So instead of low socioeconomic status, I consider low family monthly income as risk factor for CVD. Family monthly income 10000 taka or less was considered as risk factor.

3.16: Ethical Consideration

Permission from ethical review committee of Bangladesh Institute of Health Science was taken. Informed consent was taken before starting the interview. Risk status of the respondents was provided which help them to take appropriate preventive measures. There was no human risk as there was no invasive procedure. The study did not divulge the name and personal information of any individual respondent at any point of time. Respondent's right to refuse and withdraw from the study was accepted.

Chapter 4
Results

This cross-sectional study was conducted with the aim to estimate the prevalence of cardiovascular disease risk factors among slum population of Dhaka city. Though hypertension is a major modifiable risk factor for CVD, it is also included as one of the cardiovascular disease. In this study, hypertension was considered as the primary outcome and association of hypertension with various socio-demographic characteristics, modifiable and non-modifiable risk factors were sought. The result of the study has been described in five major sections as follows:

1. **Socio-demographic characteristics and risk factors distribution among male and females**
2. **Association between hypertension and various socio-demographic characteristics, modifiable and non-modifiable risk factors**
3. **Effect of various modifiable and non-modifiable risk factors on hypertension**
4. **Effect of non-modifiable risk factors on various modifiable risk factors**

Table 4.1.1: Socio-demographic characteristics of study subjects- age, marital status, education, occupation, economic status, religion, family size & house type

Variables	Total n=461(100)	Male (n=241)	Female (n=220)	*p value*
Age in years				
35 to < 45	285 (61.8)	135 (56.0)	150 (68.2)	
45 to <55	111 (24.1)	57 (23.7)	54 (24.5)	0.001
55 to <65	47 (10.2)	34 (14.1)	13(5.9)	
≥65	18(3.9)	15(6.2)	3(1.4)	
Mean (±SD) age	43.04 ±8.86	45.03±9.47	40.85±7.57	0.000
Marital status				
Married	433 (93.9)	230(95.4)	203(92.3)	
Unmarried	13(2.8)	9(3.7)	4(1.8)	
Divorced	7(1.5)	0(0.0)	7(3.2)	0.009
Widower/widow	8(1.7)	2(0.8)	6(2.7)	
Education				
No formal education	263(57.0)	127(52.7)	136(61.8)	
Primary not completed	83(18.0)	37(15.4)	46(20.9)	
Primary	87(18.9)	57(23.7)	30(13.6)	0.013
Secondary	22(4.8)	16(6.6)	6(2.7)	
Higher secondary	5(1.1)	3(1.2)	2(0.9)	
Occupation				
House hold work	181(39.3)	1(0.4)	180(81.8)	
Small business	97(21.0)	79(32.8)	18(8.2)	
Day labourer	55(11.9)	51(21.2)	4(1.8)	0.000
Driver	29(6.3)	29(12.0)	0(0.0)	
Rickshaw puller	18(3.9)	18(7.5)	0(0.0)	
Private employee	17(3.7)	11(4.6)	6(2.7)	
Industrial labourer	15(3.3)	10(4.1)	5(2.3)	
Family income/month				
≤10000	169(36.7)	85(35.3)	84(38.2)	
10001 - 15000	183(39.7)	90(37.3)	93(42.3)	0.234
15001– 20000	89(19.3)	55(22.8)	34(15.5)	
>20000	20(4.3)	11(4.6)	9(4.1)	
Mean (±SD)	13754.88±4592.59	14026.97±4771.25	13456.81±4379.97	0.183
Religion				
Islam	445(96.5)	230(95.4)	215(97.7)	
Hindu	12(2.6)	8(3.3)	4(1.8)	0.389
Christian	4(0.9)	3(1.2)	1(0.5)	
Family member				
≤2	10(2.2)	8(3.3)	2(0.9)	
3-4	177(38.4)	90(37.3)	87(39.5)	0.199
≥5	274(59.4)	143(59.3)	131(59.5)	
Type of house				
Tin shade	460(99.8)	240(99.6)	220(100)	0.339
Brick build	1(0.2)	1(0.4)	0(0.0)	

**Values expressed as n(%) in parentheses or M±SD, as appropriate; M, mean; SD, standard deviation, p value, significance between male and female participants; p value was obtained by χ^2 test for categorical variables & t- test for continuous variable; 0.05 was considered as level of significance.*

Total 461 adult slum people were studied, of them males were 241(52.3%) and females were 220(47.7%). Male female proportion was almost same. Table 4.1.1 shows that mean age of the respondents was 43.04 years with standard deviation of 8.86 years whereas the mean age of male and female were 45.03 (SD±9.47) and 40.85 (SD±7.57) years respectively and the male female distribution was statistically different ($p < 0.05$). The age range of the study subjects was from 35 to above. Out of 461 respondents, majority of the study subjects (62%) was in the age range of 35 up to 45 years. Senior citizens (55 years or more) were only about 14% of study subjects. The lower age range study subjects were significantly higher than higher age range subjects ($p < 0.05$). Almost all of the respondents (93.9%) were married where male and female was 95.4% and 92.3% respectively. More than half of study subjects (57%) had no formal education where male and female distribution was 52.7% and 61.8% respectively. Only 24.8% subjects completed more than primary level of education and the literacy rate was significantly higher in male than ($p < 0.05$). Majority of the females (81.8%) were house hold worker, compared to a very negligible (0.4%) male. About one third (32.8%) males were small businessmen, compared to 8.2% females. Day laborer was about 12%, where male and female was 21.2% and 1.8% respectively. Driver and rickshaw pullers were all males, 12% and 7.5% respectively. The mean monthly family income of the respondents was 13754.88 (SD±4592) whereas for male and female it was 14026.97 (SD±4771.25) and 13456.81 (SD±4379.97). A little more than three-forth (76.4%) of the respondent's monthly family income were up to 15000 BDT. A little less than one fourth (23.6%) of the respondent's monthly family income was above 15000 taka. Monthly family income did not vary statistically among male and female ($p > 0.05$). Almost all of the respondents (96.5%) were muslim, the rates of male and female were 95.4% and 97.7% respectively. About 60% of the respondents had a family size of 5 or more persons. Almost 100% of the respondents lived in tin shed house.

Table 4.1.2: Behavioral characteristics of the respondents

Variables	Total n=461(100)	Male (n=241)	Female (n=220)	*p value*
Smoking tobacco				
Current smoker	181(39.3)	177(73.4)	4(1.8)	0.000
Non smoker	280(60.7)	64(26.6)	216(98.2)	
Daily smoker	175(38.0)	173(71.8)	2(0.9)	0.000
Mean (±SD) age of starting smoking	16.95±4.47	16.83±4.5	23.66±10.96	0.394
Mean (±SD) daily consumption of sticks	14.91±5.82	15±5.8	11.25±6.29	0.204
Types of tobacco products (n=181, male-177, female-4)				
Cigarette	164(90.6)	162(91.5)	2(50.0)	0.014
Biri	16(8.8)	14(7.9)	2(50.0)	
Hand rolled cigarette	1(0.6)	1(0.6)	0(0.0)	
Past daily smoker among non-daily smoker (n=286, male-68, female-218)	30(10.5)	29(42.6)	1(0.5)	0.000
Non smokers who exposed to second hand smoke at home (n=280, male-64, female-216)	175(62.5)	26(40.6)	149(69.0)	0.000
Non smokers who exposed to second hand smoke at workplace (n=280, male-64, female-216)	35(12.5)	16(25.0)	19(8.8)	0.001
Smokeless tobacco				
Current smokeless tobacco user	219(47.5)	87(36.1)	132(60.0)	0.000
Daily smokeless tobacco user (n=219, male-87, female-132)	188(85.8)	69(79.3)	119(90.2)	0.024
Types of smokeless tobacco (n=219, male-87, female-132)				
Zorda	175(79.9)	73(83.9)	102(77.3)	0.284
Sada pata	23(10.5)	9(10.3)	14(10.6)	
Guul	21(9.6)	5(5.7)	16(12.1)	
Mean (±SD) frequency of daily smokeless tobacco use	8.36±4.87	8.20±5.56	8.45±4.43	0.204
Physical activity				
Low physical activity	167(36.2)	79(32.8)	88(40.0)	0.000
Moderate physical activity	151(32.8)	57(23.7)	94(42.7)	
High physical activity	143(31.0)	105(43.6)	38(17.3)	
Work related vigorous activity	98(21.3)	90(37.3)	8(3.6)	0.000
Travel to and from places by bicycle/walking	213(46.2)	123(51.0)	90(40.9)	0.059
Vigorous work during recreational activities	4(0.9)	3(1.2)	1(0.5)	0.361
Mean(±SD) minutes of sedentary activity in a day	159.76±71.28	163.44±76.67	155.73±64.80	0.243

Variables	Total n=461(100)	Male (n=241)	Female (n=220)	*p value*
Alcohol consumption				
Lifetime abstainer of alcohol	413(89.6)	196(81.3)	217(98.6)	0.000
Alcohol consumer	16(3.5)	16(6.6)	0(0.0)	
Current drinker	8(1.7)	8(3.3)	0(0.0)	
Daily drinker	4(0.9)	4(1.7)	0(0.0)	
Binge drinker	4(0.9)	4(1.7)	0(0.0)	
Heavy drinker	2(0.4)	2(0.8)	0(0.0)	
Moderate drinker	2(0.4)	2(0.8)	0(0.0)	

**Values expressed as numbers and percentages in parentheses or M±SD, as appropriate; M, mean; SD, standard deviation, p value, significance between male and female participants; p value was obtained by χ^2 test for categorical variables & t- test for continuous variable; 0.05 was considered as level of significance.*

Table 4.1.2 shows that overall prevalence of smoking was 39.3%, it was 73.4% among men and 1.8% among women, prevalence found significantly higher among male ($p < 0.05$). Overall prevalence of daily smoking was 38%, the rates were 71.8% and 0.9% among male and female respectively. Daily smoking rate was found significantly higher among male ($p < 0.05$). The mean age of starting smoking was 16.95 (SD±4.47) years; for male and female it was 16.83 (SD±4.5) years and 23.66 (SD±10.96) years respectively. The mean number of stick consumed per day was 14.91 (SD±5.82) and it was not varied statistically among male and female. Majority of the smokers (90.6%) smoked cigarette, only a small portion (8.8%) smoked biri and male female distribution was not statistically different ($p > 0.05$). Among the non-daily smokers, past daily smokers were 10.5% and the prevalence was significantly high among male ($p < 0.05$).

Moreover 62.5% and 12.5% non-smokers were exposed to second hand smoke at home or work place respectively and females were significantly more exposed at home than males ($p < 0.05$). Overall prevalence of smokeless tobacco use was 47.5%, the rates were 60.0% and 36.1% among female and male respectively. Smokeless tobacco use was found significantly higher among female ($p < 0.05$). Majority of the current smokeless tobacco users (85.8%) were daily smoker. Most of the smokeless tobacco users use zorda (79.9%), followed by sada pata and guul (10.5% and 9.6%) respectively and male female distribution was not statistically different ($p > 0.05$). Mean frequency of daily smokeless

tobacco use was 8.36 (SD±4.87) and this was not statistically different among male and female ($p > 0.05$).

Based on MET minutes/week, 36.2% of the study subjects fell into low physical activity category (<600 MET minutes/week), 32.8% fell into moderate physical activity category (600–3000 MET minutes/week) and 31% fell into high physical activity group (>3000 MET minutes/week). Prevalence of high physical activity was more in males compared to females and low physical activity was more in females compared to male. This differ statistically ($p < 0.05$). Most of the METs of women were contributed by moderate activities. Almost half of the respondents (46.2%) travelled to and from places by bicycle or by walking and almost all of the respondents (99.1%) did not do any vigorous activity during leisure time. A little more than one fifth of the respondents (21.3%) were engaged in work related vigorous activity, the rates were 37.3% and 3.6% among male and female respectively. Males were engaged in work related vigorous activity significantly more than female ($p < 0.05$). Mean minutes of sedentary activity in a day was 159.76 (SD±71.28), for male it was 163.44 (SD±76.67) and for female, it was 155.73 (SD±64.80) minutes respectively, which did not differ statistically ($p > 0.05$). Almost ninety per cent study subjects (89.6%) were lifetime abstainer of alcohol. Alcohol consumer (drinking wine in last 12 months) was 3.5% and all of them were male. Current drinker (1.7%), daily drinker (0.9%) and binge drinker (0.9%) were also male. Moderate and heavy drinkers were 0.4% each and also were male.

Table 4.1.3: Dietary pattern- fruit, vegetable, oil and salt consumption of the respondents

Variables	Total n=461(100)	Male (n=241)	Female (n=220)	*p value*
Fruit and vegetable consumption				
Mean (±SD) days of fruits intake in a week	2.38 ± 1.65	2.38±1.61	2.39±1.69	0.931
Mean (±SD) days of vegetable intake in a week	5.84 ± 0.88	5.73±0.920	5.95±0.837	0.010
Mean (±SD) daily fruit intake in servings	1.00 ± 0.24	1.02±0.302	0.97±0.163	0.023
Mean (±SD) daily vegetable intake in servings	1.28 ± 0.45	1.34±0.474	1.21±0.411	0.002
Low fruit consumption	461(100)	241(100)	220(100)	
Low vegetable consumption	461(100)	241(100)	220(100)	
Oil consumption				
Types of cooking oil used				
Soyabin oil	371(80.5)	199(82.6)	172(78.2	0.319
Palm oil	83(18.0)	39(16.2)	44(20.0)	
Mustard oil	5(1.1)	3(1.2)	2(0.9)	
Mean(±SD) daily consumption in ml (n=341)	19.12±5.13	18.87 ± 5.30	19.27 ± 5.04	0.494
High oil consumption (n=341, male-122, female-219)	88(25.8)	11(9.0)	77(35.1)	0.000
Salt consumption				
Mean(±SD) salt intake per day in gm (n=341, male-122, female-219)	13.26±3.79	13.32±4.17	13.24±3.57	0.855
High salt consumption (n=341, male-122, female-219)	338(99.1)	121(99.2)	217(99.1)	0.929
Extra salt intake(n=461)	448(97.2)	232(96.3)	216(98.2)	0.214

**Values expressed as numbers and percentages in parentheses or M±SD, as appropriate; M, mean; SD, standard deviation, p value, significance between male and female participants; p value was obtained by χ^2 test for categorical variables & t- test for continuous variable; 0.05 was considered as level of significance.*

Table 4.1.3 showed that survey population took fruit on an average 2.38 (SD±1.65) days a week. Vegetables consumption was particularly high. They consumed vegetables in around 5.84 (SD±0.88) days a week. But neither fruit nor vegetable consumption was adequate in quantity. The overall daily per person consumption of fruit was 1.00 (SD±0.24) serving and of vegetables 1.28 (SD±0.45) servings against their minimum daily total requirement of 5 servings. Considering this as minimum recommended

amount, 100% of the study subjects did not consume adequate fruit or vegetables on an average day. All of the 461 study participants could tell about the types of cooking oil used in their home, but only females were able to tell about the quantity of oil and salt they consume in a month. Most of the subjects (80.5%) consume soya bin oil, followed by palm oil (18%), which did not differ statistically among male and female ($p > 0.05$). Of the 241 male, only 122 person could be assessed for their oil and salt consumption and of the 220 female, only one person could not tell about her oil and salt consumption. Average daily oil consumption for male was found 18.87 (SD±5.3) ml and for female it was 19.27 (SD±5.0) ml. This did not vary statistically ($p > 0.05$). For our country, the recommended amount of edible oil to be consumed per day is 5 tsp (25 ml) for men and 4 tsp (20 ml) for women. Only 9% male consume more than recommended level of oil daily, whereas it was 35.2% in case of female. Females took significantly higher amount of oil than male ($p < 0.05$). Total 341 participants could be assessed for their salt consumption. Their mean salt consumption per day was 13.2 (SD± 3.79) grams, which was more than double of the recommended level. A total 338 (99.1%) participants consume salt in excess of their normal requirement. Almost all (97.2%) participants took extra salt while taking food and this did not differ statistically among male and female ($p > 0.05$).

Table 4.1.4: Biological risk factors among the respondents

Variables	Total n=461(100)	Male (n=241)	Female(n=220)	*p value*
Overweight and obesity				
Mean(±SD) BMI in kg/m^2	22.37±2.92	22.2±2.80	22.55±3.04	0.202
Category of BMI				
Underweight	32(6.9)	17(7.1)	15(6.8)	
Normal	357(77.4)	192(79.7)	165(75.0)	0.349
Overweight	72(15.6)	32(13.3)	40(18.2)	
Waist circumference				
Mean(±SD) waist circumferences in cm	79.83±7.71	81.36±8.04	78.16±6.97	0.000
Category of waist circumferences				
High	130(28.2)	30(12.4)	100(45.5)	
Normal	331(71.8)	211(87.6)	120(54.5)	0.000
Blood pressure				
Mean(±SD) systolic blood pressure	115.09±14.23	117.43±14.69	112.52±13.28	0.000
Mean(±SD) diastolic blood pressure	73.64±9.65	75.22±9.09	71.91±9.97	0.000
Blood pressure status				
Normal	393(85.2)	201(83.4)	192(87.3)	0.242
Hypertension	68(14.8)	40(16.6)	28(12.7)	
Blood pressure never measured	123(26.7)	62(25.7)	61(27.7)	0.628
Previously diagnosed hypertensive	53(11.5)	28(11.6)	25(11.4)	0.932
Previously diagnosed hypertensive on medication (n=53)	16(30.2)	7(25.0)	9(36.0)	0.384
Antihypertensive medication (allopathic) in last 2 weeks (n=53)	13(24.5)	6(21.4)	7(28.0)	0.579
Herbal or ayurvedic medication (n=53)	3(5.7)	1(3.6)	2(8.0)	0.486
Anti-hypertensive medication among current hypertensive	10(14.7)	6(15.0)	4(14.3)	0.935
Hypertensive unaware about hypertension (n=68, m-40, f-28)	44(64.7)	26(65.0)	18(64.3)	0.952
Hypertension controlled among treatment group (n= 16)	6(37.5)	1(14.3)	(55.6)	0.091
Diabetes				
Diabetes	23(5.0)	14(5.8)	9(4.1)	0.397
Blood glucose never measured	404(87.6)	209(86.7)	195(88.6)	0.533
Treatment with insulin	6(1.3)	4(1.7)	2(0.9)	0.478
Treatment with oral anti-diabetic	13(2.8)	8(3.3)	5(2.3)	0.498

**Values expressed as numbers and percentages in parentheses or M±SD, as appropriate; M, mean; SD, standard deviation, p value, significance between male and female participants; p value was obtained by χ^2 test for categorical variables & t- test for continuous variable; 0.05 was considered as level of significance.*

Table 4.1.4 showed that mean BMI of respondents was 22.37 (SD±2.92), for male and female it was 22.2 (SD±2.80) and 22.55 (SD±3.04) respectively. More than two third of the population (77.4%) were of normal weight whereas underweight and obesity was 6.9% and 15.6% respectively. Proportion of overweight in women (18.2%) exceeded the proportion of those in men (13.3%). Mean waist circumferences was 79.83 (SD±7.71) cm, for male it was 81.36 (SD±8.04) cm and for female it was 78.16 (SD±6.97) cm. Males mean waist circumference was significantly higher than females ($p < 0.05$). A little more than one fourth of the respondents (28.2%) waist circumference was found high, for male and female, it was 12.4% and 45.5% respectively. The prevalence of high waist circumference was significantly higher in females than in males ($p < 0.05$). Higher prevalence of both central and general obesity in women may predispose them to an increased risk of cardiovascular diseases.

Overall prevalence of hypertension was 14.8% and the rates among male and female were 16.6% and 12.7% respectively. The mean systolic blood pressure of male and female was 117.43 (SD±14.69) mmHg and 112.52 (SD±13.28) mmHg respectively whereas mean diastolic blood pressure of male and female was 75.22 (SD±9.09) mmHg and 71.91 (SD±9.97) mmHg respectively. Both mean systolic and diastolic blood pressure was significantly higher in males than in females ($p < 0.05$). A little less than one third (26.7%) of the study subjects never measured their blood pressure. The prevalence of previously diagnosed hypertension was 11.5%. Among the currently diagnosed hypertensive, 64.7% were unaware of their high blood pressure. Only 14.7% of currently diagnosed hypertensive and 30% of previously diagnosed hypertensive were taking medication. Among treatment group, 81% were taking modern treatment and 19% were taking traditional treatment. A little more than one third (37.5%) of subjects who were on antihypertensive treatment, had blood pressure within normal level. Blood glucose measurement was not included in this study. Documented history of diabetes was sought. Around 87.6% of participants never measured their blood glucose. About 5% of the

people were previously diagnosed to have diabetes (men 5.8% and women 4.1%). Only 1.3% and 2.8% study subjects were treated with insulin and oral anti diabetic agents respectively. Male female distribution was not statistically different (p >0.05).

Table 4.1.5: Family history of coronary heart disease/heart attack and stroke

Variables	Total n=461(100)	Male (n=241)	Female (n=220)	*p value*
Family history				
Heart attack	2(0.43)	1(0.41)	1(0.45)	
Stroke	7(1.51)	5(2.07)	2(0.90)	0.571

**Values expressed as numbers and percentages; p value, significance between male and female participants; p value was obtained by χ^2 test for categorical variables; 0.05 was considered as level of significance*

Table 4.1.5 showed that almost 98% of the study subjects had no family history of coronary heart disease or stroke and the male female difference was not statistically significant (p >0.05).

4.2 Association between hypertension and various socio-demographic, modifiable and non-modifiable risk factors

The socio-demographic characteristics I studied here are as follows:

1. Age group
2. Education
3. Occupation
4. Family income
5. Sex

Some of these characteristics are also considered as risk factor for CVD like advancing age, sex and low monthly family income.

The risk factors I studied here are as follows:

1. Tobacco use
2. Low fruit and vegetable consumption
3. High salt and oil intake
4. Physical inactivity
5. Harmful alcohol consumption
6. Overweight and obesity
7. High waist circumference
8. Raised blood pressure
9. Diabetes mellitus
10. Advancing age
11. Heredity or family history
12. Gender
13. Low socioeconomic status- low monthly family income.

I could not classify socioeconomic status of study subjects. So instead of low socioeconomic status, I consider low monthly family income as risk factor for CVD.

4.2.1 Association between hypertension and socio-demographic characteristics

Association between hypertension and different socio-demographic characteristics like sex, age group, education, occupation and average monthly family income were sought. For this purpose, education was further categorized into up to primary and primary & above groups. Average monthly family income was categorized into two income groups, one is 10000 taka or less and the other one is above 10000 taka monthly.

Table 4.2.1: Association between hypertension and socio-demographic characteristics

Variables	Hypertension		Total	$\chi 2$	p value
	Present	Absent			
Age group					
35 to <45	16(5.6)	269(94.4)	285(61.8)	77.770	0.000
45 to <55	21(18.9)	90(81.1)	111(24.1)		
55 to <65	21(44.7)	26(55.3)	47(10.2)		
≥65	10(55.6)	8(44.4)	18(3.9)		
Education					
<Primary	50(14.5)	296(85.5)	346(75.1)	0.099	0.753
≥Primary	18(15.7)	97(84.3)	115(24.9)		
Occupation					
House hold work	20(11.0)	161(89.0)	181(39.3)	35.743	0.001
Small business	15(15.5)	82(84.5)	97(21.0)		
Day labourer	6(10.9)	49(89.1)	55(11.9)		
Driver	3(10.3)	26(89.7)	29(6.3)		
Rickshaw puller	2(11.1)	16(88.9)	18(3.9)		
Private employee	4(23.5)	13(76.5)	17(3.7)		
Family income					
≤10000	8(4.7)	161(95.3)	169(36.7)	21.289	0.000
>10000	60(20.5)	232(79.5)	292(63.3)		
Sex					
Male	40(16.6)	201(83.4)	241(52.3)	1.370	0.242
Female	28(12.7)	192(87.3)	220(47.7)		

Table 4.2.1 showed statistically significant association between hypertension and age group ($p < 0.001$), occupation ($p < 0.01$) and monthly family income ($p < 0.001$). No association was found for education and gender with hypertension.

4.2.2 Association between hypertension and modifiable risk factors

Association between hypertension and modifiable risk factors like tobacco use, oil consumption, physical activity, nutritional status based on BMI, central obesity based on waist circumference and previously diagnosed diabetes were sought. Low fruit and vegetable consumption was not studied because all of the respondents fell into low fruit and vegetable consumption group. Salt consumption could not be analyzed because 99.1% of the respondents who could tell about their salt consumption were high salt consumer. Alcohol consumption was also omitted because a very small percentage of the respondents were alcohol drinker

Table 4.2.2: Association between hypertension and modifiable risk factors

Variables	Hypertension		Total	$\chi 2$	p value
	Present	Absent			
Smoking tobacco use	24(13.3)	157(86.7)	181(39.3)	0.527	0.468
smokeless tobacco use	42(19.2)	177(80.8)	219(47.5)	6.504	0.011
Second hand smoking- home	30(17.1)	145(82.9)	175(38.0)	1.284	0.257
Second hand smoking - workplace	5(14.3)	30(85.7)	35(7.6)	0.007	0.936
High oil consumption in male (n=122)	2(18.2)	9(81.8)	11(9.0)	0.004	0.952
High oil consumption in female (n=219)	10(13)	67(87)	77(35.2)	0.004	0.948
Physical activity					
High	15(10.5%)	128(89.5%)	143(31.0%)		
Moderate	17(11.3%)	134(88.7)	151(32.8)	9.682	0.008
Low	36(21.6)	131(78.4)	167(36.2)		
Nutritional status- BMI					
Underweight	2(6.3)	30(93.7)	32(6.9)		
Normal	42(11.8)	315(88.2)	357(77.4)	24.142	0.000
Overweight and obese	24(33.3)	48(66.7)	72(15.6)		
High waist circumference- male (n=241)	12(40.0)	18(60.0)	30(12.4)	13.557	0.000
High waist circumference- female (n=220)	19(19.0)	81(81.0)	100(45.5)	2.873	0.090
Diabetes	11(47.8)	12(52.2)	23(5.0)	21.061	0.000

Statistical significant association was found between hypertension and BMI ($p < 0.001$), physical activity ($p < 0.005$), smokeless tobacco use ($p < 0.01$), diabetes ($p < 0.001$) and waist circumference in male ($p < 0.001$).

4.2.3 Association between hypertension and non-modifiable risk factors

Non- modifiable risk factors like advancing age and sex were discussed in socio-demographic section. Only family history of heart attack or stroke is analyzed here.

Table 4.2.3: Association between hypertension and family history of heart attack or stroke

Variable	Hypertension		Total	$\chi 2$	p value
	Present	Absent			
Family history (+)	2(22.2)	7(77.8)	9(2.0)		
Family history (-)	66(14.6)	386(85.4)	452(98.0)	0.408	0.523

The table 4.2.3 showed no association between hypertension and family history of heart attack or stroke ($p > 0.05$).

4.3 Effect of various modifiable and non-modifiable risk factors on hypertension

Modifiable risk factors I tested include current smoker, current smokeless tobacco user, low physical activity, overweight and obesity, high waist circumference, low monthly family income and previously diagnosed diabetes. Low fruit and vegetable consumption was not tested because all of the respondents fell into low fruit and vegetable consumption group. Salt and oil consumption was not included because a large portion of the respondents did not give proper history regarding salt and oil consumption. Alcohol consumption was also omitted because a very small percentage of the respondents were alcohol drinker. Non modifiable risk factors include gender, advancing age, and family history of coronary heart disease/stroke. Family history was not tested because a very negligible portion of the respondents had a positive family history. For convenience of the study, age was further categorized into above 55 years and 55 years or less. Weight was categorized again into normal to underweight and overweight & obese group. Physical activity was further categorized into low physical activity and physically active group. Both high and moderate physical activity were combined to categorize as physically active group,

Table 4.3.1: Effect of various modifiable and non-modifiable risk factors on hypertension

Variables	Crude OR	95% CI		Adjusted OR	95% CI	
		Lower	Upper		Lower	Upper
Sex	1.365	.810	2.300	2.761	1.136	6.712
Age group	8.847	4.890	16.004	6.273	3.112	12.644
Monthly family income	5.205	2.423	11.181	3.834	1.668	8.815
Current smoker	.820	.479	1.402	.593	.256	1.374
Current smokeless tobacco user	1.971	1.163	3.342	2.598	1.316	5.126
Physical activity	2.250	1.337	3.786	1.895	1.007	3.567
Overweight and obesity	3.920	2.191	7.015	2.284	1.048	4.978
High waist circumference	2.488	1.466	4.222	2.170	1.012	4.654
Diabetes	6.127	2.582	14.540	2.004	.659	6.095

**Reference category was female sex, age less than 55 years, monthly family income 10000 taka or less, non smoker, not smokeless tobacco user, physically active, normal or underweight, normal waist circumference and non diabetic.*

The table 4.3.1 showed that after adjusting all other effects, risk of hypertension was found almost 3 times higher in male compared to female (OR 2.761, 95%CI 1.136-6.712). Risk of hypertension was more than six times higher in higher age group compared to lower age group (OR 6.273, 95%CI 3.112- 12.644). High income group was found to have almost 4 times higher risk of hypertension compared to low income group (OR 3.834, 95%CI 1.668-8.815). Current smokeless tobacco users were also found to have more than 2.5 times higher risk of hypertension than non smokers (OR 2.598, 95%CI 1.316-5.126). Risk of hypertension was found to be almost 2 times higher among the people with low physical activity compared to high activity group (OR 1.895, 95%CI 1.007-3.567). Risk of hypertension was also found to be more than 2 times higher in overweight-obese (OR 2.284, 95% CI 1.048-4.978) and high waist circumference (OR 2.170, 95% CI 1.012-4.654) group compared to normal to underweight and normal waist circumference group respectively. No significant effect was found for current smoking status and diabetes on hypertension.

4.4 Effect of non-modifiable risk factors on various modifiable risk factors

Non modifiable risk factors include gender, advancing age, and family history of coronary heart disease/stroke. Family history was not tested because a very negligible portion of the respondents had a positive family history. For convenience of the study, age was further categorized into above 55 years and 55 years or less.

Table 4.4.1: Effect of sex and age on current smoking status

Variables	Crude OR	95% CI		Adjusted OR	95% CI	
		Lower	Upper		Lower	Upper
Sex	149.344	53.343	418.114	166.284	58.821	470.081
Age group	1.495	.882	2.534	.533	.275	1.032

**Reference category was female sex and age less than 55 year.*

Table 4.4.1 showed that after adjustment, risk of smoking was 166 times more in male compared to female (OR 166.28, 95%CI 58.82- 470.08). Age had no effect on smoking.

Table 4.4.2: Effect of sex and age on current smokeless tobacco user

Variables	Crude OR	95% CI		Adjusted OR	95% CI	
		Lower	Upper		Lower	Upper
Sex	.377	.258	.549	.362	.246	.532
Age group	1.009	.597	1.706	1.341	.773	2.325

**Reference category was female sex and age less than 55 year.*

Table 4.4.2 showed that after adjustment, risk of smokeless tobacco use was 74% less in male compared to female (OR 0.362, 95%CI 0.246-0.532). Age had no effect on smokeless tobacco use.

Table 4.4.3: Effect of sex and age on physical activity

Variables	Crude OR	95% CI		Adjusted OR	95% CI	
		Lower	Upper		Lower	Upper
Sex	0.731	0.500	1.071	.631	.424	.939
Age group	2.333	1.373	3.966	2.670	1.544	4.619

**Reference category was female sex and age less than 55 year.*

Table 4.4.3 showed that after adjustment, risk of low physical activity was almost 37% less in male compared to female (OR 0.631, 95%CI 0.424- 0.939) and more than 2.5 times higher in 55 years or more age group compared to less than 55 years age group (OR 2.670, 95%CI 1.544- 4.619).

Table 4.4.4: Effect of sex and age on overweight and obesity

Variables	Crude OR	95% CI		Adjusted OR	95% CI	
		Lower	Upper		Lower	Upper
Sex	.689	.415	1.143	.641	.381	1.078
Age group	1.550	.792	3.033	1.620	.814	3.221

**Reference category was female sex and age less than 55 year.*

Table 4.4.4 showed that there was no significant effect of sex and age on overweight and obesity.

Table 4.4.5: Effect of sex and age on waist circumference

Variables	Crude OR	95% CI		Adjusted OR	95% CI	
		Lower	Upper		Lower	Upper
Sex	.171	.107	.272	.148	.091	.243
Age group	1.156	.653	2.045	2.168	1.127	4.173

**Reference category was female sex and age less than 55 year.*

Table 4.4.5 showed that after adjustment, risk of high waist circumference was almost 85% less in male compared to female (OR 0.148, 95%CI 0.091- 0.243) and more than 2 times higher in 55 years or more age group compared to less than 55 years age group (OR 2.168, 95%CI 1.127- 4.173).

Table 4.4.6: Effect of sex and age on diabetes

Variables	Crude OR	95% CI		Adjusted OR	95% CI	
		Lower	Upper		Lower	Upper
Sex	1.446	.613	3.410	.919	.366	2.310
Age group	7.925	3.330	18.860	8.109	3.283	20.034

**Reference category was female sex and age less than 55 year.*

Table 4.4.6 showed that after adjustment, risk of diabetes was more than eight times higher in 55 years or more age group compared to less than 55 years age group (OR 8.11, 95%CI 3.28- 20.03). Sex had no effect on diabetes.

Chapter 5
Discussion

To the best of my knowledge, this is the first CVD risk factor survey among urban slum population in Bangladesh. The study subjects, mostly rural migrants who had come to Dhaka for economic reasons and residing in the slums showed a marked prevalence of hypertension and unawareness about hypertension status, very high prevalence of smoking tobacco use in male and smokeless tobacco use in female, sedentary life style and low physical activity with very minimum exercise, very much inadequate fruit and vegetable consumption with high salt intake with invariable use of extra salt in diet and higher prevalence of high waist circumference among female.

Cardiovascular disease (CVD) is a rising health burden among the world's poor with hypertension as the main risk factor (102). Slums are typically characterized by poor living conditions with limited access to quality healthcare. The prevalence of risk factors for CVD is high in slums and the associated psychosocial burden of insecurity, violence and stress may cause an increased risk of CVD. Therefore a large part of the CVD burden is on the urban poor, who may not have the financial resources or adequate health literacy. In India, people in slums are generally at a higher risk for CHD than Indians living in more affluent areas mostly because of the higher prevalence of major CHD risk factors such as uncontrolled hypertension and tobacco use amongst them (103).

In the current study, the prevalence of hypertension was found to be 14.8% and the rates among male and female were 16.6% and 12.7% respectively. Among the hypertensive, 64.7% were unaware of their diagnosis, only 14.7% of currently diagnosed hypertensive and 30.2% of previously diagnosed hypertensive were taking medication and 37.5% of treatment group had controlled blood pressure. Mean systolic blood pressure was 115.09 (SD ±14.23) and mean diastolic blood pressure was 73.64 (SD ±9.65). Both systolic and diastolic blood pressure was high in males compared to females. A cross-sectional, population-based study was conducted to assess the prevalence, awareness, treatment,

and control of hypertension among people aged 20-59 years from 120 clusters spread across Delhi. According to this study, the prevalence of hypertension among slum dwellers was 23%. Among the hypertensive, 55% were unaware of their diagnosis; about 36% were taking treatment and only 9.4% had controlled blood pressure (BP) (103). Studies conducted in slums of Faridabad, Delhi and urban Chennai in India among lower socioeconomic groups reported a prevalence of 17.2, 12 and 8.4 % respectively (104–106). Two studies in Kenya have reported on hypertension among poor urban slum residents. Of these one was among Kibera slum residents and reported an unadjusted hypertension prevalence of 13%, the rates were 17.8% and 11.1% among males and females respectively. The mean blood pressure was 122/71mmHg. Among the hypertensive, 87% were unaware of their diagnosis and only 10% of them were taking treatment (107). The other study, a population based survey in an urban slum in Nairobi, Kenya showed prevalence of hypertension was 22.8%, among them 80% were unaware of their hypertensive status (108). Findings of these studies were consistent with the findings of the current study. In another population based study on urban slum dwellers done in Patna, India showed prevalence of hypertension were 16.36 percent (males 18.79 %, females 14.48%. (109). This study finding is compatible with the current study. A descriptive study among slum people in Nairobi, Kenya showed the mean systolic and diastolic blood pressure was 149.2 and 95.2 mmHg respectively. Among hypertensive, only 6.8% were aware about their hypertension status (102). The mean systolic and diastolic blood pressure was much less in the current study. Dissimilar result also found regarding awareness about hypertension status.

Moreover, statistical significant association was found between hypertension and advancing age, higher monthly family income, increased BMI, low physical activity, smokeless tobacco use, diabetes and increased waist circumference in male sex in the current study. Study conducted in Patna by Singh et al showed statistical significant association ($p < 0.05$) of hypertension with BMI, waist circumference, tobacco use, alcohol consumption and physical inactivity (109). Kibera slum study showed significant association of hypertension with male gender, high body mass index and increasing age

(107). Joshi MD et al showed that older age, higher general and central obesity were independently associated with hypertension (108).

Logistic regression in current study showed increased risk of hypertension among male sex, higher age group, high income group, smokeless tobacco use, low physical activity, high BMI and high waist circumference. Multivariate logistic regression by Singh et al revealed that high BMI and alcohol were associated with hypertension (109). Another slum study in India showed increased risk of hypertension with higher age group. Findings of these studies are consistent with current study (110).

The current study showed a high prevalence of smoking tobacco use in male (39.3% in both sex with 73.4% among male sex) and a strikingly high prevalence of smokeless tobacco use (60%) in female. Singh et al showed tobacco users were 12.54 percent (109). Joshi MD et al showed current smokers were 10% (108). A study in Bihar, India showed 22.75 percent prevalence of smoking in both sexes and all social classes (111) The prevalence of smoking is much higher in current study. Another study in North India showed higher prevalence of tobacco use among slum dwellers (men 48.3%, women 11.9%) than non-slum dwellers (men 35.2%, women 3.5%). (11) This study finding is compatible with the current study. Several cohort and case-control studies have also reported a significant positive association between smokeless tobacco use and CHD (112–114). This study also showed smokeless tobacco use as significant predictor of hypertension (OR2.598, 95%CI 1.316-5.126).

Though majority of the study subjects (77.4%) in the current study had normal BMI, the overall prevalence of overweight and obesity was 15.6%. Female showed a higher prevalence of overweight compared to male (18.2% versus 13.3%). Also females had much higher prevalence of central obesity (45.5%). Study done in Patna, India showed higher prevalence of high body mass index (BMI) and waist circumference (WC) than the current study; 31.94 percent (males 31.83%, females 32.03%) and 50.45 percent (males 39.1%, females 59.17%) respectively (109). In urban Chennai, Mohan et al reported a 33 % prevalence of overweight and obesity in low income group and the

prevalence increased with increase in income (106). Misra et al and ICMR Task force study reported a prevalence of overweight of 25 percent and 20 percent respectively in Delhi slums (105,115). The study conducted in Patna, India showed higher prevalence of central obesity in females as compared to males (109). A study in Kenya showed 58.3% of women were either obese or over-weight and 41.5% females had high waist circumference (107). The current study also showed similar result (45.5% in females versus 12.4% in males). The study done by Joshi MD et al showed majority of males had normal BMI and waist circumference, whereas a third of females were obese or overweight and 40% had central obesity (108). Findings were mostly consistent with the current study. An observational study conducted on women in a slum in Peru showed prevalence of central obesity and BMI obesity were 90% and 30% respectively (116). The present study showed a lesser prevalence of central and BMI obesity. A descriptive study among slum people in Nairobi, Kenya showed a higher BMI in 63% of women and higher waist circumference more in men (102). The present study showed lesser prevalence of higher BMI in both sexes and increased waist circumference more in women.

Singh et al showed significant association of hypertension with both central and general obesity ($p < 0.05$). Multivariate logistic regression revealed that high BMI were associated with hypertension (109). BMI levels of >25 was significantly associated with hypertension in the current study; similar results were observed in Indians living in Mauritius who had increased rates of HTN at these BMI levels (117). Chirinos et al. of Pennsylvania school of Medicine reports among patients with hypertension increasing BMI was a significant predictor of hypertension (OR1.04,95%CI,1.02-1.06) (118). The current study also showed similar result (OR2.28, 95%CI 1.05-4.98). Study in Kenya also showed independent association of hypertension with higher general and central obesity (108).

The present study showed prevalence of low physical activity, alcohol consumption and diabetes as 36.2%, 3.5% and 5% respectively. Prevalence of low physical activity was more in females than males (40% versus 33%). The urban slum study in Nairobi, Kenya

showed prevalence low physical activity, harmful alcohol drinking and diabetes were 20%, 52% and 5% respectively (108). Alcohol consumption was much less in the current study. This is because our society is much conservative and people are mostly followers of religious law. Almost all of the alcohol consumers were found hesitant to tell about their alcohol drinking.

The increased prevalence of CHD and its risk factors among slum dwellers is of major concern since this group is large in number, and they have poor access to acute care management and long-term secondary prevention practices. This is due to the inadequacy of the urban public health delivery system to access these areas of very high population density. In spite of better health care infrastructure, primary healthcare facilities have not grown in proportion to the explosive growth of urban population, in particular the slum population. The social exclusion and lack of information and assistance at the secondary and tertiary hospitals make them unfamiliar with the modern hospital environment making them less likely to use these facilities. The lack of economic resources also restricts their access to the available private facilities. Moreover, a general lack of understanding about the causes of CHD and social stigma among this group results in a large proportion of those with illness remains undiagnosed and very few undertaking preventive medical treatment. Similarly, as they have poor compliance and adherence to pharmaceutical treatments, they are also more exposed to future CHD events. A continued neglect of the healthcare of people in overcrowded urban slums will inevitably lead to greater expenditure and diversion of healthcare resources in the long-term, having to manage end stage complications of major risk factors for CHD. Research has confirmed that CHD risk factor occurs frequently in cluster in hypertensive individuals and that the risk of developing CHD is determined by the cumulative effect of multiple concomitant CHD risk factors (119). Therefore, targeting preventive intervention at these people is fundamental to an effective CHD prevention approach.

Chapter 6

Conclusion, Limitation and Recommendations of the Study

6.1 Conclusion

The study population showed high prevalence of hypertension and other cardiovascular disease risk factors like both smoking and smokeless tobacco use, low physical activity with very minimum exercise and a considerable amount of time of sedentary activity, very minimum fruit and vegetable intake with very high salt intake. Two important findings were very high smokeless tobacco use and high waist circumference among female. Furthermore, the vast majority of hypertensive patients were unaware about their hypertension status and very small portion of them were on medication. Effectiveness of treatment was also under question, because hypertension was not controlled in majority of patients. These findings points to the need for greater awareness of hypertension and other cardiovascular disease risk factors in this population. Preventive efforts in this population targeting behavioural changes in lifestyle to curtail these risk factors urgently required. Reducing these risk factors will not only have an effect on cardiovascular diseases, but will also have wide-reaching beneficial effects for other chronic non-communicable diseases.

6.2 Limitations

Limitations of studies are very common in social work. This study also has some limitations. First of all, due to budget constraints, I only did the first two steps of WHO steps approach- questionnaire and physical measurement. The third step- biochemical measurement of blood glucose and lipid profile could not be done. Secondly, self reporting and recall bias might have affected the validity of response to questions wealth, education, occupation, smoking, alcohol misuse, diet and physical activity. Self-reporting can lead to inaccurate reporting due to lack of awareness, misinterpretation of questions, or concern for judgement and affect study conclusions. Recall bias in dietary assessment is very much common. In this study only females were able to tell about their salt and oil consumption. Thirdly, full dietary assessment was not done. Finally, in clinical practice, a diagnosis of hypertension requires multiple measurements on several occasions. I took a single occasion measurement and therefore, the prevalence of hypertension found in this survey may represent an over or underestimation.

6.3 Recommendations

On the basis of key findings, the recommendations would be followings:

- Further large scale study is recommended including other slums which will represent all slum population.
- Levels of health literacy have to increase in order for people to change their lifestyle, get diagnosed or comply with therapy. Health education program focusing on smoking, physical activity, dietary pattern and importance of blood pressure management may be introduced.
- Follow up study is necessary to determine the prediction capability of the tool.

Chapter 7
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Annex-1

Prevalence of Cardiovascular Disease Risk Factors among Adults in Slum of Dhaka City							
Work plan (July 2014- June 2015)							
Sl .No.	**Activity detail**	**1-2 months**	**3-4 months**	**5-6 months**	**7-8 months**	**9-10 months**	**11-12 months**
1	**Title selection and approval**						
2	**Protocol writing**						
3	**Literature review**						
4	**Questionnaire Development, Training of the Data collector and Pilot study**						
5	**Data collection**						
6	**Data processing and data analysis**						
7	**Report writing and submission**						

Annex-2

Informed Consent Form (English)

Dear Participant
Assalamualaikum, you have been selected to be a part of this thesis and this is why we would like to interview you. This thesis is being conducted by Dr. S. M. Zahid Hassan Arefin, a student of M.Phil in Epidemiology and Biostatistics at Bangladesh Institute of Health Sciences (BIHS) under University of Dhaka. We are interested in conducting a research on Risk factors of Cardiovascular Diseases among adults in your slum. The purpose of this thesis is to find out the prevalence of cardiovascular diseases risk factors among adults in a slum of Dhaka city.

Title of thesis
Prevalence of Cardiovascular Disease Risk Factors among Adults in Slum of Dhaka City.

Why you are selected for this study?
This study will assess cardiovascular diseases risk factors among adults in a slum of Dhaka city. You will be one of approximately 461 participants to be asked to participate in this study.

Data Collection Methods
Step 1- Interview questions **Step 2**- Physical Measurements

Risks and Discomforts
You will not be charged for any part of the examination. We do not expect an unusual risk to occur as a result of participation. In the unlikely event that during examination procedures if you require medical care, first aid will be available.

Confidentially
The information you provide is totally confidential and will not be disclosed to anyone. It will only be used for research purposes. Your name, address, and other personal information will be removed from the instrument and only a code will be used to connect your name and your answers without identifying you. We will not use your name in sharing and publishing the results of this study.

Voluntary Participation
Your participation is voluntary and you can withdraw from the study after having agreed to participate. You are free to refuse to answer any question that is asked in the questionnaire. If you have any questions about this study you may ask me or contact to the researcher [Dr. Zahid Arefin, cell no: +8801911255960].

Results
The results of this thesis will be used to help plan strategies in reducing the risk factor that contribute to cardiovascular diseases in Bangladesh. The results will be published in research publications, media briefings and reports and can be made available to you on your request.

Consent to Participate
Signing this consent form indicates that you have read this consent form (or have had it read to you) and that you voluntarily agree to participate in this research study.

Signatures
I hereby provide informed consent to take part in steps 1 and 2 of this risk factor study.

Name of the participant: **Witness:**

Sign or fingerprint Sign or fingerprint

সম্মতিপত্র (বাংলা)

প্রিয় অংশগ্রহণকারী,

আসসালামু আলাইকুম। আপনি এই গবেষনাকর্মে অংশগ্রহনের জন্য মনোনীত হয়েছেন বিধায় আমরা আপনার সাক্ষাৎকার নিতে ইচ্ছুক। এই গবেষণা কর্মটি ডাঃ এস এম জাহিদ হাসান আরেফীন এর দ্বারা পরিচালিত হচ্ছে, যিনি ঢাকা বিশ্ববিদ্যালয় এর অধীন বাংলাদেশ ইনষ্টিটিউট অব হেলথ সায়েন্সেস এ এম ফিল ইপিডেমিওলজী ও বায়োস্ট্যাটিসটিকস কোর্সে অধ্যয়নরত আছেন।

থিসিস টাইটেল :

Prevalence of Cardiovascular Disease Risk Factors among Adults in Slum of Dhaka City.

ডেটা সংগ্রহ পদ্ধতি ঃ **Step-1:** সাক্ষাৎকার পর্ব **Step-2:** শারিরীক পরিমাপ

ঝুকিঃ

এই গবেষণাকর্মে অংশগ্রহণের জন্য আপনাকে কোন টাকা দিতে হবে না। আপনার কোনরকম শারিরীক বা মানসিক ক্ষতির সম্ভাবনা নেই। অস্বাভাবিক ক্ষেত্রে, আপনার কোনরকম চিকিৎসার প্রয়োজন হলে, প্রাথমিক চিকিৎসার ব্যবস্থা থাকবে।

গোপনীয়তা ঃ

আপনি যে তথ্য প্রদান করবেন, তা সম্পুর্নভাবে গোপন রাখা হবে এবং কোন অবস্থাতেই তা প্রকাশ করা হবে না। আপনার নাম, ঠিকানা এবং ব্যক্তিগত তথ্য ব্যবহার না করে একটি কোড ব্যবহার করা হবে, যা দিয়ে আপনাকে সনাক্ত করা সম্ভব হবে না।

স্বেচ্ছায় অংশগ্রহণঃ

আপনি সম্পুর্ণ স্বেচ্ছায় এই গবেষণা কর্মে অংশগ্রহণ করবেন এবং যে কোন সময় এই গবেষণাকর্ম থেকে নিজেকে প্রত্যাহার করতে পারবেন।

অংশগ্রহণে সম্মতি ঃ

আপনি এই সম্মতি পত্রে স্বাক্ষর করলে আপনি এই গবেষণাকর্মে অংশগ্রহণে সম্মত আছেন বলে বিবেচিত হবে।

অংশগ্রহনকারীর নাম ও
স্বাক্ষর/আঙ্গুলের ছাপ

স্বাক্ষীর নাম ও
স্বাক্ষর/আঙ্গুলের ছাপ

Annex-3
Questionnaire- Bangla

Prevalence of Cardiovascular Disease Risk Factors among Adults in Slum of Dhaka City

তথ্য প্রদানকারীর আই.ডি.নং	☐☐☐
সাক্ষাতকারের তারিখ	☐☐ ☐☐ ☐☐
তথ্য প্রদানকারীর নাম:	
ঠিকানা:	
ফোন নং (যদি থাকে)	

Step 1 ডেমোগ্রাফিক তথ্যাবলী

মূলঃ ডেমোগ্রাফিক তথ্যাবলী			
প্রশ্নাবলী		**উত্তর**	**কোড**
১	লিঙ্গ	পুরুষ ১ মহিলা ২ ☐	**D1**
২	আপনার বয়স কত?	☐☐ বৎসর	**D2**
৩	সর্বমোট কত বৎসর প্রাতিষ্ঠানিক শিক্ষা গ্রহণ করেছেন? (প্রথম শ্রেণীর নিচে এবং উপানুষ্ঠানিক শিক্ষা অন্তর্ভুক্ত হবে না)	☐☐ বৎসর	**D3**

বর্ধিতঃ ডেমোগ্রাফিক তথ্যাবলী			
প্রশ্নাবলী		**উত্তর**	**কোড**
৪	আপনি কতদুর লেখাপড়া করেছেন? কোন প্রাতিষ্ঠানিক শিক্ষা নেই ... ...১ প্রাথমিক শিক্ষা অসম্পূর্ন... ...২ প্রাথমিক শিক্ষা... ...৩ মাধ্যমিক শিক্ষা... ...৪ উচ্চ মাধ্যমিক শিক্ষা... ...৫ স্নাতক/ ডিগ্রী... ...৬ স্নাতকোত্তর... ...৭ জানাতে অসম্মতি ৮৮	☐☐	**D4**
৫	আপনার ধর্ম কি? ইসলাম ... ...১ হিন্দু ... ...২ খ্রিষ্টান ... ...৩ বৌদ্ধ ... ...৪ অন্যান্য ... ...৫ জানাতে অসম্মতি ৮৮	☐☐	**D5**

৬	আপনার বৈবাহিক অবস্থা কি? অবিবাহিত ... ...১ বিবাহিত ... ...২ পৃথক ... ...৩ তালাকপ্রাপ্ত ... ...৪ বিপত্নীক ... ...৫ জানাতে অসম্মতি ৮৮	☐☐	**D6**
৭	নিচের কোনটি গত ১২ মাসের মধ্যে আপনার প্রধান পেশা হিসেবে বিবেচিত হতে পারে? সরকারী কর্মচারী ... ...১ বেসরকারী কর্মচারী ... ...২ ব্যবসা (ছোট) ... ...৩ ব্যবসা (বড়) ... ...৪ কৃষি কাজ (জমির মালিক এবং কৃষক) ... ...৫ ক্ষেত মজুর ... ...৬ কারখানার শ্রমিক ... ...৭ দিনমজুর... ...৮ রিকশাওয়ালা) ... ...৯ ছাত্র) ... ...১০ গৃহ-কর্ম ... ...১১ অবসরপ্রাপ্ত ... ...১২ বেকার, কর্মক্ষম... ...১৩ বেকার, কর্মক্ষম নন ... ...১৪ স্ব-নিয়োগ... ... ১৫ ড্রাইভার..... ১৬ অন্য কিছু.....১৭ জানাতে অসম্মতি ৮৮	☐☐	**D7**
	অন্য কিছু (নির্দিষ্ট করুন)	----------	**D7a**
৮	আপনার পরিবারের সদস্য সংখ্যা কতজন? (ছয় মাসের কম বয়সী শিশু বাদে)	মোট সদস্য সংখ্যা ☐☐	**D8**
৯	গড়ে আপনার পরিবারে মাসিক আয় কত?	..... টাকা	**D9**
১০	আপনি কি ধরনের বাসায় বসবাস করেন? কাচা (মাটির তৈরী)..... .... ১ টিন শেড..... .... ২ ইটের..... .. .. ৩ অন্যান্য..... .... ৪	☐	**D10**
	অন্য কিছু (নির্দিষ্ট করুন)	.....	**D10a**

Step 1 জীবনাচরণ পরিমাপের তথ্যাবলী (Behavioral Measurements)

মূল : তামাকের ব্যবহার

এখন আমি আপনাকে বিভিন্ন স্বাস্থ্য বিষয়ক জীবনাচরণ সম্পর্কে কিছু প্রশ্ন করব। এগুলোর মধ্যে আছে-ধুমপান, মদ্যপান, ফল ও শাক-সব্জি খাওয়া এবং শারীরিক পরিশ্রম। প্রথমে ধুমপান।

প্রশ্নাবলী		**উত্তর**	**কোড**
১১	আপনি কি বর্তমানে কোন প্রকার ধুমপান করেন? যেমন-সিগারেট, বিড়ি, হুক্কা, চুরুট, পাইপ। (নমুনা কার্ড অনুযায়ী)	হ্যাঁ ১ ☐ না ২ (যদি না হয়, তবে ১৬ নং প্রশে যান)	**T1**
১২	আপনি কি প্রতিদিন/নিয়মিত ধুমপান করেন?	হ্যাঁ ১ ☐ না ২ (যদি না হয়, তবে ১৬ নং প্রশ্নে যান)	**T2**
১৩	কত বৎসর বয়স থেকে আপনি ধুমপান শুরু করেন?	☐☐ বৎসর জানা না থাকলে ৭৭	**T3**
১৪	কতদিন যাবত আপনি প্রতিদিন/নিয়মিত ধুমপান করছেন?	☐☐ বৎসর বা ☐☐ মাস বা ☐☐ সপ্তাহ জানা না থাকলে ৭৭	**T4a** **T4b** **T4c**
১৫	গড়ে প্রতিদিন নিচের কোনটি কতবার করে আপনি পান করেন?		
	সিগারেট	☐☐	**T5a**
	বিড়ি	☐☐	**T5b**
	হুক্কা/ধাবা	☐☐	**T5c**
	পাইপ	☐☐	**T5d**
	হাতে মোড়ানো সিগারেট	☐☐	**T5e**
	চুরুট	☐☐	**T5f**
	অন্যান্য	হ্যাঁ ১ ☐ না ২	**T5g**
	অন্যান্য (নিদিষ্ট করুন)	.....	**T5**

বর্ধিতঃ তামাকের ব্যবহার			
প্রশ্নাবলী.		**উত্তর**	**কোড**
পূর্বে ধুমপান করতেন কিন্তু বর্তমানে করছেন না, এমন ক্ষেত্রে:			
১৬.১	পূর্বে কি আপনি কখনো প্রতিদিন/নিয়মিত ধুমপান করতেন?	হ্যাঁ ১ ☐ না ২ (যদি না হয়, তবে ১৭নং প্রশ্নে যান)	**T6**
১৬.২	কতদিন যাবত আপনি প্রতিদিন /নিয়মিত ধুমপান করছেন না? (যে কোন ১টি উত্তর দিন)	☐☐ বৎসর বা ☐☐ মাস বা ☐☐ সপ্তাহ জানা না থাকলে ৭৭	**T7a** **T7b** **T7c**
১৭	আপনি কি বর্তমানে কোন ধুয়াহীন তামাক ব্যবহার করছেন? (যেমন-জর্দা, সাদা-পাতা, গুল, নস্যি)	হ্যাঁ ১ ☐ না ২ (যদি না হয়,তবে ২০ নং প্রশ্নে যান)	**T9**
১৮	আপনি কি ধুয়াহীন তামাক প্রতিদিন ব্যবহার করেন? (যেমন-জর্দা, সাদা-পাতা, গুল, নস্যি)	হ্যাঁ ১ ☐ না ২ (যদি না হয়, তবে ২০ নং প্রশ্নে যান)	**T10**
১৯	গড়ে প্রতিদিন কতবার এগুলো ব্যবহার করেন? (প্রতিটির উত্তর নিতে হবে)		
	জর্দা	☐☐	**T11a**
	সাদা-পাতা	☐☐	**T11b**
	গুল	☐☐	**T11c**
	নস্যি	☐☐	**T11d**
	খৈনি	☐☐	**T11e**
	অন্যান্য	হ্যাঁ ১ ☐ না ২	**T11f**
	অন্যান্য হলে নির্দিষ্ট করুন	.....	**T11 others**

পূর্বে ধোয়াহীন তামাক ব্যবহার করতেন, কিন্তু বর্তমানে করছেন না এমন ক্ষেত্রে			
২০	পূর্বে কি কখনো আপনি প্রতিদিন ধূয়াহীন তামাক ব্যবহার করতেন? (যেমন-জর্দা, সাদা-পাতা, গুল, নস্যি)	হ্যাঁ ১ ☐ না ২	**T12**
২১	গত ৭ দিনে, আপনার উপস্থিতিতে অন্য কেউ আপনার বাড়ীতে ধূমপাণ করেছেন?	হ্যাঁ ১ ☐ না ২ (যদি না হয়,তবে ২৩ নং প্রশ্নে যান)	**T13**
২২	হ্যাঁ হলে গত ৭দিনের মধ্যে কতদিন আপনার উপস্থিতিতে অন্য কেউ আপনার বাড়ীতে ধুমপান করেছেন?	☐ দিন	**T14**
২৩	গত ৭ দিনে, আপনার উপস্থিতিতে অন্য কেউ আপনার কর্মক্ষেত্রের আবদ্ধ এলাকায় ধূমপান করেছেন?	হ্যাঁ ১ ☐ না ২ (যদি না হয়,তবে ২৫ নং প্রশ্নে যান)	**T15**
২৪	হ্যাঁ হলে গত ৭দিনের মধ্যে কতদিন আপনার উপস্থিতিতে অন্য কেউ আপনার কর্মক্ষেত্রের আবদ্ধ এলাকায় ধুমপান করেছেন?	☐ দিন	**T16**

মূল : মদ্যপান			
প্রশ্নাবলী		**উত্তর**	**কোড**
২৫	আপনি কি কখনো মদ জাতীয় পানীয় পান করেছেন? (যেমন-দেশী মদ, বিয়ার, ওয়াইন, স্পিরিট)	হ্যাঁ ১ ☐ না ২ (যদি না হয়,তবে ৩২ নং প্রশ্নে যান)	**A1a**
২৬	আপনি কি গত ১২ মাসে কোন ধরনের মদ জাতীয় পানীয় পান করেছেন?	হ্যাঁ ১ ☐ না ২ (যদি না হয়,তবে ৩২ নং প্রশ্নে যান)	**A1b**
২৭	গত ১২ মাস যে কোন ধরনের মদ জাতীয় পানীয় কি হারে পান করেছেন?	দৈনিক ..... ১ সপ্তাহে ৫-৬ দিন..... ২ সপ্তাহে ১-৪ দিন..... ৩ ☐ মাসে ১-৩ দিন ..... ৪ মাসে ১ বারের কম..... ৫	**A2**
২৮	আপনি কি গত ৩০ দিনে কোন ধরনের মদ জাতীয় পানীয় পান করেছেন?	হ্যাঁ ১ ☐ না ২ (যদি না হয়,তবে ৩২ নং প্রশ্নে যান)	**A3**
২৯	গত ৩০ দিনের মধ্যে আপনি কত দিন মদ জাতীয় পানীয় পান করেছেন?	☐☐ জানা না থাকলে ৭৭	**A4**
৩০	গত ৩০ দিনের মধ্যে মদ জাতীয় পানীয় পান করার সময় এক বারে (one single occasion) গড়ে কত ইউনিট (1standard alcoholic drink=1unit) মদ পান করেছেন? [নমুনা কার্ড এ প্রদর্শিত মাপ অনুযায়ী]	☐☐ জানা না থাকলে ৭৭	**A5**
৩১	গত ৩০ দিনে কতবার একসাথে (one single occasion) ৫ (পুরুষ) বা ৪ (মহিলা) ইউনিট এর বেশি মদ জাতীয় পানীয় পান করেছেন?	☐☐ জানা না থাকলে ৭৭	**A6**

মূল : খাদ্যাভ্যাস সংক্রান্ত তথ্যাবলী

আমরা সাধারণত যেসব ফল এবং সব্জি খাই সেই খাদ্য সম্পর্কিত প্রশ্ন করবো। আমার কাছে দেশীয় ফল এবং শাক-সব্জির ছবিসহ একটি পুষ্টি কার্ড আছে, প্রতিটি ছবি এক একটি সার্ভিংস এর সমান। উত্তর দেওয়ার সময় গত ১ বছরের সাধারণ ১টি সপ্তাহের কথা চিন্তা করুন....

প্রশ্নাবলী		উত্তর	কোড
৩২	সাধারণত সপ্তাহে কত দিন ফল খান? [নমুনা কার্ড অনুযায়ী]	☐☐ দিন জানা না থাকলে ৭৭ (যদি '০০' হয়, তবে ৩৪ নং প্রশ্নে যান)	F1
৩৩	গড়ে একদিনে কতটুকু ফল খান? [নমুনা কার্ড অনুযায়ী]	☐☐ সার্ভিংস জানা না থাকলে ৭৭	F 2
৩৪	সাধারণত সপ্তাহে কত দিন শাক-সব্জি খান? [নমুনা কার্ড অনুযায়ী]	☐☐ দিন জানা না থাকলে ৭৭ (যদি '০০' হয়, , তবে ৩৬ নং প্রশ্নে যান)	F 3
৩৫	গড়ে একদিনে কতটুকু শাক-সব্জি খান? [নমুনা কার্ড অনুযায়ী]	☐☐ সার্ভিংস জানা না থাকলে ৭৭	F 4

বর্ধিত : খাদ্যাভ্যাস সংক্রান্ত তথ্যাবলী

প্রশ্নাবলী		উত্তর	কোড
৩৬	আপনার বাসার রান্নার সময় সাধারণত কোন ধরনের তৈল ব্যবহার করা হয়? [নমুনা কার্ড অনুযায়ী যে কোন একটি নির্দিষ্ট করুন]	সয়াবিন তেল..... ১ পাম অয়েল..... ২ সরিষার তৈল..... ৩ সানফ্লাওয়ার তৈল..... ৪ রাইস ব্রান তৈল.....৫ মাখন/ঘি.....৬ ডালডা.....৭ অন্যান্য.....৮ নির্দিষ্ট কোনটি নয়.....৯ কিছুই নয়.....১০ ☐☐	F5
	অন্যান্য (নির্দিষ্ট করুন)	.....	F5 Others
৩৭	সাধারণত আপনার বাসায় ১ মাসে কি পরিমাণ তেল ব্যবহার করা হয়?	☐☐.☐☐ লিটার	F 6
৩৮	সাধারণত আপনার বাসায় ১ মাসে কি পরিমাণ লবণ ব্যবহার করা হয়?	☐☐.☐☐ কেজি	F 7
৩৯	আপনি কি খাবার সময় পেণ্ডটে বাড়তি লবণ নেন?	হ্যাঁ ১ না ২ ☐	F 8
৪০	বাড়িতে তৈরী হয় না এমন খাবার গড়ে সপ্তাহে কতবার খান? (সকালের নাস্তা, দুপুর ও রাতের খাবার)	☐☐ সংখ্যা জানা না থাকলে ৭৭	F 9

মূল: শারীরিক পরিশ্রম সংক্রান্ত তথ্য

সাধারণ একটি সপ্তাহে বিভিন্ন ধরনের শারীরিক পরিশ্রমে আপনি যে সময় কাটান সে সম্পর্কিত কিছু প্রশ্ন করবো। আপনি যদি মনে করেন, আপনি কোন ধরনের শারীরিক পরিশ্রম করেন না, তবুও দয়া করে প্রশ্নগুলোর উত্তর দিবেন।

আপনি পেশাগত কাজের সময় প্রথমে আপনার পেশাগত কাজে যে সময় ব্যয় করেন তা সম্পর্কে চিন্তা করুন। তা হতে পারে টাকার বিনিময়ে বা বিনামূল্যের কাজ। পড়াশুনা, ট্রেনিং , বাসা-বাড়ীর কাজ, খাদ্য-শস্যের চাষাবাদ, মাছ ধরা বা খাদ্যের জন্য শিকার করা অথবা চাকুরী খোঁজা। এখানে ভারী মাত্রার কাজ বলতে বোঝায় খুব পরিশ্রমের কাজ যাতে একজন অত্যাধিক হাপিয়ে উঠেন এবং বুক ধরপর করে এবং মধ্যম মাত্রার কাজ বলতে বোঝায় মাঝারী পরিশ্রমের কাজ যাতে একজন অল্প হাপিয়ে ওঠেন।

প্রশ্নাবলী		**উত্তর**	**কোড**
৪১	আপনার পেশাগত কাজে অত্যাধিক হাপিয়ে উঠেন এবং বুক ধরপর করে এমন কোন কাজ একনাগাড়ে কমপক্ষে ১০ মিনিট করতে হয় কি? যেমন-ভারী জিনিস তোলা, মাটি কাটা, নির্মাণ কাজ, ধান কাটা ইত্যাদি। [নমুনা কার্ড অনুযায়ী]]	হ্যাঁ ১ ☐ না ২ (যদি না হয়,তবে ৪৪ নং প্রশ্নে যান)	P1
৪২	সাধারণ একটি সপ্তাহে এ ধরনের ভারী কাজ কতদিন করতে হয়?	☐ দিন	P2
৪৩	এক দিনে এই ধরনের ভারী কাজ আনুমানিক কতক্ষণ করতে হয়?	☐☐ ☐☐ ঘন্টা মিনিট	P3 (a-b)
এখন আমি আপনার মধ্যম মাত্রার ভারী কাজ সম্পর্কে জানতে চাইবো।			
৪৪	আপনার পেশাগত কাজে অল্প হাপিয়ে উঠেন এমন কোন কাজ একনাগাড়ে কমপক্ষে ১০ মিনিট করতে হয় কি? যেমন দ্রুত হাটা বা হাল্কা ভার বহন ।[নমুনা কার্ড অনুযায়ী]	হ্যাঁ ১ ☐ না ২ (যদি না হয়,তবে ৪৭ নং প্রশ্নে যান)	P4
৪৫	সাধারণ একটি সপ্তাহে এ ধরনের ভারী কাজ কতদিন করতে হয়?	☐ দিন	P5
৪৬	এক দিনে এই ধরনের ভারী কাজ আনুমানিক কতক্ষণ করতে হয়?	☐☐ ☐☐ ঘন্টা মিনিট	P6 (a-b)
আপনি সাধারণত কাজে, দোকানে, বাজারে বা উপাসনালয়ে যাতায়াতের জন্য যা ব্যবহার করেন সেই সম্পর্কে জানতে চাইবো।			
৪৭	যাতায়াতের জন্য আপনি কি একনাগাড়ে কমপক্ষে ১০ মিনিট হাঁটেন বা বাইসাইকেল ব্যবহার করেন?	হ্যাঁ ১ ☐ না ২ (যদি না হয় ,তবে ৫০ নং প্রশ্নে যান)	P7
৪৮	যাতায়াতের জন্য সাধারণ একটি সপ্তাহে কতদিন একনাগাড়ে কমপক্ষে ১০ মিনিট হাঁটেন বা বাইসাইকেল ব্যবহার করেন?	☐ দিন	P8
৪৯	এক দিনে মোট কতক্ষন সময় যাতায়াতের জন্য আপনি হাঁটেন বা বাইসাইকেল চালান?	☐☐ ☐☐ ঘন্টা মিনিট	P9 (a-b)

মূল: শারীরিক পরিশ্রম সংক্রান্ত তথ্য			
পরবর্তী প্রশ্নগুলো পেশাগত কাজ এবং যাতায়াতের বাহিরে খেলাধুলা, ব্যয়াম অথবা বিনোদনমূলক কাজ সম্পর্কে। এখন আমি আপনাকে এই ধরনের ভারী কায়িক পরিশ্রম সম্পর্কে প্রশ্ন করব।			
প্রশ্নাবলী		উত্তর	কোড
৫০	পেশাগত কাজের বাহিরে আপনি কি এমন কোন কাজ কমপক্ষে একনাগাড়ে ১০ মিনিট করেন, যাতে অত্যাধিক হাপিয়ে উঠেন এবং বুক ধরপর করে। যেমন খেলাধুলা, ব্যয়াম অথবা বিনোদনমূলক কাজ করেন (দৌঁড়ানো, হাডুডু বা ফুটবল খেলা) [নমুনা কার্ড অনুযায়ী]]	হ্যাঁ ১ না ২ (যদি না হয়, তবে ৫৩ নং প্রশ্নে যান)	P10
৫১	একটি সাধারণ সপ্তাহে পেশাগত কাজের বাহিরে এমন পরিশ্রম কতদিন করেন? যেমন-খেলাধুলা, ব্যয়াম অথবা বিনোদনমূলক কাজ।	☐ দিন	P11
৫২	এক দিনে পেশাগত কাজের বাহিরে এ ধরনের ভারী কাজ আনুমানিক কতক্ষন করেন?	☐☐ ☐☐ ঘন্টা মিনিট	P12 (a-b)
এখন আমি আপনার পেশাগত কাজের বাহিরে মধ্যম মাত্রার কায়িক পরিশ্রম সম্পর্কে জানতে চাইবো।			
৫৩	পেশাগত কাজের বাহিরে আপনি কি এমন কোন কাজ কমপক্ষে একনাগাড়ে ১০ মিনিট করেন, যাতে অল্প হাপিয়ে উঠেন । যেমন খেলাধুলা, ব্যয়াম অথবা বিনোদনমূলক কাজ, জোরে হাটা, সাইকেলিং, সাতার কাটা, ভলিবল অথবা দাড়িয়াবান্ধা খেলা। [নমুনা কার্ড অনুযায়ী]	হ্যাঁ ১ না ২ (যদি না হয়, তবে ৫৬ নং প্রশ্নে যান)	P13
৫৪	এক সপ্তাহে পেশাগত কাজের বাহিরে এমন পরিশ্রম কতদিন করতে হয়?	☐ দিন	P14
৫৫	এক দিনে পেশাগত কাজের বাহিরে এ ধরনের মাঝারী কাজ আনুমানিক সর্বমোট কতক্ষন করেন?	☐☐ ☐☐ ঘন্টা মিনিট	P15 (a-b)
বর্ধিতঃ শারীরিক পরিশ্রম সংক্রান্ত তথ্য			
পরবতী প্রশ্নটি কর্মক্ষেত্রে, বাড়িতে, এক জায়গা থেকে অন্য জায়গায় যেতে অথবা বন্ধুদেব আড্ডায়, গাড়ী, বাস বা ট্রেনে করে যাওয়া, পড়াশোনা, কার্ড খেলা অথবা টেলিভিশন দেখার ক্ষেত্রে শুয়ে বা হেলান দিযে কাটানোর সময় সম্পর্কে এখনে ঘুমিয়ে কাটানোর সময় অন্তর্ভূক্ত হবে না।			
৫৬	ছুটির দিন ছাড়া সাধারন একটি দিনে ঘুম বাদে কতটুকু সময় আপনি শুয়ে বসে কাটান?	☐☐ ☐☐ ঘন্টা মিনিট	P16 (a-b)

মূলঃ উচ্চ রক্তচাপ সংক্রান্ত তথ্য			
প্রশ্নাবলী		**উত্তর**	**কোড**
৫৭	আপনার রক্তচাপ একজন ডাক্তার বা স্বাস্থ্যকর্মী দ্বারা কখনো মাপিয়েছেন কি?	হ্যাঁ ১ ☐ না ২ (যদি না হয়, তবে ৫৯ নং প্রশ্নে যান)	H1
৫৮	কোন ডাক্তার বা স্বাস্থ্যকর্মী আপনাকে কখনও বলেছেন কি যে আপনার উচ্চ রক্তচাপ আছে?	হ্যাঁ ১ ☐ না ২	H2

বর্ধিতঃ উচ্চ রক্তচাপ সংক্রান্ত তথ্য			
৫৯	গত ২ সপ্তাহে উচ্চ রক্তচাপের কোন ঔষধ খেয়েছেন কি?	হ্যাঁ ১ ☐ না ২	H3a
৬০	উচ্চ রক্তচাপের জন্য আপনি কি ধরনের ঔষুধ খাচ্ছেন?	অ্যালোপ্যাথিক ১ হোমিওপ্যাথিক ২ ☐ হার্বাল/আয়ুর্বেদিক ৩	H3b

মূলঃ ডায়াবেটিস সংক্রান্ত তথ্য			
প্রশ্নাবলী		উত্তর	কোড
৬১	আপনি কি কখনো কোন ডাক্তার বা স্বাস্থ্যকর্মী দ্বারা রক্তের সুগার মাপিয়েছেন?	হ্যাঁ ১ ☐ না ২ (যদি না হয়, তবে ৬৬ নং প্রশ্নে যান)	S1
৬২	কোন ডাক্তার বা স্বাস্থ্যকর্মী কি কখনও আপনাকে বলেছেন, আপনার রক্তে সুগার বেশী বা ডায়াবেটিস আছে?	হ্যাঁ ১ ☐ না ২ (যদি না হয়, তবে ৬৬ নং প্রশ্নে যান)	S2

বর্ধিতঃ ডায়াবেটিস সংক্রান্ত তথ্য			
আপনি কি বর্তমানে ডাযাবেটিসের জন্য ডাক্তার বা স্বাস্থ্যকর্মী দ্বারা নিম্নোক্ত কোন চিকিৎসা পেয়েছেন ?			
	ইনসুলিন	হ্যাঁ ১ ☐ না ২	S3a
৬৩	মুখে খাওয়ার ওষুধ	হ্যাঁ ১ ☐ না ২	S3b
৬৪	আপনি রক্তে সুগার বাড়ার জন্য এলোপ্যাথিক ছাড়া অন্য কোন চিকিৎসক দেখিয়েছেন কি? (যেমন- হোমিওপ্যাথি, আয়ুর্বেদিক, কবিরাজি, ঝাড়ফুঁক ও অন্যান্য)	হ্যাঁ ১ ☐ না ২	S4
৬৫	আপনি কি ডায়াবেটিসের জন্য বর্তমানে কোন ভেষজ বা কবিরাজী চিকিৎসা নিচ্ছেন?	হ্যাঁ ১ ☐ না ২	S5

মূল: পারিবারিক ইতিহাস সংক্রান্ত তথ্য			
প্রশ্নাবলী		উত্তর	কোড
৬৬	আপনার পরিবারে কেউ কি কখনো হার্ট অ্যাটাক বা স্ট্রোক- এ আক্রান্ত হয়েছিলেন?	হ্যাঁ ১ ☐ না ২	FH1
৬৭	উত্তর হ্যাঁ হলে নির্দিষ্ট করুন	হার্ট অ্যাটাক ১ ☐ স্ট্রোক ২	FH 2

Step 2 শারীরিক পরিমাপের তথ্যাবলী (Physical Measurements)

মূল : উচ্চতা এবং ওজন			
এখন আমি আপনার উচ্চতা এবং ওজন নেব (সোজা হয়ে দাঁড়িয়ে)			
প্রশ্নাবলী		উত্তর	কোড
৬৮	উচ্চতা (সেন্টিমিটারে)	☐☐☐ . ☐ সে. মি	**M1**
৬৯	ওজন (কিলোগ্রাম) (যদি যন্ত্রের সর্বোচ্চ মাত্র অতিক্রম করে তাহলে ৬৬৬৬)	☐☐☐ . ☐ কেজি	**M2**
৭০	মহিলাদের জন্য ঃ আপনি কি গর্ভবর্তী	হ্যাঁ ১ ☐ না ২ (যদি হ্যাঁ হয়,তবে ৭২ নং প্রশ্নে যান)	**M3**
মূল : কোমর			
এখন আমি আপনার কোমরের মাপ নেব (সোজা হয়ে দাঁড়িয়ে)			
৭১	কোমরের মাপ	☐☐☐ .☐ সে. মি	**M4**
মূল : রক্তচাপ			
এখন আমি আপনার রক্তচাপ মাপব			
৭২	রিডিং ১ সাক্ষাৎকার প্রদানকারী ৫ মিনিট বিশ্রাম নেওয়ার পর প্রথমবার রক্তচাপ মাপুন। দ্বিতীয়বার রক্তচাপ মাপার পূর্বে ৫ মিনিট অপেক্ষা করুন।	সিষ্টোলিক ☐☐☐ মি.মি. অব মার্কারী	**M5a**
		ডায়াষ্টোলিক ☐☐☐ মি.মি. অব মার্কারী	**M5b**
৭৩	রিডিং ২ দ্বিতীয়বার রক্তচাপ মাপুন। যদি প্রথম ও দ্বিতীয় রিডিং এর মধ্যকার পার্থক্য ৫ মি.মি. অব মার্কারী এর বেশী হয় তবে তৃতীয়বার রক্তচাপ মাপুন। তৃতীয়বার রক্তচাপ মাপার পূর্বে পূণরায় ৫ মিনিট অপেক্ষা করুন।	সিষ্টোলিক ☐☐☐ মি.মি. অব মার্কারী	**M6a**
		ডায়াষ্টোলিক ☐☐☐ মি.মি. অব মার্কারী	**M6b**
৭৪	রিডিং ৩ তৃতীয়বার রক্তচাপ মাপুন।	সিষ্টোলিক ☐☐☐ মি.মি. অব মার্কারী	**M7a**
		ডায়াষ্টোলিক ☐☐☐ মি.মি. অব মার্কারী	**M7b**

Questionnaire- English

Prevalence of Cardiovascular Disease Risk Factors among Adults in Slum of Dhaka City

Participant Identification Number	☐☐☐
Date of interview	☐☐ ☐☐ ☐☐
Participant's name	
Address	
Phone No (if available)	

Step 1 Demographic Information

CORE: Demographic Information			
Question		**Response**	**Code**
1	Sex	Male 1 Female 2 ☐	**D1**
2.	How old are you?	☐☐ Years	**D2**
3	In total, how many years have you spent at school or in full-time study (excluding less than Class 1 and pre-school)?	☐☐ Years	**D3**

EXPANDED: Demographic Information			
Question		**Response**	**Code**
4	What is the **highest level of education** you have completed? No formal schooling 1 Less than primary school 2 Primary school completed 3 Secondary school completed 4 Higher Secondary school completed 5 College/University completed 6 Post graduate degree completed 7 Refused 88	☐☐	**D4**
5	What is your **religion**? Islam 1 Hinduism 2 Christianity 3 Buddhism 4 Others 5 Refused 88	☐☐	**D5**

6	What is your **marital status**? unmarried 1 married 2 Separated 3 Divorced 4 Widowed 5 Refused 88	☐☐	**D6**
7	Which of the following best describes your **main work** status over the past 12 months? Government employee 1 Non-government employee 2 Business (small) 3 Business (large) 4 Farming (Land owner & farmer) 5 Agricultural worker 6 Industrial worker 7 Daily laborer 8 Rickshaw puller 9 Student 10 Housework 11 Retired 12 Unemployed, able to work 13 Unemployed, unable to work 14 Self employed 15 Driver 16 Other17 Refused to tell 88	☐☐	**D7**
	Please specify, if other	.....	**D7a**
8	What is the number of your family member? (exclude children below 6 months of age)	☐☐	**D8**
9	What is your average monthly family income?	..... Taka.	**D9**
10	In which type of house do you live in? Kacha (made of clay)..... .... 1 Tin shade.....2 Brick made.....3 Other.....4	☐	**D10**
	Please specify, if other	**.....**	**D10a**

Step 1 (Behavioral Measurements)

CORE: Tobacco Use

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

	Question	**Response**	**Code**
11	Do you currently smoke any **tobacco products,** such as cigarettes, cigars or pipes? *(as showcard)*	Yes 1 ☐ No 2 (*If No, go to question 16)*	**T1**
12	Do you smoke tobacco products **daily/ regularly?**	Yes 1 ☐ No 2 (*If No, go to question 16)*	**T2**
13	How old were you when you **first started** smoking daily?	☐☐ Age (years) Don't know 77	**T3**
14	Do you remember how long ago it was?	☐☐ Years Or Months Or Weeks Don't know 77	**T4a** **T4b** **T4c**
15	On average, **how many** of the following do you smoke each day?		
	Manufactured cigarettes	☐☐	**T5a**
	Biris	☐☐	**T5b**
	Hukkah/Dhaba	☐☐	**T5c**
	Pipes	☐☐	**T5d**
	Hand-rolled cigarettes	☐☐	**T5e**
	Cigars, cheroots	☐☐	**T5f**
	Other	Yes 1 ☐ No 2	**T5g**
	Please specify, if other	.....	**T5 others**

EXPANDED: Tobacco Use			
Question		**Response**	**Code**
16.1	In the past, did you **ever** smoke **daily**?	Yes 1 ☐ No 2 (*If No, go to question 17)*	**T6**
16.2	How **long ago** did you stop smoking daily? *(record only 1, not al 3)*	Years ago ☐☐ Months ago Weeks ago Don't know 77	**T7a** **T7b** **T7c**
17	Do you **currently use** any **smokeless tobacco** such as zarda, sadapata, gul, snuff?	Yes 1 ☐ No 2 (*If No, go to question 20)*	**T9**
18	Do you **currently use smokeless tobacco** products such as zarda, sadapata, gul, snuff **daily?**	Yes 1 ☐ No 2 (*If No, go to question 20)*	**T10**
19	On average, how many **times a day** do you use …		
	zarda	☐☐	**T11a**
	sadapata	☐☐	**T11b**
	gul,	☐☐	**T11c**
	snuff	☐☐	**T11d**
	Other	Yes 1 ☐ No 2	**T11e**
	Other (specify)	.....	**T11 others**

20	In the **past,** did you **ever use** smokeless tobacco such as zarda, sadapata, gul, snuff **daily?**	Yes 1 No 2 ☐	**T12**
21	During the past 7 days, did someone **in your home** smoke when you were present?	Yes 1 No 2 ☐ ((*If No, go to question 23*)	**T13**
22	If yes, on how many days did someone **in your home** smoke when you were present?	Number of days ☐	**T14**
23	During the past 7 days, did someone smoke in closed areas **in your workplace** (in the building, in a work area or a specific office) when you were present?	Yes 1 No 2 ☐ ((*If No, go to question 25*)	**T15**
24	If yes, on how many days did someone smoke in closed areas **in your workplace** (in the building, in a work area or a specific office) when you were present?	Number of days ☐	**T16**

CORE: Alcohol Consumption			
Question		**Response**	**Code**
25	Have you **ever** consumed an alcoholic drink such as local wine, beer, wine, spirit?	Yes 1 No 2 (*If No, go to question 32*) ☐	**A1a**
26	Have you consumed an alcoholic drink within the **past 12 months?**	Yes 1 No 2 (*If No, go to question 32*) ☐	**A1b**
27	During the past 12 months, **how frequently** have you had at least one alcoholic 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 ☐	**A2**
28	Have you consumed an alcoholic drink within the **past 30 days?**	Yes 1 No 2 (*If No, go to question 32*) ☐	**A3**
29	During the past 30 days, on how many **days** did you have at least one alcoholic drink?	☐☐ Don't know 77	**A4**
30	During the past 30 days, what was the **average number** of standard alcoholic drinks you had (in one single occasion), counting all types of alcoholic drinks together?	☐☐ Don't know 77	**A5**
31	During the past 30 days, how many times did you have for **men: five or more**, for **women: four or more** standard alcoholic drinks in a single drinking occasion?	☐☐ Don't know 77	**A6**

CORE: Diet			
The next questions ask about the fruits and vegetables that you usually eat. I have a nutrition card here that shows you some examples of local fruits and vegetables. Each picture represents the size of a serving. As you answer these questions please think of a typical week in the last year.			
Question		**Response**	**Code**
32	In a typical week, on how many days do you **eat fruit?** *(as showcard)*	Number of days ☐☐ Don't Know 77 (*If 00, go to question 34*)	**F1**
33	How many **servings** of fruit do you eat on **one** of those days? *(as showcard)*	Number of servings ☐☐ Don't Know 77	**F 2**
34	In a typical week, on how many days do you **eat vegetables?** *(as showcard)*	Number of days ☐☐ Don't Know 77 (*If 00, go to question 36*)	**F 3**
35	How many **servings** of vegetables do you eat on one of those days? *(as showcard)*	Number of servings ☐☐ Don't know 77	**F 4**

EXPANDED: Diet			
Question		**Response**	**Code**
36	What type of **oil or fat is most often** used for meal preparation in your household? (USE SHOWCARD) (SELECT ONLY ONE)	Soya bean oil 1 Palm oil 2 Mustard oil 3 Sunflower oil 4 Rice bran oil 5 Butter or ghee 6 Dalda 7 Other 8 None in particular 9 None used 10 ☐☐	**F5**
	Other (specify)	.....	**F5 Others**
37	How much oil is generally used in your home in one month?	☐☐ ☐☐ Liter	**F 6**
38	How much salt is generally used in your home in one month?	☐☐ ☐☐ Kg	**F 7**
39	Do you take extra salt while taking food?	Yes 1 No 2 ☐	**F 8**

40	On average, how many meals per week do you eat that were not prepared at home? By meal, I mean breakfast, lunch and dinner.	Number ☐☐ Don't know 77

CORE: Physical Activity

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

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

Question		**Response**	**Code**
41	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like carrying or lifting heavy loads, digging or construction work, harvesting for at least 10 minutes continuously?	Yes 1 No 2 ☐ (*If no, go to question 44*)	P1
42	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days ☐	P2
43	How much time do you spend doing vigorous- intensity activities at work on a typical day?	☐☐ ☐☐ Hour minute	P3 (a-b)
Now I would like to ask you about the time you spend doing moderate-intensity activity			
44	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking or carrying light loads for at least 10 minutes continuously? *(USE SHOWCARD)*	Yes 1 No 2 ☐ (*If no, go to question 47*)	P4
45	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	☐ days	P5

46	How much time do you spend doing moderate- intensity activities at work on a typical day?	☐☐ ☐☐ Hour minute	P6 (a-b)
Travel to and from places			
47	Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 ☐ (*If no, go to question 50*)	P7
48	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	☐ days	P8
49	How much time do you spend walking or bicycling for travel on a typical day?	☐☐ ☐☐ hrs mins	P9 (a-b)

CORE: Physical Activity, Continued			
Recreational activities			
Now I would like to ask you about sports, fitness and recreational activities (leisure)			
Question		**Response**	**Code**
50	Do you do any vigorous-intensity sports, fitness or recreational *(leisure)* activities that cause large increases in breathing or heart rate like running, playing ha-du-du or football for at least 10 minutes continuously? *(USE SHOWCARD)*	Yes 1 No 2 ☐ (*If no, go to question 53*)	P10
51	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational *(leisure)* activities?	☐ days	P11
52	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	☐☐ ☐☐ hrs mins	P12 (a-b)

Now I would like to ask you about the time you spend doing moderate-intensity activity outside your work			
53	Do you do any moderate-intensity sports, fitness or recreational *(leisure)* activities that cause a small increase in breathing or heart rate such as brisk walking, cycling, swimming, playing volleyball and dariabandha for at least 10 minutes continuously? *(use showcard)*	Yes 1 No 2 ☐ (*If no, go to question 56*)	P13
54	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational *(leisure)* activities?	☐ days	P14
55	How much time do you spend doing moderate-intensity sports, fitness or recreational *(leisure)* activities on a typical day?	☐☐ ☐☐ hrs mins	P15 (a-b)
EXPANDED: Physical Activity			
Sedentary behaviour			
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping.			
56	How much time do you usually spend sitting or reclining on a typical day?	☐☐ ☐☐ hrs mins	P16 (a-b)

CORE: Raised Blood Pressure			
Question		**Response**	**Code**
57	Have you ever had your blood pressure measured by a doctor or other health worker?	Yes 1 No 2 ☐ (*If no, go to question 61*)	H1
58	Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?	Yes 1 No 2 ☐ (*If no, go to question 61)*	H2

EXPANDED: History of Raised Blood Pressure			
59	Are you currently receiving any treatments for high blood pressure prescribed by a doctor or other health worker?	Yes 1 No 2 ☐	H3a
60	What type of medication are you taking?	Alopathic 1 Homeo 2 Herbal 3 ☐	H3b

CORE: History of Diabetes			
Question		**Response**	**Code**
61	Have you ever had your blood sugar measured by a doctor or other health worker?	Yes 1 No 2 ☐ (*If no, go to question 66*)	S1
62	Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes?	Yes 1 No 2 ☐ (*If no, go to question 64*)	S2

EXPANDED: History of Diabetes			
Are you currently receiving any of the following treatments/advice for diabetes prescribed by a doctor or other health worker?			
63	Insulin	Yes 1 No 2 ☐	S3a
	Oral drugs-modern	Yes 1 No 2 ☐	S3b
	Traditional	Yes 1 No 2 ☐	S4

Core- Family history of heart attack or stroke			
Question		**Response**	**Code**
64	Do you have any family history of heart attack or stroke?	Yes 1 No 2 ☐	FH1
65	If yes, specify	heart attack 1 stroke 2 ☐	FH 2

Step 2 Physical Measurements

CORE: Height and Weight			
Now I am going to measure your height and weight (in erect posture)			
Question		**Response**	**Code**
66	Height In Centimeters (cm)	☐☐☐ ☐	**M1**
67	Weight In Kilograms (kg)	☐☐☐ . ☐	**M2**
68	**For women:** Are you pregnant?	Yes 1 No 2 ☐ (*If no, go to question 70*)	**M3**
CORE: Waist			
Now I am going to measure your waist (in erect posture)			
69	Waist circumference In Centimetres (cm)	☐☐☐ ☐	**M4**

CORE: Blood Pressure			
Now I am going to measure your blood pressure (in sitting posture)			
70	Reading (After 5 minutes of rest, take the first reading. Let the person take rest again for 5 minutes before taking second reading).	Systolic (mmHg) ☐☐☐	**M5a**
		Diastolic (mmHg) ☐☐☐	**M5b**
71	Reading 2 (Take the second reading. If difference between 1st and 2nd reading is more than 5 mm Hg, take 3rd reading. Wait 5 minutes before 3rd reading.	Systolic (mmHg) ☐☐☐	**M6a**
		Diastolic (mmHg) ☐☐☐	**M6b**
72	Reading 3 (Take the third reading)	Systolic (mmHg) ☐☐☐	**M7a**
		Diastolic (mmHg) ☐☐☐	**M7b**

Annex-4

SHOWCARDS

A. Tobacco Products

Examples The following picture shows a few selected examples of tobacco products. Sites are to develop show cards including specific examples of local tobacco products.

Step	Section	Items
Step 1, Tobacco use	T	T1 to T14

Manufactured Cigarettes

Snuff, available in wet and dry form

Roll-your-own (RYO) cigarettes

Betel nut

Pipe

Chewing tobacco, e.g., plug, loose-leaf, chimo, toombak, guthha or twist.

Cigars, e.g., cigarillos, double coronas, cheroots, stumpen, chuttas and dhumtis.

Betel leaf

Biri

Water pipe, also known as shisha, hookah or hubble-bubble

B. Alcohol Consumption

SHOWCARDS

Step	Section	Items
Step 1. alcohol consumption	A	A1-A7

1 standard drink =

1 Standard bottle of **regular beer** (285ml)

1 Single measure of **spirits** (30ml)

1 Medium size glass of wine (120ml)

1 Measure of **aperitif** (60ml)

Note: Net alcohol content of a standard drink is approximately 10g of ethanol. However, standard drinks in different countries can contain different amounts of ethanol. Therefore, countries may have to adapt this measure according to their own standards and will report it measure if different from the standard mentioned above.

Source: World Health Survey Questionnaire.

C. Diet (Typical Fruit And Vegetables And Serving Sizes)

SHOWCARDS

Step	Section	Items
Step 1, Diet	D	D1 to D6

VEGETABLES





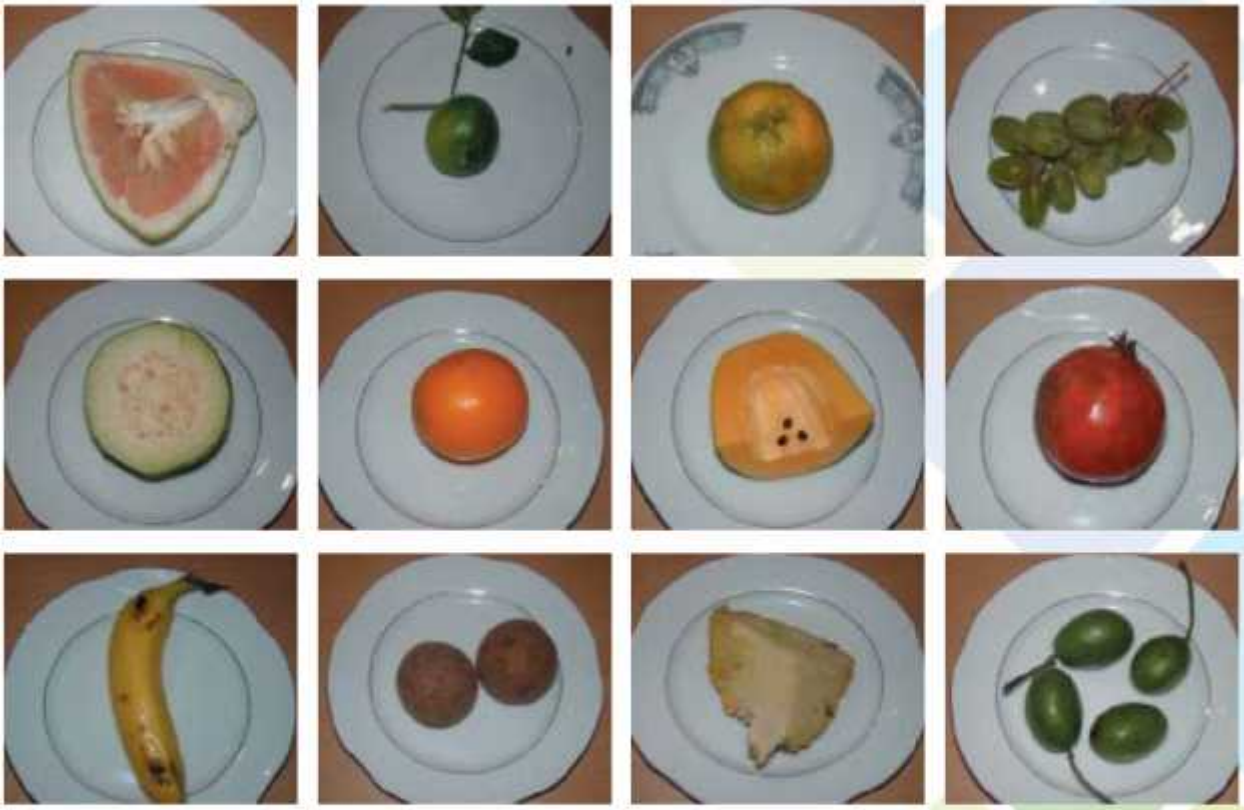

Serving size: One standard serving=80 grams (translated into different units of cups depending on type of vegetable and standard cup measures available in the country).

Vegetables	1 Serving size
Raw green leafy vegetables	1 cup
Other vegetables cocked chopped	½ cup
Vegetable Juice	½ cup

SHOWCARDS

Step	Section	Items
Step 1, Diet	D	D1 to D6

FRUITS



Serving size: One standard serving=80 grams (translated into different units of cups depending on type of vegetable and standard cup measures available in the country).

Fruits	1 Serving size
Apple, Banana, Orange	1 medium size piece
Chopped, Cooked or caned fruit	½ cup
Fruit Juice	½ cup Not artificially flavored