DISTRIBUTION OF HYPERGLYCEMIA AND RELATED CARDIOVASCULAR DISEASE RISK FACTORS IN NEGLECTED ETHNIC COMMUNITY (BIHARIES) IN DHAKA CITY

DR. SABRINA AHMED
Student, MPhil in Noncommunicable Diseases (Thesis Part)
Session: 2011-2012
Registration No: 300

DEPARTMENT OF COMMUNITY MEDICINE
BANGLADESH INSTITUTE OF HEALTH SCIENCES (BIHS)
FACULTY OF BIOLOGICAL SCIENCES
UNIVERSITY OF DHAKA
DHAKA, BANGLADESH

DECLARATION

I hereby humbly declare that the thesis work titled **"Distribution of Hyperglycemia and Related Cardiovascular Disease Risk Factors in Neglected Ethnic Community (Biharies) in Dhaka City"**, a requirement for the partial fulfillment of degree of Master of Philosophy (MPhil) in Non Communicable disease under the faculty of Biological Sciences, Dhaka University (DU), was carried out by me under the guidance of Dr. Pradip Kumar Sen Gupta, Associate Professor, Department of Community Medicine, Bangladesh Institute of Health Science(BIHS).No part of the work has been submitted for another degree or qualification or publication in any other institute at home or in abroad.

Dr. Sabrina Ahmed
MPhil Student
Department of Community Medicine
Bangladesh Institute of Health Science (BIHS), Dhaka.

CERTIFICATE

This is to certify that the thesis entitled "**Distribution of Hyperglycemia and Related Cardiovascular Disease Risk Factors in Neglected Ethnic Community (Biharies) in Dhaka City**" is submitted by Dr. Sabrina Ahmed in partial fulfillment of the requirement for the degree of Master of Philosophy (MPhil) in Noncommunicable diseases under the Faculty of Biological sciences, Dhaka University (DU), and was carried out under my guidance and supervision.

Pradip Sen Gupta

Dr. Pradip Kumar Sen Gupta
Associate Professor
Department of Community Medicine
Bangladesh Institute of Health Science (BIHS), Dhaka

UNIVERSITY OF DHAKA

Faculty of Biological Sciences

The undersigned certify that they have carefully read and examined the student on this thesis and being satisfied, recommended to the Faculty of Biological sciences, University of Dhaka for acceptance of this thesis entitled **"Distribution Of Hyperglycemia And Related Cardiovascular Disease Risk Factors In Neglected Ethnic Community (Biharies) In Dhaka City"**by Dr. Sabrina Ahmed in partial fulfillment of the requirement for the degree of Master of Philosophy (MPhil) in Non-Communicable Disease .

Board of Examiners

Convener:

Signature.....

Name:

Designation:

Member:

Signature.....

Name:

Designation:

Member:

Signature.....

Name:

Designation:

This thesis is dedicated to my father Prof. Dr. M. S. A. Mansur Ahmed, my mother Mahbuba Ahmed & my daughters Arisha, Aizah & my husband Md. Shariful Islam

CONTENTS

ACKNOWLEDGEMENTS

At first I want to express my gratitude to Almighty Allah for granting me the wisdom, physical and mental power to undertake the research work.

I want to thank NORAD's programme for Master studies (NOMA) of the university of Oslo, Norway for the financial support throughout my MPhil program at the Bangladesh Institute of Health Sciences (BIHS) under the University of Dhaka (DU).

I would like to acknowledge the ethical review committee of Bangladesh Institute of Health Sciences for assessing the ethical issues in this study and allowing me to conduct the study.

I would like to express the deepest appreciation to Prof. Liaquat Ali, Director BIHS for his wise suggestions, comments and perceptive ideas throughout the study; that always inspired me to take the challenges.

I would like to express my sincere thanks to my honorable Supervisor Dr. Pradip Kumar Sen Gupta, Associate Professor, Department of Community Medicine BIHS for his support and excellent guidance.

I am extremely grateful to my honorable teacher mentor Prof. M.S.A.Mansur Ahmed for his wise suggestions and excellent intellectual inputs.

I would like to express my thanks to my Co-Supervisor Palash Chandra Banik, Senior Lecturer, Department of Community Medicine, BIHS for his constructive guidance throughout the study, endless support and help for conducting the entire research process.

I am also thankful to all teachers, faculties of my department and also other departments of BIHS for their support and assistance.

In addition, I am thankful to my study participants, the Behari people living in Geneva camp, Mohammadpur for their participation and help for completing the study.

Finally, I am extremely grateful to my parents, my husband, my brothers and sister in law for their unflagging support and sacrifice throughout the study and helping me every possible way.

Dr. Sabrina Ahmed

MPhil Student (Thesis Part)

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXURE

ABBREVIATIONS

ADA	:	American diabetic association
AG	:	Glucose after 2 hrs
BADAS	:	Bangladesh Diabetic Association
BIRDEM	:	Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders
BMI	:	Body mass index
BP	:	Blood pressure
CI	:	Confidence Interval
DBP	:	Diastolic Blood Pressure
DM	:	Diabetes Mellitus
FBS	:	Fasting blood sugar
GDM	:	Gestational Diabetes Mellitus
HBA1c	:	Glycosylated Hemoglobin
HC	:	Hip Circumference
ID	:	Identification Number
IDF	:	International Diabetes Federation
IFG	:	Impaired Fasting Glucose
IGT	:	Impaired Glucose tolerance
NCD	:	Noncommunicable Diseases
NGOs	:	Non government organization
NIDDM	:	Non Insulin Dependent Diabetes Mellitus
OGTT	:	Oral Glucose Tolerance Test
OR	:	Odds Ratio
SBP	:	Systolic Blood Pressure
SPSS	:	Statistical Package for Social Science
T1DM	:	Type 1 Diabetes Mellitus
T2DM	:	Type 2 Diabetes Mellitus
TC	:	Total Cholesterol
WC	:	Waist Circumference
WHO	:	World Health Organization
WHR	:	Waist to Hip Ratio

ABSTRACT

The study was aimed to estimate the prevalence of hyperglycemia and its related cardiovascular risk factors in Behari people living in Geneva camp. This is a community based cross sectional study which was conducted through screening in camp settings, which included total of 300 participants (aged ≥ 30 years) by following purposive sampling procedure. Oral glucose tolerance test (OGTT) was performed to diagnose Hyperglycemia according to the diagnostic criteria of World Health Organization (WHO). Presence of cardiovascular risk factors were determined by measuring Blood Pressure, BMI, Total cholesterol, Waist Hip Ratio etc. Logistic regression analysis was used with or without Adjustment for potential confounders. Of total 300 respondents ,201(67%) were females and 99(33%) were males. The mean age of males and females were 50.9±13.2 and 45.4±12.5 respectively and in combined group mean age was 47.2±12.9 years. More than half (58.3%) of the respondents were found illiterate where illiteracy was found more in females (65.7%). Among the respondents about 36% males were employed whereas majority of the female respondents were housewives (69.7%). In this study 35.5% respondents were found with the family history of diabetes. In case of shared risk factors, the prevalence of hypertension was 22.7% (n=68); where prevalence of hypertension in males and females was 28.3% and 19.9% respectively. According to OGTT 29.3% respondents were found as diabetic cases where prevalence of diabetes was found more in females (31.8%). The prevalence of IGT was found high (18%) which was more or less equal in males and females (17.2% and 18.4% respectively). Prevalence of high cholesterol level was found as 45.7% overall which was more orless nearly equal in males and females. The prevalence of underweight, normal, overweight and obese was 2.3%, 23.7%(CI -.122-5.15), 38% (CI-0.25-10.16) and 36%(CI -0.35-14.85) respectively. Waist circumference was found to be high in 69.7% of study subjects in terms of central obesity. The prevalence of smoking was 9% which was not so high and prevalence of alcohol consumption was very low (only 3.3%). Prevalence of low physical activity was 36.3%.Current study found that 26.7 % of the study population took extra salt in terms of table salt regularly whereas 19% took it occasionally which is a risk factor of high blood pressure. Significant association ($p<0.05$) of high blood pressure was found with age, education and monthly income. The indices of obesity (high BMI and WHR), Hyperlipedemia (increased Total Cholesterol) may at least in

part explain the high prevalence of hyperglycemia and its related CVD risk factors in Behari people living in Dhaka city.

CHAPTER-I
INTRODUCTION

INTRODUCTION

1.1 Background

Hyperglycemia (diabetes) for all age groups worldwide was estimated as 2.8% in 2000 and will be 4.4% (approx.) within 2030[5]. The total number of people with the symptoms of hyperglycemia is projected to rise from 171 million to 366 million from 2000 to 2030[5] and in 2004, an estimated 3.4 million people died from the consequences of hyperglycemia Diabetes is a fast expanding health problem worldwide both in developing and developed countries[1], it is a major reason of morbidity and mortality worldwide [2]. In the presence of obesity and hypertension it is one of the significant risk factor for cardiovascular disease [3], a foremost cause of death in the world [4]. The leading global risks for mortality in the world are high blood pressure (responsible for 13% of deaths globally), tobacco use (9%), high blood glucose (6%), physical inactivity (6%), and overweight and obesity (5%)[6] · Hyperglycemia (high blood sugar) causes 16% of DALY loss in low income countries including Bangladesh[6]. According to WHO in 2030 diabetes will be the 7th foremost reason of death[7]. Especially urban population in developing countries will be double within 2030[5] and most of the people with hyperglycemia are having or associated with the related cardiovascular risk factors like high blood pressure and obesity[8]. Type 2 diabetes, hypertension and obesity share several characteristics:

- Their common risk factors (unhealthy diets, physical inactivity and harmful alcohol use) and other exacerbating factors (e.g. tobacco use) are potentially amenable to behavioral modification [9]
- They can be detected using simple tests and managed in primary-care settings in low-income countries [10]
- The benefits of prevention and care extend beyond cardiovascular disease to related conditions of public health importance [11]
- They are the focus of efforts to ensure greater prioritization of non-communicable diseases (NCDs) on the global research agenda[12,] the research agenda of development agencies[13] and in the health and development policies of low-income countries[14]

Recent estimates indicate the global burden of chronic NCDs:

- 285 million people with diabetes in 2010[1]
- 972 million with hypertension in 2013

- 400 million adults with obesity in 2005 [3].
- 65–70% of those with diabetes or hypertension live in the developing world [1,13]

NCDs such as diabetes are poorly understood and under-prioritized in developing countries[15]. Information on diabetes prevalence is often limited in low-income countries, particularly in sub-Saharan Africa and South Asia in both rural and urban population[16]. Since data have to be extrapolated from distant and probably dissimilar countries and populations, further epidemiological investigation in these regions is urgently needed[16].Good-quality data on disease burden are crucial to aid planning and implementation of prevention and control strategies for diabetes and other chronic NCDs[17] .Detailed epidemiological studies help in understanding NCD pathogenesis and in rational clinical management. Therefore, it is of particular interest to study the epidemiological transition of the state and to identity the cardiovascular risk factors in order to recognize the extent of the problem. Surprisingly, no data in this context among the neglected minor ethnic population (Bihari camp) exits. So, this study has been designed to describe the distribution of hyperglycemia with its associated cardiovascular risk factors in this population in Dhaka city (Bangladesh).

1.2 Rationale:

Distribution of hyperglycemia in general population is known in Bangladesh[9], but the distribution of hyperglycemia and its related cardiovascular risk factors among the minor neglected ethnic group is unknown. According to The World Bank Conference held in Sep, 2011 heart disease, cancer, diabetes, chronic respiratory conditions and other noncommunicable diseases (NCDs) increasingly threaten the physical health and economic security of many lower and middle income countries. Noncommunicable diseases have already appeared as important public health problems in Bangladesh [21]. They are linked to a few common risk factors that are amenable to interventions. A risk factor approach for prevention of NCDs is proved to be feasible and cost effective. Surveillance of these risk factors is, therefore warranted. A national survey of NCD risk factors was carried out in Bangladesh from Nov, 2009 to Apr, 2010 by using WHO STEP wise approach with an objective of determining the prevalence of risk factors in adult aged 25 years and above. It is assumed that the targeted ethnic community (Biharies) in Dhaka city is not aware of the dangers of NCDs and their risk factors at all. So this study aims at knowing the distribution of hyperglycemia and its related cardiovascular risk indicators among the Beharies. This will help policy planners to plan appropriate strategy for prevention and control of NCDs particularly of the diabetes and cardiovascular diseases among this neglected group of population.

1.3 Operational Definitions

The definition of different information of this study will be used by the researcher for the benefit of research work and to realize the main or exact theme of objective. Some of the terms will be in this study are given below to prevent confusion.

Hyperglycemia/Diabetes Mellitus

It has been determined according to WHO 2006 criteria through measuring venous plasma glucose level by OGTT at 0 min(Fasting) and 120 min after oral glucose (75 gm.) administration. If the 0 min glucose level is≥7.0 mmol/L and 120 min glucose level is ≥11.1 mmol/L, the person will be considered as Diabetic.

Impaired Glucose Tolerance

It has been determined if the 0 min glucose level is <7.0 mmol/L and 120 min glucose level is between 7.8 to <11.1 mmol/L.

Impaired Fasting Glucose

When the 0 min glucose level is 6.1 to <7.0 mmol/L and 120 min glucose level is < 7.8 mmol/L.

Normoglycaemic

If the 0 min glucose level is < 6.1 mmol/L and 120 min glucose level is < 7.8 mmol/L

Anthropometric assessment

Measurement of the physical dimension and the gross composition of the body. In this study BMI **(Body Mass Index)** and WHR (waist hip ratio) have been used.

BMI (Body Mass Index)

It is calculated by the formula:

Weight in kg/ (height in meter)^2.

It helps to grade the obesity. The BMI≥25 is graded as overweight/obese.

Hypertension (HTN)

Defined as a systolic blood pressure of ≥ 140mm Hg and / or diastolic blood pressure of ≥ 90 mm Hg.

Hypercholesterolemia

Fasting Venous blood cholesterol level ≥200 mg/dl [12]

Triglycerides level

Fasting Venous blood Triglycerides level considered abnormal if it is > 150 mg/dl

Occupation

The main source of earning money.

Total monthly income

It will include pay and allowances drawn (in case of service) or total income from any source by respondent plus any income from other family members.

Tobacco Smoker:

Current Smoker: percentage of the respondents who smoke tobacco daily.

Occasional Smoker: Occasional means not smoking daily but, smoking irregularly and occasionally.

Never Smoker: Never smoker is a person has never smoked at all.

Past Smoker: Respondents who was tobacco smokers in the past and currently had stopped for more than one year.

Vigorous-intensity physical activities:

Activities that demand hard physical effort and moderate increases in breathing or heart-rate.

Sedentary/Mild intensity physical activities:

Sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at desk, sitting with friends, traveling in car, bus, train, reading, playing cards, or watch television, but do not include time spent sleeping.

Socio-economic status:

Socio economic status determined by self-reported monthly family income and expenditure of the respondents. : It includes < 5000 Taka with lower income group and ≥ 5000 Taka with higher income group.

Behari Community:

The Bihari community primarily focuses on a geographical location of Indian state of Bihar. "Bihari" originally a Hindi word, literary means a person from Bihar. In Bangladesh, the term also recognize them as non-local and Urdu speaking people,(Ilias 2003).The "Bihari" community is also referred to as Muhajirs; defined by the census of Pakistan,1951, 'a person who has moved into Pakistan as a result of partition or fear of disturbances connected therewith', Indian-Bangladeshi, non-locals, Non-Bangladeshi, stranded Pakistanis or Urdu speaking people. The "Bihari" are such people who opposed the independence of Bangladesh, wanted to go to Pakistan but could not do so due to complication in the repatriation process (Farzana,2008). A relatively large number of Pakistanis known as the "Bihari" community have been stranded in Bangladesh since its independence in 1971. According to one report, the community is comprised of over 300,000 yet it is not recognized with a clearly defined identity[22] .They have been living in 66 squalid camps with poor facilities scattered in several areas of Bangladesh for more than four decades although they are residing in 'refugee camps', the united nations high commissioner for refugees (UNHCR) does not recognize them as refugees. Therefore, they are deprived of the benefits and opportunities extended to the refugees by the UNCHR.As a consequence, the stranded Biharies in Bangladesh face multiple problems. There are about 25,000 people living in Mohammadpur Geneva camp, which is considered the biggest camp and is comparatively in good position.

1.4 Research Questions

1. What is the distribution of hyperglycemia in study population?
2. What are the related cardiovascular risk indicators present among the hyperglycemic subjects of this ethnic group?

1.5 OBJECTIVES

A. General Objective:

To find out the distribution of hyperglycemia and its related cardiovascular risk indicators in neglected ethnic population (Biharies) in Dhaka city

B. Specific Objectives:

- To determine the distribution of hyperglycemia in minor ethnic group
- To identify the related cardiovascular risk indicators (hypertension, obesity, lack of physical activity, smoking, harmful consumption of alcohol) among the hyperglycemic subjects.
- To find out the relationship between the hyperglycemia with different risk factors.
- To find out the socio-demographic characteristics of the study population

1.6 Limitations of the study

- The study place is selected purposively. So The subjects of the study that selected may not be the representatives of the whole Bihari community and the result cannot be generalized
- Most of the respondents were females as the males were less interested and unavailable due to their daily work, so selection bias exists.

CHAPTER-II
LITERATURE REVIEW

LITERATURE REVIEW

2.1 Global Burden of Noncommunicable Diseases

Bangladesh has been experiencing an epidemiological transition from communicable diseases to noncommunicable diseases (NCDs).NCDs are important cause of diseases burden, morbidity and mortality. At least 25% of the deaths in primary and secondary government health facilities are caused by the disease. Presently, Bangladesh does not have a community-based public health program for NCDs. Only hospital-based information, although poor, is available. However, exact situation in the country is not known because of lack of representative data, lack of advocacy, lack of logistic and other facilities for initiation of efficient surveillance system on NCDs, as well as difficulties in the generating resources for newer initiatives. Surveillance for a few communicable diseases is known to exist although it needs major improvement. The Health, Nutrition, Population sector programme (HNPSP) has identified three NCDs-cancer, cardiovascular diseases and diabetes mellitus-as major public health problems. Therefore surveillance of these diseases should be started to assist in formulating country policies and programmes. They have a few common risk factors for which Bangladesh does not have representative data to be addressed for primary prevention. Tertiary level hospital data indicate that cardiovascular diseases have already appeared as one of the leading causes of mortality. Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM)and its sister organizations has initiated surveillance of diabetes mellitus all over the country.

2.2 Diabetes Mellitus

Diabetes mellitus (DM) is a group of metabolic disorder with multi-clinical features characterized by high blood glucose levels, with disturbances of carbohydrate, fat and protein metabolism, resulting from insulin secretion, or insulin action or both. Diabetes mellitus commonly referred to as diabetes means "sweet urine". Elevated levels of blood glucose(hyperglycemia)lead to spillage of glucose into the urine, hence the term sweet urine. Glucose is the main source of energy for the body's cells. Normally, the levels of glucose in the blood are tightly controlled by a hormone called insulin, which is made by the pancreas. Insulin helps glucose enter the cells and thus lowers the blood glucose level. When blood glucose elevates(for example, after eating food),insulin is released from the pancreas to normalize the glucose level. In patients with diabetes, the pancreas does not make enough insulin or the body can't respond

normally to the insulin that is made. This causes glucose levels in the blood to rise, leading to symptoms such as increased urination, extreme thirst, and unexplained weight loss. Diabetes mellitus is also an important factor in accelerating the hardening and narrowing of the arteries leading to coronary heart diseases, strokes and other blood vessel diseases. Diabetes mellitus is a chronic medical condition, meaning that although it can be controlled, it lasts a lifetime. Uncontrolled and poorly controlled diabetes increase the risk of macro and micro vascular disorders, infections, dysfunction and other associated problems. Long-term DM may lead to complications in any organ of the body, but main target organs are heart, kidney, nerves and eyes.

Diabetes mellitus (DM) is becoming a pandemic worldwide. WHO listed 10 countries to have the highest numbers of people with diabetes in 2000 and 2030[26].Bangladesh appears in the list for both 2000 and 2030 with India, Pakistan, China, Japan and USA etc. According to the report, Bangladesh has 3.2 million diabetic subjects and the number is expected to increase to a staggering 11.1 million by 2030.Several small-scale population based studies conducted in Bangladesh at different time points have revealed an increasing trend of diabetes prevalence in rural and urban communities[34].A recent population based study [35] showed a significant increase in the prevalence of DM in rural Bangladesh from 2.3% to 6.8% over 5 years. This prevalence was higher than found in the previous rural studies of Bangladesh [36,37]. However, the association of obesity and diabetes in this population is unconventional. Some studies showed that BMI and WHR were important predictors of diabetes in rural Bangladeshi population, although the population was considered as lean [35,36]while the others did not [34,38].

The risk for developing diabetes is higher in people with a family history of diabetes[39]. This finding strongly suggests that genetic determinants play a role, but so far few genes have been associated with type 2 diabetes. Environmental factors include prenatal factors, obesity, physical inactivity and dietary and socioeconomic factors.

The strongest and most consistent risk factors for diabetes and insulin resistance among different populations are obesity and weight gain [40] for each unit increase in body mass index, the risk of diabetes increases by 12 percent [41].The distribution of fat around the trunk region, or central obesity, is also a st4rong risk factor for diabetes

[42].Cardiovascular disease, atherosclerosis ,hypertension and stroke are common problems affecting individuals with diabetes, all of which correlate highly with the presence of obesity [43,44].Cardiovascular disease(CVD) is the leading cause of death among diabetes and is responsible for much of the increase in diabetes related morbidity and mortality. CVD-related morality is 2-4 times higher among diabetics [43] Diabetes risk may be reduced by increasing physical activity. Conversely, a sedentary lifestyle and physical inactivity are associated with increased risks of developing diabetes [45].Some studies report a positive relationship between dietary fat and diabetes, but specific types of fats and carbohydrates may be more important than total fat or carbohydrate intake. Increased affluence and Westernization have been associated with an increase in the prevalence of diabetes in many indigenous population and in developing economies [46,47].Conversely ,in developing countries, those in lower socioeconomic groups have a higher risk of obesity and consequently of diabetes [48] .

2.3 Classification of Diabetes Mellitus

According to world Health Organization (WHO) diabetes mellitus has been classified into two types: type 1 diabetes mellitus and type 2 diabetes mellitus (WHO), 1999.Beside that gestational diabetes mellitus is another known type of diabetes.

Type 1 diabetes

It was previously called insulin dependent diabetes or juvenile onset diabetes .this is immune mediated diabetes. Type 1 diabetes mellitus results from an absolute deficiency of insulin due to autoimmune destruction of the insulin producing pancreatic beta cell[23]This type of diabetes can affect generally in early stage of life and insulin is required for survival. It has multiple genetic predispositions and has also been said to be related to environmental factors, though still poorly defined. This type of diabetes, account for 5-10% of those with diabetes.

Type 2 diabetes

Type 2 diabetes mellitus, the common set form of diabetes is also called non-insulin dependent diabetes mellitus or adult onset diabetes. This type of diabetes is characterized by insulin resistance and/or abnormal insulin secretion, either of which may predominate [24,25]. Type 2 diabetes mellitus, account for approximately 90-95% of these with diabetes. Type 2 diabetes mellitus is a disorder entirely separate from type

1 diabetes mellitus. Relative beta-cell insufficiency is, by definition, present in all individuals with type 2 DM. The disorder, in most cases, is also characterized by insulin resistance detected at the level of skeletal muscle, adipose tissue, and the liver. Insulin resistance at the former site results in decreased peripheral glucose disposal, whiles the latter, in increased hepatic glucose production. In many individuals, the natural history of type 2 DM begins with a period of insulin resistance with preserved, indeed augmented, pancreatic insulin secretion, as the insensitivity to insulin action in peripheral tissues is overcome by hyperinsulinemia. As a result, plasma glucose concentrations remain relatively normal. As the disease progresses, however, pancreatic islet cell function falters and it is no longer able to meet the peripheral demand. As a result, insulin levels fail to keep up with requirements, and hyperglycemia ensues.

Gestational diabetes mellitus

In recent years, diabetes mellitus (DM) appears to be a global health problem. It is one of the leading causes of death, disability and economic loss throughout the world. Diabetes affects persons of all ages and races. The disease reduces both a person's quality of life and life expectancy and imposes a large economic burden on the health care system and on families. According to the world Health Organization (WHO) Report there were 171 million people worldwide with DM in 2000 and predicted that 366 million people will have DM by 2030[26].The International Diabetes Federation has estimated that another 314 million persons have impaired glucose tolerance and that number will increase to 472 million by 2030[27].In 2003,the worldwide prevalence of diabetes mellitus was estimated at 5.1 percent among people age 20 to 79.By 2025,the worldwide prevalence is projected to be 6.3 percent, a 24 percent increase compared with 2003[28].The prevalence of DM is reaching epidemic proportions. The prevalence of diabetes was higher in developed countries than in developing countries [28].However,it is estimated that the developing countries will bear the brunt of this epidemic in the 21st century, with 80% of all new cases of diabetes expected to appear in the developing countries by 2025[29].In the developing world, the prevalence was highest in Europe and Central Asia and lowest in Sub-Saharan Africa. Some of these variations may reflect differences in the age structures and level of urbanization of the various populations. The largest increase in prevalence by 2025 is expected to be in the Middle-East, Sub-Saharan Africa, South Asia and Latin America [26].In terms of

those affected, the biggest increase in the developing countries is projected to take place among adults of working age.The World Health Organization (WHO) estimates that, in 2001, worldwide approximately 1.6 percent of all deaths caused by diabetes mellitus, and approximately 3 percent of all deaths caused by non-communicable diseases. More recent estimates by WHO suggests that the actual number may be triple this estimate and that about two-thirds of these deaths occur in developing countries [30].Within the developing regions most deaths caused by diabetes occurred in East Asia and the Pacific and fewest in Sub-Saharan Africa. Diabetes-related complications include microvascular diseases; for example, retinopathy, blindness, nephropathy and kidney failure and macro vascular diseases; like, coronary heart diseases, stroke, peripheral vascular disease and lower-extremity amputation. Those complications result inn disability. In the United States, a much higher proportion of people with diabetes than of people without diabetes have physical limitations;66 percent compared with 29 percent[31].Disability are even more pronounced among older people[32].Cardiovascular disease(CVD) causes up to 65 percent of all deaths in developed countries of people with diabetes [33].

2.4 Risk Factors of Non Communicable Diseases

Tobacco Smoking

Smoking, which is believed to be the number one major single known cause of non-communicable diseases, [49] is widespread around the world. Estimate of the World Health Organization (WHO) indicates that roughly about 30% of the global adult male populations are smokers.It is estimated that tobacco-related deaths exceed 4 million annually. It has been estimated that by 2030, diarrheal diseases and lower respiratory infections will have been surpassed by chronic obstructive airways diseases as causes of mortality[50-51]while the prevalence of tobacco use in many industrialized nations is reducing; there is a growing epidemic of smoking in the developing world. In many African countries, there is paucity of data on the epidemiology of tobacco and smoking. Based on the available data however, in African countries, it appears smoking among adults is more common among males and the poor.[52] An estimated 4.8 million deaths cases worldwide in 2000 was believed to have occurred due tobacco smoking, particularly occurring in developing countries.[53] Globally, an estimate of 250 million of today's children is expected to die from tobacco-related diseases.[54]Hublet et al, 2006 have studied and reported on daily

cigarette smoking among adolescents in Europe. Daily cigarette smoking was 5.5% and 20.0% among boys in Sweden and Latvia respectively. Among girls, daily smoking was 8.9% and 24.7% in Poland and Austria repectively.[55]In sub-Sahara Africa, data on national smoking prevalence ranges from 20% to 60% among men. Rate of smoking among certain sub-Sahara African youth has been documented. A prevalence rate of 1,4% in Zimbabwe,1.5% in Nigeria,34.4% in Cape Town, South Africa which exhibit a steadily increase and that must need an attended.[56] In Kenya, a study into a Global Youth Tobacco Survey document a rate of 7.2% cigarette smoking among school-going children and 8.5% of other tobacco related products.[57]A similar study on modifiable risk factors for coronary heart diseases among young people in Ethiopian (15-25 years of age) residing in Addis-Ababa was 11.8% for males and 1.1% for females in 1995[58].Prevalence of tobacco smoking in Kampala and Lilongwe among adolescents was 5.6% and 6.2% respectively[59] .In Tanzania , a population based study into smoking prevalence demonstrated smoking to be more common in men than women. A prevalence of 27% tobacco smoking among males and 5% in females was reported.[60] Studies have shown that an estimated 50% adolescents who start smoking become regular smokers(WHO,2000).About 50% of those who continue to smoke during adulthood die from diseases associated with smoking.[61] Various categories of smoking exist which must be considered in estimating an extent of smoking related infections. A study into Prevalence and determinants of Adolescent tobacco smoking in Addis Ababa, Ethiopia indicate an overall prevalence of 2.9% of which 4.5% males and 1% females were current smokers. The same study also reports an estimated 15.1% males and 5.7% females ex-smoking status among the population.[62]On comparative assessment, several studies document a higher prevalence of smoking among males than females.[63] In Ghana specific, little is known about prevalence of smoking. Before the year 2003, no National data was available on prevalence of smoking among adults. The 2003 Ghana Demographic Health Survey estimated smoking prevalence in men aged 15 to 19 to be only 0.7% [64]Global Youth Tobacco Survey(GYTS) also documented smoking prevalence rate of 4.8% among 1,917 Ghanaian school children between the ages of 11-16 years in 2000.Males smoker were more than females (5.3% versus 3.8%).[65]

Unhealthy Diet

Behavior Measures Results of observational studies and clinical trials document an association between sodium chloride (NaCl) intake and blood pressure.The effect of NaCl on blood pressure increases with age, with the height of the blood pressure, and in persons with a family history of hypertension. Among population groups, age related increments of blood pressure and the prevalence of hypertension are related to NaCl intake.[66]In societies with high potassium intakes, both mean blood pressure levels and the prevalence of hypertension tend to be lower than in societies with low potassium intakes.[67]Meta-analysis of clinical trials have concluded that oral potassium supplements significantly lower both systolic and diastolic blood pressure.[68] Within and among populations, as with potassium, there is an inverse association between dietary calcium intake and blood pressure, and low calcium intake is associated with an increased prevalence of hypertension.[64] A study by Maham et al in India indicates that majority(93.2%) of the subjects (190) incorporated into a study of risk factor profile of noncommunicable diseases in an industrial productive had low daily intake of vegetables and fruits.

Physical Inactivity

Physical inactivity is known to be a major public health problem of concern in 2000 as physical activity levels of people of all ages tended to diseases.[69] The centers for Diseases and control (CDC 2001)reported that, among the youth is America aged 12 and 13 years,69% were regularly active. However, the number dropped to 38% for young people between the ages of 18-21 years. A physically inactive child is more likely to become a physically inactive adult, which could lead to chronic diseases of lifestyle.[70] Patterns of inactivity, also known as sedentism , begin early in life, making the promotion of physical activity among children imperative.[71] The prevalence of physical inactivity among youth worldwide has increased. In the international level,67% of young children in Canada did not meet the average physical activity guidelines to achieve optimal growth and development.[72]

High BMI/obesity

Body mass index (BMI) is an important correlate of blood pressure and hypertension prevalence. By the current World Health Organization[73]criteria,a BMI <18.5kg/m2 is considered underweight, 18.5-24.9 kg/m2 ideal weight and 25-29.9 kg/m2 overweight

or pre-obese. The obese category is sub-divided into obese class I(30-34.9kg/m2),obese class II(35-39.9kg/m2) and obese class III(≥40kg/m2).A BMI greater than 28kg/m2 in adults is associated with a three to four-fold greater risk of morbidity due to T2DM and CVDs than in the general population.[74]Obesity which is defined as a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health is impaired[75] in absolute terms, and its distribution in the body-either around the waist and trunk (abdominal, central or android obesity) or peripherally around the waist and trunk (abdominal, central or android obesity) or peripherally around the body (gynoid obesity)-has important health implications. A central distribution of body fat is associated with a higher risk of morbidity and mortality than a more peripheral distribution.[76] Measurement of the waist circumference, measured at the midpoint between the lower border of the rib cage and the iliac crest, [77] or the waist; hip ratio(WHR) provide useful indices of abdominal fat accumulation and a better correlation with an increased risk of ill health and morality than BMI alone.[78]An abdominal girth in excess of 108cm (40 inches) for men and 98 cm(35 inches) for women or a WHR > 1.0 and 0.85 in men and women, respectively, are the currently accepted indicators of excessive abdominal fat accumulation which correlated with a substantial increased risk of metabolic complications.[79] There is presently a global epidemic of obesity in all age groups and in both developed and developing countries. In 1995, there were an estimated 200 million obese adults worldwide. As of 2000, the number of obese adults had increased to over 300 million. In developing countries, it is estimated that over 115 million people suffer from obesity-related problems.[80]

High Blood Pressure

Blood pressure is considerably lower in children than in adults and increases steadily throughout the first two decades of life. In adults, cross-sectional and longitudinal surveys have shown that systolic and diastolic blood pressure increase progressively with age. For example, in the WHO MONICA survey, systolic blood pressure increased by about0.29 to 0.91 mm Hg per year in men and 0.6-1.31 per year in women.[81] This increase remains stable and possibly declines after age 50 for diastolic but not for systolic blood pressure, leading to a steep increase in pulse pressure; a key risk factor for cardiovascular outcome.[82] These trends have been demonstrated in both genders and most ethnic groups.[83] Similarly, many studies document an increase in

hypertension prevalence with age.[84] In the United States based on NAHNES 1999-2002,hypertension prevalence increased from 6.7% in persons 20- 39 years to 65.2% in persons 60 years of older. The greatest increase in hypertension prevalence between 1988-1991(57.9%) and 1999-2000(65.4%) occurred in individuals who are 60 years or older. According to a study in Ghana by Charles and Ellis (2006),on pre hypertension in the Ashanti Region, West Africa: An opportunity for early prevention of clinical Hypertension; documented 40% and 29% as a prevalence of both pre-hypertensive and hypertensive respectively with Pre-hypertension being more in non-hypertensive males than no-hypertensive females particularly people aged around 35 years.

2.5 Diseases among Different Ethnic Groups

The UK boasts a culturally diverse population with ethnic minorities accounting for almost 8% of the population in the 2001 census. This represented an increase in the percentage of ethnic members of the population by approximately 50% in the decade spanning 1991-2001.The largest ethnic minority group was Indians, followed by Pakistanis, mixed ethnic backgrounds, Black Caribbean's, Black Africans and Bangladeshis[85]It is clear that each populations group, either that determined by religion or ethnicity, has differences in terms of illness behavior, seeking assistance with health matters and beliefs about illness. Some of these processes are determined by culture and more work is required to understand these reasons. Furthermore, some diseases are more prevalent in certain ethnic groups-for example, cardiovascular-related illnesses are more prevalent in men from the Indian subcontinent. This has sparked a lot of interest, and programs to increase the detection of cardiovascular disease and its risk factors in ethnic groups are underway. Unsurprisingly, most of the surveys have focused on issues such as hypertension, diabetes mellitus and coronary heart diseases. Why these differences in predilection for illness exist across ethnic groups is unknown. Along similar lines it is important to remember that a large proportion of research is performed with cohorts that presently do not include enough ethnic minority patients, meaning that results may not necessarily correlated to patients from ethnic groups.[86]In 1999 and again in 2004,the Health Survey for England performed surveys on ethnic minority groups. Large-scale surveys like the health survey for England show that black and minority ethnic groups as a whole are more likely to report ill health, and that ill health among black and minority ethnic

people starts at a younger age than in the White British. There is more variation in the rates of some diseases by ethnicity than by other socioeconomic factors. However, patterns of ethnic variation in health are extremely diverse, and interlink with many overlapping factors.[87]

The survey reported the following:

- Ethnic differences in health vary across age groups, so that the greatest variation by ethnicity is seen among the elderly.
- Ethnic differences in health vary between men and women, as well as between geographical areas.
- Ethnic differences in health may vary between generations. For example, in some black and minority ethnic groups, rates of ill health are worse among those born in the UK than in first-generation immigrants.
- Pakistani, Bangladeshi and Black-Caribbean people report the poorest health.
- Pakistani women and Bangladeshi men were more likely to report the presence of a long-standing illness which limited them on a daily basis. Furthermore, the figures had increased in Pakistani women by almost 10% when compared with the results of the 1999 survey.
- Of more concern, all ethnic minorities reported a severe lack of support, especially people of Pakistani and Bangladeshi origin.
- Indian, East African, Asian and Black African people the same health as white British.
- Chinese people report better health.

Cancer

- Overall, cancer rates tend to be lower in black and ethnic minority groups.
- Those from South Asian, the Caribbean and Africa have lower mortality rates from lung cancer because of lower of smoking.
- The highest morality is in people from Ireland and Scotland.

Ischemic heart disease (IHD)

- South Asian men are 50% more likely to have IHD than men in the general population.
- Presence of HID and stroke is higher in men than women(as in the general population).

- Bangladeshis have the highest rates (followed by Pakistanis, then Indians and other South Asians).
- Men born in the Caribbean have a 50% higher mortality from stroke than the general population.
- Risk factors like smoking, blood pressure, obesity and cholesterol fail to account for all these ethnic variations, socioeconomic factors may play a part.

Cerebrovascular disease

- Black Caribbean men have a much higher prevalence of stroke-the risk is almost two thirds higher than the general population. Indian men also have a higher risk of stroke (relative risk 1.42).[88] However, high rates of stroke were also seen in Bangladeshi women, Pakistani women and Irish men.
- Furthermore, research from the USA suggests that ethnic minority patients have more severe strokes and may do less well in rehabilitation.[89]
- Interestingly, the prevalence of angina and stroke were lower in both Chinese men and women, especially in the latter group.

2.6 Increased burden of cardiovascular disease in ethnic minority groups

The high levels of cardiovascular mortality and morbidity in ethnic minority groups has been under much scrutiny. There are a number of theories as to what is the cause for the observed differences, including genetic variation and dietary influences. It is suggested that the risk factor profile is different in terms of intensity and prevalence, for example:

Diabetes mellitus

The 1999 and 2004 surveys both reported that the prevalence of diabetes is greater in men than women. The observed prevalence was markedly higher in Bangladeshi, Pakistani, Indian and Black Caribbean patients.[88] For the Bangladeshi and Pakistani population this represents an almost five times higher prevalence than the general population. There were no significant changes between the prevalence rates when the two surveys were compared. The prevalence of diabetes mellitus in Black Caribbean men was also similar to Indians. However, Black Caribbean women were noted to have the highest prevalence of diabetes mellitus amongst all women.

Hypertension

In the Health Survey for England 2001, the prevalence of hypertension was reported as over 25% in those over 40 years of age and nearly 50% in those aged 80 over in the general population.[90] Hypertension is more frequently encountered in ethnic minorities, although differences do not reach statistical significance.[91] The average blood pressure is different in the differing ethnic groups. Another difference is the development and presence of target organ damage-for example, Black Caribbean patients have an increased prevalence of left ventricular hypertrophy(a predicator of mortality and morbidity independent of other risk factors).[92]

Hyperlipidaemia

There is no clear evidence that a different in lipid levels exists between ethnic minorities. Despite this, plasma lipid concentrations are greater in patients of South Asian descent (ie; from the Indian subcontinent and East Africa).[93-94] this may explain the differences in prevalence of cardiovascular disease seen between them and the Black Caribbean population. Black Caribbean populations appear to have higher high density lipoprotein (HDL) fractions and lower triglycerides, where Pakistani and Bangladeshi men is are more likely to have low HDL levels. It is postulated that these changes probably represent genetic variations, eg polymorphism of hepatic lipase genes.[95]

Obesity

In the 1999 UK health survey, obesity and raised waist-hip ratio were higher in those with cardiovascular disease, and more so in Indian and Bangladeshi women.

Smoking

Smoking levels in men of ethnic minorities is similar to the general population with a reduction in smoking rates since 1999.The use of chewing tobacco is higher in people of Bangladeshi background, but the rates appear to have decreased in the 2004 survey.

CHAPTER-III
METHODOLOGY

3.1 Study Design

A cross-sectional study was conducted; which was focused on the assessment of the prevalence of hyperglycemia and determinants of the cardiovascular risk factors related to hyperglycemia among the Bihari people at a single point in a specified time. Considering the time period and resource availability, cross-sectional study design was most feasible.

3.2 Study Place

The selected study place was Geneva Camp, Mohammadpur which is under North Dhaka City Corporation. Total camp area is 136000 square feet and total population living here is 25000.The area is highly dense and overcrowded. On an average 9 to 10 people live in one room. The place was chosen as our study place as it isone of the the largest Bihari camps in Dhaka city.

3.3 Study Population

Study population was the Bihari people living in a stranded Pakistani camp (Bihari camp) at Mohammadpur, which is known as Geneva camp, Dhaka. It is thelargest Bihari camps in Bangladesh.

3.4 Study Period

The study was conducted from July 2014 to March 2015. Protocol writing took first 3months, preparatory activities including questionnaire development, training, pretesting were done for 2 months, data collection period was for 1month and the rest of the time was spent for data processing, analysis and report writing. Literature was reviewed during the whole study period.

3.5 Study Subjects

All the persons living in Geneva Camp aged more or equal to 30 years, both diabetic and non-diabetic (both sexes)who visited the data collection camp and were willing to participate in the study.

3.6 Sample Size

The prevalence of type 2 Diabetes Mellitus among general population of Bangladesh was 6.1% in 2010[5]. The following formula was used to calculate the sample

Sample size (n)=Z^2*p*q/d^2

Where z=1.96(95% confidence interval),

P=Prevalence

q= 1-p

d= error (precision)

estimated sample size by taking prevalence 6.1% and error =0.057,the sample size became of 284.we took it as 300.

3.7 Inclusion criteria

- The participants has to be self-declared (Biharies)
- Living in Geneva Camp, Dhaka.
- Age of the respondents is from 30 years and above.
- Willing to participate in the study.

3.8 Exclusion criteria

- Respondents who are below the age 30 yrs.
- Psychologically compromised
- Not willing to participatein the study.

3.9 Sampling Method

Purposive sampling technique was used for this study.

3.10 List of Key Variables

Socio-demographic Variables

Age

Sex

Religion

Marital Status

Education level

Employment

Monthly Household Income

Behavior Related variables

Smoker

Smokeless tobacco user

Vegetable and fruit serving per day

Protein diet per day

Extra salt intake per day

Alcohol intake

Physical activity level

Hypertension History

Duration of hypertension

Frequency of measurement of Blood Pressure over last 1 month

Biochemical variables

FBS(Fasting Blood Sugar)

2hrs after Blood Sugar (OGTT)

Total Cholesterol

Variable for Physical Measurement

Height

Weight

Blood Pressure

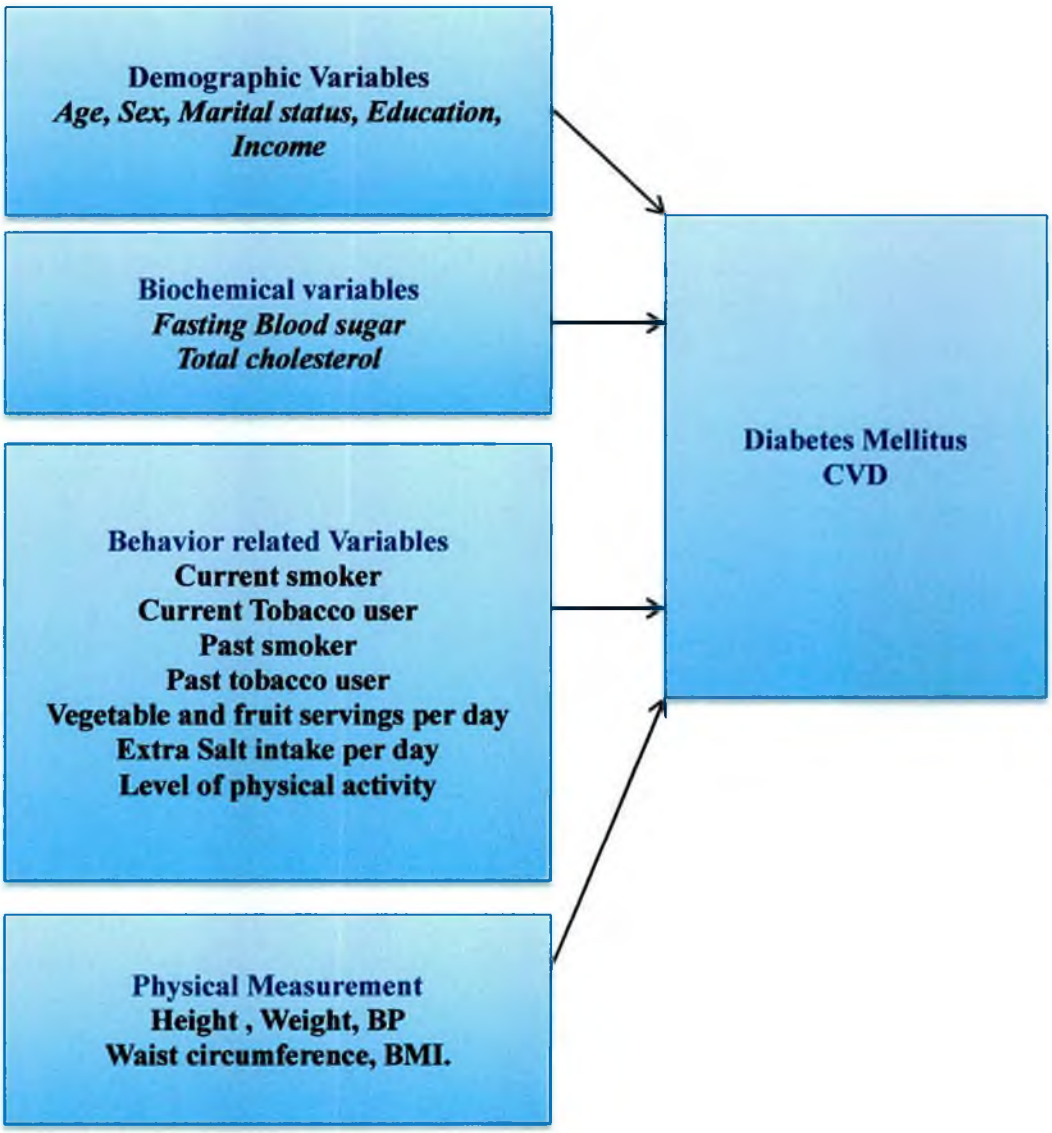
Waist circumference

Hip circumference

Waist Hip Ratio

BMI

3.11 Conceptual framework



3.12 Data Collection technique

This section describes briefly about the method used for data collection including interview of the respondents, anthropometric measurements, blood pressure measurement and blood sample collection.

Interview

The participants were interviewed face-to-face by using semi structured questionnaire. Informed consent was taken before interview and whole procedure was described prior to start interview. The interview took about 15 to 20 minutes including general information section, socio-demographic information included age, gender, religion,marital status education, occupation and economic status, behavioral variablesincluded tobacco use, alcohol consumption, dietary habit and physical activity, anthropometric measurements included height, weight, waist circumference, hip circumferences, blood pressure measurement and biochemical tests section including fasting blood sugar, oral glucose tolerance test (OGTT), total cholesterol. The participants were also asked about their medical history and dietary habit like fatty food intake,empty caloric drink intake,vegetable and fruits intake.

Anthropometric measurements

The participants were measured for anthropometric characteristics(Height, weight, waist circumference, hip circumference)

Weight

Weight was measured by a digital weight machine. It was calibrated daily with prop posture to the nearest 0.1 kg. Participants were requested to remove their shoes and extra weight and to wear light clothing. They then stood on the weight machine motionless and weight distributed equally on both legs.

Height

Height of the participants was taken by using measuring tape. During the measurement the participants stood straight in a plain surface touching the back with the wall surface with the head positioned straight, feet together, knee straight, and heels, buttocks and shoulder blades in contact with the surface of the wall, shoes wear off and arm by the sides.

Waist circumference

For waist circumference participants stood erect with the abdomen relaxed, arms at both sides, feet together and their weight equally divided over leg, the lowest rib margin and the iliac crest in the mid axillari line was located and marked. Then a tape was placed horizontally midway between the to points to measure waist circumference to nearest CM. Subject were asked to breath normally and the measurements were taken after expiration.

Hip circumference

The hip girth measurement was taken with minimal clothing at the level of the greatest protrusion of the gluteal (buttock) muscles, the subject stands erect with their weight evenly distributed on both feet and legs slightly parted, making sure not tensed the gluteal muscles. The tape was not to tight or too lose, was lying flat horizontally.

Blood pressure measurement

Blood pressure was measured in sitting position; with cuff at the level of the heart. After 5 minutes of rest a second reading was taken. The first sound denoted the systolic blood pressure, and the disappearance of the sound was taken as diastolic. If the difference of the two readings was more than 5 mm of Hg, a third reading was taken.

Blood sample Collection

All the participant were given a token followed by completion of the questionnaire where the name of the participants, age, ID number, scheduled time and date of blood sample collection were written clearly and also they were informed verbally. So all the pre-schedule date and time after coming to the camp, the fasting state of the participants were confirmed and 5 cc of venous blood was collected with aseptic precaution. After that the participant was given 75 gm of glucose in 520 ml of water and advice to drink in 3 to 5 minutes. Two hours after glucose administration 3 cc venous blood was collected. It was ensured that the participant was doing any vigorous physical activity and taking any food in this time period. Blood samples were collected following standard protocol. After 30 minutes blood samples were centrifuged for 10 minutes at 3000 rpm to obtain plasma and serum. Separated plasma and serum was preserved in a freezer (-25c) for future biochemical analysis.For

measuring total cholesterol, cholesterol meter and cholesterol strips have been used. Niddle has also been used for pricking the tip of the finger and we took one drop of blood on the cholesterol strip and waited for 160 seconds and got the results.

3.13 Data Collection Instruments

Data were collected using a semi-structured questionnaire and check-list. A list of variables of interest was made in relation to the objectives and collateral appropriate questions and scales were developed. List of questionnaire leaped out. The questions were constructed in simple Bangla. Pre-testing of questionnaire was done to see the understandably time consumption, consistency of questions and acceptability. After reviewing the outcome of the pre-testing, changes were incorporated accordingly. Check list was used to record anthropometric measurements and laboratory data.

Tools used for Data collection

- Measuring tapes were used to measure waist and hip circumferences
- Height measuring tape were used to measure body height
- Digital weight machines were used to measure body weight
- Sphygmomanometers were used to measure blood pressure
- Disposable syringe, cotton swabs, stripes, reagents were used for blood withdrawal
- Cholesterol meter and cholesterol strips were used for measuring total cholesterol.

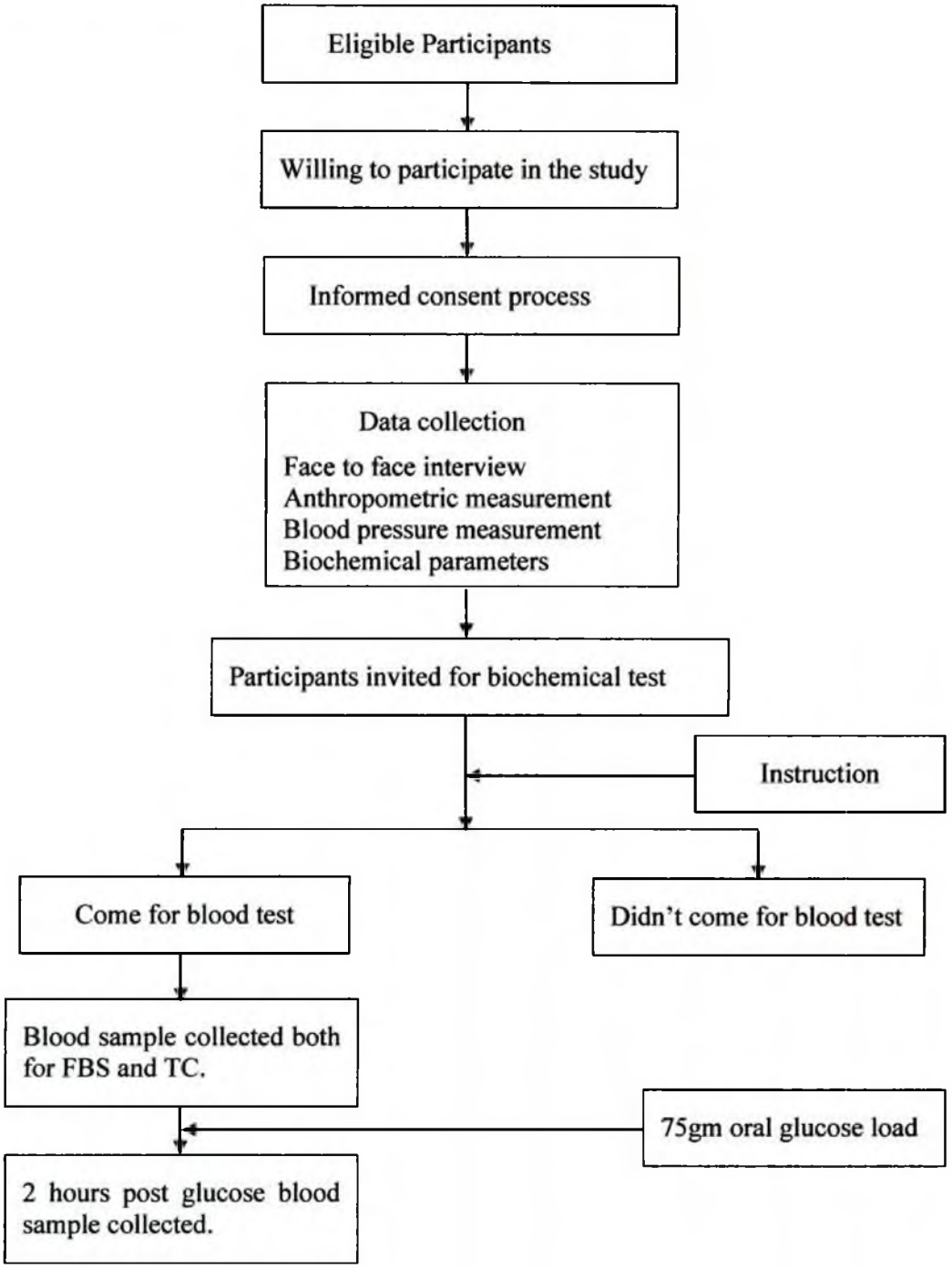
3.14 Training

At first a group of 8 data collectors was built on the basis of their experience of working in different study programmes, among them 4 people were physicians and remaining 4 people were physiotherapist. Four day long training has been given to them where they were informed about the objectives, outcome and benefits of the study, the way of interviewing, and process of using the instruments. One person was selected as a data collector supervisor whose main duty was to supervise every steps of data collection.

3.15 pretesting

Pretesting has been done among30 subjects for first two days to find out the validity and reliability of the questionnaire and the instrument. After that some errors were foundin questionnaire and it was corrected accordingly.

3.16 Flow diagram



3.17 Data processing

After collection data were checked thoroughly for consistency and completeness. Individual questionnaire was checked and cleaned to avoid any possible error. Data were initially checked on the day of collection to exclude any error or inconsistency or incompleteness. Data were categorized and coded during entry into SPSS software.It was started by the participant identification number and other properties of the variables. Then specific values were entered into each variable for each independent source of data. Data were cleaned by detection and correction of data set.

3.18 Data analysis

Data were analyzed using Statistical Package for Social Science (SPSS version 17). Univariate, bivariate and multivariate analysis was done. Statistical association between categorical variables were tested using chi square (x^2) test and mean difference of continuous variables by independent sample t-test to find out the association of socio-demographic status and risk factors of interest. A p-value of <0.05 was considered statistically significant.

3.19 Ethical consideration

Ethical approval was taken from BUHS Research Ethics Committee. Informed consent was taken from each participant. Confidentiality of the participants was strictly maintained. Questionnaires and laboratory documents were kept securely. Participants were given right to withdraw at any stage of the study. The study strictly followed the Helsinki declaration with confidentiality and anonymity of data. All the procedures were done with giving respect and dignity to the participants. The medical waste materials were disposed in proper way to ensure to safety of the researchers and subjects. The laboratory results were distributed to the study participants and advice was given to those having abnormal findings.

CHAPTER-IV
RESULTS

RESULTS

Socio demographic characteristics of the respondents:

Table-1: Socio-demographic characteristics of the sample population

Variables	Male (n=99)		Female (n=201)		Overall (n=300)	
	n	%	n	%	n	%
Age group						
30-59 years	46	46.5	117	58.2	163	54.3
50-69 years	42	42.4	71	35.3	113	37.7
70 years and above	11	11.1	13	6.5	24	8.0
Mean age (Mean±SD) years	50.9±13.2		45.4±12.5		47.2±12.9	
Educational status						
Illiterate	43	43.4	132	65.7	175	58.3
Primary	30	30.3	51	25.4	81	27.0
Secondary	18	18.2	16	8.0	34	11.3
Higher secondary	6	6.1	0	0.0	6	2.0
Graduation	2	2	2	1.0	4	1.3
Occupational Status						
Employed	36	36.4	11	5.5	47	15.7
Unemployed	27	27.3	16	8.0	43	14.3
Laborer	18	18.2	17	8.5	35	11.7
Housewife	0	0	-	69.7	141	47.0
Others	18	17.2	17	8.5	34	11.3
Working pattern						
Mostly Physical effort	65	65.7	163	81.1	228	76.0
Mostly mental effort	34	34.3	38	18.9	72	24.0
Monthly family income(BDT)						
<10000	87	87.9	185	92.0	272	90.0
10000-20000	9	9.1	12	6.0	21	7.0
20000-30000	1	1.0	4	2.0	5	1.7
Mean monthly family income (BDT)	7782±6928		-- 6583±4254		2 6979±5306	0.7

Table 1 shows Socio-demographic and economic characteristics of the study subjects. Regarding age group, in male it was found that Majority (46.5%) were in age group 30-59 followed by 50-69 yrs. (42.4%) and lowest (11.1%) were in age group 70+ yrs.Similarly in females Majority (58.2%) were in age group 30-59 followed by 50-69(35.3%) and lowest (6.5%) was in age group 70+. Mean age of the males was 50.9±13.2 and that of females was 45.4±12.5yrs.However mean age in combined group was 47.2±12.9 years. As regards educational status,in males majority(43.4%) were illiterate followed by Primary(30.3%) followed by secondary(18.2%) then higher secondary(6.1%) and Graduation(2%).Similar trend in educational status was observed in females being highest(65.7%), second highest (25.4%) as primary and lowest(1.0%) as graduates. Regarding occupational status, majority (36.4%) of males were employed followed by unemployed (27.3%), then laborers (18.2%).In females, majority (69.7%) were housewives followed by laborers (17%) and unemployed (16%) respectively. Working pattern in both males and females showed highest proportion with physical efforts being (65.7%) and (81.1%) respectively.

Table-2: Distribution of the respondents according to the family history of the chronic diseases (n=300)

Variables	Responses		Percent of Cases
	N	Percent	
Hypertension	72	24.7	36.0%
Heart disease	62	20.7	31.0%
Diabetes	108	38.0	54.0%
Cancer	9	3.0	4.5%
Chronic Respiratory disease	40	13.3	20.0%
Others	13	4.3	6.5%
Total		**104**	**152.0%**

**Multiple responses is counted here; N=no. of responses*

Table 2 shows distribution of respondents as per family history of chronic diseases. Majority (36%) respondents had family history of diabetes followed by Hypertension (24%) and then Heart disease (20.7%).Family history of cancer was reported by only 3% of the respondents.

Family history of Diabetes and hypertension:

Figure 1 shows family history of diabetes and hypertension of the respondents. Among males 35.4% had family history of diabetes and 25.3% had family history of hypertension. Among females 39.8% had family history of diabetes and 24.4% had family history hypertension. In both groups combined 38.3% had family history of diabetes and 24.7% had family history of hypertension.

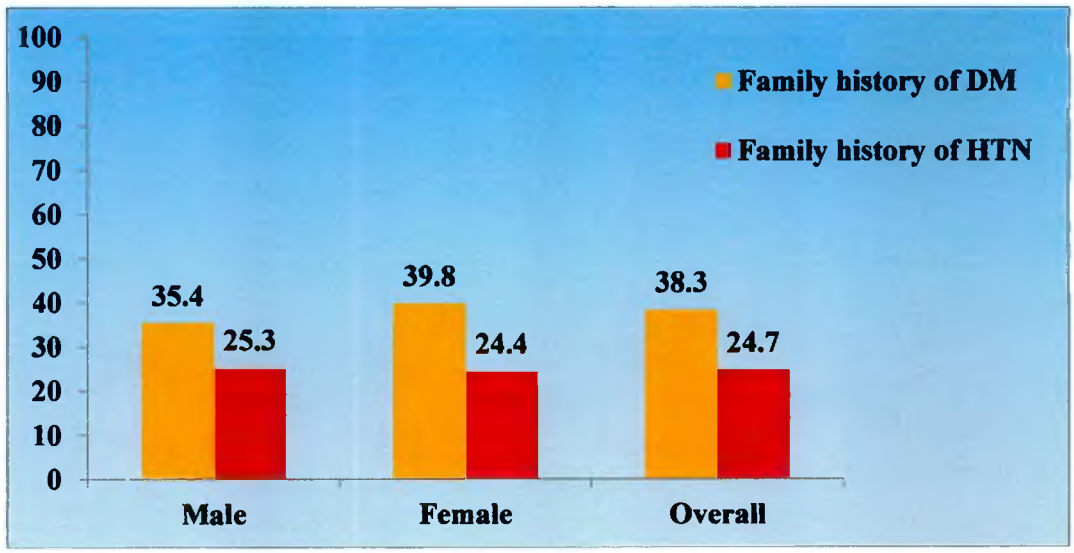


Figure-1: Distribution of the respondents according to family history of Diabetes and Hypertension.

Lifestyle behavior of the respondents:

Table 3 and 4 shows the lifestyle behavior of the respondents. It is found that 25% of males are current smokers compared to 1% of the females.Regarding past smoking 13.1% males were ex-smokers compared to 5.5% of the females. Never smokers in males were 61%.Average duration of smoking in males was 17.3±14.0 years compared to 1.0±0.0 years in females. Average number of sticks of Cigarettes or bidis per day was 5.3±4.0 in males compared to 1.0±0.0 in females (Table-3).

Table-3: Tobacco consumption characteristics of the participants

Variables	Male		Female		Overall	
	n	%	n	%	n	%
Smoking status						
Current smoker	25	25.3	2	1.0	27	9.0
Ex smoker	13	13.1	11	5.5	24	8.0
Never smoked	61	61.6	188	93.5	249	83.0
Average duration in years(for Current smoker)	17.3±14.0		1.0±0.0		16.1±14.1	
Average number of sticks cigarette or bidis per day(Current smoker)	5.3±4.0		1.0±0.0		4.9±4.0	
Smokeless tobacco consumption status						
Yes	41	41.4	57	28.4	98	32.7
No	58	58.6	144	71.6	202	67.3
If yes, types of smokeless tobacco used						
Zarda	22	53.7	45	78.9	67	68.4
Sadapata	2	4.9	3	5.3	5	5.1
Gul	15	36.6	4	7.0	19	19.4
Others	2	4.9	5	8.8	7	7.1
Pattern of Zarda intake						
Regular	15	68.2	32	71.1	47	70.1
Occasional	7	31.8	13	28.8	20	29.9
Pattern of Sadapata intake						
Regular	2	100	2	66.7	4	80
Occasional	Nil	Nil	1	33.3	1	20
Pattern of Gulintake						
Regular	9	60	4	100	13	68.4
Occasional	6	40	Nil	Nil	6	31.6
Average duration of Zorda, Sadapata, and Gul intake	18.5±14.5		8.9±9.5		12.9±12.7	
Alcohol intake status						
Yes	7	7.1	3	1.5	10	3.3
No	92	92.9	198	98.5	290	96.7

Regarding smokeless tobacco 41.4% of males were user of smokeless tobacco compared to 28.4% of females. Regarding types of smokeless tobacco majority (Males 53.7% and females 71.1%) were users of Zarda followed by Gull (males 36.6% and females 7.0%).Sadapata users were 4.9% in males compared to 5.3% in females. In combined group, consumption of Zarda, Gul and Sadapata was 68.4%, 19.4% and % respectively. Among the users of Zarda 68.2% males and 71.1% females were regular users. Among gull users 9(60%) males and 4(100%) females were regular users (Table-3).

Table-4: Distribution of respondents according to food habit

Variables	Male		Female		Overall	
	n	%	n	%	n	%
Average day of fruits intake in a week	2.1±1.2		1.8±1.0		1.9±1.1	
Average amount of fruits intake in a day (in a servings)	1.2±0.5		1.4±0.9		1.3±0.8	
Average day of vegetables intake in a week	4.6±1.9		5.3±1.8		5.1±1.9	
Average amount of vegetables intake in a day (servings)	2.0±0.8		1.8±0.6		1.9±0.7	
Follow WHO Recommended amount of fruits and vegetables intake (5 servings/day)						
Yes	3	3	4	2	7	2.3
No	96	97	197	98	293	97.7
Extra salt intake history						
Regular(daily)	26	26.3	54	26.9	80	26.7
Occasional	15	15.2	42	20.9	57	19.0
Never	58	58.6	105	52.2	163	54.3
Average day of fast food intake in a week	3.2±1.8		1.5±0.8		2.8±1.8	
Average day of street food intake in a week	3.1±1.5		2.7±1.5		2.9±1.5	
Average day of fatty rich food intake in a week	2.0±1.1		1.9±0.9		1.9±1.0	
Average day of empty caloric drinks intake in a week	3.3±2.1		1.8±1.6		2.4±1.9	

Regarding WHO Recommended amount of fruits and vegetables intake 97%males and 98% females did not take the recommended 5 servings of fruits and vegetables per day. Average servings of vegetables intake in a day was found to be 2.0±0.8 in males and 1.8±0.6 in females (Table-4).

Regarding extra salt intake 26.3% of males and 26.9% of females were found to be regular users and combindly, it amounts to 26.7%.Occasional users of extra salt was found to be 15.2% in males and 20.9% in females (Table-4).

In both males and females weekly average days of intake of fast food, street food, fatty rich food and empty caloric drinks was found to be 2.8±1.8, 2.9±1.5, 1.9±1.0 and 2.4±1.9 respectively (Table-4).

Table-5: Distribution of respondents according to physical activities

Variables	Male		Female		Overall	
	N	%	n	%	n	%
Physical activity status						
Yes	62	62.6	129	64.2	191	63.7
No	37	37.4	72	35.8	109	36.3
Types of physical activity						
Moderate intensity activity	62	100	129	100	191	100
Heavy intensity activity	Nil	Nil	Nil	Nil	Nil	Nil
Average day of moderate physical activity in a week	6.4±1.2		5.7±1.7		6.0±1.6	
Average minutes of moderate physical activity in a day (in minutes)	50.0±37.7		45.6±38.5		47.0±38.2	
Do WHO recommended physical activity (150 minutes in a week)						
Yes	48	48.5	74	36.8	122	63.9
No	51	51.5	127	63.2	69	36.1

Table -5 shows physical activity status of the respondents. Regarding physical activity status performance of physical activities in male and females was found to be almost equal (62.6% and 64.2% respectively.) and all with moderate activity and none with heavy activity. Average day of moderate physical activity in a week in males and females was found to be 6.4±1.2 and 5.7±1.7 respectively. Average minutes of moderate physical activity in a day in males and females were observed to be 50.0±37.7 and 45.6±38.5 respectively. Performance of WHO recommended physical activity (150 minutes in a week) in males and females was observed to be 48.5% and 36.8% respectively.

Anthropometric, Metabolic and physiological measurements:

Table 6 shows anthropometric and physiological measurements of the respondents. Mean height of the males was 161.1±7.1cm compared to 147.7±7.2 cm in females. Mean BMI of males was 24.4±4.1 Kg/m^2 compared to 27.1±5.1 Kg/m^2 in females. Overweight was observed in 39.4% of males compared to 17.4% in females. Obesity was found in 19.2% of males compared to 44.3% of females.Mean waist circumference(cm) in males was 91.9±11.9cm compared to 90.2±12.0cm in females. Risky waist circumference (>90 cm) observed in 49(49.5%) males compared to that (>80cm) in 160 (79.6%) of females. Waist Hip ratiowas observed to be 0.95±0.05 compared to 0.91±0.06 in females.

Table-6: Anthropometric, metabolic and physiological measurement of the respondents

Variables	Male (n=99)		Female (n=201)		Overall (n=300)	
	n	%	n	%	n	%
Mean height (cm)	161.1±7.1		147.7±7.2		152.1±9.6	
Meanweight (kg)	63.5±12.5		59.1±11.7		60.6±12.1	
MeanBMI (Kg/m^2)	24.4±4.1		27.1±5.1		26.2±4.9	
Nutritional Status by BMI category						
Underweight	5	5.1	2	1.0	7	2.3
Normal weight	36	36.4	35	17.4	71	23.7
Over weight	39	39.4	75	37.3	114	38
Obese	19	19.2	89	44.3	108	36
Mean waist circumference(cm)	91.9±11.9		90.2±12.0		90.8±12.0	
Waist circumference male						
Normal(<90cm in males and <80cm) in females)	50	50.5	41	20.4	91	30.3
Risky(>90cm in male;>80cm in female)	49	49.5	160	79.6	209	69.7
Hip circumference (cm)	97.3±11.4		98.9±11.8		98.4±11.7	
Waist Hip ratio	0.95±0.05		0.91±0.06		0.93±0.06	
Nutritional Status by WHR category						
Normal	12	12.1	28	13.9	40	13.3
Risky	87	87.9	173	86.1	260	86.7
Average Systolic blood pressure (mm of Hg)	126.4±17.7		118.7±15.8		122±16.8	
Average Diastolic blood pressure (mm of Hg)	77.2±9.9		75.0±9.5		76.1±9.7	
Blood pressure status of the respondents						
Hypertensive	28	28.3	40	19.9	68	22.7
Normotensive	71	71.7	161	80.1	232	77.3

Table-7: Biochemical features

Variables	Male		Female		Overall	
	n	%	n	%	n	%
Glycemic status of the respondents according to OGTT blood glucose						
Normal	58	58.6	100	49.8	158	52.7
IGT	17	17.2	37	18.4	54	18
Diabetes	24	24.2	64	31.8	88	29.3
Mean fasting blood glucose (mmol/L)	7.0±4.0		7.5±4.0		7.3±4.0	
Mean blood glucose after 75 mg glucose intake 2 hours after	9.6±5.9		10.1±5.6		9.85±5.75	
Mean total cholesterol	197.1±41.4		201±49.8		200.4±47.2	
Blood lipid status of the respondents						
Normal	53	53.5	110	54.7	163	54.3
Hyperlipidemia	46	46.5	91	45.3	137	45.7

Nutritional Status by WHR category in case of males was risky in 87.9% respondents compared to 86.1% of the females (Table-6). Regarding blood pressure status of the respondent's hypertension was observed in 28.3% of males compared to 19.9% of females (Table-6). According to OGTT,blood glucose in case of males 58(58.6%), 17(17.2%) and 24(24.2%) were found to be normal, IGT and Diabetic respectively. I case of females 100(49.8%), 37(18.4%) and 64(31.8%) were observed to be normal, IGT and Diabetic respectively.

Regarding Blood lipid status of the respondents46.5% of the males were hyperlipidemia (>200 mg/dl) compared to 45.3% of the females. Mean cholesterol in males was 197.1±41.4 mg/dl compared to that in females was 201±49.8 mg/dl (Table7).

Glycemic status:

Figure- 1shows the glycemic status of the respondents. Based on reading of fasting blood glucose 70% of males and 63% females were found to be normal and only 2% of females were regarded as impaired fasting glucose(IFG).Thirty percent of males were found as diabeticcompared to 35% of females.

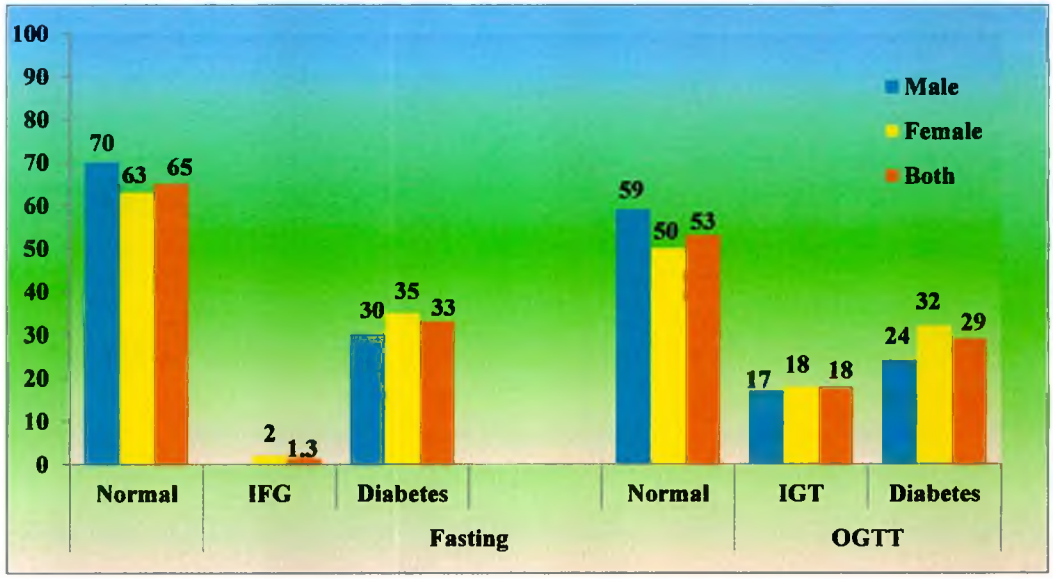


Figure-2: Distribution of the respondents according to their glycemic status

Based on Oral glucose tolerance test (OGTT) 59% males and 50% females were found normal. IGT was observed in 17% of males compared to 18% of females. Diabetes was observed in 24% males and 32% of females and combindly it was 29% (in both males and females).

Inferential statistics:

Relationship between different risk factors with hyperglycemia was examined. Chi squared test or t-test was applied wherever applicable. Significant relationship was found in case of age group, highest cases of hyperglycemia was in age group 30-59 year age group compared to other groups. There was also significant relationship in respect of physical exercise status, 65% of the respondents, 65.7% respondents did not do any physical exercise that had hyperglycemia compared to 33.6% respondents who did physical exercise and had hyperglycemia. It was also observed that there is significant relationship in respect of hypertension and hyperglycemia.

Table-8:Relationship between the hyperglycemia with different risk factors (n=300)

Variables	Hyperglycemia		χ^2/t-value	p-value
	Yes n(%)	No n(%)		
Sex				
Male	58 (58.6)	41 (41.4)	2.07	0.150
Female	100 (49.8)	101 (50.2)		
Age group				
30-59 years	104 (63.8)	59 (36.2)	26.42	0.001*
50-69 years	38 (33.6)	75 (66.4)		
70 years	16 (66.7)	8 (33.3)		
Smoking status				
Current smoker	12 (44.4)	15 (55.6)	1.05	0.591
Ex-smoker	14 (58.3)	10 (41.7)		
Never smoked	132 (53.0)	117 (47.0)		
Alcohol intake status**				
Yes	6 (60.0)	4 (40.0)	0.22	0.753
No	152 (52.4)	138 (47.6)		

Variables	Hyperglycemia		χ^2/t-value	p-value
	Yes n(%)	No n(%)		
Recommended fruits and vegetables intake**				
Yes	3 (42.9)	4 (57.1)	0.27	0.711
No	155 (52.9)	138 (47.1)		
Do recommended physical activity				
Yes	41 (33.6)	81 (66.4)	29.97	0.001*
No	117 (65.7)	61 (34.3)		
Hypertension				
Yes	22 (32.4)	46 (67.6)	14.56	0.001*
No	136 (58.6)	96 (41.4)		
Nutritional status of the respondents*				
Underweight	5 (71.4)	2 (28.6)	10.53	0.012*
Normal weight	47 (66.2)	24 (33.8)		
Over weight	60 (52.6)	54 (47.4)		
Obese	46 (42.6)	62 (57.4)		
Hyperlipidemia				
Yes	101 (62.0)	62 (38.0)	12.37	0.001*
No	57 (41.6)	80 (58.4)		
Extra salt intake				
Regular	48 (60.0)	32 (40.0)	7.69	0.021*
Occasionally	36 (63.2)	21 (36.8)		
Never	74 (45.4)	89 (54.6)		

***Fisher's Exact test was done, $p<0.05$ considered as a level of significance, *=significant*

Significant relationship was also observed in case of nutritional status, hyperlipidemia and extra salt intake with hyperglycemia (Table-8).

Binary logistic regression analysis:

Relationship between different risk factors and hyperglycemia was also examined(Table-6).It was found that, there is significant relationship with respect to sex (p= 0.017), hyperlipidemia (p=0.019),hypertension (p=0.054),Age (p=0.001),physical activity(p=0.001) (Table9).

Table-9 Relationship between the hyperglycemia with different risk factors (n=300) by binary logistic model

Variables	B	p-value	OR	95% CIfor OR	
				Lower	Upper
Sex					
Male			Ref		
Female	0.773	0.017*	2.166	1.148	4.084
Recommended fruits and vegetables intake					
No			Ref		
Yes	-0.465	0.589	0.628	0.116	3.390
Hyperlipidemia					
No			Ref		
Yes	0.657	0.019*	1.929	1.112	3.347
Hypertension					
No			Ref		
Yes	-0.652	0.054*	0.521	0.269	1.010
Nutritional status by BMI					
Underweight			Ref		
Normal weight	-0.230	0.810	0.795	0.122	5.157
Over weight	0.471	0.617	1.602	0.252	10.167
Obese	0.831	0.383	2.297	0.355	14.858
Age	0.043	0.001*	1.044	1.021	1.068
Monthly family income	0.000	0.787	1.000	1.000	1.000
Extra salt intake					
Never			Ref		
Regular	-0.331	0.321	0.718	0.373	1.382
Occasionally	-0.466	0.200	0.628	0.308	1.280
Do recommended physical Activity					
No			Ref		
Yes	1.553	0.001*	4.725	2.654	8.410
Constant	**-2.779**	**0.044***	**0.062**		

*p<0.05 considered as a level of significance, *=significant*

CHAPTER-V
DISCUSSION

DISCUSSSION

The study was done to determine the prevalence of hyperglycemia (Diabetes Mellitus) among Bihari population in Dhaka city and the cardiovascular risk factors associated with it. A cross-sectional community based study was conducted among 300 adult (≥30 years) males and females. Apart from selective anthropometric measurement, information on various factors such as smoking and alcohol consumption, food habit, physical activity, family history of chronic diseases and different biochemical markers which are attributable to diabetes were also obtained from the respondents through a semi structured questionnaire.

The mean age of the participants in current study was 50.9 years for male and 45.4 years for female. The highest numbers of respondents were in between 30-59 years of age group. Regarding the diabetes, according to OGTT higher prevalence was observed in females which are 31.8% and in males it is 24.2%.Similarly according to fasting blood glucose higher prevalence was observed in female 34.8% whereas in males it was 34.8%. Higher prevalence was observed in 30-59 age group overall which is consistent with previous study findings for developing countries that most people with diabetes are aged between 45 and 64 years [96].The literacy rate is very poor in the population. It was found that 175(58.3%) out of 300 subjects had no formal education whereas only 1.3% was found with graduation or higher education. It was observed that 27(27.3%) persons were unemployed in males and 16(8%) in females. In female 140(69.7%) were involved in domestic tasks (housewife) predictive of less productivity, though only 11(5.5%) were engaged in skilled occupation. The male skilled worker ratio is more than female worker which indicating gender discrimination among the Behari peoples. Monthly family income is 7782±6928 (BDT) and 6583±4254 (BDT) among male and female respectively which is very low in amount. Numerous studies have found an inverse relationship between type-2 diabetes and education, occupation and income that is consistent across all adult age groups. Diabetic patients have less education, less employment and less income[97]. It is also found that Diabetes prevalence is more strongly associated with poverty[98].There is an inverse association between socioeconomic status and the prevalence of type2 diabetes in the middle years of life[99].In a study conducted in USA, Diabetes was over twice as prevalent among African-Americans (10.3%) as

compared to whites [4.6% ; odds ratio (OR) = 2.38; 95% confidence interval (95% CI):1.50, 3.75; P = 0.0001]. This finding suggests that exposure to factors that are implicated in the causation of diabetes is more common in deprived areas as well as has racial difference[100].About 9% (27 persons) of the respondents in the current study have been known to be smokers and all of them were male. It is interesting that no female respondent was found with the habit of smoking. Whereas it is alarming that 32.7% (98) respondent are taking smokeless tobaccos; among them 41.4% and 28.4% were male and female respectively. In a previously conducted study it was found that among those current smokers who had smoked $\geq$ 2 packs/day diabetes rate is higher in them than who had never smoked. The chance of diabetes is 45% in-case of men and 74% in-case of women. The men and women who had quitted cigarette for $\geq$ 5 years and $\geq$10 years respectively had same incidence rate as who had never smoked[101].However, in my study the association between smoking and diabetes was not found to be significant, indicating some error in measurement or may be due to small sample size.

In this study it was found that there was no association between smoking and diabetes. Considering the social and religious aspect of the study population in Bangladesh, the alcohol consumption seems to be very low among the respondents (10 persons which are 3.3% of total participants).Alcohol intake was found to be associated with risk of non-insulin-dependent diabetes mellitus specially in men[102].The same study showed that those who developed diabetes consumed more alcohol in the past week and in the past 24 hours. The explanation of the finding in my study may be due to the fact that it was a Muslim community who usually do not drink alcohol.

Family history may serve as a better predictor of diabetes risk than any other factors. In my study it was revealed that about 38.3% (115) of the studied population had positive family history of diabetes which accounts to 35.4% and 39.8%among male and female respectively. In the event of hypertension, the condition is little bit better. Around 24.7% study subjects have relatives having hypertension where 25.3% were in male and 24.4% were in female. Many studies have demonstrated the association between positive family history and type 2 diabetes. Knowler et al found that among the pima Indians, the incidence of type 2 DM was 2.3 times as high (p = 0.039)

insubjects with one diabetic parent and 3.9 times as high(p=0.0003) in those with two diabetic parents as in those with two non-diabetic parents[103].In an occupational cohort of healthy Caucasian men with normal fasting blood glucose, Bjornholt et al found an increased risk associated with family history of diabetes and some evidence for a greater effect of maternal diabetes(RR=2.51, 95% CI= 1.55-4.07) compared with paternal diabetes(RR=1.41,95% CI = 0.66-3.05). Analysis was adjusted for fasting glucose, BMI, fitness, TGs and age[104].

In participants from the Framingham Offspring study, the age-adjusted risk associated with a history of maternal diabetes(OR-6.4,95% CI 2.3-4.9) was similar to that for paternal diabetes(OR=3.5,95% CI=2.3-5.2).The age-adjusted risk associated with both parents having diabetes was consistent with an additive risk model(OR=6.1),95% CI=2.9-13.0)[105]

In summary, most studies reported a twofold to six fold increased risk of type 2 diabetes associated with a positive family history compared with a negative family history of diabetes. These estimates are constantly elevated across different study designs and in several ethnic groups.[106] This study also supports these data and exhibits significant relationship among diabetes and positive family history of DM, HTN. Relevant nutritional measurements like BMI,WHR were taken from the study population which are very much related to causation of DM. American Diabetes Association(ADA) recognizes BMI$\geq$ 25 kg/m^2 as a risk factor for type2 DMI.[107] In my study,108 subjects (36%) were overweight. Among the obese population, 46 subjects 42.6% had abnormal glucose metabolism. Therefore, among the diabetes cases, 52.6% had BMI $\geq$ 25kg/m^2 .Two national surveys conducted by Bays et al revealed the relation between body mass index(BMI) and prevalence of diabetes mellitus, hypertension and dyslipidaemia. Increased BMI was associated with increased prevalence of diabetes mellitus, hypertension and dyslipidaemia in both studies and in each condition, more than 75% of patients had BMI$\geq$ 25kg/m^2 [108].My study supports this information though the rate is little bit low may be due to lesser sample size and difference in the background information of the participants of these two studies. Again it is found in this study that 260 participants(86.7%) had abnormal Waist Hip ratio which is alarming. Among them 46% subjects suffered from either DM or Glucose intolerance which validates the previous findings that increased WHR

is closely associated with increased risk of DM.[109] In this study among 300 participants 137(45.7%) were found with abnormal cholesterol level where prevalence of male and female was almost equal which was 46.5% and 45.3% respectively. In this study 101(62%) respondent with hyperlipidemia had abnormal glucose metabolism. It establishes the link between abnormal lipid with abnormal glucose metabolism. Hypertriglyceridemia, reduced high density lipoprotein (HDL),and small low density lipoprotein (LDL) particles characterize the dyslipidaemia associated with increased abdominal fat which is a risk factor for coronary artery disease (CAD),hypertension, stroke and type 2 diabetes. Individuals with type 2 diabetes accounts for 20-30%of early cardiovascular disease whereas familial combined hyperlipidaemia, accounts for additional 10-20%of premature CAD.[110] Once combined hyperlipidaemia is established both chronic hyperglycemia and hyperlipidemia can have deleterious effects on beta cell function. Prolonged exposure of pancreatic betacells to fatty acid increased basal insulin release but inhibits glucose induced insulin secretion.[111] Current guild lines recommend that the patient with DM should be aggressively treated for dyslipidaemia with the goal to maintain LDL below 2.6mmol/l, trigleceride below 1.7mmol/l and HDL above 1.02 mmol/l[112]. My study has been able to show significant link with total cholesterol. The LDL, HDL and TG could not be sorted due to lack of budget and laboratory support.

CHAPTER-VI
CONCLUSION AND RECOMMENDATION

7.1 Conclusion

- The prevalence of hyperglycemia in the study population was found to be 29.3% overall according to OGTT, which is much higher than that of the general population of Bangladesh in 2010.
- It is also higher than other sub groups of Bangladesh like tribes in hill tracts, suburban and rural population.
- The prevalence of IGT is also very high among the study population.
- Study shows there is strong association between hyperglycemia and age group (age group 50-69 showed significantly higher prevalence than other age groups).
- It was also found that there is strong association of hyperglycemia with hypertension.
- Significant relationship was also observed in case of nutritional status, hyperlipidemia and extra salt intake with hyperglycemia.

7.2 Recommendation

The result of this study should be taken under consideration though the sample size was low. Inadequate diet, low income, poor education, sedentary life style, and poor access to health care leads to several health problems including diabetes. So the health professionals and planners should introduce diabetes care among these minor ethnic groups. It is important to include these minor groups in the county's health policy.For prevention and control of Diabetes Mellitus in minor ethnic groups importance of the following recommendations are necessary.

- Setting up health care centers with feasible and acceptable diagnostic facilities along with referral system.
- Community mobilization is an important step which should be taken by the community and religious leaders.
- More and more research should be done on different burning issues especially on noncommunicable diseases among the minor ethnic groups.
- Research including both genetic predisposition and behavioral along with socio-demographic factor identification should be done. These should be the concern of the policy makers, clinical personals, and future researchers.

CHAPTER-VII
REFERENCES

REFERENCES

1 Mbanya JCN , Sobngwi AA. Motala E, Assah EF, Enora ST, Diabetes in sub-Saharan Africa. Lancet 375. 201022542266.

2 International Diabetes Federation. Diabetes Atlas. 4th edn. Brussels: International Diabetes Federation; 2010.

3 Yusuf S, Hawken S, Ounpuu S, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. Lancet. 2004;364:937–52.

4 World Health Organization. Obesity and overweight. Fact sheet no. 311. http://www.who.int/mediacentre/factsheets/fs311/en/index.html (accessed 15 January 2015).

5 Wild S, Roglic G, Green A, et al.Global prevalence of diabetes: estimates for the year 2000 and projections for 2030.Diabetes Care. 2004 May;27(5):1047-53.

6 Global health risks. Mortality and burden of disease attributable to selected major risks. Geneva, World Health Organization, 2009.

7 Global status report on noncommunicable diseases 2010. Geneva, World Health Organization, 2011.

8 Jaime A. Davidson, Christopher G. Parkin, Is Hyperglycemia a Causal Factor in Cardiovascular Disease? Does proving this relationship really matter? Yes. Diabetes Care November 2009 vol. 32 no. suppl 2 S331-S333.

9 Magnusson R. Developing a global framework to address non-communicable diseases. Diabetes Voice. 2008;53:9–12.

10 Beaglehole R, Epping-Jordan J, Patel V, et al. Improving the prevention and management of chronic disease in low-income and middle-income countries: a priority for primary care. Lancet. 2008;372:940–49.

11 Jeon CY, Murray MB. Diabetes Mellitus Increases the Risk of Active Tuberculosis: A Systematic Review of 13 Observational Studies. PLoS Med. 2008;5:e152. doi:10.1371/journal.pmed.0050152.

12 Daar AS, Singer PA, Persad DL, et al. Grand challenges in chronic non-communicable diseases. Nature. 2007;450:494–96.

13 United Kingdom Department for International Development (DFID) Research Strategy 2008–2013. London: DFID; 2008.

14 World Health Organization. 2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases. Geneva: World Health Organization; 2008.

15 Anonymous. Diabetes – a global threat. (Editorial) Lancet. 2009;373:17.

16 International Diabetes Federation. Diabetes atlas. http://www.diabetesatlas.org/content/africa (10 January 2010, date last accessed)

17 Nunn AJ, Mulder DW, Kamali A, Ruberantwari A, Kengeya-Kayondo JF, Whitworth J. Mortality associated with HIV-1 infection over five years in a rural Ugandan population: cohort study. BMJ. 1997;315:767–71.

18 Magnusson R. Developing a global framework to address non-communicable diseases. Diabetes Voice. 2008;53:9–12.

19 WHO. Global status report on noncommunicable disaeses 2010. Geneva World Health Organization.

20 WHO. Cardiovascular Diseases(CVDs), Facts sheet: Geneva; [2013/08/22].

21 Bangladesh NCD Risk Factor Survey. Report on noncommunicable disease 2010.

22 Country reports on human rights practices, U.S. Department of State.2003-2004.

23 Alkinson MA and Eisenbart GS Type 1 diabetes: new perspective on disease pathogenesis and treatment.Lancet 2001 ;358 :221-229.

24 Cavaghan MK, Ehrmann DA and Polonsky KS. Interaction between insulin resistance and insulin secretion in the development of glucose intolerance. J clin invest 2000;106-32.

25 Zimmet P.Diabetes epidemiology as a trigger to diabetes research. Diabetologia 1999;4

26 Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes :estimates for the year 2000 and projections for 2030. Diabetes Care 2004;27 :1047-53.

27 International Diabetes Federation . Diabetes Atlas, 2nd ed. Brussels, Belgium, 2003

28 Narayan KMV, Zhang P, Kanaya AM, Williams DE, Engelgau MM, Imperatore G, and Ramachandran A. Disease Control Priorities in Developing

Countries. Diabetes : The Pandemic and Potential Solutions, Chapter -30.

29 World Health Organization : World Diabetes :A news Letter. September 2003, p 3-6.

30 WHO (World Health Organization).Global Burden of Disease for the Year 2001 by World Bank Region , for Use in Disease Control Priorities in Developing Countries. 2nd ed . 2004. http:// www.fic.nih.gov/dcpp/gbd.html.

31 Ryerson B, Tierney EF, Thompson TJ, Engelgau MM, Wang J, Gregg EW, et al. Excess Physical Limitations among Adults with Diabetes in the U.S. population,1997-1999.Diabetes Care 2000;23(9):1272-77

32 Gregg EW, Beckles GL, Williamson DF, Leveille SG, Langlois JA, Engelgau MM, et al . Diabetes and Physical Disability among Older U.S. Adults. Diabetes Care 2000;23(9):1227-77.

33 Geiss LS, Herman WH, and Smith PJ. Mortality among Persons with Non-Insulin Dependent Diabetes. In Diabetes In America,2nd ed. National Diabetes Data Group, 233-58. Bethesda, MD: National Institute of Health,1995.

34 Hussain A, Vaaler S, Sayeed MA, Mahtab H, Ali SMK, Khan AKA. Type 2 diabetes and impaired fasting blood glucose in rural Bangladesh ; a population based study. The European Journal of Public Health 2006.

35 Rahim MA, Hussain A, Khan AKA, Sayeed MA, Ali SMK, Vaaler S. Rising prevalence of type 2 diabetes in rural Bangladesh : A population based study . Diabetes Research & Clinical Practice 2006; 77(2): 300-305.

36 Sayeed MA, Mahtab H, Khanam PA, Latif ZA, ALI SMK, Banu A, Ahren B, Khan AKA. Diabetes and impaired fasting glycemia in a rural population of Bangladesh. Diabetes Care 2003; 26; 1034-1039.

37 Sayeed MA, Ali L, Hossain MZ, Banu A, Rumi MAK, Khan AKA. Effect of socioeconomic risk factors on the difference in prevalence of diabetes between rural and urban population of Bangladesh. Diabetes Care 1997;20:551-555.

38 Hussain A, Rahim MA, Khan AKA, Ali SMK, Vaaler S. Type 2 diabetes in rural and urban population :diverse prevalence and associated risk factors in Bangladesh. Diabetic Medicine 2005; 22: 931-936.

39 Rich SS. Mapping Genes in Diabetes. Genetic Epidemiology Perspective .Diabetes 1990; 399(11):1315-19.

40 Haffner SM. Epidemiology of Type 2 Diabetes : Risk Factors. Diabetes Care

1998; 21(Suppl.3):C3-6.

41 Ford ES, Williamson DF, and Liu S. Weight Change and Diabetes Incidence: Findings from a National Cohort of U.S. Adults. American Journal of Epidemiology 1997;146(3):214-22.

42 Yajnik, CS. The Insulin Resistance Epidemic in India: Fetal Origins, Later Lifestyle, or Both? Nutrition Reviews 2001:59 (1,part1):1-9.

43 Centres for Disease Control and Prevention. National diabetes fact Sheet: general information and national estimates on diabetes in the United States,2005. Atlanta, GA: U.s> Departmant of Health and Human Services, Centers For Disease Control.

44 Glendenning PN, Hearne SA, Segal LM, et al. F as in fat: How obesity policies are failing in America. Trust for America's Health,2005.at http://healthyamericans.org/reports/obesity2005/obesity2005Report.pdf (accessed on 25th feb.2015).

45 Hu FB, Li TY, Colditz GA, Willett WC, and Manson JE. Television watching and Other Sedentary Behaviours in Relation to Risk of Obesity and Type 2 Diabetes Mellitus In Women. Journal of the American Medical Association 2003; 289(14):1785-91.

46 Rowley KG, Best JD, McDermott R, Green EA, Piers LS, and O'Dea K. Insulin Resistance Syndrome In Australian Aboriginal People. Clinical and Experimental Pharmacology and Physiology 1997; 24(9-10):776-81.

47 Williams DE, Knowler WC, Smith CJ, Hanson RL, Roumain J, Saremi A, et al.The Effect of Indian or Anglo Dietary Preference on the Incidence of Diabetes in Pim Indians. Diabetes Care 2001;24(5):811-16.

48 Everson SA, Marty SC, Lynch JW, and Kaplan GA. Epidemiologic Evidence for the Relation between Socioeconomic Status and Depression, Obesity, and Diabetes. Journal of Psychosomatic Research 2002;53 (4):891-95.

49 Juliet A, Liam S, David A L. Smoking Patterns In Ghanaian Civil Servants: Changes Over Three Decades.2006.

50 Center for Disease Control and Prevention . Increasing Physical activity: A Report on Recommendations of the Task Force on Community Preventive Services. Morbidity and Mortality Weekly Report 2001; 50:1-1.

51 Frantz J, Phillips J, Amosun S. Promotion of Physical Activity In South African

Youth –is it The Answer to the Public Health Burden of Chronic Disease? African Journal for Physical ,Health Education, Recreation and Dance 2003;9(2):200-207.

52 Summerfield L. Promoting Physical Activity and Exercise among Children.(1998) Available at http://www.kidssource.com. (accessed on 4th April,2014)

53 Canadian Fitness And Lifestyle Research Institute. Physical Inactivity Crisis of Children and Youth Continues to Worsen . February 2,1998.

54 Guo S, Roche A, chumlea W et al. The predictive Value of Childhood Body Mass Index Values For Overweight at Age 35.American Journal of Clinical Nutrition.1994;59:810-819.

55 Vorster HH. An Epidemiological Study of Hypertension and Its Determinants in a Population in Transition: The THUSA Study. Journal of Human Hypertension.2000;14:779-787.

56 Steyn N , Burger S, Monyeki KD . Seasonal Variation In Dietary Intake of The Adult Population of Dikgale. South African Journal of Clinical Nutrition.2001;14(4):140-145.

57 Bourne L, Lambert EV, Steyn K. Where does the Black Population of South Africa Stand on the Nutrition Transition? Public Health Nutrition.2002;5(1A):157-162.

58 Popkin BM. Urbanization ,Lifestyle Changes and the Nutrition Transition. World Development.1992;27(11):1905-1999.

59 Nieto FJ, Alonso J, chambless LE et al. Population Awareness and Control of Hypertension and Hypercholesterolemia. The Atherosclerosis Risk in Communities Study. Arch. Intern.Med. 1995;155:677-84.

60 Wassertheil-Smoller S, Anderson G, Psaty BM et al. Hypertension And Its Treatment In Postmenopausal Women: Baseline Data from the Women's Health Initiative.Hypertension.2000;36:780-89.

61 Ahluwalia IB, Mack KA, Murphy W et al. State Specific Prevalence of Selected Chronic Disease Related Characteristics – Behavioral Risk Factor Surveillance System,2001.Morbidity and Mortality weekly report 2003;52:1-80.

62 Cent D. Racial/Ethnic Disparities In Prevalence, Treatment and Control of Hypertension –United States,1999-2002. Morbidity and Mortality weekly report

2003.2005:54:7-9.

63 Betre M, Kebede D,Kassaye M. Modifiable Risk Factors for Coronary Heart Disease among Young People in Addis Ababa. East Afr Med J.1997;74(6):376-81.

64 Anon, Ghana. Results from the Demographic and Health Survey Studies in Family Planning 2005 jun;36(2):158-62.

65 Hajjar I, Jane MK, Theodore AK. Hypertension: Trends in Prevalence, Incidence, and Control.Annual Review of Public Health.2006;27:465-490.

66 Kirstie J, Edwards R, Mugusi F et al. tobacco Smoking In Tanzania, East Africa; Population Based Smoking Prevalence Using Expired Alveolar Carbon Monoxide As A Validation Tool. (2001).

67 World Health Organization. Mackey J, Ericksen M. Tobacco Atlas. 2002.

68 Emmanuel R, Abdurahman A, Adamson SM. Prevalence And Determinants of Adolescent Tobacco Smoking In Addis Ababa, Ethiopia, BMC Public Health. 2007; 7:176.

69 Addae S. History of Western Medicine in Ghana, 1880 – 1960. Durham: Durham Academic Press. 1996.

70 Pobee JOM. The Heart of The Matter. Community Profile of Cardiovascular Diseases Of A Sub – Saharan African Country 2006.

71 Amoah AGB, Owusu KO, Adjei S. Diabetes in Ghana: A Community Prevalence Study in Greater Accra. Diabetes Research and Clinical Practice, 2002; 56: 197-205.

72 Adubofour KOM, Ofei F, Mensah-Adubofour J et al, Diabetes in Ghana: A Morbidity and Mortality Analysis. International Diabetes Digest 1993; 4(3), 90-92.

73 Cappuccio FP, Micah FB, Emmett L et al. Prevalence, Detection, Management, and control of Hypertension In Ashanti, West Africa. Hypertension. 2004; 43(5) : 1017-22.

74 Cutler J, Macmahon S, Peto R et al. Blood Pressure, Stroke and Coronary Heart Disease. I, Prolonged Differences in Blood Pressure Lancet British Edition 1990.

75 Murray CJL, Lopez AD, Global Burden of Disease. Harvard, mA: Harvard School of Public Health, 1996. (Vol 1 of Global Burden Of Disease And Injury Series).

76 Pampel FC. Patterns Of Tobacco Use In The Early Epidemic Stages: Malawi And Zambia, 2000-2002. Am J Pub Health. 2002; 95: 1009-1005.

77 Ezzati M, and Lopez AD. Measuring The Accumulated Hazards of Smoking: Global and Regional Estimates For 2000 460. Tob Control 2003 mar; 12(1): 79-85.

78 Peto R. And Lopez AD. The Future Worldwide Health effects of Current Smoking Patterns. In Tobacco: Science, Policy And Public Health. New York: Oxford University Press; 2004.

79 Hublet A, De Bacquer D, Valimaa R et al. Smoking Trends Among Adelescents from 1990 to 2002 In Ten European Countries And Canada. BMC Public Health. 2006; 6:280.

80 Townsend L, Flisher AJ, gilreath T et al. A systematic Review of Tobacco Use among Sub-Saharan Africa Youth. Journal of Substance Use 2006, 11(4): 245-269.

81 Winkvist A, Barcos A, Berglund G et al. Public Health Nutrition, Cambridge Univ Press. 2007; Page 1. Diversity Of Dietary Patterns Observed In The European Prospective.

82 Garrow JS. Obesity and Releated Diseases. London: Churchill Livingstone; 1988. Pp.1-16.

83 Kissebah AH, Krakower GR, Regional Adiposity and Morbidity. Physiological Review.1994;74:761-811.

84 Han TS, Seidell JC, Currall JE et al. The Influences of Height and Age on Waist Circumferences as an Index of Adiposity in Adults. Int J Obes Relat Metab Disord. 1997;21:83-89.

85 Population of The United Kingdom: by ethnic group – Census 2001, Office for National Statistics.

86 Brindle P, May M, Gill P et al. Primary Prevention of cardiovascular disease: a web – based risk score for seven British black and minority ethnic groups.

Heart.2006 Nov;92(11):1595-602.

87 Ethnicity and Health. Parliamentary Office of Science and Technology 2007.

88 Rahim MA, Akhtar H, Khan AKA et al. Rising prevalence of type 2 diabetes in rural Bangladesh: A Population Based study.

89 Stansbury JP, Jia H, Williams LS et al. Ethnic disparities in Stroke :epidemiology, acute care, and post-acute outcomes. Stroke. 2005 Feb; 36(2):374-86.

90 Ghandehari H, Kamal-Bahl S, Wong ND. Prevalence and extent of dyslipidemia and recommended lipid level in US adults with and without cardiovascular comorbidities: The National Health and Nutrition Examination Survey 2003-2004.American Heart Journal 2008;156:112-9.

91 World Health Organization. Obesity: preventing and managing the global epidemic: Report on a WHO consultation 2000.

92 Khan JM, Beevers DG; Management of hypertension in ethnic minorities.Heart.2005 Aug;91(8):1105-9.

93 Health Survey for England 2004: The Health of Minority Ethnic Groups – headline tables.National Statistics/Health and Social Care information Centre,2005.p.1-59.

94 Ferdinand KC; Coronary artery disease in minority racial and ethnic groups in the United states. American Journal of Cardiology.2006 Jan 16;97(2A):12A-19A.

95 Kuller LH. Ethnic differences in atherosclerosis, cardiovascular disease and lipid metabolism. Curr Opin Lipidol.2004 Apr;15(2):109-13.

96 Yoon,K.-H.,et al.,Epidemic obesity and type 2 diabetes in Asia.The lancet,2006.368(9548):p.1681-1688.

97 Cowie,C.C. and M.S.Eberhardt,Sociodemographic characteristics of persons with diabetes.Diabetes in America,1995.2:p.85-116.

98 Robbins,J.M.,et al.,Socioeconomic status and type 2 diabetes in African American and non-Hispanic white women and men:evidence from the Third National Health and Nutrition Examination survey.American Journal of public Health ,2001.91(1):p.76.

99 Connolly,V.,et al., Diabetes prevalence and socioeconomic status:a population based study showing increased prevalence of type 2 diabetes mellitus in

depived areas.Journal of Epidemiology and Community Health,2000.54(3):p.173-177.

100 Brancati,F.L.,et al.,Diabetes mellitus,race ,and socioeconomic status a 0 population-based study.Annals of Epidemiology,1996.6(1):p.67-73.

101 Will,J.C.,et al .,CIgarate smoking and diabetes mellitus:evidence of a positive association from a large prospective cohort study.International Journal of Epidemiology,2001.30(3):p.540-546.

102 Holbrook,T.L.,E.Barrett –Connor ,and D.L.Wingard,A prospective population-based study of alcohol use and non-insulin-dependent diabetes mellitus.American journal of epidemiology,1990.132(5):p.902-909.

103 Knowler,W.C.,Diabetes incidence in Pima Indians:contributions of obesity and parental diabetes.American Journal of Epidemiology,1981.113(2):p.144-156.

104 Bjornholt,J.V.,et al., Type 2 diabetes and maternal family history :an impact beyond slow glucose removal rate and fasting hyperglycemia in low-risk individuals? Results from 22.5 years of follow-up of healthy nondiabetic men.Diabetes care,2000 .23(9):p.1255-1259.

105 Meigs,J.B., L.A.Cupples,and P.Wilson,Parental transmission of type 2 diabetes:the Framingham Offspring study.Diabetes,2000.49(12):p.2201-2207

106 Harrison,T.A.,et al.,Family history of diabetes as a potential public health tool.American journal of preventive medicine,2003.24(2):p.152-159.

107 ADA Clinical practice recommendations.2014;Available from:http://professional.diabetes.org/ResourcesForprofessionals.aspx?typ=17&cid=84160&pcid=84160.

108 Bays, H.E.,R.Chapman and S.Grandy,The relationship of body mass index to diabetes mellitus,hypertension and dyslipidaemia:comparison of data from two national surveys.International journal of clinicalpractice,2007.61(5):p.737-747.

109 Seidell,J.et al.,Narrow hips and broad waist circumferences independently contribute to increased risk of non-insulin-dependent diabetes mellitus. Journal of internal medicine, 1997.242(5):p.401-406.

110 Carr,M.C. and J.D.Brunzell,Abdominal obesity and dyslipidemia in the metabolic syndrome: importance of type 2 diabetes and familial combined hyperlipidemia in coronary artery disease risk.The journal of Clinical Endocrinology & Metabolism, 2004.89(6):p.2601-2607.

111 McGarry,J.and R.Dobbins,Fatty acids,lipotoxicity and insulin secretion.Diabetologia,1999,42(2)"p.128-138.

112 Haffner,S.M.,Dyslipidemia management in adults with diabetes.Diabetes Care, 2004.27:p.S68-71.

ANNEXURES

CONSENT FORM

Dear Participant,

Purposive Selection

You have been purposively selected to be part of this thesis and this is why we would like to interview you. This thesis is being conducted by Dr. Sabrina Ahmed, a student of M.Phil in Non-communicable Diseases at Bangladesh Institute of Health Sciences (BIHS) under Dhaka University (DU). This type of study is currently taking place in several countries around the world.

Title of Thesis

The title of this thesis is "**Distribution Of Hyperglycemia And Related Cardiovascular Disease Risk Factors In A Neglected Ethnic Community (Biharies) In Dhaka City**".

Aim of the Thesis

To identify the diabetic patients among the neglected ethnic group (beharies) in Dhaka city and to find out the cardiovascular risk factors among them.

Data Collection Methods

Step 1- Interview questions
Step 2- Physical examination & biochemical test

Timeframe

This study will take approximately 30-40 minutes.

Confidentiality

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.

Results

The results of this thesis will be used to help plan strategies in reducing the risk factor that contribute to diabetic foot ulcer among the diabetic patients as well as chronic non-communicable diseases in Bangladesh.

The results will be published in research publications, media briefings and reports and can be made available to you by local health workers.

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. Sabrina Ahmed, cell: +8801674750046].

Consent to Participate

Signing this consent indicates that you understand what will be expected of you and are willing to participate in this survey.

Read by Participant		Interviewer	
Agreed		Refused	

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

প্রিয় উত্তরদাতা

এই গবেষনাটি পরিচালনা করবেন ডাঃ সাবরিনা আহমেদ এম. ফিল শিক্ষার্থী নন কমিউনিকেবল ডিজিজ বিভাগ বাংলাদেশ ইনস্টিটিউট অব হেল্থ সায়েন্স (BIHS).

গবেষনার শিরোনামঃ "Hyperglycemia And Related Cardiovascular Disease Risk factors in a Neglected Ethnic Community (Beharies) in Dhaka City".

গবেষনার লক্ষ্যঃ আপনাদের মাঝে ডায়বেটিক রোগী এবং ডায়বেটিক রোগীদের মাঝে যাদের হৃদরোগ হবার সম্ভাবনা রয়েছে তাদের চিহ্নিত করা।

তথ্য সংগ্রহের পদ্ধতিঃ প্রশ্নোত্তর

সময়সীমাঃ ৩০ মিনিট

গোপনীয়তাঃ আপনার দেয়া তথ্যের গোপনীয়তা রক্ষা করা হবে এবং তা কারো কাছে প্রকাশ করা হবে না। এই তথ্যদি শুধুমাত্র গবেষণার কাজে ব্যবহৃত হবে। আপনার নাম ঠিকানা এবং ব্যক্তিগত তথ্যাদি গোপন করে আপনাকে একটি কোডের মাধ্যমে সনাক্ত করা হবে।

ফলাফলঃ এই গবেষণা লব্ধ ফলাফল

আপনাদের মাঝে ডায়বেটিক রোগী এবং ডায়বেটিক রোগীদের মাঝে যাদের হৃদরোগ হবার সম্ভাবনা রয়েছে তাদের সনাক্ত করে কৌশলগত পরিকল্পনা প্রণয়নে ব্যবহৃত হবে। এই ফলাফল বিভিন্ন ভাবে গবেষণাপত্র প্রচার মাধ্যমে এবং রিপোর্টে প্রকাশিত হবে।

এই গবেষণায় আপনি স্বেচ্ছায় অংশগ্রহণ করবেন এবং যেকোন সময় আপনি এ থেকে নিজেকে সরিয়ে নিতে পারবেন।

অংশগ্রহণে সম্মতিঃ

সম্মত		সম্মত হননি	

স্বাক্ষর স্বাক্ষী

উত্তর দাতার নাম ঃ স্বাক্ষর /টিপসই

স্বাক্ষর/টিপসই

WORK PLAN

	Time															
Activites	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8	Wk9	Wk10	Wk11	Wk12	Wk13	Wk14	Wk15	Wk16
Proposal development																
Literature review																
Approval from IRB																
Data collection																
Data Management and analysis																
Draft report writing																
Final report submission																
Dissemination																

QUESTIONNAIRE

HYPERGYCEMIA AND RELATEDCARDIOVASCULAR DISEASE RISK FACTORS IN A NEGLECTED ETHNIC COMMUNITY (BEHARIES) IN DHAKA CITY.

Bangladesh Institute of Health Sciences(BIHS)

Name of Interviewer:

Date of interview: ***Time of interview:***

Part one: Respondent Identification

Name of Respondent: ***ID no:***

Address:

Contact number where possible:

Part Two: Demographic Information

Sl no	***Questions***	***Response***
1	*Sex (Record Male / Female as observed)*	*Male 1* *Female 2*
2	*How old are you?* *(Help participant to estimate age)*	*Years:*
3	*What is the **highest level of education** you have completed?*	*Illiterate=1* *Primary =2* *Secondary(VI-SSC passed) =3* *Higher Secondary (XI-HSC passed) =4* *Graduation (after HSC-Degree passed) =5* *Masters and Above =6*
4	*Which one of this list best describes your main work status?*	*Employed 1* *Unemployed 2* *labourer 3* *Housewife 4* *Others=*
5	*What is the nature of your work/job?*	*Mostly involve physical effort 1* *Mostly involve mental effort 2*
6	*What is the average monthly income of your household?*	***In BDT:***
7	*Family history of Chronic disease you have*	*Hypertension 1* *Hearth Disease 2*

		Diabetes Mellitus 3 *Cancer 4* *Chronic Respiratory disease 5* *Others (specify)=*

Family and Personal History of Diabetes

8 (a)	Do you have DM?	yes 1 No 2
(b)	if yes, what is the duration of DM ?	..... years

Family and Personal History of Hypertension

9 (a)	Do you have Hypertension?	yes 1 No 2
(b)	If yes , what is the duration of hypertension?	..... years
(c)	Do you take any anti hypertensive drug?	yes 1 No 2

History of Behavioral Risk Factors (Tobacco)

10	*(a)*	*History of smoking?*	*Current smoker=1* *Ex-smoker= 2* *Never smoked= 3*
	(b)	*Duration of Smoking (Only for current smoker)*	*Months=* *Years=*
	(c)	*Number of stick per day*	
		Do you consume smokeless tobacco?	*Yes=1* *No=2*
	(d)	*If yes, what is the type?*	*Zarda = 1* *Sada pata = 2* *Gul = 3* *0thers = 4*
	(e)	*What is the status of consumption of .....?*	*Zarda Recurrent = 1* *Occasional = 2* *Sada pata Recurrent = 1* *Occasional = 2* *Gul Recurrent = 1* *Occasional = 2* *0thers Yes (Current) = 1* *Recurrent = 2*
	(f)	*Smokeless tobacco consumption (Yrs)..... ...*	*Zarda.....* *Sada pata ....*

			Gul…….. *Others……*

History of Behavioral Risk Factors (Alcohol)

11	*(a)*	*Do you consume alcohol?*	*Yes=1* *No=2*
	(b)	If yes what is the duration?	..... Years.

History of Behavioral Risk Factors (Unhealthy diet)

12	*(a)*	*How many days per week usually do you have fruits?*	*Days:*
	(b)	*How many servings of fruit do you have a day?*	*No of servings:*
	(c)	*How many days per week usually do you have vegetables?*	*Days:*
	(d)	*How many servings of vegetables do you have a day?*	*No of servings:*
	(e)	*Do you take extra table salt in your meal?*	*Regular = 1* *Occasionally =2* *Never = 3*
	(f)	*How many days in a usual week do you have fast-food? (Burger, Sandwich, Pizza etc)*	*……Days*
	(g)	*How many days in a usual week do you have street food? (Singara, Pori, Somucha, Chop etc)*	*…… Days*
	(h)	*How many days in a usual week do you have fatty rich food? (Birani, Tahari etc)*	*…… Days*
	(i)	*How many days in a usual week do you have empty caloric drink? (CoCa Cola, Pepsi, Fanta, 7up, Energy drinks etc.)*	*…… Days*

History of Behavioral Risk Factors (Physical Inactivity)

13	*(a)*	*Do you exercise?*	*Yes=1* *No=2*
	(b)	*If yes, which type of exercise?*	*Moderate (brisk walking) = 1* *Heavy (Running/jogging, swimming, cycling, football and volleyball) = 2*
	(c)	*How many days per week do you do exercise?*	*Moderate exercise: In days: ……* *Heavy exercise: In days: ……*

	(d)	*Average duration of exercise done per day*	*Moderate exercise: Minutes=* *Heavy exercise: Minutes=*

Physical Measurement

Questions		***Response***
14	*Height*	*In Centimetres (cm):*
15	*Weight* *Record participant's weight in kg.*	*In Kilograms (kg):*
16	*Waist circumference* *Record participant's waist circumference in 77entimeters.*	*In Centimetres (cm):*
17	*Hip circumference*	*In Centimetres (cm):*
18	*BP Reading 1* *(Record first measurement after the participant has rested for 15 minutes. Wait 3 minutes before taking second measurement).*	*Systolic (mmHg):* *Diastolic (mmHg):*
19	*BP Reading 2*	*Systolic (mmHg):* *Diastolic (mmHg):*
20	*OGTT* *Fasting blood sugar* *2hrs after 75 gm glucose intake*	*: mmol/l* *mmol/l*
21	*Total cholesterol level*	*: mg/dl*

Signature of the interviewer

Figure: Map of the study place (Geneva Camp, Mohammadpur)