

Risk Factors Analysis of Non-Communicable Diseases among Adults in Jhenidah

A research paper submitted to the Department of Pharmacy for the partial fulfillment of the Degree of Bachelor of Pharmacy.

Submitted By

Mehedi Mala Mitu

ID: 2013-3-70-043



Department of Pharmacy

East West University

DECLARATION BY THE RESEARCH CANDIDATE

I, **Mehedi Mala Mitu**, ID: 2013-3-70-043, hereby declare that the dissertation entitled “Risk factors analysis of non-communicable Diseases among adults in Jhenidah” submitted to the Department of Pharmacy, East West University, Aftabnagar, Dhaka in the partial fulfillment of the requirement for the degree of Bachelor of Pharmacy (Honors) is a genuine & authentic research work carried out by me. The contents of this dissertation, in full or in parts, have not been submitted to any other institute or University for the award of any degree or Diploma of Fellowship.

Mehedi Mala Mitu

ID: 2013-3-70-043

Department of Pharmacy,

East West University, Dhaka, Bangladesh

CERTIFICATION BY THE SUPERVISOR

This is to certify that the dissertation entitled “Risk factors analysis of non-communicable Diseases among adults in Jhenidah” is a bonafide research work done by Mehedi Mala Mitu (ID: 2013-3-70-043), in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy under my supervision.

Nigar Sultana Tithi

Senior Lecturer and Supervisor

Department of Pharmacy

East West University, Dhaka, Bangladesh

ENDORSEMENT BY THE CHAIRPERSON

This is to certify that the dissertation entitled “Risk factors analysis of non-communicable Diseases among adults in Jhenidah” is a bonafide research work done by Mehedi Mala Mitu (ID: 2013-3-70-043), under the guidance of Nigar Sultana Tithi, Senior Lecturer, Department of Pharmacy, East West University, in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy.

Dr. Chowdhury Faiz Hossain

Professor & Chairperson

Department of Pharmacy

East West University, Dhaka, Bangladesh

ACKNOWLEDGEMENTS

Above all, I express my gratitude to Almighty for all the bounties granted to me and only with his guidance and help this achievement has become possible.

It is my pleasure and proud privilege to express my heartiest regards and gratitude to my respected teacher and supervisor **Ms. Nigar Sultana Tithi**, Senior Lecturer, Department of Pharmacy, East West University, for her expert supervision, constructive criticism, valuable advice, optimistic counseling, constant support & continuous backup and encouragement throughout every phase of the project as well as to prepare this dissertation.

I would also like to put forward my most sincere regards and profound gratitude to **Dr. Chowdhury Faiz Hossain**, Professor and Chairperson, Department of Pharmacy, East West University, for giving me the opportunity to conduct such an interesting project and for facilitating a smooth conduction of my study.

I would also like to put forward my most sincere regards and profound gratitude to **Dr. Shamsun Nahar Khan**, Associate Professor, Department of Pharmacy, East West University for her appreciation.

I would also like to thank **Md. Abdus Salam** for his unconditional support and also my friends **Rakibul Hasan Shakil, Nahida Akter, Rehnuma Tarannum Smita, Dilruba Yeasmin Soma, Nazmun Sultana Nishi** and my dear sister **Marzia Rahman Trisha** who helped me instantaneously when I needed the most while working on this research paper.

And at the end, I would like to thank my family for their endless inspiration, support and care during my research work.

DEDICATION

Dedicated to my beloved parents **Md. Abdul Motin & Mrs. Nurzahan Begum**, my beloved brother **Mehedi Hasan Meathun** and my niece **Mahdiya Amira Anaya** for their unconditional support.

Table of Contents

	Page no.
List of Figures	I
List of Tables	II
List of Abbreviations	II
Abstract	III
CHAPTER ONE (INTRODUCTION)	(1-20)
1.1 Overview	1
1.2 Global Condition of NCDs	1
1.3 WHO response	2
1.4 Non-communicable disease in Bangladesh	2
1.5 Risk factors of NCDs	3
1.5.1 Modifiable behavioral risk factors	3
1.5.2 Metabolic/Physiological risk factors	5
1.6 List of non-communicable diseases	7
1.7 Major NCDs in Bangladesh	9
1.8 Major list of non-communicable diseases that is occurring globally	10
1.8.1 Diabetes	10
1.8.1.1 Type 1 diabetes	10
1.8.1.1.1 Causes of Type 1 diabetes	10
1.8.1.1.2 Symptoms of type 1 diabetes	10
1.8.1.1.3 Risk factors of type 1 diabetes	11

1.8.1.2	Type 2 diabetes	11
1.8.1.2.1	Risk factors of type 2 diabetes	12
1.8.1.3	Gestational diabetes	12
1.8.1.4	Secondary diabetes	12
1.8.1.5	Pre- diabetes	13
1.8.1.6	Complication for diabetes mellitus	14
1.8.1.7	Treatment of diabetes mellitus	15
1.8.2	Hypertension	16
1.8.2.1	Risk factors of high blood pressure	16
1.8.2.2	Treatment of hypertension	17
1.8.3	Heart diseases	17
1.8.4	Osteoporosis	17
1.8.5	Alzheimer	18
1.8.6	Cancer	19
1.8.6.1	Lung cancer	19
1.8.6.2	Leukemia	19
1.8.6.3	Skin cancer	19
1.8.7	Obesity	20
1.8.8	Asthma	20

CHAPTER TWO (LITERATURE REVIEW)

(21-29)

Significance of the study	30
Aims and Objectives of the study	31
CHAPTER THREE (METHODOLOGY)	32
3.1 Type of the Study	32
3.2 Study Area	32
3.3 Inclusion Criteria	32
3.4 Exclusion Criteria	32
3.5 Study Population	32
3.6 Development of Questionnaire	32
3.7 Sampling Technique	32
3.8 Data Collection Method	32
3.9 Data Analysis	32
CHAPTER FOUR (RESULTS)	(33-46)
4.1 Age distribution of the respondents	33
4.2 Gender of the respondents	33
4.3 Educational qualifications among respondents	34
4.4 Occupational Qualifications of the Respondents	34
4.5 Marital status of the respondents	35
4.6 Residential Status of the Respondents	35
4.7 Monthly Family Income of the respondents	36

4.8	BMI (Body Mass Index) Status of the Respondents	36
4.9	Waist Circumference Status of the Respondents	37
4.10	Sleeping habits of respondents	38
4.11	Blood pressure status of the respondents	38
4.12	Current medical condition of the respondents	39
4.13	Status of respondents about suffering from any conditions	40
4.14	Family history of respondents about suffering from any conditions	40
4.15	Knowledge of the respondents about tobacco use, excess salt intake, physical inactivity and overweight	41
4.16	Status of respondents about tobacco product use	42
4.17	Status of respondents about dietary habit (Fruit eating)	42
4.18	Status of respondents about dietary habit (Vegetable eating)	43
4.19	Status of respondents about dietary habit (Eating meal outside)	43
4.20	Habit of adding salt or salty sauce in the food	44
4.21	Physical activity status of the respondents	45
4.22	Habit of eating processed food high in salt	45
4.23	Doctor's advice to the respondents	46

CHAPTER FIVE (DISCUSSION & CONCLUSION) (47-50)

CHAPTER SIX (REFERENCES) (51-55)

List of Figures

	Page no.
1.1 Risk factors for the leading non-communicable diseases worldwide	7
1.2 Major NCDs in Bangladesh	9
1.3 Symptoms of Diabetes Mellitus	14
4.1 Age distribution of the respondents	33
4.2 Gender of the respondents	33
4.3 Educational qualifications among respondents	34
4.4 Occupational qualifications of the respondents	34
4.5 Marital status of the respondents	35
4.6 Residential status of the Respondents	35
4.7 Monthly family income of the respondents	36
4.8 BMI (Body Mass Index) status of the respondents	36
4.9 Waist circumference status of the respondents	37
4.10 Sleeping habits of respondents	38
4.11 Blood pressure status of the respondents	38
4.12 Current medical condition of the respondents	39
4.13 Status of respondents about suffering from any conditions	40
4.14 Family history of respondents about suffering from any conditions	40
4.15 Knowledge of the respondents about excess salt intake, physical inactivity and overweight.	41
4.16 Status of respondents about tobacco product use	42
4.17 Status of respondents about dietary habit (Fruit eating)	42

4.18	Status of respondents about dietary habit (Vegetable eating)	43
4.19	Status of respondents about dietary habit (Eating meal outside)	43
4.20	Habit of adding salt or salty Sauce in the food	44
4.21	Physical activity status of the respondents	45
4.22	Habit of eating processed food high in salt	45
4.23	Doctor's advice to the respondents	46

List of Tables

Table 1.2	Blood pressure list	6
Table 1.2	BMI categories	6
Table 1.3	List of non-communicable diseases	7

List of Abbreviations

NCDs	Non-communicable diseases
WHO	World Health Organization
STEPS	STEP wise approach to Surveillance (STEPS)
BMI	Body Mass Index
DM	Diabetes Mellitus
PHCS	Primary Health Care System

Abstract

Bangladesh is enduring rapid demographic and epidemiological transitions, with an increasing older population and a shifting disease burden from infectious, communicable diseases to chronic, non-communicable diseases (NCDs). NCDs were conveyed to represent the highest cause specific mortality burden among adults in Bangladesh. This study was done to determine the distribution and prevalence of common risk factors for major NCDs among 295 adult population of Jhenidah, Bangladesh by using a structured questionnaire. Among the respondents 41.02% were male and 58.98% were female. The highest respondents (38.98%) were found in the age range of 18 to 30 years. About 24.41% study participants were suffering from hypertension and 12.20% from Diabetes. Hypertension (34.24%), diabetes mellitus (24.75%), cancer (8.81%), smoking (54.24%) and smokeless tobacco use (44.41%) were found in the family history of the respondents. Inadequate physical activity (54.92%), low intake of fruits per day (50.51%), smokeless tobacco use (17.63%), smoking (14.58%), and low intake of vegetables per day (8.47%) were prevalent among them. According to BMI, 22.03% of the study population was overweight and 2.37% were obese whereas about 84.48% female respondents were in overweight range in respect of their waist circumference. The majority of the respondents had knowledge about the association of health problems with tobacco use, excess salt intake, physical inactivity and obesity. Majority of the respondents were advised by doctors to modify their lifestyle but most of them are less willing to follow those. At this juncture, adequate and continuous monitoring of NCD risk factors in Bangladesh is needed. Health awareness programs and guidelines related to the risk factors of NCDs might be the appropriate solution in this perimeter.

Key- words: *Non-communicable diseases, Bangladesh, Modifiable risk factors, Non-modifiable risk factors.*

Chapter-1

Introduction

1.1 Overview

Non-communicable diseases (NCDs), also known as chronic diseases, are not passed from person to person. They are of long duration and generally slow progression. NCDs are related to the interaction of various genetic, environmental and especially lifestyle factors, including smoking, alcohol abuse, unhealthy diets and physical inactivity. NCDs are often prevalent in disadvantaged socio-economic populations and areas and represent a major obstacle to the economic development of many countries. NCDs mainly 4 types: Cardiovascular diseases (like heart attacks and stroke), Cancers, Chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and Diabetes.

These four NCD factors are the world's leading causes of death and kill an estimated 35 million people each year; 60% of all deaths globally; with 80% in low and middle income countries. WHO estimates that total deaths from non-communicable diseases will increase by a further 17% over the next 10 years (World Health Organization, 2015).

1.2 Global condition of NCDs

Non-communicable diseases (NCDs) kill 38 million people each year. Almost three quarters of NCD deaths (28 million) occur in low and middle income countries. Sixteen million NCD deaths occur before the age of 70; 82% of these "premature" deaths occurred in low and middle income countries. Cardiovascular diseases account for most NCD deaths, or 17.5 million people annually, followed by cancers (8.2 million), respiratory diseases (4 million), and diabetes (1.5 million). These 4 groups of diseases account for 82% of all NCD deaths. Tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets all increase the risk of dying from an NCD. "The Global Status Report on Non-communicable Diseases" was developed as part of the implementation of the 2008–2013 "Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases", which was endorsed by the World Health Assembly (WHA) in 2008. However, WHO publishes "The Global Status Report on Non-communicable Diseases" in 2010 and 2014 the worldwide epidemic of cardiovascular diseases, cancer, diabetes and chronic respiratory diseases, along with their risk factors and determinants are reported (World Health Organization, 2016).

1.3 WHO response

Under the leadership of the WHO more than 190 countries agreed in 2011 on global mechanisms to reduce the avoidable NCD burden including a Global action plan for the prevention and control of NCDs 2013-2020. This plan aims to reduce the number of premature deaths from NCDs by 25% by 2025 through nine voluntary global targets. The nine targets focus in part by addressing factors such as tobacco use, harmful use of alcohol, unhealthy diet and physical inactivity that increase people's risk of developing these diseases.

The plan offers a menu of “best buy” or cost-effective, high-impact interventions for meeting the nine voluntary global targets such as banning all forms of tobacco and alcohol advertising, replacing trans fats with polyunsaturated fats, promoting and protecting breastfeeding, and preventing cervical cancer through screening. In 2015, countries will begin to set national targets and measure progress on the 2010 baselines reported in the global status report on non-communicable diseases 2014. The UN General Assembly will convene a third high-level meeting on NCDs in 2018 to take stock of national progress in attaining the voluntary global targets by 2025 (World Health Organization, 2015).

1.4 Non- communicable diseases in Bangladesh

Like many low income countries around the world, Bangladesh is in the midst of an epidemiologic transition where the burden of disease is shifting from a disease profile dominated by infectious diseases, under-nutrition and conditions of childbirth to one increasingly characterized by non-communicable chronic diseases (NCDs). Chronic non-communicable diseases (NCDs) are a major public health challenge, and undermine social and economic development in much of the developing world, including Bangladesh. Three NCDs are responsible for a considerable portion of the mortality, morbidity and health services utilization in Bangladesh, in particular, and South-East Asia, more generally: cardiovascular disease, diabetes and tobacco-related illness. Cardiovascular diseases have become a major and growing contributor to mortality and disability in South-East Asia and rank among the top ten causes of death in Bangladesh. The prevalence of diabetes has risen more rapidly in South-East Asia than any other large region in the world. In Bangladesh, it is projected that the number of people with diabetes in Bangladesh will increase from 1.5 million in 2000 to 4 million in 2025. A recent

household survey in Bangladesh estimated that tobacco-related illnesses were responsible for 16 percent of all deaths in the country. The country's limited resources, weak public health systems, highly unregulated private health sector, and aging population also present significant challenges to effectively tackling the growing burden of NCDs in Bangladesh. The selected diseases are also consistent with the priorities of the Bangladeshi government. The Health, Nutrition, Population Sector Program (HNPS), a five-year policy and programmatic framework that governs health services in Bangladesh has identified NCDs as one of five priority areas of the emerging health sector challenges. In addition, addressing NCDs is part of the Ministry of Health's cooperation strategy with the WHO to reduce major NCDs and associated risk factors, the Strategic Plan for Surveillance and Prevention of Non Communicable Diseases, 2007–2010, and the National Strategic Plan of Action for Tobacco Control, 2007–2010. The results from this review may also provide useful information for other low income countries with a similar disease profile (Bleich *et al.*, 2012).

1.5 Risk factors of NCDs

There are two types of risk factors for NCDs; Modifiable behavioral risk factors and Metabolic/physiological/ risk factors.

1.5.1 Modifiable behavioral risk factors

Tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol increase the risk of NCDs. Tobacco accounts for around 6 million deaths every year (including from the effects of exposure to second-hand smoke), and is projected to increase to 8 million by 2030.

- About 3.2 million deaths annually can be attributed to insufficient physical activity.
- More than half of the 3.3 million annual deaths from harmful drinking are from NCDs.
- In 2010, 1.7 million annual deaths from cardiovascular causes have been attributed to excess salt/sodium intake.

Tobacco use: For all these major NCDs, tobacco use is arguably the most preventable risk factor. Tobacco use is a serious public health problem in the South East Asia Region where use of both smoking and smokeless form of tobacco is widely prevalent. The region has almost one quarter of the global population and about one quarter of all smokers in the world. Smoking

among men is high in the Region and women usually take to chewing tobacco. Tobacco use is the single greatest preventable cause of NCDs. Tobacco use kills more than 15,000 people a day and accounts for one in six of all NCD deaths. Although fewer people are using tobacco in some countries, the global trend is on the rise. By 2020, WHO estimates that tobacco will cause 7.5 million deaths annually, or about one in ten of all deaths. An estimated 100 million people were killed by tobacco used during the 20th century (Thakur *et al.*, 2011).

Physical inactivity: WHO defines physical activity as any bodily movement produced by skeletal muscles that require energy expenditure – including activities undertaken while working, playing, carrying out household chores, travelling, and engaging in recreational pursuits. Insufficient physical activity is one of the leading risk factors for death worldwide. Insufficient physical activity is a key risk factor for non-communicable diseases (NCDs) such as cardiovascular diseases, cancer and diabetes. Physical activity has significant health benefits and contributes to prevent NCDs. Globally, 1 in 4 adults is not active enough. More than 80% of the world's adolescent population is insufficiently physically active (Bull and Bauman, 2011).

Unhealthy Diet: Approximately 16.0 million (1.0%) disability adjusted life years and 1.7 million (2.8%) of deaths worldwide are attributable to low fruit and vegetable consumption. Adequate consumption of fruit and vegetables reduces the risk for cardiovascular diseases, stomach cancer and colorectal cancer. There is convincing evidence that the consumption of high levels of high-energy foods, such as processed foods that are high in fats and sugars, promotes obesity compared to low-energy foods such as fruits and vegetables (Bull and Bauman, 2011).

Salt intake: The amount of dietary salt consumed is an important determinant of blood pressure levels and overall cardiovascular risk. A population salt intake of less than 5 grams per person per day is recommended by WHO for the prevention of cardiovascular disease. However, data from various countries indicates that most populations are consuming much more salt than this. It is estimated that decreasing dietary salt intake from the current global levels of 9-12 grams per day to the recommended level of 5 grams per day would have a major impact on blood pressure and cardiovascular diseases (Zaman *et al.*, 2015).

Harmful use of alcohol: It is one of the major risk factor for NCDs. The harmful use of alcohol results in the death of 3.3 million people annually. There are 60 different types of diseases where

alcohol has a significant causal role. It also causes harm to the well-being and health of people around the drinker. In 2010, the worldwide total consumption was equal to 6.2 liters of pure alcohol per person 15 years and older. Unrecorded consumption accounts for 25% of the worldwide total consumption (Global Health Observatory, 2011).

1.5.2 Metabolic/physiological risk factors

These behavior's lead to four key metabolic/physiological changes that increase the risk of NCDs: raised blood pressure, overweight/obesity, hyperglycemia (high blood glucose levels) and hyperlipidemia (high levels of fat in the blood).

In terms of attributable deaths, the leading metabolic risk factor globally is elevated blood pressure (to which 18% of global deaths are attributed) followed by overweight and obesity and raised blood glucose. Low and middle income countries are witnessing the fastest rise in overweight young children (Esmailnasab, Moradi and Delaveri, 2012).

High Blood Pressure: Blood pressure is the pressure of blood on the walls of arteries as the heart pumps it around the body. It's a vital part of how the heart and circulation works. A blood pressure reading under 120/80mmHg is considered optimal. Readings over 120/80mmHg and up to 139/89mmHg are in the normal to high normal range. The high prevalence of NCD risk factors and unrecognized and untreated hypertension represent major problems (Ahmad *et al.*, 2016).

Table 1.1: Blood Pressure Chart

Blood Pressure Category	Systolic mm Hg (upper #)		Diastolic mm Hg (lower #)
Normal	less than 120	and	less than 80
Prehypertension	120 – 139	or	80 – 89
High Blood Pressure (Hypertension) Stage 1	140 – 159	or	90 – 99
High Blood Pressure (Hypertension) Stage 2	160 or higher	or	100 or higher
Hypertensive Crisis (Emergency care needed)	Higher than 180	or	Higher than 110

(American Heart Association, 2016)

Obesity: Excess weight, especially obesity, is a major risk factor for NCDs such as cardiovascular disease, Type 2 diabetes, some musculoskeletal conditions and some cancers. As the level of excess weight increases, so does the risk of developing these conditions. In addition, being overweight can hamper the ability to control or manage chronic disorders. Body mass index (BMI) is widely used to monitor body weight. BMI is the body weight in kilograms, divided by the square of height in meters (Gregg and Shaw, 2017).

Table 1.2: BMI categories (National Heart, Lung and Blood Institute, 2017)

<p>BMI Categories: Underweight = <18.5 Normal weight = 18.5–24.9 Overweight = 25–29.9 Obesity = BMI of 30 or greater</p>

Hyperglycemia: Hyperglycemia doesn't cause symptoms until glucose values are significantly elevated above 200 milligrams per deciliter (mg/dL), or 11 millimoles per liter (mmol/L). Symptoms of hyperglycemia develop slowly over several days or weeks. The longer blood sugar levels stay high, the more serious the symptoms become (Esmailnasab, Moradi and Delaveri, 2012).

Hyperlipidemia: Raised cholesterol increases the risks of heart disease and stroke. Globally, a third of ischemic heart disease is attributable to high cholesterol. Non-communicable diseases in general and cardiovascular diseases (CVD) in particular are a big cause of concern worldwide especially in fast growing economy country. CVD is one of the leading causes of deaths in developing country like Bangladesh. Risk factors for cardiovascular disease are now significant in all populations. Globally, around 39% of adults aged 25 and over had raised cholesterol in 2008 (Shokeen and Aeri, 2015).

Risk factors for the leading non-communicable diseases worldwide

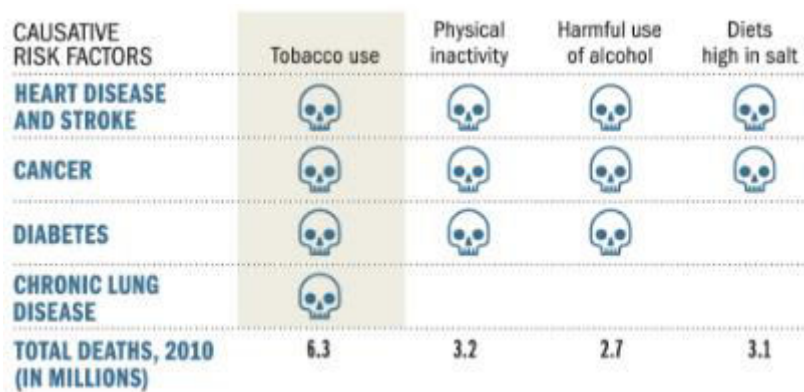


Figure 1.1: Risk factors for the leading non-communicable diseases worldwide

(World Health Organization, 2015)

1.6 List of non-communicable diseases

Genetic diseases are caused by hereditary factors passed down by parents to children and also along extended generational lines. Chromosomal errors passed on to offspring result in a long list of recognized clinical diseases. Environmental diseases often are the result of the interplay between a combination of environmental exposures, lifestyle factors, diet and occupational hazards. Below there is a non-communicable diseases list:

Table 1.3: List of non-communicable diseases

Genetic Disease	Environmental Disease
<ul style="list-style-type: none"> • Achondroplasia, • Albinism • Bardet-Biedl syndrome • Bipolar disorder • Canavan disease • Color blindness • Cystic fibrosis • Down's syndrome • Fragile X syndrome • Galactosemia • Hemophilia • Krabbe disease • Muscular dystrophy • Neurofibromatosis • Noonan syndrome • Osteogenesis • Patau syndrome • Sickle-cell disease • Tay-Sachs disease • Triple X syndrome • Turner syndrome • Usher syndrome • VonHippel-Lindau syndrome • Waardenburg syndrome 	<ul style="list-style-type: none"> • Appendicitis • Anorexia nervosa • Arteriosclerosis • Asthma • Carpal tunnel syndrome • Chronic obstructive pulmonary diseases • Emphyema • Fetal alcohol syndrome • Glaucoma • Fibromyalgia • Hyperthyroidism • Hypothyroidism • Irritable Bowel Syndrome • Liver cirrhosis • Narcolepsy • Osteoporosis • Sudden infant death syndrome (SIDS) • Tick paralysis

<ul style="list-style-type: none">• Wilson's disease• Xeroderma pigmentosum	
----------------------------------------------------------------------------------------------------	--

(wma.net, 2016)

1.7 Major NCDs in Bangladesh

Chronic non-communicable diseases (NCDs) are a major public health challenge, and undermine social and economic development in much of the developing world, including Bangladesh. Epidemiologic evidence on the socioeconomic status (SES) related pattern of NCDs remains limited in Bangladesh. Although there are many types of non-communicable diseases but in Bangladesh only few types are very common and the reason may be either the geographical or environmental pattern of Bangladesh. Major NCDs in Bangladesh is given below:

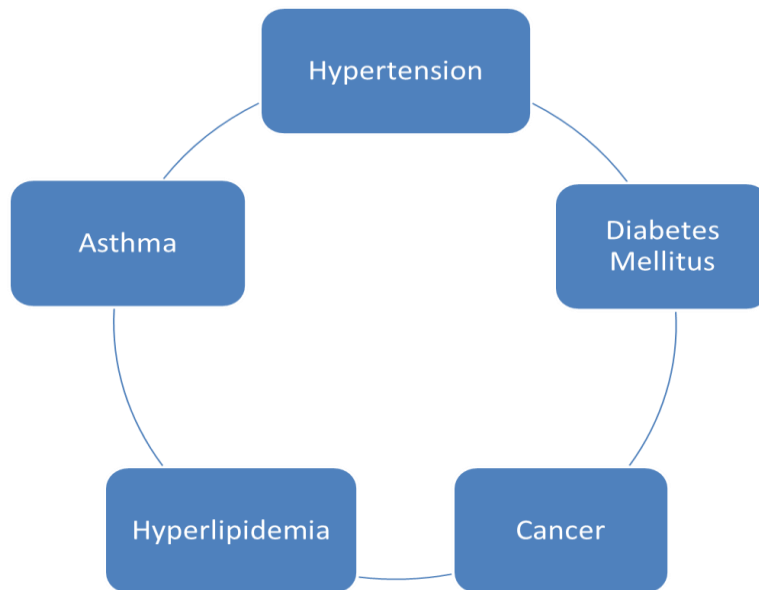


Figure 1.2: Major NCDs in Bangladesh (justhealth.net, 2016)

1.8 Major list of Non-communicable disease that is occurring globally

1.8.1 Diabetes

Diabetes limits the body's ability to process glucose normally. Type 1 diabetes which is present from birth causes the pancreas to be destroyed by the immune system, causing glucose to build up in the bloodstream. Type 2 diabetes is developed over time causing the cells to resist the effects of insulin, causing unhealthy levels of glucose in the bloodstream. Risk factor of Type 2 diabetes is being overweight or obese.

1.8.1.1. Type 1 diabetes

Type 1 diabetes happens when the immune system destroys cells in pancreas called beta cells. They are the ones that make insulin. Type 1 diabetes is rare. Only about 5% of people with diabetes have type 1. It is more common in whites than in African-Americans. It affects men and women equally. Although the disease usually starts in people under 20, it can happen at any age. Doctors don't know all the things that lead to type 1 diabetes. But they do know the genes that play a role.

1.8.1.1.2. Causes of Type 1 Diabetes

Type 1 diabetes can result when something in the environment, like a virus, tells the immune system to go after pancreas. Most people with type 1 diabetes have signs of this attack, called autoantibodies. They're present in almost everyone who has the condition when their blood sugar is high. Type 1 diabetes can happen along with other autoimmune diseases, like Grave's disease or vitiligo (Ruggenenti and Remuzzi, 2000).

1.8.1.1.3. Symptoms for type 1 diabetes:

These are often subtle, but they can become severe. They include:

- Heavy thirst
- Increased hunger (especially after eating)
- Dry mouth
- Nausea and vomiting

- Pain in belly
- Frequent urination
- Unexplained weight loss (even though eating and feel hungry)
- Fatigue (weak, tired feeling)
- Blurred vision
- Heavy, labored breathing
- Frequent infections of the skin, urinary tract, or vagina (Ruggenti and Remuzzi, 2000).

1.8.1.4. Risk factor for type-1 Diabetes

- Although the exact cause of type 1 diabetes is unknown, factors that may signal an increased risk include:
- Family history: The risk for type 1 diabetes increases if a parent or sibling has type 1 diabetes.
- Environmental factors: Circumstances such as exposure to a viral illness likely play some role in type 1 diabetes.
- The presence of damaging immune system cells (autoantibodies): Sometimes family members of people with type 1 diabetes are tested for the presence of diabetes autoantibodies. If these autoantibodies are present in one's body, then he or she have an increased risk of developing type 1 diabetes. But not everyone who has these autoantibodies develops diabetes.
- Dietary factors: These include low vitamin D consumption, early exposure to cow's milk or cow's milk formula, and exposure to cereals before 4 months of age. None of these factors has been shown to directly cause type 1 diabetes.
- Geography: Certain countries, such as Finland and Sweden, have higher rates of type 1 diabetes.

1.8.1.2. Type 2 diabetes

Type 2 diabetes is the most common form of diabetes, and is largely preventable by maintaining a healthy lifestyle. It occurs when the body becomes resistant to the insulin being produced by the pancreas and/or the amount produced is inadequate to meet the body's needs. Insulin is often used in the treatment of type 2 diabetes, but not in all cases.

1.8.1.2.1 Risk Factors of Type 2 Diabetes

An estimated 15 million people have type 2 diabetes. The risk of developing type 2 diabetes in the general population is 1 in 9 individuals. People with this disease represent roughly 90-95 percent of all cases of diabetes.

- Being over age 45
- Having a family history of the disease
- Being overweight
- Not exercising regularly
- Being of a certain racial or ethnic group (African American, Hispanic/Latino American/ Native American or Asian American/Pacific Islander).
- Having a low HDL (high-density lipoprotein) or high triglycerides
- Having had gestational diabetes during pregnancy (WHO, 2016).

1.8.1.3. Gestational Diabetes

Any pregnant woman can develop gestational diabetes, but some women are at greater risk than are others. Risk factors for gestational diabetes include

- Age: Women older than age 25 are at increased risk.
- Family or personal history: The risk increases if anyone have pre-diabetes a precursor to type 2 diabetes or if a close family member, such as a parent or sibling, has type 2 diabetes.
- Weight: Being overweight before pregnancy increases the risk.
- Race: For reasons that aren't clear, women who are black, Hispanic, American Indian or Asian are more likely to develop gestational diabetes (myoclonic.net, 2017).

1.8.1.4. Secondary diabetes

Secondary diabetes can be defined as a diabetic condition that develops after the destruction of the beta-cells in the pancreatic islets and/or the induction of insulin resistance by an acquired disease (e.g. endocrinopathies) or others. Recently, diabetes mellitus has divided into four distinct types (type 1 diabetes, type 2 diabetes, other specific types of diabetes and gestational

diabetes) in the Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus in USA. The categories between secondary diabetes and the other specific types of diabetes might be different a little. The details of the genetic defects in insulin action have been presented elsewhere (MacGill and Webberley, 2016).

1.8.1.5 Pre-diabetes

Pre-diabetes means that blood sugar level is higher than normal but not yet high enough to be type 2 diabetes. Without lifestyle changes, people with pre-diabetes are very likely to progress to type 2 diabetes. But progression from pre-diabetes to type 2 diabetes isn't inevitable. Eating healthy foods, incorporating physical activity in daily routine and maintaining a healthy weight can help bring blood sugar level back to normal. Pre-diabetes affects adults and children. The same lifestyle changes that can help prevent progression to diabetes in adults might also help bring children's blood sugar levels back to normal (MacGill and Webberley, 2016).

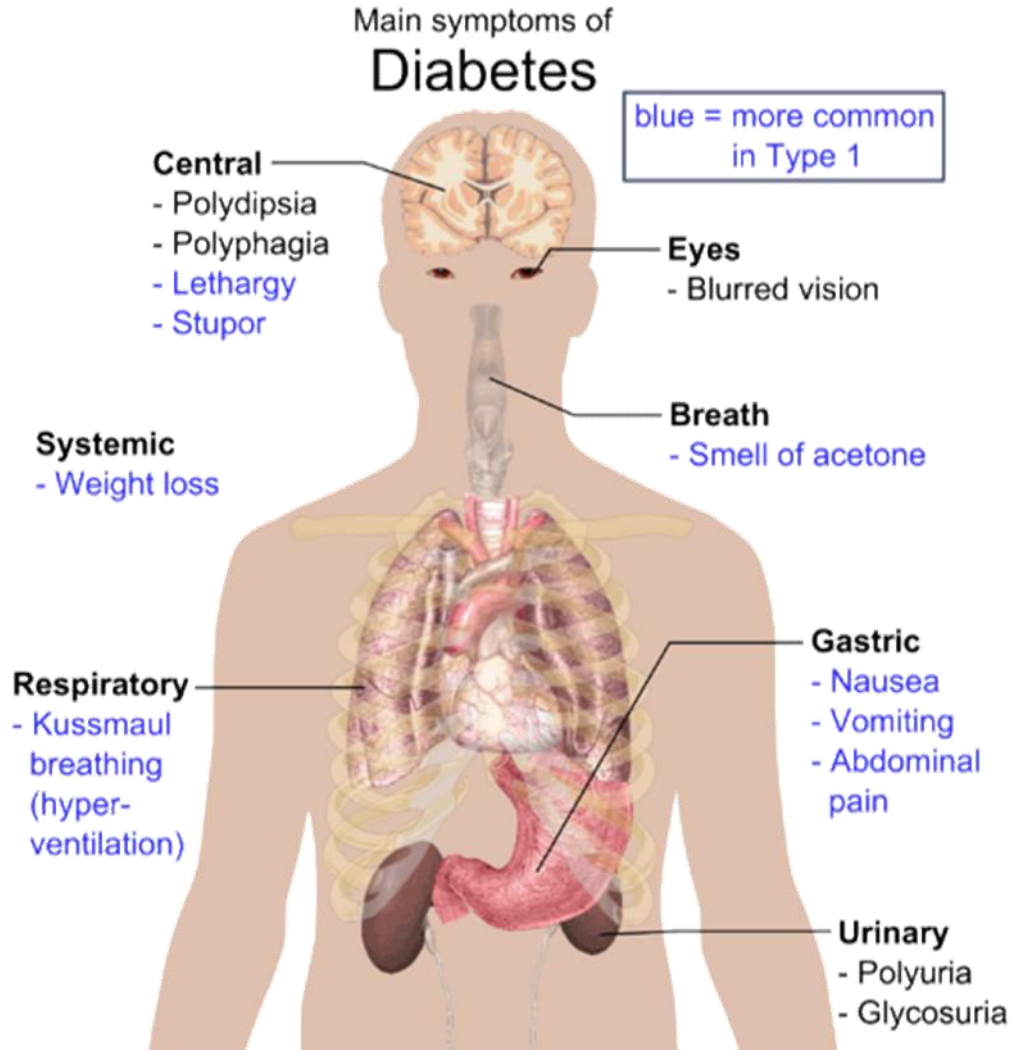


Figure 1.3: Symptoms for Diabetes Mellitus (MacGill, 2016)

1.8.1.6. Complications of diabetes mellitus

If diabetes is not adequately controlled the patient has a significantly higher risk of developing complications. Complications linked to badly controlled diabetes: Below is a list of possible complications that can be caused by badly controlled diabetes:

- Eye complications - glaucoma, cataracts, diabetic retinopathy, and some others.
- Foot complications - neuropathy, ulcers, and sometimes gangrene which may require that the foot be amputated.
- Skin complications - people with diabetes are more susceptible to skin infections and skin disorders.

- Heart problems - such as ischemic heart disease, when the blood supply to the heart muscle is diminished.
- Hypertension - common in people with diabetes, which can raise the risk of kidney disease, eye problems, heart attack and stroke.
- Mental health - uncontrolled diabetes raises the risk of suffering from depression, anxiety and some other mental disorders.
- Hearing loss - diabetes patients have a higher risk of developing hearing problems
- Gum disease - there is a much higher prevalence of gum disease among diabetes patients.
- Gastro paresis - the muscles of the stomach stop working properly.
- Ketoacidosis - a combination of ketosis and acidosis; accumulation of ketone bodies and acidity in the blood.
- Neuropathy - diabetic neuropathy is a type of nerve damage which can lead to several different problems.
- HHNS (Hyperosmolar Hyperglycemic Nonketotic Syndrome) - blood glucose levels shoot up too high, and there are no ketones present in the blood or urine. It is an emergency condition.
- Nephropathy - uncontrolled blood pressure can lead to kidney disease.
- PAD (peripheral arterial disease) - symptoms may include pain in the leg, tingling and sometimes problems walking properly
- Stroke - if blood pressure, cholesterol levels, and blood glucose levels are not controlled, the risk of stroke increases significantly.
- Erectile dysfunction - male impotence.
- Infections - people with badly controlled diabetes are much more susceptible to infections.
- Healing of wounds - cuts and lesions take much longer to heal.

(MacGill, 2016)

1.8.1.7. Treatment of Diabetes Mellitus

Controlling blood sugar (glucose) levels is the major goal of diabetes treatment, in order to prevent complications of the disease. Many people with type 1 diabetes live long, healthy lives. All people with type 1 diabetes must use insulin injections to control their blood sugar. Type 2

diabetes may be managed with non-insulin medications, insulin, weight reduction, or dietary changes (medicine.net, 2017).

1.8.2. Hypertension

This is caused when an individual consistently has a blood pressure reading over 140/90. This can be caused by diabetes, smoking, excessive salt intake, obesity or kidney disease.

1.8.2.1. Risk factors for High Blood Pressure

- **Age:** The risk of high blood pressure increases with age. Through early middle age, or about age 45, high blood pressure is more common in men. Women are more likely to develop high blood pressure after age 65.
- **Race:** High blood pressure is particularly common among blacks, often developing at an earlier age than it does in whites. Serious complications, such as stroke, heart attack and kidney failure, also are more common in blacks.
- **Family history:** High blood pressure tends to run in families.
- **Being overweight or obese:** The more the weigh, the more blood need to supply oxygen and nutrients to tissues. As the volume of blood circulated through blood vessels increases, so does the pressure on artery walls.
- **Not being physically active:** People who are inactive tend to have higher heart rates. The higher the heart rate, the harder the heart must work with each contraction and the stronger the force on arteries. Lack of physical activity also increases the risk of being overweight.
- **Using tobacco:** Not only does smoking or chewing tobacco immediately raise blood pressure temporarily, but the chemicals in tobacco can damage the lining of artery walls. This can cause the arteries to narrow, increasing the blood pressure. Second hand smoke also can increase blood pressure.
- **Too much salt (sodium) in diet:** Too much sodium in diet can cause body to retain fluid, which increases blood pressure.
- **Too little potassium in diet:** Potassium helps balance the amount of sodium in cells. If a person don't get enough potassium in his diet or retain enough potassium, he may accumulate too much sodium in his blood.

- Too little vitamin D in diet: It's uncertain if having too little vitamin D in diet can lead to high blood pressure. Vitamin D may affect an enzyme produced by kidneys that affects blood pressure.
- Stress: High levels of stress can lead to a temporary increase in blood pressure. If a person tries to relax by eating more, using tobacco or drinking alcohol, he may only increase problems with high blood pressure.
- Certain chronic conditions: Certain chronic conditions also may increase the risk of high blood pressure, such as kidney disease, diabetes and sleep apnea (Zanchetti et al., 2017).

1.8.2.2. Treatment of Hypertension

Eating a healthy diet with less salt, exercise regularly, quit smoking and maintain a healthy weight. Medication used for high blood pressure include Thiazide diuretics, Beta blockers, Angiotensin-converting enzyme (ACE) inhibitors, Angiotensin II receptor blockers (ARBs), Calcium channel blockers and Renin inhibitors (Zanchetti *et al.*, 2017).

1.8.3. Heart Diseases

Cardiovascular diseases cause more than 15 million deaths in the world each year, according to the World Health Organization. They account for 50% of all deaths in several developed countries, and more than 50% in Africa and Western and Southeast Asia. They are also the major cause of death in adults. In addition, many cardiovascular incidents are not necessarily fatal, but may impair the ability to lead a normal daily life, resulting in enormous healthcare costs to society. This is a very broad category of diseases which impact the circulatory system or heart. This can include congenital heart disease, rhythm irregularities, heart failure, heart attack, unstable angina, mitral valve prolapse, aortic regurgitation, cardiogenic shock or endocarditis (Thom *et al.*, 2006).

1.8.4. Osteoporosis

This condition causes a decrease in bone mass which can make the bones brittle and at higher risk for damage. Around 80 percent of people who have osteoporosis are women. Additional factors which increase the risk of this disease are the presence of diseases such as rheumatoid arthritis, inactivity, low sex hormone levels or smoking.

Risk factors: Both men and women may have certain ‘risk factors’ that can make them more likely to develop osteoporosis. People should discuss risk factors with their doctor, and anyone over 50 with risk factors may require a bone density scan.

Women are at a greater risk of developing osteoporosis because of the rapid decline in oestrogen levels during menopause. When oestrogen levels decrease, bones lose calcium and other minerals at a much faster rate. As a result a bone loss of approximately 2% per year occurs for several years after menopause. Men also lose bone as they age, however testosterone levels in men decline more gradually so their bone mass remains adequate till later in life (Medicine.net, 2017).

1.8.5. Alzheimer

This condition causes dementia in those in advanced age, or over 60 years old. Symptoms of this condition can vary but often include getting lost, memory loss, difficulty managing daily tasks or managing money, personality changes, loss of bodily control or delusions. Risk factors of Alzheimer’s include:

- Cardiovascular risk factors: Brain infarcts, heart disease and mid-life hypertension increase the risk of Alzheimer’s disease and Vascular dementia. Smoking has also been identified as a risk factor.
- Diabetes: A recent study found that having diabetes increases the risk of developing Alzheimer’s disease by 65%. This risk can be reduced by careful management of diabetes with medications that maintain blood glucose levels within a healthy range.
- High cholesterol: Cholesterol is essential to brain function. It is a component of cell membranes, and it is required for the repair and establishment of new connections between nerve cells. However, studies have shown that, high cholesterol in mid-life and late-life can increase the risk of Alzheimer’s disease.
- Family history
- Head injury (Kalaria *et al.*, 2008).

1.8.6. Cancer

The medical term for cancer or tumor is neoplasm, which means a relatively autonomous growth of tissue. Cancer develops when cells in a part of the body begin to grow out of control. Although there are many kinds of cancer, they all start because of out-of-control growth of abnormal cells. There are different types of neoplasm and unfortunately there is no system for their nomenclature.

- Some tumors are named after the individual who first described the condition, such as Hodgkin's disease, Kaposi sarcoma etc.
- Some are named according to the tissue or origin, for example: 1) a cancer that arises from connective tissues is called a sarcoma, 2) that arises from epithelium is called adenoma and 3) that from fibrous tissue is called fibroma; 4) a cancer of the blood involving the abnormal increase of leukocytes is called leukemia 5) cancer in lymph nodes is lymphoma.

1.8.6.1. Lung Cancer: Lung cancer causes malignant cell growth in the lung tissue, often as a result of exposure to pollutants or the use of tobacco products. As many as 90 percent of lung cancer cases are caused by smoking with non-smokers having a very small risk of this disease.

1.8.6.2. Leukemia: Leukemia causes the body to produce abnormal blood cells that then release malignant cells into the bloodstream. Since the bloodstream carries these malignant cells throughout the body they can affect other tissues such as the nervous system, skin or liver. While this disease is often associated with children, most patients are actually men over 60.

1.8.6.3. Skin Cancer: Skin cancer is caused when ultraviolet rays damage the skin cells. This can appear anywhere on the body but is most common on the skin. Those that have low pigmentation in the skin such as redheads, blondes or those with blue eyes tend to be at higher risk for this disease. Limiting direct skin exposure can significantly reduce the risk of developing skin cancer and with early detection this disease is 95 percent curable. Risk factors for skin cancer:

- previously had a skin cancer and/or have a family history of skin cancer
- have a large number of moles on their skin

- have a skin type that is sensitive to ultraviolet (UV) radiation and burns easily
- have a history of severe/blistering sunburns
- spend lots of time outdoors, unprotected, during their lifetime
- actively tan or use solariums or sunlamps
- Work outdoors (Dimeo, 2001)

1.8.7. Obesity

Excess weight, especially obesity, is a major risk factor for cardiovascular disease, Type 2 diabetes, some musculoskeletal conditions and some cancers. As the level of excess weight increases, so does the risk of developing these conditions. In addition, being overweight can hamper the ability to control or manage chronic disorders (Edward *et al.*, 2017).

1.8.8. Asthma

Asthma is a long-term lung condition. People with asthma have sensitive airways in their lungs which react to triggers, causing a 'flare-up'. In a flare-up, the muscles around the airway squeeze tight, the airways swell and become narrow and there is more mucus. These things make it harder to breathe. A person's asthma symptoms can vary over time and sometimes they will have no symptoms, especially when their asthma is well-controlled. Symptoms often vary from person to person, but they are most commonly:

- breathlessness
- wheezing
- tight feeling in the chest
- Continuing cough (Heymsfield and Wadden, 2017).

Chapter-2

Literature Review

Zaman *et al.* 2015, had conducted a survey on 4,073 (1,812 men and 2,261 women) adults aged 25 years or older selected from rural and urban households to determine the risk factors of NCDs. In this study they found that 44% used tobacco in any form and almost 93 % did not consume adequate fruit and vegetables (5 servings or more). Thirty eight percent had low physical activity level (<600 MET-minutes/week). One-quarter (26 %) were overweight (body mass index ≥ 25 kg/m²). Twenty-one percent had hypertension (blood pressure $\geq 140/90$ mmHg or medication) and about 5 % had documented diabetes. Upon examination of risk factor clustering, they observed that 38 % had at least three risk factors. After this threshold, clustering suddenly dropped down to a fairly low level. Using this threshold as a cut-off, clustering of risk factors was associated with age, male gender, urban residence, educational levels and quality of house in multivariate analysis (Zaman *et al.*, 2015).

A survey had conducted where 9,275 individuals aged 25 years or older randomly drawn from all over the country. Information on diet, physical activity, tobacco and alcohol, and treatment history for hypertension and diabetes were collected. Height, weight, waist circumference, and blood pressure (BP) were measured. There were 4,312 men and 4,963 women with the mean age of 42 years (standard deviation 13 years). Half of them (54%) used tobacco in some form, <1% consumed alcohol within the past 30 days, 92% did not consume adequate fruit and vegetables (five servings or more), and 35% had low physical activity level [<600 metabolic equivalent (MET) min per week]. Documented diabetes was found in 4% of the participants. Seventeen percent were overweight [body mass index (BMI) ≥ 25 kg/m²] and 21% had abdominal obesity (men ≥ 94 , women ≥ 80 cm). Overall, 21% people had hypertension (blood pressure $\geq 140/90$ mmHg or medication). Physical inactivity, alcohol intake, hypertension, obesity, and diabetes were more prevalent in urban areas, as opposed to tobacco. Tobacco intake showed a decreasing gradient, but hypertension, obesity, diabetes, and low physical activity showed an increasing gradient across the wealth quartiles. From this study they had reached a conclusion that risk factors are widely prevalent in Bangladeshi people across sexes and across both rural and urban areas of residences and NCD prevention through risk factor control, and early detection and treatment of hypertension and diabetes are warranted (Zaman *et al.*, 2016).

Jesmine *et al.*, 2017, had reported that non-communicable diseases (NCDs) were reported to represent the highest cause-specific mortality burden among adults in Bangladesh. To date, a

comprehensive nationally representative data are lacking on the NCDs using the full protocol of WHO-STEP approach to describe the NCDs risk factors in Bangladesh. They had conducted this study on total 22454 Bangladeshi populations more than 15 years old were included in this analysis. Of the study participants that took part in the survey, about 45.9% were males and 54.1% were females, 52.78% were from rural areas, 47.22% were from urban areas and about one in four (24.4%) had no formal education. Blood pressure, fasting blood sugar and lipid profiles were measured in 99%, 85% and 60% respectively of the 20,039 participants. In Bangladeshi population the total prevalence of selected risk factors are as follows: smoking (21.7%), smokeless tobacco (30.8%), low intake of fruits and vegetables per day (86.9%), inadequate physical activity (41.4%), alcohol consumption (0.7%), raised blood pressure (23.8%), diabetes (10.6%), overweight and obesity (24.1%), abdominal obesity (19.7%), raised total cholesterol (28.0%), hypertriglyceridemia (33.8%), low HDL level (65.7%). Nearly half of the participants use any types of tobacco, 17.8% reported having been diagnosed with high blood pressure, and 6.5% reported having diabetes. Overweight, abdominal obesity, physical inactivity, low intake of fruits and vegetables per day, smokeless tobacco, raised cholesterol and raised blood pressure (BP) were more common in females than males, 25.5% vs 22.7%, 31.1 vs 8.3, 60.1% vs 22.6%, 93.1% vs 80.6%, 31.9 vs 29.6, 30.7% vs 25.3% and 26.6% vs 21.0%. A total of 5.07% of the teenagers had one risk behaviour, 20.74% had two, 28.57% had three, and 43.37% presented all the investigated risk behaviors. Only 2.25% did not display any of the analyzed risk behaviors. Finally they conclude that adequate and continuous monitoring of NCD risk factors in Bangladesh is needed, and the surveillance findings should be used in health promotion and disease prevention activities. (jesmine *et al.*, 2017)

MM Zaman reported that Noncommunicable Diseases (NCDs) have been increasing in Bangladesh. It is necessary to examine the capacity of the Primary Health Care (PHC) system and its response to an intervention to strengthen NCD control measures. The assessment of the capacity of PHC was done in Debhata upazila of Satkhira district using interviews, record reviews and observations using check lists and questionnaires. A basic minimum intervention was done to see its appropriateness in a view to detect, prevent and manage NCDs, and to generate evidence to substantiate control measures. The intervention included such components as (a) strengthening health system through training and supply of equipment and medicines; (b) promoting medical information system and evidence generation, and (c) creation of public

awareness through observance of NCD related days and campaigns. Doctors, nurses, technologists and field level workers were present as per approved post and providing services. Relevant medicines, as per WHO essential drug list, were either supplied inadequate quantities or not supplied at all. Newly established NCD corner was not able to function adequately. The attendance of patients with NCDs was also poor (only 427 patients in 2013). Detection and referral of cases from field by the health workers were absent. Training of people and supply of essential equipment/logistics have improved functions substantially. With a short training and provision of equipment, health assistants could conduct NCD risk factor survey with satisfactory quality. Strengthening skills of personnel and provision of essential medicines and technologies can improve capacity of PHC system to deal with NCDs (Zaman *et al.*, 2016).

Mahal and Karan and Engelgau, 2010 had conveyed a paper to analyse the NCDs as an economic burden in India. According to their study, in 2004, 4.8 million (59.4 percent) of the estimated 8.1 million Indian deaths were due to NCDs. With India's population ageing over time and a higher incidence of NCDs in older age groups, and with evidence emerging that the India's poor are at heightened risk of acquiring NCDs owing to high rates of smoking and tobacco use, occupational risks, and residential living conditions, a better understanding of the economic impact of NCDs becomes urgent (Mahal, Karan and Engelgau, 2010).

Australian women health, 2014 report that Women are affected by non-communicable diseases (NCDs) in different ways to men. Not only are women's experiences of NCDs influenced by the social conditions of women's lives which are different to those of men, NCDs often manifest differently in women than they do in men. Moreover, women experience a higher burden from chronic disease and live more years of life with a disability from chronic disease than do men (AMA 2014; AIHW 2012c). The purpose of this paper is to stimulate policy dialogue on the particular issues related to women and NCDs, to strengthen gender analysis in policy and programs, and strengthen the focus on gender in clinical guidelines and particularly, the equitable inclusion of gender analysis in research which is needed to inform guideline development (Australian women health, 2014).

Muluneh *et al.*, 2012, this study had been conducted by taking a random sample of 4,469 individuals aged 15-64 years was studied. Data on characteristics and chronic symptoms

inventories were collected by interviewing study participants. Blood pressure was taken three times from each individual and blood sugar and lipid levels were determined after an overnight fasting. The overall prevalence of CNCD was 8.9% (7.8% men and 9.8% women). The specific observed prevalence were 0.5% for diabetes mellitus (DM), 2.6% for hypertension, 3.0% for cardiovascular diseases, 1.5% for asthma and 2.7% for mental illness. In addition 3.1% and 9.3% of the study population had been informed to have DM and hypertension respectively. According to their study, there is a high prevalence of CNCD among the study population indicating an immediate need for preventive action and also warrant further nationally representative study (Muluneh *et al.*, 2012).

A total of 4180 people, 1691 males (40.5%) and 2489 females (59.5%), aged from 25 to 64 years were included in this study. Most of them (95.7%) were from the Lao Lum ethnic group. The rate of tobacco smoking was significantly higher in males for all age groups. Among current smokers, 98.7% are current daily smokers and among daily smokers. Men also use more smokeless tobacco than women (14.6% vs 1.1%). The rate of alcohol drinking was significantly higher for males (72% versus 36%). The percentage of population attained a high level of physical activity was 64.1%. Males spent more time in physical activity than female (4 hours versus 2 hours). Seventy percent of physical activity is related to work and 68.2% of the population does no physical activity during their recreational time. Mean waist/hip ratio were 0.9 for both sexes and the percentage of population with heart rate per minute over 100 was 3.1 % for men and 2.9 % for women. Twenty-seven percent of the population is overweight and 5.8% is obese. Twenty percent of women and 24.9% of men have raised blood pressure (SBP \geq 140 and/or DBP \geq 90) or are on medication for raised blood pressure. Percentage with raised blood pressure (SBP \geq 160 and/or DBP \geq 100 mmHg or currently on medication for raised BP) was 8.9 %. More than 80% of the people with raised blood pressure were not on medication. Amongst these individuals, 83.8% are not on medication for raised blood pressure. The survey results show that the most relevant non-communicable diseases risk factors affecting a considerable part of the population of Vientiane capital city are raised blood pressure, tobacco use among men, excessive alcohol consumption, low exercise and low fruit and vegetable intake (World Health Organization, 2008).

Anwar Islam and Tuhin Biswas (2014) they stated that the rapidly increasing burden of chronic Non-Communicable Diseases (NCDs) constitutes a major public health challenge undermining the social and economic development throughout much of the developing world. NCDs accounted for 63% or 36 million of the estimated 57 million deaths that occurred globally in 2008 (WHO 2011). Resource poor developing countries like Bangladesh are faced with the most intractable challenge in this regard. Based on an extensive review of secondary data, the paper assesses the current burden and the future trend of NCDs in Bangladesh and at the same time examines the preparedness of the health system in responding to the challenges of chronic non-communicable diseases. The paper strongly argues that the NCDs pose an alarming issue for Bangladesh. However the health care system in Bangladesh needs to be further strengthened to effectively respond to this challenge. Bangladesh lacks a clearly articulated national NCD plan. Moreover, currently there is no routine surveillance of NCD related morbidity and mortality or of NCD risk factors. The health system seems to have limited human, technical and functional capacity to promote behavioral changes conducive to prevent NCDs. At the primary health care level, Bangladesh initiated limited number of poorly defined NCD-related health promotion activities. Clearly the health system in Bangladesh demands greater financial, human and technical resources to effectively address NCDs (Anwar and Tuhin, 2014).

Islam *et al.*, 2014 had provided a report on NCDs where stated that non-communicable diseases (NCDs) have globally shown increasing impact on health status in populations with disproportionately higher rates in developing countries. NCDs are the leading cause of mortality worldwide and a serious public health threat to developing countries. Recognizing the importance and urgency of the issue, a one-day symposium was organized on NCDs in Developing Countries by the CIHLMU Center for International Health, Ludwig-Maximilians-Universität, Munich on 22nd March 2014. The objective of the symposium was to understand the current situation of different NCDs public health programs and the current trends in NCDs research and policy, promote exchange of ideas, encourage scientific debate and foster networking, partnerships and opportunities among experts from different clinical, research, and policy fields. The symposium was attended by more than seventy participants representing scientists, physicians, academics and students from several institutes in Germany and abroad. Seven key note presentations were made at the symposium by experts from Germany, UK, France, Bangladesh and Vietnam. This paper highlights the presentations and discussions during

the symposium on different aspects of NCDs in developing countries. The symposium elucidated the dynamics of NCDs in developing countries and invited the participants to learn about evidence-based practices and policies for prevention and management of major NCDs and to debate the way forward (Islam *et al.*, 2014).

Two cross-sectional studies were conducted by Htet *et al.*, 2016 in urban and rural areas of Yangon Region in 2013 and 2014 respectively, using the WHO STEP wise approach to surveillance of risk factors of NCDs. Through a multi-stage cluster sampling method, 1486 participants were recruited. They found that age-standardized prevalence of the behavioral risk factors tended to be higher in the rural than urban areas for all included factors and significantly higher for alcohol drinking (19.9% vs. 13.9%; $p = 0.040$) and low fruit & vegetable consumption (96.7% vs. 85.1%; $p = 0.001$). For the metabolic risk factors, the tendency was opposite, with higher age-standardized prevalence estimates in urban than rural areas, significantly for overweight and obesity combined (40.9% vs. 31.2%; $p = 0.023$), obesity (12.3% vs. 7.7%; $p = 0.019$) and diabetes (17.2% vs. 9.2%; $p = 0.024$). In sub-group analysis by gender, the prevalence of hypercholesterolemia and hypertriglyceridemia were significantly higher in urban than rural areas among males, 61.8% vs. 40.4%; $p = 0.002$ and 31.4% vs. 20.7%; $p = 0.009$, respectively. Mean values of age-standardized metabolic parameters showed higher values in urban than rural areas for both male and female (Htet *et al.*, 2016).

World Health Organization (WHO) estimates for deaths attributed to Non Communicable Diseases (NCDs) in Nepal have risen from 51% in 2010 to 60% in 2014. A nationally representative cross-sectional survey was conducted by Aryal *et al.*, 2015 from Jan to June 2013 on the prevalence of NCD risk factors using the WHO NCD STEPS instrument. A multistage cluster sampling method was used to randomly select the 4,200 respondents. The adjusted prevalence ratio (APR) was used to assess the determinants of NCD risk factors using a Poisson regression model. The prevalence of current smoking (last 30 days) was 19% (95%CI:16.6-20.6), and harmful alcohol consumption (≥ 60 g of pure alcohol for men and ≥ 40 g of pure alcohol for women on an average day) was 2% (95%CI:1.4-2.9). Almost all (99%, 95%CI:98.3-99.3) of the respondents consumed less than five servings of fruits and vegetables combined on an average day and 3% (95%CI:2.7-4.3) had low physical activity. Around 21% (95%CI:19.3-23.7) were overweight or obese (BMI ≥ 25). The prevalence of raised blood pressure (SBP ≥ 140 mm of Hg or

DBP \geq 90 mm of Hg) and raised blood glucose (fasting blood glucose \geq 126 mg/dl), including those on medication were 26% (95%CI:23.6-28.0) and 4% (95%CI:2.9-4.5) respectively. Almost one quarter of respondents, 23% (95%CI:20.5-24.9), had raised total cholesterol (total cholesterol \geq 190 mg/dl or under current medication for raised cholesterol). The study revealed a lower prevalence of smoking among women than men (APR:0.30; 95%CI:0.25-0.36), and in those who had higher education levels compared to those with no formal education (APR:0.39; 95%CI:0.26-0.58). Harmful alcohol use was also lower in women than men (APR:0.26; 95%CI:0.14-0.48), and in Terai residents compared to hill residents (APR:0.16; 95%CI:0.07-0.36). Physical inactivity was lower among women than men (APR:0.55; 95%CI:0.38-0.80), however women were significantly more overweight and obese (APR:1.19; 95%CI:1.02-1.39). Being overweight or obese was significantly less prevalent in mountain residents than in hill residents (APR:0.41; 95%CI:0.21-0.80), and in rural compared to urban residents (APR:1.39; 95%CI:1.15-1.67). Lower prevalence of raised blood pressure was observed among women than men (APR:0.69; 95%CI: 0.60-0.80). Higher prevalence of raised blood glucose was observed among urban residents compared to rural residents (APR:2.05; 95%CI:1.29-3.25). A higher prevalence of raised total cholesterol was observed among the respondents having higher education levels compared to those respondents having no formal education (Aryal *et al.*, 2015).

A cross-sectional survey was carried out by Nelson and Nyarko and Binka, 2015 between the months of May and June, 2010 among a sample representative of the medical and surgical out-patients population to determine the prevalence of certain risk factors of non-communicable diseases (NCDs). Participants (n = 230) were selected by systematic random sampling. Standardised international protocols were used to measure the prevalence of smoking, alcohol consumption, physical inactivity, obesity, raised blood pressure, raised blood glucose and total cholesterol. From their survey they found that the obesity level of the study population was 40.4% with 54% being overweight. Tobacco use among the respondents was 4.8%. Alcohol consumption was 64.8%, with 54.3% of the study population being physically inactive. Almost 48% and 70.9% of the participants consumed fruits and vegetables respectively, at least three days in a week. The prevalence of hypertension was 33.6% for men and 35.2% for women. The prevalence of raised glucose and total blood cholesterol level among the study population was 6.5%. Almost 62% of the participants had a combination of three or more risk factors. The prevalence of the significant risk factors in this study were physical inactivity (54.3%), alcohol

consumption (64.8%), overweight (54%), obesity (40.4%) and raised blood pressure (34.3%). Hospitals should therefore include NCD risk factor monitoring as part of routine services (Nelson, Nyarko and Binka, 2015).

Mondo *et al.*, 2016 done this survey by using the WHO STEP wise approach to surveillance of non-communicable diseases (STEPS) methodology. Participants (n = 611) were residents of the Kasese district selected in a one-step, complete survey of a rural district. Standardized international protocols were used to record history of disease, and measure behavioral risk factors (smoking, alcohol consumption, fruit and vegetable consumption, physical activity), physical characteristics [weight, height, waist and hip circumferences, blood pressure (BP)], fasting blood glucose (BG) and total cholesterol (TC) levels. Data were analyzed using simple descriptive analysis. In this sample, the prevalence of hypertension (systolic BP \geq 140 mmHg and/or diastolic BP \geq 90 mmHg) was 22.1% for men and 20.5% for women. Fifteen per cent of men and 16.8% of women were overweight [body mass index (BMI) \geq 25 kg/m²] and 4.9% of men and 9.0% of women were obese (BMI \geq 30 kg/m²). Nine per cent of participants were diabetic, 7.2% ate five or more combined servings of fruit per day while only 1.2% ate five or more combined servings of vegetables per day. Fifty-one per cent of the population were physically inactive and 9.6% were daily smokers. Thirty-one per cent of females had fasting blood sugar levels (FBS) \geq 6.1 mmol/l while 10% of males had FBS $>$ 6.1 mmol/l. This study presents evidence on the magnitude of NCDs, their risk factors and gender distribution in a rural population in Uganda, a poor country in east-central Africa (Mondo *et al.*, 2016).

This survey was conducted by Pham *et al.*, 2009 using the WHO "STEP wise approach to surveillance of non-communicable diseases" (STEPS) methodology. Participants (n=1978) were residents of the Mekong Delta region selected by multi-stage sampling. Standardized international protocols were used to measure behavioral risk factors (smoking, alcohol consumption, fruit and vegetable consumption, physical activity), physical characteristics (weight, height, waist and hip circumferences, blood pressure--BP), fasting blood glucose (BG) and total cholesterol (TC). Data were analyzed using complex survey analysis methods. In this sample, 8.8% of men and 12.6% of women were overweight (body mass index (BMI) \geq 25 kg/m²) and 2.3% of men and 1.5% of women were obese (BMI \geq 30 kg/m²). The prevalence of hypertension (systolic BP \geq 140 mmHg and/or diastolic BP \geq 90 mmHg, or taking

medication for hypertension) was 27.3% for men and 16.2% for women. There were 1.0% of men and 1.1% of women with raised blood glucose (Pham *et al.*, 2009).

Non-communicable diseases (NCDs) are the leading causes of death globally; almost two-thirds of all deaths are due to NCDs. The International Diabetes Federation noted that India's prevalence of diabetes among 20–79-year-old is 9.09%. India has 65 million of diabetes cases which will rise to 109 million by 2035, only second to China which has 98 million diabetics that will increase to about 142.7 million by 2035. Today's investment in rupees on NCDs will save our millions lives and rupees in future attributed to NCDs. Ministry of health and family welfare survey of 2012–2013 districts levels survey-4 involved the variables of NCD's risk factors. Materials and Methods: The present study analyzed the available data of NCD's risk factors (17 states available data and district wise data of Maharashtra), particularly blood sugar and hypertension for these states, which were available on the websites of ministry. Results: Prevalence of “risk factors” of NCDs, particularly “raised blood sugar (hyperglycemia)” and “raised blood pressure (hypertension)” found more in North Indian people followed by South Indian and North-East people. In case of focused state of Maharashtra, percentages of people affected with hyperglycemia found in rest of Maharashtra (ROM) followed by Marathwada whereas raised hypertension were found more in ROM followed by Vidarbha region indicating future mortality and morbidity associated with NCDs. Conclusion: “Strong and separate health education program” is needed at central level for the intervention and prevention of “risk of future NCD's risk factors” to tackle the upcoming burden and cost associated with NCDs (Mote, 2016).

Non-communicable diseases (NCDs) are a major disease burden in the Region. Many of the risk factors are related to lifestyle and can be controlled. Physical inactivity, low fruit and vegetable intake, high fast food consumption and high cholesterol are predominant causes of cardiovascular disease and some cancers. Overweight and obesity can lead to metabolic changes and raise the risk of NCDs, including heart disease and type 2 diabetes. Three main strategies are proposed to deal with the problem: estimate need and advocate for action; develop national policies, strategies and plans for prevention and care; promote and implement community participation in prevention and care. NCDs are preventable using available knowledge; solutions are effective and highly cost-effective (Khatib, 2004).

Significance of the study

Non-communicable diseases (NCDs) kill 40 million people each year, equivalent to 70% of all deaths globally (WHO, 2017). NCDs are more and more prevalent in developing countries where they double the burden of infective diseases. Like many low income countries around the world, Bangladesh is in the midst of an epidemiologic transition. The World Health Organization (WHO) estimates that by 2020, NCDs will account for 80 percent of the global burden of disease, causing seven out of every 10 deaths in developing countries, about half of them premature deaths under the age of 70. According to WHO, it is estimated that the global NCD burden will increase by 17% in the next ten years, and in the African region by 27%. Almost half of all deaths in Asia are now attributable to NCDs, accounting for 47% of global burden of disease. Over 80% of cardiovascular and diabetes deaths, 90% of COPD deaths and two thirds of all cancer deaths occur in developing countries (Islam *et al.*, 2014). There are two types of risk factor for non-communicable disease, one is modifiable and other is non-modifiable risk factors. The risk factors of non-communicable disease can be possible to reduce if any person wants.

A few studies had been done to determine the presence and prevalence of risk factors of NCDs in Bangladesh including Zaman *et al.*, 2015; Zaman *et al.*, 2016 and Jesmine *et al.*, 2017 and another study had also been conducted to determine the knowledge of risk factors of NCDs among health care professionals (Zaman *et al.*, 2016). No work is done on Jhenidah district till now. So we are planning to investigate in Jhenidah people (including urban and rural area) whether they are suffering from NCDs and also determine the prevalence of risk factors among them. By doing this survey we can know which risk factor is more abundant to them and either they have any kind of knowledge about the risk factor of NCDs or not. From that we can take steps to reduce the possible risk factors and to increase awareness among the people about NCDs.

Aims and Objectives of the Study

The main objectives of the study are –

- ✓ To determine prevalence estimation of NCD risk factors of mass people for adults respondents of ≥ 18 years.
- ✓ To determine the modifiable risk factors associated with non-communicable disease.
- ✓ To determine the biological/non-modifiable risk factors associated with non-communicable disease.
- ✓ To determine the knowledge and awareness regarding the Risk factors.

Chapter-3

Methodology

3.1 Type of the Study

It was a survey based study.

3.2 Study Area

The survey was conducted in Kaligonj and Chandba sub-district of Jhenidah of Bangladesh.

3.3 Inclusion Criteria

- Both males and females.
- Anyone at the age of ≥ 18 years.

3.4 Exclusion Criteria

- Person unwilling to conduct the study.

3.5 Study Population

In this study, the enquiry was carried out on 295 respondents.

3.6 Development of the Questionnaire

The questionnaire was developed by following STEPS guideline but some modification had been done based on the socio-economic information of Bangladeshi population and the questionnaire was pre-tested before finalize.

3.7 Sampling Technique

In this study convenient sampling technique was followed.

3.8 Data Collection Method

The data was collected through using the developed questionnaire by face to face interview.

3.9 Data Analysis

After collecting, all the data were checked and analyzed with the help of Microsoft Excel 2010.

Chapter-4

Results

4.1 Age distribution of the respondents

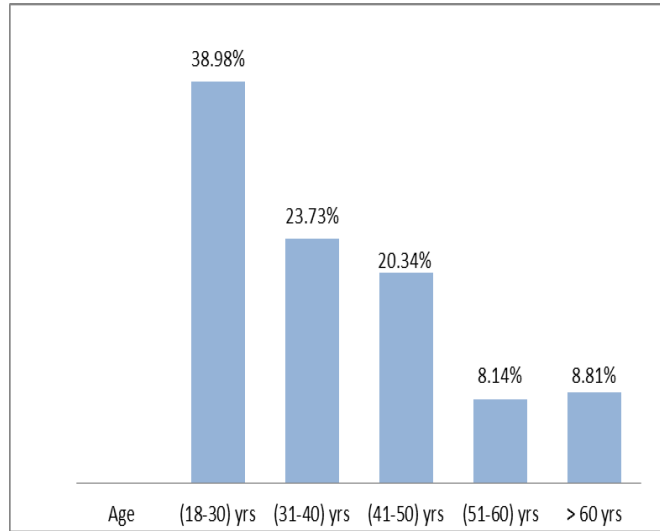


Figure 4.1: Age distribution of the respondents

During this study it was found that about 38.98% population were in between 18 to 30 years, whereas, 23.73% were within the range of 31 to 40 years. However, only 8.14% population were in between 51 to 60 years of age. Around 20.34% population were within 41 to 50 years range and rest of the population which includes 8.81% were above 60 years of age.

4.2 Gender of the respondents

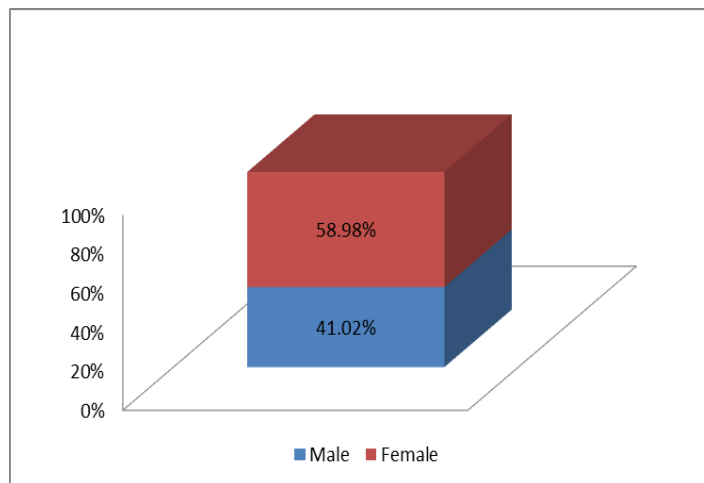


Figure 4.2: Gender of the respondents

In this study, 58.98% respondents were female and rest of the population which includes 41.02% were male respondents.

4.3 Educational qualifications among respondents

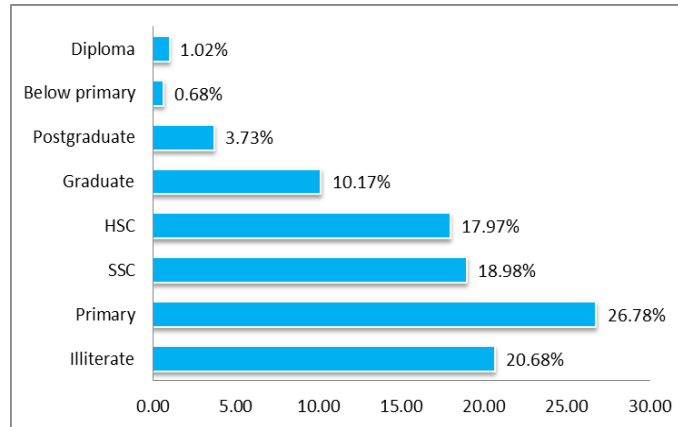


Figure 4.3: Educational qualifications among respondents

Regarding their educational status about 26.78% of the population passed primary level, whereas, 0.68% were below primary level and 20.68% were illiterate. Around 18.98% population were passed SSC level and 17.97% population were passed HSC level. This study found that 10.17% people were graduates and 3.73% were post graduate. Only few people (1.02%) were in diploma level.

4.4 Occupational Qualifications of the Respondents

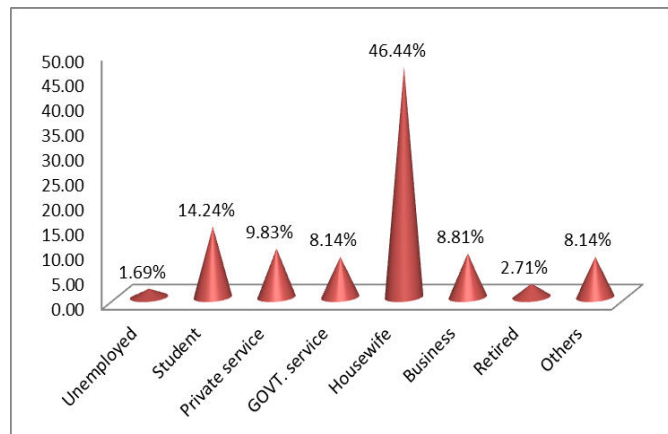


Figure 4.4: Occupational Qualifications of the Respondents

Throughout this study it was found that 46.44% among the respondents were housewife, whereas, 14.24% were student. Around 9.83% are working in the private sectors and 8.14% are the GOVT. service holders. Among the respondents 8.81% were businessmen and 1.69% were

unemployed. The rest of the population which includes 2.71% were retired and 8.14% population are pursuing other means for living.

4.5 Marital status of the respondents

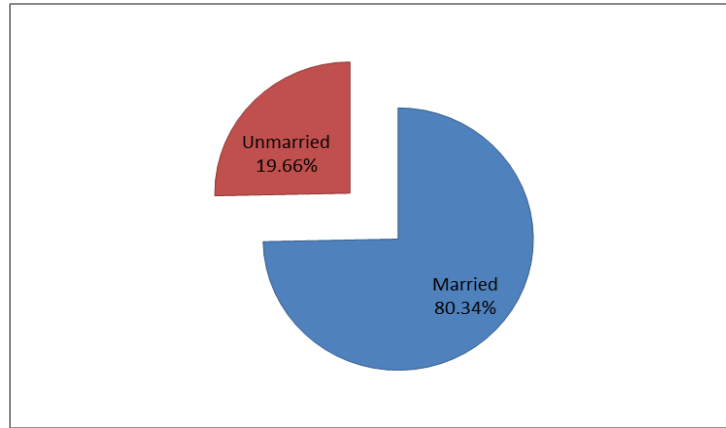


Figure 4.5: Marital status of the respondents

Among the respondents among 80.34% of the population were married upon which the study was conducted, whereas, 19.66% were unmarried.

4.6 Residential Status of the Respondents

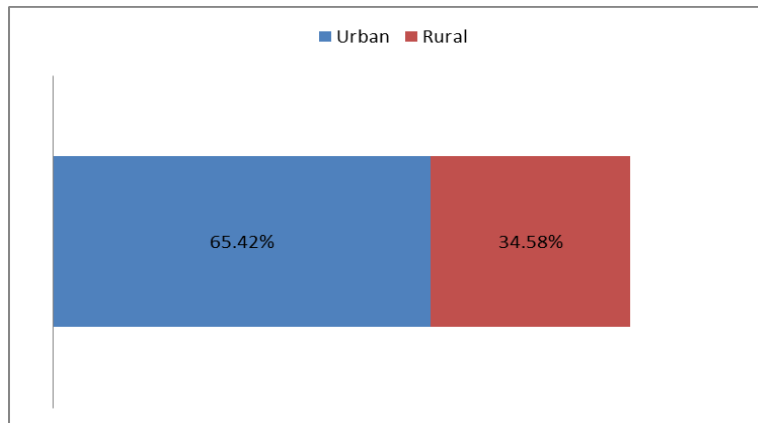


Figure 4.6: Residential Status of the Respondents

In this study, 65.42% respondents were living in the urban areas and the rest of the population were living in rural region includes around 34.58%.

4.7 Monthly Family Income of the respondents

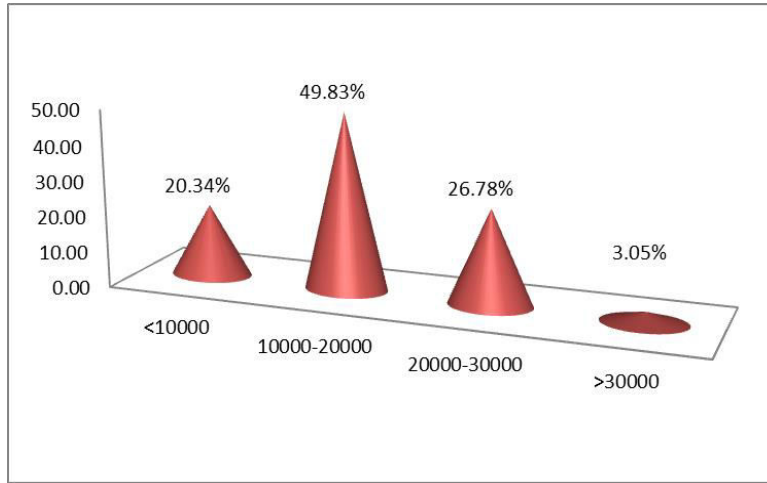


Figure 4.7: Monthly Family Income of the respondents

This study found that around 49.83% population had monthly family income 10000-20000tk, whereas, 26.78% had earnings of 20000-30000tk. Around 3.05% population had >30000tk monthly income and rest of the population which includes 20.34% had <10000tk as their monthly income.

4.8 BMI (Body Mass Index) Status of the Respondents

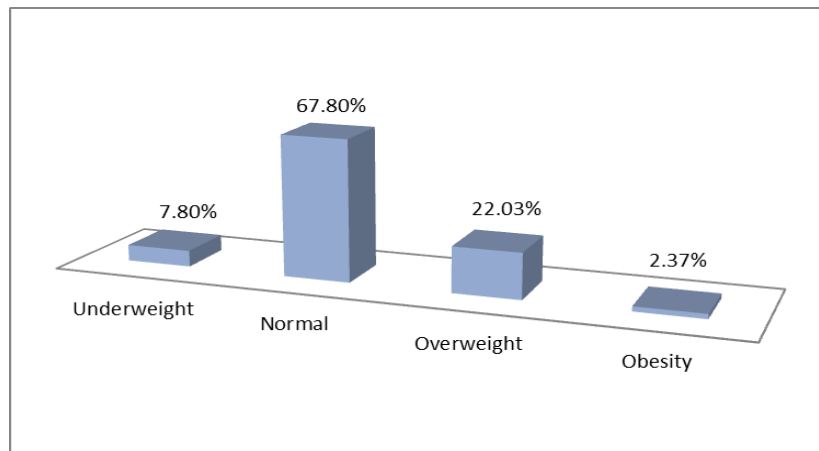


Figure 4.8: BMI (Body Mass Index) Status of the Respondents

Height, Weight and Waist circumference of each of the respondents were taken properly and it was then calculated with the BMI Calculator to signify the obesity in the studied population. From the results, we can see that 67.80% of the population had a normal weight whereas 7.80%

of the population were underweight. But it was found that 22.03% of the population were within the range of overweight and had greater risk of obesity in the near future. On the other hand 2.37% of the population were already in the range of obesity so they were in greater risk of suffering from different kinds of non-communicable diseases.

4.9 Waist Circumference Status of the Respondents

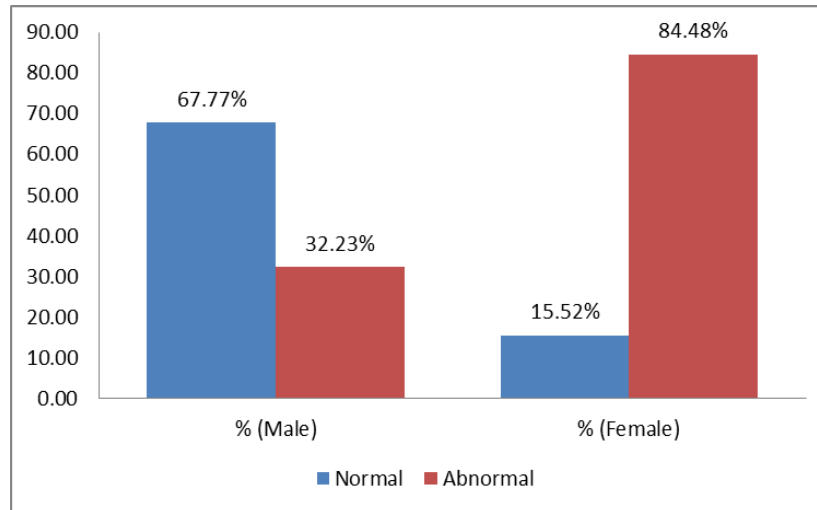


Figure 4.9: Waist Circumference Status of the Respondents

In our study among 295 respondents 121 were male and 174 were female. The standard of waist circumference for male and female is quite different. For male 37 inches or less (≥ 94 cm) is a standard and on the other hand for female ≤ 31 inches (80 cm) is considered as normal waist circumference. By analyzing our data we have found that 67.77% of male population had normal waist circumference and 32.23% had abnormal waist circumference. On the other hand, only 15.52% of the female respondents had normal waist circumference and a large percentage of female respondents had abnormal waist circumference which is 84.48%. So, in this case we may say that according to our study female respondents has more chance to face non-communicable disease in future than male respondents.

4.10 Sleeping habits of respondents

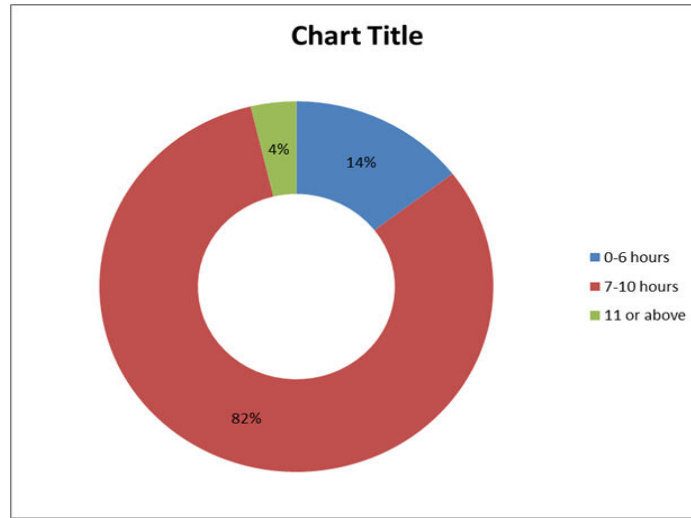


Figure 4.10: Sleeping habits of respondents

Normally a healthy person needs 7-10 hours of sleep. In our study among 295 respondents we have found that 82% population has normal sleeping habit. The person with 0-6 hours' sleep is not sufficient whereas the rest of the population which includes 4% of the people had a sleeping duration of above 11 hours a day which means those people are not sufficiently physically active and they have a high risk of non-communicable disease.

4.11 Blood Pressure Status of the Respondents

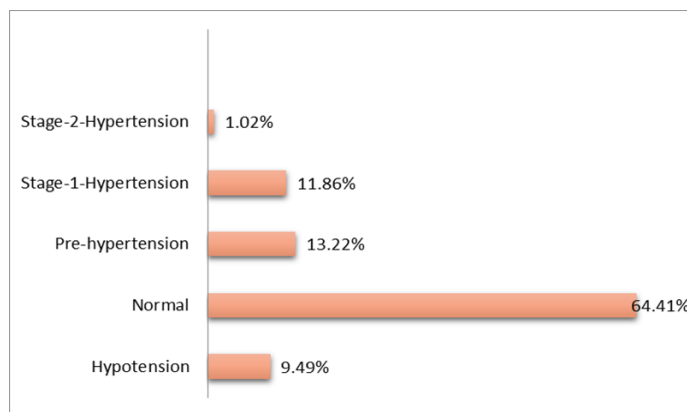


Figure 4.11: Blood Pressure Status of the Respondents

Blood pressure played an important role in the study and when we took the blood pressure of the respondents made sure that they are in the resting condition and we took blood pressure two

times with 10 minutes differences. During this, when the pressure of each of the respondents were measured it was seen through analysis that 9.49% of the respondent had hypotension and 64.41% of the people had normal blood pressure conditions. But the major concerning issue was that 11.86% of the people having hypertension 1 and rest of the population had 0.68% hypertension 2 which may lead to further complications. Around 0.33% population were in the stage of hypertension crisis that may lead to serious health damage.

4.12 Current Medical Condition of the Respondents

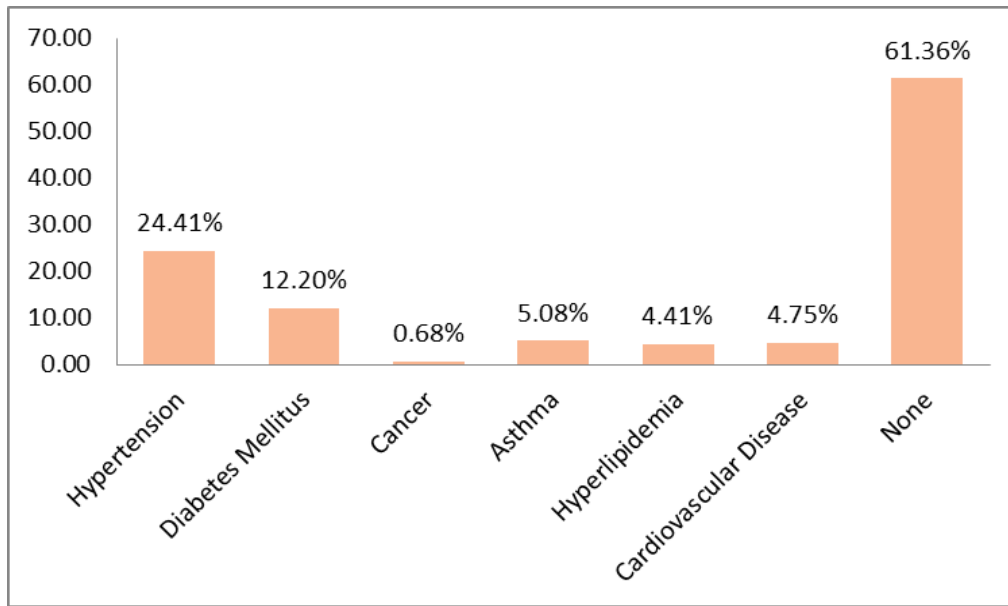


Figure 4.12: Current Medical Condition of the Respondents

When the respondents were asked whether they are suffering from any of the medical conditions than 24.41% of the people answered that they are suffering from hypertension. Other respondents included 5.08% from asthma, 12.20% from Diabetes Mellitus, 4.41% from hyperlipidemia, 4.75% from cardiovascular diseases and only 0.68% from cancer. But 61.36% of the populations were not suffering from any of the conditions out of 295 respondents.

4.13 Status of Respondents about suffering from any conditions

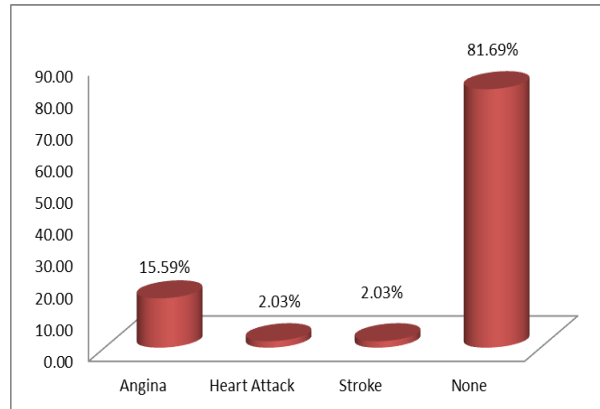


Figure 4.13: Status of Respondents about suffering from any conditions.

When the respondents were asked whether they are suffering from any of the medical conditions than 15.59% answered that they are sometimes suffer from angina. 2.03% people suffered from heart attack and stroke caused in 2.03% people also. But 81.69% people are not suffering in any of these following conditions.

4.14 Family history of respondents about suffering from any conditions

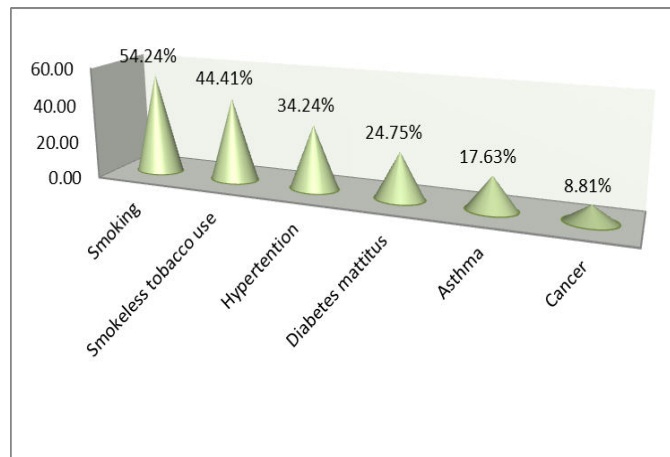


Figure 4.13: Family history of respondents about suffering from any conditions

Every year 2.5 lakh Bangladeshis die due to tobacco and the rate of death is 28 per hour, according to a report of World Health Organization (WHO). Our study found that among 295 respondents 54.24% had family history of smoking and 44.41% had family history of smokeless

tobacco use. However, 34.24% answered that their family history had hypertension and 24.75% had diabetes mellitus. The rest of the conditions regarding asthma and cancer 17.63% and 8.81% provided affirmative answers about family history.

4.15 Knowledge of the Respondents about Tobacco use, Excess salt intake, Physical inactivity and Overweight.

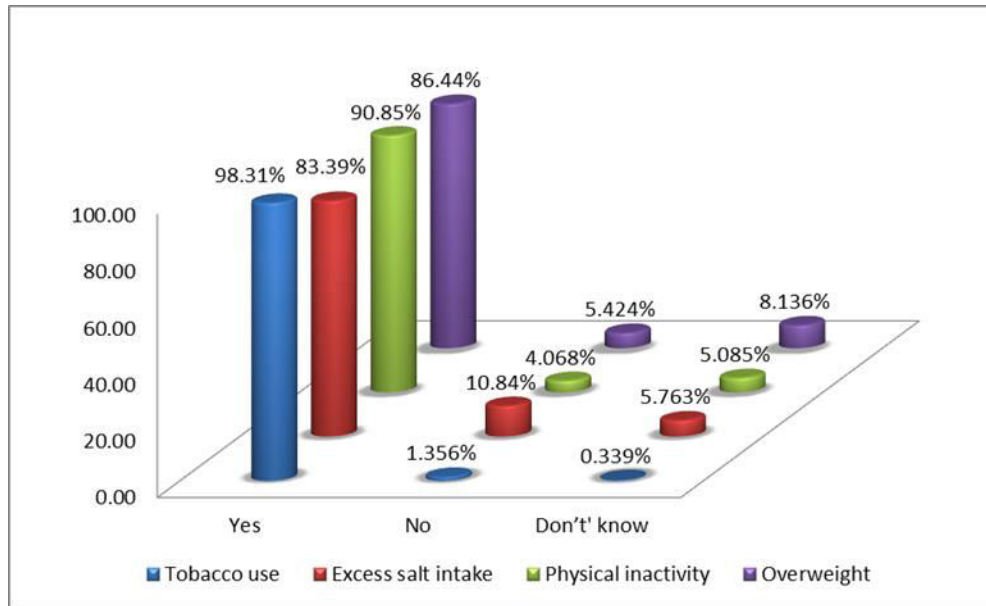


Figure 4.15: Knowledge of the Respondents about Tobacco use, Excess salt intake, Physical inactivity and Overweight.

When the respondents were asked whether Tobacco use causes health problem then about 98.31% of the population knew that tobacco use can cause health problem. Around 1.356% of the population thought that tobacco use didn't cause any sort of health problem. The rest of the population which includes 0.339% of the people had no idea that tobacco use could cause any sort of health problem in a person. In case of their knowledge about excess salt intake, 83.39% of the population knew that excess salt intake may cause health problem especially for them who have hypertension. Around 10.84% of the population thought that excess salt intake did not cause any types of health problem and 5.763% of the population had no idea about this. When the respondents were asked about their knowledge in physical inactivity 90.85% gave positive answer whereas 4.068% thought that physical inactivity didn't cause any health problem and 5.085% of population had no idea about this condition. In case of overweight, 86.44% of the total population thought that overweight may cause serious health problem. But 5.424% of the

population did not think that it can cause any type of health issues. Only 8.136% of the population had no idea about this type of health condition.

4.16 Status of Respondents about Tobacco product use

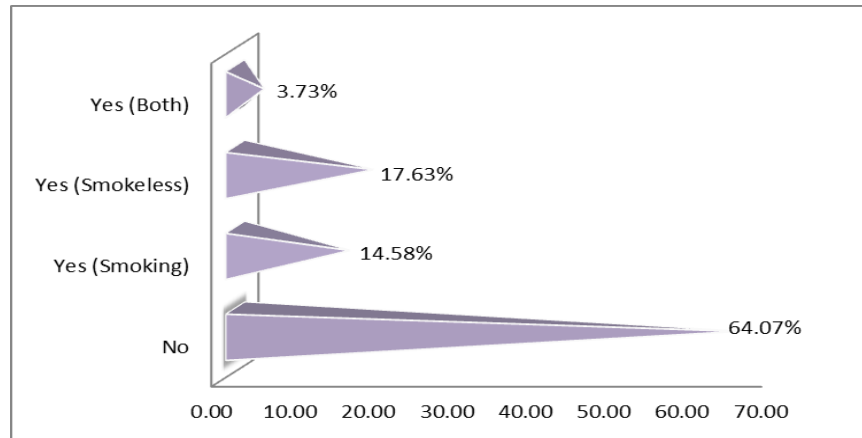


Figure 4.16: Status of Respondents about Tobacco product use

When the respondents were asked about the use of tobacco in their daily life then 64.07% people provide negative answer. Whereas 14.58% people take cigarettes, pipes or biri and 17.63% people take chewing, snuff, gul, jorda, pan-masala or any other types of smokeless product. Around 3.73% of the total respondents take both smoking and smokeless products.

4.17: Status of Respondents about Dietary Habit (Fruit eating)

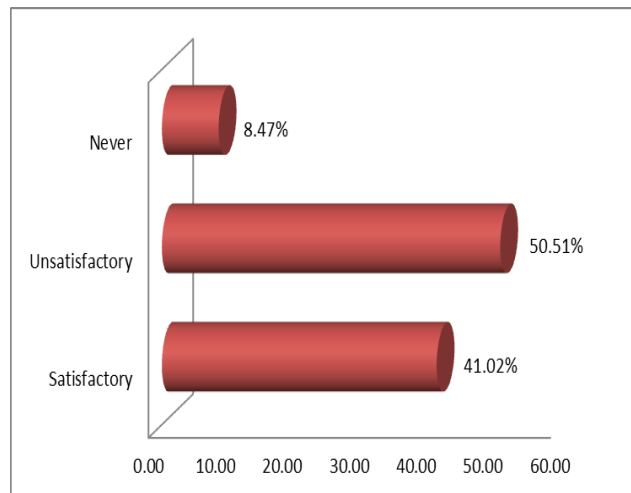


Figure 4.17: Status of Respondents about Dietary Habit (Fruit eating)

Normally the people who have taken fruits at least 5-7 days in a week that person is considered as in the satisfactory level and those who have taken fruits at least 1-4 days in a week that person is in the unsatisfactory level. In our study, we have found that among 295 of the total respondents 41.02% people are in the satisfactory level and 50.51% people are in the unsatisfactory level. About 8.47% of the total respondents do not take fruits at all.

4.18 Status of Respondents about Dietary Habit (Vegetable eating)

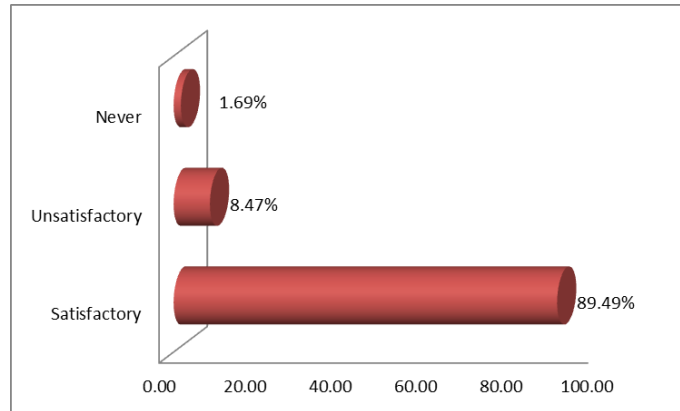


Figure 4.18: Status of Respondents about Dietary Habit (Vegetable eating)

Normally the people who have taken vegetables at least 5-7 days in a week that person is considered as in the satisfactory level and those who have taken fruits at least 1-4 days in a week that person is in the unsatisfactory level. In our study, we have found that among 295 of the total respondents 89.49% people are in the satisfactory level and 8.47% people are in the unsatisfactory level. About 1.69% of the total respondents do not take fruits at all.

4.19 Status of Respondents about Dietary Habit (Eating meal outside)

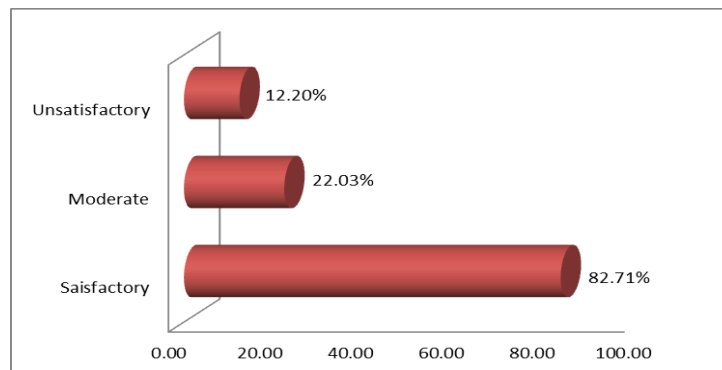


Figure 4.19: Status of Respondents about Dietary Habit (Eating meal outside)

Eating meal outside is a greater threat for non-communicable diseases occurrence. Habit of eating meals is an important parameter in this study. The eating habits of this study population were analyzed about how many meals they take within home and how many they take outside. On the basis of that it was found that 82.71% of the people didn't take a single meal outside which is satisfactory in nature. Whereas 12.20% of the population take meal outside and this people have a high risk to cause non communicable diseases in future. The rest of the population 22.03% take a meal prepared outside the home at least 3-4 days per week which is moderate in nature.

4.20 Habit of adding Salt or Salty Sauce in the Food

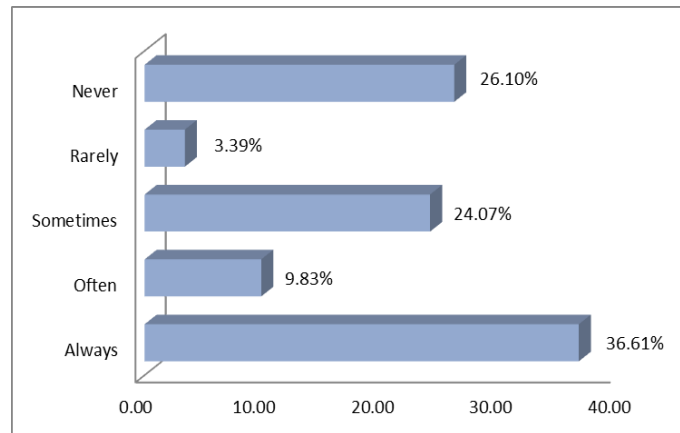


Figure 4.20: Habit of adding Salt or Salty Sauce in the Food

After analysis of this data of 295 respondents, 36.31% of the total population take salt or add salty sauce in their food. Whereas 9.83% people often add salt or salty sauce in their food and 24.07% of the population sometimes added it. Out of the 295 respondents, 3.39% people rarely use salt or salty sauce in their food. Around 26.10% of the total population never added salt or any types of salty sauce in their food.

4.21 Habit of eating processed food High in Salt

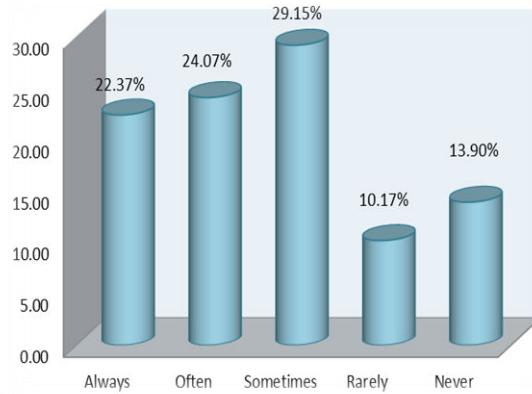


Figure 4.21: Habit of eating processed food High in Salt

When the respondents were asked about if they eat processed food high in salt content 22.37% gave positive answer. On the other hand 24.07% of the people often ate processed food high in salt content and 29.15% of the sometimes ate this type of food. Out of the 295 respondents 10.17% rarely and 13.90% never ate processed food high in salt content. Upon analyzing it can be easily said that major portion of the study population sometimes eats such kind of food which increases the risk of suffering from non-communicable diseases.

4.22 Physical Activity status of the Respondents

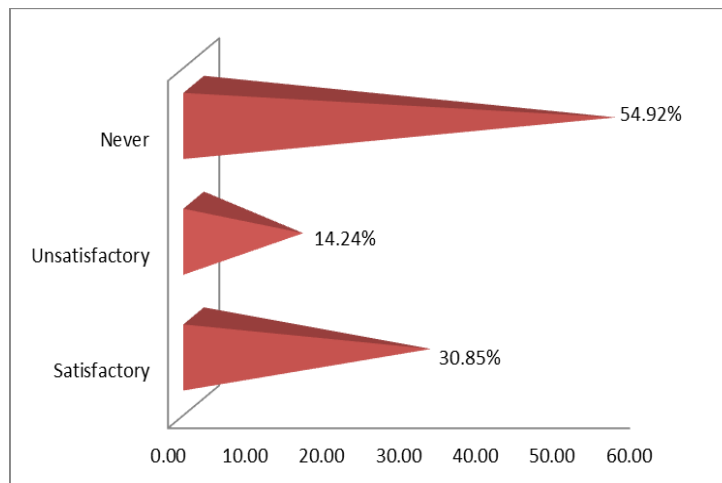


Figure 4.22: Physical Activity status of the Respondents

In our study we collect data from 295 respondents in case of physical study on the basis of that increases respiration rate or heart rate and which is usually done for 10 minutes continuously. Generally physical activity for 150 minutes or more per week is considered as satisfactory level and in our study we found that 30.85%. Physical activity for less than 150 minutes per week is considered as unsatisfactory level and in this study we found that 14.24%. But a large amount of population which is 54.92% avoids physical activity. Upon analyzing this it can be said that the majority of the study population do not comply with the physical activity standard which increases their chances for suffering from non-communicable diseases.

4.23 Doctor's Advice to the Respondents

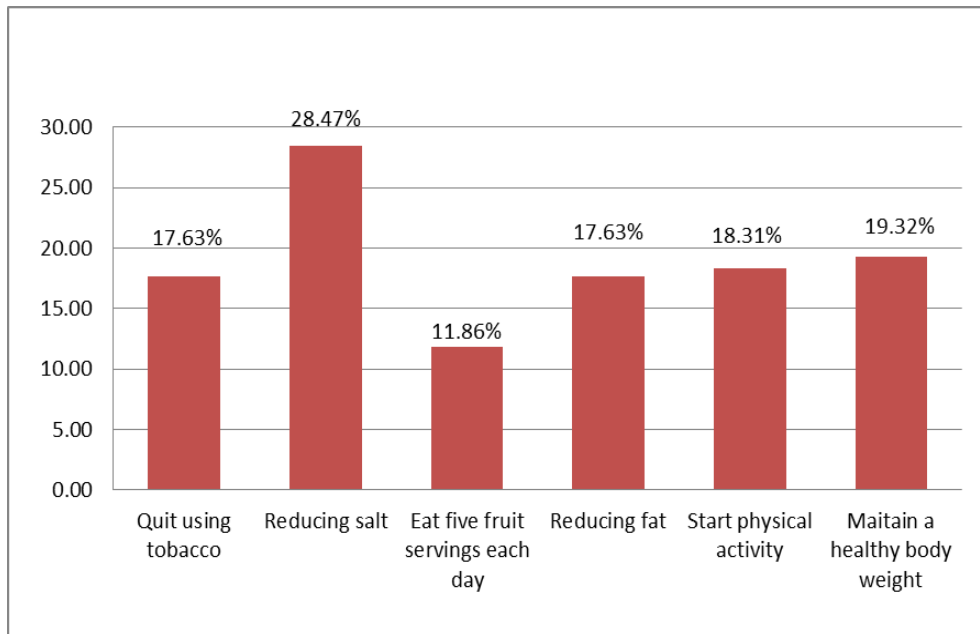


Figure 4.23: Doctor's Advice to the Respondents

Out of 295 respondents when they were asked about whether their doctors ever gave them any advices regarding their behavioral modifications on lifestyles regarding quit smoking tobacco 17.63% of the total respondents gave positive answer. 28.47% people were advised by the doctor to reduce salt in their diet and 11.86% were advised to eat five fruit servings each day. 17.63% of the population answered that they were advised by the doctor to reduce their fat and 18.31% people said that doctor suggest them to start physical activity. Among 19.32% of the total respondents said that they were advised by the doctor to maintain a healthy body weight.

Chapter-5

Discussion & Conclusion

Discussion

Non-communicable diseases (NCDs) have already become major killers in Bangladesh and also a major public health challenge for Bangladesh. NCDs (inclusive of injuries) account for 61 % of the total disease burden in Bangladesh. This study was done to determine the prevalence of major NCDs and their prevalence among adult people of Jhenidah district of Bangladesh and also done to determine the knowledge and awareness of the population about the risk factors. The survey reports a high prevalence of risk factors, which poses a significant threat to the Bangladeshi population for upcoming NCD epidemics.

This study was done among 295 respondents among which 41.02% were male and 58.98% were female. Majority of them aged between (38.98%) aged between 18-30 years and 20.34% were aged between 41-50 years. Regarding their educational status about 26.78% of the population passed primary level. 18.98% passed SSC level and 17.97% HSC level. This study found that 10.17% people were graduates and 20.68% were illiterate. Throughout this study it was found that 46.44% among the respondents were homemaker, whereas, 14.24% were student and around 9.83% are working in the private sectors.

In our study majority of the participants which is 61.36% out of 295 respondents were not suffering from any types of current medical conditions. 12.20% were suffering from Diabetes Mellitus and 5.08% from Asthma. Very few had cardiovascular diseases (4.75%) and only 0.68% having cancer. But 24.41% were suffering from hypertension and according to our BP measure 26.10% had hypertension among which 13.22% having pre-hypertension, 11.86% having stage 1 hypertension and 1.02% having stage 2 hypertension. 36.31% of the total population take salt or add salty sauce in their food and 26.10% of the total population never added salt or any types of salty sauce in their food. Still majority (83.39%) of the population know that salt intake may cause health problem who have hypertension. 34.24% had family history of hypertension and 24.75% had diabetes mellitus and 8.81% had cancer. A study Zaman *et al.*, 2015 showed 20.1% had hypertension. The prevalence of hypertension increased with age. This is quite similar to our study.

Within last 30 days 14.58% people said that they take cigarettes, pipes or biri that means they are the current smoker now and 17.63% people take chewing, snuff, gul, or any other types of

smokeless product. Around 3.73% of the total respondents take both smoking and smokeless products. Still 98.31% of the population knew that tobacco use can cause health problem. However, 54.24% had family history of smoking and 44.41% had family history of smokeless tobacco use. A survey conducted by Zaman *et al.*, 2015 found in his this survey, 34.2% were smokeless tobacco users. As opposed to smoking, more women (40.4%) were found to use smokeless tobacco than men (29.7%). This result is not similar to our study as major portion of our respondents are female.

Obesity has been growing in Bangladesh. Based on body mass index (weight in Kg divided by height in meter squared) we can see that 22.03% of the population were within the range of overweight and had greater risk of obesity in the near future though 67.77% male population and 15.52% female population had normal waist circumference. On the other hand 2.37% of the population were already in the range of obesity where 32.23% male and 84.48% female had abnormal waist circumference. So they were in greater risk of suffering from different kinds of non-communicable diseases. Although 86.44% of the total population thought that overweight may cause serious health problem. However, there are a higher number of people who takes processed food high in salt which increases the chance of obesity. A study by Zaman *et al.*, 2015 documented that A substantial proportion (16.9%) of the sample were overweight (BMI \geq 25). The prevalence was higher in women (20.2%) than in men (12.8%). This is similar to our study. According to our study female respondents has more chance to face non-communicable disease in future than male respondents.

Low physical activity is considered as an important predictor of many chronic NCDs. The physical activity including exercise, walking at home or at work or during travelling for 150 minutes or more per week is considered as satisfactory level and in our study we found that 30.85%. But a large amount of population which is 54.92% avoids physical activity though 90.85% population aware about it and they are in the danger zone of NCD. Where 18% of the population had abnormal sleeping habit that means those people are not sufficiently physically not active. According to Zaman *et al.*, 2015, 35% of the participants had a low level of physical activity which is not similar to our study.

Although Bangladeshi people consume vegetables every day but the quantity is low. According to STEPS taking fruits and vegetables 5 Servings a day is standardized. But during our study we

did not use this parameter rather we opted for if a respondent takes fruits or vegetables 5 days a week is quite satisfactory. On that standard in case of fruit eating 41.02% people are in the satisfactory level and 50.51% people are in the unsatisfactory level and in case of vegetable eating 89.49% people are in the satisfactory level and 8.47% people are in the unsatisfactory level. About 8.47% and 1.69% do not take fruits and vegetables at all. Considering the minimum recommended amount, 92.4% did not consume adequate fruit or vegetables on an average day (Zaman *et al.*, 2015).

Eating meal outside is a greater threat for non-communicable diseases occurrence. Habit of eating meals is an important parameter in this study. The eating habits of this study population were analyzed about how many meals they take within home and how many they take outside. In this study 82.71% of the people didn't take a single meal outside which is satisfactory in nature. Whereas 12.20% of the population take meal outside and this people have a high risk to cause non communicable diseases in future.

Out of 295 respondents doctors advices 17.63% of the population to quit smoking. 28.47%, 11.86%, 18.31% and 19.32% people answered positively in regards of reducing salt intake, taking 5 meals a day, starting physical activity and maintain healthy diet.

Conclusion

Having a vast population a developing country like Bangladesh are at a great risk of non-communicable disease factor now a days. NCDs are increasing in a high rate due to social transition, unhealthy dietary habit and rapid urbanization and as well as the old health policy which is not developed so much. Based on all the facts, it can be said that knowledge and awareness about distribution of the risk factors such as tobacco use, fruit and vegetables intake, physical activity, dietary habit, obesity, hypertension, family history of any NCDs, any current medical conditions of NCDs are quite good among the study population. Most of the respondents know about the risk factor but they are not quite aware to maintain this. They do not follow the standard guideline for maintain good health. Almost all respondents know about their family history but they do not know how to contain the biological markers. The majority portion aware about the complication of their behavioral risk factor but they don't want to modify it. People are advised by the doctor to maintain their health conditions according to the guidelines, most of the cases they don't want to follow the instruction. After the analysis it was seen that major portion of the population were suffering from one risk factor at least. But some of the population contains more than one risk factor which is very alarming. At this point, The capacity and capability of NCDF (non-communicable disease forum) must be strengthen to setup advocacy network at national level to community level to update and create policies for health and other related sectors to reduce the risk factors of NCDs. Government should take steps to aware community people regarding NCDs prevention and early diagnosis and awareness about the risk factors of NCDs like life style, developing a national NCD surveillance system and strengthen tobacco control policies can be very effective .By adopting this kinds of measures Bangladesh can set a great example in preventing NCDs and in health sector as well as.

Chapter-6

References

- Ahmad J, Z.K., Nadimi, A.E., Nejadghaderi, M., Saeidi, A. and Porkarami, A., (2016). Prevalence of smoking and high blood pressure, two major risk factors for non-communicable diseases: the SuRF NCD (surveillance of risk factors of non-communicable disease) report 2012. *Journal of cardiovascular and thoracic research*, 8(4), p.183.
- Aryal, K.K., Mehata, S., Neupane, S., Vaidya, A., Dhimal, M., Dhakal, P., Rana, S., Bhusal, C.L., Lohani, G.R., Paulin, F.H. and Garg, R.M., (2015). The burden and determinants of non communicable diseases risk factors in Nepal: findings from a nationwide STEPS survey. *PLoS One*, 10(8), p.e0134834.
- Bleich, S. N., Koehlmoos, T. L., Rashid, M., Peters. D. H. and Anderson, G., (2010). Non-communicable chronic disease in Bangladesh: overview of existing programs and priorities going forward. *Health Policy 100*. No.2 (2011): 282-289.
- Boutayeb, A. and Boutayeb, S., (2005). The burden of non-communicable diseases in developing countries. *International journal for equity in health*, 4(1), p.2.
- Bull, F.C. and Bauman, A.E., (2011). Physical inactivity: the “Cinderella” risk factor for noncommunicable disease prevention. *Journal of health communication*, 16(sup2), pp.13-26.
- Dimeo, F.C., (2001). *Effects of exercise on cancer-related fatigue*. *Cancer*, 92(S6), pp.1689-1693.
- Esmailnasab, N., Moradi, G. and Delaveri, A., (2012). Risk factors of non-communicable diseases and metabolic syndrome. *Iranian journal of public health*, 41(7), p.77.
- Gregg, E.W. and Shaw, J.E., (2017). Global Health Effects of Overweight and Obesity.
- Heart.org (2016). *High Blood Pressure*. [Online] Available at: https://www.heart.org/HEARTORG/Conditions/HighBloodPressure/High-Blood-Pressure-or-Hypertension_UCM_002020_SubHomePage.jsp [Accessed 1 May 2017].
- Heymsfield, S.B. and Wadden, T.A., (2017). Mechanisms, pathophysiology, and management of obesity. *New England Journal of Medicine*, 376(3), pp.254-266.

Htet, A.S., Bjertness, M.B., Sherpa, L.Y., Kjøllesdal, M.K., Oo, W.M., Meyer, H.E., Stigum, H. and Bjertness, E., (2016). Urban-rural differences in the prevalence of non-communicable diseases risk factors among 25–74 years old citizens in Yangon Region, Myanmar: a cross sectional study. *Biomedcentral public health*, 16(1), p.1225.

Islam, A. and Biswas, T., (2014). Chronic non-communicable diseases and the healthcare system in Bangladesh: current status and way forward. *Chronic Dis Int*, 1(2), p.6.

Islam, S.M.S., Purnat, T.D., Phuong, N.T.A., Mwingira, U., Schacht, K. and Fröschl, G., (2014). Non-Communicable Diseases (NCDs) in developing countries: a symposium report. *Globalization and health*, 10(1), p.81.

Jesmin, S., Rahman, M.A., Habib, A.A., Islam, M.M., Sultana, S.N., Zaedi, S., Khatun, T., Sohael, F., Yamaguchi, N., Okazaki, O. and Iwashima, Y., (2015). Nationwide Non-Communicable Disease Risk Factors Profile in Bangladesh. *Journal of Hypertension*, 33, p.e17.

Just-health.net. (2016). *Lists of Non-Communicable Diseases* | Just-Health.net. [online] Available at: <http://www.just-health.net/Non-Communicable-Diseases-List.html> [Accessed 25 April. 2016].

Kalaria, R.N., Maestre, G.E., Arizaga, R., Friedland, R.P., Galasko, D., Hall, K., Luchsinger, J.A., Ogunniyi, A., Perry, E.K., Potocnik, F. and Prince, M., (2008). Alzheimer's disease and vascular dementia in developing countries: prevalence, management, and risk factors. *The Lancet Neurology*, 7(9), pp.812-826.

Khatib, O., (2004). Noncommunicable diseases: risk factors and regional strategies for prevention and care.

MacGill, M. (2016). *Diabetes: Symptoms, Causes and Treatments*. [Online] Medicalnewstoday.com. Available at: <http://www.medicalnewstoday.com/info/diabetes> [Accessed 10 May. 2016].

MacGill, M. and Webberley, D. (2016). Hypertension: Causes, Symptoms and Treatments. [online] *Medical News Today*. Available at: <http://www.medicalnewstoday.com/articles/150109.php> [Accessed 10 May, 2016].

Mahal, A., Karan, A. and Engelgau, M., (2010). The economic implications of non-communicable disease for India. *Washington: World Bank*.

Medicine.net, (2017). [Online]. *Osteoporosis causes and risk factors*. Available at: <http://www.medicinenet.com/osteoporosis/article.htm> [Accessed 10 May, 2017]

Miller, A.B., Hoogstraten, B.F.A.U., Staquet, M.F.A.U. and Winkler, A., (1981). *Reporting results of cancer treatment. cancer*, 47(1), pp.207-214.

Mondo, C.K., Otim, M.A., Musoke, R., Orem, J. and Akol, G., (2016). The prevalence and distribution of non-communicable diseases and their risk factors in Kasese district, Uganda. *South African Journal of Diabetes and Vascular Disease*, 13(1), pp.31-36.

Mote, B., (2016). A regional epidemiology of India's" NCD's risk factors" focusing particularly on Maharashtra: A call for" Health promotion" once again. *International Journal of Medicine and Public Health*, 6(1), pp.26-26.

Muluneh, A.T., Haileamlak, A., Tessema, F., Alemseged, F., Woldemichael, K., Asefa, M., Mamo, Y., Tamiru, S., Abebe, G., Deribew, A. and Abebe, M., (2012). Population based survey of chronic non-communicable diseases at gilgel gibe field research center, southwest Ethiopia. *Ethiopian journal of health sciences*, 22(4), pp.7-18.

Nelson, F., Nyarko, K.M. and Binka, F.N., (2015). Prevalence of Risk Factors for Non-Communicable Diseases for New Patients Reporting to Korle-Bu Teaching Hospital. *Ghana medical journal*, 49(1), pp.12-18.

Nih.gov (2017). *Calculate Your BMI - Metric BMI Calculator*. [Online] Available at: https://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmi-m.htm. [Accessed 1 June, 2017]

Pham, L.H., Au, T.B., Blizzard, L., Truong, N.B., Schmidt, M.D., Granger, R.H. and Dwyer, T., (2009). Prevalence of risk factors for non-communicable diseases in the Mekong Delta, Vietnam: results from a STEPS survey. *Biomedcentral Public Health*, 9(1), p.291.

Ruggenti, P. and Remuzzi, G., (2000). Nephropathy of type 1 and type 2 diabetes: diverse pathophysiology, same treatment?. *Nephrology Dialysis Transplantation*, 15(12), pp.1900-1902.

Shokeen, D. and Aeri, B.T., (2015). Risk factors associated with the increasing cardiovascular diseases prevalence in India: a review. *Journal of Nutrition & Food Sciences*, 5(1), p.1.

Thakur, J.S., Garg, R., Narain, J.P. and Menabde, N., (2011). Tobacco use: a major risk factor for non communicable diseases in South-East Asia region. *Indian journal of public health*, 55(3), p.155.

Thom, T., Haase, N., Rosamond, W., Howard, V.J., Rumsfeld, J., Manolio, T., Zheng, Z.J., Flegal, K., O'donnell, C., Kittner, S. and Lloyd-Jones, D., (2006). Heart disease and stroke statistics--2006 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*, 113(6), p.e85.

Wma.net. (2016). *Non-Communicable Diseases*. [online] Available at: <http://www.wma.net/en/20activities/30publichealth/10noncommunicablediseases/> [Accessed 28 May, 2016].

World Health Organization, (2008). *Report on STEPS Survey on non-communicable diseases risk factors in Vientiane Capital city, LAO PDR*.

World Health Organization, (2011). *Global information system on alcohol and health*. Geneva, Switzerland: World Health Organization.

World Health Organization, (2013). *Global action plan for the prevention and control of noncommunicable diseases 2013-2020*.

World Health Organization, (2015). *WHO global report on trends in prevalence of tobacco smoking 2015*. World Health Organization.

World Health Organization, (2016). *Global report on diabetes*. World Health Organization.

World Health Organization, (2016). *Global Status Report on non-communicable diseases*. [Online] Available at: http://www.who.int/chp/ncd_global_status_report/en/ [Accessed 25 April, 2017]

Zaman, M.M., Bhuiyan, M.R., Karim, M.N., Rahman, M.M., Akanda, A.W. and Fernando, T., (2015). Clustering of non-communicable diseases risk factors in Bangladeshi adults: an analysis of STEPS survey 2013. *Biomedcentral public health*, 15(1), p.659.

Zaman, M.M., Rahman, M.M., Rahman, M.R., Bhuiyan, M.R., Karim, M.N. and Chowdhury, M.A.J., (2016). Prevalence of risk factors for non-communicable diseases in Bangladesh: Results from STEPS survey 2010. *Indian journal of public health*, 60(1), p.17.

Zaman, M.M., Ullah, A.K.M.J., Bhuiyan, M.R. and Karim, M.N., (2016). Moniruzzaman and Rahman SMA. Noncommunicable Disease Prevention and Control Situation in a Primary Health Care Setting of Bangladesh: Design and Baseline Findings of an Intervention. *Chronic Dis Int*, 3(1), p.1021.

Zanchetti, A., (2017). Treatment adherence and hypertension in the elderly. *Journal of hypertension*, 35(6), pp.1131-1132.