# Interlinkages between Chronic Illness and Urban Poverty in Bangladesh

**A Thesis Submitted as a Requirement for the Degree of Master of Philosophy in Economics**
**University of Dhaka**


***Submitted By***
**Azima Begum**
MPhil Registration No: 52
Session: 2022-23
Department of Economics, University of Dhaka

***Under the Supervision***
***of***
**Dr. Muhammad Shahadat Hossain Siddiquee**
Professor, Department of Economics
University of Dhaka


**October 2025**

# CERTIFICATE

This is to certify that the thesis entitled “Interlinkages between Chronic Illness and Urban Poverty in Bangladesh” has been submitted by Ms. Azima Begum in particular fulfillment of the requirements for the degree of Master of Philosophy in Economics from the Department of Economics, University of Dhaka, bearing the registration number 52. She made her best efforts to complete her thesis, exercising critical judgment on the subject matter and deriving some important policy measures. She was very regular, attentive, and effective in communication while pursuing her MPhil degree under my supervision.

**(Dr. Muhammad Shahadat Hossain Siddiquee)**
Professor, Department of Economics
University of Dhaka
Dhaka-1000, Bangladesh

# DECLARATION

This is to certify that the thesis entitled “Interlinkages between Chronic Illness and Urban Poverty in Bangladesh”, submitted in partial fulfillment of the requirements for the degree of Master of Philosophy in Economics under the University of Dhaka, is a record of genuine research work carried out by me under the supervision of Professor Dr. Muhammad Shahadat Hossain Siddiquee, Department of Economics, University of Dhaka. I further declare that this has not previously formed the basis for the award of any degree, diploma, fellowship, or other similar title of recognition.

**(Azima Begum)** Dhaka, Bangladesh

# DEDICATION

*Dedicated*

*to*

*My Loving Parents*

*&*

*My Beloved Husband*

*&*

*Daughter*

# ACKNOWLEDGMENT

At the outset, I express my profound gratitude to Almighty Allah, the Merciful and the Benevolent, for enabling me to complete this noble task.

I would like to express my indebtedness and sincere gratitude to my respected supervisor, Dr. Muhammad Shahadat Hossain Siddiquee, Professor, Department of Economics, University of Dhaka, for his inspiring guidance and unwavering encouragement throughout the study. His heartiness, complete freedom of thinking, and all-time cooperation can never be forgotten. He has always inspired me to work hard and learn more. I have no words to express my thanks to him.

I deeply thank Professor Masuda Yasmeen, Chairman of the Department of Economics at the University of Dhaka, for permitting me to conduct this research work and for providing other support.

I acknowledge with utmost honesty and sincere gratitude the course teachers, including Dr. Firdousi Naher, Dr. Syed Naimul Wadood, and Dr. Md. Deen Islam, from whom I learned a lot, having a strong motivation for my research work. I am also grateful to the members of the MPhil Examination Committee,

I am indebted to the Officials of the Department of Economics, the Staff of the Seminar, the Computer Lab, the Central Library, and the Register Building. Without the help and cooperation of those individuals, I couldn't have finished the work on my thesis paper in time—special thanks to the Bangladesh Bureau of Statistics (BBS) for the access to the Household Income and Expenditure Survey (HIES) dataset.

Last but not least, my Husband's support, prayers, and love are the real strength in my life. His sacrifice and patience have enabled me to complete this work. To complete this thesis paper, my all-time inspiration was my daughter. I would like to express my sincerest love and gratitude to my parents, other family members, friends, and well-wishers.

# ABSTRACT

Bangladesh is now in an advanced stage of the epidemiologic transition, and in the upcoming years, the burden of chronic illness will continue to rise. As chronic illnesses are the leading cause of death globally, and Out-Of-Pocket (OOP) payments for healthcare have been increasing steadily in Bangladesh, which pushes the households into poverty by catastrophic health expenditure (CHE), it is an urgent issue to investigate this area. Therefore, this study aims to identify the determinants of chronic illnesses and examine the interlinkages between chronic illness and poverty in Bangladesh, especially from an urban perspective.

The study is conducted using the nationally representative and the latest Household Income and Expenditure Survey (HIES) 2022. The Cost of Basic Needs (CBN) approach is used for estimating the poverty line. Moreover, this study has estimated the poverty impact of OOP payments (i.e., impoverishment due to OOP healthcare expenditure) by comparing the difference between the average level of headcount poverty with and without OOP healthcare payments. Probit regression models are employed to identify the determinants of chronic illness and impoverishment due to OOP healthcare payments.

This study identifies that approximately one-third of the urban population (29.17%) and approximately two-thirds of urban households (71.37%) in Bangladesh suffer from at least one chronic illness. Among the households with chronic illness, 33.6% are found with one chronic illness, 25.9% with two chronic illnesses, and 11.9% with more than two chronic illnesses. The most prevalent chronic illnesses include gastric/ulcer (8.28%), high blood pressure (8.01%), diabetes (5.06%), arthritis/ rheumatism (3.96%), and chronic heart disease (3.13%). The prevalence of chronic illnesses rises with age. The prevalence is only 5.11% among children aged 0–12 years, whereas it is 77.14% among the elderly (65+ years), suggesting a strong linkage between chronic health issues and aging. Gender-specific findings reveal the higher prevalence of chronic illnesses among women compared to men (male: 31.69% vs. female: 26.65 %). The prevalence is much higher among the formerly married individuals—those who are widowed, divorced, or separated— in comparison with the currently married individuals (formerly married: 68.78% vs. currently married 43.25 %). The highest prevalence is found for the households belonging to the highest income quantile (78.04%). The mean age in a household, the share of dependent members, households with a never married, widowed, divorced, or separated, proportion of literate members, and households belonging to higher income quantiles are positively and significantly associated with the presence of chronic illness. Whereas the proportion of earners in the household has a strong negative relationship, the female proportion in the household has no significant relationship with chronic illness.

In urban areas, the overall OOP healthcare expenditure per month per household stands at BDT 2,503; however, the figure is significantly higher (BDT 2,980) among households that report having at least one chronic illness compared to those with no chronic illness (BDT 1,002). The share of OOP health expenditure in total household expenditure is more than double among the urban households that are suffering from at least one chronic illness (7.5%) compared to those

who are not suffering from any chronic disease (3.5%). Lower-income households faces higher OOP burden (21.26% of household income) compared to the highest income households (3.96%). Notably, the prevalence of CHE is alarmingly high (70.51%) among the urban households with at least one chronic illness compared to those who report having no chronic illness (29.49%), at 10% of total expenditure as the threshold level, indicating that chronic illnesses significantly increase financial vulnerability. About 2.77 percent of households fall into poverty due to OOP healthcare expenditure in urban areas in Bangladesh. Households with at least one member suffering from a chronic illness are 3.5 percentage points more likely to fall into poverty ($p<0.01$) in comparison to households without any members experiencing chronic illnesses. Moreover, the impoverished households are 24.2 percentage points more likely to have a chronic illness ($p<0.01$), which indicates that poverty enhances the risk of chronic disease. Moreover, households with at least one member suffering from a chronic illness are affected by a substantially higher impoverishment rate due to OOP health spending (3.40%), nearly three times higher than that of households without chronic illnesses (1.22%). Similar findings are also evident for normalized poverty gap as the households that face chronic illness has greater normalized poverty gap (4.29%), which is almost double than who have no chronic illness (2.31%). Thus, the findings from the Probit regression models reveal a strong interlinkage between chronic illness and poverty in urban Bangladesh.The study findings suggest that chronic illnesses are responsible for high costs, high catastrophic expenditures, and vulnerability to households (i.e., non-poor households become poor due to OOP healthcare expenditure) in urban areas in Bangladesh.

The government and non-government health organizations need to address this urgently by paying proper attention to handling the burden of chronic disease in Bangladesh. An effective risk pooling mechanism might reduce household financial burden related to chronic illnesses. It is essential to take urban health protection schemes that target vulnerable urban populations to ensure that healthcare services are accessible and affordable, especially for chronic illnesses, in line with the Bangladesh National Urban Health Strategy. Some insights determined from this Bangladesh case study can also be useful in the context of other developing countries, to reduce chronic illnesses and thereby reduce the likelihood of falling into poverty, especially for urban areas.

**Keywords**: Chronic Illness, Poverty, OOP Healthcare Expenditure, Catastrophic Health Expenditure, Impoverishment, Urban, Bangladesh.

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# LIST OF ABBREVIATIONS

| | |
|---|---|
| BBS | : Bangladesh Bureau of Statistics |
| BDT | : Bangladeshi Taka |
| BMI | : Body Mass Index |
| CBN | : Cost of Basic Needs |
| COPD | : Chronic Obstructive Pulmonary Disease |
| DBNCDs | : Double Burden of Non-Communicable Diseases |
| DCS | : Department of Census and Statistics |
| GDP | : Gross Domestic Product |
| EA | : Enumeration Area |
| FYP | : Five-Year Plan |
| HCR | : Headcount Rate |
| HIES | : Household Income and Expenditure Survey |
| LMICs | : Lower-Middle Income Countries |
| NCD | : Non-Communicable Disease |
| NSS | : National Student Survey |
| OOP | : Out-Of-Pocket Expenditure |
| PSU | : Primary Sample Unit |
| SDG | : Sustainable Development Goal |
| TBNCDs | : Triple Barden of Non-Communicable Diseases |
| UN | : United Nations |
| UPL | : Upper Poverty Line |
| USD | : United States Dollar |
| WHO | : World Health Organization |
| SANEM | : South Asian Network on Economic Modelling |

# CHAPTER ONE: INTRODUCTION

## 1.1 Background and Motivation of the Study

From a global perspective, it is evident that different types of chronic illnesses adversely affect health and quality of life, and households incur huge medical expenditures for the members suffering from chronic diseases (Jayathilaka et al., 2020). It is estimated that 150 million people worldwide experience catastrophic healthcare expenditures (CHE) each year, and around 100 million people fall into poverty as a result of Out-Of-Pocket (OOP) payments for healthcare (Xu et al., 2007). Over 90% of these people reside in low-income nations (Xu et al., 2007). More importantly, the unbearable long-term healthcare expenditure resulting from chronic diseases creates a financial burden for households by increasing OOP healthcare expenditure, and significantly increasing the risk of CHE and pushing them into poverty (i.e., impoverishment) in Bangladesh (Ahmed et al., 2022; Rahman et al, 2013; Rahman et al., 2020; Datta et al., 2018; Khan et al., 2017).

OOP healthcare payments significantly increase poverty in low- and middle-income countries, with Bangladesh experiencing the largest relative increase in poverty as a result of these payments among the low- and middle-income countries in Asia (Van Doorslaer et al., 2006). More importantly, OOP healthcare expenditure is much higher among urban dwellers in Bangladesh than their rural counterparts (Molla et al., 2017; Rahman et al., 2020), and chronic illness is one of the determinants of high OOP and catastrophic health expenditure in urban areas (Rahman et al, 2013). Therefore, it is essential to examine the extent to which OOP expenses are disproportionately associated with poverty, particularly among the urban population of Bangladesh. This study find a missing link, as there is a dearth of evidence regarding the linkages between chronic illness and urban poverty in Bangladesh.

Some studies show that the urban poor in low- and middle-income nations, like Bangladesh, bear a heavy burden of chronic diseases (Oti & Kyobutungi, 2011; Bill et al., 2012) and risk factors for chronic conditions (Anand et al., 2007). Bangladesh, a lower-middle-income country, faces a severe burden of chronic diseases, which is evident among the urban population. This rationale has motivated working on this issue to explore the interlinkages between chronic illness and urban poverty in Bangladesh. This study aims to contribute to this regard by creating novel evidence and deriving policy implications based on the study's findings.

Over the past few decades, Bangladesh has made tremendous progress in health and economic development, such as reducing its maternal mortality ratio and achieving impressive gains in life expectancy; nonetheless, it is alarming that non-communicable diseases (NCDs) are responsible for 67% of all deaths (WHO, 2020). A recent study has indicated that the prevalence of a double burden of chronic disease in Bangladesh is 21.4%, while the triple burden stands at 6.1% (Al-Zubayer et al., 2021). Another study shows that approximately 99% of the population had at least one NCD risk factor (Khan et al., 2019). In Bangladesh, the prevalence of NCDs has grown over the past few decades (Islam et al., 2021). The global burden of disease highlights an increasing trend in Bangladesh in the case of chronic disease mortality, particularly due to stroke, ischemic heart disease, chronic kidney disease, chronic pulmonary disease, and diabetes. In Bangladesh, the major chronic diseases, such as cardiovascular diseases, cancer, and chronic respiratory diseases, are responsible for 30%, 12%, and 10% of all deaths, respectively (WHO,2018). For this reason, it is essential to invest more in chronic disease detection, screening, treatment, and palliative care to achieve Sustainable Development Goal (SDG) 3.4, which aims to reduce one-third of premature deaths by 2030.

The increasing prevalence of NCDs, especially in developing countries, is associated with lifestyle changes resulting from rapid industrialization and urbanization (Nojilana et al., 2016; WHO, 2018). The adverse effects of industrialization have contributed to increased internal migration, which is driving unplanned and chaotic urbanization in many developing countries (Gouda et al., 2019). As a result, the changing lifestyles linked to economic development are causing significant variations in the distribution of chronic diseases. Some studies in various settings find a positive association between urbanization and many NCDs and their risk factors, such as diabetes, hypertension, blood cholesterol, and body mass index (Allender et al., 2010; Goryakin et al., 2017; Mehata et al., 2021). In this particular pursuit, a study shows that approximately 31% of people suffer from chronic illnesses in urban areas in Bangladesh (Sarker et al., 2022). This estimate has motivated the researcher to explore this issue with a particular focus on the linkages between chronic illness and poverty in urban settings of Bangladesh.

Urbanization is a global phenomenon with approximately 55% of the world's population living in urban areas, and by the end of 2030, this rapid population growth in urban areas will reach this figure of 60% (Rosenberg et al., 2016), marked by overcrowding, unstable housing, lack of access to essential services, and insecurity. The proportion of the population living in slums and squatter settlements is around 50% of the total urban population (World Bank, 2020). Ooi and Phua (2007) demonstrate that in developing nations, the number of impoverished urban communities, commonly referred to as slums, has increased significantly. It is estimated that 51.9% of the total urban population in Bangladesh currently resides in urban slums (World Bank, 2020). The slum population mostly lives below the poverty line in terms of both calorie intake and the cost of

basic needs. In these areas, access to basic health services is extremely challenging due to poverty and overcrowding. Most of the people of slum dwellers or urban poor suffer from frequent diseases due to their unhygienic living conditions, malnutrition, and low level of knowledge of the health sector due to lack of education. Behavioral risk factors of NCDs are found to be substantial among the slum population in Bangladesh (Mondal et al., 2019). Chronic disease is mostly caused by social change, unplanned urbanization, an unpleasant physical environment, and an unhealthy lifestyle. Therefore, it is evident that the urban poor are highly vulnerable to chronic diseases, and the burden of such chronic diseases pushes them into poverty. This is the core focus of the thesis.

Bangladesh has shown great success in reducing poverty from 31.5 percent in 2010 to 18.7 percent in 2022 and extreme poverty from 17.6 percent in 2010 to 5.6 percent in 2022 (BBS, 2022). These estimates followed the headcount rate (HCR) based on upper and lower poverty lines, respectively. However, the poverty-reducing rate is slower in urban areas than in rural areas. As per the upper poverty line, the poverty rate of rural and urban areas was 35.2, 26.4 & 20.5 and 21.3, 18.9 & 14.7 percent in 2010, 2016 & 2022 respectively, and as per the lower poverty line, it was 21.1, 14.9 & 6.5 and 7.7, 7.6 & 3.8 percent in 2010, 2016 & 2022 respectively (BBS, 2022). These findings indicate that poverty and extreme poverty reduction rates are slowed down in urban areas, and this is because of the rapid urbanization in Bangladesh. The SANEM study finds a poverty rate of 21.6% in rural areas and 18.7% in urban areas for 2023, significantly higher than the BBS-identified poverty rate of 20.5% in rural areas and 14.7% in urban areas in

2022. According to the report, the poverty rate using the upper poverty line in the urban areas increased (The Business Standard, 2024).

Based on the discussion on the chronic illness prevalence, poverty reduction scenarios, and the consequences of households suffering from chronic illness, it is clear that chronic illness induces households to be poor. With this pursuit, this study investigates the linkages between chronic illness and poverty with a particular focus on urban areas of Bangladesh using the Household Income and Expenditure Survey (HIES) 2022, the latest nationally representative dataset of the Bangladesh Bureau of Statistics (BBS).

## 1.2 Statement of the Problem

The above background of the study lays the groundwork for this thesis work. From a global perspective, this research topic selected for the thesis is of great importance because nowadays, chronic illness is the leading cause of total death in the world, and this pushes households into poverty, creating significant barriers to growth and development by deterring global GDP growth. More importantly, urban poor people, among whom chronic illness is disproportionately common, have limited access to necessary medical care. For this reason, urban areas have become the new frontier in the fight against poverty and extreme poverty. Bangladesh is no exception in this regard. Despite such importance, it is evident that Bangladesh has focused on its health and nutrition policies on rural health services and outcomes in the last few decades, rather than on the urban areas. Moreover, the pace of poverty reduction in urban areas of Bangladesh is relatively lower compared to its counterpart, the rural areas.

The burden of chronic disease is thought to be one of the key factors for such a slowdown in urban poverty reduction. In addition, rapid urban migration from rural to urban areas makes urban health vulnerable. Therefore, a failure to improve urban health undermines the health gains of Bangladesh. Despite this alarming situation in urban areas, no studies have yet focused on how urban poverty and chronic illnesses are interlinked in Bangladesh, and thus, this issue remains underexplored and limits effective policy options. Considering these facts, this study aims to examine the relationship between chronic illness and urban poverty in Bangladesh, focusing on how demographic and socioeconomic factors affect chronic illness and how the burden of chronic illness further locks households in poverty.

## 1.3. Rationale of the Study

Though studies on chronic illnesses and poverty are widely published, the literature is scarce on the interlinkages between chronic illness and poverty, especially in the urban context of Bangladesh. It is found that chronic illness accounts for around 59 percent of total deaths in Bangladesh and incurs a significant disease burden on households (Mahumud et al., 2023 & 2022). More specifically, the prevalence of NCDs has been on the rise over the last twenty years, and therefore, the chronic disease burden in Bangladesh has increased substantially from 43.4% in 2015 to 66.9% in 2020, making it a major issue of concern for Bangladesh (ibid., 2022, pp. 3260). Despite the great success achieved in terms of equitable healthcare services for the rural population of Bangladesh, healthcare services for the urban poor remain far away from the expected level, especially for Non-Communicable Diseases (NCDs). Moreover, evidence from different studies and also from national estimates confirms that poverty reduction is slowed

down in the urban settings of Bangladesh. All these facts have motivated the researcher to conduct the study to explore the interlinkages between chronic illness and poverty.

To reduce poverty, policymakers must turn their attention to better health management to reduce the financial impact of chronic illness. If this study finds the actual correlation between chronic illness and poverty in urban settings, it would help policymakers take appropriate measures for the improvement of urban health. In turn, this would help the households defeat the poverty loop and would result in a reduction of the poverty rate in the time ahead. A reduction in the poverty rate will reduce poverty-caused chronic diseases, and this would make a positive impact on our economy by increasing the overall GDP of the country and improving living standards as well. Additionally, the results of this study aim to provide the Government of Bangladesh with important information about how to introduce, prepare, carry out, and oversee new healthcare policies. By raising awareness, it can also help eradicate or reduce the likelihood that NCDs will occur in people in general.

## 1.4. Research Objectives

### 1.4.1. Main Objective

The main objective of this study is to investigate the interlinkages between chronic illness and poverty in the urban areas of Bangladesh.

### 1.4.2 Specific Objectives

To justify the main research objective, the specific objectives of the thesis are to:

- Identify determinants of chronic illness in Bangladesh's urban settings.
- Explore how and whether chronic illness and poverty in a household is interlinked.
- Derive policy implications based on findings of the study.

## 1.5. Research Questions

### 1.5.1. Main Research Question

Are there any interlinkages between chronic illness and poverty in urban households in Bangladesh?

### 1.5.2. Specific Research Questions

- What are the determinants of chronic illness in urban settings in Bangladesh?
- Are poverty and chronic illness interlinked in the urban areas of Bangladesh?
- What are the policy implications of the findings?

## 1.6. Research Hypotheses

- **Main research hypothesis of the study:** The main research hypothesis is that there are interlinkages between chronic illness and poverty in urban areas of Bangladesh.
- **Specific research hypotheses of the study:** Specific research hypotheses are used to verify and justify the main research hypothesis. For this purpose, this study proposes two specific hypotheses. To prove whether these two hypotheses or statements are true, this study uses the usual statistical procedures of testing the statement and undertaking the null and alternative hypotheses. Rejection of the null hypothesis implies that the statement is true and vice versa.
    - **SPECIFIC HYPOTHESIS 1:** There is an association between demographic and socio-economic determinants and chronic illness among urban residents in Bangladesh. To prove this statement, the following null and alternative hypotheses are undertaken.

**Null hypothesis ($H_0$) under specific hypothesis 1:** There is no association between demographic and socio-economic determinants and chronic illness among urban residents in Bangladesh.

**Alternative hypothesis ($H_A$) under specific hypothesis 1:** There is an association between demographic and socio-economic determinants and chronic illness among urban residents in Bangladesh.

- **SPECIFIC HYPOTHESIS 2:** Specific hypothesis 2 states that poverty and chronic illnesses are interlinked, i.e., poverty induces chronic illness, and chronic illness instigates poverty as well. For proving whether the statement is true or false, the following null and alternative hypotheses are constructed.

  **Null hypothesis ($H_0$) under specific hypothesis 2:** There are no interlinkages between chronic illness and poverty in urban Bangladesh.

  **Alternative hypothesis ($H_A$) under specific hypothesis 2:** There exist interlinkages between chronic illness and poverty in urban Bangladesh.

## 1.7. Scopes, Strengths, and Limitations of the Study

### 1.7.1. Scopes of the Study

Despite the importance of establishing the linkages between poverty and chronic illnesses in Bangladesh, this is understudied in Bangladesh, especially in the context of urban areas. This creates a knowledge gap in this regard among policymakers and academicians. Existing studies in Bangladesh investigate the prevalence of NCDs and their associated risk factors (Mondal et al., 2019), economic burden and determinants (Al-Zubayer et al., 2021), OOP healthcare expenditure (Khan et al., 2025; Sarker et al., 2022), catastrophic health expenditure, and impoverishment by

OOP expenditure (Begum & Hamid, 2021; Ahmed et al., 2022; Khan et al., 2017; Hamid et al., 2014; Wagstaff & Doorslaer, 2003), and chronic illness-related healthcare-seeking choices (Adams et al., 2020). Therefore, this study is unique from the Bangladesh perspective as it explores how the sociodemographic and economic characteristics of the urban households are associated with chronic illness and how we can establish the interlinkages between poverty and chronic illness in urban settings, with the effects of determinants on chronic illness in urban settings in Bangladesh. This research differs from existing studies to date and adds a contribution to the existing literature. For this purpose, this study covers three main areas under its defined scope. First, this study explores the determinants of chronic illness in urban areas in Bangladesh. Secondly, it investigates the interlinkages between chronic illness and poverty, i.e., how the burden of the chronic illness pushes the households into poverty and vice versa. Third, this study aims to suggest key policy implications based on the findings of the study with a view to reducing urban poverty among households with chronic patients.

### 1.7.2 Strengths of the Study

The first and foremost strength of the study is that it uses the latest Household Income and Expenditure Survey (HIES) 2022, which is nationally representative of the Bangladesh population. Therefore, in our context, it is an urban representative. Secondly, it is imperative for policy prescriptions, as this study identifies the demographic and socioeconomic characteristics contributing to the prevalence of chronic illness among the urban households in Bangladesh. Third, the novelty of the study is to explore the interlinkages between poverty and chronic illnesses among urban households in Bangladesh. Last, but not least, it aims to provide some

rigorous policy implications deriving from the findings to contribute to the reduction of urban poverty in Bangladesh.

### 1.7.3 Limitations of the Study

Despite many strengths of the study, it faces a few limitations. First of all, this study is solely based on the secondary sources of data collected from the Bangladesh Bureau of Statistics (BBS). The second limitation is that this study is not interested in exploring the behavioral risk factors, such as overweight or obesity, physical inactivity, unhealthy diet, tobacco use, alcohol consumption, etc., that contribute to chronic illness. The final weakness of the study is that we are unable to prove causal relationships, as it deals with cross-sectional data.

## 1.8. Definition of the Key Concepts

- **DEFINING CHRONIC ILLNESS:** This study defines chronic illness as conditions that last for one year or longer and necessitate continuous medical care, restrict daily living activities, or both (CDC, 2024). Chronic diseases include diabetes, high/low blood pressure, back pain/migraine, gastric issues/ulcers, asthma/troubled breathing, cardiovascular disease, arthritis, dental disease, kidney disease, asthma, stroke, anemia, jaundice/hepatitis, cancer, and others (e.g., appendicitis).
- **CLARIFICATION OF POVERTY ESTIMATION:** The United Nations Development Program (2000) defines poverty as a state in which an individual or household struggles to meet their basic needs, and the supportive environment does not offer possibilities to enhance wellbeing over time or to escape vulnerability. To calculate poverty, BBS uses the “Cost of Basic Needs (CBN)” method, which was introduced and suggested by the World Bank.

Globally, this approach is well-known and frequently used to calculate the consumption-based occurrence of poverty. According to the CBN method, a person is considered to be non-poor if this person can afford the cost of the basic consumption needs bundle. Conversely, a person is considered to be poor if a person cannot afford the cost of this bundle. Therefore, in this method, poverty lines represent the minimum per capita expenditure that a person needs to afford to meet their basic needs, which include both food and non-food expenditures. According to BBS (2022), the average upper poverty line is BDT 3,832.

- **OOP EXPENDITURE:** The amount of money a patient directly pays for medical bills that are not covered by third-party (e.g., health insurance) is known as out-of-pocket expenditure. Direct medical costs, such as hospital outpatient fees, medication, admission or registration fees, physician fees, diagnostic fees, and any other related medical supplies, as well as direct non-medical costs, such as lodging, tips, and other associated expenses, are added to determine OOP expenditure for healthcare (BBS, 2010). In urban areas, the overall OOP healthcare expenditure per month per household is BDT 2,503.
- **CATASTROPHIC HEALTH EXPENDITURE (CHE):** A household is considered to be experiencing catastrophic health spending when out-of-pocket expenses cross a certain proportion of the total household budget. A household is considered as facing CHE when the medical expenses of this household exceed 10% of total household consumption expenditure (Wagstaff and van Doorslaer, 2003). According to Xu et al. (2003), CHE occurs when a household's medical expenses exceed 40% of household non-food expenditure or

capacity to pay in the past 30 days. 30.62% of households expended more than 10% of their total consumption on healthcare, and 15.91% spent more than 40% of their capacity to pay.

- **IMPOVERISHMENT:** The difference between poverty headcount, calculated by total household consumption expenditure (including healthcare costs or OOP health expenditure) and similar expenditure excluding healthcare costs or OOP health expenditure (O'Donnel et al., 2008; Wagstaff & Van Doorslaer, 2003). A non-poor household is considered impoverished by OOP payments if it becomes poor after paying for healthcare services. The number of households pushed below the poverty line or impoverished from OOP payments is calculated by applying the percentage of the impoverished population in a certain year (Ahmed et al., 2022). About 2.77 percent of households fall into poverty due to OOP healthcare expenditure in urban areas in Bangladesh.

## 1.9. Organizations of the Thesis

This Thesis paper consists of six chapters. The first Chapter includes the introduction. The second Chapter is about the literature review. Chapter three presents the data and methodology of the thesis. Chapter four presents findings of the two objectives: (a) determinants of chronic illness in urban areas of Bangladesh and (b) the interlinkages between chronic Illness and poverty in urban settings of Bangladesh. The findings of Chapter four are discussed in Chapter five. The last Chapter, Chapter six, concludes the thesis, including the policy implications.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

A literature review presents an in-depth overview of previous studies on a subject, providing insight into the current state of knowledge and pointing out knowledge gaps that can be filled by further research. In any systematic study, literature reviews serve as a foundation for a researcher. According to Creswell (2008), a literature review is a written summary of books, journal articles, and describes the current and historical state of knowledge, and other materials that categorize the literature into topics. An appropriate research question, theoretical framework, and study methodology can all be ensured by a thorough literature evaluation. Locating, reading, and assessing the researcher's reports are all part of the study of relevant literature and the statements of influential people's opinions and causal findings related to the researcher's study activities. Related literature includes theoretical, descriptive, and assessment of current practices and empirical research. It details the necessity of a proposed study. Reviews of the literature are always conducted from secondary sources and do not present novel or creative experimental work.

This chapter reviews existing literature linked to the determinants of chronic illness and the association between chronic illness and poverty. Based on both global and local research highlighting chronic illness determinants and its linkage with poverty and impoverishment, this Chapter is divided into two primary parts: (1) determinants of chronic illness and (2) the interlinkages between chronic illness and poverty in urban contexts, especially in Bangladesh.

## 2.2 Literature Review on Determinants of Chronic Illnesses

The epidemic of chronic illness cannot be fully controlled without an awareness of the determinants of chronic illness that are strong indicators of health outcomes (Hill et al., 2015; Shariff-Marco et al., 2015; Kim, 2016; Puckrein et al., 2015). Different types of determinants of chronic illness can trigger the beginning of disease and play a direct cause of some chronic diseases. Empirically, research has captured the behavior and impact of several socio-demographic determinants on chronic illnesses. Numerous studies have established a clear link between chronic diseases and their socio-demographic determinants (Vennu et al., 2020; Jana & Chattopadhyay, 2022; Amoateng et al., 2021; Al-Zubayer et al., 2021; Nyarko et al., 2021).

In a recent study, Vennu et al. (2020) show that Socio-demographic determinants like age, gender, marital status, income, education, and employment are associated with chronic conditions, such as arthritis, asthma, cancer, COPD, diabetes, and heart attack. Moreover, numerous past investigations involving various populations have demonstrated the correlation between social determinants and chronic illnesses (Northwood et al., 2018), particularly heart-related conditions (Kaplan & Keil, 1993; Jeemon & Reddy, 2010; Kreatsoulas Anand, 2010) and diabetes (Kumari et al., 2004). Many other examples have shown that social factors play a significant role as a powerful determinant of health outcomes, proven in research linked with chronic diseases such as kidney disease (Hill et al., 2015), breast cancer (Shariff-Marco et al., 2015), childhood obesity (Tomayko et al., 2015), coronary heart disease (Kim, 2016), and cardiometabolic health (Puckrein et al., 2015). Harper et al. (2011) examine how social determinants have contributed historically to decreases in the rate of cardiovascular death. Income, education, occupation, gender, and race/ethnicity are important sociodemographic

determinants that are closely linked to chronic diseases, according to research from the National Research Council and the Institute of Medicine (Woolf et al., 2013).

Additionally, demographic and socioeconomic determinants can play a causal role in fostering illness and disability, but they can also improve opportunities for disease prevention and health maintenance. These variables have a direct effect on both unhealthy and healthy lifestyles, high- or low-risk health behavior, living conditions, food security, levels of stresses and strains, social disadvantages throughout life, environmental factors that influence biological outcomes through gene expression, and, along with other links to chronic diseases.

The rising prevalence of chronic diseases has been predominantly linked to the aging population, highlighting a strong correlation with advancing age (Gouda et al., 2019). Several studies have shown that age is a major demographic determinant of chronic illness (Dugan and Lee, 2013; Kpessa-White and Tsekpo, 2020). Some research conducted in various settings, including Bangladesh, has found that there is a highly significant positive correlation between chronic illness and aging in people compared to younger individuals (Aryal et al., 2015; Maimela et al., 2016; Singh et al., 2019; Kpessa-White and Tsekpo, 2020; Rowshon, 2012; Kabir et al., 2013; Vennu et al., 2020). The same relationship is proven in India by showing the probability of having a chronic disease increased significantly with age (Jana & Chattopadhyay, 2022; Parmar & Saikia, 2018; Pati et al., 2014). A systematic review of observational studies reveals that age and the prevalence of multi-morbidity have a significant positive correlation (Pati and Agrawal, 2014; Violán et al, 2014), especially in urban areas. Nowadays, this positive correlation is more alarming

because the number of aging people is increasing in the world, which is more rapid in the low- and middle-income countries. According to WHO (2024), by 2050, there will be about 2.1 billion people aged 60 years and above, and two-thirds of the world's population over 60 years will live in low- and middle-income countries (WHO, 2024). Around the world, the significant increase in older people is making medical expenses more burdensome and increasing the lack of service providers (Dey et al., 2012). Therefore, there is a higher probability that spending money on medications will result in a significant out-of-pocket medical expense, which pushes households into poverty.

Several studies have examined the relationship between gender and health and found that gender is a significant socio-demographic variable that shapes opportunities and serious dangers to produce distinct health outcomes for men and women (Buvinić et al., 2006; Matud, 2017; Vlassoff, 2007). In addition to biological differences, males and females have different socioeconomic backgrounds, which influences their health risks and results (Matud, 2017), and males and females are likely to be affected by NCDs differently because their risk levels differ (Aryal et al., 2015). A few studies show that the prevalence of chronic disease is higher among women than men, especially in developing countries, including Bangladesh and India (Sultana et al., 2017; Maimela et al., 2016; Singh et al., 2019). According to Peek and Drum (2014), of all patients with chronic illnesses, over two-thirds (66.1%) are female, with a mean age of 58.3 years. Older women are therefore more susceptible to illness and are likely to incur greater out-of-pocket medical costs than men. Moreover, in the case of multimorbidity, women have a greater prevalence of multimorbidity than men (Chung et al., 2015; Violán et al., 2014; Marengon et al.,

2008; Fortin et al.; 2010). A similar positive correlation between female gender and multimorbidity was proved by Khan et al. (2019) in the context of Bangladesh. Notably, Jana and Chattopadhyay (2022) and Amoateng et al. (2021) show that the prevalence of chronic illness is higher among males than females in urban areas, and Vennu et al. (2020) show that compared to women, men are more likely to get diabetes, cancer, heart attacks, and arthritis.

Another demographic factor influencing chronic illnesses is the marital status of households. The majority of studies have found that people who have never married, are widowed, or have divorced are more likely than married people to report having a chronic condition. Kail (2016) shows that married people's likelihood of chronic illnesses is consistently reduced, and similar results are exhibited by Vennu et al. (2020) in the case of Asthma, cancer, COPD, diabetes, arthritis, and heart attacks by showing these chronic illnesses were more common among single, widowed, and separated people than in married people. Moreover, the frequency of having a chronic illness is higher among the never-married/widowed/divorced than the married proved by Jana & Chattopadhyay (2022) in urban areas in India. But interestingly, a study in the United States shows that marriage increases the likelihood of developing chronic illnesses because it reduces access to patient-centered medical homes compared to divorced and separated people (Almalki et al., 2018).

The education level of the households is an important socioeconomic determinant linked to the frequency of chronic diseases. The findings from some studies it is clear that a lower education level is more likely to increase the prevalence of chronic diseases. Research carried out in South

Africa elaborates that compared to people with other educational levels, secondary school graduates reported chronic illness more frequently than those with tertiary education (Amoateng et al., 2021). A study in the United States revealed that, in comparison to those who completed high school, those who only completed primary school or less education had twice as many chances of developing arthritis and chronic obstructive pulmonary disease (Vennu et al., 2020). A study by Chung et al. (2015) conducted in Hong Kong (HK) proves that socioeconomic variable such as education is inversely related to multimorbidity and the number of chronic health conditions, i.e., an individual who only completes primary school or less is a significant risk factor for both the prevalence of chronic illnesses and multimorbidity. A similar relationship between education and multimorbidity is proven by Coventry et al. (2013) and Violan et al. (2014) in their studies. Higher-educated individuals are more likely to adopt healthy habits, which decreases their risk of chronic illness (Marmot & Bell, 2019). Household heads with higher education levels have comparatively better and stronger communicative attitudes about health-related behaviors; as a result, education level is a considerably stronger protective factor when dealing with chronic illnesses. On the other hand, low levels of education may force people to engage in hazardous jobs or perform physically demanding tasks to make ends meet, which raises their risk of developing a chronic illness. A study in India finds the prevalence of chronic illness is higher among less educated elderly individuals using 2011–2012 nationally representative India Human Development Survey data by multilevel modeling (Singh and Singh et al., 2019). Surprisingly, another recent study in India shows the opposite result, which is that those with higher levels of education have a higher likelihood of having a chronic disease using NSS data by bivariate and logistic regression analyses (Jana & Chattopadhyay, 2022). This study also reveals that the main

causes of the disparity in chronic illness prevalence between urban and rural areas include higher educational attainment. A survey conducted across 41 low- and middle-income nations shows that persons with lower wealth or education levels have a higher prevalence of angina pectoris, arthritis, asthma, depression, and comorbidity, but lower prevalence of diabetes than persons with higher wealth or education levels (Hosseinpoor et al., 2012). Surprisingly, a study in Ghana conducted among the elderly population shows that education level is not a statistically significant determinant of chronic illness (Nyarko et al., 2021).

Research has also documented income as a notable socioeconomic determinant of chronic illness, which may cause households to fall into poverty. A study among older adults in India finds that those who live in the wealthiest households have more than double the risk of developing chronic illness compared to those who live in the lowest household (Singh and Singh et al., 2019). Jana and Chattopadhyay (2022) find a similar relationship, that a higher probability of having chronic diseases is observed among the wealthy elderly than the middle class, while the odds are lower among the poor. According to a Bangladeshi study, those with the highest wealth are more likely to have double burden of NCDs, DBNCDs (2.80 times greater) and triple burden of NCDs, TBNCDs (5.78 times higher) than those with the lowest wealth level (Al-Zubayer et al., 2021), which indicates that in the richest wealth status, the probability of having chronic illness increases with the number of chronic diseases. Moreover, in the United States, a study by Vennu et al. (2020) shows that the prevalence of arthritis, diabetes, and multi-morbidity is higher among those with yearly incomes less than USD 50,000 than among those with incomes over USD 50,000, among people at high risk for knee osteoarthritis. (Vennu et al., 2020). On the other hand, a study conducted across 41 low- and middle-income nations showed that several NCDs are

inversely correlated with wealth (Hosseinpoor et al., 2012). The same association between wealth and chronic illness has been demonstrated in a study conducted in South Africa by Amoateng et al. (2021). Moreover, Chung et al. (2015) show that socioeconomic status and household income status are inversely related to multimorbidity and chronic health conditions in Hong Kong.

Employment status is an important socioeconomic determinant of chronic illness, as unemployed individuals face a higher risk of developing chronic illness. In South Africa, unemployed respondents report that they face chronic disease more frequently than those who are employed (Amoateng et al., 2021). Similarly, Vennu et al. (2020) show that unemployed individuals in the United States have a higher risk of developing COPD, arthritis, cancer, and heart attacks compared to employed individuals. In another study conducted in Hong Kong (HK), being jobless or retired is a significant risk factor for the presence of multimorbidity and an increased number of chronic diseases (Chung et al., 2015).

A study in Bangladesh examines the relationship between the double burden of NCDs (DBNCDs) and triple burden of NCDs (TBNCDs) and their determinants among adults (Al-Zubayer et al., 2021). Another study in Bangladesh investigated by Khan et al. (2019) proves that the likelihood of developing multimorbidity is significantly associated with higher age, higher educational status, economic status, and higher BMI in the Adult population in Bangladesh.

From the above discussion, it is evident that determinants of chronic illness have a direct and significant effect on chronic illness in different countries, including Bangladesh. However, there is a scarce study that has investigated the relationship between determinants and chronic

diseases among the urban population in Bangladesh. Therefore, one of the main objectives of the study is to address this gap by examining the link between chronic diseases and demographics (age, gender, marital status) and socioeconomic (Income, education, and employment status) determinants in urban settings in Bangladesh.

## 2.3 Literature Review on Interlinkages between Chronic Illness and Poverty

This section examines how various chronic diseases affect household health-related expenses and the likelihood that these households would experience poverty.

In a study conducted in Sri Lanka, Jayathilaka et al. (2020) investigated the effect of chronic illness on poverty by using data from the 2016 Household Income and Expenditure Survey (HIES) conducted by the Department of Census and Statistics (DCS) in Sri Lanka. Using the Probit model. The findings of the research demonstrate that, in contrast to other chronic disease types, 34.11% of people in Sri Lankan households have severe chronic illnesses such as cancer, high blood pressure, kidney disease, heart disease, diabetes, or asthma.

This study highlights that married females who do not engage in any type of economic activity, in the age category of 40–65, with up to tertiary education, and residing in urban areas, are more likely to experience chronic diseases. Moreover, the study suggests that individuals lacking basic education, residing in rural areas, or suffering from chronic illnesses like brain, cancer, heart, or kidney diseases are at a higher risk of poverty. Findings from the study conducted by Bhojani et al. (2012) reveal that in India, out-of-pocket (OOP) payments for outpatient care for chronic diseases push low-income urban people into poverty, and the number of persons living below the poverty line doubles due to out-of-pocket expenses for chronic diseases, further exacerbating

their financial situation. Households usually sell or mortgage their assets (0.4% cases) and borrow money (4.2% instances) to make ends meet (Bhojani et al., 2012). Berman et al. (2010) and Ladusingh and Pandey (2013), in their studies conducted in India, show that high out-of-pocket (OOP) health spending pushes households into poverty.

A study in rural Bangladesh investigates how out-of-pocket (OOP) health payments lead to poverty (Hamid et al., 2014). Findings reveal that OOP payments push 3.4% of households into poverty each year, by comparing poverty levels before and after accounting for healthcare OOP expenditure. Another study in rural Bangladesh, conducted by Begum and Hamid (2021), investigates the impact of out-of-pocket (OOP) healthcare payments on poverty in Bangladesh, focusing on regions with varying climate change risks. It assesses poverty headcount, intensity, and normalized poverty gap across disease types and health conditions. Results show that 13% of households fall into poverty annually due to OOP payments. NCDs and catastrophic health spending are key drivers of poverty, especially in vulnerable areas like *Char* and *Haor* regions.

Using data from the Bangladesh Household Income and Expenditure Survey (HIES) 2010, Khan et al. (2017) and Molla and Chi (2020) highlight the significant impact of out-of-pocket (OOP) health spending on poverty in Bangladesh. Khan et al. find that OOP payments for healthcare increase the poverty headcount by 3.5%, pushing an additional 5.1 million individuals below the poverty line, as measured by the cost of basic needs. Similarly, Molla and Chi (2020) find that 3.2% of households are genuinely impoverished but are excluded from the official statistics, and 8.8% underestimation of poverty. Moreover, the poverty gap increases, showing not only more people falling into poverty but also worsening poverty among the already poor.

Another study in Bangladesh by Ahmed et al. (2022) shows that out-of-pocket (OOP) healthcare spending in Bangladesh is increasing and thus, the incidence of catastrophic health expenditure (CHE) and impoverishment from OOP payments. Using data from 46,076 households on the 2016 Household Income and Expenditure Survey, 24.6% of households faced catastrophic health expenditure (CHE) at the 10% total expenditure threshold, and 10.9% at the 40% non-food threshold, mainly affecting the poor. About 4.5% of the population (8.61 million people) fell into poverty due to OOP costs. Key factors driving CHE and impoverishment include private healthcare use, elderly household members, chronic illness, and regional disparities (Ahmed et al., 2022).

Several studies disclose that chronic illnesses are more common in urban dwellers than in rural ones (Jana & Chattopadhyay, 2022; Amoateng et al., 2021; Nyarko et al., 2021; Singh and Singh et al., 2019). Additionally, Jana and Chattopadhyay (2022) reveal that living in an urban area raises the risk of developing three major chronic diseases: diabetes, respiratory disorders, and hypertension in India. Facing the epidemiological transition like many LMICs, Bangladesh is also experiencing a double burden of communicable and non-communicable diseases, especially in urban regions (Al-Zubayer et al., 2021). Moreover, chronic illnesses are accountable for high OOP healthcare expenditure and high catastrophic health expenditures (Rahman et al., 2020).

After going through the above studies, it is clear that despite the numerous studies linking chronic illness and poverty, there is no specific study that has explored this relationship in the urban context of Bangladesh. A significant gap in the literature is evident in this regard. Therefore, the present study aims to explore the interlinkages between chronic illness and poverty in urban

areas, contributing to an area that remains under-researched, though it is vital for public policy and economic development.

## 2.4 Research Gaps

By reviewing the existing literature, it is found that the previous researchers have revealed that different determinants of chronic illness are shown to be strongly associated with chronic illness and the financial burden of out-of-pocket healthcare expenditures on households, often leading to catastrophic expenditures and impoverishment. Although several studies have been conducted globally and within Bangladesh, few researchers have examined this issue within urban settings. Most existing studies either address rural contexts or examine general national trends, although the rapid urbanization and rising burden of chronic diseases push the urban household into poverty and thus, create significant barriers to growth and development by influencing GDP.

The existing literature provides strong evidence that out-of-pocket (OOP) healthcare payments significantly contribute to poverty and impoverishment in Bangladesh, particularly in rural and vulnerable regions. But no studies have been found that examine impoverishment, providing a special focus on urban areas in Bangladesh. Therefore, the researcher is very interested in figuring out the result of these research gaps and trying to address the above questions that the previous researchers had not addressed yet.

## 2.5 Conceptual Framework

Chronic illness can lead to financial problems for households and pushes the households into poverty and on the other hand poor people are vulnerable for chronic illness. Additionally, it

presents the determinants of chronic illness. Determinants are divided into two groups: demographic factors like age, gender, and marital status, and socio-economic factors such as income, education, and employment. When someone in a household has a chronic illness, they often need ongoing medical care, which leads to higher out-of-pocket (OOP) healthcare costs. These costs can become very high and difficult to manage. For many households, especially those already vulnerable, this elevated health spending can exceed their financial capacity, leading to catastrophic health expenditure (CHE). Sustained CHE can push households below the poverty line, resulting in impoverishment due to OOP health expenditure.

On the other hand, being poor can make people more likely to get sick again, creating a cycle of illness and poverty. People who are experiencing poverty in urban areas must compromise a lot just to arrange their ends meet. They dwell in sub-standard living conditions, including unhealthy sanitary facilities. They scarcely have enough food, even essential, nutritious food. They are also the people who have less or no access to education, making them less aware of a healthy lifestyle and making them more prone to illness. They also work in hazardous and tiring conditions without adequate precautionary measures for safety. All these factors make them more susceptible to general illness and chronic illness. Once they suffer from illness, they generally do not seek health care immediately. Due to their lack of awareness and assets to support their treatment, they stall treatment as long as possible. They tend to seek cheaper and sometimes questionable sources of health care to save them from the monetary burden of treatment. These factors lead them to chronic illness. The relationship among the factors mentioned above is summarized below:

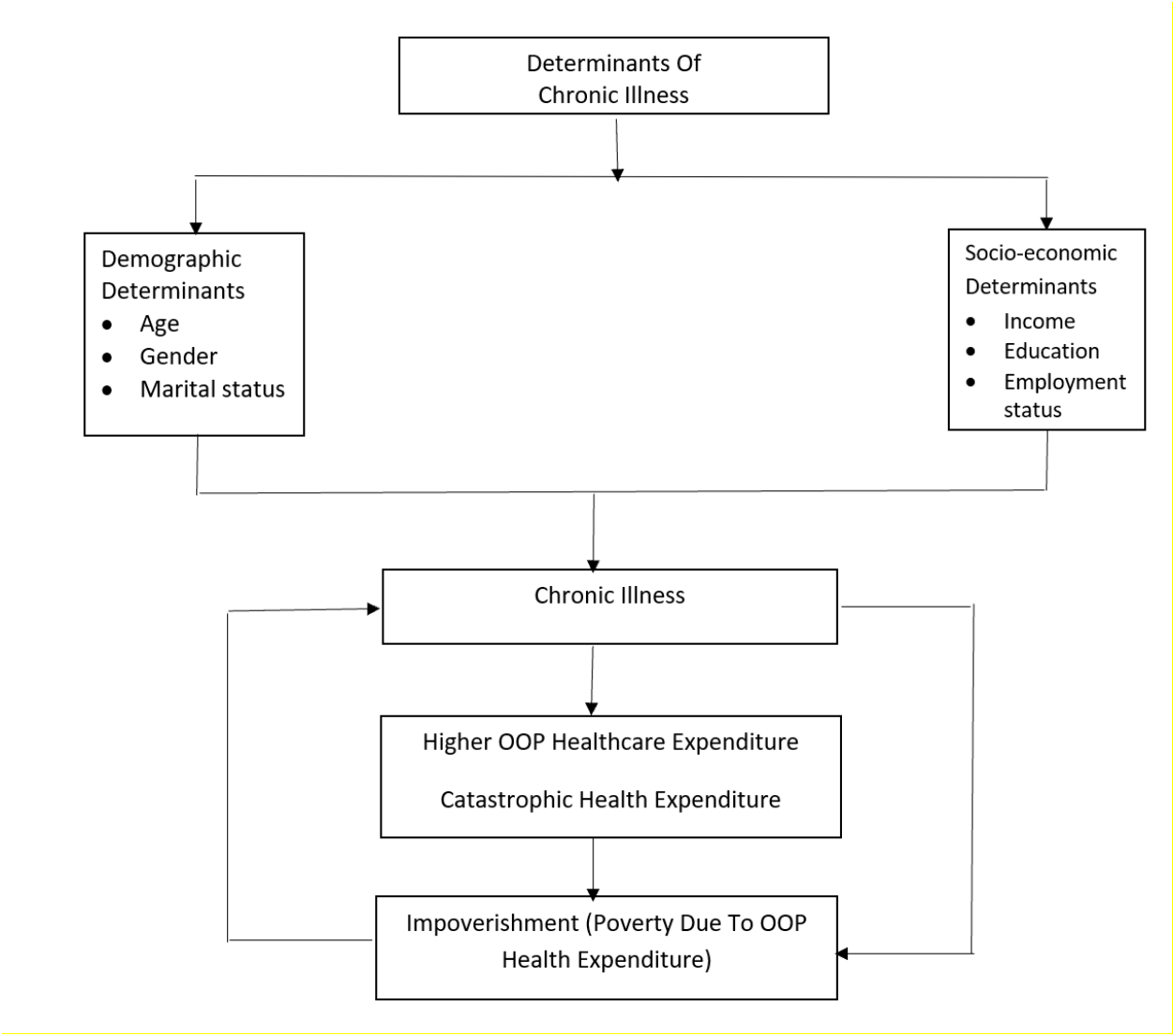


**Figure 2.1:** Conceptual framework for interlinkages between chronic illness and poverty

## 2.6 Conclusion

The researcher has reviewed the different literature related to the determinants of chronic illness and the financial burden of out-of-pocket healthcare expenditures and catastrophic expenditures on households, and related impoverishment. By reviewing related studies, the research gap for this study is finally identified.

# CHAPTER THREE: DATA AND METHODOLOGY

## 3.1 Introduction

The previous two Chapters discussed and reviewed the study's fundamental argument and theoretical outline. This Chapter describes the data and methodology employed in this study. Research methodology is a systematic and scientific technique for gathering, evaluating, and interpreting quantitative or qualitative data to test hypotheses or find answers to research questions (Eduvoice, 2023). Dawson (2019) defines methodology as the guideline system or framework that is followed to address an issue. It is a method by which researchers plan their study to use the chosen research tools to achieve their goals. It allows readers to assess the study's validity and dependability in the research document. In short, it explains what you do and how you arrive at the outcome. Providing the plan of the research project is the aim of the research methodology. It contains all of the essential components of research, such as research design, data collection methods, data analysis methods, and the overall framework in which the study is carried out.

## 3.2 Research Design

This research is designed based on the empirical research technique. Empirical research methodologies are classified into three main types: qualitative, quantitative, and mixed-methods, depending on the type of study and the data needed. Measuring and testing numerical data is the main emphasis of the quantitative research method. This method works well for quickly contacting a large number of people. This kind of research aids in forecasting, examining the causal linkages between factors, and extrapolating findings to larger populations. For this reason, to satisfy the research question, i.e., the determinants of chronic illness in urban settings in Bangladesh and the interlinkages between chronic illness and poverty among households in

urban settings, this study uses the quantitative research method, which is discussed in detail below. In this study, overall statistical analyses are executed using the StataSE14 (64-bit) version.

### 3.2.1 Data Source and Data Description

This Research has been conducted based on secondary data from the latest and largest nationally representative survey, the Bangladesh Household Income and Expenditure Survey (HIES) 2022. The Bangladesh Bureau of Statistics (BBS), the highest-ranking organization under the nation's Ministry of Planning, conducted this survey. The survey's goals, sampling strategy, design, tools, measurement system, and quality assurance have all been described elsewhere (BBS, 2022). The seventeenth round of HIES, known as HIES 2022, took place between January and December of 2022 (HIES, 2022). Since 1973, the Bangladesh Bureau of Statistics (BBS) has carried out this study every five years in Bangladesh. This survey's goal is to provide national estimates for poverty, standard of living, health, education, income, spending, and consumption. For this study, this dataset has been collected from BBS, agreeing on the rules and regulations of data use.

Bangladesh's HIES 2022 is a well-designed, nationally representative survey. One of the primary efforts of the BBS is HIES, which offers a wealth of household-level socioeconomic data that significantly influences policy decisions made by the government of Bangladesh. In Bangladesh, it is a stand-alone survey that aims to give a trustworthy and legitimate assessment of poverty and its correlates. It is extensively used around the globe to gauge levels of poverty and living standards, especially in emerging nations with low incomes. It contains important information on households, household income, expenses, consumption, savings, housing conditions, and access to electricity, water, and other utilities for households, as well as information on jobs,

education, health, and sanitation, social security eligibility, remittances, microcredit, crisis management techniques, and people with functional disabilities. For the creation of the Five-Year Plan (FYP), perspective plan, and other development projects, it serves as the primary source of data on poverty and livelihood. It is also used to track the Sustainable Development Goals (SDGs) and the progress made in reducing poverty.

### 3.2.2 HIES Survey Sampling and Sample Size Calculation

HIES 2022 is an official survey of rural and urban regions in eight administrative divisions (Barisal, Chittagong, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet) of Bangladesh, providing the cross-sectional data for this study. The survey has used a two-phase stratified cluster sampling method, and the sampling frame is created using the Population and Housing Census 2022. The basic sampling unit, called the Primary Sampling Unit (PSU), is referred to as the Enumeration Area (EA) extracted from the same census, and every EA has an average of approximately 100 households. At the first stage, the required number of PSUs is selected, and a complete household listing is carried out in the selected PSUs. In the second phase, 20 households are chosen at random from each chosen PSU to participate in a field interview. The final sample encompasses 14,400 households, spread across 720 Primary Sampling Units (PSUs) nationwide, translating to 20 households for each PSU, of which 14,395 households have responded to the survey (BBS, 2022).

### 3.2.3 Study Sample

The unit of analysis of the thesis is the household. According to the HIES 2022, the total number of responding households is 14,395. By deducting unavailable data for study purposes, the final

data set consists of 14,269 households, of which 7,136 are rural and 7,133 are urban. The thesis considers 7,133 urban households, which are used for the analytical purpose (Figure 3.1).

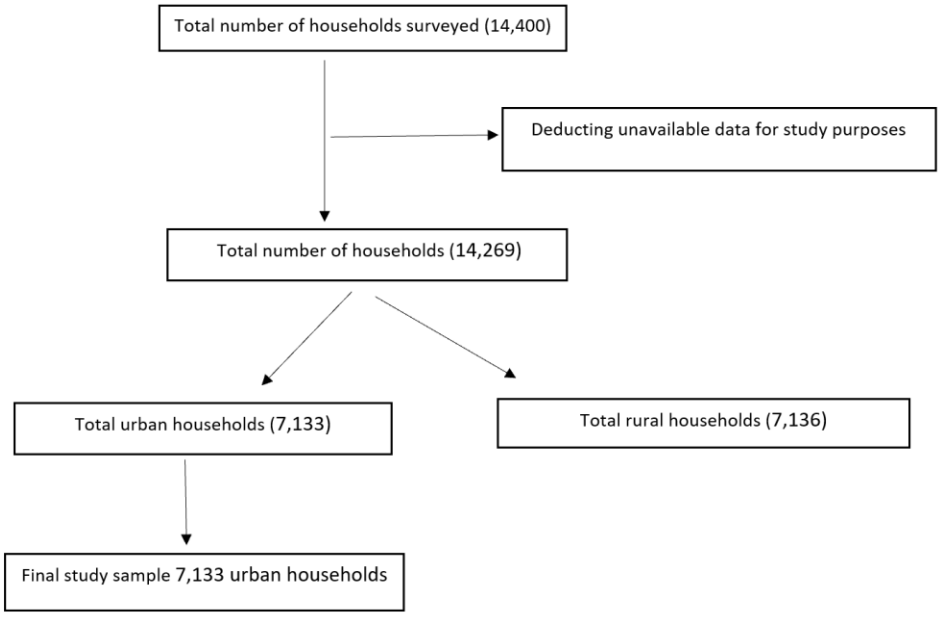


**Figure 3.1:** Flow chart showing study sampling techniques used to select survey households

## 3.3 Measurement of Variables

### 3.3.1 Outcome Variables

When a variable is being used to explain, predict, or measure something, it is called the outcome or dependent variable. It is the result or effect of changes in other explanatory variables. In this research, outcome variables are chronic illness and impoverishment due to OOP healthcare payment.

- **CHRONIC ILLNESS:** To understand the presence of chronic illness among the family members, the respondents were asked, “Have you or any member of your family suffered/suffered from any illness or disability lasting for the last 12 months or more?” In this regard, answers having ‘yes’ and ‘no’ are coded as 1 and 0, respectively. Then, a list

of chronic illnesses, including chronic fever, injuries/disability, chronic heart disease, respiratory disease/asthma/bronchitis, diarrhea/dysentery, gastric or ulcer, blood pressure, arthritis/rheumatism, skin problems, diabetes, cancer, kidney diseases, liver diseases, mental health, paralysis, ear/ENT problems, eye problems, and others are considered for observing the prevalence of diseases. In this study, to construct the chronic illness variable, the households that suffered from at least one chronic illness are denoted as "households with chronic illness", and the rest of the households are denoted as "households without chronic illness". Moreover, chronic illnesses are categorized as households with chronic illness, households having one chronic illness, households having two chronic illnesses, and households having more than two chronic illnesses.

- **OOP HEALTH EXPENDITURE ESTIMATION:** This is the share of the expenses that the household pays directly for medical bills that are not covered by third-party (e.g., health insurance). According to our research, household health expenditure is equivalent to home medical expenses paid out of pocket. OOP healthcare spending is calculated as the total of all household healthcare-related spending over the 30 days before the census at the time of receiving healthcare services (Bhojani et al., 2012). All direct medical and non-medical healthcare costs, such as prescription medications, doctor visits, hospital stays, tests, clinic fees, and medical travel expenses, are included in measuring OOP expenditures (Kastor & Mohanty, 2018). OOP healthcare payments do not include third-party payments, such as those made by micro health insurance. The healthcare expenditure included in the total expenditure for the calculation of poverty (HIES, 2022) has been considered as OOP healthcare expenditure in this study. In HIES 2022, medical

costs such as consultation fees (visit), cost of medicine, cost of hospital stays, cost of test/ investigation, and other associated costs are included.

- **MEASURING THE INCIDENCE OF CATASTROPHIC HEALTH EXPENDITURE (CHE):** A household is considered to be experiencing catastrophic health spending when out-of-pocket expenses cross a certain proportion of the total household budget. The incidence of CHE is estimated based on the proportion of out-of-pocket (OOP) healthcare payments relative to household consumption expenditure that exceeds a specified threshold (Wagstaff and van Doorslaer, 2003). To calculate the prevalence of CHE, this study has applied two threshold levels: (1) out-of-pocket (OOP) payments exceeding 10% of total household consumption expenditure, and (2) OOP payments exceeding 40% of household non-food expenditure. When a household's medical expenses exceed 10% of total household consumption expenditure, this household is considered as facing CHE (Wagstaff and van Doorslaer 2003). According to Xu et al. (2003), CHE occurs when a household's medical expenses exceed 40% of household non-food expenditure or capacity to pay in the past 30 days. The capacity to pay for health care is defined as total household consumption minus a standard amount to cover basic needs, i.e., food, housing, utilities, etc. (WHO, 2024).
- **POVERTY ESTIMATION:** The measurement of poverty is applied differently in different studies (Khan et al., 2017; Van Doorslaer; Hamid et al., 2014). We use the Cost of Basic Needs (CBN) method, considering the local price level of household consumption. The same poverty line is also used by the BBS for estimating the poverty headcount in Bangladesh (BBS, 2022). According to the CBN method, a person is considered to be non-

poor if this person can afford the cost of the basic consumption needs bundle. Conversely, a person is considered to be poor if a person cannot afford the cost of this bundle. Therefore, in this method, poverty lines represent the minimum per capita expenditure that a person needs to be able to afford to meet their basic needs, which include both food and non-food consumption items (BBS, 2022). The food poverty line is estimated by a basic food bundle including eleven essential foodstuffs (rice, wheat, pulse, milk, edible oil, meat, sweet water fish, potato, vegetables, sugar, and fruits), which meets the minimum nutritional requirements with 2,122 kcal per day per person. Each item's price is estimated using the median unit price from a reference group within each stratum. The food poverty line is then calculated by multiplying these prices by the item quantities in the bundle.

In the second phase, non-food allowances are estimated by the lower non-food allowance and the upper non-food allowance. Lower non-food allowance is calculated based on the median non-food spending (including medical expenditure) of households whose total per capita expenditure is near the food poverty line, and a household's median non-food spending whose food per capita expenditure is near the food poverty line is used to determine the upper non-food allowance. Finally, lower poverty is estimated by adding the food poverty line to the lower non-food allowance. In contrast, the upper poverty line is estimated by adding the food poverty line to the upper non-food allowance (BBS 2022). The upper poverty line is used for calculating the national poverty line, which is used in this study. According to BBS (2022), the average upper poverty line is BDT 3,832, so households whose average per capita total monthly expenditure is below BDT 3,832 are

considered poor, and those whose average per capita total monthly expenditure is equal to or above BDT 3,832 are considered non-poor (BBS, 2022). To construct division-wise urban poverty, this study uses division-wise urban upper poverty lines (BBS, 2022).

- **IMPOVERISHMENT:** This study uses the outcome variable of impoverishment due to OOP healthcare payment, instead of poverty. As healthcare expenses are often unavoidable and household resources are limited, including OOP spending in total consumption can distort the true economic situation. For example, during an illness, many households cope by borrowing, selling assets, or cutting back on essential expenses. This added spending makes their total expenditure appear higher, even though they may have less money for essentials. As a result, a household that actually falls below the poverty line due to healthcare costs may not be counted as poor if we don't subtract these costs. Similarly, a poor household that borrows money to afford treatment might also be incorrectly classified as non-poor. Because of this, poverty levels might be underestimated. To capture the true impact of healthcare costs on poverty, researchers recommend measuring household consumption net of OOP health expenses. Thus, the impoverishing effects of household OOP expenditure (the impact of OOP payments on poverty) are measured by the difference between poverty headcount, calculated by total household consumption expenditure (including healthcare costs or OOP health expenditure), and similar expenditure excluding healthcare costs or OOP health expenditure (O'Donnel et al., 2008; Wagstaff & Van Doorslaer, 2003). A non-poor household is considered impoverished by OOP payments if it becomes poor after paying for healthcare services, based on the projected poverty line. The number of households pushed below the

poverty line or impoverished from OOP payments is calculated by applying the percentage of the impoverished population in a certain year (Ahmed et al., 2022).

- **MEASURING THE EFFECT OF CHRONIC ILLNESS ON POVERTY:** We estimate the impact of OOP payments for chronic illness on poverty by analyzing the change in the average level of headcount poverty or poverty gap (which reflects the intensity of poverty or depth of poverty) before OOP health expenditure (where payments for health care are included) and after OOP health expenditure (where payments for health care are excluded), following previous research by van Doorslaer et al. (2006), Wagstaff and van Doorslaer, (2003), Begum and Hamid (2021), and Hamid et al. (2014).

  Consider $\mathrm{Z_i}$ to be the per capita expenditure of person i (including OOP healthcare expenditure), $\mathrm{P_L}$ is the poverty line, and n is the number of individuals. Then,

- **HEADCOUNT POVERTY BEFORE OOP HEALTHCARE EXPENDITURE:**

$$H_{pov}^{pre} = \frac{1}{n}\sum_{i=1}^{n} P_i^{pre} \text{ , where } P_i^{pre} = 1 \text{ if } Z_i < P_L \text{ and 0 otherwise} \quad (1)$$

- **HEADCOUNT POVERTY AFTER OOP HEALTHCARE EXPENDITURE:**

$$H_{pov}^{post} = \frac{1}{n}\sum_{i=1}^{n} P_i^{post} \text{, where } P_i^{post} = 1 \text{ if } (Z_i - OOP) < P_L \text{ and 0 otherwise} \quad (2)$$

Similarly, the before OOP healthcare and after OOP healthcare expenditure poverty gap can be defined, respectively, as

- **POVERTY GAP BEFORE OOP HEALTHCARE EXPENDITURE:**

$$G_{pov}^{pre} = \frac{1}{n}\sum_{i=1}^{n} \beta_i (P_L - Z_i)$$

- **POVERTY GAP AFTER OOP HEALTHCARE EXPENDITURE:**

$G_{pov}^{post}=\frac{1}{n}\sum_{i=1}^{n}\beta_i\{P_L-(Z_i-OOP)\}$

Where, $\beta_i=\begin{cases}1\ if\ Z_i<P_L\\0\ if\ Z_i\geq P_L\end{cases}$

When OOP healthcare expenses are greater than zero, the headcount poverty is higher in Equation (2) than in Equation (1). In the same way, the poverty gap in Equation (4) is higher than in Equation (3). Therefore, the difference between Equations (2) and (1) shows how many more people fell into poverty due to OOP payments (headcount impoverishment). Similarly, the difference between Equations (4) and (3) reflects how much deeper poverty became because of these payments (intensity of poverty). Additionally, for comparison purposes, it's helpful to use the normalized poverty gap, which measures the change in poverty gap relative to the poverty line.

More specifically, the impact of OOP healthcare expenditure on poverty (impoverishment impact of OOP payments) is simply measured by the difference between the corresponding pre-payment and post-payment poverty indicators, that is,

- **HEADCOUNT POVERTY IMPACT (INCREASE IN NUMBER OF POOR):**

$PI^H=\Delta H=H_{pov}^{post}-H_{pov}^{pre}$

- **POVERTY GAP IMPACT (INCREASE IN INTENSITY OF POVERTY):**

$PI^G=\Delta G=G_{pov}^{post}-G_{pov}^{pre}$

- **NORMALIZED POVERTY GAP:**

  $PI^{NG}$ =$\Delta NG = (G_{pov}^{post} - G_{pov}^{pre})/P_L$ , where, NG = Normalized Gap

- **PEN'S PARADE GRAPH:** To illustrate how OOP payments affect poverty or the impact of OOP payments for healthcare on impoverishment, Pen's parade graphics are created following Wagstaff and Doorslaer (2003). In Pen's parade, the X-axis represents the cumulative percentage of the population ranked by pre-payment income, and the y-axis represents income (before and after out-of-pocket payments), along with a horizontal poverty line drawn to show the threshold (Wagstaff and Doorslaer, 2003). In many developing countries, expenditure is a more reliable measure of living standards than income, especially in household surveys. HIES (2022) also used expenditure to calculate poverty. Therefore, in this study Pen's Parade graphs used per capita consumption expenditure before and after out-of-pocket (OOP) health payments to assess the effect on poverty along the y-axis against the cumulative percentage of the household ranked by pre-payment consumption expenditure, ordered from the poorest to the richest, along the x-axis and a horizontal poverty line is drawn to show the threshold (BDT 3,832/day as per BBS (2022), the average upper poverty line is BDT 3,832) to identify the poor (Ahmed et al., 2022; Hamid et al., 2014).

### 3.3.2 Explanatory Variables

The independent or explanatory variable is the one that is applied to forecast or explain changes in the outcome variable due to changes in the explanatory variables. It is typically observed to assess the effects of explanatory variables on the outcome.

The selection of independent variables for the thesis is motivated by theory and the body of literature. Two categories of criteria are taken into account when analyzing the determinants of chronic illness: demographic characteristics and socioeconomic characteristics. As demographic characteristics, this study includes the mean age of household members, the female proportion in the households, and the household head's marital status. Household head marital status means whether the household head is married or unmarried. By married means whether he/she is currently married, and the unmarried category includes never married, widowed, divorced, and separated. A vector of socioeconomic characteristics that includes household income (income quantiles), proportion of earners, and proportion literate in the household. Moreover, to show division-wise differences, this study uses the division dummy variable. Mymensingh, Barisal, Dhaka, Chittagong, Khulna, Rajshahi, Rangpur, and Sylhet are the eight divisions of Bangladesh.

Income is defined as a significant return in kind or currency obtained within a certain period in exchange for products and services. The household's monthly income is calculated by aggregating labor income, business income, agricultural income, other asset income, remittances, social safety nets, stipend, and imputed rent. Household income is categorized by quantiles.

If someone aged 7 years and above and if he/she can read and write, then he/she is treated as literate.

## 3.4 Statistical Analysis

In this study, statistical analysis is done using descriptive statistics and regression models, which are used to explore the summary statistics of the variables used in this study, identify the effects

of explanatory variables on chronic illnesses, and explore the linkages between chronic illness and impoverishment in urban Bangladesh.

### 3.4.1 Descriptive Analysis

Descriptive statistics are used for summarizing, organizing, and presenting data by using tables, graphs, and charts. When doing research, calculating descriptive statistics is an essential initial step that should always be completed before performing inferential statistical comparisons. Some measures of descriptive statistics are for data summary using Bar graphs, Histograms, Pie charts, Skewness, and kurtosis. Summary statistics represent the measures of central tendency, including mean, median, and mode, as well as measures of variability such as range, variance, and standard deviation. The research that uses descriptive statistics to determine the extent of a relationship between two or more variables based on statistical data is known as correlational research. Correlational research only describes and attempts to explain the nature of existing relationships and does not examine causality. This thesis uses descriptive statistics to examine such associations among the variables used.

Bivariate analysis (cross-tabulations) is executed to compare the association between the outcome variable (chronic illness and poverty) and explanatory variables. Descriptive statistics used frequencies, percentages, and means. The Chi-square ($\chi 2$) tests are used to measure the proportional differences in the outcome and categorical explanatory variables, and t-tests are used to measure the mean differences in the outcome variable and continuous explanatory variables. A Probit regression model is used to detect the factors associated with chronic illness and impoverishment (used as a proxy for measuring poverty) due to OOP healthcare expenditure.

### 3.4.2 Model Specification

In this study, to investigate the effects of determinants on chronic illness and to examine the interlinkages between chronic illness and poverty in households located in urban settings, the collected data are analyzed through the econometric regression model, i.e., the Probit regression model. The Probit regression model was first presented by Chester Ittner Bliss in 1935 (Bliss, 1935). Subsequently, this model was utilized in various research consistent with earlier literature to accomplish similar research goals (Jayathilaka et al., 2020). Therefore, it is logical to assume that the Probit regression model works well in this investigation and that the results are trustworthy. Probit regression is a regression technique used for binary outcome variables. The dependent variable with two possible outcomes, such as Yes = 1 and No = 0, is known as a binary outcome variable. A value's likelihood of falling into one of the two potential binary (i.e., unit) outcomes is evaluated by the Probit model, which is specified as:

P (Y = 1 | X) = $\emptyset(X^T\beta$ )

$Y_i^* = X_i^T\ \beta + e_i$

Here,

P= Probability

Y= is the dependent Variable. It denotes the change in the dependent variable. It is a binary variable with two values: 1 = Yes and 0 = No.

X= is the independent variable.

$\emptyset$= is the cumulative distribution function of a standard normal distribution.

$Y_i^*$ =a continuous real-valued variable for observation i that is unobservable, or latent.

$X_i^T$= $\left(X_i^1, X_i^2, X_i^3, \cdots\cdots\cdots X_i^k\right)^{\intercal}$, a 1xK row vector of regressors for observation i,

$B$=($\beta_0, \beta_1, \beta_2$ ····· $\beta_k$), a K×1 column vector of regression coefficients,

$e_i$ =Error term

This study utilizes the Probit model to explain the variation in the binary dependent variable with the independent variables. Probit models correspond with two dependent variables: chronic illness and impoverishment (due to OOP healthcare expenditure).

In this study, the probit model reports marginal effects instead of coefficients. Because the Probit model is nonlinear, the coefficients do not directly show how much the probability of an outcome changes, but marginal effects clearly show how a change in an independent variable affects that probability. Marginal effects explain this by showing how the probability increases or decreases (percentage changes in probability) when one variable changes by one unit, while other variables stay the same. So, while the Probit model is estimated using coefficients, the results are best presented and interpreted using marginal effects.

### 3.4.3 Probit Regression Specification for Determinants of Chronic Illness

Here, the dependent variable is a chronic illness with two possible outcomes such as Yes = 1, "with chronic illness", and no=0, "absence of chronic illness", and demographic and socio-economic determinants are explanatory variables. The following Probit regression specification is used to estimate the coefficients of the explanatory variables.

P (Y = 1 | X) = Ø ($\beta_0$ + $\beta_1$Age + $\beta_2$Gender + $\beta_3$Marital status + $\beta_4 Income$+$\beta_5$Education+$\beta_6 Earner$)

- $Y$ = is the binary dependent variable, taking the value 1 "with chronic illness" if the household experiences at least one chronic illness, and zero otherwise (absence of chronic illness).
- **Age =** Mean age in a household

- **Gender =** Female proportion in the households
- **Marital status =** Marital status of household head.1“currently married” and 0“otherwise (Never married/ Widowed /Divorced/Separated).”
- **Income =** Income quantiles
- **Education =** Proportion of literate persons in the household
- **Earner =** Proportion of earner members in the household

### 3.4.4 Probit Model for Impoverishment and Chronic Illness

In this case, the dependent variable is impoverishment, resulting from OOP healthcare expenditure, with two possible outcomes such as Yes = 1, impoverished due to OOP healthcare expenditure, and No = 0, otherwise (not impoverished). Here, chronic illness, demographic, and socio-economic determinants are used as explanatory variables. The following regression equation is used for establishing the relationship between chronic illness and impoverishment.

P (Y = 1 | X) = Ø ($\beta_0$ + $\beta_1$Chronic illness + $\beta_2$Age + $\beta_3$Gender + $\beta_4$Marital status + $\beta_5 Income$+$\beta_6$Education+$\beta_7 Earner$)

- $Y$**=** is the binary dependent variable, taking the value 1 if impoverished (the households are impoverished), and zero otherwise (households are not impoverished).
- **Chronic illness =** 1 if the household experiences chronic illness (with chronic illness), and zero otherwise (without chronic illness).
- **Age =** Mean age in a household
- **Gender =** Female proportion in the households.
- **Marital status =** Marital status of household head.1“currently married” and 0, “otherwise (never married/ widowed /divorced/separated)”.
- **Income =** Income quantile.
- **Education =** Proportion of literate persons in the household.
- **Earner =** Proportion of earner members in the household.

### 3.4.5 Probit Model for Impoverishment and Number of Chronic Illness

In this Probit model, the dependent variable is impoverishment with two possible outcomes such as Yes = 1, impoverished (due to OOP healthcare expenditure), and No = 0, otherwise. Here, we have used categorized chronic illness, demographic, and socio-economic characteristics as explanatory variables. The following regression equation is estimated for this purpose.

P (Y = 1 | X) = Ø ($\beta_0$ + $\beta_1$categorized chronic illness + $\beta_2$Age + $\beta_3$Gender + $\beta_4$Marital status + $\beta_5 Income$+$\beta_6$Education+$\beta_7 Earner$)

- $Y$ **=** is the binary dependent variable, taking the value 1 if impoverished (the households are impoverished) and zero for otherwise (households are not impoverished).
- **Categorized chronic illness =** 0 (zero) "without chronic illness", 1 "households with one chronic illness", 2 "households with two chronic illnesses", and 3 "households with more than two chronic illnesses".
- **Age =** Mean age in a household.
- **Gender =** Female proportion in the households.
- **Marital status =** Marital status of household head denoted as 1 "currently married" and 0 "otherwise (never married/ widowed /divorced/separated)".
- **Income =** Income quantiles.
- **Education =** Proportion of literate persons in the household.
- **Earner =** Proportion of earner members in the household.

### 3.4.6 Probit Model for Chronic Illness and Impoverishment

This is the fourth Probit regression model where the dependent variable is a chronic illness with two possible outcomes such as Yes = 1, "with chronic illness", and No = 0, "without chronic illness". Impoverishment (due to OOP healthcare expenditure) and demographic and socio-economic determinants are used as explanatory variables.

P (Y = 1 | X) = Ø ($\beta_0$ + $\beta_1$Impoverishment + $\beta_2 Age$ + $\beta_3$Gender + $\beta_4$Marital status + $\beta_5 Income$ + $\beta_6$Education + $\beta_7 Earner$)

- $Y$= is the binary dependent variable, taking the value 1 “with chronic illness” if the household experiences at least one chronic illness and zero, otherwise (without chronic illness).
- **Impoverishment =** 1 if impoverished (the households are impoverished), and zero otherwise (households are not impoverished).
- **Age =** Mean age in a household
- **Gender =** Female proportion in the households
- **Marital status =** Marital status of household head.1 “currently married” and 0 “otherwise (Never married/ Widowed /Divorced/Separated).”
- **Income =** Income quantile (first quantile, second quantile, third quantile, fourth quantile, and fifth quantile)
- **Education =** Proportion of literate persons in the household
- **Earner =** Proportion of earner members in the household

## 3.5 Addressing Multicollinearity

Since the study has included multiple explanatory variables, multicollinearity was checked using Variance Inflation Factors (VIFs).

## 3.6 Ethical Considerations

The Ethics Committee at the Bangladesh Bureau of Statistics (BBS) approved a waiver from ethical approval for this retrospective study. As the identified data for this study came from secondary sources, this study does not require ethical approval.

## 3.7 Conclusion

From the above discussion, it can be concluded that the goal of this Chapter is to explain the research methodology of the study. To satisfy the research question, i.e., are there any interlinkages between chronic illness and poverty among households in urban settings, and what

are the determinants of chronic illness in urban settings in Bangladesh, this study has used a quantitative research method. Quantitative analysis is discussed by descriptive and Probit regression models. The data on which this research is conducted are collected from the latest survey of BBS, Bangladesh Household Income and Expenditure Survey (HIES) 2022.

# CHAPTER FOUR: FINDINGS OF THE STUDY

## 4.1 Introduction

The main purpose of this Chapter is to present the key findings of the study based on quantitative data and satisfy the research objectives of the study by investigating the determinants of chronic illness and exploring the interlinkages between chronic illness and poverty in the urban settings of Bangladesh. The analysis is done mainly at the household level, except for a few descriptive statistics at the individual level. More importantly, to present the detailed scenario, the descriptive analysis is used at both the individual and household levels. The following sections and sub-sections address the prevalence and patterns of chronic illnesses with a special focus on urban areas of Bangladesh. More specifically, the prevalence of chronic illness as per disease, division-wise or geographic area, and the demographic and socioeconomic characteristics are addressed. Finally, this study addresses the determinants of chronic illnesses and the interlinkages between chronic illness and poverty.

## 4.2. Prevalence and Patterns of Chronic Illnesses

### 4.2 1. Prevalence of Chronic Illnesses in Bangladesh

The widespread persistence of chronic diseases is evident in Bangladesh. As per HIES 2022, the prevalence of chronic illness is 29.43%, implying that around 50.5 million people in Bangladesh are suffering from at least one chronic disease. However, this scenario is more prevalent as we measure the prevalence of chronic illness at the household level. In Bangladesh, more than two of every three households face chronic illnesses (72.37%) in Bangladesh.

### 4.2.2. Prevalence of Chronic Illnesses in Urban Areas

Findings reveal that 29.17% of urban people, which stands around 20.2 million, report suffering from at least one chronic illness, while the remaining 70.83% do not have any chronic conditions (Figure 4.1). On the other hand, more than two-thirds of households (71.37%) report having at least one chronic illness, whereas 28.63% report having no chronic illnesses (Figure 4.2). Among these households, 28.63% have no chronic illness, 33.6% have one chronic illness, 25.9% two chronic illnesses, and 11.9% more than two chronic illnesses (Figure 4.3).

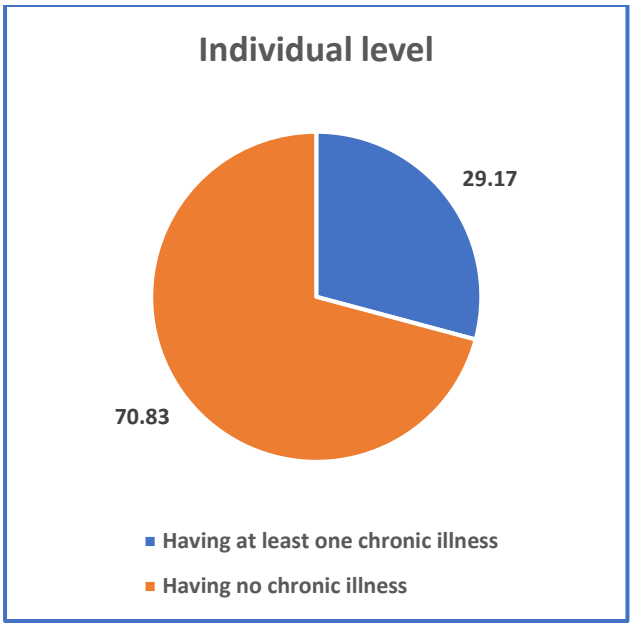


**Figure 4.1:** Prevalence of chronic illness among urban individuals (%)

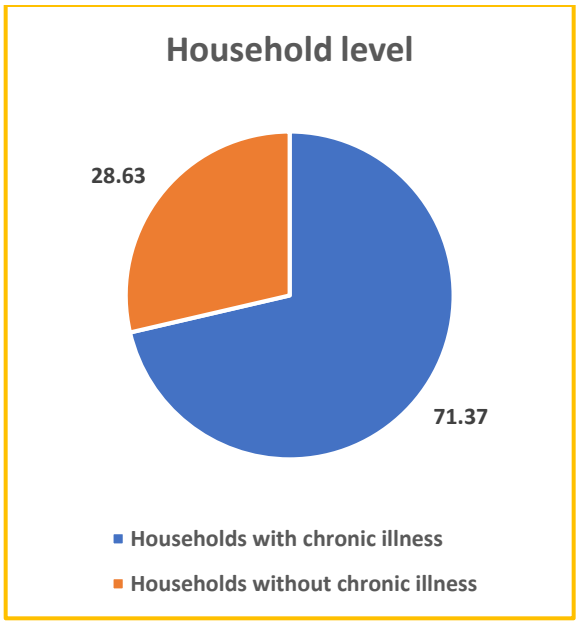


**Figure 4.2:** Prevalence of chronic illness among urban households (%)

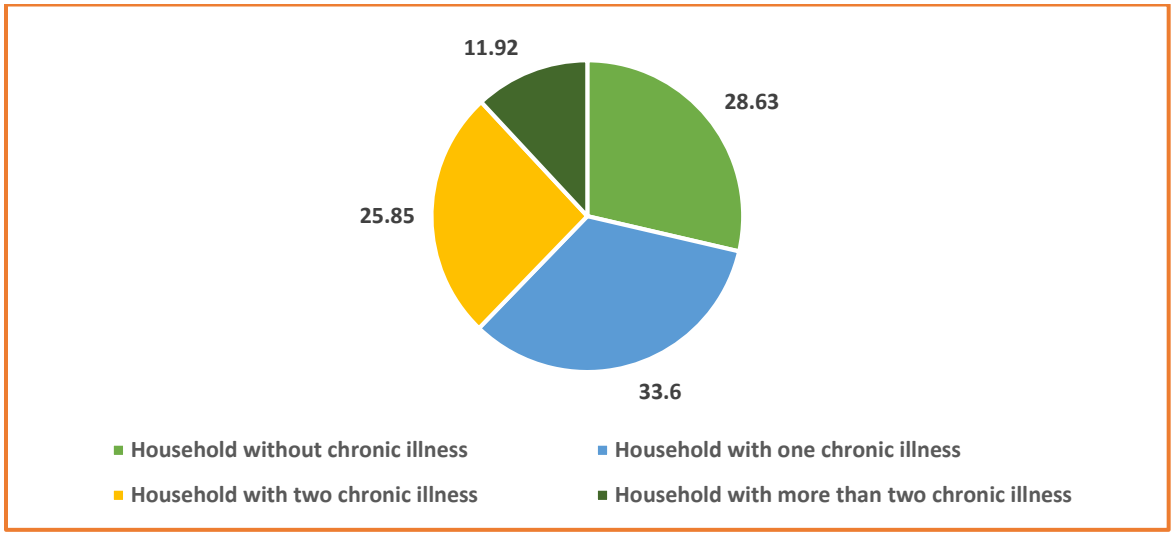


**Figure 4.3:** Distribution of households by number of chronic illnesses among urban households (%)

### 4.2.3. Disease-specific Prevalence of Chronic Illness in Urban Areas

As shown in Table 4.1, the most prevalent chronic illnesses among urban sample individuals in Bangladesh are gastric/ulcer (8.28%), high blood pressure (8.01%), diabetes (5.06%),

arthritis/rheumatism (3.96%), and chronic heart disease (3.13%). Less common conditions include cancer, paralysis, and mental health issues.

**Table 4.1:** Disease-specific prevalence of chronic illness among urban sample individuals

| Chronic illness | Number of individuals with chronic illness | % |
|---|---|---|
| Chronic Fever | 142 | 0.46 |
| Injuries/Disability | 399 | 1.29 |
| Chronic Heart Disease | 967 | 3.13 |
| Respiratory Diseases/ Asthma/Bronchitis | 910 | 2.94 |
| Diarrhoea/Dysentery | 63 | 0.20 |
| Gastric/Ulcer | 2,560 | 8.28 |
| Blood pressure | 2,478 | 8.01 |
| Arthritis/ Rheumatism | 1,224 | 3.96 |
| Skin problem | 569 | 1.84 |
| Diabetes | 1,565 | 5.06 |
| Cancer | 34 | 0.11 |
| Kidney Diseases | 203 | 0.66 |
| Liver Diseases | 118 | 0.38 |
| Mental Health | 151 | 0.49 |
| Paralysis | 104 | 0.34 |
| Ear/ENT problem | 235 | 0.76 |
| Eye problem | 276 | 0.89 |
| Others | 1,055 | 3.41 |

### 4.2.4. Division-wise Prevalence of Chronic Illness in Urban Areas in Bangladesh

The prevalence of chronic illness varies notably throughout Bangladesh's eight administrative divisions, with the greatest percentage reported in Chattogram division (80.02% of households), and followed by Barishal division (79.15%) and Khulna division (78.71%) respectively. The lowest prevalence of chronic illness is evident in Dhaka (58.22%). Other divisions that lie in the medium range include Mymensingh division (72.71%), Sylhet division (70.78%), Rajshahi division (69.74%) and Rangpur division (61.61%). See Figure 4.4 for details.

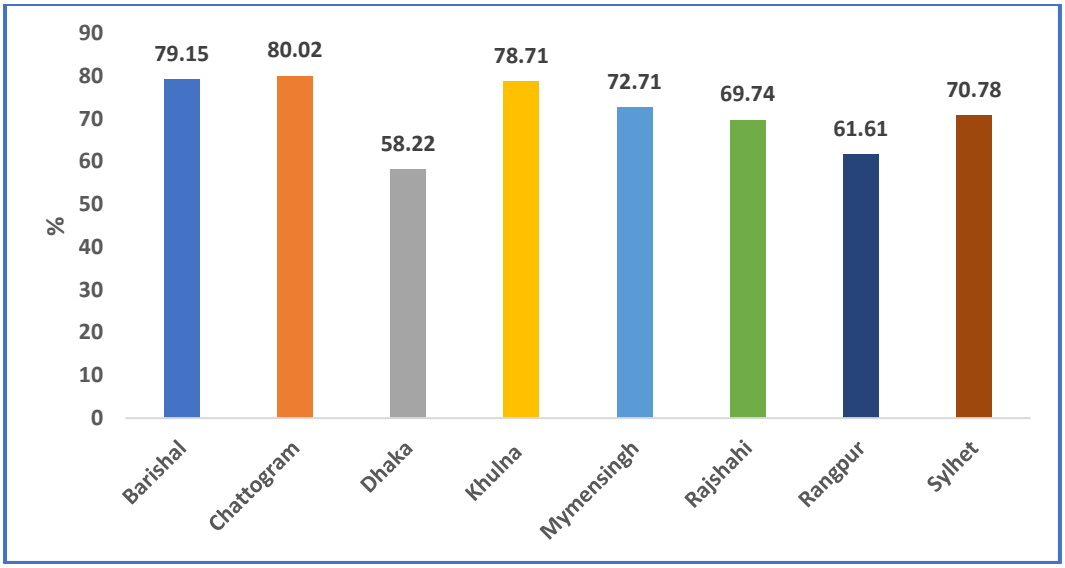


**Figure 4.4:** Prevalence of chronic illness among division-wise households in urban areas

## 4.3. Determinants of Chronic Illness

This part describes the explanatory variables considered for the thesis (i.e., age, gender, marital status, education, employment status, income) to explain the different scenarios of chronic illness prevailing in urban areas of Bangladesh.

### 4.3.1. Prevalence of Chronic Illness by Demographic Characteristics

- **Prevalence of chronic illness by different age groups:** The prevalence of chronic illnesses rises with age. The prevalence is found only 5.11% among the children aged 0–12 years and 10.87% among youth aged 13–24 years, but it increases significantly among adults and the elderly. The prevalence of chronic illness among the adult group (25-64 years) is 44.20% of the total adult population in urban areas, indicating that individuals in their middle and working years are the most likely to experience chronic illnesses. The highest prevalence, 77.14%, is found among the elderly (65+ years), suggesting a strong link between chronic health issues and aging (Figure 4.5).

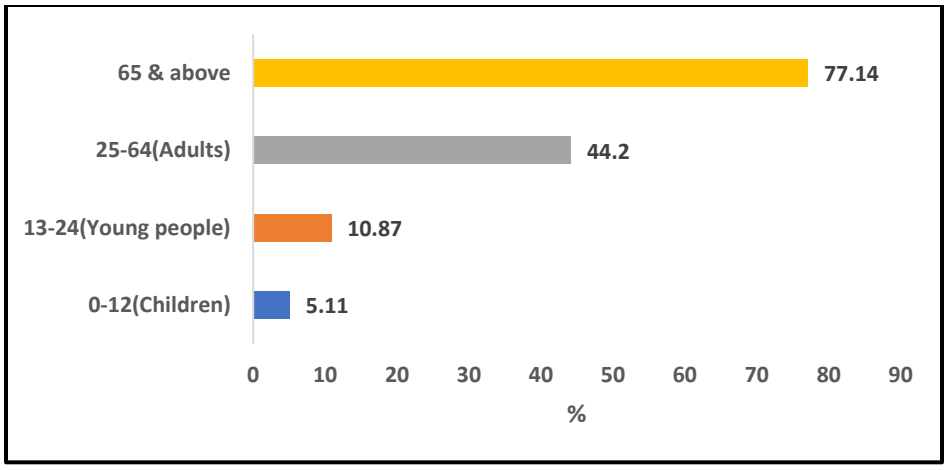


**Figure 4.5:** Prevalence of chronic illness among different age groups in urban settings

- **Prevalence of chronic illness by gender:** As per the gender-specific distribution of patients with chronic illnesses in urban areas, a higher prevalence of chronic illness is found among females compared to men (men: 31.69% vs. women: 26.65 %). Figure 4.6 shows the prevalence of chronic illness by gender.

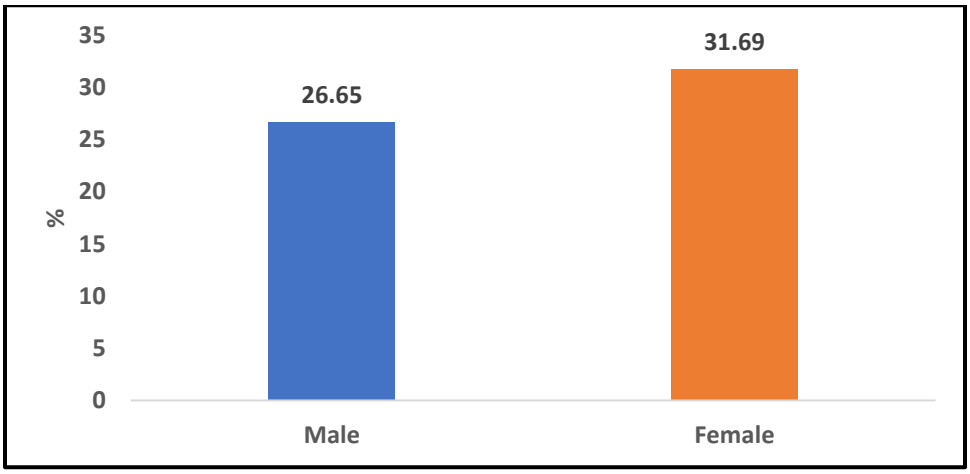


**Figure 4.6:** Prevalence of chronic illness by gender categories in urban settings

- **Prevalence of chronic illness by marital status:** The prevalence of chronic illness shows clear variation by marital status. For instance, the highest prevalence is observed among formerly married individuals—those who are now widowed, divorced, or separated—at 68.78%, followed by 43.25 % who are currently married. Chronically ill patients who are

never married account for 9.56%, and Children under 10 years old, for whom marital status is irrelevant, comprise 4.98 % (Figure 4.7).

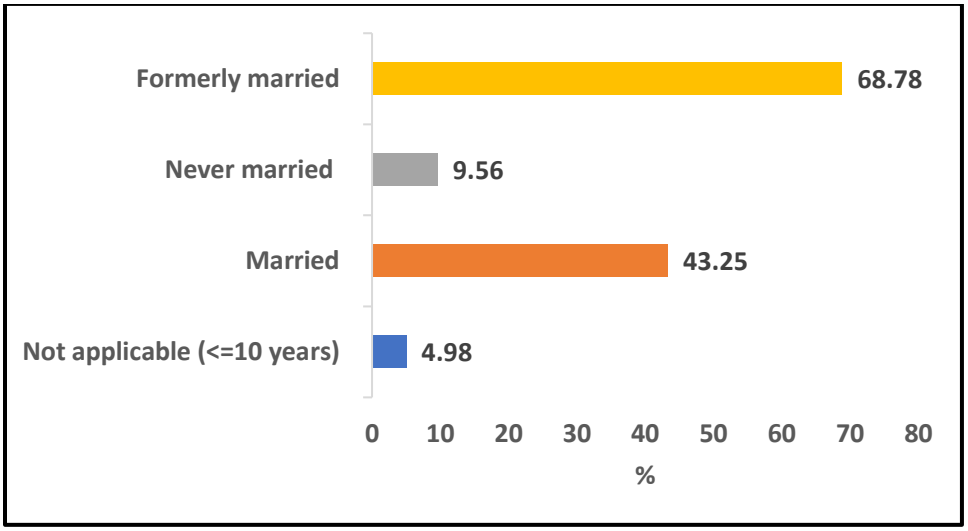


**Figure 4.7:** Prevalence of chronic illness among different marital status categories in urban settings

### 4.3.2. Prevalence of Chronic Illness by Socio-economic Characteristics

- **Households with chronic illness by income categories:** The prevalence of chronic illness is found across the different categories of income (here, the income quantiles), with variations across the different quantiles. Households belonging to the highest-income group ($5^{th}$ income quantile) confront the highest chronic illness prevalence (78.04%), followed by $4^{th}$ income quantile (73.32%), $3^{rd}$ income quantile (69.64%), $1^{st}$ income quantile (68.17%), and $2^{nd}$ income quantile (67.71%), respectively. The least prevalence is evident for the $2^{nd}$ income quantile (67.71%), implying a slightly progressive distribution of chronic illness prevalence.

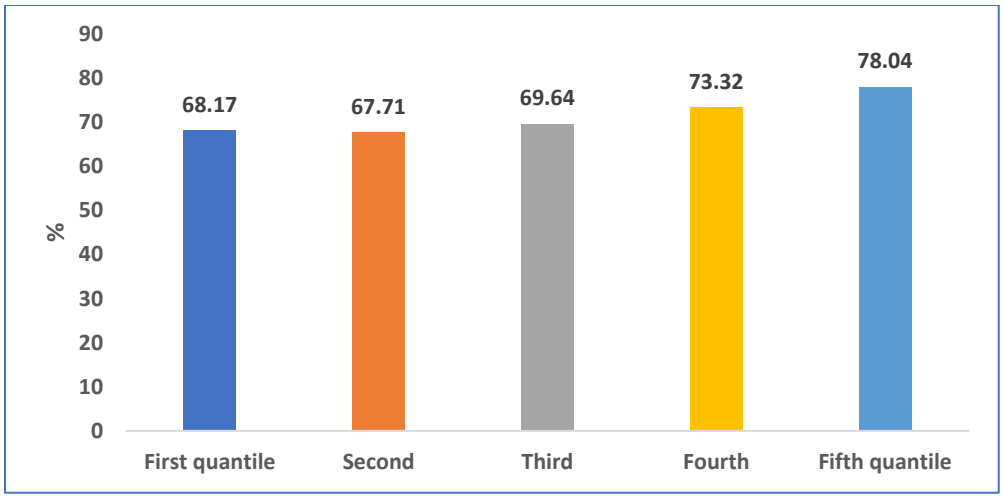


**Figure 4.8:** Prevalence of chronic illness by income categories

- **Prevalence of chronic illness by education categories:** Findings indicate that, in urban areas, the highest prevalence is observed among other categories of education (70.42 %), followed by those with pre-schooling (35.19%) and higher education (34.63 %). Among chronically ill-patients, 29.74 % are found with completion of primary education (Figure 4.9).

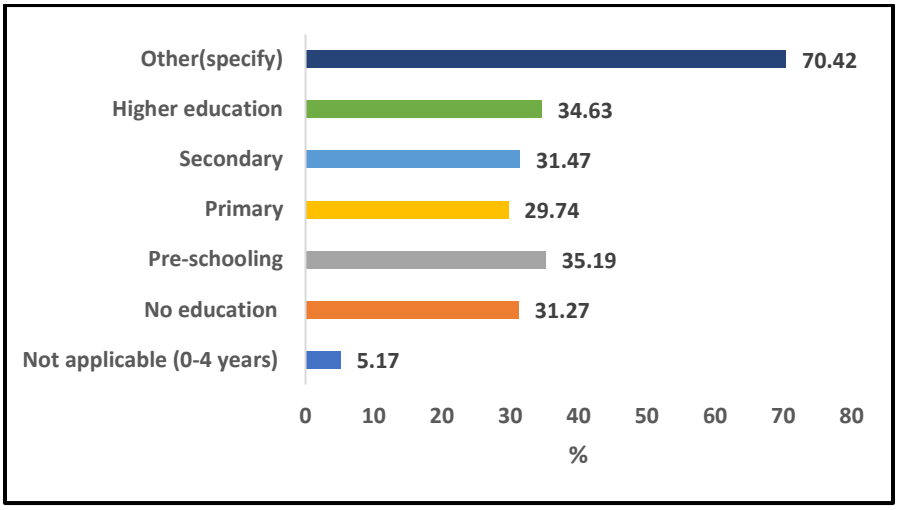


**Figure 4.9:** Chronic illness prevalence by education categories

- **Prevalence of chronic illness by employment status:** Findings reported in Figure 4.10 reveal that the prevalence of chronic illness is high among the unemployed (32.33%) compared to the employed (30.01%).

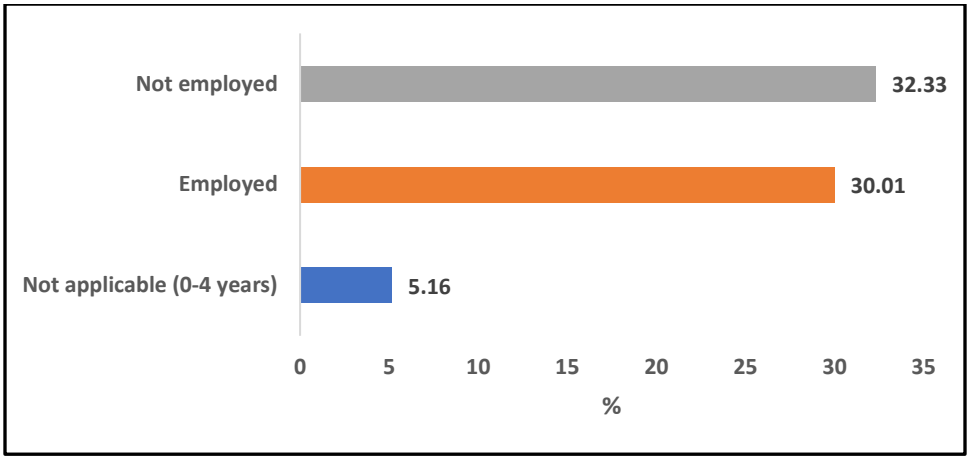


**Figure 4.10:** Prevalence of chronic illness among different employment status categories in urban settings

### 4.3.3. Summary Statistics of Demographic and Socioeconomic Characteristics by Chronic Illness Status

Table 4.2 presents the bivariate associations between chronic illness status and various demographic and socio-economic characteristics in urban settings. The average age of household members with chronic illnesses is significantly higher than that of members without chronic illness (32.26 vs. 26.22 years; $p = 0.000$). The proportion of dependent members is lower in households with chronic illnesses (30.7%) than in those without chronic illnesses (32.1%), and this difference is statistically significant ($p = 0.010$). The proportion of female members shows no significant difference ($p = 0.2087$) between the two groups. Marital status is significantly associated with chronic illness ($p = 0.001$), with currently married household heads having less chronic illness than the never married, widowed, divorced, or separated category. Prevalence of chronic illness is higher among literate individuals than those of illiterates (72% vs. 68%, $p =$

*0.000*). While the proportion of individuals with chronic illness is lower among earners compared to their counterparts (32.7% vs. 36.3%, *p=0.000*). Additionally, household income is significantly associated with chronic illnesses, with a greater proportion of chronic illnesses found in higher income quintiles. In the higher income quintiles, especially in the 5th quintile, the prevalence of chronic illness is the highest (21.8%).

**Table 4.2:** Bivariate association of chronic illness and selected demographic and socioeconomic characteristics in urban households using t-test

| **Variables** | **With Chronic illness n=5,091 Mean (se)** | **Without chronic illness n=2,042 Mean (se)** | **p-value** |
|---|---|---|---|
| Mean age (in years) | 32.262 | 26.217 | 0.000 |
| | (0.156) | (0.218) | |
| Proportion of the dependent members in households | 0.307 | 0.321 | 0.010 |
| | (0.003) | (0.005) | |
| Proportion of the female members in households | 0.504 | 0.498 | 0.209 |
| | (0.003) | (0.004) | |
| **Marital status of HH head** | | | |
| Currently married | 0.904 | 0.928 | 0.001 |
| | (0.004) | (0.006) | |
| Proportion of literate persons in the HH | 0 .720 | 0.681 | 0.000 |
| | (0.004) | (0.006) | |
| Proportion of earners in the HH | 0.327 | 0.363 | 0.000 |
| | (0.003) | (0.005) | |
| **Income quantiles** | | | |
| 1st income quantile=1 | 0.193 | 0.225 | 0.003 |
| | (0.006) | (0.009) | |
| 2nd income quantile=2 | 0.188 | 0.223 | 0.000 |
| | (0.005) | (0.009) | |
| 3rd income quantile=3 | 0.195 | 0.212 | 0.105 |
| | (0.006) | (0.009) | |
| 4th income quantile=4 | 0.206 | 0.187 | 0.069 |
| | (0.006) | (0.009) | |
| 5th income quantile=5 | 0.218 | 0.153 | 0.000 |
| | (0.006) | (0.008) | |

### 4.3.4. Determinants Using Probit Regression Model

Table 4.3 presents the marginal effects from a Probit regression model, assessing the association between demographic and socioeconomic characteristics and the status of chronic illness in urban households. The mean age of household members is positively associated with the prevalence of chronic illness, implying that the higher the mean age of household members, the more likely they are to suffer from chronic illnesses. A one-year increase in the average age increases the probability of chronic illness by 1.2 percentage points, which is highly significant. The female proportion in the household has a negative, though statistically insignificant, effect. However, if the share of dependent members increases, the likelihood of chronic illness in the household rises by approximately 4.9 percentage points, which is statistically significant. There is a statistically significant ($p < 0.1$) and negative effect of the household head's marital status on chronic illness, indicating that households with a currently married head are approximately 3.7 percentage points less likely to report chronic diseases than households heads in the reference category, including never married, widowed, divorced, or separated. The literacy status of household members is positively linked with chronic illness, and the coefficient of literacy is statistically significant at the 5 percent level ($p < 0.05$). The proportion of earners in the household has a strong negative relationship with chronic illness. The probability of being chronically ill decreases by 29.0 percentage points with an increase in the proportion of earning members in a household, which is highly significant ($p < 0.01$). Households belonging to the higher income quantiles are more likely to report chronic illness. For example, compared to the $1^{st}$ income quantile (the lowest income group), the likelihood to report chronic illnesses rises by 3.1 percentage points for the households belonging to the $2^{nd}$ income quantile ($p < 0.1$), 4.5

percentage points in the 3rd, 6.8 percentage points in the 4th, and 9.7 percentage points in the 5th income quantile; all the coefficients are statistically significant. Detailed findings are reported in

**Table 4.3:** Probit regression model of chronic illness

| Variables | Marginal effects |
|---|---|
| Mean age of the household members | 0.012*** |
| | (0.001) |
| Proportion of dependent members in households | 0.049* |
| | (0.029) |
| Proportion of the female members in households | -0.012 |
| | (0.029) |
| Marital status of the household heads (ref: Never married/ widowed/divorced/separated) | -0.037* |
| | (0.019) |
| Proportion of literate members in households | 0.051** |
| | (0.021) |
| Proportion of earning members in households | -0.290*** |
| | (0.027) |
| **Households belonging to income quantiles (ref:1st income quantile)** | |
| 2nd income quantile | 0.031* |
| | (0.017) |
| 3rd income quantile | 0.045*** |
| | (0.017) |
| 4th income quantile | 0.068*** |
| | (0.017) |
| 5th income quantile | 0.097*** |
| | (0.017) |
| **Observations** | **7,133** |

**Note**: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

## 4.4 Interlinkages between Chronic Illness and Poverty

### 4.4.1 National Poverty Status in Bangladesh

BBS (2022) reports that around 18.4% of the population is poor, indicating nearly one in five individuals falls below the poverty line (Figure 4.11), highlighting the importance of this study for understanding how poverty is linked or associated with chronic illnesses. Moreover, it highlights the current needs of the targeted interventions for poverty reduction.

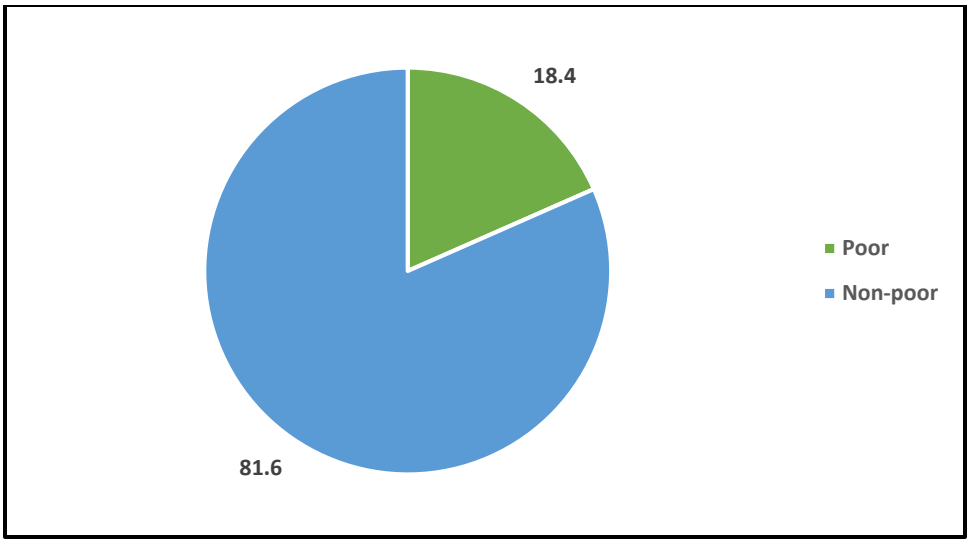


**Figure 4.11:** National poverty rate in Bangladesh (%)

### 4.4.2 Poverty Status in Urban Areas

Findings reveal that 12.41% of the urban population in the study area lives in poverty**,** indicating nearly one in eight individuals is poor (Figure 4.12).

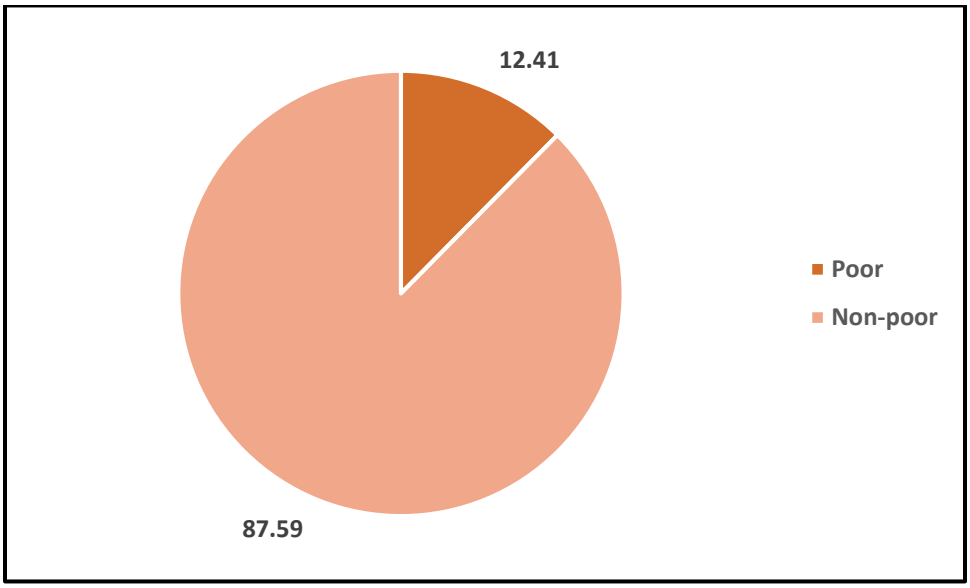


**Figure 4.12:** Poverty rate in urban areas of Bangladesh (%)

### 4.4.3 Division-wise Poverty Status in Urban Areas

The geographical variations in the rate of poverty in Bangladesh are depicted in Figure 4.13, which shows how poverty rates vary across the eight divisions in Bangladesh. The largest percentage of headcount poverty is observed in Rangpur division (23.21%) and the second highest in Barishal division (17.39 %). On the other hand, the lowest poverty is evident in Khulna division (8.47%).

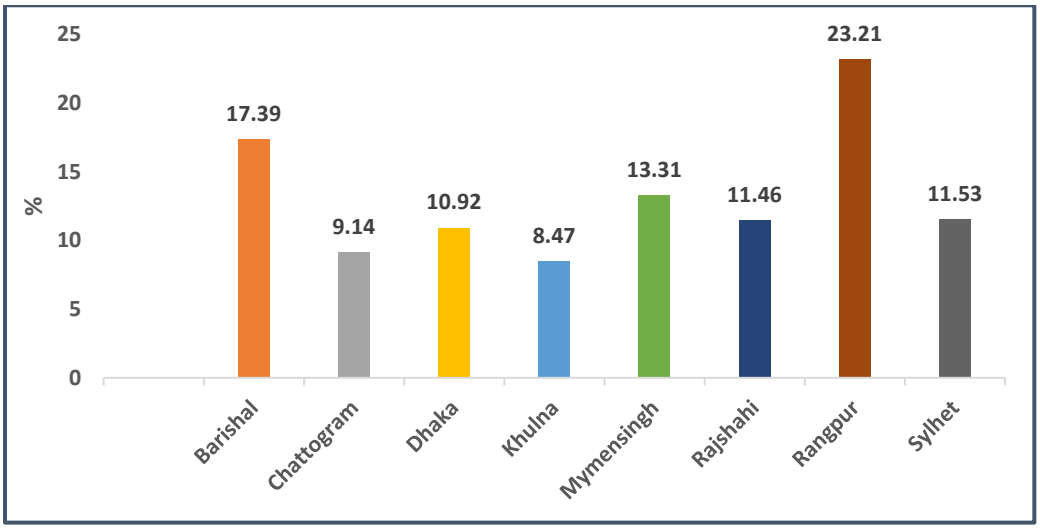


**Figure 4.13:** Division-wise poverty rate in urban areas in Bangladesh

### 4.4.4 Comparison of Demographic and Socioeconomic Characteristics by Poverty Level

Table 4.4 presents the bivariate associations between poverty and various household demographic and socioeconomic characteristics in urban settings. There is a statistically significant association [pr($X^2$) = *0.000*] between headcount poverty and the number of chronic illnesses in households. Compared to non-poor households (27.69%), a higher proportion of poor households report having no chronic illnesses (35.25%). The percentage of households with one chronic illness is higher in poor households (36.50%) than in non-poor households (33.19%).

On the other hand, the prevalence of two chronic illnesses is found to be higher in non-poor households (27.06%) than in poor households (17.29%). Non-poor households have a slightly higher proportion with more than two chronic illnesses (12.05%) compared to poor households (10.96%). The mean age of household members is significantly lower among the poor (28.4 years) compared to the non-poor (30.8 years), with a *prob(t) = 0.000*. Additionally, poor households have a higher proportion of dependent members (mean = 39.3%) than non-poor households (mean = 29.9%), and their proportional difference is statistically significant. However, based on t-statistics, this study finds that there is no significant difference in the proportion of female members in households, and the same result is evident for the marital status of the household heads. The mean proportion of literate individuals per household is lower among poor households (50.7%) compared to non-poor households (73.7%). Similarly, the mean proportion of earners is slightly lower in poor households (31.3%) compared to non-poor ones (34%), with a *prob(t) = 0.000*.

A strong and significant association is found between income quantiles and poverty. It is around 4.41 percent of poor households belong to the highest income quantile ($5^{th}$ quantile), but the bulk, i.e., 40.23% are concentrated in the lowest ($1^{st}$ income quantile). Detailed findings are reported in Table 4.4.

**Table 4. 4:** Bivariate analyses of household-level selected demographic and socioeconomic characteristics and poverty status in urban areas using the chi-square test and t-test

| Variables | Poor (n=885) Mean (se)/n (%) | Non-poor (n=6,248) Mean (se)/n (%) | Total (n=7,133) | P-value |
|---|---|---|---|---|
| **Chronic illness, n (%)** | | | | |
| Households without chronic illness | 312 (35.25) | 1,730 (27.69) | 2,04 (28.63) | |
| Households with one chronic illness | 323 (36.50) | 2,074(33.19) | 2,397(33.60) | 0.000 |
| Households with two chronic illnesses | 153(17.29) | 1,691(27.06) | 1,844(25.85) | |
| Households with more than two chronic illnesses | 97 (10.96) | 753(12.05) | 850 (11.92) | |
| Mean age of household members (in years), mean (se) | 28.41 (0.38) | 30.83 (0.14) | 30.53 (0.13) | 0.000 |
| Proportion of dependent members in households, mean (se) | 0.39 (0.01) | 0.30 (0.00) | 0.31 (0.00) | 0.000 |
| Proportion of the female members in households, mean(se) | 0.51 (0.01) | 0.50 (0.00) | 0.50 (0.00) | 0.14 |
| **Marital status of HH heads, n (%)** | | | | |
| Married | 806 (91.07) | 5,689 (91.05) | 6,495 (91.06) | 0.98 |
| Never married/ widowed /divorced/separated | 79 (8.93) | 559 (8.95) | 638 (8.94) | |
| Mean proportion of literate persons in households, mean (se) | 0.51 (0.01) | 0.74 (0.00) | 0.71 (0.00) | 0.000 |
| Mean proportion of earners in households, mean (se) | 0.31 (0.01) | 0.34(.00) | 0.34 (0.00) | 0.000 |
| **Income quantiles, n (%)** | | | | |
| 1st income quantile | 356 (40.23) | 1,086 (17.38) | 1,442 (20.22) | |
| 2nd income quantile | 244 (27.57) | 1,168 (18.69) | 1,412 (19.80) | |
| 3rd income quantile | 147 (16.61) | 1,279(20.47) | 1,426 (19.99) | 0.000 |
| 4th income quantile | 99 (11.19) | 1,329(21.27) | 1,428 (20.02) | |
| 5th income quantile | 39 (4.41) | 1,386(22.18) | 1,425 (19.98) | |
| **n** | **885** | **6,248** | **7,133** | |

### 4.4.5 OOP Health Expenditure

Households with chronic illness spend significantly more on healthcare, reducing disposable income and increasing the likelihood of falling below the poverty line. This study finds that around 70% of urban households have OOP payments regarding chronic diseases (Table 4.5). Households with chronic illness incur significantly higher out-of-pocket (OOP) healthcare expenditures compared to those without, and on average, households with chronic illness spend BDT 2,980 in urban areas and BDT 2,429 in rural areas (Table 4.6), indicating that chronic diseases substantially increase OOPE in urban dwellers in Bangladesh. On average, out-of-pocket (OOP) health expenses make up 6.5% of total household spending in urban areas. Nonetheless, households with chronic illnesses spend a higher percentage (7.5%) of total expenditure as OOP compared to households without any chronic illnesses, i.e., 3.5% (Table 4.7). This indicates that households with chronic diseases are bearing a heavier financial burden in urban areas. These descriptive findings support the study's hypothesis that chronic illness pushes households into poverty in the urban areas because of the higher burden of OOP expenditure resulting from chronic illnesses.

Table 4.8 presents the monthly average out-of-pocket (OOP) expenditure, monthly average income, and the corresponding OOP burden expressed in terms of percentage for five quantiles. Findings show that though the monthly average income increases by income quantile, the corresponding OOP burden decreases. This indicates that lower-income households face a higher OOP burden (21.26%) compared to the highest income households (3.96%). This consistent decline in OOP burden across income groups indicates a disproportionate financial burden on lower-income households, highlighting the regressive nature of out-of-pocket expenditures.

**Table 4.5:** Percentage of households that reported healthcare expenditure in the 30 days preceding the census.

| Variables | % |
|---|---|
| Percentage of households that reported any health expenditure (OOP expenditure) | 92.61 |
| Percentage of households that reported any OOP expenditure for chronic illness | 70.08 |

**Table 4.6:** The monthly average out-of-pocket payments of a household, across rural and urban areas

| Variable | Urban | Rural | Overall |
|---|---|---|---|
| Monthly average OOP healthcare of a household with chronic illness (BDT) | 2,980 | 2,429 | 2,701 |
| OOP healthcare of a household without chronic illness (BDT) | 1,002 | 945 | 974 |
| **Total (BDT)** | **2,503** | **2,098** | **2,301** |

**Table 4.7:** Share of OOP health expenditure in the total expenditure of a household in urban areas

| Variable | % |
|---|---|
| Share of OOP health Expenditure in total expenditure (households that reported chronic illness) | 7.5% |
| Share of OOP health Expenditure in total expenditure (households that reported no chronic illness) | 3.5% |
| Overall Share of OOP health Expenditure in total expenditure | 6.5% |

**Table 4. 8: out**-of-pocket (OOP) burden by Income quantile, among urban households

| Variable | Monthly average OOP | Monthly average income | OOP/Income×100 |
|---|---|---|---|
| 1st income quantile | 1,621 | 7,624 | 21.26% |
| 2nd income quantile | 1,762 | 15,097 | 11.67% |
| 3rd income quantile | 2261 | 22,479 | 10.06% |
| 4th income quantile | 2702 | 34,038 | 7.94% |
| 5th income quantile | 4034 | 1,01,884 | 3.96% |

**Note**: Out-Of-Pocket Burden = (OOP ÷ Income) × 100

### 4.4.6. Catastrophic Healthcare Expenditure

Findings reported in Table 4.9 reveal that 30.62% of households have expended more than 10% of their total consumption on healthcare, and 15.91% have spent more than 40% of their capacity to pay, indicating severe financial hardship. These results demonstrate the dearth of financial safety in the health system, with a significant portion of the population are at risk of becoming impoverished due to out-of-pocket medical costs.

Table 4.10 reports that poor household faces higher CHE than rich households. At the 10% level, catastrophic health expenditures affect 35.99% of the poorest urban households, while it is 23.79% among the richest. Findings reveal that the proportion of households facing CHE increases as we move from the poorest to the richest quantiles, reflecting a clear disparity in financial burden across income levels.

Table 4.11 reveals that catastrophic health expenditure (CHE) is high among urban households that are suffering from at least one chronic illness. At the 10% threshold level of total expenditure, over 70% of CHE incidents occur, and over 50% at the 40% threshold level of non-food expenditure. This indicates that chronic illnesses significantly increase financial vulnerability by driving up CHE.

**Table 4. 9:** Catastrophic health expenditure among urban households

| Variable | % |
|---|---|
| Catastrophic health expenditure (10% threshold) | 30.62 |
| Catastrophic health expenditure (40% threshold) | 15.91 |

**Table 4. 10:** Catastrophic Health Expenditure (CHE) among urban households by income quantiles

| Variable | 10% threshold | 40% threshold |
|---|---|---|
| 1st income quantile | 35.99 | 21.22 |
| 2nd income quantile | 31.30 | 18.13 |
| 3rd income quantile | 31.21 | 17.04 |
| 4th income quantile | 30.74 | 13.80 |
| 5th income quantile | 23.79 | 9.33 |

**Table 4. 11:** CHE among urban households by chronic illness status

| Variable | CHE 10% threshold level (%) | CHE 40% threshold level (%) |
|---|---|---|
| Households reported at least one chronic illness | 70.51 | 50.57 |
| Households reported no chronic illness | 29.49 | 49.43 |
| **Total** | **100** | **100** |

## 4.4.7. Effect of Chronic Illness on Poverty in Urban Areas

### 4.4.7.1 Impoverishment Resulting from OOP Healthcare Expenditure

Table 4.12 displays the change in the poverty headcount as a result of OOP spending. The overall poverty headcount ($H_{pov}^{pre}$) is 12.41%, considering total household consumption expenditure with OOP spending, and post-payment (after deduction of expenses for health care from total household consumption expenditure), headcount poverty($H_{pov}^{post}$) stands at 15.18 %, implying a rise in poverty headcount by 2.77% points. Therefore, 2.77% of non-poor households fell into poverty due to OOP payments for healthcare in urban areas, corresponding to 4.6 million individuals. The impact of health care payments on impoverishment can be illustrated using a Pen's parade graph by plotting household expenditure before and after health payments against the cumulative proportion of households, ranked by their pre-payment per capita monthly consumption expenditure. A Pen's parade graph shows how health care payments push some

households below the poverty line and drive those already below it into deeper poverty. Fig 14 illustrates the impact of out-of-pocket (OOP) payments on poverty in urban areas in Bangladesh. The intersection point of the pre-payment curve with the poverty line indicates how many people were poor before households incur health care expenses. The downward shifts, or 'paint drops', from this curve reflect the decline in household spending due to health payments. The graph clearly demonstrates that medical expenses pushed many non-poor households (including higher-income households) into poverty.

Moreover, Table 4.12 also presents how chronic illness affects household impoverishment due to out-of-pocket (OOP) health expenditure. Households with at least one member suffering from a chronic illness are affected by a substantially higher impoverishment rate due to OOP health spending, at 3.40%, nearly three times higher than that of households without chronic illnesses (1.22%). Figure 14 & Figure 15 clearly reveal that numerous non-poor households (including higher-income households) with chronic illness fell below the poverty line as a result of catastrophic health expenditure for chronic illness, compared to Fig.16, which illustrates the impoverishment impact of OOP payments among the households that have no chronic illness. Thus, the findings of Table 4.12 and Figures 14, 15 & 16 prove that the impoverishment impact of OOP payments for chronic illness is much higher compared to those who face no chronic illness.

#### 4.4.7.2 Average and Normalized Poverty Gaps

Table 4.12 reports that the average monthly per capita poverty gap stands at BDT 779 and BDT 917, respectively, before and after the OOP healthcare expenditure, implying that individuals, on

average, BDT 779 below the poverty line before incurring health-related expenses and BDT 798 below the line afterward. Therefore, out-of-pocket (OOP) health expenditures increase the monthly per capita poverty gap by BDT 138.

In the Pen's parade graph, the poverty gap is represented by the area between the poverty line and the income curve (Wagstaff and van Doorslaer, 2003). The graph shows that health care expenses deepen the intensity of poverty (Figures 14, 15 & 16). It is noticeable that the impact of OOP payments for healthcare on the average poverty gap (intensity of poverty) was evidently much higher for the households that are suffering from at least one chronic illness (BDT 164), which is almost double that of households without chronic illnesses (BDT 88).

The last row of Table 4.12 displays the normalized poverty gap by chronic illness, with an overall normalized poverty gap of 3.59. It is remarkably seen that healthcare payments raise the burden for chronic illnesses, the poverty gap (normalized poverty gap) for chronic illnesses, since households that face chronic illness has greater normalized poverty gap (4.29%), which is almost double than who have no chronic illness (2.31%).

**Table 4. 12:** Impact of OOP payments on poverty by chronic illness status in urban areas in Bangladesh

| Variable | Households reported at least one chronic illness | Households reported no chronic illness | Overall urban |
|---|---|---|---|
| **Headcounts poverty (%)** | | | |
| Pre-OOP payment headcount poverty ($\boldsymbol{H_{pov}^{pre}}$) | 11.26 | 15.28 | 12.41 |
| Post-OOP payment headcount poverty ($\boldsymbol{H_{pov}^{post}}$) | 14.65 | 16.50 | 15.18 |

| | | | |
|---|---|---|---|
| Headcounts poverty of OOP(Impoverishment) ($PI^H = H_{pov}^{post} - H_{pov}^{pre}$) | 3.40 | 1.22 | 2.77 |
| **Poverty gaps (Poverty Intensity) (in BDT)** | | | |
| Poverty gap before OOP healthcare expenditure ($G_{pov}^{pre}$) | 759 | 817 | 779 |
| Poverty gap after OOP healthcare expenditure ($G_{pov}^{post}$) | 923 | 905 | 917 |
| Poverty Gap Impact or Increase in intensity of poverty: $PI^G$=( $G_{pov}^{post} - G_{pov}^{pre}$ ) | 164 | 88 | 138 |
| **Normalized Poverty Gap (%)** | | | |
| $PI^{NG}$ =$(G_{pov}^{post} - G_{pov}^{pre})/P_L$ | 4.29 | 2.31 | 3.59 |

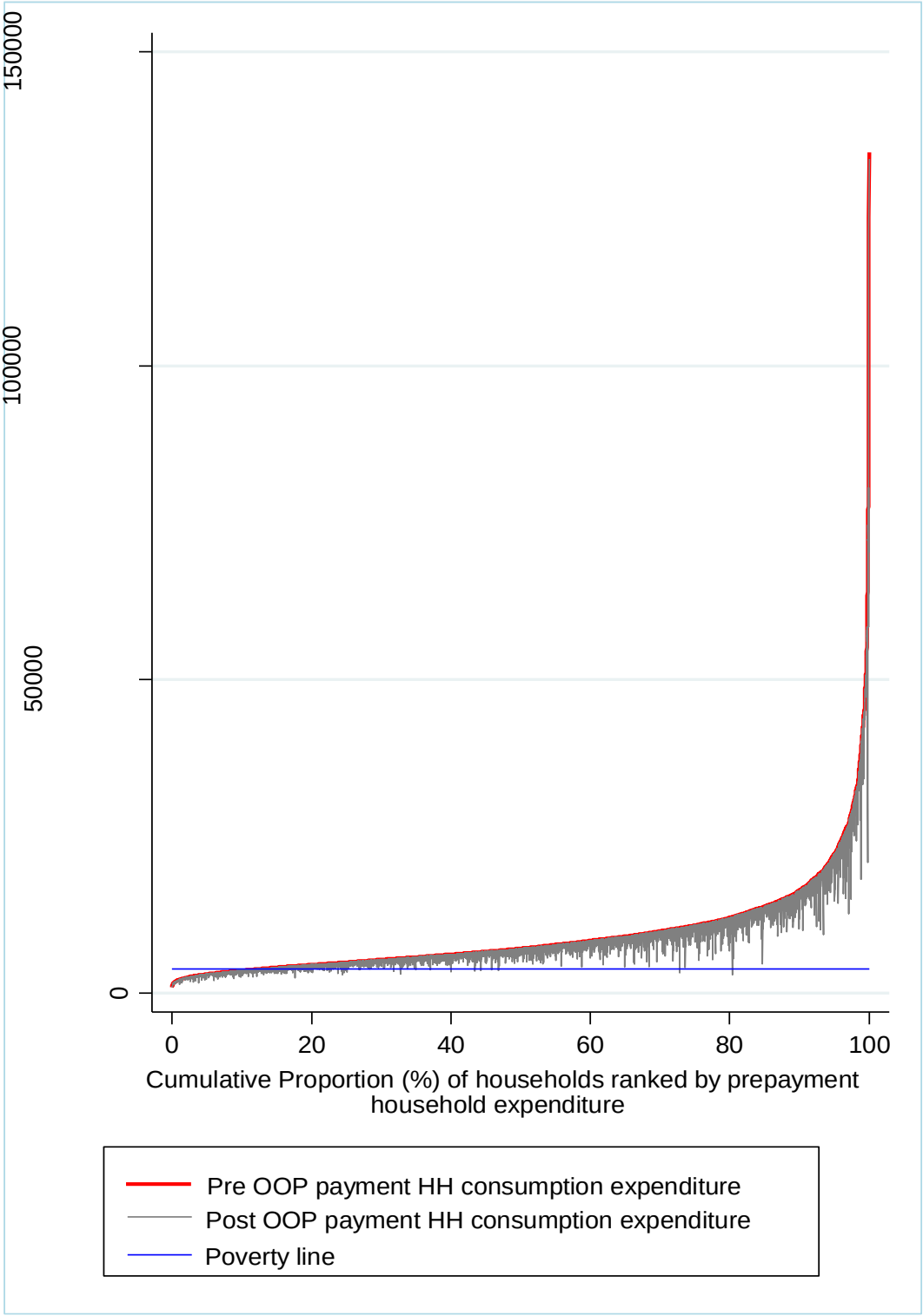


**Figure 4.14:** Pen's Parade graph showing overall poverty before and after OOP payments, based on the national poverty line

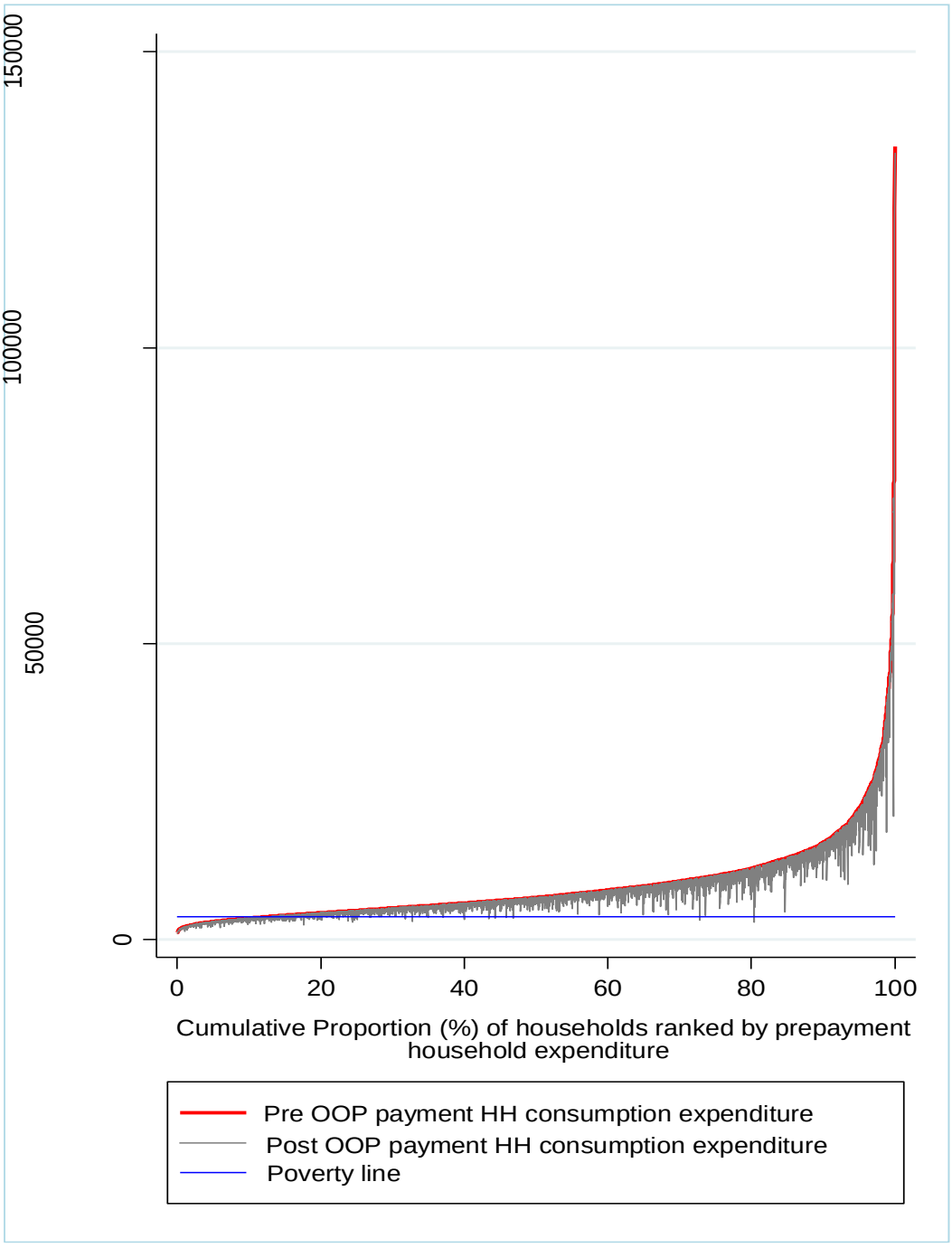


**Figure 4. 15:** Pen's Parade graph showing poverty before and after OOP payments among the households that have at least one chronic illness, based on the national poverty line

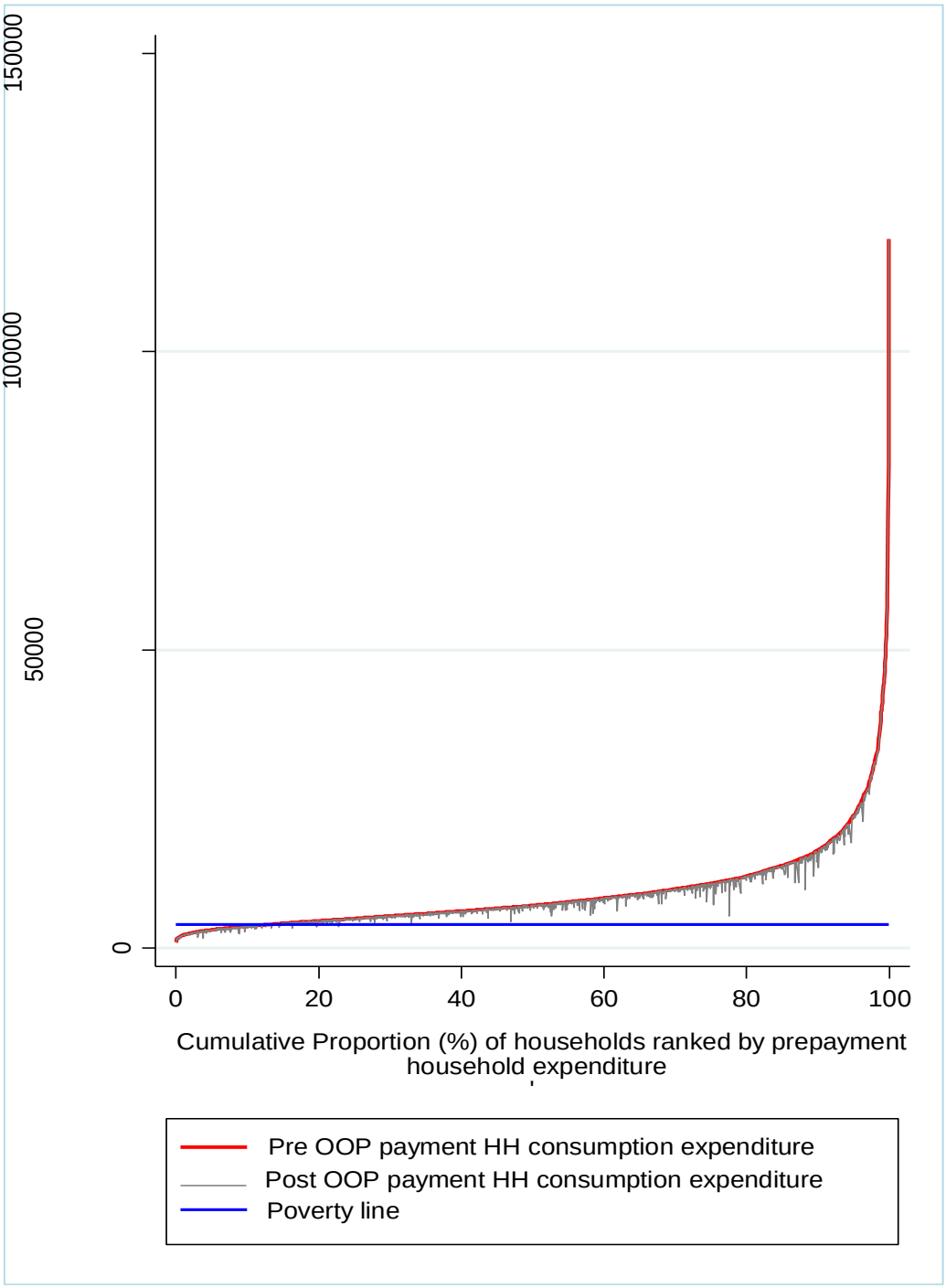


**Figure 4.16:** Pen's Parade graph showing poverty before and after OOP payments among the households that have no chronic illness, based on the national poverty line

### 4.4.8. Locational Impoverishment

Findings of Table 4.13 show that there are variations in headcount poverty across the divisions in Bangladesh, and thus, the impoverishment due to OOP payments. The most affected division is Sylhet, with poverty rising by 4 percentage points, after OOP payments, followed by Rajshahi (3.45% points) and Khulna (3.12% points) respectively. Even in the richest division like Dhaka, poverty increases by over 3 percentage points. Although the least increase in impoverishment is evident in the Rangpur division, the highest proportion of people is found to be poor.

**Table 4. 13:** Regional variations in poverty and impoverishment due to OOP in urban areas in Bangladesh.

| Division | Pre-OOP poverty (%) | Post-OOP poverty (%) | Impoverishment (%) |
|---|---|---|---|
| Barishal | 17.39 | 20.18 | 2.79 |
| Chattogram | 9.14 | 11.85 | 2.71 |
| Dhaka | 10.92 | 13.96 | 3.04 |
| Khulna | 8.47 | 11.59 | 3.12 |
| Mymensingh | 13.31 | 15.44 | 2.13 |
| Rajshahi | 11.46 | 14.91 | 3.45 |
| Rangpur | 23.21 | 25.22 | 2.01 |
| Sylhet | 11.53 | 15.53 | 4.00 |

## 4.5. Probit Regression Results

### 4.5.1 Association between Impoverishment and Chronic Illness

Table 4.14 presents the marginal effects from a probit regression model assessing the probability of household impoverishment due to out-of-pocket (OOP) healthcare expenditures resulting from chronic illness, along with a set of demographic and socio-economic characteristics, in an urban context of Bangladesh. The results are interpreted at the margin, indicating how a one-unit change in each explanatory variable affects the probability of a household falling into the category of impoverishment, holding other variables constant.

The results show that the likelihood of being impoverished is positively and strongly associated with the presence of chronic illness within a household in urban areas. Households with at least one chronic illness have a 3.5 percentage points higher probability of being impoverished due to out-of-pocket (OOP) medical expenses, compared to those without any chronic illnesses, which is statistically significant at the 1% level, indicating a strong positive association. An increase in the mean household age by one year slightly reduces the likelihood of impoverishment by 0.1 percentage points ($p<0.01$). Moreover, more dependents per family, or a higher dependency ratio, increases the probability of poverty by 1.8 percentage points ($p < 0.1$), although the household head's gender and marital status have no significant influence on impoverishment. There is a negative association between poverty and literacy, as indicated by the percentage of literate household members. A one percent increase in literacy rate reduces the probability of impoverishment by 4.6 percentage points ($p < 0.01$), implying that education might help reduce the probability of impoverishment. On the other hand, an increase in the proportion of earning members is associated with a 2.1 percentage point rise in the probability of experiencing impoverishment, though the coefficient is marginally significant.

In order to show how income is associated with impoverishment, we categorize the income into 5 quantiles, and 1$^{st}$ quantile (i.e., the poorest quantile) is treated as the reference category. This would help observe how impoverishments in other quantiles vary with the reference category. Findings reveal that impoverishments decline as we move from the poorest category to the richest category. For example, a household belonging to the 2$^{nd}$ income quantile they are less likely to be impoverished by 1.1 percentage points compared to the reference category. However, for the 5$^{th}$ income quintile, a household is less likely to be impoverished by 3.4

percentage points compared to the reference category.

**Table 4. 14:** Probit regression model of impoverishment resulting from OOP spending for chronic illness

| Variables | Marginal effects |
|---|---|
| Chronic illness | 0.035*** |
| | (0.006) |
| Mean age of the Household members | -0.001*** |
| | (0.000) |
| Proportion of the dependent members in households | 0.018* |
| | (0.010) |
| Proportion of the female members in households | -0.005 |
| | (0.011) |
| Marital status of household heads | 0.010 |
| | (0.007) |
| Proportion of literate members in households | -0.046*** |
| | (0.007) |
| Proportion of earning members in households | 0.021* |
| | (0.011) |
| **Income quantile (ref: 1st income quantile)** | |
| 2nd income quantile | -0.011* |
| | (0.007) |
| 3rd income quantile | -0.012* |
| | (0.007) |
| 4th income quantile | -0.026*** |
| | (0.006) |
| 5th income quantile | -0.034*** |
| | (0.006) |
| **Observations** | **7,133** |
| **Pseudo R2** | **0.0913** |

**Note**: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

### 4.5.2 Association between Impoverishment and Chronic Illness Categories

Table 4.15 presents the association between the impoverishment from out-of-pocket (OOP) healthcare spending and chronic illness categories, holding other demographic and socioeconomic characteristics constant. Households with one chronic illness exhibit a 2.1 percentage point rise in impoverishment ($p < 0.01$). The probability of becoming poor (impoverishment) increases with the number of chronic illnesses: households with two chronic

illnesses experience a 2.5 percentage point increase ($p < 0.01$), while those with more than two chronic illnesses experience the highest effects (i.e., 6.1 percentage points more) on impoverishment ($p < 0.01$). Findings, reported in Table 4.14 using a multivariate Probit regression model, are consistent with the findings discussed before.

**Table 4. 15:** Probit regression model of impoverishments resulting from chronic illness categories

| **Variables** | **Marginal effects** |
|---|---|
| **Chronic illness (Ref: Absence of chronic illness)** | |
| Households reported one chronic illness = 1 and 0 for otherwise | 0.021*** |
| | (0.004) |
| Households reported two chronic illnesses =1 and 0 for otherwise | 0.025*** |
| | (0.005) |
| Households reported more than two chronic illnesses = 1 and 0 for otherwise | 0.061*** |
| | ((0.010)) |
| Mean age of household members | -0.001*** |
| | (0.000) |
| Proportion of the dependent members in households | 0.018* |
| | ((0.010)) |
| Proportion of female members in households | -0.005 |
| | (0.011) |
| Marital status of household heads | 0.007 |
| | (0.007) |
| Proportion of literate members in households | -0.046*** |
| | (0.007) |
| Proportion of earning members in households | 0.024** |
| | (0.011) |
| **Income Quantile (Ref: 1st income quantile)** | |
| 2nd income quantile | -0.013* |
| | (0.007) |
| 3rd income quantile | -0.014* |
| | (0.007) |
| 4th income quantile | -0.029*** |
| | (0.007) |
| 5th income quantile | -0.037*** |
| | (0.006) |
| **Observations** | **7,133** |
| **Pseudo R2** | **0.104** |

**Note**: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

### 4.5.3 Association between Chronic Illness and Impoverishment

This section tries to examine whether impoverishment determines chronic illness. Table 4.16 shows the positive association between chronic illness and impoverishment from out-of-pocket (OOP) healthcare spending, while holding other factors, such as demographic and socioeconomic characteristics as constant. People who are impoverished because of their out-of-pocket (OOP) medical expenses are 24.2 percentage points more likely to suffer from a chronic disease, which is statistically significant even at the 1% level, indicating a very strong association.

**Table 4. 16:** Probit regression model of chronic illness resulting from impoverishment due to OOP spending

| **Variables** | **Marginal effects** |
|---|---|
| Impoverishment due to OOP payment | 0.242*** |
| | (0.038) |
| Mean age of household members | 0.012*** |
| | (0.001) |
| Proportion of the dependent members in households | 0.047 |
| | (0.029) |
| Proportion of the female members households | -0.010 |
| | (0.028) |
| Marital status of the household head | -0.039** |
| | (0.019) |
| Proportion of literate members in households | 0.060*** |
| | (0.021) |
| Proportion of earning members in households | -0.290*** |
| | (0.027) |
| Income quantile (Ref: 1st income quantile) | |
| 2nd income quantile | 0.033* |
| | (0.017) |
| 3rd income quantile | 0.047*** |
| | (0.017) |
| 4th income quantile | 0.073*** |
| | (0.017) |
| 5th income quantile | 0.103*** |
| | (0.017) |
| Observations | 7,133 |
| Pseudo R2 | 0.0784 |

**Note**: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

# CHAPTER FIVE: DISCUSSION OF THE FINDINGS

## 5.1 Introduction

This Chapter discusses the findings of the study, based on the study's research question. This present study offers valuable insights into the interrelationship between chronic illness and poverty and the demographic and socioeconomic determinants of chronic diseases among the urban population in Bangladesh. The findings highlight the widespread burden of chronic diseases, both at the individual and household levels, and reveal significant variations by demographic and socioeconomic characteristics. This Chapter critically analyzes the study's findings in the context of urban households in Bangladesh, offering insights into their policy implications. Here, a discussion is conducted in accordance with the objectives of the study. The sections that follow are organized to interpret the key findings, compare them with previous research, discuss practical implications, acknowledge limitations, and conclude the chapter.

## 5.2. Determinants of Chronic Illness

The results of the study show that the overall prevalence of chronic illness in Bangladesh is 29.43%, which is 29.17% in urban areas, and the proportion is significantly higher at the household level: 71.37% of urban households have at least one person with a chronic illness. This shows that chronic illness is not just a health problem but also a household issue that affects families' overall well-being, productivity, and financial security. A significant number of these households account for having multiple chronic conditions, with 25.9% and 11.9% suffering from two chronic illness and more than two chronic illnesses, respectively. This finding provides a good snapshot of the emerging burden of NCDs as the country is in the midst of an epidemiological transition characterized by a combined and growing burden of infectious and chronic diseases

(Ataguba et al., 2015). The overall prevalence of chronic diseases is about 21%, with 29% occurring in urban areas and 17% in rural areas (Jana & Chattopadhyay, 2022).

This study finds that the most prevalent chronic illnesses among urban households include gastric/ulcer (8.28%), high blood pressure (8.01%), diabetes (5.06%), arthritis/ rheumatism (3.96%), and chronic heart disease (3.13%). In a study in an urban area of Bangladesh, Sarker et al. (2022) find that among all chronic diseases, diabetes makes up a significant share (9.6%), followed by high or low blood pressure (5.3%).

Findings of the study reveal that each additional increase in the average age of household members increases the probability of reporting chronic illness by 1.2 percentage points. Other studies also find the estimates that are consistent with our findings, implying that there is a highly significant positive correlation between chronic illnesses and aging, including in Bangladesh (Aryal et al., 2015; Maimela et al., 2016; Kpessa-White and Tsekpo,2020; Rowshon,2012; Kabir et al.,2013; Vennu et al.,2020; Jana & Chattopadhyay, 2022). World Health Organization (WHO, 2020) reports that one of the major risk factors for chronic illnesses is aging, especially in low- and middle-income (LMIC) nations. Another study conducted in India by Singh et al. (2019) found that elderly individuals are significantly more likely to suffer from chronic conditions, echoing the 77.14% prevalence of chronic illness among older adults.

Our study reveals that in urban areas, the proportion of dependent members in a household is significantly associated with higher chronic illness risk. The regression result finds that the association between female proportion in a household and chronic illness is insignificant but descriptive analysis shows that the prevalence of chronic illness is higher among female (31.69%)

compared to male (26.65%), which is in line with the findings of some other studies conducted in different countries including Bangladesh (Sultana et al., 2017; Maimela et al., 2016; Singh et al., 2019; Peek and Drum, 2014). According to earlier research, women are more physiologically susceptible and engage in less physical activity (Ekpenyong et al., 2012; Parry et al., 2011). Other contributing factors may include traditional social values, limited access to healthcare facilities, and a shortage of healthcare professionals, all of which have reduced women's access to NCD prevention and treatment (Zahangir et al., 2017). Nevertheless, the results of this study are in conflict with earlier studies that discovered that men are more likely than women to suffer from NCDs in urban areas (Jana & Chattopadhyay, 2022, and Amoateng et al., 2021). Biswas et al. (2019) have shown similar findings from a Bangladeshi perspective.

The current result shows that widowed, divorced, or separated members are more (68.78%) likely to suffer from chronic illness, which is in line with a previous study in Bangladesh conducted by Al-Zubayer et al. (2021). Furthermore, a strong positive correlation is found between the education of the members and chronic illness. Both higher education and pre-schooling may be linked to increased risk of chronic illness, maybe as a result of differing lifestyle choices or reporting characteristics. Higher literacy in the household is linked to a 5.1 percentage point increase in the risk of chronic illness. Higher-educated members have a higher prevalence of chronic illness, as shown in a study in India conducted by Jana and Chattopadhyay (2022). This is because members with less education who work for themselves and in agriculture may engage in less vigorous physical exercise (Gregorio & Lee, 2002). Inversely, another study in India finds that India has a higher prevalence of chronic illness among less educated individuals (Singh and Singh et al., 2019).

In urban Bangladesh, this study finds that unemployed people experience a slightly higher prevalence of chronic illness (32.33%) compared to those who are employed (30.01%). The probability of being chronically ill decreases by 29.0 percentage points with an increase in the proportion of earning members in a household, which is highly significant ($p < 0.01$). This strong negative association supports previous studies showing that unemployed individuals have a higher risk of developing chronic illness (Amoateng et al., 2021; Chung et al., 2015). Similarly, in a study in the United States, Vennu et al. (2020) show that unemployed members in the households have a higher risk of developing COPD, arthritis, cancer, and heart attacks than employed individuals. Prevalence rates may be lower in households with a larger percentage of earnings because they may be better able to afford healthcare or adopt healthier habits.

This study shows a significant association of income with chronic illness. The prevalence and risk of chronic illness increase progressively with income; Compared to the first income quantile (lowest income group), the probability rises by 3.1 percentage points, in the second income quantile, 4.5 in the third, 6.8 in the fourth, and 9.7 in the fifth (highest income group). The same result was found in a study conducted in Bangladesh, which indicates the high prevalence of selected NCDs among the urban rich (Biswas et al., 2016). Studies conducted in India show that a significantly higher probability of having chronic diseases is observed among the wealthy (Singh and Singh et al., 2019; Jana & Chattopadhyay, 2022). Their easygoing and modern lifestyle may be the cause of the study's findings (Biswas et al., 2019; Camacho et al., 2020). However, this outcome contradicts the results of a systematic study conducted in 41 low-, middle-, and high-income countries (HIC), which found that a lower socioeconomic status raised the risk of non-communicable diseases and death caused by these NCDs (Sommer et al., 2015).

In descriptive analysis, this study shows that the prevalence of chronic illness varies significantly across the eight administrative divisions of Bangladesh: Chattogram, Barishal, and Khulna have the highest chronic illness prevalence, while Dhaka and Rangpur reported the lowest. Prior studies conducted in Bangladesh have discovered that divisions have significant variations in the prevalence of non-communicable diseases (Hoque et al., 2014; Zahangir et al., 2017). The most likely explanation could be the disparity in healthcare access, geographic location, and knowledge of chronic illness, which differs from division to division.

## 5.3. Interlinkages between Chronic Illness and Poverty

The present study highlights the significant financial burden of out-of-pocket (OOP) healthcare expenditures on households with chronic illnesses in urban areas in Bangladesh. We find that 70.08% of urban households make OOP payments for chronic diseases, and these households' monthly average OOP healthcare expenditure stands at BDT 2,980, which is significantly higher than in rural areas (BDT 2,429). Similar trends are confirmed in a study showing that living in an urban area and having a chronic condition are consistently the strongest indicators of high OOP expenditure, with rural families paying roughly 7% less than urban ones (Molla et al., 2017). Aligns with our findings, a substantially higher OOP payment in chronic illness is found in urban areas in Bangladesh (Rahman et al., 2020). They have shown that chronic illness is one of the determinants of high OOP and CHE (Rahman et al, 2013). Moreover, our results show that the overall share of OOP health expenditure in total expenditure is 6.5%, where a higher proportion of total household expenditure is dedicated to healthcare among households with chronic conditions (7.5%) compared to those without (3.5%). Similar to this result, another study in Bangladesh finds that households with NCDs spend a larger percentage of their income on

healthcare compared to households without NCDs (Datta et al., 2018). Sarkar et al. (2022) discovered that the overall OOP expenditure is 7.7% of the total monthly household income of Bangladeshi urban households (Sarkar et al., 2022). This indicates that the financial burden of chronic illness is more severe in urban areas, most likely as a result of a larger reliance on private services (Adams et al., 2020). The growing prevalence of NCDs exposes households in developing countries to increased OOP spending on medical treatment, raising the risk of catastrophic medical expenditure and impoverishment (Saksena, Hsu & Evans, 2014). A worker with a chronic illness spent 8.2% more on OOP than a person with a communicable illness, and this is because of the high treatment expenses for the chronic condition (Rahman et al., 2013).

In the majority of low- and middle-income nations, out-of-pocket expenses are the primary and major method of healthcare payment. Bangladesh is one of those countries with an extremely high rate of OOP health expenditure. Bangladesh now has the second-highest OOP spending share in South Asia, after Afghanistan, with a rise from 68% to 72.5% in overall health expenditures between 2010 and 2022, while Government domestic health spending (% health spending) reduces from 20.6% to 6.5% during the same period and remains <1% of the GDP throughout the period (BNHA). Consequently, a large number of households incur catastrophic healthcare costs every year. According to numerous studies, households in Bangladesh experience extreme financial difficulty and even poverty (impoverishment) as a result of their reliance on OOP payments (Khan et al., 2017; Hamid et al., 2014; Wagstaff & Doorslaer, 2003). This study reveals that lower-income households face a higher OOP burden (21.26%) compared to the highest income households (3.96%). This consistent decline in OOP burden across income

groups indicates a disproportionate financial burden on lower-income households, highlighting the regressive nature of out-of-pocket expenditures.

This study finds that the CHE incidence among urban households is alarmingly high, with 30.62% at a 10% threshold of total household consumption expenditure and 15.91% at a 40% threshold of non-food consumption expenditure. This finding marks a significant increase from the findings by Khan et al. (2017) using HIES 2010, where it was 8.6% at a 10% of total household spending as the threshold level and 4.4% at a 40% threshold of non-food expenditure in urban areas. Another study by Rahman et al (2013) finds that in 2011, at a 40% non-food spending as a threshold level, around 9% urban households in Bangladesh face CHE. Our study reveals that catastrophic health expenditure (CHE) is high among urban households that are suffering from at least one chronic illness, indicating that chronic illnesses significantly increase financial vulnerability by driving up CHE. This study aligns with the literature, which indicates that chronic illnesses significantly increase the risk of catastrophic health expenditure (CHE) and impoverishment in Bangladesh (Ahmed et al., 2022; Rahman et al, 2013; Rahman et al., 2020; Rahman et al., 2013; Datta et al., 2018; Khan et al, 2017). Rahman et al. (2013) show that chronic illness is one of the determinants of high OOP and CHE in urban areas. Begum and Hamid (2021) reveal that catastrophic healthcare expenditure and NCDs are deteriorating the poverty level in Bangladesh. They also pronounce that Bangladesh's poverty rate is getting worse due to catastrophic healthcare costs and non-communicable diseases (NCDs).

A recent study in Bangladesh finds that chronic illness is a significant contributor to high catastrophic expenditures (Rahman et al., 2020). The likelihood of experiencing CHE is 4.7 times

higher for families with at least one member who uses services for a chronic illness than for homes without any such member (Ahmed et al., 2022). Households with NCDs are 6.7 percentage points more likely to experience catastrophic medical expenses than households without any reported diseases (Datta et al., 2018). In some Asian countries, households with older people and one member who has a chronic disease are at a higher risk of experiencing CHE (Ghimire et al., 2018; Wang & Chen, 2015). Even in the 15 richest European nations, households with elderly members suffering from chronic illnesses experience higher rates of CHE (Arsenijevic et al., 2016).

In a recent study, by using the Bangladesh Household Income and Expenditure Survey 2016 data, Ahmed et al. (2022) find that the incidence of CHE is expected to be 24.6% when 10% threshold level of total household spending is used, and 10.9% when the threshold level 40% of non-food consumption is used (Ahmed et al., 2022). Khan et al. (2017) estimate that the incidence of CHE by using HIES 2010, with 10% of total household spending as the threshold level, is 14.2% of households nationally. Another study by Van Doorslaer et al. (2007) using data from HIES 2000 shows that 15.6% and 7.1% of households in Bangladesh face CHE, considering 10% of total expenditure and 40% non-food expenditure threshold, respectively. In Asia, Bangladesh is the most affected country with the highest rate of CHE (Van Doorslaer et al., 2007).

Our study reveals that catastrophic health expenditure (CHE) is high among urban households that are suffering from at least one chronic illness, indicating that chronic illnesses significantly increase financial vulnerability by driving up CHE. The higher CHE rates in the lowest income quintiles (21.22% at a 40% threshold) compared to the richest (9.33%). Various studies in Bangladesh show that CHE is more concentrated among the poor (Sarkar et al., 2021; Ahmed et

al., 2022; Khan et al., 2017; Rahman et al., 2013; Hamid et al., 2014; Xu et al., 2007). Rahman et al. (2013) discovered that in the urban area in Bangladesh, CHE is four times worse for the poorest households than for the wealthiest. The poorest households have lower spending capacity, and a significant amount of their overall spending is made up of OOP purchases. As a result, without any safety net program to pay for medical bills, they are more likely to have CHE (Haider & Mahamud, 2017). Catastrophic health expenditure from high out-of-pocket (OOP) payments remains a substantial burden for urban households, disproportionately affecting poorer and vulnerable groups and pushing many into poverty.

Our study shows that chronic illness pushes households into poverty by measuring and comparing the impact of OOP healthcare expenditure on poverty (both headcount poverty and poverty gap) before and after OOP healthcare expenditure. The findings of this study reveal that spending on healthcare (measured as OOP healthcare expenditure) increases the headcount poverty from 12.41% to 15.18%, and pushes an additional 2.77% of urban households into poverty. That means 2.77% of non-poor households fell into poverty due to OOP payments for health care in urban areas, which corresponds to 4.6 million individuals. Consistent with previous research. Our analysis shows that higher OOP healthcare expenditure notably increases poverty (Doorslaer et al., 2006; Hamid et al., 2014; Khan et al., 2017; Ahmed et al., 2022).In a study, Van Doorslaer et al. (2006) observe that in low- and middle-income countries, 2.7% of the population fell below the poverty line due to OOP payments for healthcare, and 3.8% in Bangladesh, which is the highest among all 11 Asian countries studied. It is found that 3.4% of households fell into poverty due to OOP spending for healthcare, and that non-communicable diseases are the

principal reason for the effect (Hamid et al., 2014). Using the CBN method, Khan et al. (2017) calculate that OOP payments in 2010 caused a 3.5% difference in the poverty headcount (5.1 million people). In 2016, OOP payments pushed around 4.50% of the population (8.61 million people), below the national poverty line (Ahmed et al., 2022). About 13 percent of households annually fall into poverty due to OOP outlays for healthcare, and NCDs are one of the major causes of exacerbating the poverty level in Bangladesh (Begum & Hamid, 2021).

Notably, we find that households with at least one member suffering from a chronic illness are affected by a substantially higher impoverishment rate due to OOP health spending, at 3.40%, nearly three times higher than that of households without chronic illnesses (1.22%). So, it is clear that the headcount impoverishment impact of OOP payments is huge for chronic illness, and chronic illness pushes the households into poverty, i.e., non-poor households become poor due to having chronic illness. In line with our findings, Begum and Hamid (2021) and Hamid et al. (2014), showed that the impoverishment impact for chronic illnesses was higher than for acute illnesses in rural areas in Bangladesh. Another study shows that NCD-related household medical expenditure is associated with experiencing financial distress and aggravating poverty in Bangladesh (Datta et al., 2018).

We find that out-of-pocket (OOP) health expenditures increase the monthly per capita poverty gap by BDT 138, and the normalized poverty gap is 3.59%, in urban areas. It is noticeable that the impact of OOP payments for healthcare on the poverty gap (BDT 164) and the normalized poverty gap is 4.29%, which is much higher for chronic illnesses or much higher for households

that are suffering from at least one chronic illness (BDT 164), than households without chronic illness (BDT 88 and 2.31%), respectively. The impact is almost double for chronic illness compared to no chronic illness, in both the poverty gap and the normalized poverty gap. Like our study, Begum and Hamid (2021) and Hamid et al (2014) found that the impact (both the poverty gap and the normalized poverty gap) for chronic illness is higher than for acute illness in rural Bangladesh. Therefore, it is clear that the impact (headcount poverty, poverty gap, and normalized poverty gap) is significantly higher for chronic illness. Thus, because of chronic illness, a non-poor household becomes poor, and a poor household becomes poorer.

The findings from the Probit regression models reveal a strong, interlinked relationship between chronic illness and poverty due to out-of-pocket (OOP) healthcare spending in urban Bangladesh. This study shows that households with at least one member with a chronic illness are 3.5 percentage points more likely to fall into poverty ($p<0.01$) compared with those households without any members experiencing chronic illnesses. This result is aligned with the study conducted in Bangladesh, which finds that households with at least one member with a chronic illness have 2.3 times higher risk of impoverishment compared with those households that report no chronic illness (Ahmed et al., 2022). This finding is consistent with prior research in low- and middle-income countries, including Bangladesh, which shows that chronic illnesses significantly raise healthcare costs, often driving already vulnerable households into poverty (Rahman et al., 2018; Wagstaff et al., 2018). Our findings also reveal that this risk of becoming impoverished increases with the number of chronic conditions, rising to 0.061 ($p<0.01$) for households with more than two chronic illnesses, suggesting that households with chronic illness bear a heavier

financial burden. Households with a higher proportion of dependent individuals increased risk of impoverishment, aligning with Van Doorslaer et al. (2006) and Ahmed et al. (2022). While the average age of household members shows a small negative association with impoverishment—possibly due to stable income sources like pensions—female composition and marital status show no significant effects, similar to findings by Kruk et al. (2009). Higher household literacy significantly reduces the likelihood of impoverishment. Surprisingly, more earning members increase the risk, likely due to low or unstable incomes, as noted by Flores et al. (2008). Significant regional disparities are observed in the effects of OOP healthcare spending on poverty. A strong income gradient exists—wealthier households are much less likely to be impoverished by healthcare costs.

Our analysis finds a strong association between impoverishment and chronic illness in urban Bangladesh. Households that become poor due to medical expenses are 24.2% more likely to report a chronic illness, which indicates that poverty enhances the risk of chronic illness. The findings echo with studies showing that impoverished households in urban Bangladesh often experience poor living conditions, limited access to preventive healthcare, and unhealthy lifestyles, which increase susceptibility to chronic diseases such as diabetes, hypertension, and cardiovascular disorders (Ahmed et al., 2020; Islam & Biswas, 2014). According to a systematic analysis that focuses on low- and middle-income countries (LMICs), those with lower socioeconomic position are more likely to suffer from non-communicable diseases (NCDs) such as cancer, diabetes, heart attacks, and stroke (Johns Hopkins Public Health, 2018). This analysis

also shows that poorer groups have higher rates of NCD risk factors such as obesity, alcohol and cigarette use, and hypertension.

This study has several limitations. The study relies on data obtained from a national household survey, which is subject to recall and reporting bias, among other problems. We could not provide evidence of a causal relationship because of the cross-sectional nature of this survey. Similar to earlier studies, the data contain a large number of zero OOP healthcare payments (Sarker et al., 2021; Mahumud et al., 2017), which obstructed the calculation accurate value of OOP payments. Future research may deal with the issues. Despite these limitations, study findings can be generalized to the national level because the study uses data from a nationally representative household income and expenditure of Bangladesh.

# CHAPTER SIX: CONCLUSION AND POLICY IMPLICATIONS

## 6.1 Conclusion

Our study reveals that catastrophic health expenditure (CHE) is higher in households that are suffering from at least one chronic illness than in those that have no chronic illness. More importantly, it is also higher in the lowest income group, implying the higher burdens on the poorest segment of the urban population. Our study observes that about 2.77 percent of households fall into poverty due to OOP healthcare expenditure in urban areas in Bangladesh. Therefore, OOP for healthcare expenditure induces households fall into poverty. Findings also reveal that households with at least one member suffering from a chronic illness are 3.5 percentage points more likely to fall into poverty ($p<0.01$) compared with those households without any members experiencing chronic illness. This implies that OOP healthcare costs, driven by chronic illness, induce households fall into poverty in urban areas of Bangladesh. on the contrary, this study reveals that impoverishment also determines chronic illnesses, as we find that the impoverished households are 24.2 percentage points more likely to have a chronic illness. The estimate is highly statistically significant ($p<0.01$), and thus, it is evident that poverty enhances the risk of chronic disease. Thus, the findings from the Probit regression models reveal strong Interlinkages between chronic illness and poverty due to out-of-pocket (OOP) healthcare spending in urban Bangladesh.

In addition, this study has identified that there exists a significant relationship between demographic and socioeconomic characteristics and chronic conditions of the households located in urban areas of Bangladesh. The mean age of household members, the share of dependent members, households with never married, widowed, divorced, or separated, the proportion of literate members, and households in higher income quantiles are positively

associated with the presence of chronic illness, which are statistically significant. Whereas the proportion of earners in the household has a strong negative relationship, the female proportion in the household has no significant relationship with chronic illness.

The results prove that chronic illness pushes households into poverty by imposing a financial burden on households, particularly for the low-income households and the poor (impoverished due to OOP healthcare expenditure), who are more vulnerable to chronic illness. Therefore, more attention should be paid to preventing and controlling chronic diseases to avoid mortality and unexpected medical expenses due to chronic illness. Since chronic illnesses are controllable. By improving people's knowledge, attitudes, beliefs, and abilities, it is possible to lessen the burden of chronic illness. An effective risk pooling mechanism might reduce household financial burden related to illnesses. Pre-payment mechanisms, like social health insurance, which are often recommended by international organizations (e.g., the WHO and the World Bank), tax funding, community-based health insurance, and more. For having poverty-reducing effects, it is important to strengthen urban social protection. It is essential to take urban health protection schemes that target low-income urban populations to ensure that healthcare services are accessible and affordable, especially for chronic illnesses, in line with the Bangladesh National Urban Health Strategy. There are certain insights to be learned from this Bangladesh case study that can also be applied to other developing nations to lower the prevalence of chronic illnesses and, consequently, the risk of poverty, particularly in urban areas.

# REFERENCES

Adams, A. M., Islam, R., Yusuf, S. S., Panasci, A., & Crowell, N. (2020). Healthcare seeking for chronic illness among adult slum dwellers in Bangladesh: A descriptive cross-sectional study in two urban settings. *PloS one*, *15*(6), e0233635. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0233635

Afsana, K., & Wahid, S. S. (2013). Health care for poor people in the urban slums of Bangladesh. *The Lancet*, *382*(9910),2049-2051. Available:https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(13)62295-3/abstract

Afshar, S., Roderick, P. J., Kowal, P., Dimitrov, B. D., & Hill, A. G. (2015). Multimorbidity and the inequalities of global ageing: a cross-sectional study of 28 countries using the World Health Surveys. *BMC public health*, *15*, 1-10.available: https://link.springer.com/article/10.1186/s12889-015-2008-7

Agborsangaya, C. B., Lau, D., Lahtinen, M., Cooke, T., & Johnson, J. A. (2012). Multimorbidity prevalence and patterns across socioeconomic determinants: a cross-sectional survey. *BMC public health*, *12*, 1-8.Available: https://link.springer.com/article/10.1186/1471-2458-12-201

Ahmed, S. M., Tomson, G., Petzold, M., & Kabir, Z. N. (2005). Socioeconomic status overrides age and gender in determining health-seeking behaviour in rural Bangladesh. *Bulletin of the world health organization*, *83*, 109-117.Available: https://www.scielosp.org/article/ssm/content/raw/?resource_ssm_path=/media/assets/bwho/v83n2/v83n2a10.pdf

Ahmed, S., Ahmed, M. W., Hasan, M. Z., Mehdi, G. G., Islam, Z., Rehnberg, C., ... & Khan, J. A. (2022). Assessing the incidence of catastrophic health expenditure and impoverishment from out-of-pocket payments and their determinants in Bangladesh: evidence from the nationwide Household Income and Expenditure Survey 2016. *International health*, *14*(1), 84-96. Available: https://academic.oup.com/inthealth/article/14/1/84/6213228

Alaba, O., & Chola, L. (2013). The social determinants of multimorbidity in South Africa. *International journal for equity in health*, *12*, 1-10.Available: https://link.springer.com/article/10.1186/1475-9276-12-63

Allender, S., Lacey, B., Webster, P., Rayner, M., Deepa, M., Scarborough, P., ... & Mohan, V. (2010). Level of urbanization and noncommunicable disease risk factors in Tamil Nadu, India. *Bulletin of the world Health Organization*, *88*(4), 297-304.available: https://www.scielosp.org/pdf/bwho/v88n4/a16v88n4.pdf

Allotey, P., Reidpath, D. D., Yasin, S., Chan, C. K., & Aikins, A. D. G. (2011). Rethinking health-care systems: a focus on chronicity. *The Lancet*, *377*(9764), 450-451. Available:https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(10)61856-9/abstract?rss=yes&_eventId=login

Almalki, Z. S., Karami, N. A., Almsoudi, I. A., Alhasoun, R. K., Mahdi, A. T., Alabsi, E. A., ... & Alotaib, T. M. (2018). Patient-centered medical home care access among adults with chronic conditions: National Estimates from the medical expenditure panel survey. *BMC Health Services Research*, *18*, 1-11. Available: https://link.springer.com/content/pdf/10.1186/s12913-018-3554-3.pdf

Alwan, A. (2011). *Global status report on noncommunicable diseases 2010* (pp. 176-pp).Available: https://www.cabidigitallibrary.org/doi/full/10.5555/20113168808

Al-Zubayer, M. A., Ahammed, B., Sarder, M. A., Kundu, S., Majumder, U. K., & Islam, S. M. S. (2021). Double and triple burden of non-communicable diseases and its determinants among adults in Bangladesh: Evidence from a recent demographic and health survey. *International Journal of Clinical Practice*, *75*(10), e14613.Available: https://onlinelibrary.wiley.com/doi/abs/10.1111/ijcp.14613

Amoateng, A. Y., Biney, E., & Ewemooje, O. S. (2021). Social determinants of chronic ill-health in contemporary South Africa: A social disadvantage approach. *The Social Science Journal*, 1-15.available: https://www.tandfonline.com/doi/abs/10.1080/03623319.2020.1848339

Anand, K., Shah, B., Yadav, K., Singh, R., Mathur, P., Paul, E., & Kapoor, S. K. (2007). Are the urban poor vulnerable to non-communicable diseases? A survey of risk factors for non-communicable diseases in urban slums of Faridabad. *National Medical Journal of India*, *20*(3), 115.Available: https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=1eb566201efa635d0f75835c83525af4195f3d4c

Andrade, L. H., Benseñor, I. M., Viana, M. C., Andreoni, S., & Wang, Y. P. (2010). Clustering of psychiatric and somatic illnesses in the general population: multimorbidity and socioeconomic correlates. *Brazilian Journal of Medical and Biological Research*, *43*, 483-491.Available: https://www.scielo.br/j/bjmbr/a/MKQZNrY7YbRDbZRKNCZwhBm/?lang=en&format=html

Angeles, G., Ahsan, K. Z., Streatfield, P. K., El Arifeen, S., & Jamil, K. (2019). Reducing inequity in urban health: have the intra-urban differentials in reproductive health service utilization and child nutritional outcome narrowed in Bangladesh?. *Journal of Urban Health*, *96*, 193-207.Available: https://link.springer.com/article/10.1007/s11524-018-0307-x

Angeles, G., Lance, P., Barden-O'Fallon, J., Islam, N., Mahbub, A. Q. M., & Nazem, N. I. (2009). The 2005 census and mapping of slums in Bangladesh: design, select results and application. *International journal of health geographics*, *8*, 1-19.Available: https://link.springer.com/article/10.1186/1476-072X-8-32

Anon. (2005), "Preventing chronic diseases: a vital investment", *WHO Global Report. Technical report,* 13 pp.Available: https://academic.oup.com/ije/article-abstract/35/4/1107/686408

Arsenijevic, J., Pavlova, M., Rechel, B., & Groot, W. (2016). Catastrophic health care expenditure among older people with chronic diseases in 15 European countries. *PloS one*, *11*(7), e0157765. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0157765

Aryal, K. K., Mehata, S., Neupane, S., Vaidya, A., Dhimal, M., Dhakal, P., ... & Karki, K. B. (2015). The burden and determinants of non communicable diseases risk factors in Nepal: findings from a nationwide STEPS survey. PloS one, 10(8), e0134834. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0134834

Ataguba, J. E. O. (2013). Inequalities in multimorbidity in South Africa. *International journal for equity in health*, *12*, 1-9.Available: https://link.springer.com/article/10.1186/1475-9276-12-64

Ayernor, P. K. (2012), "Diseases of Ageing in Ghana", *Ghana Medical Journal,* Vol.46, No. 2 pp. 18-22.Available: https://www.ajol.info/index.php/gmj/article/view/88735

Balarajan, Y., Selvaraj, S., & Subramanian, S. V. (2011). Health care and equity in India. The Lancet, 377(9764), 505-515. Available:https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(10)61894-6/abstract

Barikdar, A., Ahmed, T., & Lasker, S. P. (2016). The situation of the elderly in Bangladesh. *Bangladesh Journal of Bioethics*, *7*(1), 27-36. Available: https://banglajol.info/index.php/BIOETHICS/article/view/29303

BBS (2022) HOUSEHOLD INCOME AND EXPENDITURE SURVEY HIES 2022 Available: https://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/b343a8b4_956b_45ca_872f_4cf9b2f1a6e0/2023-12-23-11-15-1b221684b3d6eabaa1969237888fe5e2.pdf

Berman, P., Ahuja, R., & Bhandari, L. (2010). The impoverishing effect of healthcare payments in India: new methodology and findings. *Economic and Political Weekly*, 65-71. Available: https://www.jstor.org/stable/25664359

Begum, A., & Hamid, S. A. (2021). Impoverishment impact of out-of-pocket payments for healthcare in rural Bangladesh: Do the regions facing different climate change risks matter?. *PLoS one*, *16*(6), e0252706. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0252706

Bhojani, U., Thriveni, B. S., Devadasan, R., Munegowda, C. M., Devadasan, N., Kolsteren, P., & Criel, B. (2012). Out-of-pocket healthcare payments on chronic conditions impoverish urban poor in Bangalore, India. *BMC public health*, *12*, 1-14. Available: https://link.springer.com/article/10.1186/1471-2458-12-990

Bhojani, U., Beerenahalli, T. S., Devadasan, R., Munegowda, C. M., Devadasan, N., Criel, B., & Kolsteren, P. (2013). No longer diseases of the wealthy: prevalence and health-seeking for self-reported chronic conditions among urban poor in Southern India. *BMC health services research*, *13*, 1-10.available: https://link.springer.com/article/10.1186/1472-6963-13-306

Bill, B., Jyoti, L., Sapna, M., Vandana, V., & Sundeep, S. (2012). Prevalence of self-reported respiratory symptoms, asthma and chronic bronchitis in slum area of a rapidly developing Indian city. *Open Journal of Respiratory Diseases*, *2012*.available: https://www.scirp.org/html/2-2110021_21607.htm

Binnendijk, E., Koren, R., & Dror, D. M. (2012). Hardship financing of healthcare among rural poor in Orissa, India. BMC health services research, 12, 1-14.Available: https://link.springer.com/article/10.1186/1472-6963-12-23

Binnendijk, E., Koren, R., & Dror, D. M. (2012). Can health insurance reduce poverty? Evidence from Ghana. *International Journal for Equity in Health,* *11*(1), 24. Available: https://link.springer.com/article/10.1186/1472-6963-12-23

Bista, B., Dhungana, R. R., Chalise, B., & Pandey, A. R. (2020). Prevalence and determinants of non-communicable diseases risk factors among reproductive aged women of Nepal: Results from Nepal Demographic Health Survey 2016. *PloS one*, *15*(3), e0218840. Available:https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0218840&type=printable

Biswas, T., Islam, M. S., Linton, N., & Rawal, L. B. (2016). Socio-economic inequality of chronic non-communicable diseases in Bangladesh. *PloS one*, *11*(11), e0167140.Available:https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0167140&type=printable

Biswas, T., Townsend, N., Islam, M. S., Islam, M. R., Gupta, R. D., Das, S. K., & Al Mamun, A. (2019). Association between socioeconomic status and prevalence of non-communicable diseases risk factors and comorbidities in Bangladesh: findings from a nationwide cross-sectional survey. *BMJ open*, *9*(3), e025538. Available: https://bmjopen.bmj.com/content/bmjopen/9/3/e025538.full.pdf

Bleich, S. N., Koehlmoos, T. L., Rashid, M., Peters, D. H., & Anderson, G. (2011). Noncommunicable chronic disease in Bangladesh: overview of existing programs and priorities going forward. Health policy, 100(2-3), 282-289. Available: https://www.sciencedirect.com/science/article/abs/pii/S0168851010002654

Bliss, C. I. (1935). The calculation of the dosage-mortality curve. *Annals of Applied Biology*, *22*(1), 134-167.Available: https://onlinelibrary-wiley-com.gateway.library.du.ac.bd/doi/epdf/10.1111/j.1744-7348.1935.tb07713.x

Bloom, D. E., Cafiero, E., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L. R., Fathima, S., ... & Weiss, J. (2012). The global economic burden of noncommunicable diseases (No. 8712). Available: https://ideas.repec.org/p/gdm/wpaper/8712.html

BNHA.Public Expenditure Review 1997-2020. Available: https://heu.portal.gov.bd/sites/default/files/files/heu.portal.gov.bd/page/0c736066_95ed_45fa_85bd_599a5c498e3d/2022-04-30-17-01-5d2144f4fa7b2efafc2cf5f0374ab605.pdf

Program on the Global Demography of Aging. Available: https://ideas.repec.org/p/gdm/wpaper/8712.html

Bongaarts, J. (2020). United Nations Department of Economic and Social Affairs, Population Division World Family Planning 2020: Highlights, United Nations Publications, 2020. 46 p. Available: https://onlinelibrary.wiley.com/doi/pdfdirect/10.1111/padr.12377

Boutayeb, A., & Boutayeb, S. (2005). The burden of non communicable diseases in developing countries. International journal for equity in health, 4, 1-8. Available: https://link.springer.com/article/10.1186/1475-9276-4-2

Bowling, A., & Gabriel, Z. (2007). Lay theories of quality of life in older age. *Ageing & Society*, *27*(6), 827-848. Available: https://www.cambridge.org/core/services/aop-cambridge-core/content/view/D0B820DBF40C6721E4A11FD0D681F198/S0144686X07006423a.pdf/lay_theories_of_quality_of_life_in_older_age.pdf

Braveman, P. A., Cubbin, C., Egerter, S., Chideya, S., Marchi, K. S., Metzler, M., & Posner, S. (2005). Socioeconomic status in health research: one size does not fit all. *Jama*, *294*(22), 2879-2888. Available: https://jamanetwork.com/journals/jama/article-abstract/202015

Bredenkamp, C., Mendola, M., & Gragnolati, M. (2011). Catastrophic and impoverishing effects of health expenditure: new evidence from the Western Balkans. Health policy and planning, 26(4), 349-356. Available: https://academic.oup.com/heapol/article/26/4/349/661333

Britt, H. C., Harrison, C. M., Miller, G. C., & Knox, S. A. (2008). Prevalence and patterns of multimorbidity in Australia. *Medical Journal of Australia*, *189*(2), 72-77. Available: https://www.mja.com.au/system/files/issues/189_02_210708/bri10473_fm.pdf

Buvinić, M., Medici, A., Fernández, E., & Torres, A. C. (2006). Gender differentials in health. In D. T. Jamison, J. G. Breman, A. R. Measham, G. Alleyne, M. Claeson, D. B. Evans, P. Jha, A. Mills, & P. Musgrove (Eds.), *Disease control priorities in developing countries 2nd*. (pp. 195–210). The International Bank for Reconstruction and Development/The World Bank, Oxford University Press. Available: https://www.ncbi.nlm.nih.gov/books/NBK11729/

Camacho, P. A., Gomez-Arbelaez, D., Otero, J., González-Gómez, S., Molina, D. I., Sanchez, G., ... & Lopez-Jaramillo, P. (2020). Self-reported prevalence of chronic non-communicable diseases in relation to socioeconomic and educational factors in Colombia: a community-based study in 11 departments. *Global Heart*, *15*(1), 35. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC7218792/

CDC (2024). Centers for Disease Control and Prevention: About Chronic Diseases. Available: https://www.cdc.gov/chronic-disease/about/index.html

Chau, K., Baumann, M., & Chau, N. (2013). Socioeconomic inequities patterns of multi-morbidity in early adolescence. *International journal for equity in health*, *12*, 1-12. Available: https://link.springer.com/article/10.1186/1475-9276-12-65

Chung, R. Y., Mercer, S., Lai, F. T., Yip, B. H., Wong, M. C., & Wong, S. Y. (2015). Socioeconomic determinants of multimorbidity: a population-based household survey of Hong Kong Chinese. *PLoS One*, *10*(10), e0140040. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0140040

Coventry, P. A., Lovell, K., Dickens, C., Bower, P., Chew-Graham, C., Cherrington, A., ... & Gask, L. (2013). Update on the collaborative interventions for circulation and depression (COINCIDE) trial: changes to planned methodology of a cluster randomized controlled trial of collaborative care for depression in people with diabetes and/or coronary heart disease. *Trials*, *14*, 1-4. Available: https://link.springer.com/content/pdf/10.1186/1745-6215-14-136.pdf

Creswell, J.W. (2008), Educational Research, Pearson Prentice Hall, USA, PP-89.

Datta, B. K., Husain, M. J., Husain, M. M., & Kostova, D. (2018). Noncommunicable disease-attributable medical expenditures, household financial stress and impoverishment in Bangladesh. *SSM-population health*, *6*, 252-258. Available: https://www.sciencedirect.com/science/article/pii/S2352827318301265

Dawson, C. (2019). *AZ of digital research methods*. Routledge. Available: file:///C:/Users/ASUS/Desktop/12.pdf

Dawson, C. (2019). *AZ of digital research methods*. Routledge. Available: file:///C:/Users/ASUS/Desktop/12.pdf

Detaille, S.I.; Heerkens, Y.F.; Engels, J.A.; van der Gulden, J.W.; van Dijk, F.J. Effect evaluation of a self-management program for dutch workers with a chronic somatic disease: A randomized controlled trial. *J.*

*Occup. Rehabil.* 2013, *23*, 189–199. Available: https://link.springer.com/article/10.1007/s10926-013-9450-0

Dey, S., Nambiar, D., Lakshmi, J. K., Sheikh, K., & Reddy, K. S. (2012). Health of the elderly in India: challenges of access and affordability. In *Aging in Asia: Findings from new and emerging data initiatives*. National Academies Press (US). Available; https://www.ncbi.nlm.nih.gov/sites/books/NBK109208/

Di Cesare, M., Khang, Y. H., Asaria, P., Blakely, T., Cowan, M. J., Farzadfar, F., ... & Ezzati, M. (2013). Inequalities in non-communicable diseases and effective responses. *The Lancet*, *381*(9866), 585-597.Available: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(12)61851-0/abstract

Dugan, E., & Lee, C. M. (2013). Biopsychosocial risk factors for driving cessation: Findings from the Health and Retirement Study. Journal of aging and health, 25(8), 1313-1328. Available: https://journals.sagepub.com/doi/abs/10.1177/0898264313503493

Eduvoice (2023): Types of research methodology. Available: https://eduvoice.in/types-research-methodology/

Elwood, P., Galante, J., Pickering, J., Palmer, S., Bayer, A., Ben-Shlomo, Y., ... & Gallacher, J. (2013). Healthy lifestyles reduce the incidence of chronic diseases and dementia: evidence from the Caerphilly cohort study. *PloS one*, *8*(12), e81877. Available; https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081877

Ekpenyong, C. E., NE, U., Akpan, E. E., & Samson, T. K. (2012). Double burden, non-communicable diseases and risk factors evaluation in sub-Saharan Africa: The Nigerian experience. *European Journal of Sustainable Development*, *1*(2), 249-249.Available: http://www.ojs.ecsdev.org/index.php/ejsd/article/view/17

Flores, G., Krishnakumar, J., O'Donnell, O., & van Doorslaer, E. (2008). Coping with health-care costs: Implications for the measurement of catastrophic expenditures and poverty. *Health Economics, 17*(12), 1393–1412. Available: https://doi.org/10.1002/hec.1338

Fortin, M., Bravo, G., Hudon, C., Vanasse, A., & Lapointe, L. (2005). Prevalence of multimorbidity among adults seen in family practice. *The Annals of Family Medicine*, *3*(3), 223-228.Available: https://www.annfammed.org/content/annalsfm/3/3/223.full.pdf

Fortin, M., Hudon, C., Haggerty, J., van den Akker, M., & Almirall, J. (2010). Prevalence estimates of multimorbidity: a comparative study of two sources. *BMC health services research*, *10*, 1-6.Available: https://link.springer.com/article/10.1186/1472-6963-10-111

Ghimire, M., Ayer, R., & Kondo, M. (2018). Cumulative incidence, distribution, and determinants of catastrophic health expenditure in Nepal: results from the living standards survey. *International journal for equity in health*, *17*(1), 23. Available: https://equityhealthj.biomedcentral.com/articles/10.1186/s12939-018-0736-x?utm_source=chatgpt.com

Global Health Expenditure Database (WHO): Available; https://apps.who.int/nha/database/country_profile/index/en

Goryakin, Y., Rocco, L., & Suhrcke, M. (2017). The contribution of urbanization to non-communicable diseases: Evidence from 173 countries from 1980 to 2008. Economics & Human Biology, 26, 151-163. Available:https://eprints.whiterose.ac.uk/114610/1/4.Revised_manuscript_without_track_changes.pdf

Gouda, H. N., Charlson, F., Sorsdahl, K., Ahmadzada, S., Ferrari, A. J., Erskine, H., ... & Whiteford, H. (2019). Burden of non-communicable diseases in sub-Saharan Africa, 1990–2017: results from the Global Burden of Disease Study 2017. *The Lancet global health*, *7*(10), e1375-e1387.Available: https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30374-2/fulltext

Graham, J., Gurian, P., Corella-Barud, V., & Avitia-Diaz, R. (2004). Peri-urbanization and in-home environmental health risks: the side effects of planned and unplanned growth. International Journal of Hygiene and Environmental Health, 207(5), 447-454.Available: https://www.sciencedirect.com/science/article/abs/pii/S1438463904703090

Gregorio, J. D., & Lee, J. W. (2002). Education and income inequality: new evidence from cross-country data. *Review of income and wealth*, *48*(3), 395-416.Available: https://onlinelibrary.wiley.com/doi/abs/10.1111/1475-4991.00060

Gwatkin, D. R. (2000). Health inequalities and the health of the poor: what do we know? What can we do?. Bulletin of the world health organization, 78, 3-18.Available: https://www.scielosp.org/article/bwho/2000.v78n1/3-18/

Hamid, S. A., Roberts, J., & Mosley, P. (2011). Can micro health insurance reduce poverty? Evidence from Bangladesh. Journal of risk and Insurance, 78(1), 57-82.Available: https://onlinelibrary.wiley.com/doi/full/10.1111/j.15396975.2010.01402.x?casa_token=p83NIJhno0IAAAAA%3AgcIRlcVfpYHI0Xgcje09DioWfYKywyf2b8s4tedABDYJawfx3WJjiar3GOwNpAR2u4_qMYYqM6MPh

Haider, M. Z., & Mahamud, A. (2017). Beneficiary selection and allowance utilization of social safety net programme in Bangladesh. *Journal of Human Rights and Social Work*, *2*, 45-51.Available: https://link.springer.com/article/10.1007/s41134-017-0028-1

Hamid, S. A., Ahsan, S. M., & Begum, A. (2014). Disease-specific impoverishment impact of out-of-pocket payments for health care: evidence from rural Bangladesh. *Applied health economics and health policy*, *12*, 421-433.Available: https://link.springer.com/article/10.1007/s40258-014-0100-2

Harper, S., Lynch, J., & Smith, G. D. (2011). Social determinants and the decline of cardiovascular diseases: understanding the links. *Annual review of public health*, *32*(1), 39-69. Available: https://www.annualreviews.org/content/journals/10.1146/annurev-publhealth-031210-101234

Hasan, M. N. (2023). Prevalence and Risk Factors Associated with Chronic Diseases Among Young Adult in Bangladesh. *Journal of Scientific Research*, *15*(1).Available: https://banglajol.info/index.php/JSR/article/view/60328

Hatch, S. L., Frissa, S., Verdecchia, M., Stewart, R., Fear, N. T., Reichenberg, A., ... & Hotopf, M. (2011). Identifying socio-demographic and socioeconomic determinants of health inequalities in a diverse London community: the South East London Community Health (SELCoH) study. BMC public health, 11, 1-17. Available: https://link.springer.com/article/10.1186/1471-2458-11-861

Havranek, E. P., Mujahid, M. S., Barr, D. A., Blair, I. V., Cohen, M. S., Cruz-Flores, S., ... & Yancy, C. W. (2015). Social determinants of risk and outcomes for cardiovascular disease: a scientific statement from the American Heart Association. *Circulation*, *132*(9), 873-898. Available: https://www.ahajournals.org/doi/pdf/10.1161/cir.0000000000000228

Hill, K. E., Gleadle, J. M., Pulvirenti, M., & McNaughton, D. A. (2015). The social determinants of health for people with type 1 diabetes that progress to end-stage renal disease. *Health Expectations*, *18*(6), 2513-2521. Available: https://onlinelibrary.wiley.com/doi/pdfdirect/10.1111/hex.12220

Hoque, M. E., Khokan, M. R., & Bari, W. (2014). Impact of stature on non-communicable diseases: evidence based on Bangladesh Demographic and Health Survey, 2011 data. *BMC public health*, *14*, 1-8. Available:https://link.springer.com/content/pdf/10.1186/1471-2458-14-1007.pdf

Hossain, A., Alam, M. J., Mydam, J., & Tareque, M. (2022). Do the issues of religious minority and coastal climate crisis increase the burden of chronic illness in Bangladesh?. *BMC Public Health*, *22*(1), 270.Available: https://link.springer.com/article/10.1186/s12889-022-12656-5

Hossain, Z., Khanam, M., & Sarker, A. R. (2023). Out-of-pocket expenditure among patients with diabetes in Bangladesh: a nation-wide population-based study. *Health Policy Open*, *5*, 100102. Available: **https://www.sciencedirect.com/science/article/pii/S259022962300014X**

Hosseinpoor, A. R., Bergen, N., Mendis, S., Harper, S., Verdes, E., Kunst, A., & Chatterji, S. (2012). Socioeconomic inequality in the prevalence of noncommunicable diseases in low-and middle-income countries: results from the World Health Survey. *BMC public health*, *12*, 1-13.Available: https://link.springer.com/article/10.1186/1471-2458-12-474

Islam, M. M., Rahman, M. J., Roy, D. C., Tawabunnahar, M., Jahan, R., Ahmed, N. F., & Maniruzzaman, M. (2021). Machine learning algorithm for characterizing risks of hypertension, at an early stage in Bangladesh. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *15*(3), 877-884. Available: https://www.sciencedirect.com/science/article/abs/pii/S1871402121001119

Islam, A., & Biswas, T. (2014). Health system bottlenecks in achieving maternal and child health-related Millennium Development Goals: major findings from district level in Bangladesh. J US China Med Sci, 11(3), 147-158. Available:https://pdfs.semanticscholar.org/edbb/abcedede79ca809fdac466a7b1bed01016df.pdf

Jana, A., & Chattopadhyay, A. (2022). Prevalence and potential determinants of chronic disease among elderly in India: rural-urban perspectives. *Plos one*, *17*(3), e0264937.Available:https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0264937

Jaspers, L., Colpani, V., Chaker, L., van der Lee, S. J., Muka, T., Imo, D., ... & Franco, O. H. (2015). The global impact of non-communicable diseases on households and impoverishment: a systematic review. *European Journal of Epidemiology*, *30*, 163-188.Available: https://link.springer.com/article/10.1007/s10654-014-9983-3

Jayathilaka, R., Joachim, S., Mallikarachchi, V., Perera, N., & Ranawaka, D. (2020). Do chronic illnesses and poverty go hand in hand?. PloS one, 15(10), e0241232.Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0241232

Jeemon, P., & Reddy, K. S. (2010). Social determinants of cardiovascular disease outcomes in Indians. *Indian Journal of Medical Research*, *132*(5), 617-622. Available: https://journals.lww.com/ijmr/fulltext/2010/32050/social_determinants_of_cardiovascular_disease.22.aspx

Johns Hopkins Public Health (2018): Poverty Increases Risk of Non-Communicable Diseases in Lower Income Countries. Available: https://publichealth.jhu.edu/2018/poverty-increases-risk-of-non-communicable-diseases-in-lower-income-countries?utm_source=chatgpt.com

Joshi, K., Kumar, R., & Avasthi, A. (2003). Morbidity profile and its relationship with disability and psychological distress among elderly people in Northern India. *International Journal of Epidemiology*, *32*(6), 978-987.Available: https://academic.oup.com/ije/article/32/6/978/775159

Kabir, R., Khan, H. T., Kabir, M., & Rahman, M. T. (2013). Population ageing in Bangladesh and its implication on health care. *European Scientific Journal*, *9*(33), 34-47.Available: https://repository.uwl.ac.uk/id/eprint/3436/

Kail, B. L. (2016). Marital status as a moderating factor in the process of disablement. *Journal of aging and health*, *28*(1), 139-164. Available: https://journals.sagepub.com/doi/abs/10.1177/0898264315589572

Kaplan, G. A., & Keil, J. E. (1993). Socioeconomic factors and cardiovascular disease: a review of the literature. *Circulation*, *88*(4), 1973-1998. Available: https://www.ahajournals.org/doi/abs/10.1161/01.CIR.88.4.1973

Kastor, A., & Mohanty, S. K. (2018). Disease-specific out-of-pocket and catastrophic health expenditure on hospitalization in India: do Indian households face distress health financing?. *PloS one*, *13*(5),e0196106.Available:https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0196106&type=printable

Kelly, M. P., Morgan, A., Bonnefoy, J., Butt, J., & Bergman, V. (2007). *The social determinants of health: Developing an evidence base for political action. Final report of the measurement and evidence knowledge network to the world health organization commission on the social determinants of health*. WHO. Available: https://cdn.who.int/media/docs/default-source/documents/social-determinants-of-health/measurement-and-evidence-knowledge-network-final-report-2007.pdf

Khalequzzaman, M., Chiang, C., Choudhury, S. R., Yatsuya, H., Al-Mamun, M. A., Al-Shoaibi, A. A. A., ... & Aoyama, A. (2017). Prevalence of non-communicable disease risk factors among poor shantytown residents in Dhaka, Bangladesh: a community-based cross-sectional survey. BMJ open, 7(11), e014710. Available: https://bmjopen.bmj.com/content/bmjopen/7/11/e014710.full.pdf

Khan, J. A., Ahmed, S., & Evans, T. G. (2017). Catastrophic healthcare expenditure and poverty related to out-of-pocket payments for healthcare in Bangladesh—an estimation of financial risk protection of universal health coverage. *Health policy and planning*, *32*(8), 1102-1110. Available: https://academic.oup.com/heapol/article/32/8/1102/3858270

Khan, N., Rahman, M., Mitra, D., & Afsana, K. (2019). Prevalence of multimorbidity among Bangladeshi adult population: a nationwide cross-sectional study. *BMJ open*, *9*(11), e030886.Available: https://bmjopen.bmj.com/content/bmjopen/9/11/e030886.full.pdf

Khan, J. A., Ahmed, S., Sultana, M., Sarker, A. R., Chakrovorty, S., Rahman, M. H., ... & Niessen, L. W. (2020). The effect of a community-based health insurance on the out-of-pocket payments for utilizing medically trained providers in Bangladesh. *International health*, *12*(4), 287-298.Available: https://academic.oup.com/inthealth/article/12/4/287/5627757

Khan, J. J., Sehrin, F., Quayyum, Z., Sarker, A. R., & Rahman, M. S. (2025). Factors affecting out-of-pocket expenditures for chronic and acute illnesses in Bangladesh. *PloS one*, *20*(4), e0320429. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0320429

Kim, D. (2016). The associations between US state and local social spending, income inequality, and individual all-cause and cause-specific mortality: the National Longitudinal Mortality Study. *Preventive medicine*, *84*, 62-68. Available: https://www.sciencedirect.com/science/article/pii/S0091743515003400

Kpessa-Whyte, M., & Tsekpo, K. (2020). Lived experiences of the elderly in Ghana: Analysis of ageing policies and options for reform. *Journal of Cross-Cultural Gerontology*, *35*, 341-352.Available: https://link.springer.com/article/10.1007/s10823-020-09401-z

Kreatsoulas, C., & Anand, S. S. (2010). The impact of social determinants on cardiovascular disease. Canadian Journal of Cardiology, 26, 8C-13C. Available: https://www.sciencedirect.com/science/article/abs/pii/S0828282X10710758

Krieger, N. (2001). A glossary for social epidemiology. *Journal of Epidemiology & Community Health*, *55*(10), 693-700.Available: https://jech.bmj.com/content/55/10/693.short

Kumari, M., Head, J., & Marmot, M. (2004). Prospective study of social and other risk factors for incidence of type 2 diabetes in the Whitehall II study. Archives of internal medicine, 164(17), 1873-1880. Available: https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/217380#google_vignette

Ladusingh, L., & Pandey, A. (2013). Health expenditure and impoverishment in India. *Journal of Health Management*, *15*(1), 57-74. Available: https://journals.sagepub.com/doi/abs/10.1177/0972063413486031

Lopes Ibanez-Gonzalez, D., & Norris, S. A. (2013). Chronic non-communicable disease and healthcare access in middle-aged and older women living in Soweto, South Africa. *PloS one*, *8*(10), e78800.Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0078800

Mackenbach, J. P., Stirbu, I., Roskam, A. J. R., Schaap, M. M., Menvielle, G., Leinsalu, M., & Kunst, A. E. (2008). Socioeconomic inequalities in health in 22 European countries. *New England journal of medicine*, *358*(23), 2468-2481.Available: https://www.nejm.org/doi/pdf/10.1056/nejmsa0707519

Maimela, E., Alberts, M., Modjadji, S. E., Choma, S. S., Dikotope, S. A., Ntuli, T. S., & Van Geertruyden, J. P. (2016). The prevalence and determinants of chronic non-communicable disease risk factors amongst adults in the Dikgale health demographic and surveillance system (HDSS) site, Limpopo Province of South Africa. *PloS one*, *11*(2), e0147926.Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0147926

Mahumud, R. A., Sarker, A. R., Sultana, M., Islam, Z., Khan, J., & Morton, A. (2017). Distribution and determinants of out-of-pocket healthcare expenditures in Bangladesh. *Journal of Preventive Medicine and Public Health*, *50*(2), 91. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC5398340/

Mahumud, R. A., Sultana, M., Kundu, S., Rahman, M. A., Mistry, S. K., Kamara, J. K., ... & Renzaho, A. M. (2022). The burden of chronic diseases and patients' preference for healthcare services among adult patients suffering from chronic diseases in Bangladesh. *Health Expectations*, *25*(6), 3259-3273.Available: https://onlinelibrary.wiley.com/doi/full/10.1111/hex.13634

Mahumud, R. A., Gow, J., Mosharaf, M. P., Kundu, S., Rahman, M. A., Dukhi, N., ... & Alam, K. (2023). The burden of chronic diseases, disease-stratified exploration and gender-differentiated healthcare utilisation among patients in Bangladesh. *Plos one*, *18*(5), e0284117.Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0284117

Marengoni, A., Winblad, B., Karp, A., & Fratiglioni, L. (2008). Prevalence of chronic diseases and multimorbidity among the elderly population in Sweden. *American journal of public health*, *98*(7), 1198-1200. Available: https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2007.121137

Marengoni, A., Angleman, S., Melis, R., Mangialasche, F., Karp, A., Garmen, A., ... & Fratiglioni, L. (2011). Aging with multimorbidity: a systematic review of the literature. *Ageing research reviews*, *10*(4), 430-439.Available: https://www.sciencedirect.com/science/article/abs/pii/S1568163711000249

Matud, M. P. (2017). Gender and health. In A. Alvinius (Ed.), *Gender differences in different contexts* (pp. 57–76). IntechOpen. Available:https://doi.org/10.5772/65410

Mberu, B. U., Haregu, T. N., Kyobutungi, C., & Ezeh, A. C. (2016). Health and health-related indicators in slum, rural, and urban communities: a comparative analysis. Global health action, 9(1), 33163.Available: https://www.tandfonline.com/doi/full/10.3402/gha.v9.33163

McIntyre, D., Muirhead, D., & Gilson, L. (2002). Geographic patterns of deprivation in South Africa: Informing health equity analyses and public resource allocation strategies. *Health Policy Plan*, *17*(1), 30–39. Available: https://academic.oup.com/heapol/article/17/suppl_1/30/664498

Mehata, S., Shrestha, N., Ghimire, S., Atkins, E., Karki, D. K., & Mishra, S. R. (2021). Association of altitude and urbanization with hypertension and obesity: analysis of the Nepal Demographic and Health Survey 2016. International health, 13(2), 151-160.Available: https://academic.oup.com/inthealth/article/13/2/151/5867539

Mohan, V., Mathur, P., Deepa, R., Deepa, M., Shukla, D. K., Menon, G. R., ... & Shah, B. (2008). Urban rural differences in prevalence of self-reported diabetes in India—The WHO–ICMR Indian NCD risk factor surveillance. Diabetes research and clinical practice, 80(1), 159-168.Available: https://www.sciencedirect.com/science/article/abs/pii/S0168822707006171

Molla, A. A., Chi, C., & Mondaca, A. L. N. (2017). Predictors of high out-of-pocket healthcare expenditure: an analysis using Bangladesh household income and expenditure survey, 2010. BMC Health Services Research, 17, 1-8.Available: https://link.springer.com/article/10.1186/s12913-017-2047-0

Molla, A., & Chi, C. (2020). How much household healthcare expenditure contributes to poverty? Evidence from the Bangladesh Household Income and Expenditure Survey, 2010. *Journal of Poverty*, *24*(7), 627-641. Available: https://www.tandfonline.com/doi/abs/10.1080/10875549.2020.1742269

Mondal, R., Sarke, R. C., & Banik, P. C. (2019). Prevalence and determinants of behavioral risk factors of non-communicable diseases among a selected slum population in Bangladesh. *Chronic Diseases Journal*, 170-174.Available: **http://cdjournal.muk.ac.ir/index.php/cdj/article/view/417**

Montgomery, L. E., Kiely, J. L., & Pappas, G. (1996). The effects of poverty, race, and family structure on US children's health: data from the NHIS, 1978 through 1980 and 1989 through 1991. *American Journal of Public Health*, *86*(10), 1401-1405.Available:https://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.86.10.1401

Moore, M., Gould, P., & Keary, B. S. (2003). Global urbanization and impact on health. International journal of hygiene and environmental health, 206(4-5), 269-278Available: https://www.sciencedirect.com/science/article/abs/pii/S1438463904702230

Marmot, M., & Bell, R. (2019). Social determinants and non-communicable diseases: time for integrated action. *Bmj*, *364*. Available: https://www.bmj.com/content/bmj/364/bmj.l251.full.pdf

Nagel, G., Peter, R., Braig, S., Hermann, S., Rohrmann, S., & Linseisen, J. (2008). The impact of education on risk factors and the occurrence of multimorbidity in the EPIC-Heidelberg cohort. *BMC public health*, *8*, 1-10.Available: https://link.springer.com/article/10.1186/1471-2458-8-384

National Cancer Institute(.gov):Definition of out-of-pocket cost-NCI Dictionary of Cancer Terms. Available: https://www.cancer.gov/publications/dictionaries/cancer-terms/def/out-of-pocket-cost

Nazem, N. I., & Sultana, S. (2021). Slums, Squatter Settlements and Affordable Housing in the Dhaka Metropolitan Area. In *AUC 2019: Proceedings of the 15th International Asian Urbanization Conference, Vietnam* (pp. 467-474). Springer Singapore. Available: https://link.springer.com/chapter/10.1007/978-981-15-5608-1_36

Nojilana, B., Bradshaw, D., Pillay-van Wyk, V., Msemburi, W., Laubscher, R., Somdyala, N. I., Joubert, J. D., Groenewald, P., & Dorrington, R. E. (2016). Emerging trends in non-communicable disease mortality in South Africa 1997–2010. *South African Medical Journal*, *106*(5), 477–484. Available:https://doi.org/10.7196/SAMJ.2016.v106i5.10674

Non-Communicable Disease Risk Factor Survey, Bangladesh 2010. Dhaka Available:https://cdn.who.int/media/docs/default-source/searo/bangladesh/pdf-reports/year-2007-2012/non-communicable-disease-risk-factor-survey-bangladesh-2010.pdf?sfvrsn=37e45e81_2

Northwood, M., Ploeg, J., Markle-Reid, M., & Sherifali, D. (2018). Integrative review of the social determinants of health in older adults with multimorbidity. *Journal of Advanced Nursing*, *74*(1), 45-60.Available:https://onlinelibrary.wiley.com/doi/pdf/10.1111/jan.13408?casa_token=ejH5Fj5yJpQAAAAA%3A3kme_bFMg0OdHy86ZluHYsGgwmJfIwq0nfMP6wfMSPRa5-ymj3fDQHhUTHiojASl0M2lnAgB6BcC9Zov

Nyarko, C. C., Agyarko, K., Nyarko, P. K., & Brew, L. (2021). Determinants of chronic illness among aged population in Ghana: a multinomial logit approach. *Ghana Mining Journal*, *21*(1), 68-75.Available: https://www.ajol.info/index.php/gm/article/view/211064

O'Donnel, O., Van Doorslaer, E., Wagstaff, A., & Lindelow, M. (2008). *Analyzing health equity using household survey data: a guide to techniques and their implementation*. World Bank.

Older persons-UNHCR, 13 June 2024. Available:https://emergency.unhcr.org/protection/persons-risk/older-persons#:~:text=Overview,or%20age%2Drelated%20health%20conditions

Omotoso, K. O., & Koch, S. F. (2018). Assessing changes in social determinants of health inequalities in South Africa: A decomposition analysis. *International Journal for Equity in Health*, *17*(1), 181. Available: https://link.springer.com/article/10.1186/s12939-018-0885-y

Onwujekwe, O., Hanson, K., & Uzochukwu, B. (2012). Examining inequities in incidence of catastrophic health expenditures on different healthcare services and health facilities in Nigeria. PloS one, 7(7), e40811.Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0040811

Oti, S., & Kyobutungi, C. (2011). P2-232 cardiovascular disease conditions: prevalence, awareness, treatment and control among the urban poor in Nairobi. *Journal of Epidemiology & Community Health*, *65*(Suppl 1), A285-A285.Available: https://jech.bmj.com/content/jech/65/Suppl_1/A285.3.full.pdf

Ooi, G. L., & Phua, K. H. (2007). Urbanization and slum formation. *Journal of Urban Health*, *84*(Suppl 1), 27-34.Available: https://link.springer.com/article/10.1007/s11524-007-9167-5

Parmar, M. C., & Saikia, N. (2018). Chronic morbidity and reported disability among older persons from the India Human Development Survey. *BMC geriatrics*, *18*, 1-12.Available: https://link.springer.com/article/10.1186/s12877-018-0979-9

Patra, J., & Rehm, J. (2011). Alcohol consumption and non-communicable diseases: epidemiology and policy implications. *Addiction*, *106*(10), 1718-1724.Available: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1360-0443.2011.03605.x

Parr, J. D., Lindeboom, W., Khanam, M. A., & Pérez Koehlmoos, T. L. (2011). Diagnosis of chronic conditions with modifiable lifestyle risk factors in selected urban and rural areas of Bangladesh and sociodemographic variability therein. *BMC health services research*, *11*(1), 309. Available: https://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-11-309

Parry, C. D., Patra, J., & Rehm, J. (2011). Alcohol consumption and non-communicable diseases: epidemiology and policy implications. *Addiction*, *106*(10), 1718-1724.Available: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1360-0443.2011.03605.x

Pati, S., Agrawal, S., Swain, S., Lee, J. T., Vellakkal, S., Hussain, M. A., & Millett, C. (2014). Non communicable disease multimorbidity and associated health care utilization and expenditures in India: cross-sectional study. *BMC health services research*, *14*, 1-9.Available: https://link.springer.com/article/10.1186/1472-6963-14-451

Peek, M. E., Drum, M., & Cooper, L. A. (2014). The association of patient chronic disease burden and self-management requirements with shared decision making in primary care visits. *Health services research and managerial epidemiology*, *1*, 2333392814538775. Available; https://journals.sagepub.com/doi/full/10.1177/2333392814538775

Puckrein, G. A., Egan, B. M., & Howard, G. (2015). Social and medical determinants of cardiometabolic health: the big picture. *Ethnicity & disease*, *25*(4), 521.Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4671441/

Plümper, T., Laroze, D., & Neumayer, E. (2018). Regional inequalities in premature mortality in Great Britain. *PLoS One*, *13*(2), e0193488. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0193488

Polanco, B., Oña, A., Sabariego, C., & Barzallo, D. P. (2024). Chronic health conditions and their impact on the labor market. A cross-country comparison in Europe. *SSM-Population Health*, *26*, 101666.Available**: https://www.sciencedirect.com/science/article/pii/S2352827324000673**

Purty, A. J., Bazroy, J., Kar, M., Vasudevan, K., Zacharia, P., & Panda, P. (2006). Morbidity pattern among the elderly population in the rural area of Tamil Nadu, India. *Turkish Journal of Medical Sciences*, *36*(1), 45-50. Available: https://journals.tubitak.gov.tr/cgi/viewcontent.cgi?article=4174&context=medical

Raghupathi, W., & Raghupathi, V. (2018). An empirical study of chronic diseases in the United States: a visual analytics approach to public health. *International journal of environmental research and public health*, *15*(3), 431.Available: https://www.mdpi.com/1660-4601/15/3/431

Rahim, M. A., Vaaler, S., SM, K. A., Khan, A. K., Hussain, A., & Nahar, Q. (2004). Prevalence of type 2 diabetes in urban slums of Dhaka, Bangladesh. *Bangladesh Medical Research Council Bulletin*, *30*(2), 60-70.Available: https://europepmc.org/article/med/15813484

Rahman, K. M. (2011). UNNAYAN ONNESHAN POLICY BRIEF.Available**:** https://unnayan.org/wp-content/uploads/2021/05/Policy-Brief-on-Poverty-and-Inequality-in-Bangladesh.pdf

Rahman, M. M. (2013). James D Shelton. Bull World Health Organ, 91, 449-58. Available: https://www.thelancet.com/pdfs/journals/lancet/PIIS0140673614605110.pdf

Rahman, M. M., Gilmour, S., Saito, E., Sultana, P., & Shibuya, K. (2013). Health-related financial catastrophe, inequality and chronic illness in Bangladesh. *PloS one*, *8*(2), e56873.Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0056873

Rahman, M. S., Rahman, M. M., Gilmour, S., Swe, K. T., Abe, S. K., & Shibuya, K. (2018). Trends in, and projections of, indicators of universal health coverage in Bangladesh, 1995–2030: a Bayesian analysis of population-based household data. The Lancet Global Health, 6(1), e84-e94.Available:https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(17)30413-8/fulltext

Rahman, M. M., Zhang, C., Swe, K. T., Rahman, M. S., Islam, M. R., Kamrujjaman, M., ... & Rahman, M. M. (2020). Disease-specific out-of-pocket healthcare expenditure in urban Bangladesh: A Bayesian analysis. PloS one, 15(1), e0227565. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0227565

Rashid, S. F., Gani, S., & Sarker, M. (2013). Urban poverty, climate change and health risks for slum dwellers in Bangladesh. Climate change adaptation actions in Bangladesh, 51-70. Available: https://link.springer.com/chapter/10.1007/978-4-431-54249-0_4

Rawal, L. B., Biswas, T., Khandker, N. N., Saha, S. R., Bidat Chowdhury, M. M., Khan, A. N. S., ... & Renzaho, A. (2017). Non-communicable disease (NCD) risk factors and diabetes among adults living in slum areas of Dhaka, Bangladesh. PloS one, 12(10), e0184967.Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0184967

Riley, L. W., Ko, A. I., Unger, A., & Reis, M. G. (2007). Slum health: diseases of neglected populations. *BMC international health and human rights*, *7*, 1-6.Available: https://link.springer.com/article/10.1186/1472-698X-7-2

Rosenberg, P., Kano, M., Ludford, I., Prasad, A., & Thomson, H. (2016). Global report on urban health: equitable, healthier cities for sustainable development. World Health Organization. Available: https://eprints.gla.ac.uk/130273/

Rowshon, A. H. M. (2012). Ageing and Health: How far Bangladesh is prepared?. *Journal of Shaheed Suhrawardy Medical College*, *4*(1), 1-2.Available: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Rowshon%2C+A.+H.+M.+%282012%29.+Ageing+and+Health%3A+How+far+Bangladesh+is+prepared%3F.+Journal+of+Shaheed+Suhrawardy+Medical+College%2C+4%281%29%2C+1-2.&btnG=

Ruger, J. P., & Kim, H. J. (2006). Global health inequalities: an international comparison. Journal of epidemiology & community health, 60(11), 928-936. Available: https://jech.bmj.com/content/60/11/928.short

Ruger, J. P., & Kim, H. J. (2007). Out-of-pocket healthcare spending by the poor and chronically ill in the Republic of Korea. *American Journal of Public Health*, *97*(5), 804-811.Available: **https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2005.080184**

Saksena, P., Hsu, J., & Evans, D. B. (2014). Financial risk protection and universal health coverage: evidence and measurement challenges. *PLoS medicine*, *11*(9), e1001701. Available: https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1001701

Salisbury, C., Johnson, L., Purdy, S., Valderas, J. M., & Montgomery, A. A. (2011). Epidemiology and impact of multimorbidity in primary care: a retrospective cohort study. *British Journal of General Practice*, *61*(582), e12-e21.Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC3020068/

Saquib N, Khanam MA, Saquib J, Anand S, Chertow GM, Barry M, et al. High prevalence of type 2 diabetes among the urban middle class in Bangladesh. BMC Public Health. 2013; 13: 1032. Available: https://link.springer.com/article/10.1186/1471-2458-13-1032

Sassi, F., & Hurst, J. (2008). *The prevention of lifestyle-related chronic diseases: An economic framework*. Paris, France: OECD (OECD Health Working Paper No. 32).Available:https://api.drum.lib.umd.edu/server/api/core/bitstreams/1b52e963-8516-4997-a1e9-b239fa8ea3af/content

Satariano, W. A. (2001). Poverty, Inequality, and health: An international perspective. American Journal of Epidemiology, 154(6), 588-589. Available: https://academic.oup.com/aje/article/154/6/588/75207

Sarker, A. R., Sultana, M., Ali, N., Akram, R., Sheikh, N., Mahumud, R. A., & Morton, A. (2018). Cost comparison and determinants of out-of-pocket payments on child delivery care in Bangladesh. *The International journal of health planning and management*, *33*(4), e1232-e1249.Available: https://academic.oup.com/inthealth/article/12/4/287/5627757

Sarker, A. R., Ali, S. Z., Ahmed, M., Chowdhury, S. Z. I., & Ali, N. (2022). Out-of-pocket payment for healthcare among urban citizens in Dhaka, Bangladesh. PLoS One, 17(1), e0262900.available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0262900. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0262900

Schäfer, I., Hansen, H., Schön, G., Höfels, S., Altiner, A., Dahlhaus, A., ... & Wiese, B. (2012). The influence of age, gender and socio-economic status on multimorbidity patterns in primary care. First results from the multicare cohort study. *BMC health services research*, *12*, 1-15. Available: https://link.springer.com/article/10.1186/1472-6963-12-89

Schneider, M., Bradshaw, D., Steyn, K., Norman, R., & Laubscher, R. (2009). Poverty and non-communicable diseases in South Africa. *Scandinavian journal of public health*, *37*(2), 176-186.Available: https://journals.sagepub.com/doi/abs/10.1177/1403494808100272

Shahrawat, R., & Rao, K. D. (2012). Insured yet vulnerable: out-of-pocket payments and India's poor. Health policy and planning, 27(3), 213-221.Available: https://academic.oup.com/heapol/article/27/3/213/614322

Shariff-Marco, S., Yang, J., John, E. M., Kurian, A. W., Cheng, I., Leung, R., ... & Gomez, S. L. (2015). Intersection of race/ethnicity and socioeconomic status in mortality after breast cancer. *Journal of community health*, *40*, 1287-1299. Available: https://link.springer.com/article/10.1007/s10900-015-0052-y

Siegel, K. R., Patel, S. A., & Ali, M. K. (2014). Non-communicable diseases in South Asia: contemporary perspectives. *British medical bulletin*, *111*(1), 31-44.Available: https://academic.oup.com/bmb/article/111/1/31/282585

Singer, L., Green, M., Rowe, F., Ben-Shlomo, Y., Kulu, H., & Morrissey, K. (2019). Trends in multimorbidity, complex multimorbidity and multiple functional limitations in the ageing population of England, 2002–2015. *Journal of comorbidity*, *9*, 2235042X19872030.Available: https://journals.sagepub.com/doi/full/10.1177/2235042X19872030

Singh, P. K., Singh, L., Dubey, R., Singh, S., & Mehrotra, R. (2019). Socioeconomic determinants of chronic health diseases among older Indian adults: a nationally representative cross-sectional multilevel study. *BMJ open*, *9*(9), e028426.Available: https://bmjopen.bmj.com/content/bmjopen/9/9/e028426.full.pdf

Solar, O., & Irwin, A. (2010). *A conceptual framework for action on the social determinants of health*. WHO Document Production Services. Available: https://drum.lib.umd.edu/items/df328dec-ef67-4171-bbfd-45271d5f0635

Sommer, I., Griebler, U., Mahlknecht, P., Thaler, K., Bouskill, K., Gartlehner, G., & Mendis, S. (2015). Socioeconomic inequalities in non-communicable diseases and their risk factors: an overview of systematic reviews. *BMC public health*, *15*, 1-12.Available: https://link.springer.com/article/10.1186/s12889-015-2227-y

Streatfield, P. K., & Karar, Z. A. (2008). Population challenges for Bangladesh in the coming decades. *Journal of health, population, and nutrition*, *26*(3), 261. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2740702/

Suhrcke, M., Nugent, R. A., Stuckler, D., & Rocco, L. (2006). Chronic disease: an economic perspective. Available: https://www.research.unipd.it/handle/11577/2513046

Sultana, M., Mahumud, R. A., & Sarker, A. R. (2017). Burden of chronic illness and associated disabilities in Bangladesh: Evidence from the Household Income and Expenditure Survey. *Chronic Diseases and Translational Medicine*, *3*(02), 112-122. Available: https://mednexus.org/doi/full/10.1016/j.cdtm.2017.02.001#body-ref-R31

Taffa, N., & Chepngeno, G. (2005). Determinants of health care seeking for childhood illnesses in Nairobi slums. Tropical Medicine & International Health, 10(3), 240-245. Available: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-3156.2004.01381.x

The World Bank, World Development Indicators (2012). GNI per capita, Atlas method [Data file]. Retrieved from. Available: http://data.worldbank.org/indicator/NY.GNP.PCAP.CD

The Australian Prevention Partnership Centre: What is burden of chronic disease Available: https://preventioncentre.org.au/about-prevention/what-is-the-burden-of-chronic-disease/#:~:text=A%20chronic%20disease%2C%20also%20known,and%20injury%2C%20and%20premature%20death.

**The Business Standard, 2024): Urban poverty soars as cost of living rises: Sanem. Available: https://www.tbsnews.net/economy/urban-poverty-soars-cost-living-rises-sanem-816451**

The World Bank Group. Urban population (% of total population) | Data. 2020 [cited 3 Jan 2022]. Available: https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS

Thuan, N. T. B., Lofgren, C., Chuc, N. T. K., Janlert, U., & Lindholm, L. (2006). Household out-of-pocket payments for illness: evidence from Vietnam. BMC Public Health, 6, 1-9. Available: https://link.springer.com/article/10.1186/1471-2458-6-283

Tomayko, E. J., Mosso, K. L., Cronin, K. A., Carmichael, L., Kim, K., Parker, T., ... & Adams, A. K. (2017). Household food insecurity and dietary patterns in rural and urban American Indian families with young children. BMC public health, 17(1), 611. Available: https://link.springer.com/article/10.1186/s12889-017-4498-y

Trends, G. (2003). Public health and aging: trends in aging—United States and worldwide. *Public Health*, *347*, 921-925. Available: https://www.cdc.gov/mmWR/preview/mmwrhtml/mm5206a2.htm

Tucker-Seeley, R. D., Li, Y., Sorensen, G., & Subramanian, S. V. (2011). Lifecourse socioeconomic circumstances and multimorbidity among older adults. *BMC public health*, *11*, 1-9. Available: https://link.springer.com/article/10.1186/1471-2458-11-313

Unger, A. (2013). Children's health in slum settings. Archives of disease in childhood, 98(10), 799-805. Available: https://adc.bmj.com/content/98/10/799.short

United Nations. Sustainable Development Goals. In: The Sustainable Development Agenda [Internet]. 2017. Available: https://www.un.org/sustainabledevelopment/health/

Van Doorslaer, E., O'Donnell, O., Rannan-Eliya, R. P., Somanathan, A., Adhikari, S. R., Garg, C. C., ... & Zhao, Y. (2006). Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data. *The lancet*, *368*(9544), 1357-1364. Available: https://www.thelancet.com/journals/lancet/article/PIIS0140673606695603/abstract

Vennu, V., Abdulrahman, T. A., Alenazi, A. M., & Bindawas, S. M. (2020). Associations between social determinants and the presence of chronic diseases: data from the osteoarthritis Initiative. *BMC Public Health*, *20*, 1-7. Available: https://link.springer.com/article/10.1186/s12889-020-09451-5

Violan, C., Foguet-Boreu, Q., Flores-Mateo, G., Salisbury, C., Blom, J., Freitag, M., ... & Valderas, J. M. (2014). Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies. *PloS one*, *9*(7), e102149.Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0102149

Violán, C., Foguet-Boreu, Q., Roso-Llorach, A., Rodriguez-Blanco, T., Pons-Vigués, M., Pujol-Ribera, E., ... & Valderas, J. M. (2014). Burden of multimorbidity, socioeconomic status and use of health services across stages of life in urban areas: a cross-sectional study. *BMC public health*, *14*, 1-13. Available: https://link.springer.com/article/10.1186/1471-2458-14-530

Vlassoff, C. (2007). Gender differences in determinants and consequences of health and illness. *Journal of Health, Population, and Nutrition*, *25*(1), 47–61. Available: https://www.ncbi.nlm.nih.gov/pubmed/17615903

Vo, C. Q., Samuelsen, P. J., Sommerseth, H. L., Wisløff, T., Wilsgaard, T., & Eggen, A. E. (2023). Comparing the sociodemographic characteristics of participants and non-participants in the population-based Tromsø Study. *BMC Public Health*, *23*(1), 994.Available: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-023-15928-w#Sec7

Wagstaff, A. (2002). Poverty and health sector inequalities. Bulletin of the world health organization, 80, 97-105. Available: https://www.scielosp.org/article/bwho/2002.v80n2/97-105/en/

Wagstaff, A., & Van Doorslaer, E. (2003). Catastrophe and impoverishment in paying for health care: With applications to Vietnam 1993–1998. Health Economics, 12(11), 921–934. Available: https://onlinelibrary.wiley.com/doi/abs/10.1002/hec.776

Wagstaff, A., Flores, G., Hsu, J., Smitz, M. F., Chepynoga, K., Buisman, L. R., ... & Eozenou, P. (2018). Progress on catastrophic health spending in 133 countries: a retrospective observational study. *The Lancet Global Health*, *6*(2), e169-e179. Available: https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(17)30429-1/fulltext

Wang, Z., Li, X., & Chen, M. (2015). Catastrophic health expenditures and its inequality in elderly households with chronic disease patients in China. *International journal for equity in health*, *14*(1), 8. Available: https://link.springer.com/article/10.1186/s12939-015-0134-6?utm_source=chatgpt.com

Wang, H., Naghavi, M., Allen, C., Barber, R. M., Bhutta, Z. A., Carter, A., ... & Bell, M. L. (2016). Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. The lancet, 388(10053), 1459-1544. Available:https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)31012-1/fulltext?rss%3Dyes=&code=lancet-site

Wang, H., Torres, L. V., & Travis, P. (2018). Financial protection analysis in eight countries in the WHO South-East Asia Region. *Bulletin of the World Health Organization*, *96*(9), 610. Available**:** **https://pmc.ncbi.nlm.nih.gov/articles/PMC6154066/**

Williams, A., Kamper, S. J., Wiggers, J. H., O'Brien, K. M., Lee, H., Wolfenden, L., ... & Williams, C. M. (2018). Musculoskeletal conditions may increase the risk of chronic disease: a systematic review and meta-analysis of cohort studies. *BMC medicine*, *16*, 1-9.Available: https://link.springer.com/article/10.1186/s12916-018-1151-2

Wintara, H., Masbar, R., & Suriani, S. (2021). Determinants of socio economic and demographic characteristics of poverty in Aceh Province. *International Journal of Business, Economics, and Social Development*, *2*(2), 50-56. Available: https://journal.rescollacomm.com/index.php/ijbesd/article/view/134

Woolf, S. H., Aron, L. Y., Dubay, L., Simon, S. M., Zimmerman, E., & Luk, K. (2015). How are income and wealth linked to health and longevity?. Urban Institute. Available: https://www.urban.org/research/publication/how-are-income-and-wealth-linked-health-and-longevity

World Bank: World Development Indicators. Available:https://databank.worldbank.org/source/world-development-indicators#

World Health Organization. (2009). Global health risks: mortality and burden of disease attributable to selected major risks. World Health Organization.Available: https://books.google.com.bd/books?hl=en&lr=&id=Ycbr2e2WPdcC&oi=fnd&pg=PR5&dq=Global+health+risks:+mortality+and+burden+of+disease+attributable+to+selected+major+risks:+World+Health+Organization%3B+2009&ots=aiz_YySi7x&sig=pBMXtWupdTd2eAznvedslLg8VTs&redir_esc=y#v=onepage&q=Global%20health%20risks%3A%20mortality%20and%20burden%20of%20disease%20attributable%20to%20selected%20major%20risks%3A%20World%20Health%20Organization%3B%202009&f=false

World Health Organizaiton. (2014). Ghana Country assessement report on ageing and health. Retrieved from. Available:https://www.who.int/ageing/publications/ghana/en/

WHO (2018). Noncommunicable diseases: Factsheet. WHO. Available: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

World Health Organization. (2018). Noncommunicable diseases country profiles 2018. Available: https://www.who.int/publications/i/item/9789241514620

WHO (2020). Noncommunicable diseases progress monitor 2020. Geneva: World Health O6rganization;2020. Available: https://www.who.int/publications/i/item/9789240000490

WHO (2021). Noncommunicable Diseases In: Key fact [Internet]. 2021 Available:

WHO (2023). **Noncommunicable diseases:** Factsheet. WHO. Available: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

**WHO (2024): Ageing and health. Available:** https://www.who.int/news-room/fact-sheets/detail/ageing-and-health

**Wikipedia: Available:** https://en.wikipedia.org/wiki/Literature_review

Xu, K., Evans, D. B., Carrin, G., Aguilar-Rivera, A. M., Musgrove, P., & Evans, T. (2007). Protecting households from catastrophic health spending. Health affairs, 26(4), 972-983. Available: https://www.healthaffairs.org/doi/full/10.1377/hlthaff.26.4.972

Xu, K., Evans, D. B., Kawabata, K., Zeramdini, R., Klavus, J., & Murray, C. J. (2003). Household catastrophic health expenditure: a multicountry analysis. *The lancet*, *362*(9378), 111-117. Available: https://www.thelancet.com/journals/lancet/article/PIIS0140673603138615/abstract

Xu, K., Evans, D. B., Kadama, P., Nabyonga, J., Ogwal, P. O., Nabukhonzo, P., & Aguilar, A. M. (2006). Understanding the impact of eliminating user fees: utilization and catastrophic health expenditures in Uganda. Social science & medicine, 62(4), 866-876. Available: https://www.sciencedirect.com/science/article/abs/pii/S0277953605003667

Yardim, M. S., Cilingiroglu, N., & Yardim, N. (2010). Catastrophic health expenditure and impoverishment in Turkey. Health policy, 94(1), 26-33. Available: https://www.sciencedirect.com/science/article/abs/pii/S0168851009002127 Paper 36:

Yang, G., Wang, Y., Zeng, Y., Gao, G. F., Liang, X., Zhou, M., ... & Murray, C. J. (2013). Rapid health transition in China, 1990–2010: findings from the Global Burden of Disease Study 2010. *The lancet*, *381*(9882), 1987-2015. Available: https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(13)61097-1.pdf

Zahangir, M. S., Hasan, M. M., Richardson, A., & Tabassum, S. (2017). Malnutrition and non-communicable diseases among Bangladeshi women: an urban–rural comparison. *Nutrition & diabetes*, *7*(3), e250-e250.Available: https://www.nature.com/articles/nutd20172.pdf