“Non-Communicable Disease Burden and its Economic Impact on Households in Goa”

A Thesis submitted in partial fulfillment for the Degree of

DOCTOR OF PHILOSOPHY

Goa Business school
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By

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DECLARATION

I, Rivya Dias hereby declare that this thesis represents work which has been carried out by me and that it has not been submitted, either in part or full, to any other University or Institution for the award of any research degree.

Place: Taleigao Plateau Rivya Dias

Date:

CERTIFICATE

I hereby certify that the work was carried out under my supervision and may be placed for evaluation.

Name of the guide: Dr. B.P. Sarath Chandran

Professor, Goa Business School

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"Trust in the LORD with all your heart, and do not lean on your own understanding. In all your ways acknowledge him, and he will make straight your paths"- Proverbs 3:5-6

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Rivya Dias

Research Scholar

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List of Abbreviations

CHE	Catastrophic Health Expenditure
CKD	Chronic Kidney Disorder
CVD	Cardiovascular diseases
DALY	Disability Adjusted Life Years
HALE	Health Adjusted Life Expectancy
HH	Household
NCDs	Non-Communicable Diseases
NFHS	National Family Health Survey
OOPE	Out-of-Pocket Expenditure
PYLL	Potential Years of Life Lost
QALY	Quality Adjusted Life Years
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Introduction

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1.1 Introduction

1.1a Background

As the world is battling the variants of COVID-19, one must not fail to overlook the vulnerabilities associated with both, Communicable and Non-Communicable diseases (NCDs). The disease burden in the economy is growing at an alarming rate. This study specifically points towards the jeopardies of NCDs in the state of Goa. The major NCDs that cause mortality and morbidity worldwide are Diabetes, Cancer, chronic respiratory diseases, and cardiovascular illnesses. These and the associated risk factors are closely aligned with covid 19, which may even result in death. It is thus imperative to understand the nature of non-communicable diseases (NCDs), most commonly known as chronic illnesses. The terminology of chronic stems from the fact as it affects the individuals, and the disease sustain beyond a period of one year and requires constant and long-term treatment. Numerous studies have been done worldwide to assess the malignancies of this growing disease burden as it places a heavy toll on the lives of those afflicted, their families, their employment, wealth, income, and mental well-being. These illnesses were earlier construed to be hereditary. However, today, it manifests itself in the form of lifestyle diseases. An illness once known to beset the rich or the elite majorly has now begun to afflict those belonging to low- and middle-income households. The growing use of tobacco and alcohol, consumption of unhealthy diets, and reduction in physical activity all add to the risk factors contributing to the rising incidence of diseases.

Goa is a small state with a population of 14.59 Lakhs (Census, 2011); however, the increasing burden of NCD in the state is an issue that has plagued many households as well as the government of the state. NCDs being chronic and long-term, require frequent health as well as non-health expenditures. It often leads one to modify their behaviour and lifestyle. Such modifications sometimes come with higher costs in terms of exercise, changed dietary patterns, and counselling, among others. It thus induces a cost to the household with a patient/s afflicted with the illness. According to National Health Mission reports for Goa (2021), premature deaths due to non-communicable diseases account for 56.1% of the total disease burden, while NCD-related disability and morbidity account for 43.9%.

Overall, in India, the annual healthcare costs of NCDs are expected to reach Rs. 85,829 crores by 2026, as per the estimations of Barik and Arokiasamy (2016). In a developing

nation like India, where the burden of healthcare costs is unequivocally borne by the population owing to low government spending, these projections indicate an alarming trend in healthcare delivery and expenditure for households. The major NCDs contributing to the deaths comprise of cardiovascular diseases, Cancers, and Diabetes. The growth in the number of persons suffering from the diseases has been attributed to unhealthy diets, lack of physical activity, and use of tobacco and alcohol. The percentage of deaths in India attributable to non-communicable diseases (NCDs) has reportedly increased from 37.9 % in 1990 to 61.8 % in 2016, according to the study report by Dandona et al. (2017). These alarming statistics serve as a crucial foundation for investigating how different NCDs relatively impact the population.

The increasing burden of diseases and associated costs, specifically for Goa, is rising alarmingly. In terms of OPDs, the NSSO 2017-18 survey shows that 56% of the rural and 61% of the urban households in Goa utilise a public facility. In the case of inpatient delivery or IPDs, 85% of the rural and 59% of the urban households utilised a public facility. Furthermore, the average cost per hospitalised case in public facilities is approximately Rs. 3,039 for rural and Rs. 5,666 for urban households. Considering that NCDs require frequent treatment and hospitalisations in case of high severity of the disease, such costs can often lead to an impoverishment of households. According to Verma, Kumar & Dash (2021), nearly 13.7 % of the households in Goa were pushed into poverty owing to the OOP expenditure on NCDs, of which 8.2% were rural and 5.5% were urban.

1.1b. What is Health economics?

As we embark on this journey of development, our country is posed with numerous challenges, one among them being that of increasing health costs coupled with the "Lifestyle disease trend." Given the population of our country, health and the provision of healthcare is of utmost importance. With increasing standards of living and improved quality of life, it becomes essential to maintain a healthy work-life balance. As individuals strive to meet these demands, many health issues are ultimately ignored. Health Economics, a rising branch of economics today, deals with such issues and helps arrive at possible solutions and understanding of the concerned health problems. An individual's physical state determines how an individual addresses issues at work and at home. What concerns health economists the most is the valuation of health in monetary terms- when we try to weigh health as opposed to the various other objectives,

specifically concerning consumption goods. Health economics has been a significant area of the WHO, and they are constantly trying to improve health services. It is of utmost importance to understand the relationship between social development and economic growth, with particular emphasis on health.

1.1c. Communicable and non-communicable diseases

A healthy society is essential for one to be thriving and productive, but panic and disease can hamper consumption, production, and general well-being. The world has experienced communicable diseases from Human Immunodeficiency Virus (HIV), Ebola, the influenza pandemic, and the most recent covid 19. These pandemics have impacted the economy both regionally as well as globally. The onset of such epidemics causes strains on international trade and foreign direct investment that affect the countries both socially and economically- impact on tourism, infrastructure, social expenditures, etc., creating shock waves beyond the health sector and the geographical boundaries of the infection according to Smith (2019). Coupled with these communicable diseases, the world has witnessed the grim reality of various non-communicable illnesses such as Diabetes, Cancers, respiratory disorders, kidney diseases, and mental health. Together both cause millions of deaths yearly and increase public expenditures leading to a slowdown in the economy. The risk of a health outbreak and epidemic is not just the fear and panic of the illness but the economic, social, and physical repercussions it brings to the infected nation and the household. Because they can have less access to health care and fewer resources to guard against financial disaster, vulnerable sections, especially low-income people, are likely to suffer disproportionately.

According to Yadav & Arokiasamy (2014), the combined burden of communicable and non-communicable diseases is currently being felt in India. Age-specific morbidity patterns have changed significantly in recent decades, mainly due to an increase in the frequency of chronic diseases. In the last three decades, disease patterns in India have undergone tremendous structural changes. Advances in the epidemiological shift of mortality and morbidity to later stages suggest a change in this transition. Based on the study, during the transitional period from the 1970s to the mid-1990s, the burden of NCDs rose in rural India from 35.9 to 54.9%, whereas the burden of communicable diseases fell from 47.7 to 22.1%. Despite a decrease in the total burden of communicable diseases, this burden is still relatively high. According to the report,

communicable diseases account for as much as 30% of all illnesses. Therefore, low mortality, high morbidity, and the dual burden of NCDs and communicable diseases can be used to describe India's current stage of epidemiological transition. These broad patterns in mortality and morbidity point to India as a key contrast in the epidemiological transition process, especially in light of the findings from studies of affluent countries. (Harttgen et al. 2013; O'Caoimh 2021).

According to Dandona et al. (2017), infectious, maternal, neonatal, and nutritional disorders (referred to as infectious and related diseases in this summary for convenience) accounted for 61% of the overall disease burden in India defined as DALYs in 1990 but only 33% in 2016. Non-communicable disease burden increased correspondingly from 30% to 55% of the total illness burden between 1990 and 2016. Kerala, Goa, and Tamil Nadu are the three states with the highest ratios of non-communicable illnesses and injuries to infectious and related illnesses. According to Gupte, Ramachandran, & Mutatkar (2001), the health investment in India under the five-year plans has seen a stable variation across the years, with the highest being in the first five-year plan, i.e., 3.3 % of the GDP and the lowest in the eighth plan (1992-97) 1.75 % of the GDP. In the 1990s, health investment stood at 1.88% of the GDP; in 2016, this figure reduced to 1.3%. Thus, it can be seen that while the burden of diseases is increasing, the health expenditure in India is not rising commensurately with the disease burden and is decreasing. This adds a greater financial strain to households that are now paying a greater share of their income on health expenses through out-of-pocket expenditures.

1.1d. The burden of Non-Communicable Diseases

Non-communicable diseases (NCDs) have a very significant role to play in contributing to the overall disease burden, measured in disability-adjusted life years (DALYs) in India (One DALY represents the loss of the equivalent of one year of total health). India's State-Level Disease Burden Initiative declared that every state in India is currently rasping with a higher burden of NCDs and injuries alongside many infectious diseases. In 2017, NCDs accounted for 63.7% of all mortality and were a significant contributor to the cost of treatment for inpatient admissions, which amounted to 40%, and ambulatory care, which was 35% (Dandona et al., 2017). Financing for NCDs is laden by out-of-pocket expenditure (OOPE), assuming catastrophic proportions. Therefore, it is imperative to investigate the extent of catastrophic health expenditure

(CHE) on NCDs, which are burgeoning in India. NCDs affect the macroeconomic setting of the economy by leading to lower growth rates. These NCDs pose a financial burden to the people who have to deal with them, thus making them a dual burden to the economy (Bloom et al., 2012). National Health Accounts estimates (NHSRC,2014) reveal that appallingly low coverage of private health insurance and a shortage of government expenditure on prepayment mechanisms and subsidies showed that households heavily rely on out-of-pocket payments (58.7% of total health expenditure) for healthcare. Subsequently, households become more vulnerable to catastrophic health expenditure and impoverishment due to health shocks which in the long run leads them into poverty. The severity of the impact of NCDs on households is likely to be more in low- and middle-income countries, where low-income populations, many of whom already experience extreme absolute poverty and precarious living conditions, are especially vulnerable to impoverishment due to any degree of health spending. Thus, it is imperative to gauge an estimate of the headcount of households susceptible to catastrophic health expenditure to bolster evidence-backed policy decisions toward achieving Universal Health Coverage (Ministry of Health and Family Welfare, 2020). There has been an increase of nearly 50% in out-of-pocket expenditure for NCDs from 31.6% in 1995–96 to 47.3% in 2004. A major portion of the income is used to purchase medicines, laboratory tests, and medical equipment such as glucometers, strips, insulins, etc., as noted by Mahal et al. (2010). A study by Gupta, Kandamuthan, & Upadhyaya (2006) estimated that in Kerala, the economic burden due to cardiovascular disease (CVD) is around 20% of the state's domestic product. According to the Economist Intelligence Unit (EIU, 2007) the estimated the economic cost of the Diabetes epidemic, was nearly 2.1% of India's GDP in the year 2007. The economic costs were calculated considering direct medical care costs, productivity loss due to mortality, morbidity, and disability associated with Diabetes. Besides this, there are several studies focusing on the costs of treating Diabetes in India. Boutayeb & Boutayeb (2005) emphasised the various non-communicable diseases, including cardiovascular diseases, Diabetes, Cancer, and chronic pulmonary diseases. It was found that their burden is affecting countries worldwide, with a growing trend in developing countries. Strategies must take into account the increasing trend of risk factors correlated with these diseases.

1.1e. Economic Impact of Non-Communicable Diseases.

NCDs not just impact the health and well-being of individuals but also have detrimental impacts on social engagements and economic consequences. The economic impact of non-communicable diseases is relatively significant. Since an event in health is considered a random event, generally unforeseen, it weighs down the resources at the hands of the households. Expenditures of households on medical care must also account for the critical constraint - limited resources available to the household. In a country like India, with significant inequalities, the impact of this constraint gets even more exacerbated.

Considering the fact that age and gender determine and have an effect on good health, illness does have a very fair degree of being predicted. There is a change in the morbidity patterns as age increases and chronic illnesses occupy a major component of medical care. In any given year, a family's income can be high or low due to a temporary or permanent loss of employment, ill health, gains in investments, or other unexpected events. It is also seen that there is an inverse relationship between the price of a service and the usage of it. There are instances where an individual may postpone medical treatment -a surgical procedure, for example, due to the exorbitant prices they must pay. There are medical treatments that can be postponed or performed in different institutional settings as some of the medical treatments are sensitive to price changes. In some instances, where the medical intervention is urgent, the patient may even alter his consumption spending or resort to borrowing/liquidating assets to fund the medical expenses.

Numerous factors determine the demand for medical care, such as the incidence of illness, demographic and cultural peculiarities, and economic factors. These factors also affect an individual’s utilisation of medical services. Many reasons influence people’s choices in seeking medical treatment at a government or a private hospital/clinic. The need for medical care is one element affecting the demand for medical care. It is often seen that if the quantity of medical services is more than the actual amount that individuals require to use, it will lead to under-utilisation of medical services such as hospitals, physicians and thus bringing about a misallocation of resources- resources that could have been used in the utilisation of other productive activities. On the flip side, it is also witnessed that if the demand for medical care exceeds its supply-this would ultimately lead to increased waiting times for the patient and loss of labour

productivity- time that could have been used elsewhere by labour to improve its efficiency. Thus, it is essential to plan for the need for medical care keeping in mind the demand for medical care. The marginal cost of a medical service needs to equate to the marginal benefits to consider the service optimal. Efficiency in consumption and efficiency in production are the criteria on which the evaluation in different markets is performed. More specifically, in the context of medical care, the efficiency criterion is more widely accepted than the consumption criterion. The demand for medical care stems from the foundation that there is a demand for good health by individuals. Michael Grossman in (Grossman,1999) identifies two reasons that consumers attribute to the demand for good health –i) Consumption commodity, which believes that a consumer will feel better if his sick days' decrease, and that good health is ii) investment commodity that allows time for a person to decide for market and non-market activities. Why does the decrease in sick days' matter? Fewer sick days allow a potential individual to have increased time for both work and leisure because investing in good health has the monetary value of lowered sick days. Good health is needed to increase labour productivity and efficiency. It is also seen that as a person's age increase, the health stock depreciates. Hence, more demand and increased expenditures on medical services and medical care can be witnessed with rising ages. Increasing people's wages also leads to an increase in the demand for medical care. With reference to education, it is witnessed that education negatively affects the demand for medical care. People who are highly educated are supposedly better off at producing good health and, are less likely to increase their expenditures on medical services.

Conversely, better-educated individuals may also hold more demanding jobs that may lead to the incidence of NCDs due to their lifestyle habits. In this light, one must look closely at how factors such as the prevalence of NCDs in conjunction with demographic such as age, education, and socio-economic class lead to changes in labour productivity and efficiency. NCDs have a direct financial impact on households, society, and health systems because they have high treatment costs. NCDs also place a substantial indirect economic burden on society in the form of significant productivity losses due to early mortality, departures from the labour force at an early age, absenteeism from work due to frequent visits to the hospitals or clinics, and ultimately reduced capacity, productivity and efficiency at work (PAHO,2022).

Non-Communicable diseases impact households' financial and social security, owing to their chronic nature, and primarily when it affects people during the years when their productivity is essentially high. With such restricted ability to engage in fruitful and constructive economic activities, households are ultimately pushed into impoverishment and poverty. In this context, the present study aims to provide a comparative view of the NCDs- Diabetes, Cancer, Cardiovascular diseases, and Chronic kidney disorder, by analysing the various facets attributable to such illnesses in the state of Goa.

1.2 Statement of the Research Problem

In the background of growing NCD burden, the present study seeks to understand the economic burden placed by selective NCDs (Diabetes, Cancer, Cardiovascular diseases, and Chronic Kidney Disorder) on households of Goa. Diabetes, Cancer, CVD and CKD are selected due to their high incidence rates in Goa. The state of Goa is selected to understand the economic impact of the diseases on a high-income state, small state where the health infrastructure is developed. The study provides a comparative analysis across these NCDs to investigate their relative impact on costs, the economic behaviour of the households, impoverishing effects, source of funding, and choice of healthcare.

1.3 Research Questions

Health is an essential component and one of the many indicators that impact the country's growth and development. It plays a vital role in enhancing the overall capabilities of an individual. Incidence of chronic illnesses today is rapidly rising due to modern lifestyles and stress associated with it. NCD’s generally thought to be hereditary, today manifest themselves due to the changing patterns of consumption, work, stress, lifestyle etc. Considering the rising cost of living on one hand and the high risk of these diseases, understanding their prevalence and its economic consequences is of paramount importance. Goa being a small state, the issues need to be discerned appropriately.

1. What are the relative costs of healthcare associated with different non-communicable diseases in Goa?
2. What are the costs associated with NCDs when looking at them from the perspective of catastrophic health expenditure?

3. How do these NCDs impact HH income, HH expenditure, consumption, saving, and investment patterns?
4. What are the preferences of the general populace vis-à-vis public and private healthcare facilities?

1.4 Significance of the Study

The present study highlights one of the important concerns of the health sector, not just at a local level but also at a national purview using international frameworks of analysis. NCDs are posing huge burdens on the population. Adequate awareness and lifestyle changes are mandatory to save households from the disease burden posed by chronic illnesses. The disease burden is widening and, is posing greater threats to the country's development process. In the recent past, with the onset of COVID, this has posed a dual burden to society and the government. Since these chronic illnesses persist throughout the life span, it takes away opportunities for gainful employment and vertical mobility for millions of populations. As the literature suggests, NCDs severely impact economic outcomes at both the household and macro or national levels. Significant changes are required at the individual level in terms of lifestyle changes, including proper diet, exercise, sleep, etc. If the expenditures on health and health care increase over time, "health" as a commodity will be reasonably unaffordable by many. Undoubtedly, the government of Goa has an immense role to play in attaining its goal of "Health for all." With its growing population the government has a mammoth task to provide for this growing population within the available resources. Deaths due to non-communicable diseases increased by 37.9 % since 1990 according to Dandona et al. (2017). Kerala, Goa, and Tamil Nadu have the largest share of non-communicable diseases. Health is one of the most significant drivers of economic growth. Thus, one needs to analyse the relative healthcare costs associated with such illnesses.

From a theoretical perspective, the current study seeks to evaluate the economic burden of the diseases using frameworks of analysis such as catastrophic expenditure, direct and indirect costs, and household economic behaviour as a result of the incidence of NCDs. From a practical contribution perspective, this study presents comparative evidence of the impact the NCDs have on the households of Goa.

If extrapolated at a national level, the current study can lay the foundation to understand how each of the NCDs is likely to impact the economy at a national level. Subsequently,

the comparative evidence can also guide policymakers to ramp up the healthcare facilities to minimise the cost burden associated with each disease.

1.5 Research Objectives

1. To relatively examine the costs imposed by NCDs on the households of Goa, their impact on impoverishment, and the funding mechanisms utilised by household.
2. To assess the comparative impact of non- communicable diseases on households' earnings, employment, and ability to save, consume and invest.
3. To examine the preferences of Households Vis a Vis public health care and private health care facilities, as driven by quality factors.

1.6 Methodology

The present study uses both a descriptive and analytical approach to the economic issues concerning non-communicable diseases in the state of Goa. The classification of non-communicable diseases followed the classification adopted by WHO in Global Burden of Disease Studies, 2004. The study uses both Primary data and compares it with the findings of national secondary data on health. The secondary sources are the descriptive dataset in the National Family Health Survey (NFHS) rounds and India Human Development Survey (IHDS) 2011-12. Secondary data sources have been used to compare the empirical results of the primary survey of the study. The study's major findings are based on primary data. A representative sample was chosen wherein households were administered a questionnaire adapted from the WHO-STEPS questionnaire and other similar questionnaires. The questionnaire had several sections pertaining to the various facets attributable to those households afflicted with an NCD- the demographics, socio-economic profile, health status indicators, financial attributes of a household, consumption behaviours/ patterns, and public and private availability of medical treatment. The questionnaire also includes a segment on the costs involved in case treatment was sought outside the state of Goa. The sample chosen represented various income groups, locations, and ages across the state of Goa. The respondents were administered the questionnaire only after their consent. The responses were collected through telephonic interviews, face–to–face interviews (very few in number), and online response sheets. The sample chosen was based on the premise that the

household had at least one member afflicted with an NCD. Thus, the study utilises convenience sampling. Further, some of the respondents gave references to further respondents leading to a situation of Snowball sampling. This adds to the randomness of the sampling method. To keep the sample unbiased, the study maintains variances in responses by choosing respondents with different household categories, household types, ages, economic backgrounds, locations, demographics, etc.

Various statistical tools were used for the purpose of data analysis and interpretation. Tools such as regression analysis and other tests were used wherever necessary. Data analysis also included descriptive statistics using tables, figures, and percentages. The data was analysed using STATA 14 software.

1.7 Scope of the Study

The present study attempts to evaluate the economic burden of NCDs, namely Diabetes, Cancer, cardiovascular diseases, and chronic kidney disorder, across the households of Goa. The study measures the impact by evaluating direct and indirect costs attributable to the diseases while controlling for factors such as socio-economic class, age, and number of members with NCDs, among others. Subsequently, the study also looks at the catastrophic health expenditures that arise from these diseases. Besides, the study assesses the source of funding a household utilises to meet the expenses accruing from the incidence of these diseases. The present study also documents the economic impact of these diseases by comparing how the various NCDs affect the households' income, employment, savings, consumption, and household investment. The underlying goal of the study is to assess which of the NCDs pose the highest burden on households across Goa. The study also recognises that different households may choose different healthcare facilities when getting treated for these NCDs, and their choices may further be driven by various factors. The choice of healthcare has also been mapped in the study to ascertain the preference bundle of households. The scope of the current study is limited, wherein only a sample of 400 households was selected for the study, all of which had at least one member afflicted by NCDs such as Diabetes, Cancer, cardiovascular diseases, and chronic kidney disorder. Urban households comprised 31.75% of the total sample, while rural comprised 68.25%. Further, to get a more diverse view, these households differed on the parameters of household type, i.e., kutcha house or a pucca house, and household category, i.e., scheduled caste, scheduled tribe, other backward classes, and general. When analysing the expenditure patterns, the study

utilises a one-year recall period for income, savings, and investment and a one-month recall period for Consumption. The results of the study can be extrapolated at a macroeconomic level using adjusted weights.

1.8 Limitations of the Study

Since the study is based purely on the responses of the representative sample, the data and the analysis are based on the same.The errors and other lacunae, the accuracy of the profile prepared, and data analyses depend primarily on the information provided by the respondents themselves. Since it is a primary survey recall bias, it could be an issue beyond the investigator's control. The data gathered relied mainly on the survey method. A possible attempt was made to record valid and reliable information. The survey was conducted during the pandemic, limiting face-to-face interviews. Most respondents submitted their inputs either through telephonic mode or through a Google response sheet. The limitation of the latter mode is that in a Google response sheet, the respondents cannot clarify if they have any doubts about a particular question. This can yield obscure inputs.

Further, the sample chosen was based on the premise that the HH had at least one member afflicted with an NCD. Thus, the study utilises convenience sampling rather than a random sampling method. Also, in the current study, some of the respondents gave references to further respondents, leading to Snowball sampling. This further adds to the randomness of the sampling method. Furthermore, the snowballing effect was spurious, with the process not following a linear or exponential pattern. However, to keep the sample as unbiased as possible, the study attempts to maintain variances in responses by choosing respondents with different household categories, household types, ages, economic backgrounds, locations, demographics, etc. The ailments, disease conditions, and the associated OOP expenditure reported by the households in the survey as revealed by them and not clinically diagnosed. Given the time constraints and the limited resources, a more detailed and comprehensive analysis could not have been undertaken with certain NCDs and other illnesses, such as chronic respiratory illness and mental health. Subsequently, the study does not account for the severity of the disease, which can have a differential impact on costs borne by households whereby, analysis requires a stronger epidemiological foundation and clinical expertise.

1.9 Chapter Scheme

This study has six main chapters.

Chapter 1- Introduction: This chapter contains the background of the study, the research problem, and the objectives of the study. It also highlights the research methodology and the study's significance and limitations.

Chapter 2- Theoretical and Empirical Review Health Economics and Burden of Non-Communicable Diseases: This chapter begins with the key definitions and terms used in the study. A comprehensive, systematic, and detailed literature has been reviewed regarding critical theories, empirical studies, and the different methodologies adopted in the studies. The areas under review include- the cost burden of the diseases, source of funding associated with NCD care, impact on income /earnings, employment, consumption and savings of a household, long-term investment, and choice of healthcare. This chapter also provides the primary evidence from the sources and the research gap.

Chapter 3 deals with the analysis of the first objective: Household-level out-of-pocket expenditure on health. This major objective has four sub-objectives. The first is to compare the expenses (direct and indirect) incurred on various non-communicable diseases. In order to analyse this, a Linear Regression was adopted. A Bayesian model was adopted to calculate catastrophic health expenditures. The funding source by the households under study was analysed using logistic regression.

Chapter 4- This chapter provides the analysis of the second objective: The impact of non-Communicable diseases on income, employment, savings, consumption, and investment. In order to assess the impact of NCD on income, a linear regression was used with the dependent variable as total loss of earnings calculated as the opportunity cost of missing work calculated as the loss in daily wage for the patient and the caregiver. In order to assess the loss in employment, logistic regression was adopted. For assessing the impact on savings patterns and consumption behaviour of households, a linear regression model was utilised. Investments play an important role in funding for unforeseen contingencies, and households ailing with NCDs find it challenging to maintain a suitable level of investment. The study thus provides a descriptive overview of investments undertaken by disease-afflicted households.

Chapter 5- This chapter examines the third major objective of the study: Preferences of Households Vis a Vis public health care and private health care facilities. A chi-sq. and logistic regression were adopted to examine this objective. The preferences concerning the various quality factors were evaluated. Quality factors such as the efficiency of staff, fewer waiting hours, timely treatment, a clean environment, and privacy during treatment.

Chapter 6- Findings and Conclusions: In the final chapter, the summary of the previous chapters is presented, followed by the major findings and conclusion. The chapter also includes policy implications and recommendations as brought out by the analysis of this study and suggestions for future research.

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CHAPTER 2

THEORETICAL AND EMPIRICAL REVIEW ON THE BURDEN OF NON-COMMUNICABLE DISEASES

2.1 Introduction

2.2 List of definitions and key terms used in the study

2.3 Review of Theories in Health Economics

2.4 Burden of Non-Communicable Diseases: Review of Methodologies

2.5 Review of Empirical studies in Disease Burden.

2.6 Literature Review: Primary Evidence

2.7 Research Gap

2.8 Conclusion

2.1 Introduction

The prevalence of NCDs is growing significantly across patients in all income groups however a greater impact of these diseases if felt by the patients belonging to lower income strata. According to the data by IHME and WHO, the prevalence rate of NCDs has risen globally by 29.18 % between 1999 and 2019. The risk of NCDs is increased by several modifiable behaviours, including cigarette use, physical inactivity, poor lifestyle choices, and consumption of alcohol which has seen a rise in recent years. The increase in risk factors has led to additional deaths of 37.71% between 1999 and 2019, according to the IHME database. The leading cause of death worldwide is non-communicable diseases (NCDs), which include heart disease, stroke, Cancer, chronic respiratory illnesses, and Diabetes. This undetected plague hampers the economic advancement of many nations and is a significant contributor to poverty. The burden is expanding, as is the number of affected individuals, families, and communities. The major NCDs have common, controllable risk factors at their core. They include smoking, dangerous alcohol usage, and poor eating habits. Healthcare costs for NCDs swiftly deplete household funds in low-resource environments. Millions of people fall into poverty each year due to NCDs' high prices, which frequently include time-consuming and expensive treatment that hinders development.

The relationship between health and economic growth has also been studied theoretically. These indicate significant connections between national economic development and human health. Since the financial burden of NCD incidence is frequently quantified, many health economics approaches are employed.

Given the budget, in any medical system, the choice must be made concerning the type of medical services people utilise. This leads to a choice between using government healthcare services, which are mass-produced at affordable rates, and private healthcare services, which offer superior quality. In this context, this chapter is divided into sections. Section 2.2 describes the list of definitions and key terms used in the study. Section 2.3 reviews the theories in Health Economics. Section 2.4 describes the burden of Non-Communicable Diseases by reviewing the Methodologies, while section 2.5 reviews Disease Burden estimation across different empirical studies. Finally, section 2.6 provides a section on the primary evidence derived from the extensive literature review, section 2.7 gives the research gap, and finally, the conclusion is presented in section 2.8

2.2 List of Definitions Used in the Study

Out-of-pocket expenditure (OOPE): Expenditures borne directly by a patient where insurance does not cover the total cost of the health good or service. They include cost-sharing, self-medication, and other expenditure paid directly by private households. Some countries also have estimations of informal payments to healthcare providers. Some households need more out-of-pocket payments. (OECD, 2009)

Direct cost/ direct medical cost (Continuous variable): A Sum of the total of all health Expenses that includes medical expenditures, laboratory test costs, and hospitalisation costs over a period of one year.

Indirect cost (Continuous variable): A sum of the loss of income of the patient and the caregiver on account of the medical condition, visits to the clinic, and duration of hospitalisation as well as payments given to the caretaker of dependents of the family. (Lakshmanan, 2015); (Weerasinghe et al., 2022).

Catastrophic Health Expenditure (CHE) (Continuous Variable): Catastrophic health expenditure is commonly defined as payments for health services exceeding 40% of household disposable income after subsistence needs are met (Mahal et al., 2010) using the formula:

$$D_j = \frac{h_j}{E_j - n_j P}$$

h_j: Combined health spending on all hospital costs for HHj

E_j: total HH consumption spending.

nj: Size of the HH; p: poverty line of spending

Catastrophic spending occurs where Dj>0.4

Annual Hospitalisation Cost (Continuous variable): The annual cost a person incurs due to being hospitalised. This can comprise the hospital bill, the bed cost, surgery, etc.

Medical Expenditure (Continuous variable): The number of times a patient purchases medicines into the amount he has to spend every time he buys the medicines, aggregated over a period of one year.

Annual Laboratory test cost (Continuous variable): The costs of laboratory tests and other diagnostic tests a person incurs over a period of one year.

Household: A 'household' is usually a group of persons who typically live together and take their meals from a common kitchen unless the exigencies of work prevent any of them from doing so. Persons in a household may be related or unrelated or a mix of both. (Census, 2011)

Care Giver: Formal caregivers are specially trained in caregiving and are paid for their job. They can be volunteers for charity purposes or can make this their profession. The care provided by the family members, which is unpaid, is the informal and the largest sector of caregiving (Priya et al.,2021)

2.3 Review of Theories in Health Economics

Analysis of the economic impact of ill health can address a range of policy concerns relating to the effects of sickness or injury. It is distinct from but complementary to clinical or epidemiological approaches to disease burden assessment. Some of these inquiries concern the impact of poor health on a home, business, or government at the microeconomic level. In contrast, others pertain to the macroeconomic level, such as a household's income or a company's earnings, including the impact of an illness on a nation's gross domestic product or its future chances for growth. There are many different methodologies used to estimate direct and indirect costs. According to welfare economic theory, people or populations try to maximise utility (what economists refer to as economic welfare), subject to various restrictions, including income and time (Coyle & Nakamura, 2019). These different methodologies are based on the theory of health economics.

The United Nations Population Fund (UNFPA) and the World Health Organization (WHO) in 2021 agreed on measures to control the rise in NCDs. Outcomes included Certain country-level actions such as tobacco control, reducing harmful use of alcohol, and improving health.

The statistics showing the increasing trend of NCD prevalence, the cost of medical care, and a surge in the population vulnerable to NCDs based on the risk factors present a rather portentous projection of the healthcare scenario in India. The NCDs afflicting the population comprise those that accrue due to lifestyle habits. In a state like Goa, which has incomes higher than India's national average, the prevalence and impact thereof of lifestyle-based diseases becomes all the more pertinent. Linked to this issue is also the fact that different

conditions may impact populations differently based on the cost it imposes and the loss of efficiency, among others. These aspects mentioned above served as the premise for the research motivating this study. The following section discusses the assessment of health economics as a relevant area of study of theoretical foundations that can help us quantify the impact of NCDs in the state of Goa, India.

Why is health economics a relevant area of study?

According to the study by Audibert et al. (2012), the health status of a population is linked with the efficiency of labour increasingly and also human capital accumulation based upon the contribution of health hours. Further, according to Bloom and Canning (2000), improvements in longevity increase savings and, in turn, investments. Subsequently, there is also growing dependence on nations' wealth from demographic dividends. The effect of health on economic growth has also been the subject of theoretical investigations. These indicate strong linkages between a nation's human health and economic growth. In this light, it becomes essential to understand this relation from different perspectives. The subsequent section tries to build upon this dynamic.

From a perspective, the two areas one can study are Institution v/s Household perspective.

As categorised in the study by Luce et al. (1996), the cost of illnesses can partly explain the different strands of perspectives under which health economics can be examined. These comprise of societal, health care system, third party players, business, government, and lastly, participants and families. Table 2.1 summarises these strands from the perspective of cost coverages and has been taken from Luce et al. (1996).

Table: 2.1 Perspective within the cost of illness

Perspective	Medical Costs	Morbidity Costs	Mortality costs	Transportation /Non-medical costs	Transfer Payments
Societal	All costs	All costs	All costs	All costs	-
Healthcare system	All costs	-	-	-	-
Third-party payer	Covered costs	-	Covered costs	-	-
Business	Covered costs (Self-insured)	Productivity losses (Absenteeism)	Productivity losses	-	-
Government	Covered (Medical aid)	-	-	Criminal Justice Costs	Attributable to illness

Participant and Families	Out-of-pocket costs	Wage losses/HH production	Wage losses/HH production	Out-of-pocket costs	Amount Received

Source: Excerpt from Luce et al.1996.

From the perspective of society and societal costs of NCDs, the coverage broadly focuses on medical, morbidity, mortality, and non-medical costs such as loss of productivity, etc. According to the study by Basu et al. (2015), the societal cost arising out of CVD has been estimated to be $13.6 billion per year. It covers three treatment categories- $2.6 billion for primary prevention, $0.8 billion for secondary prevention, and $10.2 billion for tertiary treatment.

From the healthcare system's perspective, the analysis's cost coverage is limited to medical costs only. Based on the results of the study by Prinja et al. (2016), the annual cost of delivering healthcare services in three Indian states (Haryana, Himachal Pradesh, and Punjab) through public sector primary and community health facilities was estimated to be Rs 8.8 million and Rs. 26.9 million respectively.

The third party's perspective seeks to cover medical costs whose burden is borne by insurance companies. The study by Shoree et al. (2014) found that in the context of the Rashtriya Swasthya Bima Yojana (RSBY) insurance scheme, the claims from the state of Chhattisgarh have increased by 266% (Rs. 38,436 to 1,40,900) in private hospitals, and by 204% in public facilities (Rs. 30,525 to 92,905) between the years 2002 and 2013.

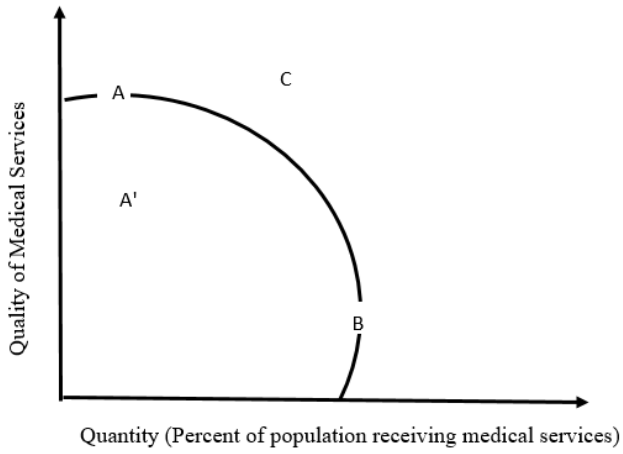
The business perspective of healthcare looks at the cost burden of absenteeism of workers and the medical cost covered by the employer. Based on World Health Organization (2017), a significant proportion of businesses amounting to 42% in 2010, have stated concerns regarding the impact of NCDs. They have highlighted the adverse effects on output, revenue, profitability, business performance, and potential for economic growth. They have found that NCDs have impeded workforce productivity by elevating absenteeism rates, diminishing workers' energy and focus, and depleting critical workplace skills. In addition, the business community is also concerned with the impact of NCDs on the size and purchasing power of their current and prospective customer bases.

The government perspective covers the cost coverage from transfer payments and medical and infrastructural costs. This is relatively straightforward as it is accounted for the budget allocated from the GDP for healthcare. In India, the latest FY 2022-23 budget allocated Rs. 86,200.65 crores towards healthcare, which accounts for 2.3% of the GDP. In the context of this study, the scope would be the household perspective, also known as the patient or family perspective of looking at the cost of health.

The trade-off between the quantity and the quality of services provided in healthcare

The production possibility curve representing medical care shows a trade-off between the quantity and the quality of services provided in healthcare (Figure 2.1). Given the budget, in any medical system, the choice must be made concerning the type of medical services that need to be produced. Choosing a combination of the quality and quantity of medical services by society depends on a set of criteria. If the Maximization of consumer preferences were one of the criteria, selecting a group of consumers and gathering information would be one way of knowing the quality-quantity combination that should prevail. This trade-off also allows one to understand the choices needed to produce the best medical care. Choosing the best combination that also induces less cost is one of the optimal solutions for the efficient quality of health services that can be provided.

Figure 2.1: Production possibility curve depicting a trade-off between the quantity and the quality of services provided in healthcare



Source: Feldstein, (2012)

Andersen's Model of access to healthcare

This model acts as a framework for understanding the situations that either smoothen or hinder the general public's utilisation of health care services. Each individual's utilisation and access to health services is primarily based on three characteristics that consist of predisposing factors (such as societal conditions related to education, ethnicity, social networking, etc.), Enabling factors (access to health services, health insurance, availability of health professionals, wait times besides including genetic and psychological features) and lastly, need factors (including underlying health conditions requiring medical intervention).

The present study draws from Andersen's framework in providing a holistic approach to the issues discerning NCDs concerning the utilisation of public and private healthcare services.

2.4 Burden of Non-Communicable Diseases: Review of Methodologies

Several studies have outlined the burden that NCDs impose at an individual level, at a household level and at a macroeconomic level. Considering that the measurement of this burden can be approached in different ways, studies use a myriad of tools, techniques, and methodologies to estimate it (Jo,2014; Koopmanschap,1998; Akobundu et al., 2006; Drummond et al., 2015). The various approaches can be summarised below according to the stratification followed across different studies.

Prevalence- vs. incidence-based approaches

The cost-of-illness studies (COI) could be described as a prevalence-based or incidence-based approach based on how it uses epidemiological data. Prevalence based method estimates the economic burden of a condition over a specific period, usually a year, while the incidence-based approach estimates a new number of cases arising in a predefined period and accounts for the lifetime costs of a condition from its onset until its disappearance (by cure or death). Prevalence-based studies estimate the number of cases of death and hospitalisations attributable to diseases in a given year and then estimate the costs that flow from those deaths or hospitalisations (plus other costs such as prevention, research, and law enforcement costs). Incidence-based studies estimate the number of new cases of death or hospitalisation in a given year and apply a lifetime cost estimate to these new cases.

Prospective vs. retrospective approaches

The cost of illness analysis can be performed either in a prospective or retrospective way based on the relationship between the launch of the study and the data collection. The retrospective approach accounts for all the relevant events that have already happened before the study. The prospective approach accounts for all the relevant events that have not already occurred at the beginning of the study. i.e., the data collection needs to be done by following up with the patients over time.

Top-down vs. bottom-up vs. econometric approaches

Top-down approach

Under the top-down approach or the epidemiological or attributable risk approach, the estimates measure the proportion of disease due to exposure to the disease or the risk factors.

It uses aggregated data along with population-attributable fraction (PAF) or epidemiological measures to calculate the attributable costs.

Bottom-up approach

In a bottom-up approach, the cost estimation can be calculated in two steps. The first step is to measure and quantify the health inputs employed, and the second step is to estimate the unit costs of the inputs used to produce and confer specific medical and health care services. The total costs result from the multiplication of unit costs by the quantities used. In most cases, national-level survey datasets are used as they provide reliable data on medical care utilisation. This allows the researchers to easily quantify the number of medical care services along with unit costs or price values.

Econometric approach

Within the econometric approach, the researcher tries to estimate the difference in costs by dividing the sample population into cohorts (one with the disease and another cohort without the disease). Series of regression analyses is performed on the two cohorts that are matched, keeping in mind various demographic and mediating factors and other chronic conditions. Through this analysis, one can either arrive at a mean differential (compares differences of the mean costs incurred by each of the two cohorts to determine the incremental difference attributable to the disease) and a multiple-stage regression approach that is typically performed if there are a large number of cases with zero costs and a few cases of very high costs. In the multiple-stage regression method, the incremental cost of the disease is measured through a comparison of the coefficients of the disease dummy variable.

Household perspective – Methodology

Health Adjusted Life Expectancy (HALE)

Based on the study by Lajoie (2013), Health Adjusted Life Expectancy (HALE) is a measure of population health that considers two aspects of mortality and morbidity. It modifies overall life expectancy by accounting for the amount of time lived in less than perfect health. The calculation involves subtracting from the life expectancy a figure which is the number of years lived with a disability multiplied by a weight to represent the effect of the disability. As per the results of Hay et al. (2017), for females in the year 2016, life expectancy was found to be 70.33, and HALE has been calculated to be 59.67, while for males, the life expectancy was 66·93 and HALE was 58·18.

Disability Adjusted Life Years (DALY)

WHO Specifies the measurement mechanism of Disability Adjusted Life Years (DALY) as the impact of premature death or disability on life lost in a population. They are primarily used to estimate the burden of disease on populations. Weightings conditions are applied when doing these calculations, some of which include the time trade-off approach[1], greater weightage on the life of a young adult compared with a newborn, among others. According to Menon et al. (2019), there were approximately 9·7 million deaths and 486 million DALYs in India in 2017. About 75% of deaths and DALYs occurred in rural areas. The DALYs here account for disabilities attributed to all communicable and non-communicable diseases. As per the WHO Global Burden of Disease, 2011, mortality does not give a complete picture of the disease burden borne by individuals in different populations. The disability-adjusted life year (DALY), i.e., a time-based measure that combines years of life lost due to premature mortality (YLLs) and years of life lost due to time lived in states of less than total health, or years of healthy life lost due to disability (YLDs) can be used for assessment of the disease burden. One DALY represents the loss of the equivalent of one year of total health. Using the DALYs, the burden of diseases that cause premature death can be compared to that of diseases that do not cause death but do cause disability (such as cataracts causing blindness).

Quality-Adjusted Life Year (QALY)

According to Whitehead & Ali (2010), the quality-adjusted life year (QALY) incorporates the impact of a disease on both the quantity and quality of life. QALY comes under a class of assessment known as cost-utility analysis. Utilities are measured on cardinal scales of 0-1, capturing preferences for different health states based on treatment interventions. In the study by Sathish et al. (2020) on the cost-effectiveness of a lifestyle-based Diabetes prevention program in Kerala, the authors estimated the cost-effectiveness analysis for Diabetes across 1007 participants. They found that effective intervention had led to a gain of US$155 per person per annum.

QALY and DALY are most commonly used in cost-effectiveness analysis (CEA), which help in the measurement of health benefits. In the recent past, it has been seen that childhood and adult mortality rates have continued to decline worldwide, whereas morbidity or the

[1]. The time trade-off approach requires survey respondents to answer questions that compare their preferences to living more years in imperfect health compared with fewer years in perfect health.

time lived with health loss, has become a significant concern in high-income countries (HICs) and low- and middle-income countries (LMICs). Estimations of QALYs and DALYs are being used increasingly to assess the cost-effectiveness of interventions that affect quality and length of life (Feng et al., 2020). The measurement of health benefits is a critical issue in health economic evaluations. It is seen that there is very scarce empirical literature exploring the differences between using quality-adjusted life years (QALYs) or disability-adjusted life years (DALYs) as benefit metrics and, thus, their potential impact on decision-making. These two paradigms have emerged as the main competitors in informing national agencies and global decision-makers, although not without controversy and with the availability of other alternative potential metrics (Augustovski et al., 2018)

Potential Years of Life Lost (PYLL)

PYLL- Potential Years of Life Lost (PYLL), as defined by Whitehead & Ali (2010), requires adding up deaths due to a particular cause or multiple causes at each age and multiplying this with the number of remaining years to live up to a selected age limit. The limit of 70 years is frequently chosen (sometimes 65 is chosen). The choice of 70 and 65 signifies the level of development for which the calculation is being undertaken, with 70 being the limit in developed countries. PYLL can be expressed absolutely or as a rate relative to the at-risk population. Based on the study by Dubey& Mohanty (2014), the PYLL, in the year 2011 in millions for males, was estimated to be 146.6 years, and for females, it was 107.9 years.

Contingent Valuation

The contingent valuation method is used in primary surveys where household responses indicate the value they place on health or the loss of a healthy lifestyle. This method can be used through three approaches- Direct elicitation, dichotomous choice, and discrete choice experiment. These methods rely on respondents answering closed or open-ended questions regarding WTP (Willingness to Pay) or ranking their preferences based on rankings of preferred outcomes. Such techniques help in ascertaining the demand curves. (Boardman et al., 2011; Nilsson,2014).

The present study has refrained from using contingent valuation methods owing to some of the criticisms against this approach. Some of these include that there is a difference in the willingness to pay and willingness to accept estimates. It also results in biased results accruing from hypothetic bias, warm glow, strategic response, framing, and embedding effects. (Nilsson, 2014). Furthermore, given that the present study is capturing the household

perspective, the measures of QALY, DALY, HALE, and PYLL were not aligned with the scope of the household perspective and hence were not used in the present study. The use of DALYs is encouraged internationally by major entities like the WHO, who primarily utilise them to assess and compare disease burden between nations. Such measures allow for cross-country comparison while not accounting for heterogeneity and undertake economic impact while considering the standard wage rate at the geographical level. However, this study sample has variations in the income levels, which are different from the standard wage rate of Goa and thus can lead to an inaccurate measurement of the estimations at a household level.

2.5 Review of Empirical studies in Disease Burdens.

Health is one way of measuring human capital, as it is an essential determinant of economic growth. Improved health enhances productivity and efficiency, resulting in an increase in incomes, living standards, social returns, and economic growth. Over time, the economy has witnessed a continued increase in demand for health care which has resulted in an increase in healthcare expenditures, both at the individual as well as at an aggregate level. Dandona et al. (2017), in their report, estimated that the percentage of deaths due to Non-Communicable Diseases (NCDs) in India increased in the years from 1990 to 2016 to the amounts of 37.9% and 61.8%, respectively. The four major NCDs that led to this disease burden are cardiovascular diseases, Cancers, chronic respiratory diseases, and Diabetes. Sharma et al. (2013), in their study, witnessed that the treatment cost is twice more for NCDs as compared to other conditions and illnesses. NCDs are long-term and chronic. As such, the cost of medicines is also high, thus imposing them to being more vulnerable financially, which ultimately accounts for distress financing owing to the long-term condition of the illness. Indian Council for Medical Research (ICMR), the National Institute of Communicable Diseases, the All-India Institute of Medical Sciences (AIIMS), and the Public Health Foundation of India (PHFI) are the major institutions dealing with non-communicable diseases. There is also a dearth of availability of public amenities in rural areas, which includes infrastructure, human resources such as medical officers and specialists, etc. It is also seen that those qualified in treating non-communicable diseases are inadequate. This section on literature review considers this as a wide area to study and will throw light on how the disease impacts the lives of individuals and society broadly. The review gives a bird's eye view over aspects like the disease burden of NCDs, the direct and indirect cost burden of the illness, social impact, catastrophic health expenses, economic

impact, out-of-pocket expenditure, public and private health care facility, medical insurance, etc.

2.5.a. The Burden of Non-Communicable Diseases

A most recent study by Menon et al. (2022) studied the cost burden of non-communicable diseases using an NSSO survey and found that India had about 4.7 million deaths in 2017. NCD-related Disability Adjusted life years (DALY) accounted for 226.8 million deaths in 2017. CVD, followed by Chronic respiratory diseases, Cancer, and stroke, were among the leading causes of NCD DALY. The highest losses due to CVD were seen in Punjab, followed by Karnataka. Cancer burden was highest in Kerala, followed by Karnataka, Uttar Pradesh, and West Bengal. For NCDs, nearly 70% sought treatment at private healthcare facilities, albeit with interstate variation. In Maharashtra, Andhra Pradesh, Karnataka, Telangana, Gujarat, and Punjab, 80% of those afflicted with NCDs are considered private facilities. In the North-Eastern states, there was more reliance on public facilities.

Further, the mean out-of-pocket expenditure for NCDs was Rs. 26,585. The expenditures incurred in private facilities were much higher as compared to the public health facility. Since NCDs are long-term and chronic, they require frequent hospitalisations, and they pushed 47% of households to catastrophic expenditure. Based on the study by Mahal et al. (2010), in 2004, the NSSO estimates of health expenditure aggregated to nearly Rs.400.31 billion. The highest cost burden was due to heart diseases (Rs. 58.18 billion); meanwhile, for Diabetes and Cancer, it was Rs.36.43 billion and Rs. 26.38 billion, respectively.

Similar to Menon et al. (2022), many other studies have also tried to estimate the burden of NCDs and OOPE incurred by households using the secondary data from NSSO surveys (Behera & Pradhan, 2021; Verma et al., 2021). While Behera & Pradhan (2021) investigated the impact of NCDs on health expenses using only 2017-18 NSSO rounds, Verma et al. (2021) undertook a comparison of the growth in the OOPE by using NSSO rounds 2014-15 and 2017-18. The NSSO data on household social consumption details the cause of hospitalisation, the usage of private and public health facilities, the amount of monetary burden with respect to healthcare costs, and assistance received from both government and private healthcare facilities.

Behera & Pradhan (2021) found that households with NCD-afflicted members had higher out-of-pocket expenditures. The medical OOPE was incurred on medication, diagnosis,

physiotherapy, blood transfusion, oxygen, etc, and was higher when persons opted for private over public healthcare. For persons opting for public facilities, the share of households incurring CHE was lower (27.68%) compared to those visiting private facilities (72.09%). CHE was impacted by residential area, religion, caste group, and the size of the household based on the linear regression estimates. The rural households, especially those belonging to SC/ST and OBC, were more vulnerable to CHEs indicating that the burden of OOPE is disproportionately distributed.

Verma et al. (2021) estimated the burden of NCDs in India and the incidence of CHE using the threshold level of 10%. Overshoot and Mean Positive Overshoot Indices were used to measure the intensity of catastrophes. To understand the CHE's impact on deprivation, the Poverty Headcount Ratio and Poverty Gap Index were computed using India's official poverty line. Similarly, India's State-Level Disease Burden Initiative, expanded upon by Dandona et al. (2017), affirmed that each state in India is battling with the burden of NCDs. In 2017, chronic illnesses accounted for 63.7% of all mortality and were the major contributor to the cost of treatment and ambulatory care. Further, hospitalisations accounted for a sizeable proportion of out-of-pocket expenses on NCD care, and the rate of hospitalisation among NCD patients increased from 2014 to 2017–18. Catastrophic expenses and distress financing is large primarily due to affordability and accessibility to medicines, owing to chronic illnesses and the long-term nature of NCDs. Poorer households find it difficult to cope with healthcare costs as compared to the affluent class. An interesting fact brought out by this study is that the mean out-of-pocket expenditure in India is profusely higher than the WHO estimate for developing countries. This is due to a lack of insurance coverage and social security.

Studies have also highlighted that non-communicable diseases are increasing in India due to a lack of awareness and insufficient healthcare access to people. In many developed countries, individuals aged 55 or older are usually found to be in a trap of non - communicable diseases, but in India, their onset occurs quite early, i.e., individuals above the age of 45 years are found to be under the trap of non-communicable diseases (Arokiasamy,2018; Mohanty, 2019). Mohanty (2019) investigated 11 selected NCDs and found that the median age for the prevalence of these diseases have fallen in the last decade. Similar findings have been reported by Kathirvel (2018), which found that the age group most affected by NCDs is between 26 and 59 years and constituting about 2/3rd of the population. The prevalence of NCDs in India is 116 per 1,000 population, with hypertension,

digestive diseases, and Diabetes being the main drivers. This presents an appalling reality of the burden that these illnesses pose to the Indian population at large. The studies by Kathirvel (2018) and Arokiasamy (2018) have emphasised that there is a need for political commitment to take up the NCD agenda at the national level so that premature NCD deaths can be prevented and reduced. They further state that Indian data of NCDs for research and policies must identify long-term trends of prevalence and incidence.

Arokiasamy (2018) estimated the trends of selected NCDs at a state-level for the year 2016. It identified that CVDs such as ischemic heart disease and stroke had the largest share in the total burden of mortality in 2016. Similarly, chronic obstructive pulmonary disease (COPD) and asthma together contribute about 10.9% to total mortality, and Diabetes contributes around 3.1% of the total mortality burden. The incidence of cardiovascular diseases and their share of mortality are highest in the states of Andhra Pradesh, Goa, Himachal Pradesh, Kerala, Maharashtra, Punjab, Tamil Nadu, and West Bengal. As per data in 2016 CVDs, respiratory diseases, and Diabetes lead to the death of around 4 million Indians annually, with most deaths occurring in the age group of 30–70 years. However, one major limitation of the study is that the data was based on self-reports, and this might fail to include persons with undiagnosed conditions of NCDs. Similarly, a primary healthcare survey report on NCDs in India by Thought Arbitrage Research Institute found that hypertension, digestive disease, and Diabetes were the top three NCDs, followed by respiratory diseases, brain/neurological disorders, heart diseases/CVD, kidney disorders, and Cancer.

The global epidemic of NCDs was recognised by the United Nations and is addressed by the Sustainable Development Goals (SDGs) to be achieved by 2030. As per WHO reports (2021), NCDs are a cause of death to nearly 41 million people each year, accounting for 71% of all deaths globally in the age group of 30 and 69 years. CVDs again accounted for most NCD deaths, followed by Cancers, respiratory disorders, and Diabetes. It is of utmost importance to look into the key components of detection, screening, and treatment of NCDs, as well as palliative care. Essue et al. (2018) have emphasised that in low- and middle-income countries (LMICs), the healthcare systems' ability to provide access to high-quality healthcare services is hampered by a lack of prepayment mechanisms and the tools and resources to pool financial risks. As a result, many health systems have relied largely on private contributions in the form of out-of-pocket expenses for decades. Adding to this, insufficient access to healthcare, subpar treatment, and expensive user fees also lead to higher OOPE among LMICs (Sangar et al., 2019). Relying on out-of-pocket expenses to pay

for health care is inefficient and puts a significant financial burden on households' exacerbating poverty and leading to households foregoing required care. There is greater concern among people with chronic diseases as they face recurring lifetime costs due to illness management and treatment (Kankeu et al., 2013). For instance, in some nations, a household may have to spend up to 8 days' worth of salary to buy only one of the numerous medications needed for the best management of Diabetes or cardiovascular disease (Mourik et al., 2010; Gelders et al., 2006). Thus, the state financing of healthcare is particularly important in a country like India, which has around one-fifth of the world's population.

A thorough understanding of state-by-state health trends for health financing is vital to achieve Universal Health Coverage (UHC) in India by 2030. To investigate if the allocated health budget was commensurate with the disease burden, Bagepally et al. (2022) used the information on India's state-wide healthcare budget allocation for the years 2015 to 2019. Disease burden was calculated based on the Global Burden of Disease, Injuries, and Risk Factors Study (GBD) estimates and state-level disability-adjusted life-years (DALY). Goa had the most funding per DALY in 2019 (34,260 or US$ 486.66), while Bihar received the least funding (2,408 or US$ 34.20). Budget allocations per DALY were higher in smaller, less populated states than in larger states. The amount of money spent on healthcare was inversely correlated with infectious diseases and linearly correlated with non-communicable diseases. With the exception of Assam, Karnataka, and Himachal Pradesh, most state-level health budget allocations, as well as the overall disease burden, grew over time.

It is estimated that India could spend $4.58 trillion between 2012 and 2030 on NCDs and mental health issues. The majority of the economic loss will be caused by CVDs ($2.17 trillion) and mental health issues ($1.03 trillion) (Bloom et al.,2014). The economic losses can be calculated based on DALYs as well as data from National Sample Survey Office, which assesses the out-of-pocket expenses by households. Sangar et al. (2019) estimated the catastrophic burden of OOP health expenditure at a 10% threshold level and found that Cancer and CVD have a larger catastrophic burden than several other non-communicable diseases (NCDs). OOP health expenses for various illnesses have an influence on poverty in terms of headcount and payment disparity. Infections, CVDs, gastro-intestinal, and musculoskeletal are substantially more affected by poverty in terms of the payment difference. Diseases including gastro, musculoskeletal, respiratory, cardiovascular diseases, and injuries also have a greater influence on the poverty divide.

2.5. b. Cost Burden of the Diseases.

This segment of the chapter highlights the literature available on the costs imposed by the NCDs to the households in terms of **Direct and Indirect costs, catastrophic health expenses, and out-of-pocket payments as made by the households**. This differs from the previous section in terms of the focus. While the previous section deals with costs at a macroeconomic level, this section concentrates on the disease burden at a microeconomic or household level. The studies listed here highlight how chronic illness, due to its long-term nature, poses a major burden to households, eventually leading them into poverty, especially those that belong to the vulnerable segment of society. WHO report (2021) highlights that poverty is closely linked with NCDs. With the speedy increase in NCDs, it is projected to result in impediments in the reduction of poverty levels, especially in low- and middle-income countries, thus increasing the household costs that are seen to be associated with health care. It is also often seen that the vulnerable and marginalised get sicker and die sooner than people belonging to higher social strata. This is especially true because they are exposed to a greater risk of harmful products, such as tobacco, or unhealthy dietary practices and have limited access to affordable health services. Given the low incomes and temporary nature of jobs, healthcare costs for NCDs quickly drain household resources. The exorbitant costs of NCDs, including expensive and lengthy treatment resulting in loss of income, force millions of people into poverty.

Direct and Indirect costs associated with NCDs

The direct cost is linked to the use of resources as a direct result of receiving treatment and receiving medical care. It comprises of direct healthcare costs (diagnosis, treatment, care, and prevention) arising from both inpatient and outpatient healthcare. It can be summarised as the sum of medicine cost, hospitalisation cost, and lab test cost in specific terms. The direct costs classification draws from the theoretical framework developed across various studies (WHO, 2002; Riewpaiboon, 2014; Yousefi et al.,2014).

The indirect cost comprises the sum of foregone wages of the patient and the caregiver due to hospitalisation, visits to the clinic and recovery period, and other non-healthcare costs (transport, housekeeping, social service, and legal cost). The indirect cost component of foregone wages also includes costs for absenteeism, loss of productivity, and disability. Indirect expenses substantially impact the Efficiency ratios. The manner in which studies

account for each indirect cost component varies greatly (Jacobs & Fassbender, 1997; Jacobs & Fassbender, 1998). Several studies have utilised a linear regression model to find the incremental costs attributable to various diseases.

Specifically for Diabetes, several studies have estimated the direct and indirect costs borne by households across various geographical zones of India. Sharma et al. (2016) and Bhaskaran (2003) estimated the direct costs of Diabetes to be Rs. 19,552 in South India and Rs. 14,507 for Karnataka, respectively. Pan-India estimates of Diabetes-related average direct costs were Rs. 25,391, according to Tharkar et al. (2010). The difference in the estimates arises owing to the duration of the disease, mode of treatment, and geographical zones under consideration. Sharma et al. (2016) presents a more comprehensive view of this issue and highlight that total direct expenses were higher when Diabetes was present for a longer period of time. Further, patients of private clinics paid higher annual direct costs (Rs. 19552, US$425) compared to government clinics (Rs. 1204, US$26.17).

The perspective of cost differentials across the different states within India was outlined in Oberoi & Kansra (2020). The systematic review of literature on direct costs of Diabetes used 225 studies published between 1999 and February 2019 across different geographical zones of India. For the North zone, South zone, north-east zone, and west zone, the annual median direct cost of Diabetes was Rs 18890, Rs. 10585, Rs. 45792, and Rs.8822, respectively. Similarly, the annual median indirect cost of Diabetes was Rs. 18146, Rs.1198, Rs. 18,707, and Rs.3949 for the North, South, Northeast, and West, respectively. The indirect cost estimates found in Oberoi & Kansra (2020) are similar to those found within other pan-India studies, such as Nagarathna et al. (2020), which indicated the indirect costs to be Rs. 13,179; and Tharkar et al. (2010) which estimated it to be Rs.4970. All the studies converge on the aspect that there are differences in the indirect costs across rural and urban areas and across age groups. The urban-rural indirect cost differential stems from transportation costs and the usage of healthcare services. Poor health outcomes and delayed care are both related to lack of access and transport costs especially linked to the utilisation of healthcare in rural areas (Lakshmanan, 2015; Weerasinghe, 2022).

Particularly for Cancer, there is a vast literature that estimates the direct and indirect costs associated with the illness in India. A cross-sectional study of 508 Cancer patients in 5 cities across India (Thiruvananthapuram, Aizawl, Bikaner, Kolkata, and Mumbai) conducted by Nair et al. (2013) estimated the average direct cost of Cancer to be Rs. 58,050 annually. The

costs varied across private and public healthcare facilities, with almost 45% of patients opting for private healthcare facilities as opposed to 32% who went to public hospitals. Nearly 76% of the patients faced financial hardships while they were receiving treatment. The indirect cost attributable to Cancer was Rs. 27,248, which covers expenses on travel, accommodation, meals, etc. Cancer patients in Mumbai and Thiruvananthapuram have reported the highest opportunity costs (wage loss to the family) and indirect expenditures, respectively. The study was useful in demarcating the cost differentials across the various cities in the North, South, East, and West regions of India.

Comparable assessments across the literature focussing on the same geographical scope shows that the estimates for South India are similar across different studies. For Cancer treatment in a public facility in southern India, the direct medical cost and the indirect costs, respectively, were Rs. 1271 and Rs. 34,545 (according to Maurya et al., (2021); Rs. 25,606 and Rs. 8772 the direct cost and indirect costs estimated by Dinesh et al., (2020). Both of these studies relied on community-based cross-sectional surveys for assessments. Dinesh et al. (2020) also found that there was a significantly large gap between income levels and the cost of Cancer care, indicating a gap between affordability and the cost of treatment. This finding exuberates the extent of the cost burden posed by the disease. The literature on costs associated with Cancer care in North India outlines interstate differences in cost and estimated direct costs can amount to Rs.79,038.36 per day per patient (Harsvardhan et al.,2022) and Rs.27939.97 (Barwal et al., 2019). Both these estimates vary significantly owing to the type of care being provided, whereby Harsvardhan et al. (2022) looked primarily at palliative care, while Barwal et al. (2019) focused their analysis on pre-treatment financial expenses.

The literature also highlights several studies that are focussed on the type of Cancers. The study by Goyal et al. (2014) on patients with oral Cancer admitted in Delhi hospitals found that the average cost of treatment for stage 1 patients was Rs. 1,49,995.29, stage 2 patients paid Rs. 1,41,621.36, and stage 3 patients paid Rs. 1,82,859.75. Different treatment procedures result in different treatment costs. Jain and Mukherjee (2016) estimated the economic burden of breast Cancer in Punjab and found that 79% of the entire cost of the illness was attributable to direct expenses. The biggest factors in the overall cost of illness were the cost of medications (36.23%), hospitalisation costs (27.05%), and lost productivity (13.44%). The cost of therapy varies depending on the type of facility utilised (more in private than public), the stage of Cancer, and the patient's age at the time of diagnosis

(patients older than 60 incurred more expenses than those younger than 60). In this regard, a more comprehensive analysis by Mohanti et al. (2011) assessed the costs incurred prior to the treatment, during treatment, and in palliative care. Their analysis indicated that the mean (average) costs of Cancer treatment for a patient came to Rs. 36,812, which included Rs.14,597 spent prior to admission, Rs.14,031 on hospital expenses, and Rs.8,184 for the lengthy course of radiotherapy. In their sample of the Cancer patients admitted to All India Institute of Medical Sciences, the patients had a monthly per capita income of Rs. 1749, further elucidating the financial burden they faced. The study suggested that making financial provisions for Cancer patients who cannot afford treatment costs and risk losing out on Cancer care advantages will be a highly justifiable strategy.

A study on the costs associated with Pancreatic Cancer by Basavaiah et al. (2018), reviewing the expenses of 98 patients undergoing pancreatic-duodenectomy (PD) treatment, found the cost to be 2,95,679.57. Private ward patients and those with multiple health conditions paid a substantially higher cost. Just 29.6% of the patients had health insurance placing a significant financial burden on the patients. Their study proposed that insurance policies should provide greater coverage that can, in part, reduce the financial burden of Cancer patients undergoing complex treatments.

With respect to cardiovascular diseases, various studies have tried to provide estimates with regard to both direct and indirect costs as borne by the patients. Cross-sectional studies have been conducted by Kumar et al. (2019); Pankaj and Kanchan (2016) in the metro cities of Delhi and Mumbai using a sample of 223 patients and 204 households, respectively. Kumar et al. (2019) revealed that the average annual cost incurred amounted to Rs. 15,691.45, of which 78.49% was attributable to direct costs (drugs, supplements, diagnostic tests, and transportation charges) while 21.5% to the indirect costs (wage loss of the patient and caretaker, during the days of hospitalisation) and yearly direct costs contributed Rs.97,36,631 to the overall annual costs of Rs.1,01,80,918. Hospitalisation (66%) and medications (19%) accounted for the majority of household health spending on coronary heart disease, respectively. The overarching results indicated that heart disease not just posed an economic burden on the patient, family, and society but was also linked with impairment of the quality of life of the patient. For cardiovascular disease, the indirect cost was estimated to be Rs. 3,373.66 annually, according to Kumar et al. (2019). Further, Pankaj and Kanchan (2016) find that the majority of health spending went toward direct expenses (95.6%) rather than indirect costs accounting for 4.4%. The majority of the expenses were attributed to

hospitalisation costs rather than wage losses due to work missed. Further, both the wealthy and the poor patients paid higher medical costs to treat heart diseases. Hospitalisation, lack of health insurance, and poorer socioeconomic level were found to be substantially linked with catastrophic healthcare expenditure. More than two-thirds of households used their own resources to manage their medical costs.

Further, based on the results of Chauhan and Mukherjee (2016), in North India, the estimated cost of hospitalised heart patients and OPD expenses amounted to Rs. 2,43,606 and Rs. 48,578, respectively. Similarly, Kumar et al. (2022) evaluated the direct cost for 100 patients at a super-speciality hospital in New Delhi to be Rs. 2,47,822 patients for treating CVD. The highest cost was incurred for treating Rheumatic Heart Disease. Besides, in comparison to developed nations, India has lower treatment costs for cardiovascular disorders. Even though chronic diseases are a significant source of economic burden, there are still discrepancies throughout the social spectrum. Using longitudinal data from India Human Development Survey (IHDS) rounds 2004-05 and 2011-12, Patel et al. (2020) estimated the health care expenditure on cardiovascular diseases to be Rs. 8,483 in 2004-05, which eventually increased to Rs.14,380 in 2011-12. Healthcare expenses are higher for inpatient treatment. The average healthcare expenditure has risen across all socioeconomic and demographic groupings. For urban regions, the health care spending increased from Rs. 7449 to 14,178, while for rural regions, it increased by Rs.10,055 and Rs.14,674. There was a positive relationship between healthcare costs and members' incomes, ages, and levels of education. Srivastava and Mohanty (2013) used two NSSO rounds- the 52nd (July 1995-June 1996) and 60th (January-June 2004) rounds to compute the mean hospitalisation cost for CVDs using age and sex groupings. The average cost of hospitalisation for CVDs in 2004 was Rs.14,975 for men and Rs. 12,276 for women.

Chronic kidney disorder (CKD) is one among the many chronic illnesses plaguing households with huge costs of dialysis and haemodialysis, as well as pre- treatment and post-treatment costs and hospitalisations. Studies have estimated the direct and indirect cost burden associated with CKD. However, literature on CKD is scarce compared to other NCDs. There are geographical differences in cost burden across the states in India owing to treatment types and severity. Singhal et al. (2018) and Satyavani et al. (2014) estimated the cost burden for CKD patients. While the former computed the direct and indirect cost on a sample of 65 patients between the period 2015-17 based on the treatment types, namely haemodialysis before and after the period 2016, to depict the change in costs, the latter

particularly looked at end-stage renal failure (ESRD) due to Diabetes and its complications among 209 ESRD patients. Singhal et al. (2018) estimated the average direct cost of treatment before and after 2016 to be Rs. 55,657 and Rs. 33,613, respectively. The year 2016 marks the period when directly acting antivirals (DAAs) became cheaper for use in treatments. The cost decreased as treatment ensued. For those not on haemodialysis average direct cost before 2016 was Rs. 66,599, while after 2016 was Rs. 59,079. Haemodialysis related subsidised owing to state funding reduced the costs significantly, wherein Direct costs in were Rs. 54,387 before 2016 and Rs. 40,338 after 2016. The average indirect cost was Rs. 5,281 before 2016 and Rs. 2,144 after 2016. The average indirect cost of treatment before and after 2016 was Rs. 6,128 and Rs. 2,222, respectively, for those not on haemodialysis. Meanwhile, the indirect costs for patients receiving haemodialysis were Rs. 3,444 and Rs. 2,125 before and after 2016, respectively.

Meanwhile, Satyavani et al. (2014) estimated the direct cost as Rs. 61,170, considering laboratory costs, medical consultations, monthly expenditures on medicines, and hospitalisation. The average cost of dialysis in a private healthcare facility is Rs.12,000 per month, amounting to Rs.1,40,000 per year. A kidney transplant would typically cost Rs.50,000 in a government setting and Rs. 3,00,000 in a private health facility. It was further seen that, on average more than 70% of the patients had dialysis eight times a month. The recommended number of dialysis treatments per month for patients is 12, yet many of the study participants reduced this amount voluntarily because they were unable-to pay for it. A majority of the households (46%) mainly resorted to personal savings while treating for CKD. In India, people with CKD or ESRD are generally not covered by medical insurance and must pay for their own care from a variety of other alternative sources. Both these studies were discrete since they both evaluated the cost burden at different stages of the treatment.

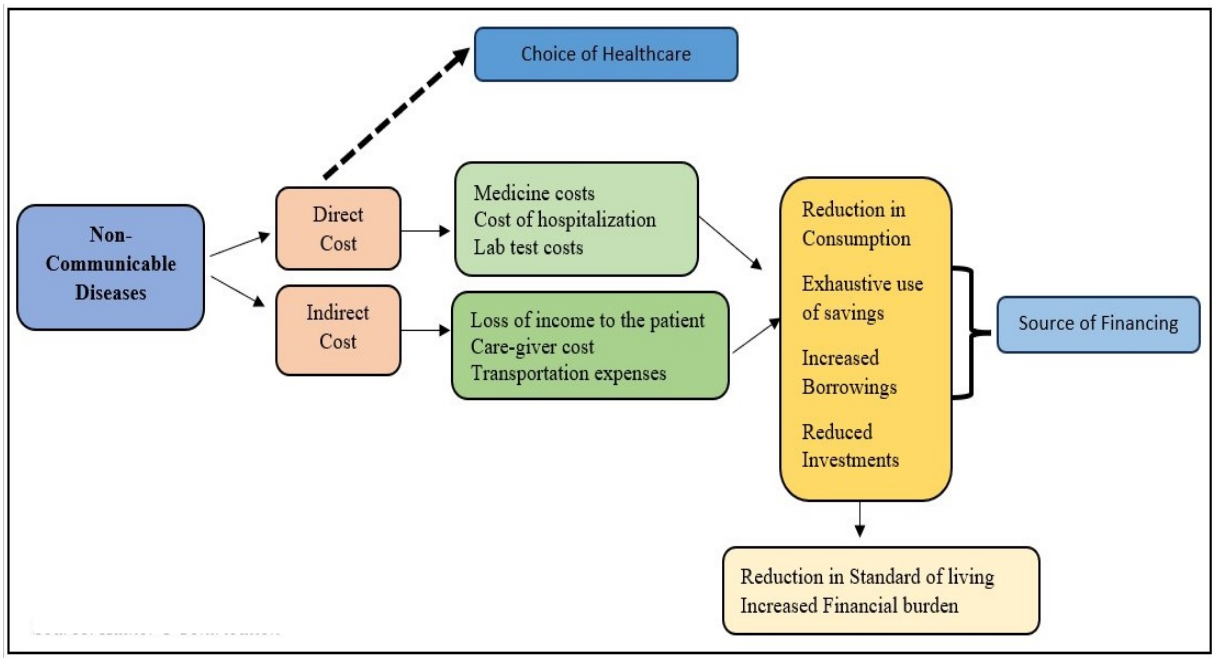
Another study by Ahlawat and Tiwari (2017) estimated the direct costs associated with CKD using a sample of 150 patients seeking treatment at a tertiary hospital in Chandigarh. They found the direct cost to be Rs.25,836 (US $386) per year while costs, when haemodialysis is included, was Rs.2,13,144 (US $3181). Patients using haemodialysis, smokers, those with comorbid conditions, and those with end-stage renal disease had statistically significantly higher treatment costs. This further strengthens the findings of Satyavani et al. (2014) that the severity of CKD and the mode of treatment puts a greater financial burden on households. Agarwal and Srivastava (2009) looked at the cost of various treatments linked with CKD across India using the Indian CKD Registry database. It found that annually, over

3,500 transplants are performed, with 700 cadaver donors. As a result, between 18,000–20,000 individuals (or 10% of new instances of ESRD) receive renal replacement treatment as a whole. Single-session-haemodialysis costs between $15 and $40, and erythropoietin is an additional $150 to $200 each month. A state-run hospital charges USD 800-1,000 for the transplant process and USD 350–400 per month for tacrolimus, steroids, and mycophenolate immunosuppression. The study, however, did not dwell on the difference in costs across India.

Khanna (2009) attempted to compare the cost of dialysis across India by dividing its findings into geographical zones. The results revealed that Haemodialysis (HD) sessions in India might cost anything from Rs 150 in public hospitals to Rs 2000 in private hospitals. Most private hospitals charge an average of Rs. 12000 per month for HD and Rs. 140,000 ($3000) per year for dialysis. Specifically, for different geographical zones, the study found that the per session costs were Rs. 1250, Rs.1100, Rs.1350, and Rs.1000 for North, South, East, and West, respectively. AV fistula construction costs anywhere between Rs 6000 and Rs 20000, depending on the quality of the private hospital. Erythropoietin typically costs between Rs 4000 (biosimilar) and Rs 10000 per month (the pioneer brand). An average kidney transplant can cost anywhere between Rs. 50000 to Rs. 300000 in a government facility. The annual maintenance cost for medications following a transplant is Rs. 1,20,000, or Rs. 10,000 per month. Considering the high cost of treatment associated with CKD, many households incur extremely high out-of-pocket expenditures, pushing them into poverty, leading to CHE.

In this light, Ramachandran and Jha (2013) studied the CHE incurred by households owing to Kidney transplantation. Compared to other kidney treatments, kidney–transplantation imposes the maximum financial burden on patients of CKD, as per their analysis. The expenses of 50 patients seeking treatment at a hospital in Chandigarh. They found that the total financial burden comprised of both direct and indirect expenses showed that the direct costs accounted for two-thirds of the total costs, which ranged from US$ 2,151 to $ 23,792. The majority of direct expenses were spent on hospitalisation prior to referral, dialysis, and medications. Indirect costs amounted to Rs. 15,283, and the majority of indirect costs were related to travel and lost income. Financial loss and educational dropouts were also noted. Fifty-four per cent of the sample had a severe financial loss, whereas 8% and 10% had moderate and mild losses.

Figure 2.2 The disease burden of NCDs: Conceptual Framework



Source: Conceptualised by the author based on literature survey

Catastrophic health expenditure associated with NCDs

While the studies cited before show the cost burden of the diseases under the scope of the study, the extent of damage is better estimated by analysing the impact of this burden on the impoverishment of households. In this respect, it's imperative to look at studies that assess the CHE of households due to the incidence of NCDs. WHO (2005) defines it to be any expenditure incurred by households for medical treatment that can pose a threat towards a household's financial ability to maintain its subsistence needs. Catastrophic health spending is defined as the expenditure that poses a threat towards a household's financial ability to maintain its subsistence needs. In this study, "catastrophic" spending occurs when health expenditure on all medical costs for a given household exceeds the 40% threshold level of subsistence income a household needs for consumption. Several studies use different threshold levels to define catastrophic out-of-pocket expenses varying from 10%-40% (Rashidian et al., 2018; Ravi et al.,2016). It has been seen in the literature that hospitalisation cases, as well as demographics, significantly impact the catastrophic health expenses incurred by households. According to Peters, Yazbeck et al. (2002), more than 40% of hospitalised patients in India reported borrowing money or selling assets to cover hospital expenses. On average, this type of financing covered 19–28% of hospital expenses (Rani et al.,2003). Rural residents, members of scheduled castes, uneducated men, and young

patients were also more likely to turn to borrowing and the sale of assets than wealthier households (Peters, Yazbeck et al.,2002; Bonu, Rani et al.,2003). Across the years 1993-2012, the study by Dwivedi, Pradhan, and Athe (2021) mapped the incidence of CHE using a logistic regression on the data from three rounds of nationally represented Consumer Expenditure Surveys. Findings show that from 1993 to 2012, there were more cases of CHE. Residents of rural areas and families with a mix of ages, such as those with a higher proportion of young children and senior citizens, were more at risk. The economic position has a big impact on CHE and the rise in healthcare demand. Mahal et al. (2010) also used logistic regression to estimate the odds of incurring a CHE due to the incidence of various NCDs and hospitalisations. The results indicated that the odds of incurring a CHE was extremely high for Cancer and CVD patient, and further hospitalisation due to any NCD increased the odds of incurring CHE by 160%.

CHEs often impoverish a household, especially if they have to resort to distress financing to meet health expenses. Various studies have explained the factors that lead to CHE, besides also highlighting the financial bearing it has on households. Although the conclusion arrived at is equivalent across studies, they differ in terms of the methodologies adopted. A more robust and general understanding of CHE was presented in the study by Swetha et al. (2020), which conducted a longitudinal study to analyse the prevalence of CHE and its associated factors on account of out-of-pocket healthcare expenses. Their study was based on a sample of 350 households in Bangalore, both with and without chronic illnesses. The study was conducted from January 2016 to April 2017. The results showed that 14.86% of the households experienced CHE during the period of study. A statistically significant association was found between CHE and socioeconomic status. CHE were incurred by 42% of the households with a member having a chronic illness. A similar analysis conducted in Bangalore by Bhojani et al. (2012) suggested that the number of persons living in poverty increased in a single month as a result of OOP expenses for chronic diseases, further increasing their poverty. Families took loans (4.2% of the time) and sold or mortgaged their assets (0.4% of the time) to make ends meet.

At a pan-India level similar to the work done by Dwivedi, Pradhan, and Athe (2021), Ghosh (2011) found that in 1993-1994 and 2004-2005, OOP payments raised the poverty rate by 4% and 4.4%, respectively. In other words, the requirement to pay for healthcare services forced 47 million people into poverty in 2004–05 and 35 million people into poverty in 1993–94. The study compared the OOP payments and its impact on CHE between 1993-

1994 and 2004-2005 using data from National Sample Survey on consumption expenditure and further compared the dynamics across 16 Indian states. In 2004–2005, the percentage of households with catastrophic OOP health payments varied substantially by state, from 3.46% in Assam to 32.42% in Kerala. Compared to some of the high-income states like Punjab, Maharashtra, Gujarat, and Tamil Nadu, poorer states like Madhya Pradesh, Uttar Pradesh, and Rajasthan had greater rates of catastrophic health expenses. The higher prevalence of non-communicable diseases in high-income states was the cause of the higher OOP healthcare spending. This indicates that funding mechanisms such as insurance can prevent households from impoverishment due to high OOP healthcare spending. In this regard, community-based health insurance programmes can successfully shield low-income families from the unpredictable risk of medical costs. Ranson (2002) found that in Gujarat, the proportion of catastrophic hospitalisations and those leading to poverty decreased by more than half as a result of community-insurance programmes that reimbursed medical expenses among member households.

The incidence of CHE can differ based on the disease and household type. Kastor & Mohanty (2018) studied the disease-specific CHE in India using household-level data from the 71st National Sample Survey Organization (2014). For defining CHE, they set the threshold of household health spending exceeding 10% of household consumption expenditure. They estimated the out-of-pocket expenditure for 16 selected diseases across three broad categories- communicable diseases, NCDs, and injuries using multivariate logistic regression and determinants of CHE. For Diabetes, Cancer, and CVD are detailed out, 49% of households within the sample incurred a CHE. The incidence of CHE was 45% for Diabetes, 60% for heart disease, and 79% for Cancer. Cancer, followed by heart disease, caused the highest CHE among all diseases. There was a strong association between distress financing and CHE. Choice of healthcare was the most significant determinant of CHE, whereby those seeking treatment from private healthcare facilities were more likely to incur a CHE.

Particularly for Diabetes, Spangler et al. (2012) found that compared to no Diabetes, households with a diabetic member had a 17.8% greater chance of incurring catastrophic health expenses. Similarly, Sathyanath et al. (2022) assessed the average expenditure by Diabetes patients through a literature review. They found that average OPD costs to patients were 3% of their annual income, but problems significantly raised the whole cost by more than 10%, which is catastrophic health spending. Tripathy & Prasad (2018) estimated

household out-of-pocket (OOP) expenditure and catastrophic expenditure accruing on account of Diabetes-related hospitalisation and outpatient care. They used the NSSO survey that was over a period of six months from January-June 2014. Using a stratified random sampling method, they interviewed 3,33,104 persons. Their study reported that CHE as OOP expenditure per hospitalisation episode amounted to 30 % of annual consumption expenditure. They also estimated that the Median private sector OOP hospitalisation expenditure ($231 USD) was nearly four times higher than the public sector ($57). Among patients seeking private healthcare, the prevalence of catastrophic expenditure was 23%, much higher than a public facility (7%). Nazir et al. (2020) also found similar results in the study focussed on Diabetes patients in Karnataka, wherein 27% of the sampled respondents experienced CHE owing to the financial burden posed by the disease. However, it was mainly found to be prevalent among hospitalised patients.

For Cancer, Dhankhar et al. (2021) systematically reviewed the literature to estimate Cancer-related out-of-pocket and CHE. The inpatient and outpatient costs of Cancer care were estimated to be Rs. 83,396 ($4405) and Rs.2653 ($140), respectively. The total direct costs were Rs. 47,138 ($2490), and indirect costs were Rs. 11,908. ($629). The proportion of individuals facing catastrophic expenditure was 62.7%. The most common modes of distress financing for Cancer treatment were savings, income, borrowing money, and the sale of assets. Wadasadawala et al. (2021) illustrated that Cancer-related expenses became catastrophic for most households (68%) during the pandemic owing to financial instability and job losses. Even in the absence of pandemic-related financial fluctuations, CHE was found to be prevalent in 61.6% of the cases of Cancer patients in South India, based on the results of Maurya et al. (2021). The prevalence of CHE was reported to be 62% (Singh et al., 2020) and 90% in another CROCODILE Study Group (2022), which further elaborated that CHE was experienced nearly six months after the patient's decision to undergo treatment. Considering the difference in the thresholds for mapping CHE, the study by Shaik (2020) mapped the catastrophic spending by Cancer patients by setting three different thresholds of 10%, 20%, and 30%. It found that across the different thresholds, the catastrophic health expenses were significant and led to financial burden across the households even at a low threshold level.

Pandey and Meltzer (2016) discussed catastrophic expenses among CVD patients, who estimated that at a Pan-India level, out-of-pocket purchases of heart medications might push 17 million rural and 10 million urban residents into poverty and widen the country's poverty

gaps by 2.9%. Mohanan et al. (2019) estimated the individual and household-level costs and impoverishing effects among heart disease patients in Kerala, India, across 63 hospitals. They conducted a cluster randomised clinical trial between November 2014 and November 2016 to study cost data for 2114 respondents. The median expenditure among respondents was $480.4, largely driven by in-hospital expenditures. Individuals without health insurance had approximately $400 higher out-of-pocket costs. Catastrophic health spending was thus higher among individuals without insurance (58.1%) as compared to those who had insurance (39.9%). Individuals without insurance had a 45% greater risk of catastrophic health spending and a 3-fold higher risk of distress financing. Daivadanam et al. (2012) assessed the incidence of CHE among patients suffering from heart disease in Kerala and found that CHE was experienced by 84% of the sampled respondents. They further elaborated that participant with low socioeconomic status (SES) had an increased risk of having CHE by 15 times; those with job losses increased their risk by seven times; while those who lacked health insurance and underwent any intervention increased their risk of CHE by six times. Hospitalisation may strongly impact CHE, considering Engelgau et al. (2012) found that hospitalisation cases among CVD patients increased the risk of CHE by 12%. However, Mukherjee and Koul (2014) found that even without hospitalisation, nearly 30% of the sampled respondents from Jammu and Kashmir incurred a CHE owing to healthcare expenses and loss in work days.

Lastly, for CKD in India, the literature suggests that nearly 2,10,000 new patients are afflicted with CKD each year, of which 1,74,478 patients seek dialysis as a treatment, with costs ranging between $15-$60 (Bharati & Jha, 2020). Expanding on costs, Gummidi et al. (2022) estimated the household financial burden associated with pre-dialysis CKD in rural communities in Uddanam, Andhra Pradesh. The survey of 221 patients found that almost 70% of the households experienced high expenditure attributable to medical care, and 40% of this population resorted to distress financing. The total annual cost of illness was $308, of which direct costs comprised 79.9% of the total treatment costs. Costs for CKD care services were catastrophic for 67.4% of the total patients surveyed. Patients opting for private facilities experienced CHE more frequently, with 39% of this pool resorting to distress financing. Similarly, Kaur et al. (2018) conducted a study on a public sector facility with patients from Haryana, Punjab, Himachal Pradesh, Uttarakhand, Jammu and Kashmir, Uttar Pradesh, Bihar, and Jharkhand. The survey of 108 patients revealed that the average cost per patient for an HD session was Rs. 2838 ($44). The OOPE was primarily spent on

medications and consumables (64.1%), travel (18.4%), boarding/food (7.9%), and diagnostics (5.2%). Demographic-centred analysis of the sample indicated that males reported a greater mean OOPE than females [Rs. 3029 (US$47) vs Rs. 2592 (US$40)]. Patients from rural regions reported larger OOPEs than those from urban areas (Rs. 3128 (US$49) vs Rs. 2049 (US$32)]. Patients in the lowest income quartile had nearly twice as many OOPEs as those in the highest quintile. The prevalence of CHE varied based on the number of dialysis sessions taken by the patient. While 11.1% of patients receiving weekly dialysis incurred CHE, the incidence of CHE rose to 38.1% for those receiving twice-a-week sessions; and further increased to 51.9% for patients receiving three sessions each week. Nearly 59.3% of all the patients funded these expenses on dialysis using borrowing from friends or family, 35.2% used their salary or savings, and 5.6% sourced money from selling assets. In another study that was based on CKD patients in Kerala by Jose et al. (2022), direct non-medical and indirect expenses made up $115.6 of the monthly OOP expenditure for dialysis, while the total expenses amounted to $478.4. A total of 142 (93.4%) people experienced catastrophic medical expenses, while 76 (50%) experienced distress financing. The issue of distress financing has been elaborated upon by Khan, Jan, and Rashid (2020), which found that distress financing was prevalent in 70% of the sample of CKD patients in a tertiary hospital in North India, whereby 62.5% of such patients sold assets, and 70% relied on borrowings. The prevalence of CHE was seen to be present in 95% of the sample.

Dwivedi, Pradhan, & Athe (2021) in their study highlighted that healthcare expenditure varies significantly among various sections of the population. They further used a measure of CHE to outline the real burden of spending among households. Using a multivariate logistic regression identifying the major determinants of CHE, it revealed that the occurrence of catastrophic health expenses has increased from 1993 to 2012 period. Economic status is significantly associated with CHE and increased demand for healthcare. The study saw a limited incidence of CHE among the disadvantaged segment of the population though a greater share was devoted to health expenditure in recent years. It was also suggested that an appropriate risk pooling mechanism is required to address the healthcare needs of the disadvantaged segment, such as the elderly, children, poor, and rural population in India.

Similarly, using a Bayesian two-stage hurdle model, Rahman et al. (2020) analysed the CHE at a 40% threshold of a household's capacity to pay in urban Bangladesh. The disease-specific out-of-pocket healthcare expenditure revealed that chronic illnesses were

responsible for high costs and catastrophic expenditures. In a similar study, Swe et al. (2018) followed a Bayesian two-stage hurdle model to assess CHE and impoverishment in Nepal. The study points out that despite the subsidy programme implemented by Nepal for the poor afflicted with Cancer or kidney disease, 40% of those suffering from renal and liver disorders and Cancer faced catastrophic medical costs. The study found that injuries led to the highest incidence of catastrophic expenditure, followed by chronic illness and recent acute illness. Asthma, Diabetes, heart conditions, malaria, jaundice, and parasitic illnesses also increased CHE. This study further assessed the inequality related to healthcare financing as the poorer populations suffered more CHE despite subsidy schemes.

Source of Funding associated with NCD care

There is a vast amount of literature on the burden and source of funding used by NCD patients relying on both secondary databases as well as primary survey studies. Engelgau et al. (2012) used National Sample Survey Organization (NSSO) survey data from 1995-96 and 2004 covering nearly 2,00,000 households to assess the healthcare utilisation patterns and out-of-pocket health spending by disease category and determined how households financed their overall health expenditures with respect to specific health conditions. Their results showed that the share of NCDs in out-of-pocket health expenses incurred by households had increased over time from 31.6% in 1995-96 to 47.3% in 2004. In both years, household savings and income were the most important source of financing for many health conditions, typically between 40-60% of all spending, while 30-35% was financed through borrowings. Another study using nationwide healthcare surveys conducted in 2014 and 2017–18 by Verma et al. (2021) found majority of households (89.4% in 2014 and 91.4% in 2017–18) financed the treatment costs of NCDs through household income/ savings. This study used logistic regression and found households borrowing money for treatment were more likely to incur catastrophic health spending (the odds ratio is 2.69, significant at a 99% confidence interval). Primary studies by Bhattacharyya et al. (2016) have conducted such an analysis at a state level using cross-sectional surveys. Their study sampled 405 households of villages and wards of Udupi taluk, Karnataka, between the period February to July 2015 to identify modalities of financing health expenses. It was found that household income/savings financed 57.1% of the expenditure, loans with interest financed 9.8%, contributions by friends/relatives 7.8%, and the remainder was financed by other sources. In this study, the private sector provides for 80% of health care, explaining high expenses and the distribution structure of financing options availed.

Most of the above literature focuses on the source of funding for NCDs in general; the following section details the source of funding for the diseases that are specified under the scope of the present study. For Diabetes, Tharkar et al. (2010) assessed the annual healthcare expenditure for patients with Diabetes using an epidemiological approach for estimating the cost of illness related to Diabetes, including constituents of the indirect and intangible cost. Their study analysed the various modes of payment used to fund the expenses accruing from the treatment of Diabetes. Their results showed that irrespective of socioeconomic status, the expenditure incurred for treatment and management of Diabetes in India was mostly met through personal savings (60%). This was followed by funding through the sale or mortgage of properties like land, house, etc., and loans with high-interest rates (39%).

There is a plethora of literature on the source of funding for Cancer treatment. Rajpal et al. (2018) assessed the economic burden of Cancer in India using evidence from a cross-sectional nationally representative household survey (71st round of Social Consumption Health- 2014). A concentration index (CI) was used to discern the socioeconomic gradient in Cancer prevalence and its healthcare utilisation patterns alongside the modes of funding the treatment. The results showed that poorer households were more deprived and thus resorted to borrowings in the first place. On average, treatment for about 40% of Cancer hospitalisation cases was funded mainly through borrowings, sale of assets, and contributions from friends and relatives. The incidence of resorting to distress financing was observed to be large among poor households. Such adversities are seen among those households that seek Cancer care/treatment in a private hospital. There is a devastating incidence of distressed financing among households in rural areas, with 48.7% seeking treatment in public hospitals and 58.4% of households using seeking treatment in private hospitals. Alexander et al. (2019) used a mixed method design to collect and analyse data from 378 patients in Bangalore suffering from Cancer between 2008-2012. This study assessed the financial coping strategies and found 57% of patients met the costs of treatment through personal savings and health insurance, while 43% sold their property or took high-interest personal loans. In a similar analysis of breast Cancer patients in Punjab, Jain and Mukherjee (2016) revealed that households with insurance used savings as a coping mechanism (85%). For the households that paid for the therapy entirely out of pocket, borrowing (88%), saving (73%), and selling financial assets (55.7%) were the most common financial coping mechanisms. In another study in Punjab, 30% of the 3,230 households with breast Cancer patients had to sell assets to pay for treatment. In the major cities, 12.4 % of 508 patients sold their properties for treatment. Many families used a combination of coping

mechanisms to deal with their financial difficulties, the most common of which were borrowing, social networks, and savings. Putting money aside, selling financial assets, and deferring repayment are all options. (Nair et al., 2013).

Among patients with heart disease, distress financing- defined as borrowing money and selling assets, was most prevalent in the lowest income quartile (47.2%) and second income quartile (33.3%), with a prevalence of 26% overall (Pankaj & Kanchan, 2016). Further, Rao et al. (2011) examined the patterns in healthcare utilisation, expenditure, and source of funding using data from the 60th round of the National Sample Survey Organization (NSSO). Their results indicated that the households used a variety of methods to finance OPP for hospital treatment. These include current income and savings (57%), borrowing from moneylenders, banks, friends/relatives (35%), and, in extreme situations, the sale of their assets (8%). These trends were found to be different for the poor and rich strata, whereby only 38% of expenditures were financed through savings for the poorer while 62% for the richest group. The majority of expenditures in the poorest group were financed through borrowings (55%), while this share decreased as the economic status improved. The share of asset sales as a financing source was similar across different economic groups.

For CKD, Bala (2017) assessed out-of-pocket expenditure incurred by dialysis patients and its impact on their household finances using a primary survey sample of 190 kidney patients. Savings was a major source of financing resorted to by the households at 68.42%. The other major sources include the mortgaging of assets 27.36% and the remainder through the sale of land, sale of assets, and loans. The costs of treatment of CKD increase when it is present as a comorbid disease. To this extent, Satyavani et al. (2014) analysed the economic impact of chronic kidney disorder among type 2 diabetic patients in India. The study was conducted with a total of 209 respondents. The majority of the funds for the treatment of CKD came from personal savings, which amounted to 46%.

2.5.c. Impact of selected NCDs on Income /Earnings.

In terms of the impact of NCDs on the earnings of a household, there is sufficient literature that details the losses attributable to the disease. Most studies use a linear regression model to depict this impact. Although the earnings are very closely related to indirect cost, it differs on account of its coverage. Loss of earnings accounts for the foregone wages of the patient and caregiver on account of the number of work days missed due to hospitalisation or visits to the clinic. Global empirical findings indicate that the four most common NCDs and

mental health conditions would cause total worldwide economic losses of 47 trillion USD by 2030, or over 75% of the world's gross domestic product (GDP) (Bloom et al., 2012). Low- and middle-income countries are expected to be disproportionately impacted by this due to frail health systems, particularly in developing and least-developed nations, lack of safety nets, and continuous efforts to deal with numerous concurrent health concerns (Kazibwe et al.,2021). Based on a systematic literature review by Jaspers et al. (2015). NCDs have a large and growing global impact on households and impoverishment across all continents and levels of income. NCDs most often strike people during their most productive years in low- and middle-income countries. When people with NCDs face high healthcare costs and a limited ability to work, their families face increased financial strain. In the context of NCDs, the most direct relation is observed due to the absenteeism of the patient and the caregiver. The absenteeism can accrue due to days spent in medical consultation, hospitalisation, and post-recovery care. WHO (2011) estimated that the total revenue lost in India as a result of chronic illnesses ranged from 1094 to 1113 billion Indian Rupees (INR). Of these, income loss from CVDs and Diabetes together totalled INR 163 billion, with income loss from hypertension accounting for INR 199 billion (INR 144–158 billion).

Particularly for Diabetes, studies have highlighted that the patient's income loss accounted for a sizable share of the indirect expenditures, followed by the loss of caretakers' income (Grover et al.,2005). Similar results have been found by Chandra et al. (2014) for Diabetes patients whereby the average indirect cost per year was Rs. 3949, of which 91.3% was accounted for by lost pay, 4.9% on diet management, 3.4% was spent on travel, and 0.4% on health education. Several studies have estimated the loss in income of patients and caregivers due to Diabetes. A survey of a community slum in Mumbai by Fernandes & Fernandes (2017) estimated that the loss of income reported by patients was Rs.1263 over a period of six months. Anbhore (2020) estimated that among the sample of 150 patients from Mumbai, the days of productivity loss among diabetic patients was nearly 20 days. The household compromised on both food and non-food expenses, which amounted to Rs.6981 annually. Similarly, Chandra et al. (2014) estimated the wage loss to be rupees 3605 annually for diabetic patients in the urban setting of Pune. In rural areas of Hisar, Kumar & Mukherjee (2014) found the average monthly wage loss for a diabetic patient to be Rs. 151.7. This figure, when aggregated across the entire sample of 113 patients and their caregivers, amounted to a monthly income loss Rs. 23,400.

In the case of Cancer, in a community-based cross-sectional study in Kerala, Dinesh et al. (2020) estimated the loss of income for the patient to be Rs.3880 monthly. This amounted to nearly 44% of the total indirect cost, while the average income loss to the companion and caregiver was Rs.3,882. Some studies have also estimated such income losses using secondary databases instead of cross-sectional surveys. Using data of 5,55,352 individual members across India from the 75th round of the NSSO survey for health and morbidity for the year 2017-18, Goyanka (2021) assessed the nature as well as the magnitude of the disease burden for Cancer-ailing families. The study found that the income loss was different considering inpatient and outpatient care. For inpatient care, the income loss per person for a Cancer-afflicted household was 2.5 times greater than that of a non-Cancer affected household, amounting to a differential of Rs. 1,765 monthly. Cancer imposes a massive economic and non-economic burden on individuals and households affected. Kumar et al. (2021) found similar results in their survey of 192 Cancer patients in Puducherry, India. Their study found that the median income loss by patients and caregivers was Rs. 18,000 over the course of two months, which amounts to nearly a monthly income loss of Rs.9,000. The relatively higher figures in the case of Cancer can be attributed to the intensive care required. Considering the high costs of Cancer and implications on health and productivity, such financial burdens are exacerbated in households with lower incomes.

A study by Dror et al. (2008) assessed the financial burden of Cancer in 5 resource-poor towns in India by surveying 3,531 households. An intriguing finding was the correlation between income and the expense of a medical episode. Indirect expenditures, such as "wage loss" and "resources committed to caring for patients," contributed to this. Considering low-income households have lower opportunity costs and thus estimated wage losses are lower, such burdens may thus lead to inaccurate burden projections. In this light, Dror et al. (2008) depicted the burden of income loss not as absolute numbers but rather as a share of monthly income to provide a more comprehensive analysis. They found that the wage loss accounted for only 30% of the total cost of illness; however, when calculated as a percentage of income, it was nearly 73%.

In the context of cardiovascular diseases, Huffman et al. (2011) studied the burden of the disease across 500 households in India. He found that the decrease in income across high- low- and middle-income groups within India differed. The high-income households had a 62.1% decrease in income, while the low- and middle-income groups faced 40.4% decrease and 26.3% decrease, respectively. These estimates were calculated based on the

microeconomic and functional/productivity impact of CVD hospitalisation through cross-sectional surveys. The monthly loss of income was Rs.4,100, according to the study by Daivadanam et al. (2012); Srinivas et al. (2021) used two Indian Longitudinal Household surveys comprising 41,350 households to estimate the wage losses accruing due to cardiovascular diseases. They found that wage loss comprises a significant share of the total economic burden of the disease, amounting to nearly Rs.2,310 every month. In the poorest households, wage loss due to illness accounts for roughly 15% of total household spending owing to lower incomes. Wage loss accounts for more than 80% of the total economic burden of illness among the poorest households but only about 20% of the economic burden of illness among the wealthiest. Wage loss accounts for a sizable portion of the total economic burden of illness in India, affecting the poorest households disproportionately. This shows that Universal Health Coverage must protect poor households from the financial risk of illness. Furthermore, their study also notes that a significant amount of informal insurance exists in low- and middle-income countries (for example, through transfers from extended family members and social network members). However, a large body of research shows that "consumption smoothing" through informal insurance mechanisms is both incomplete and inefficient in India and other countries, implying that providing formal wage loss or disability insurance could still result in potentially large welfare gains, even for those with other sources of informal support.

Pankaj & Kanchan (2016) used data from 204 households in Mumbai during the period April-May and October-November 2013 to find the income losses accruing to patients with coronary heart disease. The household annual loss in wages was found to be Rs. 2,177.87, and when aggregated across the sample, the total annual wage loss was Rs. 4,44,287. The study further concluded that in an urban city like Mumbai, Coronary Heart Disease imposes a significant economic burden on households. CHE was incurred by all income groups, implying that coronary heart disease is an expensive disease for both rich and poor households.

Kwatra et al. (2013) examined the comparative costs of cardiovascular disease by assessing the same at the time of admission and then at the 1-month and 6-month follow-ups. The study found that across the 189 patients through the entire temporal span, the loss of income to the patient was Rs. 14,705, while the loss to the caregiver amounted to Rs.8,525. The income losses amounted to 29% of the total cost of illness. Hospitalisations and complications have a significant and positive impact on indirect costs, as expected. Further,

at the time of the 1-month follow-up, 91% of the sample reported that they were not working; at the 6-month follow-up, this figure reduced to 84.6%, which was still high. Impact on caregiver's income was prevalent in 58.2% of the sample at the 1-month follow-up, while at the 6-month follow-up, this reduced to 33%. This indicates that heart diseases lead to significant losses in income not only owing to job losses experienced by patients but also impacts on the caregiver's income.

When considering Chronic Kidney disorder, the monthly loss of earnings for Kidney patients was estimated to be $1364 annually as per the study by Ramachandran & Jha (2013). Indu et al. (2007) studied the impact of kidney stone ailments in the coastal villages of Gujarat. The study used census data to determine the prevalence of kidney stone cases and chose a sample of 156 households with 176 affected people for a detailed study. A structured questionnaire was used for gathering information about the afflicted person's family, medical expenses, wage loss due to inability to work due to ailment, and expenses on potable water and other house infrastructure, etc. Their study found that the ailment led to an average wage loss of 50% of their income. The loss in wages averaged out to Rs. 2,867.5 per person per month. Families affected by kidney stones incur significant medical costs as well as lose wages throughout the year. Income loss was calculated by multiplying the person's weekly income by the number of weeks unemployed. Interestingly, the greatest contributor was the caregiver's income loss, followed by transportation expenses and the patient's income loss. Patients and families have described ESRD as a devastating condition.

Suja et al. (2012) analysed the loss in income of patients and caregivers on the overall cost of the disease and found that it accounted for 24.5% of the total cost of illness across 79 patients surveyed in Kerala. The average loss of income per dialysis session was Rs. 1080, which amounted to a total loss of Rs.77,726 when cumulated across six months. Similar estimates have been indicated by Gupta et al. (2022), whereby the study delves into income losses by looking at two alternative treatment methods of haemodialysis and peritoneal dialysis. For a kidney patient without complications using haemodialysis treatment, the estimated annual wage loss amounted to Rs.41,743. The overall recurrent yearly income loss for a patient getting peritoneal dialysis without issues was projected to be Rs.23,366, while it was Rs.2,470 for peritoneal dialysis therapy.

2.5.d. Impact of selected NCDs on Employment.

The incidence of disease also hampers an individual's employability, with some patients experiencing a loss of employment. Most studies utilise a binary outcome model such as the logit or a probit to quantify this impact.

The literature points towards strong evidence that shows that non-communicable diseases are associated with significant job losses. The withdrawal from the workforce occurs from the health hazards associated with non-communicable diseases. Kulkarni et al. (2019) analysed the impact of various NCDs on loss of income in India using the survey data from India Human Development Survey (IHDS) 2015. Their study estimated the number of hours worked by an NCD patient; the probit regression results showed that the prevalence of an NCD increased the probability of losing employment by 15%. Some of the reasons were rooted in the disabilities associated with NCDs, such as difficulty in walking, using toilet facilities, dressing, etc.

Turning towards the disease-specific loss attributable to loss of employment/productivity, in the context of Diabetes, the study by Thsehla (2020) found that the probability of losing employment increases by 5% in the case of males and 6% in the case of females. Similarly, an analysis by Mehta et al. (2022) in the western Rajasthan region showed that the maximum impact was felt among patients belonging to the class IV socioeconomic status. Nearly 255 patients experienced a loss of job due to Diabetes. This shows that Diabetes poses an unequivocal burden on patients of different classes, whereby the likelihood of economically backward patients losing a job is higher. Albeit Diabetes may seem to be an NCD that may not have a significant impact on job losses, the severity of the disease can hamper workforce participation. Pillai (2012) estimated that 44.2% of diabetic patients that developed foot ulcers had to take early retirement or lose their jobs. Although the literature on job losses attributable to the incidence of Diabetes is scanty in the Indian context, some studies, such as those by Singh et al. (2021) and Rupani and Vyas (2023), have found a significant correlation between loss of employment and the incidence of Diabetes when it occurs as a comorbidity.

Owing to the chronic nature of Cancer, it becomes imperative to assess its impact on the employability of those afflicted with the illness. Using information from a nationally representative health and morbidity survey of nearly 74,000 Indian households in 2004, a

noted study by Mahal et al. (2013) determined the impact of Cancer on workforce participation, among other aspects, such as medical expenses, consumption, debt payments, and asset sales. They estimated the adult workforce participation rates to be lower, between 2.4% and 3.2%. The chronic impact was studied by Kulkarni et al. (2019), who estimated a reduction in employability due to Cancer affliction by 3.2%.

In comparison, Basalathullah et al. (2021) conducted a single-centre retrospective study at a tertiary care hospital and assessed the employability of patients who have recovered from Cancer. Using a questionnaire to collect data on employment and return to work, which assessed the occupation, level of education, paid employment prior to diagnosis, type of work, formal or informal work, return to work, and duration of return to work after discharge, the study found that 16.1% of the sample could not re-join the workforce even after recovery. The chi-square test was used to test the associations and comparisons between the variables for the return to work and categorical variables. In low- and middle-income countries like India, employment is a significant socioeconomic problem, and the re-employment of Cancer survivors is known to be a major challenge. While Kulkarni et al. (2019) and Basalathullah et al. (2021) looked at the impact on patients affected with Cancer, Ghatak et al. (2016) assessed the job losses associated with Cancer looking at it not just from the perspective of the patient but also the job losses accrued to the caregiver. Families were given a cost diary in which they recorded their expenditures and lost income/employment. Employment details included the loss of employment in either parent and leave by the employer with or without pay. The study found stated that 34% of the caregivers experienced job losses.

In the context of CVD, Karan et al. (2014) used the National Sample Survey data (2004) and found that the probability of losing employment due to heart disease was 2.5%. The study further mentioned that families with a history of cardiovascular disease (CVD) had lower employment rates, and older family members reported greater losses in employment than younger ones. Members of households had lower employment rates, particularly women and older people. While the sick person's inability to work may account for some of this decline, other family members may also be shouldering more of the household's caregiving duties. Given that over 90% of India's workforce works in the informal sector, a fall in employment could result in significant losses in household income. Battarcharjee et al. (2012) found a strong association between employment adjustments and the prevalence of CVD. However, loss of employment was not a common phenomenon in its sample of 223

respondents in Mumbai identified over a period of one year. The impact of CVD on job losses may be low in some cases where the severity of the stroke and condition is manageable. Nonetheless, withdrawal from the workforce can occur in the case of CVD, as seen in Raj et al. (2015), wherein among the 500 South Indian households under study, 8.5% of the subjects comprising both patients and caregivers, quit their job. This research was carried out in a tertiary referral hospital in central Kerala. Sluman et al. (2019) compared the employment status and productivity (measured as a work ability score) among patients with heart diseases across 15 countries, including India. The study found notable differences in the employability of the patients not just across the nations but also within the country itself. Females with heart diseases were more susceptible to job losses as compared to men in India. Further, the unemployment rates were higher among the patients. Particularly in India, only 43% of the patients continued to remain employed, while the remainder no longer participated in economic activities owing to health complications.

Lastly, for CKD, the estimated job loss was found to be significantly high (44%) based on the study by Lakshmi et al. (2017). Bala (2017) studied the impact of CKD on the employability of patients using data from 234 subjects, wherein 39.5% of the patients and 11.1% of the caregivers reported a loss of employment. Further using systematic random sampling, Manavalan et al. (2017) also found a strong relation between the prevalence of CKD and loss of employment. The study used a sample of 204 patients and found that prior to the diagnosis of CKD, 85.3% were employed. However, post diagnosis, the percentage of employment dropped to only 19.1%. A study by Kumar, Khandelia, and Garg (2018) found that 16.7% of CKD patients reported job loss due to health complications. The importance of health-related quality of life in chronic kidney disease (CKD) care is often overlooked. Loss of employment was noted as a factor acting as socioeconomic stress among CKD patients leading to depression (Jadhav & Lee, 2014). Several studies, such as those by Ahlawat, Tiwari, and D'Cruz (2018) and Kohli, Batra, and Aggarwal (2011), have highlighted the prevalence of depression among the patients of CKD, which was exacerbated on account of job losses and functional disabilities.

2.5.e. Impact of NCDs on Consumption and Savings of a household.

Out-of-Pocket Expenditures on health have a strong impact on the overall finances of a household. A household can meet these additional payments through either change in the consumption expenditure or, in some cases, changes in the savings of the household. These

changes can become significant, especially when the health expenses accrue from continuous health costs due to the chronic condition of the disease.

According to NHSRC (2014), the present prepayment and risk pooling systems in India are insufficient, and thus, Indian households face a large financial burden of medical treatments. Government funding and social health insurance contributions are insufficient to meet household healthcare needs. Over three-quarters of all healthcare payments are paid out-of-pocket (OOP) at the point of service delivery, with medicine purchases accounting for the single largest component of these payments (approximately 63%). These OOPs are likely to change the consumption pattern of households whereby they reduce their consumption of non-health expenses.

Jaspers et al. (2015) conducted a systematic literature review to study the global economic impact of non-communicable diseases (NCDs) on household expenditures for high, low, and middle-income countries. For Diabetes, the results estimated that 6–11% of the total population in low and middle-income countries would be impoverished even if they buy the lowest price generic Diabetes medication. Household income losses after CVD diagnosis were 26.3%. The risk of impoverishment due to Cancer-related expenses was nearly 2.3 times more compared to other NCDs. Seeking medical help can have both direct and indirect financial consequences, such as hospitalisation, medicine, and transportation costs. On a microeconomic level, the indirect costs of not seeking treatment can have a similar impact. Poverty can result from economic consequences combined with divergent coping strategies (e.g., household labour substitution, use of savings, changing consumption choices). Pallegedara (2016) found that households with chronic NCD patients have greater out-of-pocket expenses on medicines and other pharmaceutical products, medical laboratory testing, and other auxiliary services. The study relied on data from the Sri Lankan Department of Census and Statistics' cross-sectional household income and expenditure survey 2012-2013. The expenditure on other non-health products and services was reduced in this study among impoverished households. Albeit this study was focussed on patients in Sri Lanka, the results would be applicable to any country where the cost of healthcare burden is borne by the households as opposed to the state.

Empirical literature outlines the trends of household consumption expenditures and out-of-pocket expenses in India that are strongly impacted by the incidence of NCDs. One such study by Selvaraj, Farooqui, and Karan (2018) quantified the financial burden imposed by health expenses due to NCDs from 1994 to 2014. The goal was to figure out which diseases

are responsible for a significant portion of a household's financial burden. Their results showed that these expenses pushed nearly 38 million persons into poverty in the year 2011–2012. Their study used secondary data from the Consumer Expenditure Surveys of 1993–1994, 2004–2005, and 2011–2012 and the Social Consumption of Health Survey 2014. The study noted that the share of health spending from overall consumption expenditure had increased sharply from 4.8% during 1993–1994 to nearly 7% in 2011–2012. It was also found that expenditure on treatment of Cancers, CVDs, and injuries was one of the highest among all the diseases.

Mohanty et al. (2017) surveyed 2647 households in India and found that one-third of the population is multidimensionally poor. They found that health shocks were significant predictors of impoverishment and reduced consumption among the sample. Considering the low sample in Mohanty et al. (2017) cannot be used to extrapolate the results at a macroeconomic level, another study by Mohanty et al. (2020) studied the trend in out-of-pocket health expenditure from the three rounds of health survey (2004, 2014-15, and 2017-18) and two rounds of consumption survey (2004-05 and 2011-12). This research uses suitable survey data to produce comparable estimates of medical spending and out-of-pocket payments in India. The share of medical expenditure on NCDs in total expenditure by households was 93% in 2004, 91% in 2014, and 91% in 2018, based on the results. They also noted that poor households lose welfare as a result of OOP healthcare payments as they borrow and sell assets, underuse, or do not seek healthcare due to a lack of resources, whereas rich people met used income or savings. Kankeu et al. (2013) found that there were significant effects on self-reported daily food consumption, which was reduced in 37% of households, and that 38% of households sold property or used savings to compensate for lost income. In addition, 45% of patients were cared for by one or more informal caregivers who did not live with them, one-third of these caregivers' households reduced their daily food consumption, and 26% had delays in payments of essential services such as electricity or telephone services. It's worth noting that these are the kinds of welfare losses that helped shape the concept of catastrophic health spending. Thakur et al. (2011) studied the socioeconomic impact of NCDs on Indian households by summarising the outcome of various empirical literature in this domain. The study found that 45% of OOP expenditures for NCD were financed by income or savings. This study looks at health financing from the perspective of aggregation of households' behaviours. The investigation suffers from the limitation that it clubs the income and savings together as a coping strategy, whereas it should be decoupled. Consumption, too, should be looked at scrutiny as a reduction in non-

food expenses (school fees, EMIs for household items) can have a different implication as compared to reducing food expenses to cope (this behaviour has been found to be prevalent, especially in low-income households) (Miranda et al.,2008).

As the literature suggests, altering consumption patterns is one of the coping mechanisms of households to meet rising health expenses attributable to NCDs. The households may decrease their food and non-food consumption. Various studies across the literature have utilised linear regression models to quantify this impact. Particularly for Diabetes, Anbhore (2020) found that the household compromised on both food and non-food expenses, which amounted to Rs.6981 annually. In the context of Cancer, the monthly decrease in per capita consumption was estimated to be 28.7%, according to the study by Rajpal, Kumar & Joe (2018). In a literature review by Chakrabarty et al. (2017), families of Cancer patients in India deal with their financial difficulties by reducing spending on other members of the family or other aspects of life. For cardiovascular diseases, the consumption expenditure of the households declined by 30.4%, according to the study by Allarakha, Yadav & Yadav (2022). The aspect of displaced consumption among patients of CKD has been studied very little; however, in the study by Bradshaw et al. (2019), CKD patients experienced crippling levels of financial hardship related to the disease expenditure despite subsidised treatments. Thus, the decrease in consumption expenditure in CKD has limited literature for Indian respondents- a gap addressed by this study.

There is evidence to support the disease-specific impact on savings of a household quantified through linear regression models. The estimated decrease in savings for patients with Diabetes was found to be Rs. 7,500 annually based on the results of Kumpatla et al. (2013). Based on the findings of Sujata, Ram & Thakur (2021), the monthly reduction in savings for Cancer patients was found to be Rs.6625. For Cardiovascular diseases, the decrease in savings was estimated to be 86.5% of the mean monthly income for the patients, as found in the study by Sangar, Dutt, & Thakur (2019). The estimated reduction in savings for patients with chronic kidney diseases was found to be Rs.1,80,743 annually by Satyavani et al. (2014).

A similar study was done by UNDP (2005) in the context of households afflicted with HIV in Vietnam. The study detailed the HIV/AIDS-related expenditure and income losses of 125 four provinces of Vietnam and focussed on the financial coping strategies used by households. *The present study uses this as a foundation to present a comparable picture of*

the coping strategies, that is- the extent of changes in consumption expenditure or draining of savings across the four NCDs.

2.5.f. Impact of selected NCDs on long-term Investment

NCDs can also affect household investment apart from consumption and savings patterns (WHO,2007). The literature on the impact of high OOPE on savings and investment is scanty. However, in the Indian context, the study by Mahal et al. (2010) has deliberated upon the reduced savings and investments of households afflicted with NCDs. The study, however, only provides a theoretical understanding of how the investments by households decrease as not just an offshoot of reduced savings. The reduced productivity of NCD patients leads to lower participation in economic activities which in turn reduces their ability to save and build high-value investments. In another study by Atella, Brunetti & Maestas (2012), it was found that households' investment patterns change due to the onset of diseases. The increase in the consumption of health-related services and goods frequently leads to a corresponding reduction in the resources available for savings and investment, according to WHO (2009). In this context, the study uses percentages to map household's investment behaviour as a result of the incidence of diseases.

The out-of-pocket expenditure on health poses to be a burden on households, as the literature in the previous section outlines. The consumption and savings pattern of the household changes as a response to health shocks. Linked with savings is the aspect of the household's investment which changes considering the economic relation of savings equals to investment. Atella, Rosati, and Rossi (2006) postulated that out-of-pocket medical expenditure risk leads to a household altering its financial behaviour in two ways- increasing precautionary saving and decreasing its risk linked to exposure to other financial risks (such as risky investments). This has been further corroborated by Goldman & Maestas (2013), who found that persons with lesser medical expenditure risk are more likely to hold risky financial assets or investments. Pak, Kim & Kim (2020) analysed Cancer survivorship's long-term effects on household assets using the 2000–2014 waves of the Health and Retirement Study. They concluded that in 2015, the loss of household assets due to Cancer was estimated to be $125,832 dollars per household with a Cancer patient. The decrease in investment assets, miscellaneous savings, real estate equity, and business equity, as well as increases in unsecured debt, contributed to this shift. Demographic characteristics, general health status, employment outcomes, and household economic attributes were also considered in regression estimates. They found that household assets are an important source

of liquidity for financing Cancer treatment and absorbing the expected expenditure risk associated with the recurrence of Cancer. Lee and Jeon (2016) analysed the effect of health status on the holding of risky assets and the equity ratio of risky assets in households' financial assets across 5,014 Korean Households. They found that health status has a significant correlation with household financial asset portfolio, whereby the ratio of inpatient treatment expenses to household total medical expenses served as a proxy for household health status. Kronenberg, Kippersluis, and Rohde (2014) conducted a longitudinal study of 7151 Dutch households to understand the association between health and investment portfolio. After running a pooled OLS, Fixed and Random effect modelling of the data, they concluded that healthier individuals invest in riskier assets compared to their unhealthy peers.

The various empirical literature points towards the significant relationship between health status and investment in risky assets. The conclusion derived is that healthy households tend to hold riskier assets. In the long run, it is understood that risky assets give greater returns. Thus, the unhealthy household's inability to hold risky assets can impact its overall wealth in future.

The literature concerning the impact of investment due to the prevalence of NCDs, especially in a comparative light, is scanty. *The present study aims to address this gap and outline the relative impact of the 4 NCDs on the likelihood of a household undertaking investment in assets.*

2.5. g. Public v/s Private healthcare-preferences: push and pull factors.

Based on the NFHS data for Goa in 2019-21, 61.6% of the households utilised public healthcare while 38.3% utilised private healthcare facilities. Among the urban Goan households, 57.3% utilised public healthcare facilities, while 42.7 % utilised private healthcare facilities. For the rural households, the data found that a higher majority preferred public over private (67.8% v/s 32.1%). The pull factor driving households towards the public sector is the cost, while the push factor driving people away from the public sector and towards the private sector are multifold. Several studies have tried to ascertain the factors that drive households towards different healthcare facilities. Literature suggests that even with several government initiatives aimed towards the improvement of public sector healthcare services, the private sector is a dominant player.

There are several studies that seek to examine the healthcare utilisation patterns of patients. Some of these include studies by Sahoo & Madheswaran (2014) and Harpham & Molyneux (2001). Studies like Borah (2006) and Bhattacharyya et al. (2018) have found that price and distance significantly determine the choice. The study by Boachie (2016) has found waiting time to be an essential factor driving the choice of healthcare. Efficiency has also been found to be an important factor driving the choice based on studies by Iles (2013), Ngangbam & Roy (2019), Basu et al. (2012), and Ravi et al. (2016). Other factors such as waiting time, privacy of medical examination, cleanliness, and sufficient treatment time have been included as they have been found to be significant drivers, as per studies by Kumari et al. (2009) and Musyoka (2019). Based on the study by Ravi et al. (2016), timely treatment is also a factor that plays a role in determining the choice of healthcare.

Using descriptive cross-sectional research among 120 respondents from Nepal, Shrestha & Adhikari (2021) found that 60.8% of respondents preferred private healthcare facilities, and there was a strong correlation between quality factors and the choice of healthcare facility. The study used a Chi-square test to determine the relationship between the selection of healthcare institutions and various factors such as timely treatment, explanation of health issues, clean environment, reputation of the facility, lesser waiting hours, and medical equipment availability. There was also an association of demographics such as age, gender, and family income with the healthcare choice. Considering the strong association of income levels with the choice of healthcare Rout, Sahu & Mahapatra (2021) analysed states of India on the basis of low- middle- and high-income status to understand factors determining utilisation of either public or private facility. They conducted a multi-variate regression to highlight the demographic factors that drive the choice alongside the various quality factors. Except in Assam and Odisha, public facilities for outpatient and inpatient services were found to be underutilised, which was linked to poor quality of care and excessive waiting times. Caste, education, and wealth were the most important determinants of healthcare choice and socioeconomic characteristics. Expanding on the association of age and choice of healthcare, Chatterjee et al. (2019) studied the choice of public versus private healthcare among the elderly population using Andersen's Health Behavioural Model. The demographic features of age, gender, marital status, and prior illness were the predisposing factors considered. The social characteristics of occupation, education, social network, culture, family size, religion, and residence mobility were the social factors impacting the choice of healthcare. Lastly, health beliefs such as attitudes, knowledge, and values related

to one's health and access to healthcare were considered. The findings, based on NSSO data, suggest that upper caste seniors with higher levels of education, higher incomes, larger family sizes, and surgery needs were more likely to choose private health care. Those with higher economic dependence, chronic diseases, and longer hospital stays were more likely to prefer public inpatient services. The magnitude and impact of these characteristics varied by region. They also found Health schemes to be a significant enabling factor. Public hospitals were preferred over private due to the facility of availing government schemes which led to cost reductions for the patients.

India is a highly populated country, and thus, public and private healthcare facilities face a significant burden when providing healthcare services. The provision of healthcare services by the facilities and the utilisation thus depends not just on the quality factors of the facility but also their structure, i.e., the locational attributes that impact the patient burden. The study by Barik & Desai (2014) attributed the preference for private over public hospitals to two factors- the structure of government healthcare and secondly, the quality of care while using secondary data from India Human Development Survey 2004-05. The structure of government healthcare refers to the accessibility of such facilities. Sometimes despite the facility being available in the vicinity, it was seen that in the rural areas, 69% were forced to visit a private facility due to the absence of staff in the public facility or lack of equipment. The quality factors that drove the preference for private were the competency of the staff and quicker treatment. In this context of the healthcare structure, Bagchi et al. (2020) have particularly focused on the non-utilisation of public healthcare facilities during sickness. Their study used nationally representative samples of 3,51,625 women from the secondary database of National Family Health Surveys NFHS-4 (2015–2016). In India, majority of women (88 %) reported that their family members did not use public healthcare. 'No close facilities' (42.4%), 'inconvenient facility timing' (29.6%), 'poor quality of care' (52.3%), 'health workers frequently absent' (16.8%), and 'extended waiting time (39.9%) were cited as the leading causes of their lesser usage.

Several studies have mapped the utilisation of public or private healthcare facilities using primary surveys. Malik and Varma (2018) studied the factors affecting the decision of 386 patients when choosing private or public healthcare during the period July-September 2016 using Chi-Square and T-test statistics. Patients' personal factors (severity of disease, insurance coverage, and anxiety prior to seeing a doctor) also influenced their decision. Other factors such as referral to the hospital by doctor, family and friends, family income,

insurance type & coverage, hospital services quality, employment of patients' family members in hospital, cost of services provided at the hospital impacted the decision. Motawni and Devendra (2014) undertook a study of 479 patients from the public sector and 337 patients in the Private sector in Udaipur. They used ordinal scale mapping to assess the factors affecting patients' decision in the selection of a hospital. They found the leading factors driving the choice were convenient hours, lesser waiting time, qualified & experienced doctors, inbuilt pharmacy facility, and convenient location. As the literature indicates, the cost factor is a driving cause influencing the decision among patients. However, the accessibility and quality of care lead to poorer sections utilising public healthcare. The study by Angeli et al. (2018) looked at the socio-cultural sustainability of private healthcare providers in an Indian slum setting. They chose a sample of 436 low-income patients from 5 hospitals in Ahmedabad and undertook Chi-Square Analyses to understand the degree of association of factors with the choice of healthcare. The empirical results suggested that for the poorer sections, public healthcare was often the only choice as they could not afford private hospitals. The factors that drove them to a private hospital were either bad experiences with or references from public hospitals. Lesser waiting times, appropriate equipment, and better quality of staff were other factors increasing preference for private facilities.

Long waiting lines, filthy environment, bad management, low service quality, inconvenient opening times, and a lack of medicines have all been noted as deficiencies of public hospitals in the literature. There is, however, very little evidence of how these factors affect the decision when juxtaposed with the prevalence of different NCDs. Many studies have undertaken the study of factors driving the choice of the household when afflicted with a particular NCD with little focus on comparison with other NCDs. In this regard, the present study seeks to bridge this gap by looking at the choice of households with the interplay of quality factors and the prevalence of 4 NCDs- Diabetes, Cancer, CVD, and CKD.

2.6 Literature Review- Primary Evidences

- NCDs pose a significant burden on the population, which has increased in the last two decades owing to the rising out-of-pocket health expenditures. This has led to the impoverishment of households in the event of catastrophic health expenditures. The prevalence of NCDs can have a significant impact in pushing households into poverty, whereby an unequivocal burden is borne by households with lower incomes.

Patients are likely to incur higher costs when seeking treatment at private healthcare compared to government healthcare facilities.

- A sizeable portion of expenses on NCDs are associated with hospitalisations and inpatient treatments. The lack of insurance coverage and social security further escalates the issue of health expenses. Some of the leading NCDs that are associated with high out-of-pocket expenses include Cancer, CKD, CVD, and Diabetes. CVD particularly accounts for a major share of NCD-related deaths.
- The costs associated with NCDs can be direct (medicine, diagnosis, treatment, hospitalisation costs) or indirect (travel, loss of income due to absence or productivity, disability). The direct and indirect costs can vary based on the severity of the disease and the number of members in the households afflicted with the disease. Hospitalisation costs account for a major share of the direct costs, while loss of income due to absence accounts for a significant share within the indirect costs.
- CHE occurs when health expenses diminish the household's ability to undertake consumption spending and push the households into poverty. Prevalence of Cancer, followed by heart disease and Diabetes, are the leading factors that are associated with catastrophic health spending. Rich households often rely on savings and income to fund health expenses, while poorer households' resort to borrowing. NCDs can lead to costs to households on account of absenteeism at work, which leads to loss of income/earnings for not just the patient but also the caregiver.
- Limited literature is available in the context of chronic kidney diseases; however, all studies indicate a strong association between catastrophic health spending and the prevalence of CKD. Major sources of financing for catastrophic health expenses are borrowing money and the sale of assets. Diabetes related expenses are often met through savings, Cancer related expenses are funded from the sale of assets and borrowing. Source of funding for CVD and CKD related expenses are savings and the mortgaging of assets. In the case of highly severe CKD, households' resort to borrowing. Significantly high losses of income are reported in the case of CKD. This is followed by Cancer. In the context of CVD and Diabetes, the income losses depend on the severity of the disease. The loss of income for households with higher income is larger in magnitude due to higher opportunity costs of time. However, with poorer households there is a greater risk of loss of employment due to absenteeism.
- NCDs are associated with significant job losses. The loss of employment is associated with the disabilities associated with diseases as well as the income-

economically backward have a higher probability of losing their job. In the case of Diabetes - there is a lower risk of a patient with high income losing employment; the risk increases for patients from poorer households, and the incidence of diabetic foot increases the likelihood of job losses. Cancer is associated with a high probability of losing a job, irrespective of economic status. CVD is also associated with a lower likelihood of job losses which increases in the case of the financial situation of the patient and the severity of the condition. CKD is linked to a very high likelihood of losing employment.

- Health-related expenses increase in the event of a household suffering from NCDs which can entail changes in consumption and saving patterns of the household. These changes become more long-standing when the households belong to a country where the state plays a limited role in sharing the cost burden. Reduction in consumption, especially food consumption, to cope with health expenses is prevalent in poorer households. The poorer households also reduce non-food expenses by missing payments such as electricity, school fees etc.
- Disease specific studies indicate statistics on the percentage share of the sample that report the decrease in savings or decrease in consumption expenses. The majority of patients reporting a loss of savings and impoverishment were afflicted with Cancer or CVD. Diabetes causes long-term impoverishment due to the drain of savings. Literature on CKD though scanty, showed evidence of nearly halving of savings for patients.
- Savings are associated with investments which undergo changes as a response to the health expense shocks. Households alter their financial behaviour by decreasing their holding of risky assets. This behaviour leads to households foregoing higher returns in future, leading to decreasing overall wealth accumulation. Such a behaviour is particularly malefic for households from lower economic backgrounds.
- When choosing between private and public healthcare, cost is the leading factor driving the choice and especially for poorer households. The factors such as less waiting hours, distance from home, competency of staff, clean environment, and privacy also are significant factors that influence the decision. Poorer households in rural areas are often unable to utilise the public sector facilities due to the absence of staff or appropriate equipment.

2.7 Research Gap

The literature on the cost burden posed by NCDs, both in terms of their cumulative as well as comparative impact, is limited, especially in the context of Goan households. As per the Goa Disease burden profile, 1990-2016, NCDs and injuries accounted for 70.9% and 11.5% of deaths, respectively. The sheer numbers show the significance of these diseases in the state of Goa.

Albeit, there is significant literature on disease-specific burden based on the direct and indirect cost to households, very few studies have focussed on the cost burden in a comparative light, and no study has taken this exercise, particularly for Goa in recent times. Similarly, there is limited literature on the prevalence of NCDs and their relative impact on catastrophic health expenses in Goa due to the incidence of various NCDs- the study seeks to bridge this literature gap.

With respect to loss of income, there is sufficient literature outlining disease-specific losses to patients and caregivers. However, the literature is sparse in terms of comparing the loss of income from the prevalence of different NCDs. This is an essential piece of information that can help corroborate the diminishing earnings of the households and further help in macroeconomic estimations of disease burden, especially when done in a comparative light.

Loss of employment due to NCDs is mapped through descriptive statistics of patients in the study sample in majority of the empirical literature. However, it's important to note that most of these studies are disease-specific and are unable to capture the relative comparison of the effect that an NCD has on job losses. The present study seeks to map out the relative impact of NCDs on the probability of loss of employment.

In terms of an impact of an NCD on the household's consumption and saving patterns majority of the empirical literature focus on descriptive statistics of samples reporting either loss of consumption or loss of savings. There is a dearth of literature that specifies the dynamics of this process. Very few studies outline the dynamics of financial coping strategies (changes in consumption or saving patterns) in terms of magnitude as well as risk. This present study addresses this gap by outlining the dynamics of financial coping mechanisms when exposed to health shocks. Households can choose to either change consumption or savings patterns to meet health expenses, but the choice can vary based on the extent of expenditure. The study outlines the comparison of these decisions in the light

of the NCD the household is afflicted with, as well as the extent to which the household adjusts its consumption and savings. The present study presents a comparable picture of the coping strategies, that is- the extent of changes in consumption expenditure and draining of savings across the four NCDs.

Literature on the impact of NCDs is majorly theoretical, with empirical studies focussing on the degree of association between health status and the decision to hold risky assets. The evidence shows that households are less likely to hold high-risk assets. There is limited evidence on the degree of association between investment decisions and the prevalence of different NCDs. The present study examines the investment decisions of households when afflicted with different NCDs.

A significant amount of literature has focused on factors driving the choice between public and private healthcare, with little evidence of how quality factors affect the decision when juxtaposed with the type of NCD affliction. In this regard, the study contributes to the literature by looking at the choice of households with the interplay of quality factors alongside the prevalence of 4 NCDs- Diabetes, Cancer, CVD, and CKD. The study also assesses the nuances when a household is indifferent between choosing a public or private healthcare facility.

The Directorate of Health Services, Government of Goa, provides data on the levels and trends in NCDs rather than understanding and analysing the underlying processes. This study will try to fill this gap and add value to what is already known by the government.

The present study uses household-level data collected through primary samples. The sample for the present study covers the state of Goa (both Districts-North Goa and South Goa) and not a few areas/ villages/ towns as presented by other studies. The current study addresses each of before mentioned issues through a comparative lens of different NCDs while accounting for both the microeconomic factors affecting decision-making (Source of funding, choice of healthcare) as well as the outcome (cost borne by the households, catastrophic expenses, savings, investment). The diseases under the purview of the study include- Diabetes, Cancer, CVD, and CKD. The outcomes derived from this study can be used for macroeconomic estimations when comparing the impact of NCDs on households. Empirical models such as linear regression have been used for studying the impact of NCDs on direct and indirect cost, loss of earnings, change in consumption (for both food and non-

food expenses) and savings. Further catastrophic health spending in the context of the prevalence of four NCDs has also been mapped. Lastly, the study utilises logistic regression models to analyse probabilities associated with loss of employment, source of funding and choice of healthcare (in light of various quality factors) as a result of the prevalence of the four NCDs.

2.8 Conclusion

According to NSHRC (2021) reports, in Goa, non-communicable diseases burden accounted for 56.1% of premature and 43.9% of the disability and morbidities. The main causes of DALYs included heart diseases, Diabetes, and various musculoskeletal disorders, among others. Further, 74.71% of the total Disability-adjusted-life-years (DALYs) are caused by NCDs in the state. Increasing healthcare expenditures place a high financial burden on the state as well as households.

Given the varying level of the cost burden of diseases, this study looks at the aspects of direct costs and indirect costs borne by households. The literature widely relies on the method of OLS estimations of median identifications. And thus, the current study draws its methodological foundations from the empirical evidence and undertakes OLS estimations to highlight the comparative costs of these diseases.

The high-cost burden is unequivocally borne by low-income households that are more susceptible to impoverishment owing to high out-of-pocket health expenses. Thus, the study examines the impact of the type of disease affliction on Catastrophic health expenditures by households. The CHE threshold in the literature ranges between 10%-40% of overall consumption. In this context, the current study sets a 40% threshold level for CHE to estimate the prevalence of impoverishment and subsequently uses a Bayesian 2-stage hurdle to generate the comparative impact across various NCDs. This is a novel method that has not been applied in studies that focussed on the Indian context and thus serves as a contribution to the literature.

Households can use different sources to fund medical expenses based on the type of disease, as different diseases pose varied financial burdens. In this context, the study seeks to compare the various sources used to fund medical expenditures attributable to the different NCDs. This study uses a logistic regression model to identify the impact of NCDs on the choice of funding based on the framework developed by Babalola et al. (2011) in the context of Sub-Saharan Africa.

Events involving diseases that occur regionally or globally might have wider socioeconomic repercussions that are frequently overlooked in risk and effect assessments. Such occurrences have the potential to cause economic shock waves that spread far beyond the usual health sectors (Smith et al.,2019). The present study isolates the economic impact from other far-reaching societal impacts to quantify the burden posed by NCDs at a household level. Given the impact of NCDs on productivity and absenteeism rates, the study estimates the loss of earnings attributable to the type of NCD to compare the disease burden using linear regression models. Further, the diseases may lead to the patients exiting the workforce in extreme cases. To account for this impact, the study undertakes a logistic regression model to estimate the impact of the diseases on the probability of loss of employment.

Some of the strains posed by the diseases impact household-level behaviour in the context of altering their expenditure patterns. This study compares the impact of the affliction of a type of disease on the non-health consumption and savings pattern of the disease using the OLS methodology. A change in the savings patterns has the potential to alter the long-term investment holdings of a household. The current study also assesses the relative impact of the NCDs on investment decisions of the household based on descriptive analysis.

Lastly, the choice of healthcare facilities utilised by the patients depends on many push and pull factors. While there is sufficient literature on quality factors affecting the choice of healthcare, there is little evidence of the interactive effect of disease affliction juxtaposed with quality factors. Thus, the study uses a logistic regression model to understand the comparative dynamics of disease affliction and quality impacts on the choice of facility. The nuances of a patient being indifferent between public and private healthcare are also mapped using descriptive analysis.

NCDs pose a significant burden to society as a whole, and the current study uses behavioural patterns at a household level to isolate these impacts. However, there lies great merit in mapping the over-arching impact of these diseases not just at the household level but also at a national level while accounting for the strain posed on other agents of society, such as the healthcare infrastructure and businesses that suffer due to decreased productivity. While the latter is excluded from the scope of the study, the findings derived can be extrapolated at a macroeconomic level in the future to compare the disease burden impacts to account for losses to the nation.

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CHAPTER 3

EXAMINING THE HOUSEHOLD LEVEL OUT-OF-POCKET EXPENDITURE ON HEALTH.

3.1 Introduction

3.2 Profile of the Respondents

3.3 Description of Variables

3.4 Background and Methodology

3.5 Examine the Household level out-of-pocket expenditure on health.

3.5a. Comparison of Direct and Indirect costs

3.5b. Quantifying the catastrophic health expenses incurred by households.

3.5c. Assessing the source of funding when meeting costs attributable to non-communicable diseases

3.6 Chapter Summary and Conclusion

3.1 Introduction

In India, a significant amount of the population cannot afford nutritious diets, which can lead to the onset of various non-communicable diseases (NCDs). The National Family Health Survey (NFHS)- 2019-2021 for India finds that 60% of the sampled population could not afford nutritious diets nationwide. Although the data does not indicate the affordability of healthcare NCD-related expenses, these insights regarding diet affordability, alongside the percentage of people seeking treatment for NCDs, show an alarming trend regarding the affordability of healthcare services. NCDs will cost more than $30 trillion over the next 20 years, accounting for 48% of the world's GDP in 2010, and pushing millions of people into poverty, according to Bloom et al. (2011). For India, when clubbed alongside Lower middle-income countries, the estimates of direct costs stood at $6 billion in 2010 and are expected to reach $294.5 billion by 2030. The indirect costs for Lower Middle-Income Countries in 2010 stood at $ 11.3 billion and are expected to reach $44.8 billion in 2030. Similarly, the systematic review of literature by Kazibwe et al. (2021) specifically looked at the direct and indirect cost burden posed by NCDs in lower-middle-income countries. They estimated that average total costs per annum per patient are $7386.71, $6055.99, $3303.81, and $1017.05 for COPD, CVD, Cancers, and Diabetes, respectively.

Particularly NFHS 2019-2021 results for Goa indicate that 4,139 women and 1,648 men aged 15-49 per 100,000 have Diabetes. Subsequently, nearly 193 women per 100,000 in the sampled section suffered from Cancer. Albeit this figure seems low, it could be attributed to the low screening tests- only 1% of women aged 15 to 49 underwent a screening test for Cancer. Meanwhile, for men, this figure stood at 2%. Heart disease is more prevalent among women (426 per 100,000) than men. The prevalence of chronic kidney disorder was only reported by 0.44% of the sample. Although the data does not show how much expense was incurred on cost, it indicated the percentage of the population that did not seek treatment despite suffering from non-communicable diseases. In the case of Diabetes, 4.09% of the sample suffered from the disease, and 7.23% of this section did not seek treatment. Among the patients suffering from heart disease, 12.5% did not seek treatment.

The India Human Development Survey (IHDS) data 2011-12 shows that nearly 10% of the surveyed population spent Rs. 1000 a month on medical costs of outpatient services. A slightly lower share (8%) spent Rs.700 on medical expenses. IHDS data shows that nearly 11% of the surveyed population spent Rs. 2000 a month on medical costs of inpatient services. A slightly lower share (10%) spent Rs 3000 a month on medical expenses. With

regard to healthcare expenditure, impoverished households are at a greater risk of incurring catastrophic health expenditures that can make it difficult for households to manage their consumption expenses.

On average, IHDS data reveal that the mean monthly consumption expenditure of the surveyed population was Rs.1,16,973. Of this, the average inpatient medical expenses were Rs.8661, while the average medical outpatient expenditures were Rs.486. Frequent trips to the hospital can likely lead to increasing outpatient costs coupled with failing health, diminishing the afflicted member's ability to engage in economic activities. This will lead households to sometimes resort to liquidating assets or borrowing/loans. IHDS data shows that 3% of the population took a loan for medical expenses.

Before beginning with the analysis of the objectives, the study details out the profile of the sampled respondents with respect to their educational background, gender distribution, rural-urban distribution, marital status of respondents, employment status of the respondents, NCD prevalence within the HH of the respondents and annual earnings of the sampled respondents. The following section also includes the description of variables used in the study.

3.2 Profile of the respondents

The study utilizes a sample of 400 respondents for hypothesis testing. These respondents submitted their responses via telephonic interviews, face-to-face interviews, and Google response forms. This section highlights the demographics of the data as presented through divisions within NCD prevalence, age, education status, and economic background among others.

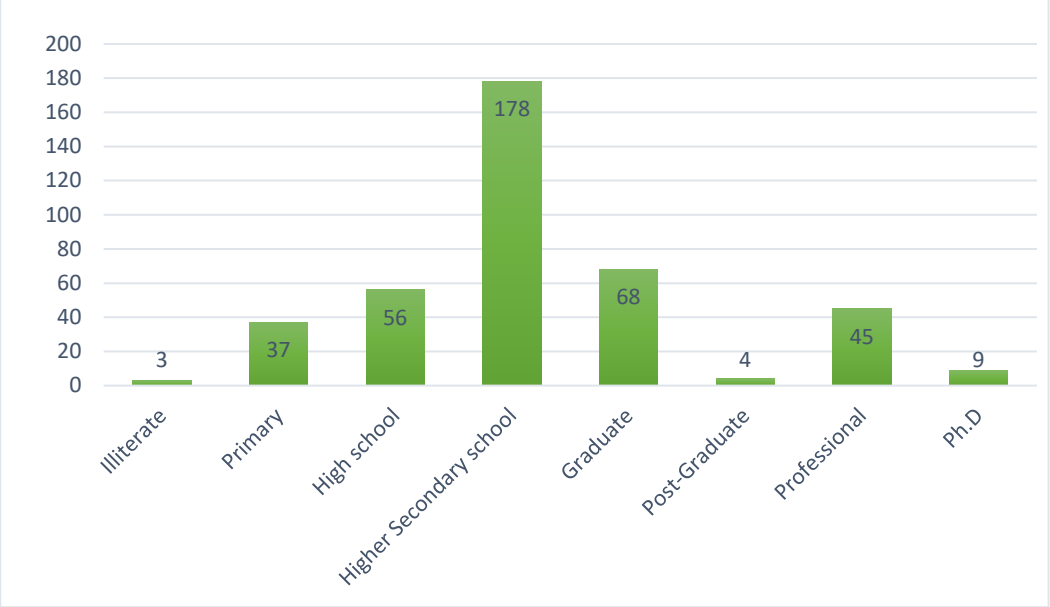
Table 3.1. Descriptive statistics of the demographics of the sample

N=Total no of people:400 observations	**Frequency**	**% of sample**	**Mean**	**Std. Deviation**
Ages				
Below 25	43	10.75	15.08	5.77
26-40	42	10.5	31.61	5.33
41-60	260	65	49.81	4.96

61 and above	155	38.75	69.80	8.56
Discrete variables	**Frequency**	**% Of sample**		
Socio-Economic Class				
General	304	76		
ST/SC/OBC	96	24		
Non-Communicable Diseases				
Diabetes	201	50.25		
Cancer	107	26.75		
CVD	155	38.75		
CKD	6	1.50		
Combination of a household with >1 member ailing with NCD	86	21.5		
Continuous Variable	**Mean**	**Std. Dev**	**Min**	**Max**
Annual earnings of Household (rupees)	323343	468252.2	0	5000000

Source: Primary Survey Data.

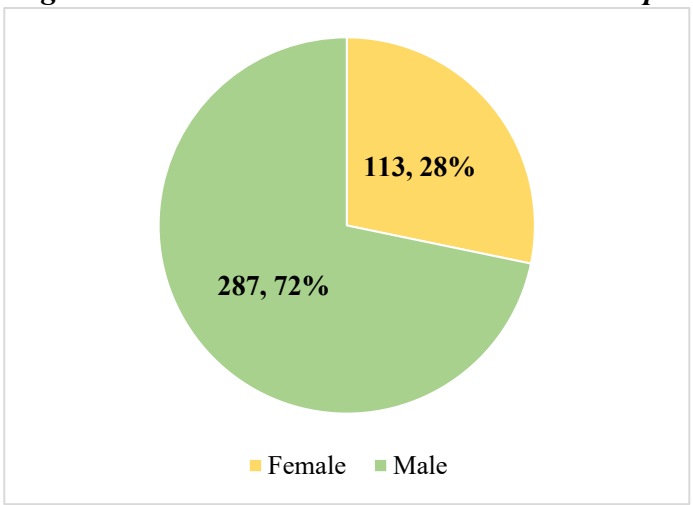
Figure 3.1. Educational background of the sample respondents.



Source: Primary Survey Data.

Figure 3.1 shows the highest education attained by a member in the HH within the sample of respondents. As can be seen, a majority of respondents had a family member whose highest education attained was that of the Higher secondary education category (XII std). A marginal pool of people namely 3 were illiterate and further, there were 09 respondents whose highest education was Ph.D. However, from the graph, it is seen that a sizeable number of respondents have attained some degree of educational qualifications.

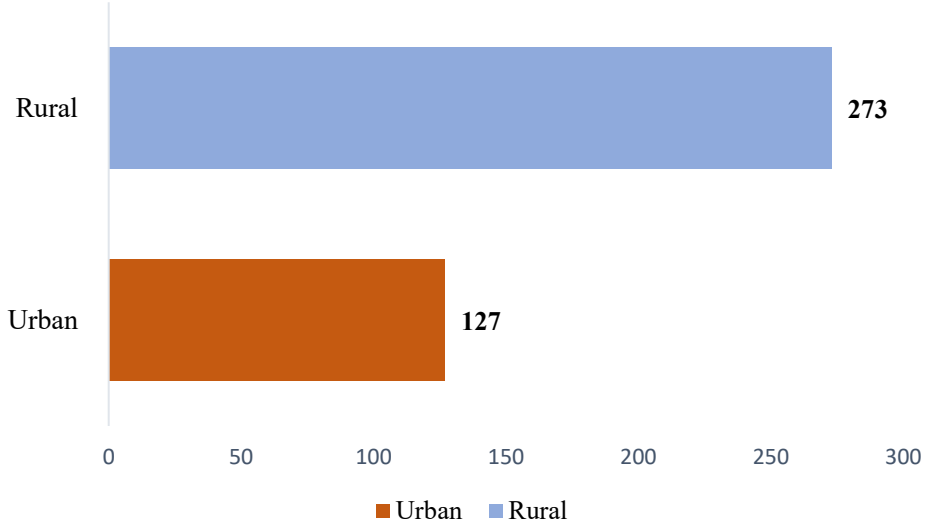
Figure 3.2.: Gender Distribution within the sample



Source: Primary Survey Data.

As can be seen from Figure 3.2. among the respondents there were 113 families where the head of the household was a Female and 287 families where the head of the household was a male.

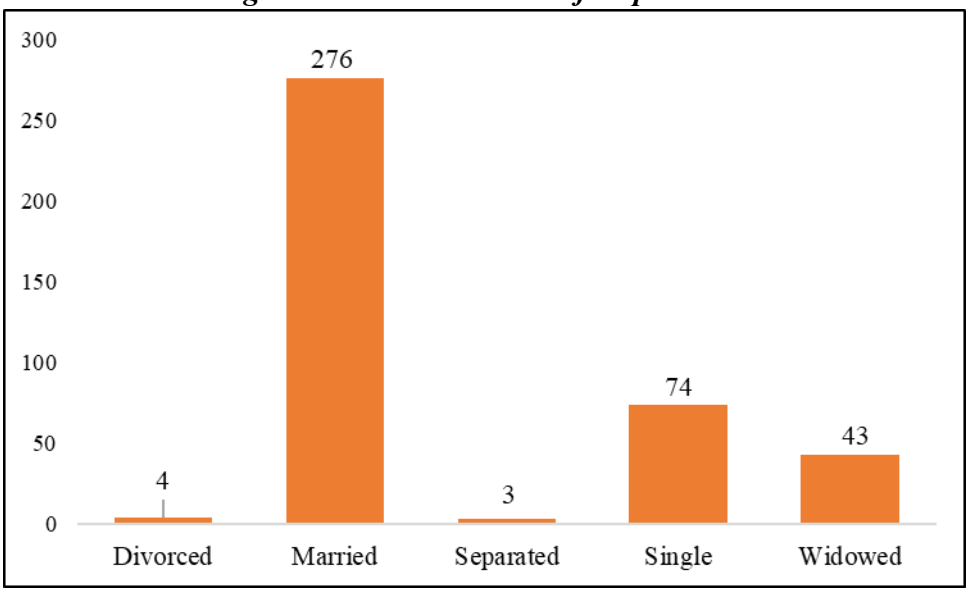
Figure 3.3.: Rural-Urban distribution within the sample.



Source: Primary Survey Data

Among the sample of respondents, 273 responding HH belonged to the rural area while 127 respondents belonged to the urban pockets of Goa as can be seen from Figure 3.3.

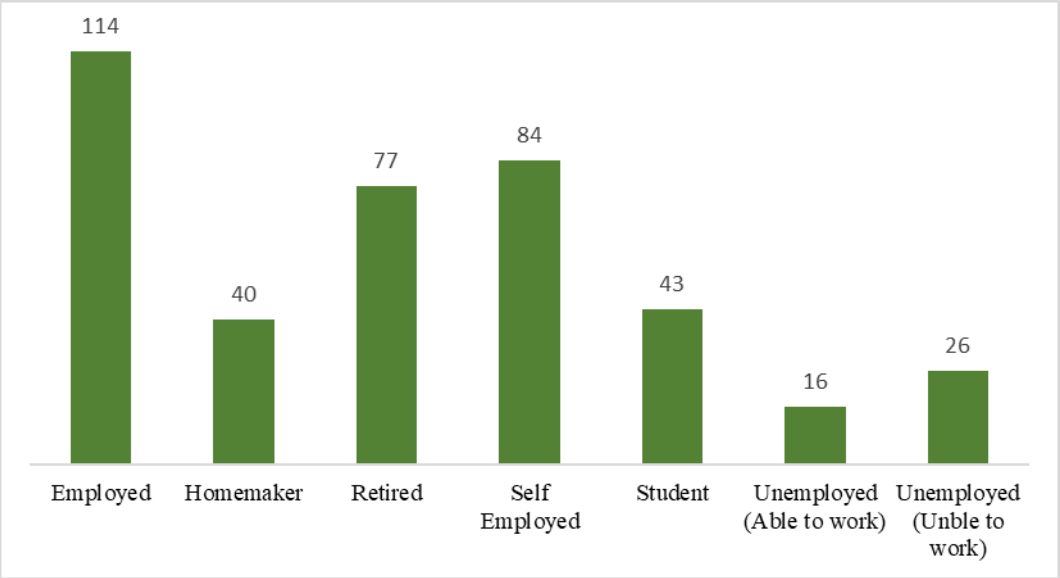
Figure 3.4. Marital status of respondents



Source: Primary Survey Data

Figure 3.4 shows that a sizeable number of respondents were married (276/400). Subsequently singles comprised 74 out of 400. Among the sample it was found that 43 of the respondents were widowed, 03 were separated and 04 were divorced. Thus, the study has variances in demographics in terms of marital status. This is essential as it has a bearing on caregiving responsibilities.

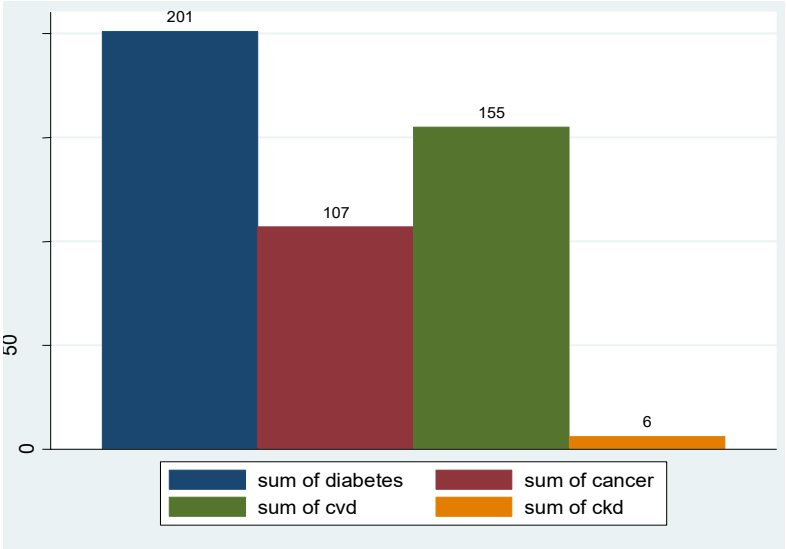
Figure 3.5. Employment status of the respondents.



Source: Primary Survey Data

Figure 3.5 shows employment status of the respondents. Among the respondents 29% were employed, 10% were homemakers, 19% were retired, 21% were self-employed, 11% were students, 4% were unemployed (Able to work) and 7% were unemployed (unable to work).

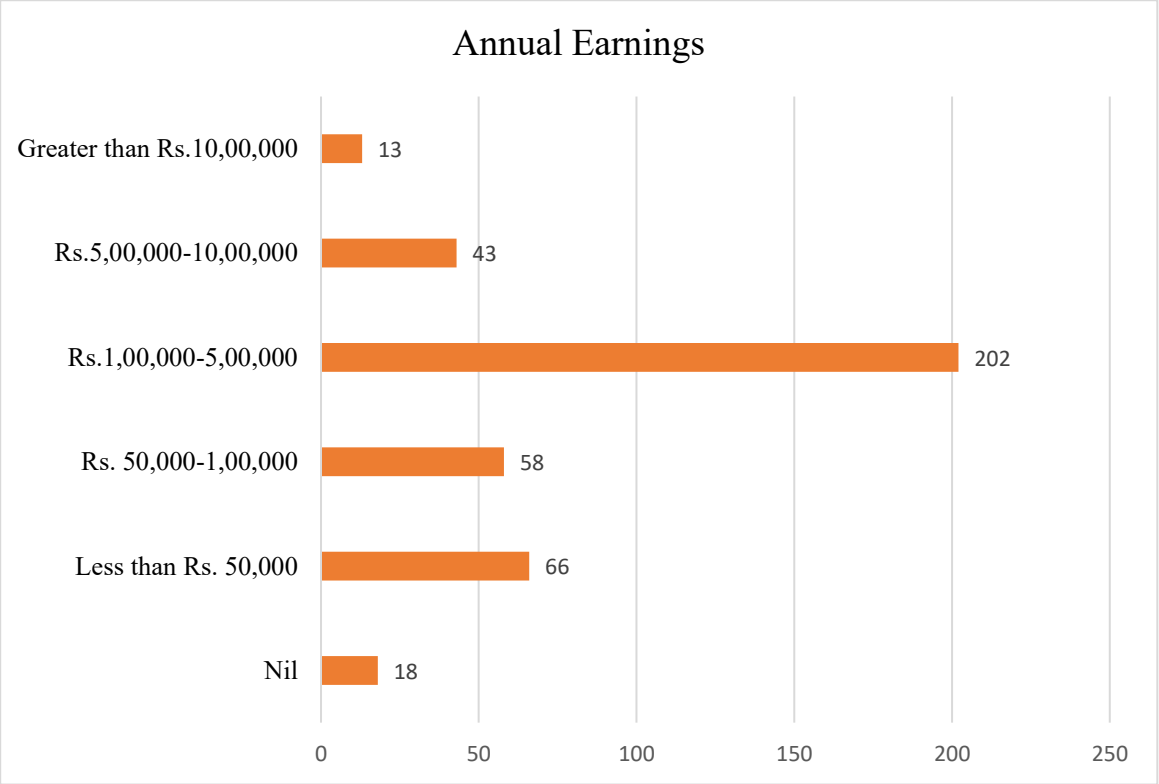
Figure 3.6: NCD prevalence within the HH of the respondents



Source: Primary Survey Data

Figure 3.6 depicts the prevalence of NCDs among the HH of the sampled respondents. The highest incidence is that of Diabetes (201 people) followed by cardiovascular disease (155 people), followed by Cancer (107 people), and then chronic kidney disease (06 people). The sum of these frequencies does not add up to 400 but rather more as the respondents had been asked to give the count of prevalence among their HH members. The study deliberately takes non-equal frequencies of diseases within the sample to align the variances with the trends seen in the overall population across Goa. Data by GBD India (2019), represents the data in the form of deaths due to NCDs, Years lived with NCDs, and DALYs. Based on these numbers the sampled respondents mirror the prevalence trend seen in Goa.

Figure 3.7: Annual Earnings among the sampled respondents.



Source: Primary Survey data

Figure 3.7 shows the annual earnings among the sampled respondents. Where a majority of the sampled respondents earn between rupees one to five lakh annually. The extremes comprise of 18 persons earning zero income annually and 13 persons earning more than 10 lakh rupees per annum.

3.3 Description of variables

Table 3.2: Description of variables used in the study

Variable name	Type of variable	Dummy codes	Definition	Source
Non-Communicable diseases (NCDs)			Non communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental, and behavioural factors.	World health organization
Diabetes	Dummy	1 if diabetic else 0	Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves. The most common is type 2 Diabetes, usually in adults, which occurs when the body becomes resistant to insulin or doesn't make enough insulin. Type 1 Diabetes, once known as juvenile Diabetes or insulin-dependent Diabetes, is a chronic condition in which the pancreas produces little or no insulin by itself. For people living with Diabetes, access to affordable treatment, including insulin, is critical to their survival.	World health organization
Cancer	Dummy	1 if afflicted with Cancer, else 0	Cancer is a large group of diseases that can start in almost any organ or tissue of the body when abnormal cells grow uncontrollably, go beyond their usual boundaries to invade adjoining parts of the body, and/or spread to other organs. The latter process is called metastasizing and is a major cause of death from Cancer.	World health organization

Cardiovascular diseases	Dummy	1 if afflicted with CVD, else 0	CVDs are a group of disorders of the heart and blood vessels and include coronary heart disease, cerebrovascular disease, rheumatic heart disease, and other conditions. High levels of risk factors can indicate a higher risk of heart attack, stroke, heart failure, and other complications.	World health organization
Chronic kidney disorder	Dummy	1 if afflicted with CKD, else 0	Chronic kidney disease (CKD) is a non-communicable disease usually caused by Diabetes and hypertension.	World health organization
Socio-Economic class	Interaction variable of two dummies	ST/SC/OBC=0 Kuccha= 0 General=1 Pucca = 1	HH type x HH category = {Kuccha, pucca}x {ST, SC, OBC, General}	
Age	Continuous variable		The sum of the ages of all the members of the HH	
Total household members	Discrete variable		The total number of household members.	
Highest Education	Categorical Variable	0-Illiterate	A person who does not know to read and write.	
		1-Primary	Education till 4th Standard	
		2-High school	Education till 10th Standard	
		3-Higher Secondary	Education till 12th standard	
		4-Graduate	A degree (Three years) in BA, B. Com, BSc, BBA, etc.	
		5-Post Graduate	A master's degree	

		6-Professional	Engineering, Doctor, Hotel Management, Law.	
		7-Diploma	Course with a duration of less than a year	
		8-Ph. D	Doctorate	
Earning	Continuous variable		The total annual earnings of the household.	
Consumption	Continuous variable		Food Expenditure and Non-Food expenditure for a recall period of 1 month and 1 year respectively.	
Saving	Continuous variable		Self-declared amount of annual savings reported by the household.	In the categories Cash/ Bank deposit/ Insurance / RD's Jewellery Land House/Flat/ Plot Mutual Funds Post office savings PPF Shares/ Bonds.
Investment	Dummy	YES=1 No=0	Whether or not a household has made any long-term investment.	Investment Comprises of all savings done by the HH minus the liquid cash saved.

				Thus, saving is not equal to Investment.
Source of Funding	Dummy	Savings= 0	If a person is able to fund his medical expenditure from his own savings/reduction in consumption.	
		Borrowings/ Liquidation=1	If a person funds his medical expenditure. Either from formal channels like bank loans or informal channels such as friends and relatives- his funding source is classified as borrowing. If a person funds his medical expenditure by selling off or liquidating his assets e.g., jewelry, car, it is classified as liquidation.	
Annual Visits	Continuous variable		Defined as the number of visits made by a patient to the hospital or clinic in a given year.	
Total loss of earning	Continuous variable		This is calculated as the opportunity cost of the number of days of work missed on account of medical condition or caregiving-responsibilities.	
Loss of Employment	Dummy	1 =Job loss 0 = Otherwise	If a person loses his primary source of income on account of medical condition.	
Medical Insurance	Dummy	YES=1 No=0	If a person has any medical insurance either through an employer or a private insurance agent, he is considered to have medical insurance coverage.	

Total number of members with NCD	Discrete variable	The number of members within the HH that are suffering from NCD- Diabetes, Cancer, CVD, CKD.	

3.4 Background and Methodology

This chapter describes the results to achieve objective one, which seeks to examine the household level out-of-pocket expenditures on health care costs with respect to the selected NCDs. Analysing these costs then helps one understand the impact chronic and long-term illness have on the bearing of household expenses. The study further divides the main objective into three sub-objectives to ascertain the effect individually using regression analysis. The present study uses the framework established by Bloom et al. (2011) and Lakshmanan (2015) as the foundation for the calculation of direct and indirect costs based on the Cost of Illness Approach to estimate the values in current terms for the state of Goa, India and for the NCDs-Diabetes, Cancer, CVD, CKD. The components of indirect cost and the theoretical framework for the inclusion of indirect cost components have been included using the study by Lakshmanan (2015) and Weerasinghe et al. (2022) as a base. Linked to the aspect of costs is the fact that the lower income countries bear the unequivocal burden of such costs, especially when the country's public health infrastructure is unable to cater to the needs of the population. Thus, the cost burden of NCDs can be catastrophic in low-income countries. Murphy et al. (2020) estimated the risk of catastrophic health spending and impoverishment among households where at least one person is afflicted with NCDs (CVD, Diabetes, kidney disease, Cancer, and respiratory diseases). The study considered 18 countries in its sample and found that the risk was highest for Lower Middle-Income Countries, including India. The findings indicated that financial protection from healthcare costs for people with NCDs is inadequate in such countries. ***Section 3.5a*** of this chapter tries to map out the cost associated with the NCDs in terms of direct expenses (Medicine cost, hospitalisation cost, and lab test cost) and Indirect costs expenses associated with NCDs (loss of income to the patient and the caregiver, payment made to caretaker who is appointed by the household and travel cost).

Given India's high risk of catastrophic expenditure, it is critical to analyse the various risk factors and NCDs that increase the chances of catastrophic health spending. Kundu et al.

(2018) have found that out-of-pocket costs associated with the acute and long-term impacts of NCDs are significantly high (47% in 2004), leading to catastrophic health spending by households. The study by Sriram and Albadrani (2022) used a multiple regression model to analyse National Sample Survey Organization data from 2014 and 2018 to investigate the effect of out-of-pocket health expenditure on household welfare. They found that the intensity of catastrophic health expenditure was higher among households with members having a chronic illness and when members had a higher duration of hospitalisation. However, the study did not expand upon the relative impact of different NCDs in this light. The present study uses the methodology adopted by Rahman et al. (2020) that adopts a Two-Stage Bayesian Hurdle model to map the major illnesses responsible for high out-of-pocket spending that increases the risk of impoverishment. Rahman et al. (2020) used the approach for the population of Bangladesh, while Swe et al. (2018) utilised the same approach for the study in Nepal. The current study uses this framework for analysis to get a relative impact of the role of various NCDs in catastrophic spending in Goa. Catastrophic expenditure is defined as any expenditure for medical treatment that can pose a threat towards a household's financial ability to maintain its subsistence needs (Puteh & Almualm, 2017). Following Mahal et al. (2010), the study considered the impact of health spending on NCDs on the economic situation of households. Here "catastrophic" spending is defined as occurring when health expenditure on all medical costs for a given household exceeds a certain proportion of a suitably defined measure of ability to pay. For the purpose of analysis, this present study adopted a 40% threshold level, although other cut-offs are possible. Linked to the issue of affordability is that for poorer households, the cost burden associated with NCDs is unequivocally higher compared to the more affluent households. This leads to a greater risk of such households becoming impoverished, and thus, the issue of catastrophic health expenses associated with NCDs is dealt with in this ***section 3.5b.***

The financial burden of NCDs can take a toll on the budgets at household levels especially since some of these are considered shock events for households. Families, especially those already struggling financially, may be able to handle a one-time shock and bounce back in the short term. However, they might be unable to handle the continuous expenditures of treating chronic illnesses. In this context, it becomes imperative to understand the financial coping mechanisms of households when they are faced with out-of-pocket expenses associated with different NCDs. Yadav et al. (2021) used a Multivariable logistic regression to map the different financial coping mechanisms households use when facing NCDs' cost burden. Their study used India's National Sample Survey data between 2004 to 2018 to

conduct their analysis. Their study indicated that rural households and those seeking treatment in private facilities were more prone to hardship financing (liquidation of assets). A modified framework with a dual choice model (logistic regression) to understand the relative impact of NCDs in driving the choice of source of funding is used in the present study. In the context of funding these out-of-pocket expenses linked to NCDs, households face various choices, from savings to borrowings/ liquidation of assets. Often these choices are linked to the affordability by households and their economic status alongside the extent of payments to be made. Thus, ***section 3.5c*** of this chapter studies the household choices juxtaposed with the prevalence of NCDs and other factors.

3.5 Examine the Household level out of pocket expenditure on health

3.5a Sub-Objective (A): Comparison of Direct and Indirect Cost

In order to achieve this objective, the study breaks down out-of-pocket expenditure on health into two brackets ***direct cost and indirect cost***. As outlined earlier, direct costs comprise expenditures on medicines, laboratory/ diagnostic tests, and hospitalisations. To relatively examine the direct expenses on various non-communicable diseases, the study takes the dependent variable as direct expenditure and the independent variable as NCD type, age, earnings, education, and socioeconomic group. Table 3.3 describes how each of the variables are measured.

Table 3.3 Description of variables in the Regression model for Direct cost analysis

Variable	Measurement
Direct Cost (Dependent Variable)	In INR- Cost incurred across the year as reported by the sample respondents.
Diabetes	Dummy variable taking value 1 if a member has Diabetes, 0 otherwise.
Cancer	Dummy variable taking value 1 if a member has Cancer, 0 otherwise.
CVD	Dummy variable taking value 1 if a member has CVD, 0 otherwise.
CKD	Dummy variable taking value 1 if a member has CKD, 0 otherwise.
Earnings	Measured in log form of the INR reported by the sampled respondents.

Socioeconomic class	Dummy variable. Taking the value of 1 if a person lives in a pucca house and at the same time belongs to the general category, 0 otherwise.
Ages	Measured in Log form of the sum of the ages of the household members of the respondents.
Highest Education	Categorical variable, taking the values 0-Illiterate, 1-Primary, 2-High school, 3-Higher Secondary, 4-Graduate, 5-Post Graduate, 6-Professional, 7-Ph. D

Source: primary survey data.

In order to evaluate the impact each of the diseases has on the direct cost of a household, the study uses linear regression. For each of the NCDs, a separate dummy variable is introduced. The final equation for this model is given below:

$$Direct\ cost = \beta_0 + \beta_1 Diabetes + \beta_2\ Cancer + \beta_3\ CVD + \beta_4\ CKD + \beta_5\ Earnings + \beta_6\ Socio\ Economic\ class + \beta_7\ Ages + \beta_8\ Education + \varepsilon$$

The study expects a positive relationship between the various NCDs and the direct cost based on the evidence from the literature. The study formulates and tests the following hypothesis:

H_0: The incidence of NCDs does not impact the direct cost incurred by HH.

H_{0a}: Incidence of Diabetes does not impact the direct cost incurred by the HH, i.e., $\beta_1=0$

H_{0b}: Incidence of Cancer does not impact the direct cost incurred by the HH, i.e., $\beta_2 =0$

H_{0c}: Incidence of CVD does not impact the direct cost incurred by the HH, i.e., $\beta_3=0$

H_{0d}: Incidence of CKD does not impact the direct cost incurred by the HH, i.e., $\beta_4 =0$

The alternative hypothesis is stated below:

H_1: The incidence of NCDs impacts the direct cost incurred by HH

H_{1a}: Incidence of Diabetes impacts the direct cost incurred by the HH, i.e., $\beta_1\neq0$

H_{1b}: Incidence of Cancer impacts the direct cost incurred by the HH, i.e., $\beta_2 \neq0$

H_{1c}: Incidence of CVD impacts the direct cost incurred by the HH, i.e., $\beta_3\neq0$

H_{1d}: Incidence of CKD impacts the direct cost incurred by the HH, i.e., $\beta_4 \neq0$

The results of the OLS model are presented in Table 3.3.

Table 3.4: Results of the OLS model

Linear regression	Number of observations = 400
	F (8,391) = 15.67
	Prob > F=0.0000
	R-squared =0.2428
	Root MSE =2.8e+05

Direct Cost	Coef.	Robust Std. Err.	t	P>t
Diabetes	72217.38	6338.98	11.39	0.056*
Cancer	316493.4	952.1837	332.39	0.002***
CVD	83105.25	6346.417	13.09	0.049**
CKD	748371.8	1918.396	390.1	0.002***
Earning	-7431.928	191.8986	-38.73	0.016**
Socio-economic class	116329.6	2693.426	43.19	0.015**
ages	-380.4399	3565.517	-0.11	0.932
Highest Education	-5640.871	563.725	-10.01	0.063*
_cons	14372.96	12686.06	1.13	0.46

Significant at 1%, 5 % and 10% level of significance

Source: Results based on primary survey data.

In Table 3.4, the results show that all of the NCDs considered significantly impact the direct cost. For Diabetes, it was seen that if a household has a member who has Diabetes, the direct cost increases by Rs. 72,217.38 annually. This result is significant at a 10% level of significance. For Cancer, the total direct costs increase annually by Rs. 3,16,493.4, significant at a 1% level of significance. In the case of CVD, the annual total Direct cost increases by Rs. 83,105.25. This result is significant at a 5% level of significance. The most significant result is in the case of CKD, where the annual total direct cost increases by Rs. 7,48,371.8, result significant at a 1% level of significance.

Similar results and analysis have been found in studies such as Mahal et al. (2010), whereby dummy variables for different NCDs, such as Diabetes, Cancer, CVD, and CKD, were used to identify their statistical significance in impacting direct cost.

Hence the results lead us to reject the null hypothesis for the NCDs- Diabetes, Cancer, CVD, and CKD that states that these NCDs do not impact the direct costs of a household.

Among the control variables, it is seen that annual earnings are significant at a 5% level of significance and have a positive relationship with direct cost, and align with findings from literature such as Saeed and Khan (2019). The regression results show that a 1% increase in annual earnings reduces the total direct cost by Rs. 7,431.93. This could be since higher-paying jobs are likely to offer medical plans to their employees that reimburse medical expenses for various medicines. These medical plans are over and above the medical insurance offered by organisations to their employees, and often such plans are not offered to casual wage earners or low to mid-pay employees. Socioeconomic class is significant at a 5% level of significance and positively correlates with direct cost. The estimates indicate that if the person belongs to an affluent class, his annual total direct cost increases by Rs.1,16,329.6. This could be attributed to the fact that people in the affluent class prefer to go to private hospitals as against government hospitals. Such a positive and significant impact on socioeconomic class and the direct cost burden of the disease has also been found in the literature and various models where it has been used as a control variable (Gillani et al.,2018).

The ages of a household were found to be statistically insignificant. Lastly, the results show a negative and significant relationship between annual direct cost and highest education, whereby households with highly educated members reduced their annual total direct cost by Rs. 5,640.87. One can rationalise this result by the fact that persons with higher education are more conscious of their health, can afford more nutritious diets, and adopt healthier lifestyles. This result closely mirrors the result found in the study by Williams et al. (2018)

After analysing the direct cost, the study moves on to evaluate **the impact of the incidence of an NCD on the Indirect Cost incurred by a HH.**

To examine the indirect expenses on various non-communicable diseases, the study takes the dependent variable as indirect cost and the independent variable as NCD type, age, income, education, and socioeconomic group. To measure indirect cost expenditure incurred by a household, the study compares the duration of hospitalisation and days of work missed by the patient and the caregiver and used this data to evaluate wages foregone to arrive at the monetary value of indirect cost. Indirect cost also comprises the travel cost incurred by the patient and their family. The annual indirect cost in terms of foregone wages has been calculated by multiplying the number of missed work days by the patient and the caregiver across the year (in days) with daily earnings. Added to this is the component of the round-trip cost, i.e., the travel cost incurred by both the patient and the caregiver for consultation,

hospitalisation, medical purchases, diagnostic tests, etc. Table 3.4 describes how each of the variables are measured.

Table 3.5 Description of variables in the Regression model for Indirect cost analysis

Variable	Measurement
Indirect Cost (Dependent Variable)	In INR- Cost incurred across the year as evaluated by the author using daily earnings multiplied by the number of leaves stated by sampled respondents (estimated foregone wages) + travel cost incurred.
Diabetes	Dummy variable taking value 1 if a member has Diabetes, 0 otherwise.
Cancer	Dummy variable taking value 1 if a member has Cancer, 0 otherwise.
CVD	Dummy variable taking value 1 if a member has CVD, 0 otherwise.
CKD	Dummy variable taking value 1 if a member has CKD, 0 otherwise.
Socioeconomic class	Dummy variable. Taking the value of 1 if a person lives in a pucca house and at the same time belongs to the general category, 0 otherwise.
Earnings	Measured in log form of the INR reported by the sampled respondents.
Caretaker	Dummy variable taking the value of 1 if the HH has employed a caretaker,0 otherwise.
Ages	The sum of the ages of the members in the HH
Number of members with NCD in the HH	Total number of members in the HH ailing with an NCD
Loss of Employment	Dummy variable taking the value of 1 if the afflicted member has lost his job on account of the NCD, else 0
Non-Goa hospital	Dummy variable taking the value of 1 if the HH has visited a hospital outside the state of Goa, else 0.

Source: primary survey data.

In order to evaluate the impact each of the diseases has on the indirect cost of a household, the study uses a linear regression. For each of the NCDs, a separate dummy variable is introduced. The final equation for this model is given below.

$$Indirect\ cost = \beta_0 + \beta_1 Diabetes + \beta_2\ Cancer + \beta_3\ CVD + \beta_4\ CKD + \beta_5\ Socioeconomic\ class + \beta_6\ earnings + \beta_{7\ caretaker} + \beta_8\ ages + \beta_9\ number\ of\ members\ with\ NCD + \beta_{10}\ loss\ of\ Employment + \beta_{11}\ Non\text{-}Goa\ hospital + \varepsilon$$

Based on the evidence from the literature, the study expects a positive relation between the various NCDs and the total indirect cost. The hypothesis formulated and tested is specified as follows:

H_0: The incidence of NCDs does not impact the indirect cost incurred by HH.

H_{0a}: Incidence of Diabetes does not impact the indirect cost incurred by the HH, i.e., $\beta_1=0$

H_{0b}: Incidence of Cancer does not impact the indirect cost incurred by the HH, i.e., $\beta_2 =0$

H_{0c}: Incidence of CVD does not impact the indirect t cost incurred by the HH, i.e., $\beta_3=0$

H_{0d}: Incidence of CKD does not impact the indirect t cost incurred by the HH, i.e., $\beta_4 =0$

The alternative hypothesis is stated below:

H_1: The incidence of NCDs impacts the indirect cost incurred by HH

H_{1a}: Incidence of Diabetes impacts the indirect cost incurred by the HH, i.e., $\beta_1\neq0$

H_{1b}: Incidence of Cancer impacts the indirect cost incurred by the HH, i.e., $\beta_2 \neq0$

H_{1c}: Incidence of CVD impacts the indirect cost incurred by the HH, i.e., $\beta_3\neq0$

H_{1d}: Incidence of CKD impacts the indirect cost incurred by the HH, i.e., $\beta_4 \neq0$

Table 3.6 Results of the OLS model

Linear regression	Number of observations = 400
	F (11, 388) = 14.9
	Prob > F = 0.0000
	R-squared = 0.2970
	Root MSE = 32915

Total Indirect Cost	Coef.	Robust Std. Err.	t	P>t
Diabetes	6872.857	144.2307	47.65	0.013**
Cancer	13829.98	294.0447	47.03	0.014**
CVD	4435.027	991.9353	4.47	0.14
CKD	19003.67	638.0685	29.78	0.021**
Socio Economic Class	6875.748	481.7428	14.27	0.045**
Earnings	1939.256	12.71617	152.5	0.004***
Caretaker	1.149481	0.0039194	293.28	0.002***
Ages	-203.7866	1.791683	-113.74	0.006***
Number of members with NCD	3850.626	148.4943	25.93	0.025**
Loss of Employment	26988.26	536.5857	50.3	0.013**
Non-Goa hospital	7227.684	558.7984	12.93	0.049**
_cons	-13838	528.2431	-26.2	0.024

Significant at 1%, 5 % and 10% level of significance

Source: Results based on Primary survey data.

From Table 3.6, it is seen that all NCDs except CVD are significant in impacting annual total indirect cost. The incidence of Diabetes leads to an increase in the annual indirect cost by Rs. 6872; this is significant at a 5% level of significance. The incidence of Cancer leads to an increase in the annual indirect cost by Rs. 13,829, which is significant at a 5% level of significance. CVD was found to be statistically insignificant in impacting indirect costs. This could be attributed to the fact that indirect cost for CVD is usually experienced in relatively infrequent events compared to other diseases. Thus, the impact of CVD on indirect cost would be lesser owing to lower opportunity cost. The incidence of CKD has the highest impact on total indirect cost, where it increases by Rs. 19,003 and is significant at a 5% level of significance. Similar analysis has been found in studies such as Mahal et al. (2010), whereby dummy variables for different NCDs, such as Diabetes, Cancer, CVD, and CKD, were used to identify their statistical significance in impacting indirect cost.

The results lead us to reject the null hypothesis, which states that the incidence of NCDs- Diabetes, Cancer, and CKD does not impact the indirect cost incurred by a household. However, the study fails to reject the hypothesis that CVD has an impact on the total indirect cost.

Among the control variables, it was found that there is a positive relationship between socioeconomic class and indirect cost which is significant at a 5% level of significance, similar to results found in Prabhakar et al. (2023); Kansra and Oberoi 2020. The empirical results show that a person from a more affluent class will have a total indirect cost of Rs. 6875.74 higher than a person who does not belong to an affluent class. The positive coefficient can be explained by the fact that people from an affluent class are likely to have jobs that pay more and have a greater opportunity cost in terms of missing a workday.

Annual earnings have a positive and significant relationship with indirect cost, and this result is significant at a 1% level of significance. Sangamithra & Vasanthi (2015); Kankeu et al. (2013) has also found a substantial and significant result between earnings and indirect cost. Hence the results closely mirror those found in the literature. The empirical results show that a 1% increase in annual earnings leads to Rs. 1,939.25 increase in indirect cost. This can be attributed to the fact that a person earning more has a higher opportunity cost in terms of missing a workday, explaining the positive coefficient value.

The results also show that when households employed a caretaker, it increased their total indirect cost marginally compared to those without a caretaker. This marginal increase could be explained by the fact that sometimes these caregiving activities are entrusted to the household help, which also undertakes other activities in the household. This variable has a positive and significant relationship to the dependent variable, significant at a 1% level of significance. Similar results have been found in the study by Bose and Banerjee (2019); Kankeu et al.(2013)

The ages of the household members have a negative and statistically significant result with total indirect cost, whereby the significance is at a 1% level of significance. More specifically, an increase in the sum of the ages of household members leads to a decrease in total indirect cost by Rs. 203.78. This could be due to the fact that an aged person is likely to be retired and thus has a lower opportunity cost in terms of missing work days leading to the negative coefficient. Ages have been found to have a strong association with indirect costs across the literature. (Prabhakar, Goel & Acharya,2023; Sangamithra & Vasanthi,2015).

The number of members with an NCD in a household was positively and significantly related to the annual total indirect cost at a 5% level of significance, whereby an increase in one such member with NCD leads to an increase in indirect cost by Rs.3850.62, owing to

multiple people missing work days on multiple occasions. Studies such as Bhattacharya & Jana (2022) have found the number of members with NCD to impact indirect costs significantly. Thus, the results align with the literature.

The empirical results also showed that loss of employment led to a positive and significant impact on the total indirect cost, whereby the total indirect cost increased by Rs. 26,988.26 and is significant at a 5% level of significance. Loss of employment leads to a loss in the source of income; hence it is positively related. Loss of employment is statistically significant across other studies in literature, such as Shiba and Abelyan (2018).

Households that sought treatment in a hospital outside the state of Goa saw an increase in their indirect cost by Rs.7227.68, significant at a 5% level of significance. Indirect costs are higher owing to the travel time involved in case the hospitalisation/visit was undertaken outside the state of Goa. The choice of this variable is considering that a significant proportion of the sample reportedly sought treatment outside the state of Goa. Seeking treatment from a location away from the domicile location of the patient can entail higher travel costs and more days of work lost, both of which impact indirect costs, which encompasses travel costs and loss of earnings.

On comparing direct and indirect costs, the study finds several similarities; for all of the NCDs, the incidence of the disease leads to an increase in both direct and indirect costs. Earning has a negative relationship with direct cost and a positive relationship with indirect cost. The positive relation between earnings and direct cost can be attributed to the fact that better-paying jobs tend to come with OPD and IPD reimbursements from employing organisations, reducing the direct cost burden on households. Conversely, earning has a positive impact on indirect cost, considering that if a person misses his work due to NCD, he ends up losing more earnings leading to an increase in indirect cost. Socioeconomic class has a positive relation with both direct and indirect costs. The direct cost increases with a better socioeconomic class since a patient may prefer a private over a government hospital which increases the direct costs of a person. The same socioeconomic class was found to have a positive relation with total indirect cost considering the greater probability of affluent classes holding higher paying jobs that entail a greater opportunity cost associated with missing a workday Ages of a household were found to have an insignificant impact on direct costs; however, it has a significant and negative impact on indirect costs. The negative relationship between indirect cost and age can be attributed to the fact that as the ages

increase, it is likely that a person does not have a job leading to lower opportunity cost and thus a negative impact on Indirect cost.

It must also be noted here that the direct medical costs are greater than the indirect costs associated with the incidence of non-communicable diseases. These results are similar to studies conducted in other parts of India (Mathew & Olickal, 2023) as well as systematic literature reviews conducted in low-income economies as well as middle-income countries (Kazibwe et al.,2021) and Menon et al.,(2022). One of the key reasons why the direct medical costs may be greater than the indirect cost could be attributed to the calculation methodologies. Indirect cost monetises the days of work missed due to illness by considering the loss of earnings. Given India's low incomes, such a monetisation may result in a lower value of indirect cost. Subsequently, travel cost, another indirect cost component, is also priced low in a country like India. Furthermore, the direct cost can also be quantified as higher owing to the repetitive nature of medicine purchases, diagnostic tests that occur more frequently, and hospitalisation costs, which can be a monetary shock. Compared to indirect costs, one expects the frequency of incurring direct costs to be much higher, resulting in higher direct costs over indirect costs.

3.5b. Sub-Objective b: To measure the catastrophic health expenses incurred by households on NCD.

The study aims to look at the catastrophic health expenditure incurred by the household owing to the incidence of NCDs- Diabetes, Cancer, CVD, and CKD. In order to undertake this, the study lays down the foundation for categorising an expenditure as catastrophic. Household consumption spending less combined survival income for all household members. A threshold level of 40% was used for this analysis, albeit there are other cut-offs possible. Survival income has been defined as the poverty line level of expenditure multiplied by household size. In this study, the poverty line has been defined as the average poverty line for Goa combining urban and rural which was Rs. 1,112/per capita per month. (Planning Commission, 2014). Mathematically, for each household "j", the variable defined was as:

$$D_j = \frac{h_j}{E_j - n_j P}$$

Here, hj is the combined health spending on all hospitalisations for household "j", Ej is total household consumption spending, n j is the size of household "j", and P is the poverty line

level of spending. Catastrophic spending occurs whenever Dj exceeds 0.4 in the study framework.

Table 3.7: Description of variables in Bayesian Regression

Variable	Measurement
Catastrophic health Expenditure dummy	Binary variable taking the value 1 if the HH has incurred catastrophic health expenditure, 0 otherwise.
Catastrophic health Expenditure	Measured in INR – Amount of Catastrophic Health Expenditure incurred as measured by the formula: D $\frac{h_j}{E_j - n_j P}$
Diabetes	Dummy variable taking value 1 if a member has Diabetes, 0 otherwise.
Cancer	Dummy variable taking value 1 if a member has Cancer, 0 otherwise.
CVD	Dummy variable taking value 1 if a member has CVD, 0 otherwise.
CKD	Dummy variable taking value 1 if a member has CKD, 0 otherwise.
Socioeconomic class	Dummy variable. Taking the value of 1 if a person lives in a pucca house and at the same time belongs to the general category, 0 otherwise.
Hospitalisation Duration	Number of days spent in the hospital on account of treatment.
Highest Education	Categorical variable, taking the values 0-Illiterate, 1-Primary, 2-High school, 3-Higher Secondary, 4-Graduate, 5-Post Graduate, 6-Professional, 7-Ph. D
Number of members in the HH	Total number of members within the HH as reported by the sampled respondents.
Medical Insurance	Dummy variable taking value 1 if the HH has utilised medical insurance, 0 otherwise.

Source: Primary survey data

The study deploys a Bayesian two-stage hurdle model as done in Rahman et al. (2020), where the first stage is defined as a logit model mapping whether or not a household incurs a catastrophic health expenditure. In the second stage, the model truncates the household incurring the catastrophic health expenditure and subsequently evaluates which NCDs lead to the outcome of catastrophic health expenditure.

Stage 1 equation- Logit regression:

$$Ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 diabetes + \beta_2 Cancer + \beta_3 CVD + \beta_4 CKD + ei_i$$

P is the probability that Y=1 i.e. The household has incurred a catastrophic health expenditure, whereby Y= Catastrophic Health Expenditure dummy. The following hypothesis was formulated to understand the relation between the incidence of NCD and household catastrophic health expenditure.

H_0: The incidence of an NCD does not lead to the outcome of a household incurring a catastrophic health expenditure.

H_1: The incidence of an NCD leads to the outcome of a Household incurring a catastrophic health expenditure.

Stage 2 equation- Linear regression on the truncated observations where stage 1 Y=1:

$$\textit{Catastrophic Health Expenditure} = \beta_0 + \beta_1\, diabetes + \beta_2\, cancer + \beta_3\, CVD + \beta_4 CKD + \beta_5 Socioeconomic\ class + \beta_6 Hospitalisation\ duration + \beta_7\, Highest\ education + \beta_8 Number\ of\ members\ in\ the\ HH + \beta_9\, Medical\ Insurance + ei$$

H_0: NCD does not have an impact on the amount of the Catastrophic health expenditure, given H_1 in the previous hypothesis is true.

H_1: NCD does impact the amount of the Catastrophic health expenditure, given that H_1 in the previous hypothesis is true.

In a two-stage Bayesian analysis, the formulation of the null hypothesis differs from a linear regression. In this, test the hypothesis H0: $\theta < 0.1$, where θ denotes the prior distribution of the probability p. In this case, the distribution is set at the mean value of the variables.

Table 3.8 gives the result of the regression.

Table 3.8: Results of the Bayesian Model

Bayesian regression — MCMC iterations = 12,500
Random-walk Metropolis-Hastings's sampling — Burn-in = 2,500
MCMC sample size = 10,000
Number of obs = 400
Acceptance rate = 0.1587
Efficiency: min = .001774
avg = .001033
max = .002718
Log marginal likelihood = -259.17335

	Mean	Std. Dev.	MCSE	Median	Equal tailed [95% Cred. Interval]	
Catastrophic health Dummy						
Diabetes	0.0646077	0.0415188	0.002519	0.0642739	-.0127588	.1491218
Cancer	0.1959125	0.0213002	0.002268	0.1956565	.1519787	.2357084
CVD	0.1022781	0.029846	0.002607	0.1019825	.0462998	.1609149
CKD	0.6095435	0.08956	0.012275	0.6053067	.4449241	.78664
_cons	0.8439369	0.027578	0.003471	0.8457946	.790272	.8969815
Catastrophic health Expenditure						
Diabetes	0.0996684	0.10371	0.018227	0.1053591	-.102464	.2970415
Cancer	0.8559236	0.093484	0.010535	0.8575545	.6779289	1.03098
CVD	1.2736	0.14646	0.01185	1.276617	1.005105	1.570942
CKD	1.366882	0.093209	0.009441	1.36667	1.181379	1.542901
Socio Economic Class	0.1720262	0.054816	0.011658	0.1670304	.0746911	.2810551
Hospitalisation Duration	-0.0037235	0.0040844	0.000286	-0.0034864	-.012493	.003278
Highest Education	-0.3509427	0.04559	0.00611	-0.349809	-0.4398198	-0.2659983
No. of members in the HH	-0.013488	0.021955	0.002291	-0.0147006	-.0520909	.0310856
Medical insurance	0.150421	0.1113518	0.026439	0.1568698	-.0577794	.3507263
_cons	-0.5139745	0.037629	0.004316	-0.5134491	-0.5907855	-0.4391203
lnsig	-1.630307	0.079006	0.005366	-1.631806	-1.783483	-1.480789

Source: Results based on Primary survey

To identify the relation and impact of NCDs on Catastrophic Health Expenditure, a Bayesian 2-stage hurdle model was used. The first stage considers the incidence of a household incurring catastrophic health expenditure as a dummy variable and tests if the prevalence of an NCD impacts it using a logit model. The results of the regression can be found in Table 3.8, which considers the logistic regression and the marginal effects calculated thereof to get the probability impact. For the purpose of the objective, the marginal effects have been interpreted. The results show that an average household with a patient with Cancer is 19.59% likely to incur a catastrophic health expenditure. Households with CVD are 10.22% likely to incur a catastrophic health expenditure; lastly, CKD is 60.95% likely to incur a catastrophic health expenditure. Diabetes is statistically insignificant in explaining the incidence of catastrophic health expenditure. These results mirror those found in the study by Mahal et al. (2010).

In the second stage, the role of other factors that lead to catastrophic health expenditure was examined by applying the regression model to only the pool of people who have incurred catastrophic health expenditure. In this stage, the dependent variable is the amount of catastrophic health expenditure incurred by a household. It was found that the incidence of Cancer increases the catastrophic health expenditure by 85%. The incidence of CVD increases the catastrophic health expenditure by 127%, and the incidence of CKD increases the catastrophic health expenditure by 136%. Diabetes was found to be statistically insignificant in the second stage of regression.

The study also finds that socioeconomic class has a positive and statistically significant impact on catastrophic health expenditure, where the CHE increases by 17.2%. This could be attributed to the fact that households from higher socioeconomic classes are more likely to visit private healthcare facilities, which are more expensive and can lead to catastrophic health expenses. These results are aligned with a recent study by Raveendran (2020), who assessed the OOPE among rural households.

Similarly, the highest education has a negative and significant impact on the CHE. The negative sign can be rationale as greater education leads to better-paying jobs creating a savings pool that can prevent households from incurring catastrophic health expenditures. Such similar associations have been found in studies by Sriram & Albadrani (2022), Pal (2010), and Kastor and Mohanty (2018).

Based on the empirical results of the Bayesian two-stage hurdle model, the study rejects the null hypothesis that the NCDs- Cancer, CVD, and CKD do not affect the catastrophic health expenditure of the sampled population.

3.5c. Sub-Objective (c): To assess the source of funding when meeting costs attributable to NCDs.

An essential premise that impacts the household's ability to deal with NCDs' economic burden is its funding modality. In order to understand household behaviour in terms of sourcing funds to meet medical expenditures, the study looks at the various sources and tries to find how the incidence of disease impacts the choice. To meet any medical expenditure as the first choice, a household is likely to depend on its savings; however, as the severity of expenditure mounts, their choice is likely to shift to either liquidation of funds or borrowing from others. One must also recognise that the latter is indicative of the severity of the economic burden of an NCD. The table below describes the variables that have been used in the model.

Table. 3.9 Description of the variables in the model

Variable	Measurement
Source of funding	Dummy variable taking value of 0 if a HH chooses to utilise its own savings, and 1 if the HH chooses to liquidate assets or borrow from external sources such as relatives, friends, banks, etc.
Diabetes	Dummy variable taking value 1 if a member has Diabetes, 0 otherwise.
Cancer	Dummy variable taking value 1 if a member has Cancer, 0 otherwise.
CVD	Dummy variable taking value 1 if a member has CVD, 0 otherwise.
CKD	Dummy variable taking value 1 if a member has CKD, 0 otherwise.
Ages	Measured in Log form of the sum of the ages of the household members of the respondents.
Earnings	Measured in log form of the INR reported by the sampled respondents.
Socioeconomic class	Dummy variable. Taking the value of 1 if a person lives in a pucca house and at the same time belongs to the general category, 0 otherwise.
Number of Dependents	Measured as the number of people in the HH who do not contribute to HH earnings.
Medical Insurance	Dummy variable taking value 1 if the HH has utilised medical insurance, 0 otherwise

Hospitalised dummy	Dummy variable taking value 1 if the HH had any member was hospitalised due to NCD, 0 otherwise
Loss of Employment	Dummy variable taking value 1 if any HH member had lost employment due to NCD, 0 Otherwise.
Number of members with NCD	Members suffering from an NCD within the HH, as reported by the sampled respondents.

Source: Primary survey data

Considering the model looks at the outcome to be the choice of source of funding, thus the outcome variable is a binary variable and the study uses logistic regression to map the choice.

$$Ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 diabetes + \beta_2 cancer + \beta_3 CVD + \beta_4 CKD + \beta_4 ages + \beta_5 earnings + \beta_6 socio\ economic\ class + \beta_7 No.of\ dependents + \beta_8 medical\ insurance + \beta_9\ hospitalised\ dummy + \beta_{10} loss\ of\ employment + \beta_{11} no.of\ members\ with\ NCD + ei_i$$

The study expects that the incidence of the underlying NCDs will lead to households resorting to borrowing or liquidating of assets. The hypothesis the study seeks to test is formulated as follows:

H_0: NCDs have no impact on the choice of source of funding.
H_1: NCDs have an impact on the choice of source of funding.

Table. 3.10 Results of the Logistic Regression

Logistic regression	Number of observations =400
	LR chi2(12) =34
	Prob > chi2=0.0007
Log likelihood = -171.55642	Pseudo R2=0.0902

Source of Funding	Coef.	Robust Std. Err.	z	P>z
Diabetes	0.819384	0.0587	13.96	0
Cancer	1.052481	0.1119277	9.4	0
CVD	0.6965504	0.1083552	6.43	0

CKD	0.619816	0.09833	6.3	0
Ages	-0.10491	0.03036	-3.46	0.001
Earnings	-0.0206973	0.0038425	-5.39	0
Socio-Economic Class	-0.5975095	0.0647039	-9.23	0
Number of Dependents	0.0058102	0.0179794	0.32	0.747
Medical Insurance	0.0026998	0.0033228	0.81	0.417
Hospitalised(yes/No)	0.9604862	0.0770642	12.46	0
Loss of Employment	0.8086549	0.050781	15.92	0
Number of members with NCD	-0.0315386	0.010949	-2.88	0.004
_cons	-2.035402	0.0818275	-24.87	0

Conditional marginal effects Number of observations = 400

Model VCE: Robust

Expression: Pr(dummyfundingsource (0:saving,1:borrowing), predict() dy/dx

Category	Mean
Diabetes	0.5025
Cancer	0.2675
CVD	0.3875
CKD	0.015
Ages	4.067034
Earnings	11.61641
Socioeconomic Class	0.7
Number of Dependents	2.025
Medical Insurance	0.3225
Hospitalised(yes/No)	0.4625
Loss of Employment	0.0375
Number of members with NCD	1.25

Table. 3.11 Results of the Logistic Regression with marginal effects

	dy/dx	Delta-method Std. Err.	z	P>z
Diabetes	0.1069799	0.00481	22.24	0***
Cancer	0.1374134	0.01095	12.55	0***
CVD	0.0909426	0.01172	7.76	0***
CKD	0.0809241	0.01068	7.58	0***
Ages	-0.0136967	0.0036	-3.81	0***
Earnings	-0.0027023	0.00043	-6.29	0***
Socio-Economic Class	-0.0780117	0.00637	-12.25	0***
Number of Dependents	0.0007586	0.00233	0.33	0.744
Medical Insurance	0.0003525	0.00042	0.83	0.406
Hospitalisation	0.1254025	0.0134079	9.35	0***
Loss of Employment	0.1055791	0.0038127	27.69	0***
No. of members with NCD	-0.0041177	0.0013196	-3.12	0.002***

Significant at a 1%, 5% and 10% level of significance
Source: Results based on primary survey

The study uses a logit model to detect the impact of NCD and other variables on funding sources, where 1 denotes borrowings/liquidation and 0 denotes savings.

As seen in Table 3.11, for the study, the marginal effects were interpreted, and it was seen that the incidence of Diabetes increases the probability of a household borrowing/liquidating funds by 10.69%. The incidence of Cancer increases the probability of borrowing/liquidation by 13.74%. Subsequently, the study finds that the incidence of CVD increases the probability of a household borrowing/liquidating funds by 9.09%. For CKD, the study finds that it increases the probability of a household borrowing/liquidating funds by 8.09%. This could be attributed to the fact that it is a chronic disease that is more expensive to treat (chari,2018). A similar impact of source of funding on distress financing has been found in studies such as Panikkassery (2020); Sriram (2019); Dhanaraj (2016); Ravi et al. (2016); Thomas et al. (2023).

The study also takes into account other factors impacting the source of funding in the logit model to make it more comprehensive. With reference to the control variables, if the ages

of the household members increase by 1%, the probability of resorting to borrowing /liquidation decreases by 1.36%. This is likely because higher ages entail that the person has worked for a longer period in his life and has cumulated savings, decreasing the tendency to take loans or sell assets. Thus, savings are used to fund medical expenses more than liquidation and borrowings. The study's data set also had persons from higher age groups. Such a similar relationship between age and the source of funding have been assessed and found in the study by Kumar et al. (2020).

If the earnings of the household members increase, their dependence on borrowing decreases. Such a relationship has also been found in the study by Thomas, Dash, and Sahu (2023); Kruk et al. (2009).

For those belonging to a higher socioeconomic class, their probability of borrowing/liquidation decreases by 7.80%. The impact of socioeconomic classes on funding sources have been studied by Mukesh, Gupta, and Singh (2018) and Khura et al. (2022) and also depict similar results as found in the present study. A member of a household being hospitalised due to NCD increases the probability of borrowing/liquidation by 1.3%. Similar results have been found in the study by Mondal et al. (2010).

Loss of Employment increases a household's dependence on borrowing. A positive and statistically significant result was also found in studies like Thomas, Dash, and Sahu (2023); Bradshaw et al.(2019).

If the number of members with NCD in a household increase, the probability of borrowing/liquidating funds decreases by 0.4%. A similar result has been depicted in the study by Ravi, Ahluwalia, & Bergkvist (2016). Albeit this should have increased the probability of borrowings/liquidating funds. The decreasing probability could be due to the fact that a greater number of household members with NCD, especially ones suffering from chronic diseases, are likely to make financial arrangements via medical insurance, a separate track of savings for medical expenses that can enable them to meet the fund requirements. All of the results are statistically significant at a 1% level of significance.

Hence, the study rejects the hypothesis that the NCDs-Diabetes, Cancer, CVD, and CKD do not impact the choice of source of funding.

3.6 Chapter Summary and Conclusion

This chapter tries to map out the cost associated with the NCDs in terms of direct expenses (Medicine cost, hospitalisation cost, and lab test cost) and indirect expenses (loss of income to the patient and the caregiver, travel cost, expenses incurred on employing caretaker). The empirical results obtained through OLS regression show that all of the NCDs considered significantly impact the direct cost. The highest monetary impact was that of CKD, followed by Cancer, CVD, and Diabetes. The results also indicate that certain demographic factors such as income household members, socioeconomic status, and education have a strong bearing on total direct costs associated with the NCDS.

Moving on to the indirect cost, the results indicate that all NCDs significantly impact the annual total indirect cost. In terms of monetary impact, CKD, followed by CVD, Cancer, and Diabetes, have the highest impact on the annual indirect cost. Reading the results of direct and indirect costs in conjunction, it was found that CKD has the maximum impact on households' out-of-pocket expenses for healthcare. Similar to direct cost demographics also have a significant association with indirect costs.

The study investigated the relationship between the incidence of NCDs and their impact on the impoverishment of households by analysing catastrophic health expenditure by mapping the probability of its occurrence and magnitude. To this extent, the study used a Bayesian 2-stage hurdle model. All NCDs significantly impact the probability that a household incurs catastrophic health expenditure. Furthermore, all NCDs apart from Diabetes led to an increase in the amount of this expenditure. The highest monetary impact was that of CVD, followed by Cancer and CKD. In this context, one must understand that the incidence of CKD can be fatal for an impoverished household. Thus, its impact on increasing expenditure may be visible for a shorter duration owing to the death of the afflicted person. The study finds that the socioeconomic class of the household and educational attainment significantly impacted the household's catastrophic health expenditures on account of an NCD.

Lastly, in light of the direct expenses and indirect expenses leading to catastrophic health expenditures, the study investigated how households fund the out-of-pocket expenses accruing from the incidence of NCDs. Literature suggests that households are faced with the option of either using up savings or borrowing/liquidation assets. Among these two options, the latter is often used as a last-resort measure. The study deployed a logistic regression analysis with marginal effect to find out the probability of the sampled population utilising these two sources of funding associated with the NCDs. It was seen that Cancer, Diabetes,

CVD, CKD all increased the probability of a household borrowing/ liquidating their assets to fund the expenses. The magnitude of the probability was seen to be highest in the case of Cancer and lowest in the case of CKD. Apart from demographics such as ages, income, and socioeconomic status; the results indicated that episode of hospitalisation, loss of employment, and the number of members afflicted with NCD within a household were significantly impact the choice of source of funding by a household.

The overarching results found in the study strengthen the argument that non-communicable diseases have a significant impact on the direct expenses and the indirect expenses of a household which can ultimately lead to marginalised households incurring catastrophic health expenses. Furthermore, the burden associated with a physical ailment and caregiving duties also exacerbates budget constraints of the households owing to the fact that the patient or the caregiver cannot efficiently participate in income-generating activities. This often leads to households resorting to liquidation of assets or borrowing from external sources. The chronic nature of the disease does not just lead to the impoverishment of a household in the present generation, but the contracting income coupled with increasing expenses also limits the household's ability to invest in long-term assets. Thus, the impoverishing impact of NCD afflictions has the potential to extend intertemporally to the next generation within families. The current results drawn from a sample of 400 respondents can be extremely significant if extrapolated to a state or national level.

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CHAPTER 4

THE IMPACT OF NON-COMMUNICABLE DISEASES ON EARNINGS, CONSUMPTION, SAVINGS, EMPLOYMENT, AND INVESTMENT OF A HOUSEHOLD

4.1 Introduction

Non-communicable diseases (NCDs), of which the four most common- Diabetes, Cancer, and cardiovascular diseases, are the leading cause of morbidity and mortality in India and throughout the world. They have a negative impact on social and economic progress as well as population health. Indeed, NCDs have a direct financial impact on households, society, and health systems through high treatment costs. Moreover, NCDs place a huge indirect economic burden on society by causing significant productivity losses due to early deaths, early labour force departures, absenteeism, and reduced capacity at work. Increased absenteeism and labour force departures directly impact income levels, which can further strain consumption, savings, and household investment decisions.

Mahal et al. (2010) conducted empirical research investigating the far-reaching macroeconomic impact of NCDs in India. They found that in 2004, NCDs led to an annual income loss of one trillion rupees. More than one-third of all income losses were due to CVD and hypertension. NCDs significantly impacted the labour force participation of the patients with NCDs, whereby it was seen that the overall workforce participation rate was only about 47% for the survey respondents. Extrapolating this impact, a macroeconomic level indicated that the decreased labour force participation led to a decrease in the overall consumption spending of households on non-health expenses and output produced by the nation. The impact on consumption, savings, and output was mapped by estimating the change in GDP levels, which were decreased by nearly 5% due to NCDs.

The present chapter attempts to study the dynamic underpinnings of how an incidence of a non-communicable disease impacts a household's income, savings, consumption, employment, and ability to invest. At the very glance, all of these factors seem interlinked; however, to show a more nuanced perspective, the study analyses the impact of each of these factors individually.

The main objective of this chapter is to examine the impact of non-communicable diseases on the Earnings (Income), Consumption, Savings, Employment, and Investment of a Household. The study further divides this main objective into sub-objectives to ascertain the impact individually using regression analysis.

4.2 Background

There is strong and widespread evidence of a two-way relationship between an individual's health and workability, which has a bearing on labour market exit decisions and income, savings, and consumption levels. At a macroeconomic level, Bloom et al. (2010) have postulated that a healthy population leads to a more efficient labour supply in the workforce that positively impacts the overall economic growth and productivity levels of the economy which has been substantiated by their empirical research. This further highlights the importance of studying this relationship at a household or a microeconomic level- which this chapter endeavours to explore. The disease burden attributable to various NCDs not only reduces the ability of individuals or households to earn but also leads them to spend down their available income, thus diverting those resources away from investments in human capital development, such as education, to pay for non-productive healthcare (WEF,2014). Significant household expenses for the care of a member can consume a substantial proportion of the household's income, especially for NCDs that are likely to be expensive to treat.

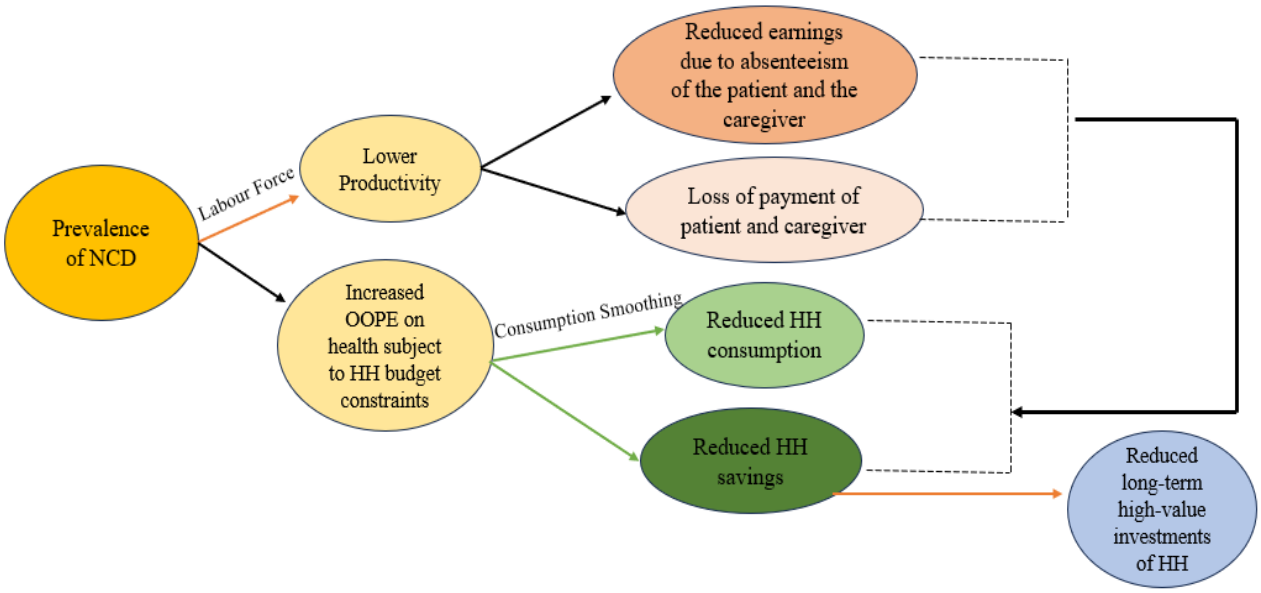
Theoretical frameworks developed by studies such as Mohanan (2008) and Pramesh et al. (2014) suggest that in the event of health shocks, households often alter their consumption and savings patterns to cope with the high out-of-pocket expenses in light of household budget constraints. This process has been formally defined as consumption smoothing, i.e., modifying and contracting consumption patterns due to exogenous health shocks. The theoretical background provided across various studies also described the modalities through which households smoothen their consumption levels to meet high medical expenditures.

Empirical research to study consumption smoothing by Mohanan (2008) in the context of India indicated that overall, households undertook consumption smoothing by reducing their educational spending by 20% and festival spending by 9%. Households with members who sustained injuries relied to a much greater extent on debt financing than their counterparts without injuries. Empirical research by Pramesh et al. (2014) dived further into the theoretical framework proposed by Mohanan on consumption smoothing to ascertain whether demographic factors impact high out-of-pocket expenditures. The study suggested that high out-of-pocket expenditure disproportionately affects rural and low-income households. Such involuntary expenses were sometimes met by reducing the cost of

spending on essentials such as food and rent, selling assets, use of savings, and undertaking greater financial risk through loans from family and landlords.

Based on the theoretical foundations found within the literature, this study summarises the various interlinkages between NCDs and household behaviour and presents the conceptual framework depicted in Figure 4.1.

Figure 4.1 Conceptual framework depicting the interlinkages between NCDs and household behaviour



Source: Conceptualised by the author based on literature survey

4.2.1 Impact of NCDs on Earnings

The first interlinkage the study analyses is the prevalence of NCD and its impact on earnings. The prevalence of an NCD not only has a detrimental effect on the health of a person but also on his ability to be able to efficiently do his day-to-day work leading to a loss of productivity. The loss in productivity can lead to increased absenteeism and hence a reduction in earnings. Mahal et al. (2010) found that the annual losses in household income attributable to NCDs burden aggregated to almost INR 280 billion. More than one-third of all income losses were due to CVD and hypertension, and another 15% were accounted for by Diabetes.

A study by Grover et al. (2005) analysed the impact of Diabetes on household earnings and found that loss of income due to NCD-related complications of patients comprised a huge margin within the indirect cost of NCDs. Considering the 1997 values, this loss of income

was estimated to be at roughly Rs.2086.74/- for a recall period of six months. Daivadanam et al. (2012) found that, particularly for CVD in 2008, the loss in income accounted for nearly Rs.5000/- in a recall period of nine months. Albeit this value seems low, it is essential to note that among the survey respondents in the study, this accounted for nearly 10% of their income being lost. Sangamitra and Kumar (2014) found that Cancer was a leading cause of death in India, with approximately 1.5 - 2 million cases at any given time and nearly 7 lakh new cases added annually, with 3 lakh deaths. Most Cancer patients in India reel under the pressure of expensive treatment. Another study by Dinesh et al. (2020) estimated the annual loss in income due to Cancer to be INR 7,762/- across the sample surveyed in Kerala. Considering that most of the sample survey had a monthly income between 5000 to 10,000, this amounts to a loss of earnings for nearly one month. In the context of CKD, a study by Gummidi et al. (2022) found that annual income losses amounted to Rs. 2,193/- among a cohort studied in Kerala. The average annual income of the survey respondent pool was 1,83,009/- that means income loss comprises a 1.23% loss of their annual income. The study used a minimum wage rate for calculating productivity loss, which may not be correct for all employees. It did not calculate productivity losses for caregivers, which might have contributed to underestimating costs owing to lost productivity. This figure is low, but the authors claim this to be an underestimate as they have used the minimum wage rate to calculate productivity loss, which only accounts for loss to caregivers. The literature points towards a paucity of studies in the context of Goa and the impact of NCDs on income. To fill this gap, this particular section on the impact of NCDs on earnings/loss of income to a household pertains to analysing this relationship and understanding how different NCDs impact the loss of earnings of households.

4.2.2 Impact of NCDs on Consumption Patterns of a Household

The second interlinkage the study analyses is the prevalence of NCD and its impact on consumption patterns. The health shocks households face due to high OOPE on health due to the limited budget constraints of households can place a significant burden. To cope with these expenses' households, undertake consumption smoothing. Thus, the prevalence of an NCD through the consumption smoothing process reduces consumption expenses.

Verma et al. (2021) found that the proportion of Indians who were pushed under the Below Poverty Line attributable to the expenses on NCD- related treatment increased further to 12.43% in 2017–18. It is important to note that the pushing into Poverty arises from a significant decrease in the consumption levels for survival. This points towards the

displacement of consumption owing to NCDs. Pal (2013) suggested that poor households decrease the share of clothing and education in India and increase the share of food, fuel, and travel in their consumption patterns due to NCDs. Particularly for Cancer, Mahal et al. (2013) found that in households without a Cancer patient, the non-medical consumption expenditure per member for 15 days was Rs.321/- while for Cancer-affected patients, it was much lower at Rs. 294/- In the context of Diabetes Anbhore (2020) found that 24% of households under study were found to have reduced the non-health expenses due to the burden of health expenditure. Of these households that reduced their non-medical consumption, 47.20% households compromised on food and social obligation, 16.70% on food consumption only, 22.20% compromised on child's education, and 14% compromised on household's other member treatment. For CVDs, based on the findings of Karan et al. (2014), there were significantly lower levels of non-medical consumption among CVD-affected households as compared to non-CVD-affected households. The average difference between the two showed that CVD led to a decrease in non-medical consumption of nearly Rs.110.64/- per fortnight. The aspect of displaced consumption among patients of CKD has been studied very little; however, in the study by Bradshaw et al. (2019), CKD patients experienced crippling levels of financial hardship related to the disease's expenditure even despite subsidised treatments.

4.2.3 Impact of NCDs on Savings of a Household

The third interlinkage the study analyses is the prevalence of NCD and its impact on a household's savings. While sometimes households may meet these expenses by reducing consumption, as seen in the previous section, in some cases, the appropriation of funds may take place from the savings pool of a household. The savings pool of a household also funds the high OOPE households face. Further, decreased earnings due to productivity losses and absenteeism can reduce the ability of households to generate savings.

According to the study by Selvaraj and Karan (2009), the OOP expenditures arising from NCDs have proven to be a significant drain on the households' total resources. In terms of the empirical literature on the drain of savings, Flores et al. (2008) estimated that annually Indian Households take out Rs.823/- to meet the OOP expenditure arising from NCD-related health expenses. The same study also found that 17% of rural household financed these expenses via savings, while 22% of urban households relied on savings. To assess the impact of Diabetes on household savings, the study by Bansode & Jungari (2019) noted that within households with retired members, Diabetes-related expenses were financed by savings and

led to a decrease in savings by nearly 22%. Similarly, within households among the lowest income bracket, Diabetes-related expenses lead to a decrease in savings by 19%. This points that among lower-income households coping strategies other than savings were used to finance the health expenditure. Particularly strenuous decreases in savings were seen in the case of hospitalisation arising from Diabetes, whereby in such cases, household saving decrease by nearly 34%. Chakrabarty et al. (2017) found that nearly 85% of the household in Punjab used up savings to cope with the expenses of Cancer. Mahal et al. (2013) estimated the monthly value of the drain of savings to be between Rs. 3,576/- and Rs. 4,438/- for Cancer patients. For CVD, Rao et al. (2011) found that 57% of the expenditure related to the NCD was financed via savings and amounted to Rs. 12,317/- annually, based on the sample pool. In the context of CKD, Satyavani et al. (2014) found that 46% of the expenditure related to the disease was financed through personal savings. In this study, the authors divided the sampled respondents in the category of CKD patients without complications, requiring haemodialysis, and those requiring kidney transplantation-the annual reduction in the personal savings used up for the categories was Rs. 5,825.44/-, Rs. 28,138.2/- and Rs. 1,80,743.2/- respectively. The literature showed limited evidence of the impact of these diseases on the saving pattern of the Goan households. This study addresses this gap by analysing the highest impact incurred among the NCDs under consideration.

4.2.4 Impact of NCDs on Employment of a Household

The fourth interlinkage the study analyses is that of the prevalence of NCD and its impact on the employment. There is ample literature that points towards the linkages between the incidence of NCDs and the labour force participation rate. The prevalence of an NCD leads to productivity losses which can manifest itself as a premature exit from the labour force due to ill health. Thus, NCDs can lead to reduced labour force participation and loss of employment.

Studies by Alavinia & Burdoff (2008) show that poor health is strongly associated with non-participation in the labour force. With respect to kidney disease, the study by Klarenbach et al. (2002) deployed a logistic regression and found that the odds of the person becoming unemployed is 7.94% for a patient with renal disease in the USA. In the context of India, Kulkarni et al. (2019) used a probit model to assess the employment losses that are associated with non-communicable diseases such as Diabetes and heart disease. Mahal et al. (2013) found that workforce participation rates among household members aged 15 years and above are lowered between 2.4% and 3.2% for households with Cancer relative to those

without Cancer. The survey of CKD patients in India in the study by Anupama & Uma (2014) found that 55.72% of the CKD patients were unemployed due to health conditions. This present study addresses the gap in the literature stemming from the lack of empirical evidence of these associations in the context of Indian households in recent periods.

4.2.5 Impact of NCDs on Investment Patterns of a Household

The fifth interlinkage the study analyses is that of the prevalence of NCD and its impact on the investment patterns of a household. High OOPE burden and lower productivity lead to a decrease in the ability of the household to earn and save. This, coupled with the loss of employment, further leads to a contractionary impact on savings. A pertinent issue that comes from this pattern is that a drain on savings further reduces the capacity of households to make long-term investments. Thus, the burden of NCD is not just limited to short-term but rather long-term investment decisions, especially in the context of high-value assets.

The study by WHO (2006) substantiates the above-mentioned impact and states that the burden of chronic non-communicable diseases may invariably challenge individual or household income and savings and compete with investment activities. According to the study by Nguyen et al. (2012), sometimes households, in the light of the financial burden posed by NCDs would delay investment as a coping strategy. Albeit, there is very limited empirical literature on the impact of a household's investment decisions. Some studies, such as Schoffeld (2011), have deployed a logistic regression to evaluate this impact. The present study contributes to the literature by evaluating the impact of NCDs on the investment decisions of households.

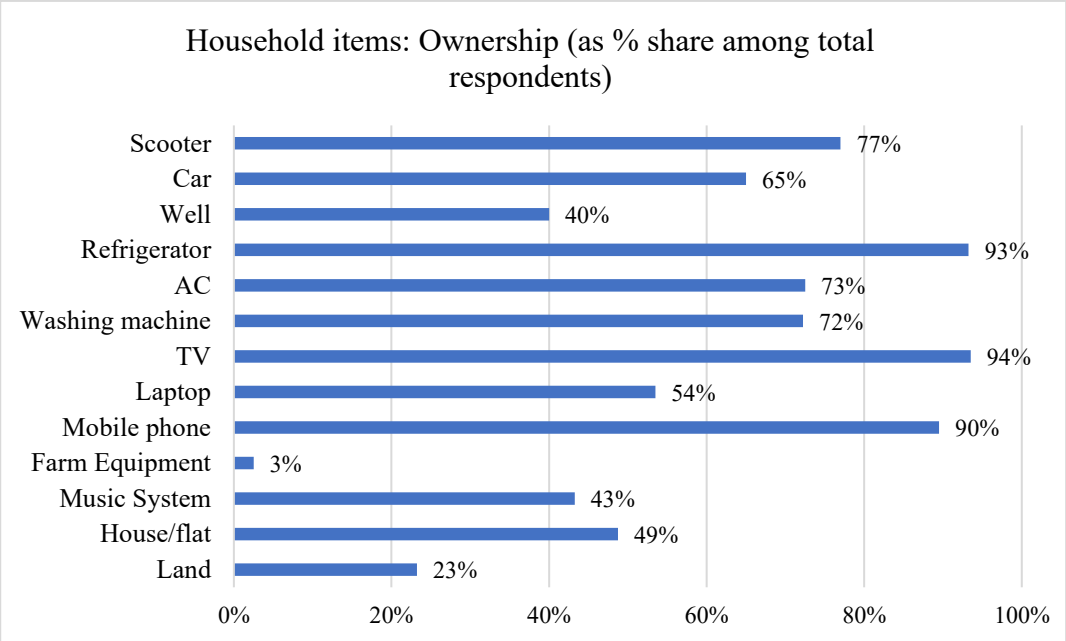
A. Insights from NFHS 2019-2021 – Impact of NCDs on employment, consumption, and Investment

According to NFHS 2019-2021, for Goa, 4,139 women and 1,648 men, roughly 79.17% of the sampled respondents were employed all year long, 18.75% were employed seasonally, and 2.08% were occasionally employed. The incidence of an NCD not only takes a toll on the physical and mental health of the patient and caretakers but also reduces their ability to be able to generate earnings and unequivocally impacts their consumption levels. Given the data of NFHS, one may find that the type of employment may also impact earnings and, subsequently, consumption, especially in the context of the incidence of an NCD. Particularly for ownership of assets, the NFHS 2019-2021 data finds that in Goa, 22.8% of the women own a house alone or jointly, while for men, this statistic stands at 21.2%.

Further, 9.2% of the women own land, while 5.2% of the men own land. In terms of household possessions, the NFHS 2019-2021 gives Pan-India level statistics that show that only 0.4% of the sampled households do not own any household goods such as electric fan, television, mobile phone, refrigerator, etc. In the urban areas, this section comprises 0.1% of the sampled population, while in the rural areas, this section accounts for 0.6% of the total population. This goes out to show that the ownership of assets is lower in rural households as compared to urban households. In this context, figure 5.1 given below presents the ownership structure of household items of the sampled respondents of the primary survey of the current study.

Among the household items, gadgets such as refrigerator, TV, and mobile phone were owned by over 90% of the sampled households. Meanwhile, land ownership was extremely low at merely 23%. Further, only 49% of the households owned a house or a flat. This goes out to show that ownership of costlier assets such as property (land, house, flat) was lower in comparison to inexpensive assets such as gadgets (mobile phone, laptop, refrigerator, and TV) and modes of transport (car and scooter).

Figure 4.2 Household items: Ownership (as % share among total sampled respondents)



Source: Primary survey data

4.3 Methodology

The chapter makes use of statistical tools such as linear regression models and logistic regression models to test the hypothesis in a robust manner.

In order to ascertain the impact that the NCDs under consideration have on the earnings of a household, a detailed analysis is explained in section 4.4. To have a thorough understanding of the model, the variables used are explained in detail in Table 4.1. The regression analysis presented in Table 4.2 gives an understanding of the loss that is seen in the earnings of a household due to the incidence of an NCD.

Further, section 4.5 explains the sub-objective- the impact an NCD has on the consumption of a household. Table 4.3 explains in detail the usage of variables in the regression analysis, which is then presented in Table 4.4. NCDs can have detrimental impacts on the consumption spending of a household with reference to food and non-food expenses. The analysis thus tries to analyse this fact.

In order to throw light on the impact of an incidence of an NCD on the savings pattern of a household, a detailed analysis is explained in section 4.6. It is true that the incidence of an NCD does lead to a reduction in savings; the study thus tries to map this decrease across the NCDs under study. The description of the variables is explained in Table 4.5. The regression analysis is further presented in Table 4.6, which provides us with valuable conclusions.

A person's employment may be threatened by chronic, life-threatening NCDs because they sometimes necessitate frequent hospitalisations and proper care. This detailed analysis of the impact of an NCD on Employment, the variable being loss of employment, is presented in section 4.7 of this chapter. Table 4.7 provides a description of the variables. To assess this, a logistic regression analysis was conducted, taking loss of employment as a binary variable and several explanatory variables. The results of the logistic regression are further presented in Table 4.8.

The study also assesses the impact of an NCD on the investment behaviour of a household. Segment 4.8 of this chapter maps the percentage of respondents who undertook long-term investments. It also tries to map how investment decreases across the NCDs. Another important feature highlighted here is the reduction in investment in a household that has more than one individual afflicted with the illness.

4.4 Impact of NCDs on Earnings of a Household

The first sub-objective within the chapter that the study examines is how an NCD can impact a household's earnings. In order to quantify loss of productivity, the study uses the proxy variable of **total loss in earnings** as a dependent variable. This is calculated as the loss in daily wages of a person across the period of one year due to missed work days, hospitalisations, etc. To arrive at the monetary value, the study summed up the number of days a person did not report to the workplace due to the disease and multiplied it by the daily average earnings. A one-year recall period has been used in the survey questions regarding earnings to account for members of households that are seasonal workers or work on contracts. Based on the annual earnings, the study has estimated average daily earnings by dividing it by 365 to monetise daily loss of earnings arising from loss of work days due to health issues.

Table 4.1 below describes the variables used in the linear regression model to ascertain the impact that non-communicable diseases have on the loss of earnings across a year.

Table 4.1 Description of variables used in the Regression model

Variable	Measurement
Total loss of Earnings	The loss in daily wages of a person across the period of one year due to leaves, hospitalisations, etc.
Diabetes	Dummy variable taking value 1 if a member has Diabetes, 0 otherwise.
Cancer	Dummy variable taking value 1 if a member has Cancer, 0 otherwise.
CVD	Dummy variable taking value 1 if a member has CVD, 0 otherwise.
CKD	Dummy variable taking value 1 if a member has CKD, 0 otherwise.
Ages	Sum of ages of the household members of the respondents.
Socio-economic class	Dummy variable. Taking the value of 1 if a person lives in a pucca house and at the same time belongs to the general category, 0 otherwise.
Total Household members	Total number of members within the household.

Annual Visits	The number of times the patient has visited the hospital or clinic.
No Goa Hospital (Dummy)	Dummy variable taking the value 1, if the member has visited a hospital outside the state of Goa, 0 otherwise.
Consumption Spending	Measured in INR as reported by sampled respondents- Calculated as the sum of annual food and non-food expenditure.

Source: Primary survey data

$$\textit{Total loss of earning (rupees)} = \beta_0 + \beta_1 Diabetes + \beta_2 Cancer + \beta_3 CVD + \beta_4 CKD + \beta_5 ages + \beta_6 Socio\text{-}economic\ class + \beta_7 total\ HH\ members + \beta_8 Annual\ visits + \beta_9 No\ Goa\ Hospital + \beta_{10} Consumption\ Spending + \varepsilon$$

Daily Wage rate = Annual earnings of the Household / 365 days

Total loss of earnings = Wage rate(number of days of work missed annually /visits to the clinic + hospitalisation duration of the patient + the caregiver's days of work missed due to caregiving responsibilities + wages paid to attendant*). (Yelin et al., 2004)

The hypothesis the study seeks to test is as follows:

H_0: The incidence of an NCD does not have any impact on the loss of income

H_{0a}: Incidence of Diabetes does not have any impact on the loss of income $\beta_1=0$

H_{0b}: Incidence of Cancer does not have any impact on the loss of income $\beta_2 =0$

H_{0c}: Incidence of CVD does not have any impact on the loss of income $\beta_3=0$

H_{0d}: Incidence of CKD does not have any impact on the loss of income $\beta_4 =0$

The alternative hypothesis is stated below:

H_1: The incidence of NCDs has an impact on the loss of income

H_{1a}: Incidence of Diabetes has an impact on the loss of income $\beta_1\neq0$

H_{1b}: Incidence of Cancer has an impact on the loss of income $\beta_2 \neq0$

H_{1c}: Incidence of CVD has an impact on the loss of income $\beta_3\neq0$

H_{1d}: Incidence of CKD has an impact on the loss of income $\beta_4 \neq0$

Table 4.2 Empirical results of the Regression, on impact of NCD on loss of earnings

Linear Regression	Number of obs= 400
	F (10, 389) =23.57
	Prob > F=0.0000

	R-squared=0.3773
	Adj R-squared=0.3612
	Root MSE=21854

Total loss of Earning	Coef.	Robust Std. Err.	t	P>t
Diabetes	5838.17	163.9416	35.61	0.018**
Cancer	9236.858	1.71463	5387.09	0***
CVD	1526.762	456.2919	3.35	0.185
CKD	7308.777	342.0475	21.37	0.03**
Ages	-129.6218	2.743877	-47.24	0.013**
Socio Economic class	7073.309	155.0091	45.63	0.014**
Total Household members	1572.904	116.0891	13.55	0.047**
Annual Visits	225.8097	2.049088	110.2	0.006***
No Goa Hospital (Dummy)	9126.503	525.5781	17.36	0.037**
Consumption Spending	0.0296004	0.0000709	417.58	0.002***
_cons	-11569.28	490.1406	-23.6	0.027

Significant at 1 %, 5 % and 10 % level of significance

Source: Results based on primary data

The empirical results show that if a household member is ailing with Diabetes, the total loss of earnings increases by Rs.5838 annually; this result is statistically significant at a 5% level of significance. The loss of earnings is greater among households where a patient is ailing with Cancer. If a household member is ailing with Cancer, the total loss of earnings increases by Rs.9236 annually, with the result being statistically significant at a 1% level of significance. If a household has a member afflicted with Chronic Kidney Disorder, the total loss of earnings will increase by Rs.7308 annually. This result is statistically significant at a 5% level of significance.

For CVD, the results were statistically insignificant. In the order of monetary impact, the highest impact was seen in the case of Cancer, followed by CKD and Diabetes. This shows that long-term chronic diseases with a more significant expenditure burden have the most detrimental impact on the household's incomes as they accentuate the losses in earnings.

In the case of Cancer and CKD, the patient requires expensive, long-term treatment with frequent hospitalisation. Among the 168 patients that were hospitalised, 77 were ailing

with Cancer. Meanwhile, 06 were ailing with CKD (The total number of patients within the sample with CKD is 6).

Although Diabetes is a long-term disease with a more frequent treatment requirement, however, its per-treatment costs are low. Thus, it poses the lowest burden on the loss of income; also, Diabetes is a disease that the person can adjust to the lifestyle around, which also leads to a low burden impact. These results align along the lines of other studies such as Joseph & Gupta (2016), Kasturiratne, Wickremasinghe, & de Silva (2005).

Hence, the study rejects the null hypothesis for the NCDs- Diabetes, Cancer, and CKD that states that these NCDs do not have an impact on the loss of earnings/income of a household. Whereas it fails to reject the hypothesis that CVD does not have any impact on the loss of income.

With reference to the control variables, if the ages of the household members increase by one year, the total loss of earnings decreases by Rs. 129.6. Higher ages up until a certain threshold reflect more work experience, which could entail greater earnings and sometimes even employment at higher levels. Again, this result is statistically significant at a 5% level of significance (5% level of significance). These results align with those found in the study by Jha et al. (2013) and others.

With reference to the socio-economic class, it is seen that compared to a non-affluent family, an affluent family would witness an additional loss of earnings of Rs. 7073.3. The result is statistically significant at a 5% level of significance. Similar associations and impacts were seen in the study by Joseph and Gupta (2016).

A positive and significant relation was seen between the total number of household members and the total loss of earnings, whereby if the number of members in the household increase, the total loss of earnings increases by Rs. 1572.9. This result is statistically significant at a 5% level of significance. Annual visits to a hospital or a clinic increase the total loss of earnings by Rs. 225.80. Similar results have been depicted in the study by Mahal, Karan, and Engelgau (2010). Seeking treatment in a hospital outside the state of Goa also significantly impacts the total loss in earnings by Rs.9126.5

If the consumption spending of the household members' increases by Rs. 1, the total loss of earnings also increases, as can be seen from the direct relation the two have. Thus, a positive and significant relationship was depicted between the two variables. Consumption spending has been used as a proxy to map the economic status of households, whereby higher

consumption spending would reflect a high-income household. Similar results have been depicted in the study by (Alam and Mahal, 2014)

4.5 Impact of NCDs on Consumption

The second sub-objective within the chapter tries to assess the impact NCDs have on the consumption patterns of a household. It is a proven fact by researchers in this field that NCDs do lead to the displacement of consumption, besides households also compromise on their food and non-food expenses. Table 4.3 given below describes the variables used in the linear regression model to ascertain the impact that non-communicable diseases have on the consumption patterns of a household across a one-year period. The sum of annual food and non-food expenditure has been considered as consumption spending in this model. The survey respondents were asked to detail their consumption with a recall period of one month for food expenditure and one -year for non-food expenditure.

Table 4.3: Description of variables used in the regression model

Variable	Measurement
Consumption spending	Measured in INR as reported by sampled respondents- Calculated as the sum of annual food and non-food expenditure.
Diabetes	Dummy variable taking value 1 if a member has Diabetes, 0 otherwise.
Cancer	Dummy variable taking value 1 if a member has Cancer, 0 otherwise.
CVD	Dummy variable taking value 1 if a member has CVD, 0 otherwise.
CKD	Dummy variable taking value 1 if a member has CKD, 0 otherwise.
Annual Earnings	Measured in INR as reported by the sampled respondents.
Total Household members	Total number of members within the household.
Hospitalisation Duration	Number of days the household member(s) was hospitalised in the last one year as reported by sampled respondents.
Annual Visits	The number of times the patient has visited the hospital or clinic.

Ages	Measured in Log form of the sum of the ages of the household members of the respondents.
Total Number of members with NCD	Members suffering from an NCD within the HH, as reported by the sampled respondents
Medical Insurance	Dummy variable taking value 1 if the HH has utilised medical insurance, 0 otherwise

Source: Primary survey

The linear regression model considered is given below:

$$Consumption\ spending = \beta_0 + \beta_1 Diabetes + \beta_2 Cancer + \beta_3 CVD + \beta_4 CKD + \beta_5 earnings + \beta_6 Total\ HH\ members + \beta_7\ hospitalization\ duration + \beta_8\ annual\ visits + \beta_9 ages + \beta_{10} Total\ no.\ of\ members\ with\ NCD + \beta_{11}\ medical\ insurance + \varepsilon$$

The hypothesis the study seeks to test is as follows:

H_0: Incidence of an NCD does not have any impact on the Consumption pattern of a HH

H_{0a}: Incidence of Diabetes does not have any impact on the Consumption pattern of a HH, i.e., $\beta 1=0$

H_{0b}: Incidence of Cancer does not have any impact on the Consumption pattern of a HH, i.e., $\beta 2 =0$

H_{0c}: Incidence of CVD does not have any impact on the Consumption pattern of a HH, i.e., $\beta 3=0$

H_{0d}: Incidence of CKD does not have any impact on the Consumption pattern of a HH, i.e., $\beta 4 =0$

The alternative hypothesis is stated as:

H_1: The incidence of an NCD has an impact on the consumption pattern of a household.

H_{0a}: Incidence of Diabetes does have an impact on the Consumption pattern of a HH, i.e., $\beta 1\neq 0$

H_{0b}: Incidence of Cancer does have an impact on the Consumption pattern of a HH, i.e.,$\beta 2 \neq 0$

H_{0c}: Incidence of CVD does have an impact on the Consumption pattern of a HH, i.e., $\beta 3\neq 0$

H_{0d}: Incidence of CKD does have an impact on the Consumption pattern of a HH, i.e., $\beta 4 \neq 0$

Table 4.4 Empirical results of the Regression on impacts of NCD on Consumption.

Linear Regression	Number of observations= 400
	F (11, 388) = 110.46
	Prob > F= 0
	R-squared=0.758
	Adj R-squared=0.7511
	Root MSE=2.80E+05

Consumption Spending	**Coef.**	**Robust Std. Err.**	**t**	**P>t**
Diabetes	37455.64	2479.47	15.11	0.042**
Cancer	24437.25	1408.21	17.35	0.037**
CVD	-33295.29	1595.17	-20.87	0.03**
CKD	-160929	1500.14	-107.28	0.006***
Earnings	0.7546983	0.00127	590.48	0.001***
Total Household members	-1879.209	1073.36	-1.75	0.33
Hospitalisation Duration	284.9564	17.0074	16.75	0.038**
Annual Visits	447.6468	1.92906	232.05	0.003***
Ages	-797.674	7.34806	-108.56	0.006***
Total number of members with NCD	84707.32	2047.66	41.37	0.015**
Medical Insurance	-3379.16	3211.54	-1.05	0.484
_cons	-77925.38	8107.36	-9.61	0.066

Significant at 1%, 5%, 10% level of significance
Source: Results based on primary survey

Table 4.4 reveals the empirical results of how a household afflicted with an NCD leads to modifications in its consumption behaviour. Among the NCDs under study, households afflicted with Diabetes and Cancer could be seen to have an increase in consumption spending by Rs. 37,455/- and Rs. 24,437/-, respectively. These results are statistically significant at a 5% level of significance. The increased expenditure can be attributed to the different diet patterns as well as the purchase of individual diagnostic kits and monitoring equipment in the case of Diabetes. In the case of Cancer, the increased spending could be attributed to the special diet. Consumption displacement associated with various NCDs was

also assessed in studies by Datta et al. (2018) and Behera and Pradhan (2021), among others. The results also show that for a household member afflicted with CVD, the consumption spending of the household decreases by Rs. 33,295/- (the result is statistically significant at a 5% level of significance). This decrease points toward the contraction of consumption expenditures by a household given a sudden and heavy financial shock whereby households seemingly bear the burden by reducing other expenditures. A similar result was found in the case of CKD, wherein the consumption expenditure of a household decreases by Rs.1,60,929/- (results statistically significant at a 1% level of significance). This was the largest amount among all NCDs under the study. The high value of contraction among consumption expenditures of households is owing to households meeting the medical expenditures, which are not only significantly high but also long-term. The treatment of kidney disorders is predominantly driven by the private sector, while the public sector hospitals largely manage patients who are critically sick and those with acute kidney injury, leaving limited capacity for accommodating patients on maintenance dialysis (Bharathi & Jha,2020). Furthermore, there is a persistent trend among kidney disorder patients where 75% of the CKD patients seek help at the very advanced stages, given that CKD does not show very marked symptoms. This not only drives up the cost of the treatment but, at times, also limits the scope of the treatment to either advanced dialysis or transplants, which are again expensive (Chari,2021).

Hence the study rejects the null hypothesis, which states that NCDs-Diabetes, Cancer, CKD, and CVD do not have any impact on the Consumption pattern of a household.

Among the control variables, a positive and significant association was seen between the annual earnings of a household and the expenditures on consumption. Further, as the earnings increase, consumption spending also increases. This result is statistically significant at a 1% level of significance, showing that as earnings increase by Rs.1/- consumption spending increases by Rs.0.75/- Pal (2013) also depicted similar associations between the income of the households and the change in consumption expenditures when afflicted with a disease.

A one-day increase in hospitalisation duration increases consumption spending by almost Rs. 285/- (This result is statistically significant at a 5% level of significance). This increase could be due to consumption spending by caretaking members during the hospitalisation period. Although the magnitude of this expenditure is not very high, the high statistical

significance points toward a strong prevalence. Tripathy et al. (2016) also analysed and found comparable linkages between hospitalisations and consumption spending.

As the annual visits to the hospital or clinic increase, the consumption spending increases by Rs.447/- (This result is statistically significant at a 1% level of significance). The increased spending here is again low in magnitude but statistically significant and could be due to spending by the members when travelling to and fro from the clinic/hospital or when waiting for consultation. (Do note that this does not amount to the travel cost but rather the peripheral spending made during the trip). Such associations align along the lines of studies done by Engelgau, Karan, & Mahal (2012), among others.

As the ages increase, consumption spending decreases by Rs.797/- (This result is statistically significant at a 1% level of significance). The decreased consumption spending with increasing ages is plausible post a certain high threshold of age where it's normal for individuals to have different appetites and spending preferences. Mohanty et al. (2014) also depicted a similar pattern between the ages of a household and consumption spending behaviours.

Further, the empirical results point towards the fact that as the number of members with NCD in a household increase, consumption spending increases by a very high value of Rs. 84,707/- (the result is statistically significant at a 5% level of significance). This increase is owing to the combined expenditures on different types of diets, home medical equipment, and perhaps food expenditures incurred by the live-in caretakers. Almost similar associations were depicted in the study by Behera & Pradhan (2021).

Overall, there was an increased consumption spending in the case of Diabetes, followed by Cancer. To examine this relation more specifically, the study undertook regression by dividing the consumption expenditure into **food and non-food spending**. Particularly for these two NCDs, the result was statistically significant that there was an increase in food expenditure that was leading to an increase in overall consumption spending. One can infer this to be a result of a change in diet as a part of treatment. There was a decrease in the overall consumption spending in households afflicted by CVD and CKD. Regressions undertaken after dividing the consumption expenditure into food and non-food expenditure show that particularly for CVD and CKD households met the financial burden by reducing their non-food expenditure. Total household members and medical insurance were found to be statistically insignificant in this regression model.

4.6 Impact of NCDs on Savings

The next sub-objective details the impact that the NCDs under study have on the savings pattern of a household. Table 4.5, given below, describes the variables used in the linear regression model to ascertain the impact that non-communicable diseases have on the savings patterns of a household across a one-year period. **Savings is defined as the sum of funds by the household** in the categories of Cash, Bank deposit, Insurance, RD's, Jewellery, Land, House, Flat, Plot, Mutual Funds, Post office savings, PPF, Shares, and Bonds.

Table 4.5: Description of variables used in the Regression model

Variable	Measurement
Savings	Measured in INR as reported by the sampled respondents.
Diabetes	Dummy variable taking value 1 if a member has Diabetes, 0 otherwise.
Cancer	Dummy variable taking value 1 if a member has Cancer, 0 otherwise.
CVD	Dummy variable taking value 1 if a member has CVD, 0 otherwise.
CKD	Dummy variable taking value 1 if a member has CKD, 0 otherwise.
Earnings	The sum of the annual incomes of the members of the HH measured in INR as reported by the sampled respondents.
Total Number of members with NCD	Members suffering from an NCD within the HH, as reported by the sampled respondents.
Total Household members	Total number of members within the household.
Direct cost	Sum of Medical expenditure, Hospitalisation cost, and laboratory test cost. This excludes the transport cost.
Caregiver (yes /no)	A dummy variable taking the value 1 if the hh has employed a caregiver/a family member has missed work days due to caregiving activities, 0 otherwise.
Availed Government Scheme	A dummy variable taking the value 1 if the hh utilises government scheme for the medical expenses, 0 otherwise.
Hospitalisation Duration	The number of days the household member(s) was hospitalised in the last one year as reported by sampled respondents.

Loss of earnings due to visits	The INR value of earnings was foregone due to visits to the clinic /hospital using the estimation formula below. Loss of earnings due to visits= Daily wages * annual visits to the clinic/hospital.

Source: Primary Survey

$$Savings = \beta_0 + \beta_1 Diabetes + \beta_2 Cancer + \beta_3 CVD + \beta_4 CKD + \beta_5 earnings + \beta_6 Total\ number\ of\ members\ with\ non\text{-}communicable\ diseases + \beta_7\ Total\ household\ members + \beta_8 direct\ cost + \beta_9\ Care\ giver\ dummy + \beta_{10}\ availed\ government\ scheme + \beta_{11}\ hospitalisation\ duration + \beta_{12}\ loss\ of\ earning\ due\ to\ visits + \varepsilon$$

The hypothesis the study seeks to test is as follows:

H_0: The incidence of an NCD does not have any impact on the savings of a HH

H_{0a}: Incidence of Diabetes does not have any impact on the savings of a HH, i.e., $\beta1=0$

H_{0b}: Incidence of Cancer does not have any impact on the savings of a HH, i.e., $\beta2 =0$

H_{0c}: Incidence of CVD does not have any impact on the savings of a HH, i.e., $\beta3=0$

H_{0d}: Incidence of CKD does not have any impact on the savings of a HH, i.e., $\beta4=0$

The alternative hypothesis is stated below:

H_1: The incidence of an NCD has an impact on the savings of a household.

H_{0a}: Incidence of Diabetes does have an impact on the savings of a HH, i.e., $\beta1\neq0$

H_{0b}: Incidence of Cancer does have an impact on the savings of a HH, i.e., $\beta2 \neq0$

H_{0c}: Incidence of CVD does have an impact on the savings of a HH, i.e., $\beta3\neq0$

H_{0d}: Incidence of CKD does have an impact on the savings of a HH, i.e., $\beta4 \neq0$

Table 4.6 Empirical results of the Regression on impacts of NCD on Savings.

Linear Regression	Number of obs= 400
	F (12, 387) =18.65
	Prob > F=0
	R-squared=0.3663
	Adj R-squared=0.3467
	Root MSE=5.50E+05

Savings	**Coef.**	**Robust Std. Err.**	**t**	**P>t**
Diabetes	-57243.7	8080.859	-7.08	0.089*
Cancer	-49431.18	276.8307	-178.56	0.004***
CVD	61857.86	1097.648	56.35	0.011**

CKD	82379.46	15129.9	5.44	0.116
Earnings	0.9152266	0.0125342	73.02	0.009***
Total Number of members with NCD	-76648.13	15060.7	-5.09	0.124
Total Household members	-6137.662	1122.083	-5.47	0.115
Direct cost	-0.0022018	0.0149168	-0.15	0.907
Caregiver	-44758.04	15720.45	-2.85	0.215
Availed Government Scheme	80946.44	7544.025	10.73	0.059*
Hospitalisation Duration	-145.5228	61.62985	-2.36	0.255
Loss of earnings due to visits	-2.451535	0.2181919	-11.24	0.057*
_cons	-89182.29	15302.87	-5.83	0.108

Significant at 1%, 5%, 10% level of significance
Source: Results based on primary survey

The empirical results of the linear regression indicate that among the NCDs under consideration, Diabetes and Cancer lead to a decline in savings to the extent of Rs. 57,243 and Rs. 49,431, respectively. This could be attributed to the fact that these illnesses being chronic and long-term lead to greater expenditures where households fall back upon their savings to meet these medical expenses. The relatively higher impact of Diabetes as compared to Cancer on savings could be explained by the fact that Diabetes is fairly long-term as compared to Cancer. Even if the pre-treatment cost of Diabetes is lower because of its long-term persistence, it leads to a greater burden on savings. However, it can be seen that CVD does not lead to a decline in savings owing to the infrequent nature of the disease. Nevertheless, it does induce a sudden health shock to the individual and their families.

Hence, the study rejects the null hypothesis for the NCDs- Diabetes, Cancer, and CVD that states that these NCDs do not have an impact on the savings of a household. The study fails to reject the hypothesis which states that CKD impacts the savings of a household.

One of the reasons for the insignificant impact of CKD can be due to its low prevalence among the sampled population.

When considering the control variables, it is observed that increased earnings lead to greater amounts of savings, indicating a positive relationship between the two as expected. This relation was statistically significant at a 1% level of significance. Studies by Bloom et al. (2014) also had similar choice of variables.

Further, if a household has availed of any government scheme, this has led to an increase in savings to the extent of Rs. 80,946, significant at a 10% level of significance. Such similar associations were also depicted in studies by Paulin (2017); Nandi (2015).

Loss of earnings due to visits was seen to be significant and had a negative relationship with savings, as expected. Comparable associations were witnessed in studies by Bloom et al. (2014); Thakur et al. (2021).

4.7 Impact of NCDs on Employment

This section of the study aims to replicate the methodology followed by Klarenbach et al. (2002) and deploys a logistic regression to analyse the relationship between the incidence of NCDs and loss of employment. Table 4.7 describes the variables used in the linear regression model to ascertain the impact that non-communicable diseases have on employment.

Table 4.7 Description of variables

Variable	Measurement
Loss of Employment (Dummy Variable)	Impact of Non-Communicable diseases on employment, where the loss of employment is considered as a dummy variable where 1 equals loss of job by the patient and 0 otherwise.
Diabetes	Dummy variable taking value 1 if a member has Diabetes, 0 otherwise.
Cancer	Dummy variable taking value 1 if a member has Cancer, 0 otherwise.
CVD	Dummy variable taking value 1 if a member has CVD, 0 otherwise.
CKD	Dummy variable taking value 1 if a member has CKD, 0 otherwise.
Annual Visits	The number of times a patient has visited the Hospital/ clinic in a year.
Ages	Measured in Log form of the sum of ages of the household members of the respondents.
Hospitalised Dummy	Dummy variable taking value 1 if the HH had any member that was hospitalised due to NCD, 0 otherwise.
Total Number of members with NCD	Members suffering from an NCD within the HH, as reported by the sampled respondents.

Highest Education	Categorical variable, taking the values 0-Illiterate, 1-Primary, 2-High school, 3-Higher Secondary, 4-Graduate, 5-Post Graduate, 6-Professional, 7-Ph. D.

Source: Primary Survey

$$Ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 diabetes + \beta_2 cancer + \beta_3 CVD + \beta_4 CKD +$$
$$\beta_5 Annual\ visits + \beta_6 Ages + \beta_7 hospitalised\ dummy +$$
$$\beta_8\ Number\ of\ members\ with\ NCD + \beta_9 Highest\ Education + e_i$$

The hypothesis the study seeks to test is as follows:

H_0: The incidence of an NCD does not have any impact on the employment of a HH member

H_{0a}: The incidence of Diabetes does not have an impact on the employment of a HH, i.e., β1=0

H_{0b}: The incidence of Cancer does not have an impact on the employment of a HH, i.e., β2=0

H_{0c}: The incidence of CVD does not have an impact on the employment of a HH, i.e., β3=0

H_{0d}: The incidence of CKD does not have an impact on the employment of a HH, i.e., β4=0

The alternate hypothesis is stated below:

H_1: The incidence of an NCD does have an impact on the employment of a HH member

H_{1a}: The incidence of Diabetes does have an impact on the employment of a HH, i.e.,β1≠0

H_{1b}: The incidence of Cancer does have an impact on the employment of a HH, i.e., β2≠0

H_{1c}: The incidence of CVD does have an impact on the employment of a HH, i.e., β3≠0

H_{1d}: The incidence of CKD does have an impact on the employment of a HH, i.e., β4≠0

Table 4.8: Results of the Logistic regression model on the impact of an NCD on employment

Logistic regression	Number of observations= 400
	LR chi2(9) =30.7
	Prob > chi2 = 0.0003
Log likelihood = -48.617627	Pseudo R2= 0.24

Loss of Employment	Coef.	Robust Std. Err.	z	P>z
Diabetes	-1.6225	0.0271272	-59.81	0.000***
Cancer	1.092106	0.0776829	14.06	0.000***
CVD	-0.2057166	0.1545629	-1.33	0.183
CKD	3.188061	0.0061859	515.38	0.000***
Annual visits	0.004258	0.0020876	2.04	0.041**
Ages	0.4053364	0.058056	6.98	0.000***
Hospitalised dummy	2.233531	0.0821834	27.18	0.000***
Total number of members with NCD	-3.02457	0.0108395	-279.03	0.000***
Highest Education	0.0693757	0.0092181	7.53	0.000***
_cons	-3.63759	0.1550291	-23.46	0.000***

Significant at 1%, 5%, 10% level of significance
Source: Results based on primary data

Conditional marginal effects Number of Observations=400
Model VCE: Robust
Expression: Pr (Loss of Employment), predict () dy/dx
w.r.t.: Diabetes Cancer CVD CKD annual visits ln age sum hospitalised dummy total number of members with NCD Highest Education.

Category	Mean
Diabetes	0.5025
Cancer	0.2675
CVD	0.3875
CKD	0.015
Annual Visits	14.695
Ln Age sum	4.0670
Hospitalised dummy	0.4625
Total number of members with NCD	1.25
Highest Education	3.27

Table 4.9: Results of the Logistic Regression with Marginal Effects

	dy/dx	Delta Method Std. Err.	z	P>z
Diabetes	-0.0107609	0.0005803	-18.54	0.00***
Cancer	0.0072431	0.0002457	29.48	0.00***
CVD	-0.0013644	0.0010759	-1.27	0.205
CKD	0.0211441	0.0007458	28.35	0.00***

Annual visits	0.0000282	0.0000128	2.21	0.027**
Ages	0.0026883	0.0004851	5.54	0.00***
Hospitalised dummy	0.0148134	0.0010963	13.51	0.00***
Total number of members with NCD	-0.0200598	0.0006745	-29.74	0.00***
Highest Education	0.0004601	0.0000783	5.88	0.00***

Significant at 1%, 5%, 10% level of significance
Source: Results based on primary data

To test the impact of NCDs on loss of employment, the study uses a logistic regression where the dependent variable was a binary outcome variable - **Loss of Employment**, where 1 equals loss of job by the patient on account of the illness and 0 otherwise. However, to get the probability impact from the logistic regression, the study uses the margins as means to ascertain how the probability changes from the average value of the independent variable.

The empirical results show that the likelihood of a person losing employment reduces in the case of Diabetes. This result was found to be statistically significant at a 1% level of significance, with the likelihood reducing by 1.07%. One can attribute this result to the fact that Diabetes is an NCD that a patient is able to adjust to along with work life. Subsequently, it was found that in the case of Cancer and Chronic Kidney Disorder, the likelihood of a person losing employment increases by 0.72% and 2.11%, respectively (Both statistically significant at a 1% level of significance). The slightly low probability seen in the case of Cancer could be due to the fact that once the treatment starts and the person recovers, he is able to resume work life; also, in some cases, the diagnosis of Cancer can happen at an early stage, aiding quicker recovery. The relatively high probability of losing employment in the case of CKD is associated with the fact that it is a chronic long-term disease that requires frequent treatment and visits to the clinic/ hospital. In the case of CVD, the probability of a person losing employment reduces; however, this result is statistically insignificant. (Alam and Mahal, 2014); (Mahal, Karan, Engelgau 2010).

Hence, the study rejects the null hypothesis for the NCDs- Diabetes, Cancer, and CKD that states that these NCDs do not have an impact on the loss of employment of a household. However, it fails to reject the hypothesis which states that CVD impacts the employment of a household.

The empirical results also show that as the annual visits increase, the likelihood of a person losing employment also increases. It depicts a positive and statistically significant result at a 5% level of significance. The choice of this variable stems from the literature that has found

an association between loss of employment and annual visits/ outpatient visits, as seen in Kulkarni et al. (2019).

Further, it was also seen that if a member is hospitalised due to the disease affliction, the likelihood of the patient losing employment increases by 1.48%. A positive and significant relationship was established at a 1% level of significance, similar to the study by Nalinam (2019); Mehta et al. (2022).

As the ages within the household increase, the likelihood of a person losing their job increases by 0.27% (statistically significant at a 1% level of significance). This result follows from the labour economic rationale. (Increasing ages of a worker is closely associated with early retirement or early departure from workforce participation). (Kulkarni et al, 2019).

The results also show that an increase in the number of members with non-communicable diseases in the household leads to a decrease in the likelihood of a person losing employment. The reasoning behind this result could be that as there are a greater number of members with NCD in the household, it is likely that they have a caretaker, so there is a lesser chance of a household member losing his job owing to caregiving responsibilities.

Lastly, it was seen that as education levels increase, the likelihood of a person losing his job increases by a very small margin of 0.046%. Kulkarni et al., (2019)

4.8 Impact of NCDs on Investment

To analyse the impact of an NCD on the household's ability to undertake long-term investment, the study uses the simple metric of percentages to depict the result

Table 4.10: Percentage of respondents undertaking long-term investments in the last one year- Breakdown by NCDs.

NCD	Investment (Yes)	No. of members in the HH	Percentage of Afflicted members who made an investment in the last one year.
Diabetes	97	201	48.26
Cancer	49	107	45.79
CVD	90	155	58.06
CKD	4	6	66.67

Source: Primary Survey Data

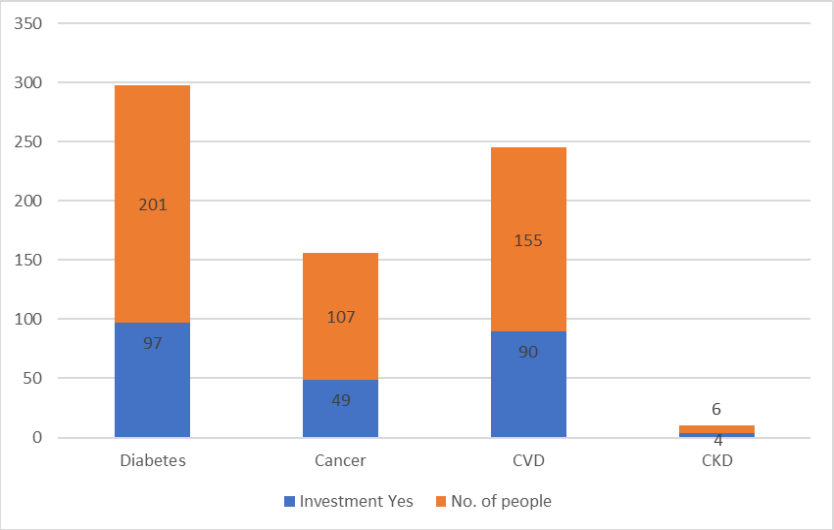
Albeit there were 400 households that were surveyed, the households were asked to detail the number of members that suffered from NCDs such as Diabetes, Cancer, CVD, and CKD. Thus, the number of people afflicted with diseases sums up to more than 400. Further, several

members may also suffer from more than one NCD at a time which can lead to a greater number of people suffering from diseases as compared to the number of households surveyed. Out of the 400 households that were surveyed within those households, only 198 members were able to make a long-term investment. This shows that only 49.5% of the households afflicted by an NCD were actually able to make a long-term investment in the last year. To ascertain the disease-specific ability, Table 4.10 gives a breakdown of the percentages of households making an investment by the NCD that they are afflicted with.

Table 4.10 shows that there were a total of 201 people who were afflicted by Diabetes among the sampled respondents, of which 97 were able to make a long-term investment in the last one year, which comprises 48.3% of the respondents. For Cancer, out of the 107 people who were afflicted, only 49 made an investment in the last one year, accounting for 45.79 % of the Cancer patients within the respondent pool. In the context of CVD, out of the 155 people afflicted, 90 made an investment, accounting for a share of 58.06%. Lastly, for CKD, it was seen that 06 were afflicted, of which 04 made investments taking the share of 66.67%.

From these results, one can decipher that Cancer, followed by Diabetes, CVD, and CKD have a depressing impact on a household's ability to make an investment. However, in this analysis, the caveat remains that the ability to make an investment not only depends on the earnings but also on the generational wealth possessed by the household; given that the latter is tough to quantify, its impact has been omitted from the analysis.

Figure: 4.3: Persons undertaking long-term investment by disease.



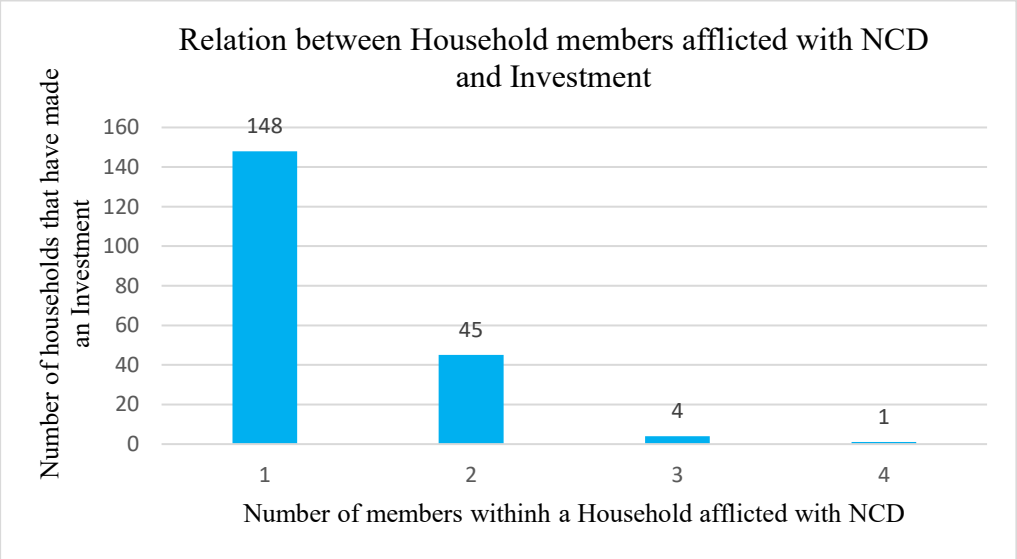
Source: Primary survey data.

Table 4.11: Comparison of the Number of members in a HH with NCD and long-term investment behaviour.

Total no of members afflicted with NCD in a household.	Number of households that have made an investment	Percentage of household investing.
1	148	74.75
2	45	22.73
3	4	2.02
4	1	0.51

Source: Primary Survey Data

Figure 4.4: Depicting the Relation between Household members afflicted with NCD and Investment



Source: Primary Survey Data.

To analyse a comparative burden of the number of members afflicted with NCD and the household's ability to make an investment, the study analysed the 198 households that made a long-term investment in the last one year. As can be seen from Figure 4.4, out of the 198 households, a majority, i.e., 148 households (74.7%), comprised those which had only one household member afflicted with an NCD. When accounting for two members afflicted with an NCD, this tally dropped sharply to 45 households' only (22.73%.). For three members within a household that had NCD, there were merely four such households (accounting for a 2% share). Lastly, for a household that had four members with an NCD, there was only one that was able to make an investment (0.51%).

4.9 Chapter Summary and Conclusion

The study finds a strong degree of association between incidence of an NCD and total loss of earnings, consumption, savings, loss of employment, and investment.

An OLS regression to test the impact of NCDs on total loss of earnings depicted that all NCDs apart from CVD led to significant loss of income. These comprise of losses attributed to both the patient and the caregiver in the event of hospitalisation, visits as well as recouping periods. CVD was found to be insignificant in this regard, possibly due to the fact that it requires infrequent hospitalisations and visits.

Similarly, in context of consumption, an OLS regression depicts that a strong degree of consumption displacement occurs due to the incidence of NCDs. Diseases such as Diabetes and Cancer led to an increase in consumption spending which could be attributed to different diet patterns as well as the purchase of individual diagnostic kits and monitoring equipment. There were also instances of decrease in consumption spending in the case of CVD and CKD. This decrease points toward the contraction of consumption expenditures by a household given a sudden and heavy financial shock. The decrease in consumption spending was stark in the case of CKD. The high value of contraction in CKD is due to the fact that the treatment is predominantly driven by the private sector. The decrease in consumption expenditures by households in the event of an NCD points towards the evidence of consumption smoothing being undertaken by households to bear the financial burden associated with the incidence of the diseases.

The study also saw a strong relation between savings and the incidence of NCDs. There was a decrease in savings in the case of Diabetes and Cancer. As for CVD, it was seen that it does not lead to a decline in savings; this could be because CVD is usually seen as an illness that is infrequent as compared to Diabetes and Cancer. Nevertheless, it does induce a sudden health shock to the individual and their families.

In terms of loss of employment, the results were mixed, with the probability of losing employment decreasing in the case of Diabetes and increasing in the case of cancer and CKD. The decreasing probability of losing employment in the case of Diabetes can be explained as the patients are able to adjust their work lifestyle along with Diabetes-related care. Cancer patients are more likely to lose employment however, once the treatment starts and the person recovers, they are able to resume the work life, or in case of early diagnosis, there is a relatively

quicker recovery. The highest probability of losing employment is witnessed in the case of CKD as it is a long-term disease requiring frequent treatment and visits to the clinic/ hospital.

Lastly, for investments, the literature shows evidence of households delaying their investment decisions or reducing future investments due to a contraction in savings owing to the financial burden of NCDs. Among the sampled population, only half of the households afflicted by an NCD were able to make a long-term investment in the last one year. The percentage of households making long-term investments varied based on disease affliction. Considering the caveat that long-term investment also depends on generational wealth accumulation, the study has excluded the impact of generational wealth from the purview of the analysis. A notable result found was that an increase in the number of NCD patients within the household reduced their ability to make long-term investments.

This study addresses the gap in the literature by simultaneously looking at the relative impact of various NCDs and juxtaposing it with the financial decisions undertaken by the household. The regression results indicate that Diabetes, Cancer, and CKD lead to an increase in the total loss of earnings. Due to the prevalence of NCDs, there has been a significant degree of consumption displacement. The overarching regression results indicate that CVD and CKD have a (negative) decreasing impact on consumption. Similarly, households afflicted with Diabetes and Cancer see a reduction in their savings. Meanwhile, considering that these illnesses are long-term and chronic, Cancer, CVD, and CKD have an increasing impact on the loss of employment attributable to the disease affliction.

Lastly, the descriptive statistics of the sample show that Cancer, followed by Diabetes, followed by CVD, and CKD, has a reducing effect on a household's capacity to make an investment. The limitation in this analysis, however, is that since generational wealth is difficult to quantify, its impact has been omitted. The ability to invest depends not just on the household's income but also on the assets it has accumulated over the generations.

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CHAPTER 5

CHOICE OF HEALTHCARE FACILITIES BY THE HOUSEHOLDS

5.1 Introduction

5.2 Theoretical Background

5.3 Factors affecting the performance of the private and public sector healthcare in India.

5.4 Household preference with respect to the choice of healthcare facility

5.5 Equity in Healthcare-Perspective from NFHS Data

5.6 Perspectives from IHDS data

5.7 Central and State Government Health Schemes/ Programmes.

5.8 Chapter Summary and Conclusion

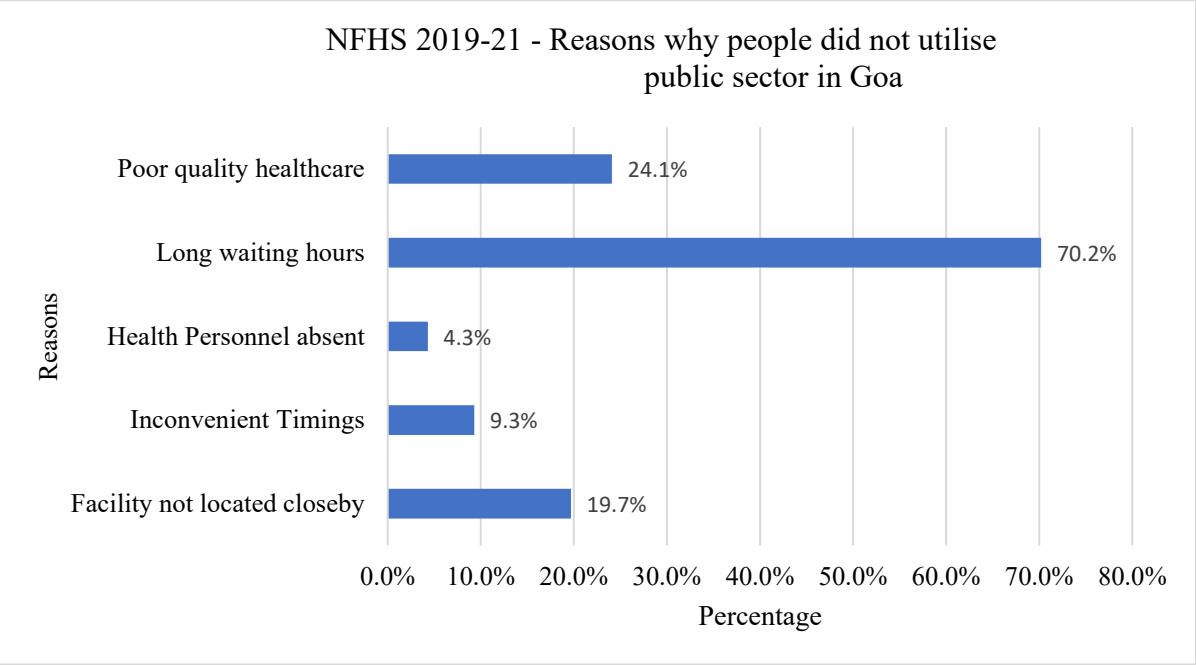
5.1 Introduction

The service industry has been the backbone of the Indian economy for the past 20 years and is an area of the global economy that is expanding quickly. The healthcare sector is one such industry that lays the foundation for human development. Patients and consumers frequently have a choice among numerous healthcare organizations choosing a healthcare facility. It is crucial to comprehend how patients make decisions and what parameters they take into account given the competitive market scenario today. There is a large body of research identifying the variables affecting patients' decision-making, however, most of these studies have been done in the West, with very few in the Indian context. The NFHS 2019-21 data for the PAN-India population shows that approximately 50.1% of the sampled population used public healthcare facilities, while 48.2% used private healthcare facilities. Among those utilizing public healthcare facilities 46.9% were urban households while 51.7% were rural households. Meanwhile among those households utilising private healthcare 51.8% were urban while 46.4% were rural households. These statistics indicate that while there is a close parity between the usage of public and private health facilities, a higher proportion of the population still rely on public health care. A deeper dive into the statistics show that the reliance on public health care decreased as the income levels of the households increased. The reasons why a majority of the population relies on public healthcare is cost and other factors such as ability to avail government health schemes that have been found to be significant drivers of the preference for public healthcare.

In Goa, the NFHS-5 statistics show that the preference for public healthcare is 61.6% and the preference for private healthcare is 38.3%. Nearly 73% of the households in Goa have at least one member covered by health scheme or health insurance. Looking at the gender specific statistics of Goa within NFHS 2019-21 data, 68.4% of the sampled female respondents and 72.7% of the sampled male respondents were covered under a health scheme or a health insurance. Despite the cost and health scheme factor nearly half of the respondents still prefer private sector. In this light the NFHS 2019-21 data, also provides an insight into reasons why people did not utilise public sector. Figure 5.1 depicts the various reasons cited by the Goan population of the NFHS survey for not using public sector facilities. It was seen for Goa approximately 38.3% of the population did not use a public facility as 19.7% found that the public facility was not nearby, 9.3% felt the timings of the public facility were inconvenient, 4.3% found health personnel to be often absent. A

majority of the respondents did not use public health care owing to waiting timings being too long (70.2%) and poor quality of healthcare (24.1%).

Figure 5.1 Reasons why people did not use public sector healthcare in Goa



Source: Author's calculation from NFHS 2019-21 survey.

5.2 Background

Dey and Mishra (2014) analysed the factors that influence a person's decision between public and private healthcare providers in India using multiple logistic regressions on National Family Health Survey – 3 (NFHS – 3) data. Their findings showed that demographic factors such as access to primary public health care, age, gender, socioeconomic groups, education levels affect the choice of healthcare. Higher ages, females, persons from lower socio-economic status, low levels of education are likely to rely more on public healthcare as opposed to private. Dalal and Dawad (2009) examined the reasons for non-utilization of public facilities by rural women in India. Their study used logistic regression analysis on the National Family Health Surveys NFHS-3 dataset. They found that primary reasons for not using public healthcare were- distance from residence, inconvenient timings of the facility, absenteeism of healthcare workforce, long waiting times and poor service quality. Apart from demographic factors the most obvious reason for them choosing public over private healthcare in India is the cost factor. The cost of treatment in private sector facilities is much higher compared to the public sector. In a country like India where there is a significant wealth inequality, costs serve as the primary benchmark for deciding on the choice of facility. Singh (2009) examined data from 6,726 inpatients

hospitalised for treatment of gynaecological disorders, heart disease, tuberculosis, urological diseases, and diarrheal diseases. The dataset used was derived from the nationally representative survey on health care was conducted by the National Sample Survey Organization (NSSO, 2006) in its 60th round in 2004. Results from the multilevel logistic regression showed that in the view of the five illnesses, the expenses of hospitalisation in private healthcare facilities was significantly more than that in public healthcare facilities. Among the illnesses, it was found that treating chronic disorders was more expensive. Similarly, the study by Nair and Raveendran (2020) indicated that NCD patients, regardless of their socioeconomic position, utilised public health care at a comparatively higher rate. By using public NCD clinics, they wished to lessen their financial burden. The study used data of 715 individuals from cross-sectional household survey using WHO -The Commission on Social Determinants of Health (CSDH) framework and applied methods such as Chi-square test and binary logistic regression.

Besides the demographic and cost factors, the characteristics of the infrastructural facilities and delivery of care also affect the choice of the facility in the Indian context. Malik and Varma (2018) used both quantitative and qualitative methods to examine the factors affecting the choice of healthcare among 386 patients in Delhi in the year 2016. According to the study's findings, patients' decisions about which hospitals to choose are influenced by a number of factors, including the severity of their illnesses, whether they were recommended to the hospital by their doctor, family, or friends, their family's income, their insurance type and coverage, the quality of the hospital services they receive, and whether or not their relatives work there.

Chauhan, Sharma and Sagar (2021) evaluated the data gathered from a diverse patient pool of 258 individuals from both public and private sector hospitals in New Delhi and Chandigarh. The results of the empirical analysis revealed that patient choice criteria while choosing a health service provider included treatment quality, cleanliness, hospital reputation, and amenities like payment and meal facilities. Additionally, it was discovered that the majority of patients visiting public sector facilities were unsatisfied with the quality factors previously described within the patient choice criteria. The study by Kamra, Singh, and De (2016) investigated the characteristics that patients consider while choosing a hospital for tertiary level medical care. A systematic questionnaire was used to gather information from in-patients of multispecialty hospitals in northern India. The study deployed techniques such as factor analysis, ANOVA, and t-test on the data. Results

indicated that basic amenities, reputation and quality, building and infrastructure, ease of access and affordability, personal experiences, responsiveness of services, recommendations and suggestions, clinical support, privacy and information sharing, and range of services are among the factors that influence patients' decisions about which hospitals to choose.

Malik and Sharma (2017) explored the elements that affect patients' decisions to choose private healthcare providers. The study used both qualitative and quantitative data. In-depth one-on-one interviews with subject specialists, healthcare professionals, nurses, and patients were part of the qualitative design. 460 indoor patients from five departments of ten multi-specialty hospitals in Delhi-NCR were used in a cross-sectional study. Using judgmental sampling, the sample was chosen from each department based more on convenience than proportion. The assessment of results was conducted using exploratory factor analysis (EFA), reliability analysis, and confirmatory factor analysis (CFA). The research identified nine criteria—professional competence, ease of access to services, administration, reputation, facilities offered, recommendation, clinical effectiveness, infrastructure and amenities, and personal constituents—that construct hospital choice, with professional competence, personal constituents and clinical effectiveness serving as the three most significant influences on patients' choices.

Palanisamy, Joseph and Alur (2021) applied a framework to understand and test a modified model of service-provider selection criteria in hospital service contexts across 55 hospitals in Indian cities. The study created an instrument with scaled items under eight specified hospital selection criteria after conducting a thorough literature review. Customer preference was positively influenced by each of the eight hospital selection factors examined. The outcomes support the standardised model's applicability and significance in the context of healthcare. The moderation study shows that the eight criteria for choosing a hospital are not moderated by the patient's gender or age. Understanding the elements that boost patient satisfaction can help with hospital marketing, operations, administration, and planning.

Literature that combines the study of choice of healthcare in consideration of select disease shows that the disease affliction can also impact the choice of healthcare. Particularly in the case of cardiovascular diseases, Raorane (2019) found that patients' decisions are influenced by social, personal, psychological, and cultural factors. There are three categories of social factors namely - Reference group, family, and the patients' roles and status. Subculture, social class and patient culture are examples of cultural elements. Occupation, age, lifestyle, personality, and economic situation are examples of personal aspects. Learning, Motivation,

Perception, Attitude, and Belief are all psychological elements. In the case of heart disease social factors were the most influential in dictating the choice of the patient.

Kujawski et.al (2018) studied the choice among patients suffering from Diabetes and hypertension. They used the data of 336 305 households from 2012–2013 District Level Household and Facility Survey to analyse the choice and the rationale of the patients. Their analysis indicated that private primary care facilities were preferred by households over public ones, especially those with hypertension. In households with both Diabetes and hypertension, facility choice was significantly influenced by the quality of care.

Pramesh et. al (2014) studied the health seeking behaviour among Cancer patients in India. His study showed that the cost of Cancer care in private facilities were significantly higher compared to public sector. This was the major driver of the preference towards public sector healthcare among patients. However, the patients cited lack of quality care and shortfall of staff were the main issues encountered when using the public hospitals for Cancer care.

In context of CKD, Jafar et al (2020) deployed a mixed methods study to examine the opinions and experiences of important stakeholders (CKD patients, healthcare providers and health planners), as well as to find obstacles to and potential enablers of access to CKD care at the primary care level in rural India. According to their results, obstacles at the level of the health system included a lack of qualified healthcare workers and medications, as well as disjointed referral paths to the hospitals' experts and subpar follow-up treatment in public hospitals.

Anderson's health Behavioural Model acts as a framework for understanding the situations that either smoothen or hinder the general public's utilization of health care services. The framework describes three characteristics namely- predisposing factors, enabling factors and need factors that impact the utilization of healthcare services. This serves as a foundation for comparing the choice of healthcare in the present study.

There is literature available on quality factors of healthcare facilities. The various studies outline how quality factors such as cleanliness, efficiency of staff, privacy, are significantly linked to the choice of health service provider. However, the literature on the choice of health facilities based on the conjunction of disease affliction alongside specific quality factors was scanty. Further, a comparative analysis of choice of facility based on diseases and quality factors is also limited. Thus, the current study aims to bridge the gap by juxtaposing specific quality factors with disease affliction to understand the factors affecting the choice of

healthcare. It is imperative to study this link as it enables the policy makers to improve the infrastructure.

5.3 Factors affecting the performance of the private sector and public sector healthcare in India.

In India in terms of healthcare facilities, the number of public hospitals and beds are growing at a rate that is slower than private facilities. The study by Rajagopalan & Choutagunta (2020) shows that in terms of healthcare capacity (hospital beds, personnel, funds) there is a greater growth in private capacity as compared to public. Despite the growth in the supply of private sector facilities the preferred choice among the population based on NFHS survey still shows a parity in the utilisation of private and public facilities. This goes to show that there must be other factors affecting the choice apart from access and cost. In this light the current study tried to look at the various quality related factors that can affect the choice of healthcare.

Quality factors thus play a critical role in influencing the decision of mode of healthcare utilisation among the Indian population. Particularly for quality factors associated with healthcare there is a variety of literature however, this literary evidence does not compare the choice of healthcare based on different diseases alongside the quality factors. Basu et al (2012) conducted a systematic review of academic papers examining the effectiveness of public and private sector delivery in low- and middle-income nations. They examined the rationale that the provision of healthcare by the private sector in low- and middle-income nations is more effective, accountable, and long-lasting than that of the public sector and the public sector offering more equitable care. The assessment framework was organised based on World Health Organization health system themes -accessibility and responsiveness; quality; outcomes; accountability, transparency, and regulation; fairness and equity; and efficiency. Their framework comprised of elements such as availability, diagnostic accuracy, reform capacity, financial barriers to care, delays among other factors. (Detailed list provided in table 6.1).

Chaterjee et al (2018) used Andersen's Health Behavioural Model to identify the factors that influence Indian people's decisions between private and public inpatient health care facilities. Apart from the demographic factors, the study found that need factors comprising of ailment, duration and surgical need are significant in explaining the choice of healthcare. Alijanzadeh et al (2016) compared the quality of health services in both public and private sectors using a cross sectional study. The study found that hospital treatment is the most

crucial criterion for evaluation of quality. In this light some of the quality factors they analysed comprise of- appropriate and clean environment, service without delays, appropriate waiting time, privacy during treatment, easy access among other factors. (Detailed list provided in table 6.1). The study by Motwani and Shrimali (2014) attempted to identify variables influencing patients' hospital choice decisions. In order to achieve the goal, a structured questionnaire based on an ordinal scale was administered to 142 public and 337 private hospital patients. By using a stratified purposive sampling technique, these patients were selected from the Udaipur division. The results outlined the four key elements that are considered when choosing a hospital i.e., trained nursing staff, 24hour emergency service, qualified and experienced doctors, and past hospital experience. The study by Swain (2018) compared the experiences of patients when utilising the services of public and private healthcare facility. A descriptive cross sectional research design was utilised to examine the responses of 340 patients in the state of Odisha. Nearly 13 dimensions of quality services were identified by the study to enable this comparison. Some of these were administrative procedures, infrastructure, staff attitude, quality of outcome, waiting time, patient safety, information availability among others (Detailed list provided in table 5.1).

Table 5.1 Quality factors assessed in various studies

Study	**Quality Factors**	
	Dimension	**Specific quality assessment factor**
Kamra et al (2019)	Tangibility	Adequate space of parking vehicles
		Cleanliness of the toilets
		Convenient location of the hospital
		Quality of ambulance service
		Facility of ATM/banks
	Empathy	Courteous and cooperative behaviour of nursing staff
		Courteous and cooperative behaviour of registration staff
		Personal attention and proper time given by doctors
		Personal attention and proper time given by doctors
		Personal and proper attention given by nursing staff
	Assurance	Brand name of the hospital
		Efficient system of addressing the complaints

		privacy during clinical examination
		Tie-up of hospitals with insurance companies
		Efficient system of addressing complaints
	Reliability	Disease and its treatment process
		Years of existence of the hospital
		Sufficient nursing staff
Chatterjee (2018)	Predisposing factors	Age
		Gender
		Caste
		Marital Status
		Education
		Household Size
	Enabling Factors	Monthly Per capita Expenditure
		Health Scheme
		Settlement type
		Source of Finance
		Economic Dependence
		Region
	Need Factor	Ailment
		Need for surgery
		Duration
		Appropriate and clean environment
		Appropriate appearance of doctors and staff
		Appropriate equipment and devices
		Providing appropriate facilities
		Service without delays
		Performing service in the promised time
		Staff and doctors competent
		Explain health condition, diagnosis and treatment in understandable way
		Reliable behaviour of doctors
		Willingness to fix the patient's problem

Alijanzadeh et al (2016)		Appropriate waiting time
		Appropriate and fast receptions
		Friendly behaviour from staff and doctors
		Access to related doctor
		Respectful toward patient
		Provide privacy during treatment
		Reply to answer questions
		Quickly resolving problems of patients
		Receive feedback from patients
		Access in services at all time
		Willingness to help patients
		Understanding patients' specific needs
Kamra et al (2016)		Affordability and convenience
		Fulfilment of clinical requirements
		Nursing and staff care
		General behaviour of doctors
		Registration and administrative procedures
		Infrastructure and amenities
		Professional behaviour of doctors
		Facilities at reception and OPD area
Motwani and Shrimali (2014)		Affordable Prices
		Convenient Location
		24X7 & Emergency Service
		Promotional Campaign
		Brand Name of Hospital
		Past Experience with Hospital
		Positive word of mouth
		Qualified & experienced Doctors
		Trained Nursing Staff
		Explanation of health problem & treatment
		Courteous & friendly supportive staff
		Coverage Under Insurance
		Least Waiting Time

		Convenient Hours
		Quick response system
		Modern Equipment's & Labs
		Infrastructure & Physical Environment
		Inbuilt Pharmacy Facility
Mahapatra, (2013)	Tangibility	Up-to-date and well-maintained medical facilities and equipment
		Clean and comfortable environment with good directional signs
		Privacy during treatment
	Reliability	Services should be provided at appointed time.
	Responsiveness	Patients should be given prompt services
		Waiting time of not more than one hour
	Assurance	Friendly and courteous staff/doctors
		Patients should be treated with dignity and respect
		Explain thoroughly medical condition to patients
	Empathy	Obtain feedback from patients
		24-hours service availability
		Doctors/staff should understand the specific needs of patients
	Affordability	Affordable charges for services rendered
Basu (2012)	Access and responsiveness	Availability
		Timeliness of service
		Hospitality
	Quality	Comprehensiveness of services
		Diagnostic accuracy
		Management standards
		Client retention
	Outcomes	Treatment success rates
		Population coverage
		Morbidity
		Mortality
		Public health Functions

	Accountability, transparency, and regulation	Reform capacity
	Fairness and equity	Financial barriers to care
		Distributive justice
	Efficiency	Cost
	Accountability, transparency, and regulation	Redundancy
		Fragmentation
	Fairness and equity	Delays
Majumder (2006)		*Enabling factors*
		Availability of health facilities
		Accessibility to healthcare
		Quality of care
		Cost of Care
Mahapatra (2003)		Received the required service
		Median waiting time (minutes)
		Staff spent enough time
		Staff talked nicely
		Staff respected their need for privacy
		The facility was very clean
Swain (2018)		Availability of resources
		Administrative procedures
		Infrastructure
		Staff Attitude
		Trustworthiness
		Quality of outcome
		Waiting Time
		Personalised attention
		Food
		Price
		Clinical procedures

		Patient safety
		Information availability

Source: Author's compilation using different literature as cited.

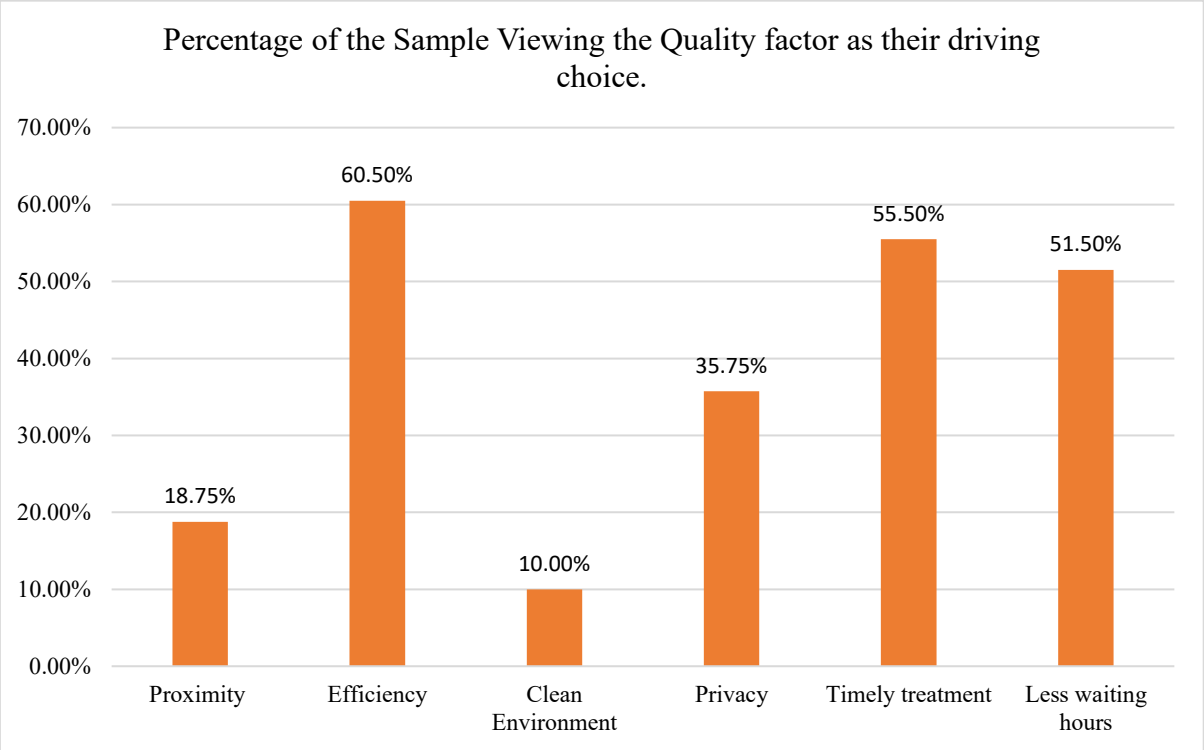
5.4 Household preference with respect to the choice of healthcare facility

With reference to the third objective that examines the preferences of Households vis a vis public health care and private health care facilities- a logistic regression has been adopted and substantiated with Chi-sq. results. Taking the public sector as the base outcome, the preferences with regard to the various quality factors have been assessed. Quality factors under consideration comprise of efficiency of staff, proximity, less waiting hours, timely treatment, clean environment and privacy during treatment.

5.4 a. Descriptive Statistics of the choice between public and private health facility based on quality factors.

At the onset of this analysis the study first assesses the quality factors that have been considered by the respondents when explaining their choice of healthcare facility. Figure 5.2 presents the results for each of the quality factors that have been considered by the respondents when making the choice of healthcare. The results depict the percentage of sampled respondents viewing quality factor as their choice. Among the sampled respondent's efficiency and timely treatment were the leading factors that drove the choice of healthcare.

Figure 5.2 Percentage of sampled respondents viewing quality factor driving their choice



Source: Primary survey data.

Further, the study analysed which quality factors were found to be significant drivers for patients when making the choice between public or private healthcare. Figure 5.2 summarises the percentage of respondents viewing quality factor driving their choice. As can be seen Efficiency of staff followed by timely treatment and less waiting hours were the leading factors considered by respondents while making a choice. The next layer of analysis delves into what choices were made by the respondents given the quality factors. Figure 5.3 and the Table 5.3 depict the percentage of respondents choosing either a public or private facility in context of the specific quality factors. As can be seen from Table 5.2, a striking majority (79%) of the respondents choosing private sector made the choice due to the privacy factor. This was followed by quality factor such as less waiting hours (69.4%) and timely treatment (67.6%). Subsequently when looking at public sector facilities the leading reason for the choice of the respondents was proximity to residence (48%). Across the different quality factors, it was seen that these factors drove a greater choice towards a private sector facility as against a public sector facility. Figure 5.3 diagrammatically depicts the choice of healthcare based on quality parameters. Thus, one can conclude that within the sample of the study the choice of government healthcare is primarily driven by the quality

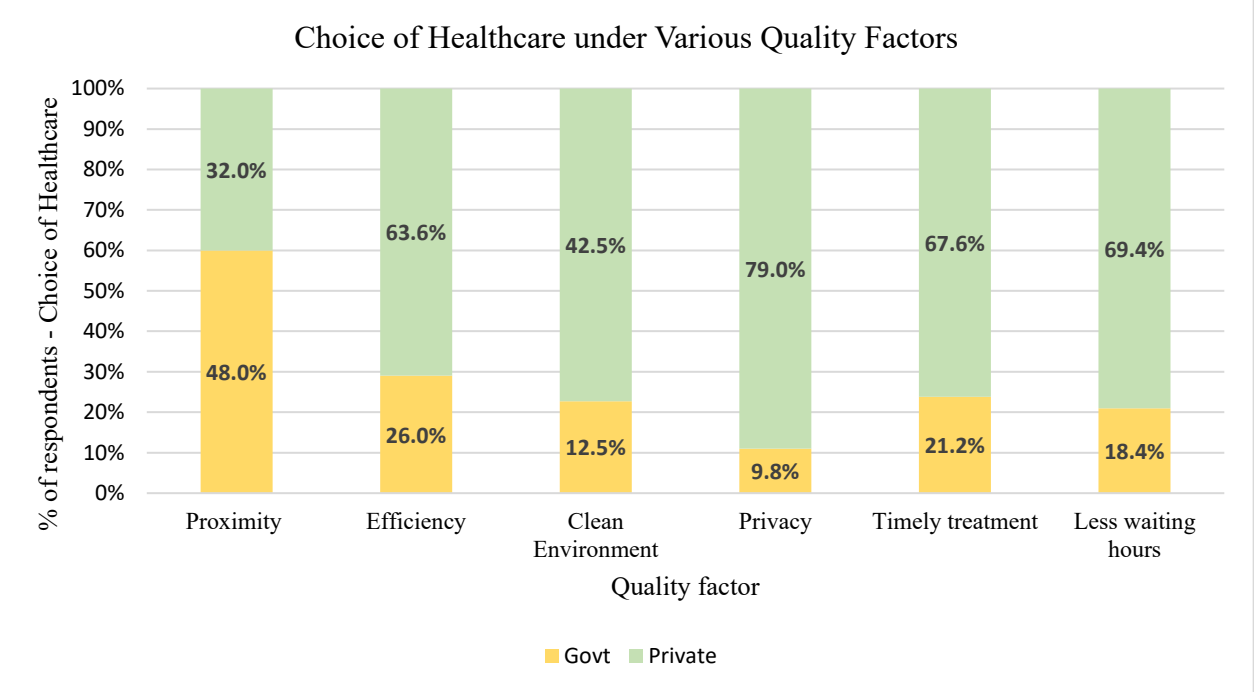
factors of proximity to residence and efficiency while, the choice of private healthcare is mainly driven by the factors such as privacy, less waiting hours and timely treatment.

Table 5.2 Choice of the respondents based on different quality aspects

Quality factors	Choice of the respondent (Percent)	
	Public	Private
Proximity to residence	48.0	32.0
Efficiency of staff	26.0	63.6
Clean Environment	12.5	42.5
Privacy	9.8	79.0
Timely treatment	21.2	67.6
Less waiting hours	18.4	69.4

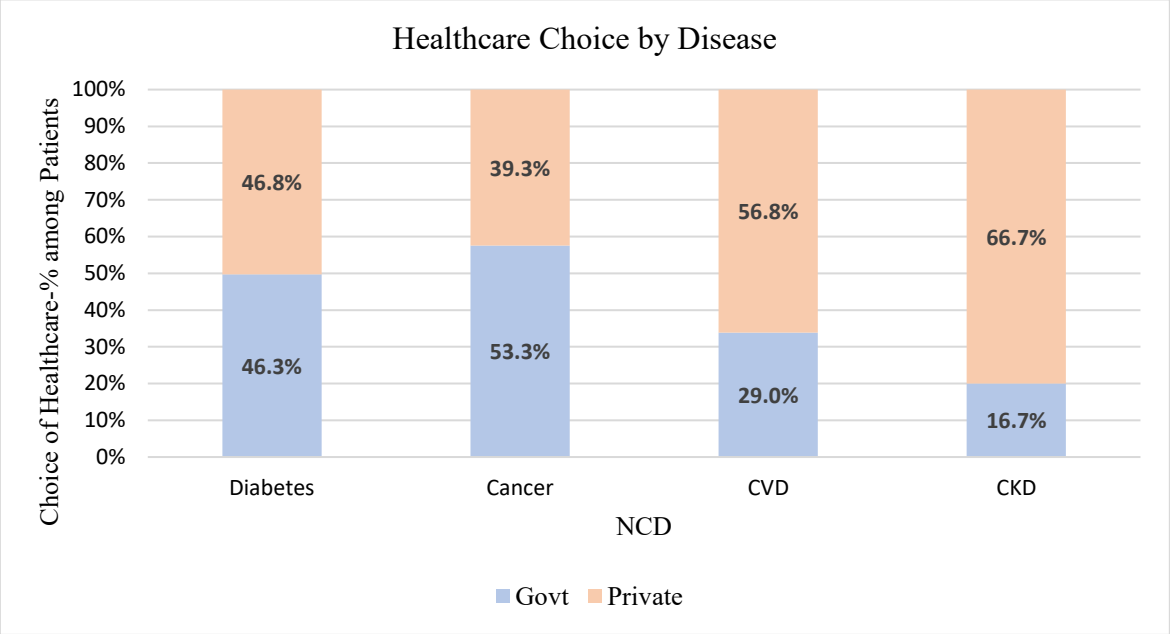
Source: Primary Survey data.

Figure 5.3 Depicting the choice of healthcare under the various quality factors



Source: Primary survey data.

Figure 5.4: Depicting the choice of healthcare among the respondents by disease



Source: Primary survey data.

Diagrammatic representation of healthcare choice by disease in Figure 5.4 showed that, for Diabetes the leading choice was private healthcare with 46.8% of the respondents opting for this followed by government (46.3%) healthcare facility. Thus, the choice of healthcare for Diabetes is almost same for public and private facility. Particularly in Goa, where the public sector health spending is highest, the quality of healthcare services in both private and public are comparable. The standards and quality of Diabetes care in the private sector vary significantly across geographies owing to the different cost of treatment and local factors. Meanwhile the preference for public health facilities stems primarily from low cost of treatment (Sharma, 2019).

In the case of Cancer, the leading choice was government hospitals where 53.3% of the patients opted for this mode, followed by private (39.35%). Cost of Cancer treatment is extremely high considering the expensive diagnostics, chemotherapy sessions. Thus, a greater preference for public facilities stems from the cost factor. When considering CVD, it was seen that 56.8% of the respondents opted for a private health facility, followed by 29.0% opting for a government healthcare facility. CVD cases usually require immediate treatment/consultations owing to acute events such as stroke/heart attack. In such cases respondents choose the healthcare facility that is quickest regardless of whether they are public or private. The study concludes that for CKD the leading choice was private healthcare facility taking a share of 66.7%, followed by government i.e., 16.7 %. Hospitals

in the public sector primarily care for seriously ill patients and those with acute kidney injury leaving little room for patients on maintenance dialysis. (Bharati, & Jha, 2020).

This explains the greater preference for private sector for CKD patients. Further the scheme rolled out by the government "Pradhan Mantri National Dialysis Programme" is executed through a public-private partnership model. Thus, most dialysis cases within CKD opt for private healthcare since such facilities allow them to utilize the scheme. (Lok Sabha Secretariat, (2018).

Description of variables

The variables considered under the objective comprise of the various quality factors, diseases and certain demographics. These variables have been used to undertake Chi-sq. testing and logistic regression modelling. The chi sq. statistic has been used since quality factors, disease affliction as well as choice of healthcare are binary variables in such cases chi sq. test is used to determine the relationship between these binary variables. Further, in regression modelling owing to the binary dependent variable the study uses logistic regression. Table 5.3 describes the variables and their measurement.

Table 5.3: Description of variables used in Chi-sq. and Logistic regression

Variable	Measurement
Quality factors (Dummy variables)	***Proximity to residence***: Describes how close is the health facility from the place of residence of the respondent. (Akinci et al, 2005)
	Efficiency of staff: Effectiveness of employees, completeness of information and quality of patient treatment (Nair, 2013)
	Clean Environment: Hygienic and sanitized infrastructure of the facility (Hazarika, 2020).
	Privacy: Interpersonal care and respect for private space for patient. (Pérotin et al ,2013).
	Timely treatment: The pace of healthcare delivery (Gosh et al, 2021)
	Less waiting hours: The lesser amount of time spent by patients to get appointments and consultations. (Sreejini,2012).
Ages	Measured in Log form of the sum of ages of the household members of the respondents.
Annual Earnings	Measured in INR as reported by the sampled respondents.

Highest Education	Categorical variable, taking the values 0-Illiterate, 1-Primary, 2-High school, 3-Higher Secondary, 4-Graduate, 5-Post Graduate, 6-Professional, 7-Ph. D
Total Household members	Total number of members within the household
Avail Government Scheme	Dummy variable taking value 1 if a household has availed a government scheme, 0 otherwise.
Medical Insurance	Dummy variable taking value 1 if the HH has utilised medical insurance, 0 otherwise
Diabetes	Dummy variable taking value 1 if a member has Diabetes, 0 otherwise
Cancer	Dummy variable taking value 1 if a member has Cancer, 0 otherwise
CVD	Dummy variable taking value 1 if a member has CVD, 0 otherwise
CKD	Dummy variable taking value 1 if a member has CKD, 0 otherwise

Source: Primary Survey Data

Chi Sq. analysis

The chi-square analysis helps in determining if categorical variables within the scope of the population are related. Unlike correlation tests that are primarily used to determine the existence of a relation between continuous variables, Chi square tests this specifically in context of dichotomous or binary variables.

The formula for chi square statistic is calculated as follows:

*Degrees of freedom = (No. of rows-1) *(No. of columns -1)*

*Expected count for each cell: (Row total*Column total)/ grand total*

In this case given that each of the quality factors as well as healthcare choice are categorical variables taking the value either 1 or 0, The number of rows and columns comprise of two categories thus the number of rows equals to the number of columns = 2

Table 5.4 Results of Pearson's Chi sq. test-Quality factors and choice of healthcare

Quality Variable	Pearson's Chi sq.	Prob
Proximity to Residence	6.3750**	Pr = 0.012

Efficiency of Staff	56.7941**	Pr = 0.000
Clean Environment	4.7664 **	Pr = 0.029
Privacy	92.0099 **	Pr = 0.000
Timely Treatment	79.0686**	Pr = 0.000
Less Waiting Hours	85.2526 **	Pr = 0.000

Significant at 1%, 5%, 10% level of significance

Source: Results based on primary survey data.

H_0: No relationship exists between the categorical variables -Healthcare choice and Quality factor

H_{0a}: No relationship exists between healthcare choice and Proximity to residence.

H_{0b}: No relationship exists between healthcare choice and Efficiency of staff.

H_{0c}: No relationship exists between healthcare choice and clean environment

H_{0d}: No relationship exists between healthcare choice and privacy

H_{0e}: No relationship exists between healthcare choice and Timely treatment

H_{0f}: No relationship exists between healthcare choice and less waiting hours

H_1: A relationship exists between the categorical variables -Healthcare choice and Quality factor

H_{1a}: A relationship exists between healthcare choice and Proximity to residence

H_{1b}: A relationship exists between healthcare choice and Efficiency of staff

H_{1c}: A relationship exists between healthcare choice and clean environment

H_{1d}: A relationship exists between healthcare choice and privacy

H_{1e}: A relationship exists between healthcare choice and Timely treatment

H_{1f}: A relationship exists between healthcare choice and less waiting hours.

As can be seen from the chi sq. test statistics displayed in table 5.4, all of the quality factors have a significant relation with the preferred choice of healthcare. The quality factors- efficiency of staff, privacy, timely treatment and less waiting hours have a more significant relation with the choice of healthcare as compared to proximity to residence and clean environment.

Table 5.5 Results of Pearson's Chi sq. test-NCDs and choice of healthcare

NCDs	Pearson's Chi sq	Prob
Diabetes	3.2289 *	Pr = 0.072
Cancer	8.4463**	Pr = 0.004
CVD	10.9073**	Pr = 0.001

CKD	1.2977	Pr = 0.255

Significant at 1%, 5%, 10% level of significance
Source: Results based on primary survey data

H_0: No relationship exists between the categorical variables -healthcare choice and NCD.

H_{0a}: No relationship exists between healthcare choice and Diabetes

H_{0b}: No relationship exists between healthcare choice and Cancer

H_{0c}: No relationship exists between healthcare choice and CVD

H_{0d}: No relationship exists between healthcare choice and CKD

H_1: A relationship exists between the categorical variables- healthcare choice and NCD.

H_{1a}: A relationship exists between healthcare choice and Diabetes

H_{1b}: A relationship exists between healthcare choice and Cancer

H_{1c}: A relationship exists between healthcare choice and CVD

H_{1d}: A relationship exists between healthcare choice and CKD

Similarly, the chi sq. test statistics displayed in table 5.5, depict if the various NCDs have a significant relation with the preferred choice of healthcare. Based on the empirical analysis the study finds that there exists a significant relation between healthcare choice and the NCDs CVD, Cancer and Diabetes, however the study fails to reject the null when investigating the relation between CKD and the choice of healthcare. Choice of healthcare is independent of the disease affliction CKD. This could be attributed to the fact that most patients opt for treatments within Pradhan Mantri Nation Dialysis programme which is executed through a public-private partnership mode.

It is important to note that the Pearson's chi sq. test simply establishes whether or not there exists a relationship between the variables without factoring the control variables or the causal link. Thus, the study post the chi sq. analysis uses a logistic regression model that caters to the causality impact while moderating for the control variables.

Results of the Logistic regression

The logistic regression equation used to study this objective has been elaborated below. Subsequently the logistic regression coefficients have been transformed to marginal effects.

$$Ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 Quality\ factors + \beta_2 NCDs + \beta_3 Number\ of\ dependents + \beta_4 Highest\ Education + \beta_5 avail\ governemnt\ schem + \beta_6 Ages + ei_i$$

H_0: The preference of HH in choosing public versus private health care are independent of quality factors:

1. Proximity to residence
2. Efficiency of staff
3. Clean Environment
4. Privacy
5. Timely treatment
6. Less waiting hours

H_1: The preference of HH in choosing public versus private health care are dependent on quality factors:

1. Proximity to residence
2. Efficiency of staff
3. Clean Environment
4. Privacy
5. Timely treatment
6. Less waiting hours

Each of the NCDs were considered as separate dummy variables taking the value 1 if the respondents are afflicted with the particular NCD, else 0. Similarly, the study converted each of the quality factors as separate dummies. The quality factors were measured as a dummy variable taking the value 1 if the respondent chose the healthcare facility based on that particular quality parameter, else 0.

Table 5.6 Empirical Results of Logistic Regression Analysis using Primary Survey Results

Logistic regression	Number of obs =363
	Wald chi2(14) =109.11
	Prob > chi2=0
Log pseudolikelihood = -145.495	Pseudo R2= 0.4178

Choice of Healthcare	**Coef.**	**Robust Std. Err.**	**z**	**P>z**	**[95% Conf.**	**Interval]**
Diabetes	-0.77761	0.049443	-15.73	0	-0.87452	-0.6807
Cancer	-1.63447	0.0961	-17.01	0	-1.82283	-1.44612
CVD	0.077738	0.001716	45.31	0	0.074376	0.081101
CKD	2.756684	0.008517	323.65	0	2.73999	2.773378

Number of Dependents	-0.5268	0.023185	-22.72	0	-0.57224	-0.48136
Highest education	0.232068	0.005881	39.46	0	0.220542	0.243594
Availed government scheme	-0.2859	0.054746	-5.22	0	-0.3932	-0.1786
Age	-0.00044	0.000536	-0.82	0.41	-0.00149	0.000608
Closer to place of residence	-0.42053	0.006372	-65.99	0	-0.43302	-0.40804
Efficiency of staff	1.092788	0.01468	74.44	0	1.064016	1.12156
Clean environment	0.092601	0.002393	38.7	0	0.087912	0.09729
Privacy	1.788681	0.053848	33.22	0	1.683141	1.894221
Timely treatment	1.184033	0.028584	41.42	0	1.12801	1.240057
Less waiting hours	1.344117	0.088192	15.24	0	1.171263	1.516971
_cons	-0.80846	0.019525	-41.41	0	-0.84673	-0.77019

Source: Results based on Primary data

margins, dydx (Diabetes Cancer cvd ckd numberofdependents highesteducationdummy availgovtscheme > agesum closertoplaceofresidence efficiencyofstaff cleanenvironment privacy timelytreatment lesswaitinghours)atmeans
Conditional marginal effects Number of obs = 363
Model VCE: Robust
Expression: Pr(newhcchoice), predict ()
dy/dx w.r.t: Diabetes Cancer cvd ckd numberofdependents highesteducationdummy availgovtscheme agesum closertoplaceofresidence efficiencyofstaff cleanenvironment privacy timelytreatment lesswaitinghours

Category	Mean
Diabetes	0.515152
Cancer	0.272727
CVD	0.366391
CKD	0.013774
Number of Dependents	2.030303
Highest education	3.242424
Availed government scheme	0.349862
Age	66.4573
Closer to place of residence	0.165289
Efficiency of staff	0.597796
Clean environment	0.060606
Privacy	0.349862
Timely treatment	0.5427
Less waiting hours	0.498623

Table 5.7: Results of the logistic regression with marginal effects

	dy/dx	**Delta-method Std. Err.**	**z**	**P>z**	**[95% Conf. Interval]**	
Diabetes	-0.18305	0.012178	-15.03	0***	-0.20692	-0.15918

Cancer	-0.38475	0.021489	-17.9	0***	-0.42687	-0.34263
CVD	0.018299	0.00035	52.29	0***	0.017614	0.018985
CKD	0.648917	0.003916	165.71	0***	0.641242	0.656592
Number of Dependents	-0.12401	0.005093	-24.35	0***	-0.13399	-0.11403
Highest education	0.054628	0.001223	44.65	0***	0.05223	0.057026
Availed government scheme	-0.0673	0.013085	-5.14	0***	-0.09295	-0.04165
Age	-0.0001	0.000126	-0.83	0.409	-0.00035	0.000143
Closer to place of residence	-0.09899	0.001209	-81.92	0***	-0.10136	-0.09662
Efficiency of staff	0.25724	0.004213	61.06	0***	0.248982	0.265497
Clean environment	0.021798	0.000627	34.74	0***	0.020568	0.023028
Privacy	0.421051	0.011436	36.82	0***	0.398638	0.443465
Timely treatment	0.278719	0.007549	36.92	0***	0.263922	0.293515
Less waiting hours	0.316402	0.019828	15.96	0***	0.277539	0.355265

Significant at 1%, 5%, 10% level of significance
Source: Results based on primary survey data.

The number of observations in this model is 363. For the purpose of undertaking a logistic regression analysis, the study has eliminated the observations that reported both as their choice of healthcare. This has led to lower number of observations.

To test the choice of health care facility that respondents would choose depends on a number of quality factors as well as the type and nature of the non-communicable diseases. In order to assess this, the **choice of healthcare** variable was used in the study. A logistic regression where the dependent variable was a binary outcome variable - choice of healthcare, where 1 equals choice of private healthcare facility and 0 was public healthcare facility. However, to get the probability impact from the logistic regression the study uses the margins at means to ascertain how the probability changes from the average value of the independent variable. The empirical results in table 5.7 show that the incidence of Diabetes and Cancer decreases the probability of choosing private healthcare facility over public by 18.3% and 38.4% respectively. In the case of Diabetes which is long -term and requires frequent insulin shots, households may prefer public health facilities. Similarly, Cancer albeit not long term has recurring and expensive treatment which can take a toll on households' budgets when they opt for private facilities, thus these results are aligned with the household's budget constraint models. In the case of CVD and CKD it was observed that the probability of a person choosing a private health facility increases by 1.8% and 64.8% respectively. In terms of CVD, one can expect a higher probability of choosing private health facility given the infrequent nature of the disease. In emergency situations for CVD the afflicted person does not have time to weigh the options of private over public and goes for the quickest option

which is usually private. Similar results have been found by a study by Pianori et al., (2020) based on a survey on the population in Italy. In the case of CKD, the higher probability can be attributed to the sample specifics whereby 4 of the 6 afflicted persons chose a private facility. The choice of private facility stems from the infrastructural deficiencies of public hospitals that majorly caters to seriously ill patients and those with acute kidney injury with limited room for maintenance dialysis and regular check-up patients. Further, higher utilisation of private sector facilities could be due to the fact that Pradhan Mantri National Dialysis program operates through the public private partnership mode.

The prime objective of identifying healthcare sector challenges can be achieved from assessing the choice of households in the light of the quality factors that drive their decision. Quality factors determine the choice of healthcare. In order to assess the factors that drive the choices among the sampled respondents six factors were assessed. The empirical results revealed that proximity to residence decreases the probability of a household to choose a private health facility as compared to public health centre by 9.8%. Thus, a higher geographical presence of public health facilities may likely lead to a greater preference for the same. Efficiency of staff (25.7%), clean environment (2.1%), privacy (42.1%), timely treatment (27.8%) and less waiting hours (31.6%) increases the probability of a household in choosing a private hospital or a clinic other than a public/ government run hospital or a clinic

It was also observed that if a household had dependents, with every increase in a dependent the probability of a household choosing a private health facility as against a public health facility decreases by 12.4%. This aligns with the budget constraints faced by household that have multiple dependents. If a household has members who are educated the probability of a household choosing a private health facility increases by 5.4%. This could be due to the fact that people with better and higher education are more likely to have better paying jobs thus allowing households to seek treatment at private health centres rather than public health facilities. Deen Dayal Swasthya Seva Yojana (DDSSY) being the most prominent scheme among the sampled respondents reveals that if a household has availed any government scheme the probability of them choosing a private health facility reduces by 6.7%.

Respondents choosing both Public and Private healthcare facilities

An interesting outcome of the study has been that 37 (9%) among the sampled respondents were indifferent while choosing between a public or a private facility. Their choice between

a public healthcare facility or a private health care facility differed on various grounds given the quality factors under consideration and several other reasons. Timely treatment, proximity to residence and less waiting hours were the primary quality attributes that led this section of respondents to either choose public or private healthcare facility. A regression analysis was not conducted for this segment. When analysing the NCDs that this segment of the population was afflicted with, it was seen that majority of the respondents (22) were ailing with CVD followed by 14 respondents ailing with Diabetes, a small number of 8 and 1 ailing with Cancer and CKD respectively.

The rationale for conducting a separate analysis for these 37 respondents instead of clubbing them with the logistic regression stems from the fact that they have equal preference towards public and private sector. The key presumption of conducting a logistic regression rest on the premise that the preferences are clearly outlined. Considering such cases within the logistic regression would violate the key requirement of independence owing to non-isolated preference structures.

5.5 Equity in Healthcare- Perspective from NFHS data

While the primary survey results allude to the overall issue of choice of healthcare among the sample of Goan citizens, the study acknowledges that the choices stem from the cost factor and are coupled with quality factors also. The cost factor has not been examined in the primary survey given its obvious nature. The issue of cost further expands itself towards the theme of overall equity in healthcare. This study thus tries to examine this perspective using secondary data from the various NFHS rounds (2-5) to ascertain whether or not there has been an improvement in equitable access to healthcare. Subsequently the study also uses IHDS round 2 data 2011-12 which depicts a nationally representative database for survey of topics of human development including health. The key difference between NFHS and IHDS survey stems from the fact that while NFHS principally gives a detailed health survey, IHDS analyses the same through the lens of other development indicators such as earnings, employment, social capital, education among others. IHDS statistics for Goa also elucidate on the state of play of health services specifically in rural areas as well as urban areas. The IHDS analysis is covered under the sections 5.6 (5.6 a and 5.6 b) of the study.

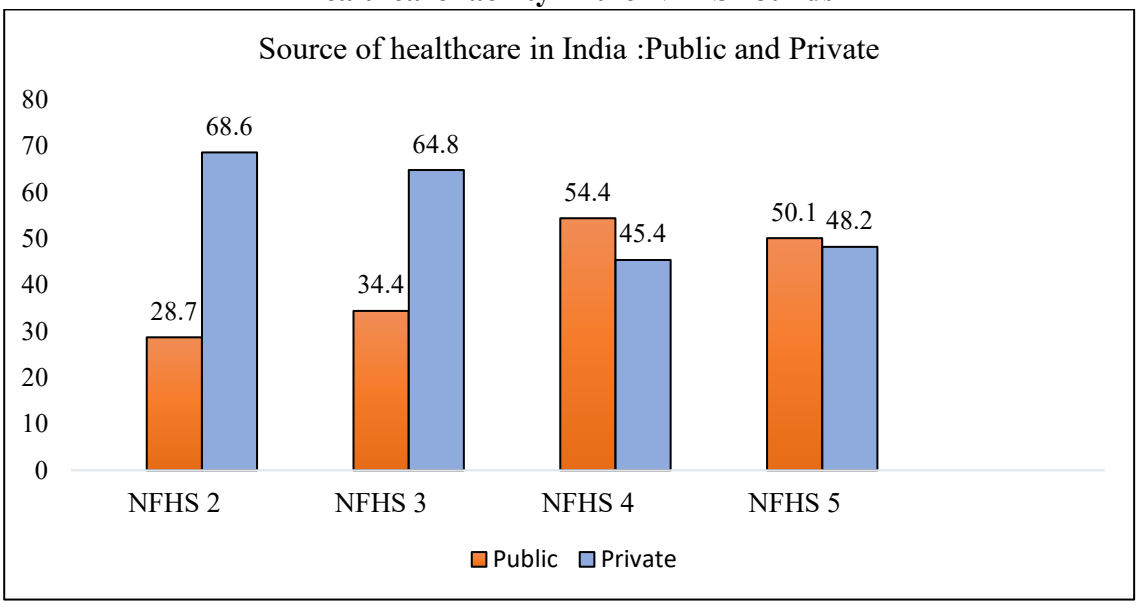
5.5 a. Public v/s Private healthcare

The first NFHS round did not detail out the preferences of the household between public and private healthcare sector. The PAN-India NFHS statistics indicate that in the second and third NFHS round there was a greater preference for private health care. However, by round

5 there was greater preference for public healthcare whereby, the percentage of respondents preferring public healthcare was 50.1% as against 28.7 % in round 2.

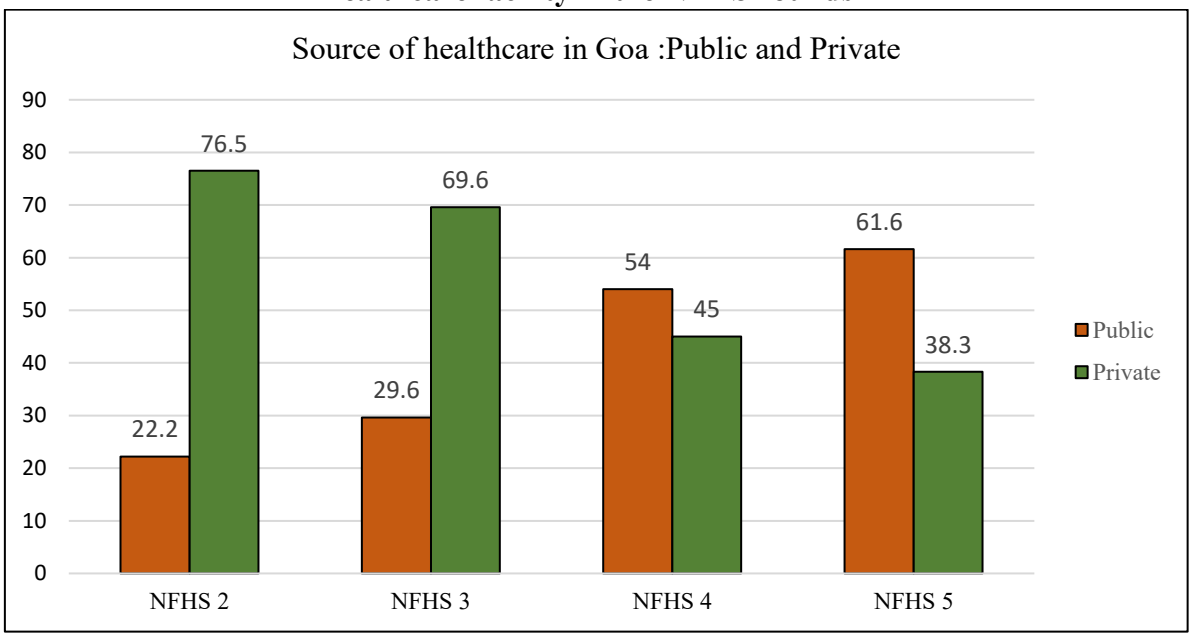
Meanwhile, the sample of households in NFHS round 2 opting for private facilities was 68.6% round 5 this decreased to 48.2%. Several studies have highlighted the rationale for the usage of public health facilities. Mustafa and Shekher (2021) found that improvement in the quality of public healthcare access increases the preference towards public healthcare. Public healthcare in India has grown in terms of infrastructure, the increase in preference can be attributed to the penetration of public healthcare infrastructure in different parts of India. Furthermore, Rao (2012) attributes the easier process for insurance and scheme related claims in public healthcare facilities, to the increasing trend towards public sector. A more detailed explanation on insurance coverage can also be found in figure 5.8. Subsequently the study looks at equity across the demographics of location (Urban/rural) and gender. The figure 5.5 illustrates a growing trend towards public healthcare across the various NFHS rounds in India. In figure 5.6 the graphs indicate the preferences of households in Goa with respect to public and private facilities across the various NFHS rounds. Particularly the NFHS statistics for Goa are also aligned with the PAN-India statistics whereby, the preference for public healthcare has increased over the years. In NFHS round 2 the preferences for public healthcare stood at 22.2% and by the NFHS round 5 this increased to 61.6 %. The preferences for private healthcare in NFHS round 5 stood at 38.3%.

Figure 5.5 Preferences of Households in India vis-à-vis public healthcare and private healthcare facility in the NFHS rounds



Source: Calculation based on NFHS data

Figure 5.6 Preferences of Households in Goa vis-à-vis public healthcare and private healthcare facility in the NFHS rounds



Source: Calculation based on NFHS data

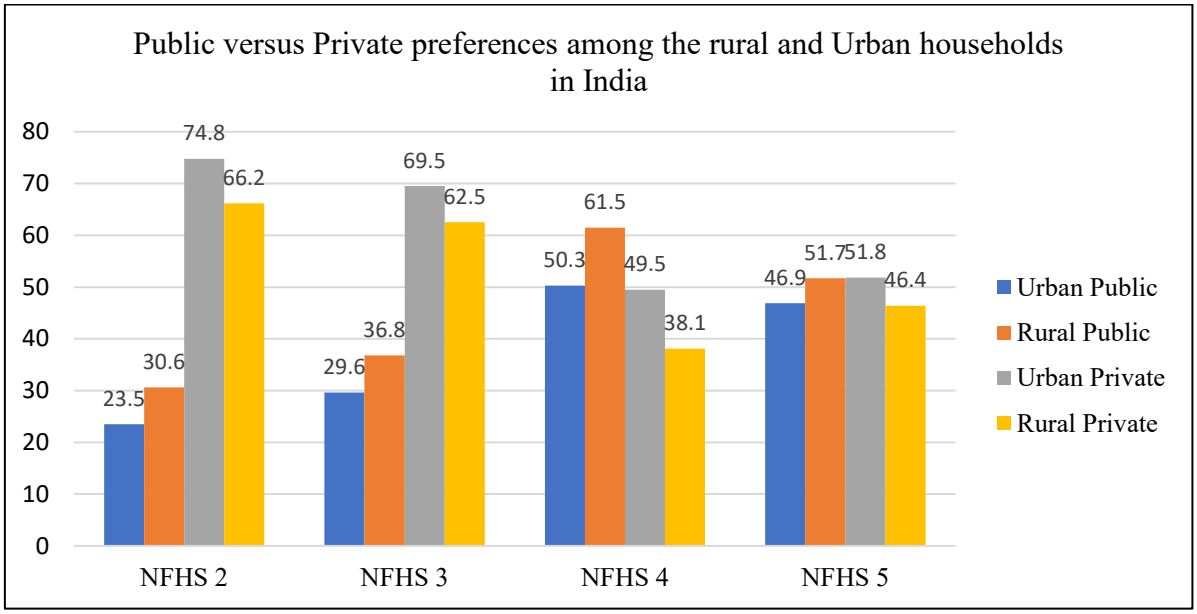
5.5 b Healthcare equity in Urban-Rural context

NFHS defines location as, whether the person's de facto residence was in an urban or rural location. A rural area is considered to be geographic area that is located outside towns and cities. Meanwhile Cities, towns and suburbs are considered to be a part of urban areas. Urban locations typically have a high population density, while rural areas typically have a low population density. Due to the varying population density private health facilities tend to be clustered more in urban areas while public facilities are more situated in rural areas to promote universal health coverage goals.

The shift in the choice preferences of the urban population depicts a greater preference towards public healthcare. A similar shift is also noticeable for the rural population whereby in the earlier NFHS rounds (NFHS-2) nearly 30.6% preferred public, while in the latest round (NFHS- 5) the share increased to almost 51.7%. Even for the urban households in NFHS round 2 the preference for public sector was 23.5% while in NFHS round 5 this increased to 46.9%. The growing preference for public over private could be attributed to not just the cost factor but rather the quality of healthcare as well as the ability to avail government healthcare financing schemes and insurance. NFHS also covers the coverage of various public insurance schemes mainly comprising of Union Government (Non-Employee and Employee) Health Scheme, State Government (Non-Employee and Employee) Health Scheme, Social health insurance schemes, Government Financed Health Insurance and

Private Health Insurances among others. In respect of availing the government schemes specially in a seamless manner, the choice of public healthcare by the masses can be justified. Figure 5.8 depicts the coverage under insurance scheme on the basis of the location. As can be seen the coverage in both urban and rural areas has increased by a significant margin in the latest round. Advent of new policies such as that of Ayushman Bharat AB-PMJAY and Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) have been monumental in increasing the healthcare equity.

Figure 5.7: Public versus Private preferences among the rural and Urban households in the NFHS rounds



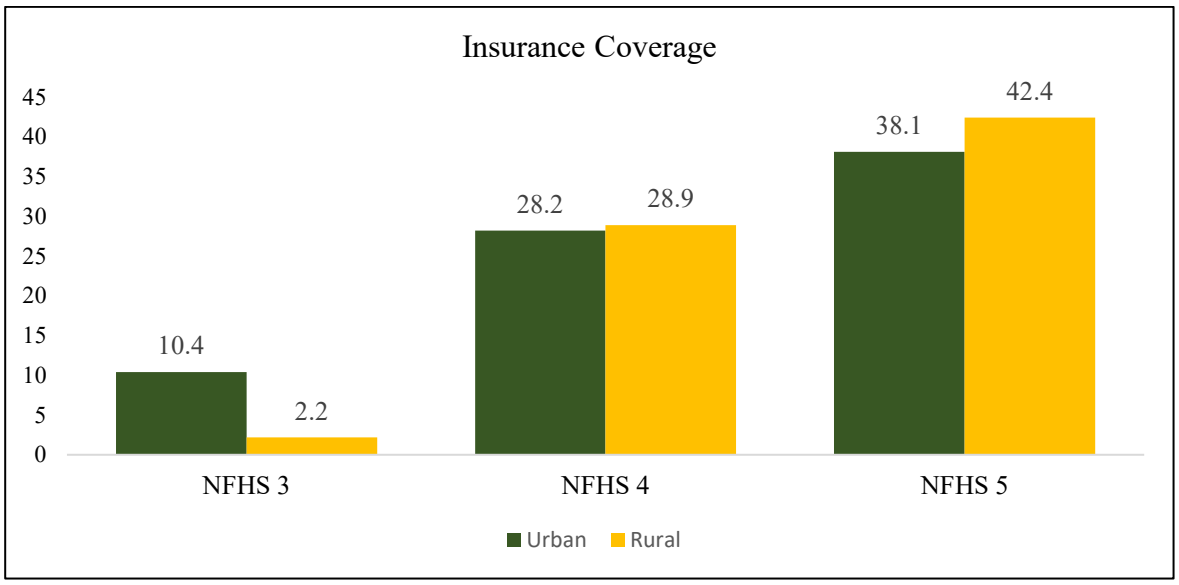
Source: Author's calculation based on NFHS data

5.5 c Insurance Coverage- Urban v/s Rural areas

The issue of insurance coverage in urban v/s rural context has been covered in NFHS rounds 3 to 5. While the increase in insurance coverage was modest in NFHS 3, in NFHS 4 it increases significantly. In NFHS round 3 the insurance coverage for urban households was merely 10.4% and in NFHS round 4 it more than doubles to 28.2 % and it further increased to 38.1% in NFHS round 5. Similarly, for rural households the insurance coverage in NFHS round 3, 4 and 5 was 2.2%, 28.9% and 42.2% respectively. In NFHS round 4, for the first time the insurance coverage for the rural areas was higher compared to the urban areas. This again can be attributed to the various government schemes targeted towards the poor. The Ayushman Bharat – Pradhan Mantri Jan Aarogya Yojana (AB-PMJAY) launched in September 2018 is the world's largest government funded healthcare programme covering

an estimated 70 crore people. Further, the Employees' State Insurance Scheme (ESIS) and Central Government Health Scheme (CGHS) covers 14 crore people.

Figure 5.8: Insurance Coverage (Rural-Urban context)



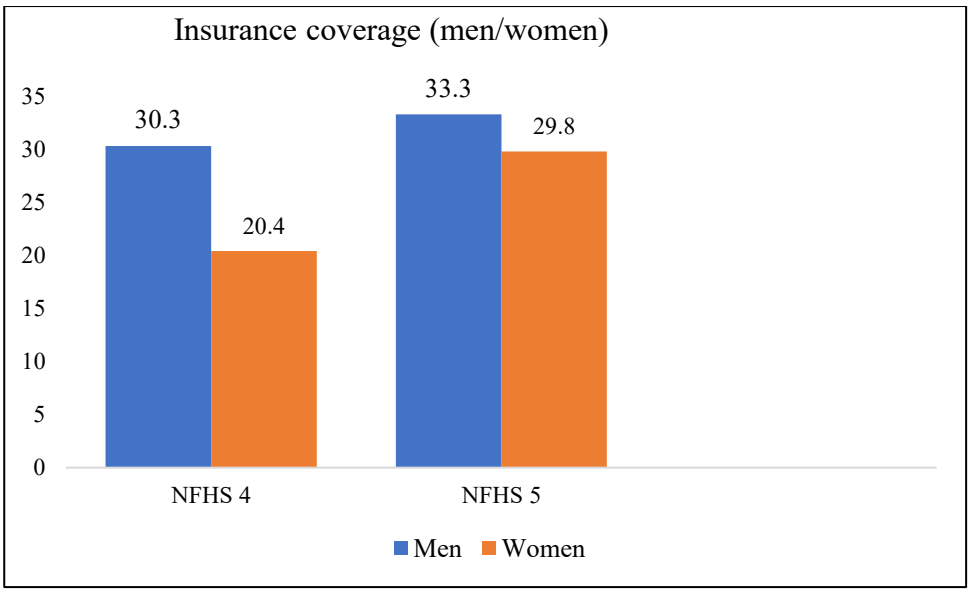
Source: Author's calculation based on NFHS data

5.5 d Gender Equity in Healthcare

The issue of gender equity in healthcare has been examined by IHDS as well as NFHS only from NFHS round 4 onwards. A key statistic mapped in NFHS dataset is that of insurance coverage rates of men and women. Compared to NFHS round 4, NFHS round 5 finds a significant increase in the insurance coverage of both men and women. In NFHS round 4 the insurance coverage of men and women was 30.3% and 20.4% respectively. Meanwhile, in NFHS round 5 the insurance coverage for men was 33.3% while for women it was 29.8%. The coverage has increased by a slightly larger margin for the women as compared to the men. This can be explained by the fact that most women have higher education rates that allows them to engage in economic activities and become financially independent. This empowers them with a greater say in the financial decisions of the household. The significant increase in insurance coverage for both male and female can also be attributed to the government policy decisions undertaken in the recent years. The central government gave its approval for the implementation of PM-JAYs in March 2018. This major public health programme has received recognition on a global scale as a crucial step toward India reaching universal coverage. The plan provides hospital coverage for the 40% of the nation's residents who are in low-income category or in poverty. The second significant project is to improve preventive and promotional health care by transforming current primary healthcare facilities

into Health and Wellness Centres. Yadav and Mohanty (2021) have suggested that wealth is highly correlated with insurance coverage and have deduced that increase in wealth indices leads to a higher uptake of insurance policies. Considering that between the NFHS rounds, there has been a change in the number of women being financially independent, one can expect a greater likelihood of women making financial decisions towards insurances, enrolment in schemes etc.

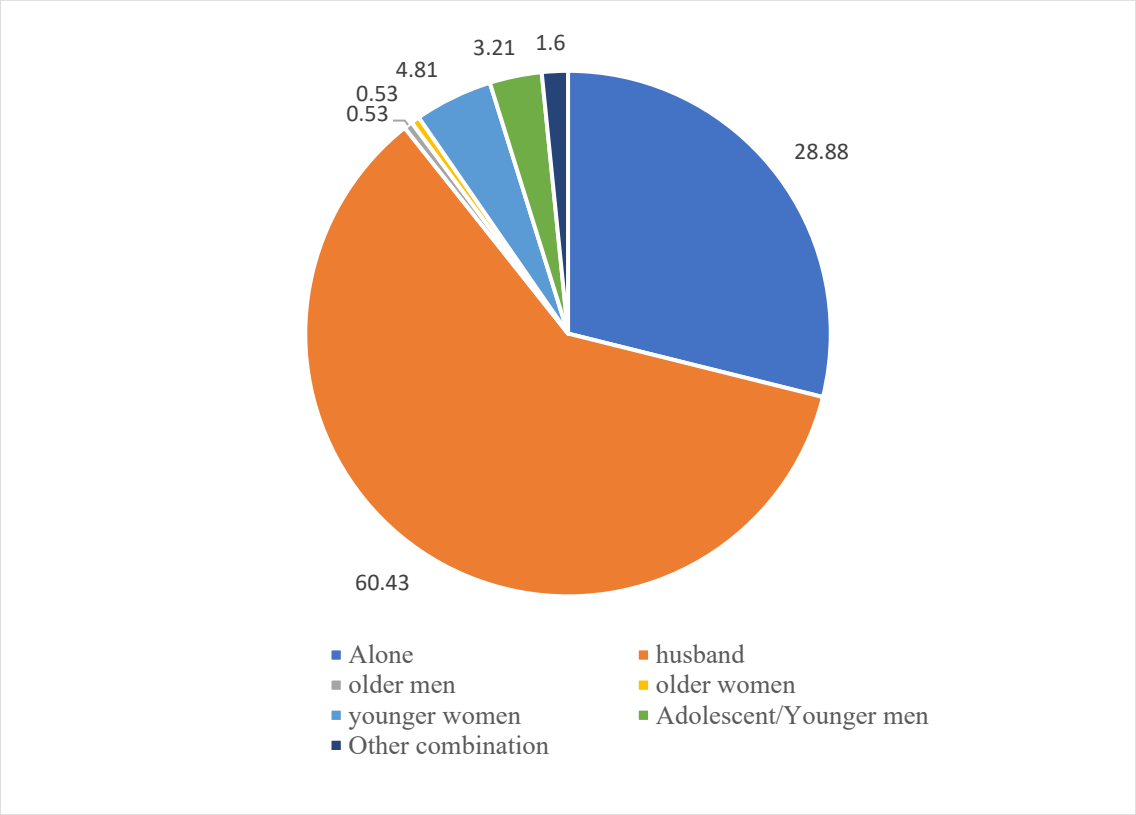
Figure 5.9: Insurance coverage (men/women)



Source: Author's calculation based on NFHS data

IHDS dataset looks at the aspect of gender equity by analysing who the women travel with when going for a medical treatment. This has a significant bearing on indirect costs whereby, women travelling alone imposes a lower cost compared to when they are accompanied by someone in which case the indirect cost increase (Indirect cost in this case includes opportunity cost of both the patient and the caregiver/accompanying member). IHDS data for Goa shows that most women (60.43%) travel with their husbands for a medical treatment and only a small share of 28.88% travel alone. The pie-chart depicted in figure 5.10 shows the different combinations of care givers that travel with women when women go for medical treatments.

Figure 5.10 Medical treatment alone/ accompanied



Source: IHDS data 2011-12

5.6 Perspectives from IHDS data

5.6 a. Choice of healthcare.

IHDS data for Goa alludes to the comparison of a government and private health sector facilities based on different surveyed questions. Goan population reportedly have high confidence in the quality of treatments of both private and public healthcare facility. However, the confidence in private healthcare facility is higher. The share of respondents having confidence in quality of treatment in Government hospitals stood at 95.68%, while for private it was 97.84%.

Particularly if we look at rural areas of Goa Statistics of IHDS data for Goan villages indicates that a greater majority of people are satisfied with the services delivered in a private health facility (66.67%) as opposed to a government health facility (33.33%). In terms of consultations in the event of minor illnesses a larger share prefers a private doctor or nurse (58.82%) as opposed to a government doctor or nurse (33.16%).

Similar to the present study, IHDS data characterises the quality factors associated with medical treatment through parameters such as waiting time, distance from residence, location preferences for treatment. Secondary data from IHDS for Goa depict a large share of the population (51.34%) experiences a waiting time of 1 hour while 27.81% experiences a wait time of 30 minutes. IHDS data shows that with respect to Goa, majority of the government dispensaries are located within the distance of 10kms from the villages. Similarly, majority of the private hospitals are also located at a distance of 10kms from villages. A greater share of the Goan population travelled to another village for medical treatment (50%) while a slightly lower share (46.7%) preferred getting the treatment in the same village or town.

5.6 b. Insurance

According to IHDS data nearly two-thirds of the village residing surveyed population of Goa are covered under a health insurance. IHDS data for Goa shows that overall, only 4.26% of the population is covered under an insurance. There is an overwhelming majority of the population that subscribes to a government health insurance as opposed to a private health insurance. The average insurance premium value paid by the patient covered ranges between Rs. 3000-5000.

Health insurance has been acknowledged as one of the main avenues that can assist in realising the goal of universalizing healthcare. In India, this is a rapidly developing and tricky industry. Various levels of social health protection mechanisms have been introduced in many low- and middle-income countries in an effort to increase access to healthcare and hence reduce health inequities. The insurance industry is extremely complex, making it difficult for the average person to comprehend all of its intricacies. As a result, the general public and those with little or no education avoid the insurance market. Furthermore, their disadvantage has been exacerbated by ignorance and a lack of knowledge. In terms of secondary data analysis, the NFHS results for insurance coverage among urban and rural dwellers indicate that the population covered under an insurance scheme has increased across the years and more significantly in NFHS round 5. Also, NFHS round 5 was the first time when the insurance coverage for the rural areas was higher compared to the urban areas. This can be attributed to the various government schemes targeted towards the poor such as the Ayushman Bharat – Pradhan Mantri Jan Aarogya Yojana (AB-PMJAY) launched in September 2018 and other incumbent schemes such as Employees' State Insurance Scheme (ESIS) and Central Government Health Scheme (CGHS). NFHS rounds 4-5 also revealed

some statistics regarding gender equity in healthcare. This chapter specifically looks at the insurance coverage among the two genders as it is linked with cost factor driving the choice of healthcare. While in round 4 the percentage of men covered under insurance was 30.3% while 20.4% of women were covered under an insurance. In NFHS round 5 the insurance coverage increases to 33.3% for men and 29.8% for women. Overall, the increase in insurance coverage between the two genders depicts a positive trend. In comparison to men, women have seen a slightly higher rise in coverage. This can be explained by the fact that the majority of women have higher education levels, enabling them to participate in the economy and achieve financial independence. The significant increase in both male and female insurance coverage can again be attributed to the government policy decisions undertaken in the recent years. Further given that there has been an increase in the number of financially independent women, one can expect a greater likelihood of women making financial decisions towards insurances, enrolment in schemes etc.

5.7 Central and State government health schemes/Programmes

The various health schemes rolled out by the central and state government provide a host of free/ economically priced services to the public. These schemes strengthen their health care systems and are rolled out with the objective of providing universal access to equitable, affordable and quality health care services and reducing the financial burden on households. These schemes can be categorized as central government schemes and state specific schemes.

Some of the central schemes/ programmes are namely Pradhan Mantri Jan Arogya Yojana, Rashtriya Arogya Nidhi, Central Government Health Scheme (CGHS), Aam Aadmi Bima Yojana (AABY), Rashtiya Swasthiya Bima Yojana (RSBY) and many others. While the state schemes for Goa are Deen Dayal Swasthya Seva Yojana (DDSSY), Goa Mediclaim Scheme, Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (ABPM-JAY). There are also some disease specific schemes/ programmes that are rolled out by the central government namely, Pradhan Mantri National Dialysis Programme, National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke (NPCDCS), National Mental Health Programme, Tertiary Care for Cancer Scheme among others.

There is a need to broaden the awareness levels of the public with regards to these schemes, in order to increase their utilization and lower the out-of-pocket financial burden of

households. Further, these numerous programmes in India can be improved upon by ensuring that enrolment cards are issued that include necessary information. This can allow the nation to reach universal enrolment, ensure continuous and fast renewal, and guarantee proper utilisation. DDSSY scheme for Goa serves as a great example whereby, there are 2.9 lakh cardholders in Goa, covering a population of 10 lakh. A family of three members gets an insurance cover of Rs 2.5 lakh while a family of four or more gets a cover of Rs 4 Lakh. Other national schemes can consider DDSSY as a mode plan for ideal coverage of NCD afflicted families.

5.8 Chapter summary and Conclusion

This chapter tries to map out the choice of healthcare facility of households based on quality factors and incidence of NCDs. The surveyed households were asked their preference for private or public healthcare based on quality factors that drive their choice. The quality factors that were considered in the study comprise of proximity to residence, efficiency of staff, clean environment, privacy, timely treatment and less waiting hours.

The descriptive analysis of the primary data indicates that quality factors- efficiency and timely treatment were the main determinants of healthcare choice among the sampled respondents. The sample of respondents choosing private sector stated that quality factors of privacy, less waiting hours and timely treatment were the major push factors determining their choice. Conversely, the sample of respondents choosing public sector stated that proximity to residence was the major push factor determining their choice. Furthermore, preference pattern based on disease affliction indicate that in case of diabetes the preference of private and public healthcare facilities is nearly same. Government hospitals were the most popular option for Cancer patients within the sample. Meanwhile for CVD and CKD the households preferred private healthcare facility.

To test the significance of association between quality factors and the choice of healthcare the study used a chi-square analysis. The analysis showed that there exists a statistically significant relation between all of the quality factors and preferred choice of healthcare of the sampled respondents. Similarly, the preferred choice of healthcare is significantly related with CVD, Cancer and Diabetes but not CKD. Considering that the chi sq. analysis simply establishes whether or not there is a relationship between the categorical variables under analysis without considering control variables or causal link the study goes further to test this relationship through the logistic regression model.

The results of the logistic regression model indicated that all the quality factors as well as NCD affliction significantly impact healthcare choice. The results indicated that the probability of choosing a private sector facility decreases in case of Diabetes and cancer patients and it increases in the case of CVD and CKD patients. A key rationale for explaining these results stems from the fact that Diabetes requires frequent insulin shots and is a long-term disease whereby treatments from private facilities can be expensive. Thus, households with Diabetes patients are likely to prefer public health facilities. Similarly, in the case of Cancer, the patients face expensive treatment in the form of chemotherapy and radiations which can take a toll on households' budgets when they opt for private facilities. For CVD and CKD, the regression results indicate that the probability of a person choosing a private health facility increased. Particularly in the case of CVD, the higher probability of choosing private health facility can be explained by the infrequent nature of the disease. In case of health emergencies of a CVD patient the afflicted person/family does not have time to weigh the options of private over public and choses the closest option which is typically private owing to the higher geographical presence of private facilities. Specifically, for CKD, the higher probability can be attributed to the specifics of the sample whereby 4 of the 6 afflicted persons chose a private facility.

Lastly this chapter elaborates upon the results of public and private healthcare facility preferences obtained within secondary data set such as NFHS as well as IHDS. The secondary results of NFHS have been further examined across the years given that NFHS specifically examines health survey in detail as opposed to IHDS that examines it as a complementary factor with other social indicators. The comparison was made to outline the theme of healthcare equity at a national level and how the dynamics have changed across time.

The results from the NFHS surveys 2-5 indicate a growing preference of public sector facilities over private. One can attribute this to the growing infrastructural expansion of the public sector and the high cost of treatment of private sector juxtaposed with the increasing burden of diseases. NFHS data on healthcare choice among urban and rural population indicates that preference of public sector has increased over time for both urban and rural population. The key reason for the preference stems from the cost factor as well as the ease of availing government schemes in public hospitals. Albeit, insurance coverage across geography (urban/rural), and gender has improved, the coverage is far from the global

norms. The access and financial funding of healthcare burden in a developing country like India remains to be a challenge.

An alternative survey- IHDS dataset, indicates that in Goa, the surveyed population has more population on the quality of treatment at a private hospital as compared to a government hospital. The confidence in private healthcare facility is high among villages in Goa, whereby they prefer private facilities even in case of consultations for minor illnesses. A majority of the population experiences a wait time of one hour at health care facilities. Most healthcare facilities both public and private are located within a distance of 10km from the villages. A greater share of the Goan population travelled to another village for medical treatment while a slightly lower share preferred getting the treatment in the same village or town.

The results of the current study have a greater alignment with the results found in the IHDS. This greater degree of convergence between the results can be attributed to the fact that the current study looks at the implications of respondents being afflicted by NCD on broad range of socio-economic issues such as direct and indirect costs, loss of employment, consumption, savings and investment, choice of healthcare facility. The IHDS survey is a health survey that looks at the issue through other development indicators, including that of earning, employment, social capital among others. Meanwhile, NFHS survey maps out health indicators while collecting information on other aspects such as gender, insurance, nutrition, maternal health. Albeit the current study includes background information on health-related statistics from IHDS and NFHS data, it does not seek to compare the primary results with the secondary information. The primary results of the study cannot be compared to secondary data owing to sample size, time constraints and prospective biases that may be seen in a localised primary survey. However, the comparison of the results with the secondary set can offer insights that the sample used in the primary survey is close to the sample used in the secondary data collection for nationalised accounts. In this case, the comparable results of the current study's primary survey with IHDS indicates that the sample used in the study is unbiased and mirrors the population results.

When examining the results of this study's primary survey on Goan population with the NFHS results for India the major theme outlined is that of divergent preferences. While in Goa the preferences are more towards private healthcare facilities (50% preferring private,

41% preferring public and 9% preferring both), the NFHS results for India suggest a greater preference for public sector healthcare (62% preferring public healthcare and 38% preferring private healthcare). It is imperative to acknowledge these divergent preferences- Goa is one of the highest public health spending states in India, possessing reasonably good quality of primary healthcare facilities. The health outcomes associated with the high public spending are visible in the state. Considering its status as a developed state with high per capita income compared to the average per capita income of India its healthcare preference pattern is akin to that of developed countries whereby the population prefers more premium quality of healthcare offered in private sector facilities. The government of Goa has its unique insurance scheme -Deen Dayal Swastya Seva Yojana that is specific to the state. This scheme has gained wide popularity among the population. The present study finds that 32.25% of the sampled respondents were covered by a medical insurance while 35.25% availed government medical schemes to fund the medical expenses attributed to the NCD's.

In the light of the high financial burden of health expenditures as well as the high cost of treatments in private healthcare facilities, policy makers must focus on not just expanding the public healthcare infrastructure but also introducing a stronger financial backing for the population suffering from NCDs that belong to low-income category. Financing of health expenditures for below poverty line (BPL) households could potentially be linked through a registry system similar to what is done in case of ration cards. Further, the public sector albeit expanding still suffers from capacity issues to cater to the high population. Health professionals and skilled health workers critical for shaping efficient health outcomes. Increasing the density of health workers has been found to have a significant and positive relationship with health outcomes (Motkuri & Mishra, 2020) and thus the government must focus on increasing the density of professionals in low-income regions where risk of catastrophic health expenditure is high. The policy makers must deliberate upon strategies that focus on both expansion of healthcare workforce and infrastructure.

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CHAPTER 6

MAJOR FINDINGS, CONCLUSIONS, AND POLICY IMPLICATIONS

6.1 Introduction

6.2 Summary of Hypothesis

6.3 Major Findings of the Study

6.4 Insights from NFHS and IHDS data

6.5 Policy Implications

- 6.5 a. Issues regarding healthcare facilities as stated by survey respondents
- 6.5 b. Policy implication with respect to infrastructural deficiencies.
- 6.5 c. Policy implication with respect to quality-related aspects.
- 6.5 d. Policy implication with respect to affordability
- 6.5 e. Policy implication with respect to health schemes
- 6.5 f. Overarching policy implications

6.6 Way forward

6.1 Introduction

The epidemiological health transition of India and Goa is undergoing rapid changes, with the burden of NCDs surpassing that of communicable diseases. According to National Health Mission reports for Goa (2021), premature deaths due to non-communicable diseases account for 56.1% of the total disease burden, while communicable diseases and injuries account for 43.9% of premature deaths. NCDs can lead to premature deaths and alternatively can result in morbidity and disability that can impose a high burden on the inflicted population given the chronic nature of the disease and high out-of-pocket medical expenses. The high OOPE owing to NCDs places several households on the brink of impoverishment, and the vulnerability of households increases as the severity of the disease increases, especially in poorer households.

The aim of this study was to assess the burden of non-communicable diseases in the state of Goa, India. Goa is a small state with a high literacy rate and a high per capita income compared to the country's other states. Thus, it presents itself as an interesting point of investigation since its epidemiological transitions and population patterns mirror those of a developed nation, although it is a state located in a developing nation. The study recognizes that different types of NCDs can result in different types of cost burdens. Hence the study seeks to compare the household burdens and behavioural patterns across 4 NCDs- Diabetes, Cancer, CVD, and CKD. Some of the research questions the study investigates comprise of- direct and indirect costs incurred by households on the 4 NCDs; catastrophic payments incurred by households; change in savings, consumption, employment, and investment patterns of the households when afflicted with NCDS; source of funding used to cope with expenditure burden and lastly, the healthcare utilization patterns of households.

It is imperative to understand that medical expenses ultimately place a strain on not just government spending but also majorly on the households who fund these medical expenses through their own savings, borrowings, and medical insurance. A high disease burden can impact the population, which affects labour efficiency and, ultimately, the national output. Thus, good health is essential for the sustainable and long-term growth of the economy as a whole. The present study is a microeconomic study; however, the findings derived can be extrapolated at a macroeconomic level in the future to compare the disease burden impacts to account for losses to the nation.

The study canonically compares the four NCDs under the scope and assesses how household behaviour differs when afflicted with different diseases. The study rationalizes the empirical results in this regard using literature to gather deeper insights into household behaviour. The level of detail of the study delves deeply into comparing four NCDs across all of the research points. To the best of the author's knowledge, a detailed study like this has not been conducted specifically in Goan households.

The chapter summarizes the findings of the preceding chapters and elaborates upon the overarching conclusion, scope for further research, and policy implications for the state of Goa.

6.2 Summary of Hypothesis

Table 6.1 Summary of Hypothesis

Variables	Research Hypotheses	Equation	Analysis	Research Objectives	Expected Sign
Research question: What are the relative costs of healthcare associated with different non-communicable diseases in Goa?					
Direct Cost	H0: The incidence of NCDs does not impact the direct cost incurred by HH. H1: The incidence of NCDs impacts the direct cost incurred by HH	Direct cost= β0+ β1Diabetes+ β2 Cancer+ β3 CVD+ β4 CKD+ β5 Earnings+ β6 Socio Economic class+ β7 Ages+ β8 Education + ε	OLS	To analyse the direct and indirect costs incurred by households on health expenditure	H1a: β1≠0 H1b: β2 ≠0 H1c: β3≠0 H1d: β4 ≠0
Indirect Cost	H0: The incidence of NCDs does not impact the indirect cost incurred by HH. H1: The incidence of NCDs impacts the indirect cost incurred by HH	Indirect cost= β0+ β1Diabetes+ β2 Cancer+ β3 CVD+ β4 CKD+ β5 Earnings+ β6 Socio Economic class+ β7Caretaker+ β8 Ages+ β9No. of members with NCD+ Loss of employment+ β11No Goa hospital+ ε	OLS		H1a: β1≠0 H1b: β2 ≠0 H1c: β3≠0 H1d: β4 ≠0
Research question: What are the costs associated with NCDs when looking at it from the perspective of catastrophic health expenditure?					
Catastrophic health Expenditure dummy	H0: Incidence of an NCD does not lead to the outcome of a household incurring a catastrophic health expenditure. H1: Incidence of an NCD leads to the outcome of a Household incurring a catastrophic health expenditure.	$Ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 diabetes + \beta_2 Cancer + \beta_3 CVD + \beta_4 CKD + ei_i$	Bayesian Two-Stage Hurdle model	To measure the catastrophic health expenses incurred by households on NCD.	H1a: β1≠0 H1b: β2 ≠0 H1c: β3≠0 H1d: β4 ≠0
Catastrophic health Expenditure	H0: NCD do not have an impact on the amount of the Catastrophic health expenditure, given H1 in the previous hypothesis is true. H1: NCD does have an impact on amount of the Catastrophic health expenditure, given H1 in the previous hypothesis is true.	$Catastrophic\ Health\ Expenditure = \beta_0 + \beta_1\ diabetes + \beta_2\ cancer + \beta_3\ CVD + \beta_4 CKD + \beta_5 Socioeconomic\ class + \beta_6 Hospitalisation\ duration + \beta_7\ Highest\ education + \beta_8 Number\ of\ members\ in\ the\ HH + \beta_9\ Medical\ Insurance + ei$			

Source of Funding Dummy variable	H0: NCDs have no impact on the choice of source of Funding. H1: NCDs have an impact on the choice of source of Funding.	$Ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 diabetes + \beta_2 cancer + \beta_3 CVD + \beta_4 CKD + \beta_4 ages + \beta_5 earnings + \beta_6 socio\ economic\ class + \beta_7 No.of\ dependents + \beta_8 medical\ insurance + \beta_9\ hospitalised\ dummy + \beta_{10} loss\ of\ employment + \beta_{11} no.of\ members\ with\ NCD + ei_i$	Logistic Regression with marginal effects	To assess the source of funding when meeting costs attributable to NCDs	H1a: β1≠0 H1b: β2 ≠0 H1c: β3≠0 H1d: β4 ≠0
Research question: What impact do these NCD's have on HH income, HH expenditure, consumption, saving and investment patterns?					
Total loss of earning	H0: The incidence of an NCD does not have any impact on the loss of income H1: The incidence of NCDs has an impact on the loss of income	*Total loss of earning (rupees) = β_0+ β_1Diabetes+ β_2Cancer+ β_3CVD + β_4CKD+ $\beta_5$ages+ β_6Socio-economic class+ $\beta_7$total HH members+ β_8Annual visits+ β_9No Goa Hospital+ β_{10}Consumption Spending+ ε*	OLS	To analyse the impact of NCDs on a households Income and Employment	H1a: β1≠0 H1b: β2 ≠0 H1c: β3≠0 H1d: β4 ≠0
Loss of Employment (Dummy Variable)	H0: The incidence of an NCD does not have any impact on the employment of a HH member H1: The incidence of an NCD does have an impact on the employment of a HH member	$Ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1$diabetes + $\beta_2$cancer + β_3CVD + β_4CKD + β_5Annual visits + β_6Ages + $\beta_7$hospitalised dummy + β_8 Number of members with NCD + β_9Highest Education + e_i	Logistic Regression with marginal effects		H1a: β1≠0 H1b: β2 ≠0 H1c: β3≠0 H1d: β4 ≠0
Savings	H0: The incidence of an NCD does not have any impact on the savings of a HH H1: The incidence of an NCD has an impact on the savings of a HH	Savings= β0+ β1diabetes+ β2cancer+ β3CVD + β4CKD+ β5earnings+ β6Total number of members with non-communicable diseases + β7 Total household members+ β8direct cost + β9 Care giver dummy + β10 availed government scheme +β11 hospitalisation duration +β12 loss of earning due to visits +ε	OLS	To Measure the impact of NCDs on a households Savings, Investment and Consumption.	H1a: β1≠0 H1b: β2 ≠0 H1c: β3≠0 H1d: β4 ≠0
Consumption	H0: The incidence of an NCD does not have any impact on the Consumption pattern of a HH H1: The incidence of an NCD has an impact on the consumption pattern of a household	Consumption spending= β0+ β1diabetes+ β2cancer+ β3CVD + β4CKD+ β5earnings+ β6Total HH members+ β7 hospitalisation duration+ β8 annual visits+β9ages+β10Total no. of members with NCD+β11 medical insurance+ ε	OLS		H1a: β1≠0 H1b: β2 ≠0 H1c: β3≠0 H1d: β4 ≠0
Investment	Sub division of the sampled population based on: 1. NCD	----------	Descriptive statistics based on grouping of		----------

	2. Number of members of the HH suffering from NCDs		sampled population		
Research question: What are the preferences of the general public vis-à-vis public and private healthcare facilities?					
Public v/s Private healthcare facilities	H0: The preference of HH in choosing public versus private health care are independent of quality factors: 1. Closer to place of residence 2. Efficiency of staff 3. Clean environment 4. Privacy 5. Timely treatment 6. Less waiting hours H1: The preference of HH in choosing public versus private health care are dependent on quality factors: 1. Closer to place of residence 2. Efficiency of staff 3. Clean environment 4. Privacy 5. Timely treatment 6. Less waiting hours	$Ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 Quality\ factors + \beta_2 NCDs + \beta_3 Number\ of\ dependents + \beta_4 Highest\ Education + \beta_5 avail\ governemnt\ schem + \beta_6 Ages + ei_i$	Logistic Regression with marginal effects	To examine the preferences of Households Vis a Vis public health care and private health care facilities, as driven by factors such as Efficiency of staff, Closer to the place of residence, less waiting hours, Timely treatment, Clean Environment, Privacy during treatment.	

6.3 Major findings of the study

6.3.1 Theoretical and Empirical Review on Health Economics and Burden of Non-Communicable Diseases

This chapter details a systematic and comprehensive review of the literature in terms of important theories and empirical studies, along with the different methodologies adopted in the studies. The areas under review included- the cost burden of the diseases, source of funding associated with NCD care, impact on income /earnings, employment, consumption and savings of a household, long-term investment, and choice of healthcare. This chapter also provided the primary evidence from the sources and the research gap. A brief summary of the same is outlined below.

Particularly in the case of health economics theories, the study found that the field of study of health economics can be looked at from the perspective of HH and institution. From the HH perspective, there are various ways to compute the cost of illness, which spans from medical, morbidity, mortality, and non-medical cost such as loss of productivity, etc. The institutional perspective covers only medical costs. The tradeoff between quantity and quality of healthcare services has been examined in the literature through the production possibility frontier at a macroeconomic level and through Anderson's behavioural model at the microeconomic level. There exist several methodologies to compute the burden of illness. The differential factor among the various methodologies is the approach whereby one can have a prevalence or incidence-based approach, prospective or retrospective approach, and top-down or bottom-up or econometric approach. The various metrics used to evaluate the burden of diseases include HALE, DALY, QALY, PYLL, and Contingent valuation of health.

With respect to burden estimation across various NCDs, there is a myriad of studies using international, national, and state-specific as well as city/village-level data. Across all the studies, it was found the burden of disease is significant and growing when examined through either a disease-specific lens or through a comparison of various diseases. Socioeconomic class, income, education, and age have been found to be significantly related to the cost burden of the disease. Disease-specific factors such as the stage of disease, the treatment type, and severity also have a strong bearing on not just the cost burden imposed on households but also the propensity of households incurring CHE. Source of financing such as borrowings as against savings increases the chances of a HH getting impoverished

by trapping households using loans in a debt trap. NCD affliction leads to a change in household behaviour due to increased chances of patient/caregiver loss of employment which alters the consumption, savings, and investment behaviour of the household. Further, there is a difference in the HH who undertake treatments in private as against public healthcare facilities. The expenses incurred in private facilities are much higher compared to public.

Despite these major findings, there was found to be a gap in the literature. Firstly, there are very few studies that compare the cost burden of different diseases, and none that undertake the same specifically for the state of Goa. Secondly, loss of income to patients and caregivers on account of the incidence of various NCDs in Goa has also not been adequately studied within the literature. This piece of information is critical as it has a macroeconomic bearing. Thirdly, the HHs use several financial coping strategies, including consumption smoothing, contraction of savings, and deferment of long-term high-value investments. The literature has mostly covered sources of financing as a primary focus to examine the HH coping strategies, while little attention has been paid to the before mentioned coping strategies in the Indian context. Fourthly the comparative probabilities of a patient and caregiver losing a job due to NCD-related complications have also not been studied in the Indian context, albeit there are many studies that estimate the same for a singular disease. Lastly, Anderson's behavioural model has been widely used as a base to investigate the impact of quality factors on the choice of healthcare, but no study has examined this link by juxtaposing disease affliction of the household. The study seeks to bridge the gaps found in the literature, contextualize the health economics models in the Indian context and use methodologies that have been used in international literature.

6.3.2 Household-level out of pocket expenditure on health

This chapter elaborates upon the first objective- *Household level out-of-pocket expenditure on health*. The primary objective was divided into three sub-objectives. The first sub-objective was to compare the expenses incurred on various non-communicable diseases with reference to both direct and indirect costs. The second sub-objective was to assess the catastrophic health expenditures incurred by households, while the third sub-objective was to examine the source of funding utilized by households. The major findings from this chapter, with reference to Direct Cost, Indirect Cost, Catastrophic Health Expenditure, and Source of Funding, are summarized below.

- The literary evidence of comparative analysis of the cost burden of different diseases within a single study was limited in the Indian context except in cases of national surveys conducted by Mahal et al. (2010). However, there were several studies that compared the cost burden of a single disease in various stages. All studies converge on the fact that the NCDs-Diabetes, Cancer, CVD, and CKD significantly impacted the direct cost.
- The study used a linear regression model on the primary data collected and found that the results align with the various studies found in the literature that report the positive and significant impact of these diseases on direct costs incurred by households.
- The striking insight found was that across the four NCDs, the magnitude of the monetary impact was highest for CKD, followed by Cancer, CVD, and Diabetes. These results closely align with Mahal et al. (2010), whereby the diseases with the largest OOPE in the year 2004 were CVD, Cancer, CKD, and Diabetes.
- The study also finds that NCDs- Diabetes, Cancer, and CKD significantly impact the indirect cost associated with the illness. Indirect costs comprised of the total loss of earnings, transportation costs, and the costs attributed to the caretakers employed.
- The highest impact was seen in the case of CKD, followed by Cancer and then Diabetes. CVD was found to be relatively insignificant in impacting indirect costs. These results are comparable to those found in Mahal et al. (2010) where some of the leading NCDs accounting for significant income losses were CVD, Diabetes, CKD, and Cancer.
- The direct medical costs were found to be greater than the indirect costs associated with the incidence of non-communicable diseases. Some of the reasons for this difference stems from calculation methodologies- Indirect cost calculates the loss of earnings and travel cost, both of which are low in magnitude in a country like India. Further, direct cost includes the cost of medicines, diagnostics (both of which occur at a high frequency), and the cost of hospitalization (which is extremely high and often presents itself as a monetary shock). Thus, direct costs round up to be higher than indirect costs. Systematic literature reviews such as Mathew & Olickal (2023), Kazibwe et al. (2021), and Menon et al. (2022) have found similar results when comparing direct and indirect costs.
- Furthermore, the direct cost can be higher owing to the repetitive nature of medicine purchases, diagnostic tests that occur more frequently, and hospitalization costs,

which can present itself as a monetary shock. One would anticipate that direct costs would occur far more frequently than indirect costs, resulting in higher direct costs than indirect costs.

- On assessing the catastrophic health expenditures, the results showed that the likelihood of households incurring catastrophic health expenditure was highest for those households that had patients with CKD, followed by Cancer and then CVD.
- The most significant monetary impact on CHE was found to be for CKD, followed by CVD and Cancer. Diabetes was found to be statistically insignificant. The study by Mahal et al. (2010) found that the incidence of Cancer and CVD were significant determinants of a household incurring catastrophic expenditure. Diabetes in this context was found to be relatively insignificant, which is similar to the results found in the primary survey of the study.
- An important premise that impacts the household's ability to deal with the economic burden of NCDs is its mode of funding. The severity of expenditure impacts the choice between using savings or borrowing/liquidation of assets from others. To meet any medical expenditure as the first choice, a household is likely to depend on its own savings. However, as the severity increases, the households' resort to borrowings/liquidation. Borrowings/liquidation as a mode of funding has a higher detrimental impact on the household since it can impair the household's economic well-being across a longer time period.
- Cancer, followed by Diabetes, CVD, and CKD, was most likely to lead households to resort to borrowings/liquidation of funds. This is in sharp contrast to the results found in the previous case of direct cost, indirect cost, and CHE where CKD was found to have had the most significant impact. One could attribute this to the fact that CKD also results in greater premature deaths as it exacerbates the impact of other co-morbid conditions. A similar impact of source of funding on distress financing has been found in studies such as Panikkassery (2020); Sriram (2019); Dhanaraj (2016); Ravi et al. (2016); Thomas et al. (2023).

6.3.3 impact of non-Communicable diseases on income, employment, savings, consumption, and investment.

This section provides an analysis of the second objective of the study. The scope of assessment includes loss of earnings, loss of employment, the impact of NCDs on savings and consumption behaviours of households, and a descriptive overview of investments

undertaken by the disease-afflicted households. The major findings brought out from this objective are summarized below.

- The study assessed the total loss in earnings of a household attributed to non-communicable diseases. The total loss in earnings was highest in the case of Cancer, followed by CKD and Diabetes. This shows that the long-term chronic diseases that have a greater expenditure burden have the most detrimental impact on the incomes of the household as they accentuate the losses in earnings. Abegunde (2007) found that, cumulatively, diseases such as CKD, CVD, Cancer, and Cancer, among other NCDs, can lead to a foregone GDP of $1.35 billion in 2006 and cumulatively amounting to $17 billion by the year 2015. The macroeconomic projections of Abegunde align with the results found through the primary survey.
- NCDs impact the patterns of consumption and savings of a household, given that a household has a limited budget constraint and high out-of-pocket expenses pose health shocks. The study investigates the impact of an NCD on the consumption and savings behaviour of a household considering the process of Consumption smoothing.
- Consumption spending (Sum of annual food and non-food expenditure) across households afflicted with NCDs was compared, whereby the recall period was one month for food expenditure and one -year for non-food expenditure.

  The empirical results indicate that a household afflicted with an NCD modifies its consumption behaviour. There was an increase in consumption spending for a household afflicted with Diabetes and Cancer. Meanwhile, there was a decrease in spending for households afflicted with CVD and CKD.
- The study also undertook regression specifically for food and non-food expenditure. Results indicated that in the case of Diabetes and Cancer, there was an increase in food expenditure, leading to an increase in overall consumption spending. One can infer this to be a result of a change in diet as a part of treatment. In the case of CVD and CKD, there was a decrease in both food and non-food expenditure. This shows that such households were meeting their financial burden by reducing their food and non-food expenditure. The results elaborating upon the consumption smoothing process of households afflicted with NCDs have not been studied in the Indian context and thus serve as a unique insight brought out through the study. However, disease-specific insights into this process have been found in Datta et al. (2018) and

Behera &Pradhan (2021), among others, and align with the results found in the current study, which compares this process across multiple diseases.

- The savings pattern of a household was also assessed in the study, whereby the empirical results indicate that Diabetes and Cancer lead to a decline in savings. Meanwhile, CVD does not lead to a decline in savings. In the case of Diabetes and Cancer, the disease is chronic and long-term, with households relying more on saving to meet medical expenses, while in the case of CVD, given the infrequent nature of the disease, it does not pose a strain on the savings of a household. CKD was found to be insignificant in relation to the savings of a household. However, given the high health expenditure burden of the disease, one may find that households rely on sources other than savings to fund such expenses. Most studies, such as Bhattacharyya et al. (2016), Tharkar et al. (2010), Nair et al. (2013), and others, have analyzed savings from a binary perspective of households opting for either savings or borrowings to fund their OOP medical expenses. However, no study details the magnitude of savings lost by households on account of disease-related expenditure. As such, the most comparable insights have been found in Mahal et al. (2010), which indicate that Diabetes, CVD, CKD, and Cancer account for the largest share of spending from savings.
- Loss of employment due to morbidity and mortality impact of NCDs has been examined in this study. The regression uses the loss of employment as a binary dependent variable. The empirical results show that Cancer and CKD increase the likelihood of a person losing employment, while Diabetes reduces this likelihood. CVD was found to be insignificant.
- The study also assessed the investment patterns of households afflicted with NCD. The survey indicates that only 49.5% (198 out of 400 surveyed households) of NCD-afflicted households made a long-term investment in the last one year.
- In the case of Diabetes, 48.3% (97 out of 201 Diabetes-afflicted households) of the households made a long-term investment. For Cancer, this figure stood at 45.79 % (49 out of 107 Cancer-afflicted households). In the case of CVD, 58.06% (90 out of 155 CVD-afflicted households) of the households made a long-term investment. Lastly, for CKD, 66.67% (04 out of 06 CKD afflicted households) of the households made an investment in the last one year.
- The investment was strongly associated with the number of members with an NCD within a household. There were 198 households that had made investments in the

last one year of which 148 households (74.7%) had a single NCD-afflicted member, 45 households (22.73%.) had two members afflicted with an NCD, four households (2%) had three members afflicted with an NCD, and lastly, one household (0.51%) had four members afflicted with an NCD.

6.3.4 Preferences of Households Vis a Vis public health care and private health care facilities

The fourth chapter of the study analyses the household preferences of choice of healthcare facilities. The preferences with regard to the various quality factors were evaluated. Quality factors such as the efficiency of staff, less waiting hours, timely treatment, clean environment, and privacy during treatment. The major findings brought out from this objective with reference to the choice of healthcare alongside quality factors and disease affliction is summarized below.

- Preferences of household's vis-a-vis public health care and private health care facilities were examined by the study in the light of quality factors that explained their choice. The quality factors considered by the study comprised Proximity, Less waiting hours, Efficiency, Privacy, Timely treatment, and Clean environment. These quality factors have been compiled from literature such as Alijanzadeh et al. (2016), Kamra et al. (2016), and Mahapatra (2013). A detailed table describing the quality factors and their source has been included in Table 5.1
- Among the 400 sampled households, 164 households (41%) preferred public healthcare facilities, 199 households (49.75%) preferred private healthcare facilities, and 37 households (9.25%) were indifferent and preferred both.
- The leading factors driving the choice among the sampled respondents were efficiency followed by timely treatment, less waiting hours, privacy, proximity to residence and clean environment.
- Among the respondents who chose private health facility, the leading quality factors driving the choice was privacy (79%), followed by Less waiting hours (69.4%) and Timely treatment (67.6%). Among the respondents who chose public sector facilities, the leading quality factors driving the choice were proximity to residence (48%) and efficiency (26.0%).
- The study analyzed healthcare choice by disease and found that for Diabetes, the choice between public and private healthcare facilities was nearly the same, with 46.8% of the respondents choosing private healthcare and 46.3% choosing

government healthcare facilities. In the case of Cancer, the respondents preferred government hospitals (53.3%) over private (39.35%). For CVD, the preference for private (56.8%) was greater than public (29.0%). Lastly, the leading choice for CKD was a private healthcare facility (66.7%) compared to a government health facility (16.7 %).

- The study conducted a chi sq. analysis to study the association between quality factors and the choice of a healthcare facility. The results indicate that all of the quality factors have a significant relation with the choice of healthcare. The quality factors, efficiency of staff, privacy, timely treatment, and less waiting hours have a more significant relation with the choice of healthcare as compared to proximity to residence and clean environment.
- The study used a logistic regression to find the causality impact of quality factors on dictating the choice of healthcare. Among the quality factors, it was seen that efficiency of staff, clean environment, privacy, timely treatment, and less waiting hours increases the probability of a household choosing a private healthcare facility over a public/ government healthcare facility. Meanwhile, proximity to residence decreases the probability of a household choosing a private health facility over a public health care facility.
- Similarly, the incidence of Diabetes and Cancer decreases the probability of a household choosing private healthcare facility over public. CVD and CKD increase the probability of a person choosing private over public healthcare facilities. In the case of Diabetes and Cancer, the disease requires frequent treatments (in the form of insulin shots, chemotherapy sessions, etc.), which can take a toll on household budgets. Thus, the preference for public healthcare facilities can be rationalized. In the case of CVD and CKD, the household may often face a sudden health emergency, in which case a private healthcare facility is preferred, given quicker response time to emergencies.

6.4 Insights from NFHS and IHDS data

- The study analyses secondary data for Goa obtained from NFHS and IHDS surveys to understand other aspects governing the utilization of healthcare facilities.
- The NFHS results show that 61.6% of the population prefers public healthcare facility, while private healthcare facility is preferred by 38.3%. There is a greater preference for public healthcare facilities in rural areas as compared to urban areas.

Overall, the preference for public healthcare facilities has grown over the years from 22.2% in NFHS round 2 (1998-99) to 61.6% in NFHS round 5 (2019-21). The choice can be attributed to a wider range of public health and insurance schemes that have grown over the years, with health insurance coverage growing from 11.4% in NFHS round 3 (2005-06) to 66% in NFHS round 5 (2019-21).

- IHDS survey analyses the aspects of healthcare utilization under the lens of other socioeconomic development indicators. The statistics depict that in the state of Goa, the confidence in the quality of public healthcare services is lower compared to private healthcare (95.68% v/s 97.84%). In terms of satisfaction with services, once again, public healthcare facilities (33.33%) fared lower than private healthcare facilities (66.67%).

  IHDS analyses the issue of gender by studying members accompanying women during a visit to a clinic or a hospital and finds that most women (60.43%) travel with their husbands for medical treatment, and only a small share (28.88%) travel alone. A greater share of the Goan population travelled to another village for medical treatment (50%), while a slightly lower share (46.7%) preferred getting the treatment in the same village or town.
- The results of the current study have a greater alignment with the results found in the IHDS survey. This can be attributed to the fact that, like the IHDS survey, the current study also examines the aspects of healthcare while juxtaposing it with other socioeconomic factors such as education, earnings, availing government schemes, and employment status, among others.

6.5 Policy Implications

The study has brought to light the implications associated with the incidence of NCDs in the context of Goan households. The findings have a strong bearing and can be extrapolated at a macroeconomic level to ascertain the impact on the nation. This segment of the chapter elaborates on the policy implications that have been developed based on the conclusions derived from the study as a response to the various research questions and complemented with the feedback reported by the survey respondents. The policy implications have been subdivided and linked to the research questions and objectives to cover the different issues highlighted by the sampled respondents.

6.5.a. Implications for Policy in terms of the affordability of medical costs.

The first objective of the study was to relatively examine the direct and indirect costs imposed by NCDs on the households of Goa, their impact on impoverishment, and the funding mechanisms utilized by households. The study finds that NCDs pose a large cost burden on households that have significant impoverishing effects. The cost burden on households comprises not just high direct costs incurred on medical expenses, diagnosis, and hospitalization but also the indirect cost comprising of opportunity cost of losing work-days by both patient and caregivers. The growing cost burden also leads to cases of distress financing which unequivocally impacts the lower income households. In light of the high financial burden of out-of-pocket health expenditures and its impact on catastrophic health spending, policymakers must focus on introducing stronger financial backing for the population suffering from NCDs that belong to the low-income category. Such households are at a high risk of impoverishment due to the chronic nature of the NCDs and the high cost of treatments. Financing health expenditures for below-poverty line (BPL) households could potentially be linked through a registry system similar to what is done in the case of ration cards.

6.5 b. Implications for Policy with respect to consumption smoothing through augmented health schemes and insurance.

The second objective of the study was to assess the comparative impact of NCDs on households' earnings, employment, and ability to save, consume and invest. The study has found that NCD affliction has a depressing impact on income, employment, consumption, savings, and investment. Thus, NCD affliction impacts the economic behaviour of the households, and their overall budget, thus altering affordability. The aspect of affordability is closely linked to the expansion of health-related schemes as well as insurance schemes that lead to cost savings by households. The health-related schemes launched by the government both at the centre and the state level have massively increased over the years both in terms of the number of schemes and population coverage. However, despite this expansion, a significant proportion of the population lacks awareness regarding such schemes. Thus, the government must focus on increasing the awareness of such schemes to the masses. Also, some of these schemes cannot be availed in all healthcare facilities, which poses to be an obstacle to their utilization; hence the ability to avail of such schemes must be upscaled. Further, the limit on the monetary coverage of such schemes is often unable to help the households bear the financial burden. The relative disease burden can serve as an

efficient foundation to launch and re-model schemes for different diseases. Such schemes must recognize if the user of such schemes belongs to a lower economic class. There can be an efficient system that links the subscriber of such schemes with other instruments, such as BPL cards, such that there is a higher coverage limit for subscribers of the lower economic class. Particularly for consumption smoothing and savings, financial instruments such as insurance have been found to be efficient in coping with health shocks. However, the limited insurance coverage and limited coverage of diseases can prove to be an obstacle to their optimal usage. Thus, the policymakers must focus on expanding the disease and the monetary coverage of insurance schemes. Further, there are variations in the expenses incurred on treatments of various diseases, and often, generic insurance with limited coverage is not useful for households to cope with health shocks. In this light, it is essential that policymakers roll out schemes that address these variations. An example of such insurance is disease-specific medical insurance. These niche policies can help households in coping with high medical expenses. Albeit such policies exist, the high premiums associated with them often reduce their uptake. In the light of universal health coverage, policymakers can work towards rolling out these insurances for below-poverty-line households at subsidized premiums.

6.5.c. Implications for Policy with respect to quality factors associated with healthcare facilities and infrastructure.

The last objective of the study was to examine the preferences of Households Vis a Vis public health care and private health care facilities, as driven by quality factors such as efficiency of staff, Closer to the place of residence, less waiting hours, Timely treatment, Clean Environment, and Privacy during treatment. The study has found that the population has a greater preference for private healthcare facilities over public healthcare facilities. The preference for private can be explained by better quality factors. Further, the study also found that despite its expansion, the public sector still has capacity problems. The primary survey respondents highlighted several quality-related issues such as inadequate hygiene, long waiting hours, longer time for treatments, appointments, incorrect diagnostic reports, and lack of co-ordination between different departments within hospitals. They also found that medical facility infrastructure was inadequate both in terms of capital equipment and human resources to cope with the growing and significant NCD burden plaguing the state.

In this light, the implications of policies can be categorized as- i) policies addressing quality factors and ii) policies addressing infrastructural deficiencies.

i) Policies for improving the quality of medical infrastructure.

The policies for improving the quality of medical infrastructure must be designed in a manner that the healthcare facilities are either incentivized for maintaining high-quality service delivery or penalized for not adhering to the benchmark quality standards. This implies that as a policy strategy, the government must establish stricter policy norms that are routinely tested and affects the accreditation of healthcare facilities. The government can establish standards of hygiene, time duration taken for healthcare delivery, information systems linking different departments, and accuracy of diagnostic reports, among other factors. Failure to abide by quality standards should have strong implications on the operations of the hospital and cancellation of licenses. Further, there should be a unified registry that considers the grievances of patients, and excessive grievances from any particular facility must be considered as a case point for a government investigation into the same.

ii) Policies for addressing infrastructural deficiencies.

Apart from quality factors, the study also noted that both private and public healthcare facilities suffered from infrastructural deficiencies that led to most households seeking treatments from facilities far away from their area of residence. Considering the high and growing burden of NCDs and the large population, it is imperative to expand the overall medical infrastructure to cope with this burden. Achieving effective health outcomes requires increasing the density of healthcare professionals as well as hospitals and healthcare systems. This entails expanding the number of beds in hospitals, upgrading village health centres, and employing a greater number of doctors and support staff alongside the number and variety of healthcare and diagnostic equipment and facilities.

To ensure that such an expansion delivers health outcomes more effectively and efficiently, the government of Goa must first identify the diseases whose affliction rate has been growing considerably. The NFHS results show that the burden of Diabetes and Cancer has grown multifold over the years. Thus, the government of Goa can explore opening targeted health centres for such diseases. Particularly in the case of Cancer, certain diagnostic equipment such as PET scans, albeit available, are priced at a very high rate, with most patients not utilizing such facilities. It is essential that the expansion of such targeted disease centres be equipped with staff as well as facilities that can enable quicker testing, diagnosis, and treatments.

6.5 d. Overarching policy implications

The growing burden of NCDs must be targeted at the source in a manner that the incidence of such diseases is minimized. This can range from launching programs at a young age for schools to launching them specifically for targeted audiences such as the elderly population. Early identification is one of the challenges facing medical research when it comes to non-communicable diseases since, when a disease is diagnosed too late, it becomes chronic and has a lower chance of being successfully treated. The government should put more effort into launching awareness initiatives, wellness programs, yoga sessions, etc., that can encourage better lifestyles and prevent the advent of illnesses. Further, research is necessary in the light of healthcare capacities for distinct disorders in order to comprehend and identify the specific improvements that the healthcare system needs to make. Only then the country be able to control the rising NCD disease burden.

6.6 Way forward

The study uses a primary survey to elicit responses from 400 households on NCDs and their related expenses and behavioural patterns. Several questions regarding different aspects of household behaviours were posed to the respondents. The survey responses have been instrumental in explaining the empirical results obtained through regression analysis. Some interesting insights have been brought to light to the study in terms of using advanced methodological techniques of analysis as well as through primary evidence of theories relating to consumption, employment, investment behaviour, and Anderson's behavioural model used in conjunction with disease affliction and quality factors.

The study used the Bayesian 2-Stage hurdle model to measure the catastrophic health expenses incurred by households on NCD. Such a regression model has not been used in the Indian context to test the comparative impact of disease affliction on households incurring catastrophic health expenditures. The usage of this methodology allowed us to first examine the relative probability of a household incurring catastrophic health expenditure due to the various NCDs. Meanwhile, in the second stage, it allowed us to undertake regression to ascertain the amount of CHE incurred by only the isolated set of households that had incurred a CHE.

In terms of primary evidence found in the study for theoretical concepts, the study brought to light the dynamics concerning household consumption behaviour when afflicted with various NCDs. The study found that households afflicted with NCDs undertake

consumption smoothing. There is a greater decrease in consumption expenditure when the household is afflicted with CVD and CKD. In contrast, there was an increase in consumption spending of households afflicted with Diabetes and Cancer, which could be explained by an increase in the food expenditure incurred due to altered diet patterns, which come at a premium cost.

The study also revealed insights from a comparative analysis undertaken to examine the impact of disease affliction on the probability of losing employment. It was found that patients afflicted with CKD had the highest probability of losing employment, while for Diabetes, the probability of losing employment was the lowest since Diabetes patients were able to adapt to their disease in their lifestyle.

A comparison of disease affliction and investment behaviour has not been extensively studied in the Indian context, despite the literature on the significant link between the two. Investments by household were strongly associated with the number of members with an NCD within a household. The proportion of households making investments more than halved when the number of diseased individuals in a household rose by more than one in the sample under study.

The study also established evidence of Anderson's behavioural model by testing the impact of quality factors and utilization of government schemes (*Enabling factors*), demographics such as education (*Predisposing factor*), and disease affliction (*Need factor*) on the choice of healthcare facility. All three factors were found to significantly impact the choice between public and private sector facilities, thus indicating evidence of the model.

However, there were certain elements for which responses were sought but not directly used in the current study. The respondents were asked if the illness had led to any other complications, whereby most respondents reported mental health issues, loss of sleep, and appetite. The impact of NCDs on mental health is significant, with nearly 20% of the respondents reporting this issue among those surveyed. Living with non-communicable diseases that are chronic, painful, or incapacitating might cause more stress and mental health issues, and literature has been advocating for creating models that integrate these impacts into the overall calculation when estimating losses due to NCDs. However, such an analysis merits a deeper and preferably a new research study that uses methods such as Structural Equation Modelling to gather more precise insights from these linkages. The current study does not delve into these issues but, as a way forward, proposes to include

such impacts in future studies. Subsequently, issues such as loss of sleep and appetite can have far-reaching effects on the energy levels of a patient and his/her ability to carry out their daily task and efficiently perform economic activities. While it is tough to estimate the direct impact of these issues on losses due to NCD, it is essential to account for the same. Thus, the study recognizes the impact of such health complications and suggests including the impact of morbid conditions and non-disease complications that are accompanied by the incidence of NCDs in the future scope of the study.

The survey also asked the respondents if the NCD had led to a change in their job on account of the illness, whereby 7% of the respondents reportedly had faced a change in job. This presents us with a different dynamic that sometimes NCD-related complications can lead to the patient switching jobs and not losing employment. One can find two possible outcomes in such a scenario- a. a person settles for a lower paying job; b. a person settles for a different job at the same or higher pay that can enable them to lead their lives while coping with NCD-related health complications. In the former case, one can expect a higher loss of earnings in comparison to the latter. Such kind of employment functionality adjustments presents a different avenue for analysis that has not been explored in the current study. The author proposes that this phenomenon merits a different study that builds on a theoretical framework of employment smoothing in the event of NCDs.

The survey investigated if the respondents had postponed their medical treatment, wherein nearly 16.5% of the sampled respondents reported having postponed. This is a significant number which outlines that sometimes the high out-of-pocket expenditure poses a burden and impacts health care utilization by patients. Such postponements can increase the severity of the disease and lead to even a higher expenditure burden in the future when medical intervention is conducted. A postponement of medical treatment can be considered as two different case accounts- a. postponement of medical treatment of a patient when the case is highly severe and; b. postponement of medical treatment of a patient when the severity of the disease is low. While the former case may result in mortality counts increasing, the latter impacts the morbidity counts of the population. High out-of-pocket thus has a two-way impact on morbidity and mortality and thus must be studied through a process of repeated cross-sectional surveys over a longer time period. The current study relies on a cross-sectional survey, and thus avenue has not been explored. As a way forward, the author suggests that medical postponement must be studied as an inter-temporal event to gather precise outcomes on morbidity and mortality on account of NCDs.

Expanding on the aspect of high out-of-pocket expenses, the study also elicited responses on the source of funding. While the study empirically analyses funding from sources such as savings, borrowings, and liquidations, it has excluded the funding from non-conventional sources such as crowdfunding programs, e.g., Milap, Impact Guru, Ketto, etc. Global digital connectivity has increased manyfold in the last couple of years, with patients relying on donations from digital crowdfunding platforms marketed via social media. While the percentage of respondents in the current survey opting for such crowdfunding modes was low a proliferation of such modes at a large scale is usually seen. The study has not explicitly investigated the role of crowdfunding in coping with high out-of-pocket medical expenses. The author proposes that such an investigation must be made at a larger scale with a sample of more than 400 respondents.

The study also found a sizeable number (49%) of respondents travelling to different hospitals outside the state of Goa for medical treatments. Considering the distance and time taken for such treatments are greater, a separate research question that must be formulated that investigates why patients opt for medical treatments that are not located in proximity to the area of residence even though nearly 19% of the respondents reported this factor to drive their choice of healthcare. Some of the hospitals visited by such respondents were KLE(Belgaum), Manipal (Uddupi), and hospitals in Mumbai such as Tata Hospitals, Hinduja, Fortis, Holy Family, and Nanavati. Considering the high distance travelled for such medical interventions, targeted inquiries must be made to gather insights on infrastructural deficiencies experienced by Goan households while also addressing that sometimes patients prefer going to hospitals where they have a personal connection even if they are outside the state of Goa. Further, the survey also questioned respondents on the time and distance travelled by patients for medical treatments. While the responses have not been used directly in the empirical investigation, the author recognizes that these responses could have been used to estimate the number of hours and, subsequently, indirect cost. The empirical investigation undertaken in the current study uses the number of days of work missed due to hospitalization/ clinical visits to estimate indirect costs.

Lastly, the current study recognizes that factors associated with the severity of a specific disease have a strong bearing on out-of-pocket expenses, employment, consumption, savings, income, and choice of healthcare. However, considering that the severity of a disease is an epidemiological factor that is tough to quantify in the absence of a medical academic background, it has been kept outside the scope of this study. As a future scope of

work, the study can incorporate a more detailed epidemiological grounding to analyze how the severity of the NCD impacts households.

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APPENDIX

A study on

"Non-Communicable Disease Burden and its

Economic Impact on Households in Goa"

This is a part of the research work related to the Ph.D. degree of Ms. Rivya Dias (Assistant Professor, Department of Economics, Carmel College for Women.), Research Scholar, under the guidance of Dr. Silvia M de Noronha, Professor, Dept. of Economics, Goa University.

QUESTIONNAIRE

Note: The undersigned is involved in research concerning the topic mentioned above, which will lead theresearcher to her Ph.D. degree. Information provided will be solely used for RESEARCH/ACADEMIC PURPOSE ONLY. I assure you that personal information or identity will not be disclosed or revealed. Confidentiality will be maintained at all times, and privacy will be respected. This questionnaire is to be filled out voluntarily. There is no compulsion on anyone of any type to answer the questionnaire. Answering the questionnaire will be construed as answering willingly, with full consent, and out of one's own free will. Thank you in anticipation for your time, cooperation, and valuable input.

Rivya Dias
Research Scholar
Goa Business School

Section A

General Information on the Household

a. District: North Goa ☐ South Goa ☐

b. Household Location: Rural ☐ Urban ☐

c. Household Residence:_____(Taluka/ Village/ City)

d. Household Head: Male ☐ Female ☐

e. Age of the Household Head _____

f. Religion: Christian, Hindu ☐ Muslim ☐ Other ☐ _____

g. Does your household belong to any of the following categories?

- ☐ Scheduled Caste
- ☐ Scheduled Tribe
- ☐ Other Backward Class
- ☐ General

h. What is your marital status? Please circle the appropriate answer

- ☐ Single
- ☐ Married
- ☐ Separated
- ☐ Divorced
- ☐ Widowed
- ☐ Other (specify)_____

i. Which of the following best describes your leading work status over the past 12 months?

- ☐ Government employee
- ☐ Non-government employee
- ☐ Self-employed
- ☐ Student
- ☐ Homemaker
- ☐ Retired
- ☐ Unemployed (able to work)
- ☐ Unemployed (unable to work)

j. How many people, including yourself, live in your household? _____

k. Educational Qualification of Household Head _____

l. Highest educational qualification attained by any Household member._____

m. Number of non-working members or dependents present in the household, including children, sickand older adults: _____

n. Type of house: a] Pucca ☐ b] Semi-Pucca ☐ c] Kutcha ☐

(Pucca-: Tiled/cemented flooring, roof & cemented walls; Semi-pucca: temporary roofs, cemented floor or walls (any one); Kuccha: thatched roofs, mud walls, and no proper flooring)

o. Total number of members diagnosed with NCD: _____

Age of the 1st patient _____

Age of the 2nd patient _____

Age of the 3rd patient _____

p. Which among the following diseases/ illnesses do you suffer from?

- ☐ Diabetes
- ☐ Thyroid
- ☐ Cancer
- ☐ Cardio Vascular diseases (heart diseases)
- ☐ Chronic Kidney Disorder
- ☐ Stress/Hypertension

SECTION B

1.1) How do you travel to the clinic or hospital? (And back)

- ☐ Walk
- ☐ Cycle
- ☐ Bus
- ☐ Train
- ☐ Taxi
- ☐ Private car
- ☐ Motorbike
- ☐ Hospital car
- ☐ Other (please specify)_____

1.2) What was the cost of a one-way fare? _____

1.3) Did you have to pay any parking fees? Yes ☐ No ☐

1.4) How long did it take to travel there from your home? Hours ☐ Minutes ☐

1.5) What would you otherwise have been doing as your main activity if you had not visited the clinic or hospital?

- ☐ Housework
- ☐ Childcare
- ☐ Caring for a relative or friend
- ☐ Voluntary work
- ☐ Leisure activities
- ☐ Attending school or college
- ☐ On sick leave
- ☐ Seeking work
- ☐ Paid work
- ☐ Other (please specify)_____

1.6) Were you accompanied by anyone on your visit? Yes ☐ No ☐ If Yes, specify _____

1.7) If yes, what was the cost of a one-way fare? _____

1.8) What would the companion do if they had not accompanied you? _____

1.9) What is the main occupation of the companion? _____

1.10) How frequently do you visit a medical practitioner? _____

The following questions are to be answered only if dependents and children are to be looked after.

1.11) When you visit the hospital/ clinic/ practitioner, do you get someone to look after your child/children or other dependents? Yes ☐ No ☐

1.12) How many hours and minutes do they spend looking after your child/children orother dependents while you are at the hospital/ clinic/ practitioner?

Hours ☐ Minutes ☐

1.13) Do you pay the caregiver? Yes ☐ No ☐

If yes, how much? _____

1.14) How far is your place of residence from the hospital/ clinic/ practitioner? in km_____

1.15) How often do you have to purchase your medicines? _____

1.16) How much do you have to spend every time you purchase medicines? _____

1.17) What is the cost per laboratory test you must undergo? _____

1.18) How often do you have to do such tests? _____

1.19) Does your insurance cover such medical expenses? Yes ☐ No ☐

1.20) In the last one year, were you/any member of the family hospitalized? Yes ☐ No ☐

1.21) How long was your hospital stay?_____days/ Month

1.22) What was the total cost incurred during this stay? _____

1.23) Have you postponed medical treatment at the time of illness at any time during the last year?

Yes ☐ No ☐

If yes, state the reasons for the postponement of medical treatment

- ☐ Lack of money
- ☐ Lack of time
- ☐ Lack of medical facilities
- ☐ any other reason_____

1.24 With reference to the illness, do you spend on medical instruments?

i. Glucometer ☐ _____

ii. Test strips for Diabetes ☐ _____

iii. Blood pressure monitor ☐ _____

iv. Inhalers ☐ _____

v. Any other, please specify_____

1.25 Has your illness led to other complications? _____

- Vision problems
- Skin allergies
- Hair loss
- Mental stress
- Forgetfulness
- Lack of sleep
- Loss of appetite

1.26) Expenditures incurred on:
Dialysis_____
Eye treatments_____
Gangrene_____
Skin Allergies _____
Blood Transfusions_____

1.27) Did you have a change in your dietary pattern as a result of the illness? Yes ☐ No ☐

1.28) If yes, the level of expenditures _____

Household Earnings

1.29) Taking the past year, what have been the average earnings of the household?
_____

1.30) Source of income and the amount.
a. Wage income_____
b. Non-wage income_____
c. Total household income from all sources_____

1.31) Measures to cope with the financial burden.

- ☐ No Selling or Borrowing
- ☐ Sold House property
- ☐ Sold Jewellery
- ☐ Sold Bonds/ Shares
- ☐ Sold Vehicles
- ☐ Sold Household Items
- ☐ Sold Cattle/ Livestock
- ☐ Crowdfunding
- ☐ Savings

If funds were raised through borrowing, specify _____

Total amount of money raised _____

1.32) Does the Household own the following items?

☐ Land	☐ Music System	☐ House/ Flat
☐ Farm Equipment	☐ Mobile phone	☐ Laptop
☐ TV	☐ Washing machine	☐ AC
☐ Refrigerator	☐ Fan	☐ Well
☐ Car	☐ Scooter	☐ Any other _____

1.33) Did you avail of any loan facility to meet medical expenses after the diagnosis?If yes, (amount)_____

1.34) Do you have medical insurance? Yes ☐ No ☐

1.35) How did you meet medical expenses; in case the insurance limit was exceeded?

Amount Exceeded: _____

1.36) Did you liquidate other insurance policies/ mutual funds or Fixed deposits to fund for the treatment?

Yes ☐ No ☐

State the amount: _____

SECTION C

2.1) On account of the illness, how many days of work have been missed in a year?

- ☐ Once or twice every month
- ☐ Once in three months
- ☐ Once in six months
- ☐ Every time I have an appointment (How many times?)
- ☐ _____

2.2) In the case of earned leave, what is the amount of income loss? _____

Did you lose your earnings due to the visit to the hospital or clinic? Amount lost _____

2.3) *If not working*: Did you stop working because of your illness?

- ☐ Yes ⟶ How many hours per week would you work otherwise? _____
- ☐ No

2.4) Was there a change in the job on account of illness? _____

Household Savings and investments

2.5) Did the Household save in the last one year? Yes ☐ No ☐

2.6) What were the savings of the Household in the last one year? _____

2.7) Do you have any Short term/ Long term investments? _____

2.8) Type of Investment

- FDs/RD
- Insurance
- Jewelry
- Land/Commercial Real Estate/ Residential Property
- Mutual Funds or Managed Investment accounts
- Post office savings
- PPF
- Shares/ Bonds

Any other _____

Household consumption expenditure

2.9) Expenditure on Food items in the last month._____

2.10) Expenditure on Non- Food items in the last month._____

2.11) Has the disease led to a fall or rise in consumption expenditure?

Items	YES	NO
Food		
Clothing/Footwear		
Durable Goods		
Education of Children		
Repair and maintenance of house/ vehicle/ cattle shed.		
Entertainment (Movies, Picnics, etc.)		

SECTION D

3.1) Have you availed of any government scheme to cater to medical expenses? Yes ☐ No ☐

If yes, - DDSSY ☐ Mediclaim ☐ PMJAY ☐ Aam Admi Bhima Yojana ☐ Free Medicines ☐

Do these Schemes cover all your medical costs associated with the illness? Yes ☐ No ☐

3.2) Which healthcare facility do you prefer?

Private health facility ☐ Public health facility ☐

3.3) What are the possible reasons that you prefer going to a government hospital?

- ☐ Proximity to residence
- ☐ Timely treatment
- ☐ Efficiency of staff
- ☐ Less waiting hours
- ☐ Clean environment
- ☐ Privacy

Any other _____

3.4) What are the possible reasons that you prefer going to a private hospital/clinic?

- ☐ Proximity to residence
- ☐ Timely treatment
- ☐ Efficiency of staff
- ☐ Less waiting hours
- ☐ Clean environment
- ☐ Privacy

Any other_____

Choice based on what is marked in 3.2

3.5) Did you visit another hospital outside the state of Goa? Yes ☐ No ☐

If yes, then proceed to the following questions.

a. Name of the Hospital: _____

b. Location of the Hospital: _____

c. Private or Government: _____

d. Cost of hospital stay: _____

e. Cost incurred on treatment: _____

f. Cost incurred on medicines: _____

Is there anything else that you wish to specify? _____

Any suggestions for improving health facilities in Goa? _____

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