



**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF PUBLIC HEALTH**

**IMPACT OF NON-COMMUNICABLE DISEASE MULTI MORBIDITY ON
HEALTH CARE UTILIZATION AND OUT - OF - POCKET HEALTH
EXPENDITURE AT TIKUR ANBESSA SPECIALIZED HOSPITAL
ADDIS ABABA, ETHIOPIA, 2020.**

BY:-MIZAN HABTEMICHAEL

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**December, 2020
Addis Ababa, Ethiopia**



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LIST OF ABBREVIATIONS AND ACRONYM

AA:	Addis Ababa
CHE:	Catastrophic Health Expenditure
CNCD:	Chronic Non Communicable Disease
COPD:	Chronic Obstetric Pulmonary Disease
CVD:	Cardiovascular Disease
DM:	Diabetic Mellitus
ETB:	Ethiopian Birr
HH:	Household
HIC:	High-Income Countries
IPD:	Inpatient Department
LMIC:	Low and Middle-Income Countries
NCD:	Non Communicable Disease
NCDMM:	Non Communicable Disease Multi morbidity
OPD:	Out Patient Department
OOP:	Out - Of-Pocket
SDG:	Sustainable Development Goal
TASH:	Tikur Anbesa Specialized Hospital
WHO:	World Health Organization

SUMMARY

Background: Out - of – pocket (OOP) health payment is the least efficient and most inequitable means of financing health care. In Ethiopia from the total health expenditure, OOP payment by household accounts 31 % which is more than the recommended 20%. Even though there are studies conducted on burden of OOP due to deferent NCDs like, cardiovascular disease, Cancer, diabetes mellitus and mental illness, there is no figure regarding the financial burden of OOP expenditure due to having more than one NCD (Multimorbidity).

Objective: The study assessed the impact of NCD multimorbidity on health care utilization and OOP expenditure at Tikur Anbesa Specialized hospital, Addis Ababa in 2020.

Method: Facility-based cross-sectional study was conducted at Tikur Anbesa Specialized Hospital from May 2020 to July 2020. Data was collected using pre-tested, structured interviewer-administered questionnaire. Data were entered using epi data version 3.1 and analyzed using STATAV 14. Binary logistic regressions, multivariable logistic regressions and negative binomial regression was used to examine the association between variables.

Result: A total of 392 respondents were participated in this study and prevalence of NCD multimorbidity was 67 % (95%CI 62.2-71.5). The frequency of OPD visits was associated with the number of NCD (IRR= 1.2, 95%CI; 1.15-1.25, P-value < 0.001) and an increased number of NCDs was also associated with a higher likelihood of having hospitalization (AOR= 1.5, 95%CI; 1.19- 2.00, P-value < 0.001). We found 30.7% and 12.9% of households incurred catastrophic health expenditure (CHE) at 25% and 40% threshold of total household expenditure respectively. At a threshold level of 25% and 40% of household non-food expenditure, the level of catastrophic payments was 61.2% and 38.7% respectively.

Conclusion and Recommendation: Multimorbid patients came to health facilities more frequently and they were exposed to increase financial problems. CHE mostly affected those households with older member, unemployed member, family member who came from outside of Addis Ababa to get health care services. Respondents who were in the poorest wealth quintile, those who have increased number of NCD conditions, those households with a hospitalized member, household who was not a member of an insurance system, those who use both public and private health facilities, and patients who visit a health facility frequently were affected by CHE. NCD multimorbid patients should be prioritized in the implementation of financial risk protection mechanisms.

1. INTRODUCTION

1.1 Background

Multi morbidity is the presence of two or more co-existing chronic diseases in an individual (1). Non communicable disease multimorbidity (NCDMM) has a strong and lifetime impact on the lives of those affected and it is unlikely to be cured. As compared to a single health conditions, multimorbidity has complex health care needs , increased Out of Pocket (OOP) expenditures and higher health service utilization than people with a single condition due to more frequent and longer hospitalizations, readmissions, and repeated physician visits (2).

Sustainable Development Goal (SDG) target 3.8 aims to achieve Universal Health Coverage (UHC) by the year 2030. It includes financial risk protection, access to quality essential health-care services, and access to safe, effective, quality, and affordable essential medicines and vaccines for all (3). Attaining UHC is a work program priority for the World Health Organization (WHO) over the next decade by considering it to be foundational in accomplishing most of the other health-related SDGs (4).

Catastrophic health expenditure (CHE) is one indicator of financial risk protection which asks if people suffer financially as a result of having to pay for the health services they need (5). OOP payments for health care are judged to be “catastrophic” when they exceed a given fraction of a household’s income or expenditure. There are different thresholds levels which are considered to calculate CHE (6).

WHO envisions seeing more that 1 billion people benefiting from UHC by 2023, yet every year, almost 100 million people are pushed into extreme poverty because of high OOP health spending and the OOP payments because of Non-Communicable Diseases (NCD) has a major contribution. Due to this, NCDs are considers as an important and growing causes of health inequalities in the world. They impose large economic burdens on households through OOP expenditures on health and it is being an important impediment against efforts to alleviate poverty (7).

1.2 Statement of the problem

The global NCD burden remains high and it is a major problem worldwide. In 2016, NCDs were responsible for 41 million of the world's 57 million deaths and 80% disability. Around 15 million of these deaths were premature (30 to 70 years). This Burden is greatest within LMICs, where 78% of all NCD deaths and 85% of premature deaths occurred (8, 9). More than 25% of the world population on average suffer from multimorbidity, and this figure is expected to increase in the coming years (2). Studies on the prevalence NCD multimorbidity have been conducted globally and showed that, multimorbidity is far more prevalent than single health condition alone.

There is also a growing prevalence of NCD multimorbidity in Low and Middle-Income Countries (LMICs) but little attention is given to its impacts on individuals. It is known that most LMICs have comparatively low levels of public spending on health and imperfect health insurance and this problem is accompanied by an individual's OOP payment on health (1). Due to this the economic impact of NCD multimorbidity and its implications for financial stress is an emerging area of research inquiry (10).

Despite the growing prevalence of multi-morbidity, little attention has been given to its implication on individuals, households, and the health systems. There is also evidence that shows multimorbidity is a strong predictor for higher health care utilization with increased likelihood of hospital admission (1, 10). Therefore, in order to ensure equity in financial protection it is crucial to understand the financial burden on patients with non-communicable disease multimorbidity (NCDMM) (11, 12).

OOP health payment is known for being the least efficient and most inequitable means of financing health care and it prevents people from seeking medical care (13). This high OOP payment for health care meant that many people face the tragic choice of either forgoing treatment or incurring financial hardship with the onset of illness (14).

Catastrophic healthcare expenditures are ruining families around the world, around 808 million people spend more than 10% of their household budget on health care, and almost 100 million people are pushed into extreme poverty each year because of OOP health expenses(3). Even though OOP below 15-20% of total health expenditure is a good indicator to reduce the risk of catastrophic health spending, in 2013, globally 32% of total health expenditure came from OOP payments also in many countries OOP payments are still too high(6). Due to this, they will decide not to seek the health care they need, which may lead to depreciated health status and decrease productivity, which will worsen the economic status of the population (15).

NCDs create inequity within and across countries. Failing to provide financial protection for the high medical costs of NCDs treatment can aggravate impoverishment and degrade the living status of the poor (7). Evidence shows that these OOP payments adversely affect particularly those people having more than one chronic illness (1).

There is evidence that NCDs create inequity within and across countries; both the poor and non-poor experience financial catastrophe from NCD related medical care. Failing to provide financial protection for the high medical costs of NCDs treatment can aggravate impoverishment and degrade the living status of the poor (7). In the case of Ethiopia, According to 2018's NCD country profile, in Ethiopia by the year 2016, out of 700,000 total deaths, 270,000(39.1%) was because of NCD and 18% of this death was premature (occurred between the age of 30 and 70). Among the deaths, 16% was because of Cardiovascular disease (CVD), 7% cancer, 2% chronic respiratory disease, and diabetes mellitus each (16).

By the year 2040, Ethiopia will be the first among the most populous nations in Africa to experience a dramatic burden of premature deaths and disability from NCDs(17). Yet, these disease conditions are underestimated; the national response to NCDs is insignificant. The government total health spending for NCDs since 2013/14 was only 12% and share for preventive care was 0.3% (18).

In Ethiopia ,As stated in National Health Account in 2016/17, from the total health expenditure, OOP by households accounts for 31% (18).A study conducted in Ethiopia that assessed the cause

of medical costs observed substantial burden due to OOP direct medical costs for a large number of non-communicable diseases (e.g., ischemic heart disease, asthma, stroke) which led the population to substantial poverty (19). There are also studies that are conducted on the magnitude of CHE for the treatment of different NCD conditions. For instance a study carried out in Addis Ababa on OOP payment for cancer treatment found out that, 74.4% of patients experienced CHE(20). Similarly 27% of CVD patients in Addis Ababa faced CHE(21) .

Moreover, in Addis Ababa 54% of the very low-income grouped and 24% of the very high-income grouped Diabetic mellitus (DM) patients experienced CHE (22). Similarly in Sodo district, in southern Ethiopia, 32.2% for households with a person having mental illness faced CHE due to OOP expenditure (23). Yet, there is no figure regarding the financial burden of out of pocket expenditure for treatment of NCD multimorbidity and the extent of CHE. Therefore, the finding from this study provides current evidence related to magnitude of CHE due to OOP payment for the treatment of NCD multimorbidity conditions and it contributes an input to fill the information gap on the issue.

1.3 Significance of the study

NCDs create inequity within and across countries. Failing to provide financial protection for the high medical costs of NCDs treatment can aggravate impoverishment and degrade the living status of the poor (7). Evidence shows that these OOP payments adversely affect particularly those people having more than one chronic illness (1). Even though there are studies done on the burden of OOP payment for the treatment a single NCD in Ethiopia, to the best of our knowledge, there is no study or comprehensive studies done regarding having more than one NCDs. Therefore, this study provides useful empirical information about the financial burden due to OOP payment for the treatment of NCDMM. Moreover, the study could also give future directions for other studies.

2. LITERATURE REVIEW

2.1 Overview of Non-Communicable Disease

Non-communicable diseases are also known as chronic diseases and they are characterized by long duration and slow progression. They cause premature morbidity, dysfunction, and reduced quality of life. They also have complex etiology (causes), multiple risk factors, long latency period, Non-contagious origin (non-communicable), prolonged course of illness, and functional impairment or disability. Key behavioral risk factors for NCDs are the harmful use of alcohol, tobacco use, dietary behavior, and physical inactivity (16, 24).

In 2016, WHO's NCD country profile stated that in Ethiopia , by the year 2016 ,from the total annual mortality 39% was due to NCD (16). The major NCDs responsible for world 57 million deaths are CVD (17.9 million deaths, accounting for 44% of all NCD deaths and 31% of all global deaths) , Cancers (9 million deaths, 22% of all NCD deaths and 16% of all global deaths), Chronic respiratory diseases (3.8 million deaths, 9% of all NCD deaths and 7% of all global deaths), and DM (1.6 million deaths, 4% of all NCD deaths and 3% of all global deaths) (8, 16).

2.2 Chronic Non-Communicable Disease Multimorbidity

No consensus of the definition of multimorbidity yet exists, but the most common definition is the presence of multiple co-occurring chronic health conditions without an index disease in a given person (2). The WHO also defines multimorbidity as 'being affected by two or more chronic health conditions in the same individual (25).

Irrespective of its difference in definitions, multimorbidity appears to be common, well recognized and important epidemiologic phenomenon for at least 40 years worldwide. It has a negative impact on the health and wellbeing of the population. Treatment management for Multi morbid patients can be very complex due to numerous medications, potential drug interactions, and numerous healthcare partners. So it is highly associated with increased healthcare utilization and expenditure (25-27).

NCDMM is becoming common and challenging to most high-income countries (HICs) and many LMICs. In European Union countries at least 50 million people are affected by NCDMM. It is also increasing in LMICs, where there are already fragile healthcare systems (25). A study conducted in Scotland found out that 54.9% of the respondents with NCD had multimorbidity. Similarly in Australia general population, the prevalence of multimorbidity has ranged from 13.1% to 71.8% (2, 28). According to a recent systematic review of the patterns of multimorbidity in HICs, the overall prevalence of multimorbidity was 66.1% , 59.6% being in the United States, and 59.4% in Canada (29).

In 2016, cross country review on multimorbidity indicated that chronic multimorbidity has been estimated to affect up to 95% of the population aged 65 years and older (30). In Spain, the percentage of the population with multimorbidity is 23.61%, representing 55% of patients with any chronic condition like Chronic Obstructive Pulmonary Disease (COPD), DM, ischemic heart disease, and heart failure being the leading cases (31).

The results of the study in India also indicated that the prevalence of multimorbidity was 57%. Hypertension and diabetes were two of the most common combination of NCDs reported in this study (32). Similarly, by the year 2014, 76.6% of Switzerland's population had two or more CNCD conditions (10). In the UK, 23.2% of the population visiting a general practitioner had at least two chronic NCD conditions(26).

Another study in Middle Income Countries (MICs) found out that in 2015, the prevalence of multimorbidity was 16.3 % in Ghana, 29% in South Africa, 29.6% in Mexico, 30.4% in India, 38.0% in china and 66.2% in Russia (1). A cross sectional study conducted in south Ethiopia among 227 adult patients found out that the prevalence of multimorbidity was 17.6 (33).

2.3 Chronic Non-Communicable Disease Multimorbidity and Level Healthcare Care Utilization

People with multimorbidity have complex health care needs compared to those with a single health condition. Studies have found out that healthcare service utilization significantly increases with each additional disease condition. A study that assessed the effect of NCD multimorbidity on healthcare utilization in six MIC showed that, outpatient visits increased from 51% for those who don't have NCD to 72% for those with multimorbidity. The average number of outpatient visits increased from 1.45 for those without NCD to 4.15 for those with multimorbidity. And the mean number of hospital days increased from 0.07 for those without any NCDs to 0.25 for those with multimorbidity (1, 2).

Another study done in India found out a strong correlation between several NCDs and health care utilization for both outpatient and inpatient services. Outpatient visits increased from 71% in those without NCDs to 83% in those with more than one NCDs. Overnight hospital stay also increased from 9% in those with no NCDs to 29% in those with more than one NCD. Similarly, in Switzerland, 98.5% of patients with multimorbidity had at least one consultation compared with 68.7% in the non-multi morbid. Additionally, multimorbid patients were 5.6 times more likely to be hospitalized compared to the non-multi morbid sample. The proportion of patients who had at least one hospitalization in this same year was 21.9% in the multimorbid versus 3.9% in the non-multi morbid sample (10, 28).

In China, multimorbidity was associated with more frequent health service use for both outpatient and hospitalization days. In 2010, outpatient visits increased from 46% for those who do not have NCD to 63% for those with more than three NCDs. Similarly, in South Africa, the number of respondents who had an outpatient visit rose from 26% for those without NCD to 81% for those with multimorbidity (1, 12).

2.4 Catastrophic Out of Pocket Health Expenditure for Chronic Non-Communicable Disease Multi morbidity

People with NCD multimorbidity have higher overall health service utilization, including more frequent and longer hospitalizations, readmissions, physician visits, and high costs than people with a single condition (2). These results severe economic consequences for patients and their households, mainly due to the financial burden associated with OOP costs for medical and health-related care(34).

In Spain 42.92%of the population had chronic NCD and 23.61% of patients have multiple conditions and they account for 63.55% of total healthcare expenditures. Similarly in the United States, two-third of the highest cost patients had multiple chronic conditions, and multimorbidity treatments are very expensive and add extra burden on the patients (30, 31).

One study in Pakistan was conducted to assess the relationship between OOP spending for NCD medication. Their result showed that patients who have used both blood pressure and diabetic medication found to face CHE by paying 120% higher money than that of patients that do not spend on blood pressure and diabetic medication (35). Similarly in Switzerland, mean total health care costs were 5.5 times higher in the multimorbid patients compared to those with none or only one chronic condition (10).

Studies in China and India showed a person with multimorbidity has the highest proportion of OOP expenditures, 83.5% and 61.0% of their income respectively (1). Similarly in India, multimorbid patients were highly dependent on their caregivers for financing their long-term healthcare needs(36). Moreover, a study in Europe on pharmaceutical expenditure has found a 49.3% variation between those patients with only diabetic and those with multimorbidity. It shows health expenditure has a rising trend corresponding to the increase in multimorbidity (37). In line with this, a study in China also found out that multimorbidity had a significant impact on CHE(12).

2.5 Determinant Factors

During literature review, it was observed that the following factors are determinants for facing catastrophic out-of-pocket payment due to chronic non-communicable multimorbid patients.

Socio-demographic and Economic Factors

In many literature, socio-demographic and economic characteristics were found to be determinant factors for increased catastrophic OOP. A study in the USA has showed that elderly patients with three or more NCDs have used five or more prescription drugs, indicating that the cost of drugs led to CHE due to OOP spending by patients (38). In Switzerland there was a significant interaction between age and gender, total costs increased by 9-10% in men aged 70 - 84 years when compared to men aged 65 to 69 years. And being female was associated with lower OOP costs (10).

In Spain, the total healthcare cost of those with multiple chronic conditions in the deprived socioeconomic group is significantly (25%) higher than that of individuals in the most favorable socio-economic group (31). In a study conducted in Kenya, the poorest households in rural areas were found to be highly affected by the highest cost burdens for treating CNCDs and they incurred potentially catastrophic cost burdens (39). In China and India research also revealed that the impact of multimorbidity on CHE was greater for individuals who are elderly and with lower levels of income (12, 36).

Number of Non Communicable Disease

The annual average cost for patients with one chronic disease is higher than that for people with none, while the effect of adding a second, third, or fourth disease becomes progressively more expensive. A study in Australia found a relationship between the number of chronic conditions and OOP spending on health. As the number of CNCDs increased people tend to spend catastrophic OOP expenses. In Switzerland for each additional chronic condition OOP Cost related to multimorbidity increased by 32.6%. In the United States, average OOP spending was almost five times higher in persons with more than three NCDs compared to those without any NCDs (1, 10, 31, 34).

Level of Health Care Utilization

Studies found that an increased number of OPD visits and the presence of hospital admission were determining factors for experiencing CHE. A study conducted in Iran on household CHE found for one additional OPD visit the likelihood of facing CHE increased 1.5 times (40). Regarding hospital admission, in an Indian study, there was evidence that more hospitalization associated with multimorbidity is likely to increase the cost of households which might make them drawn below the poverty line because of healthcare costs. In Addis Ababa, the odds of facing CHE among inpatient subjects were about eight times that of the outpatient subjects (1, 21, 28, 32).

Insurance Status

In India, there was a greater burden of chronic multimorbidity conditions on OOP spending even for those who have health insurance (1, 12). But in China, people without health insurance were 7 times more likely to experience CHE payments. Similarly, in one Ethiopian study in Northeast Showa insured households were 81% times less likely to incur CHE (14, 41).

Type of Facility

Regarding the type of health facility choice, findings show that choosing a private facility has an association with incurring CHE. A study in Bangladesh showed a risk of catastrophic expenditure was higher for private than public facilities (42). Similarly, in Iran they found that The type of hospital is a significant factor regarding catastrophic OOP expenditure (43). Another study conducted in Addis Ababa showed that , compared to public hospitals, those who visit private hospitals had higher odds of CHE by 20 times (OR=20.7, 95%CI (10.2, 42.04) p value<0.001) (21).

2.6 Conceptual Framework

The following conceptual framework (Figure 1) is developed from different literature and it was used for this study. It describes the relationship between the dependent variables, out - of - pocket payment, frequency of OPD visit and hospitalization status and independent variables, such as socio-demographic characteristics, socioeconomics characteristics, insurance status, and type of health facility, hospitalization status, frequency of hospital visits, and number of NCDs.

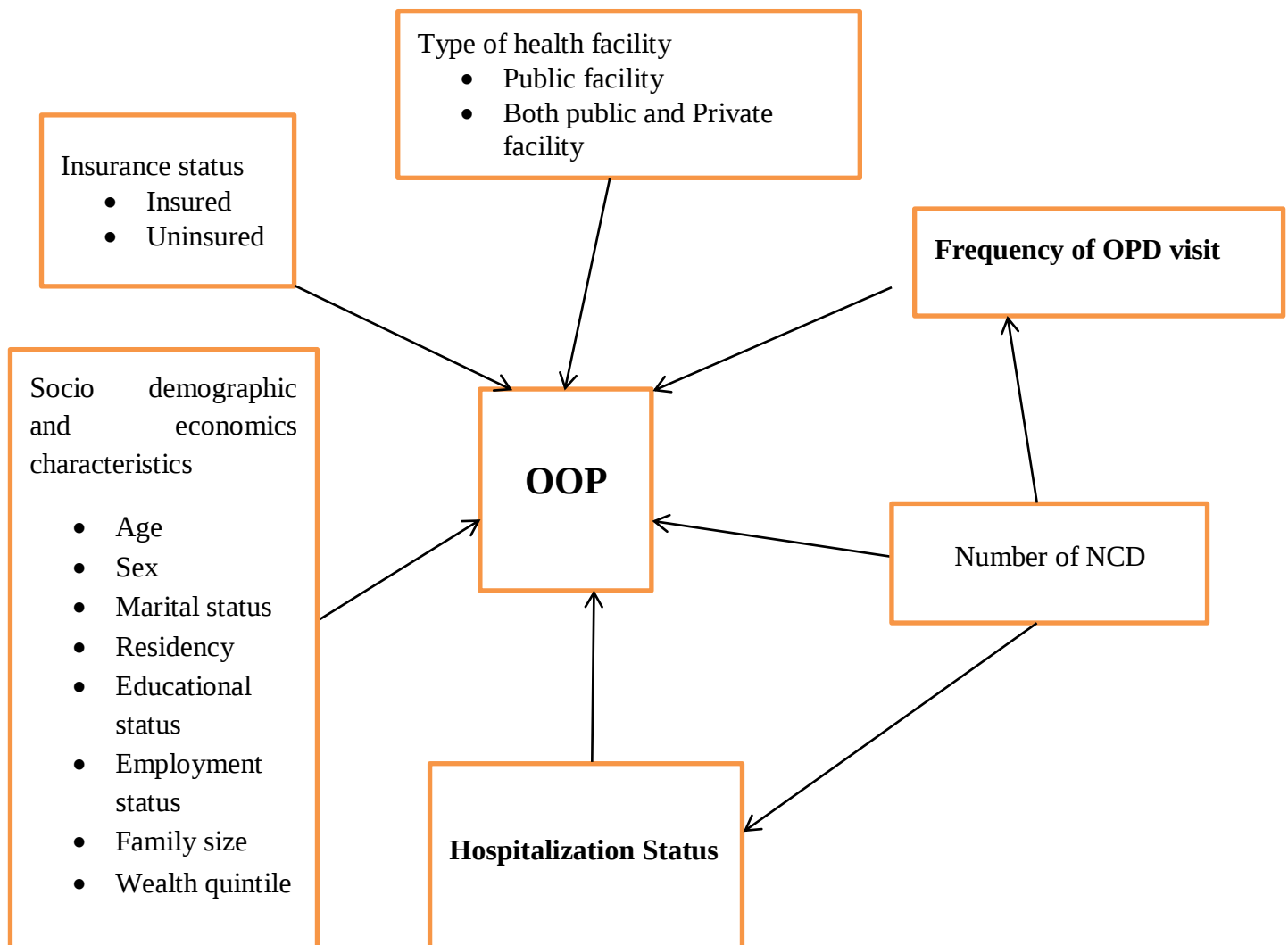


Figure 1: Conceptual framework on factors affecting out - of - pocket expenditure and level health care utilization among non-communicable multimorbid patients (developed from different literature)

3. OBJECTIVE

3.1 General Objective

To assess the impact of non-communicable disease multimorbidity on health care utilization and out-of-pocket health expenditure at Tikur Anbesa specialized hospital Addis Ababa Ethiopia 2020.

3.2 Specific Objectives

- To determine the prevalence of multimorbidity at Tikur Anbesa Specialized Hospital.
- To describe the association between level of health care utilization and non-communicable disease multimorbidity at Tikur Anbesa Specialized Hospital.
- To determine the level of out of pocket health expenditure for the treatment of non-communicable disease multimorbidity at Tikur Anbesa Specialized Hospital.
- To assess the magnitude of CHE among non-communicable disease multimorbid patients at Tikur Anbesa Specialized Hospital.
- To identify factors associated with catastrophic health expenditure due to non-communicable disease multimorbidity at Tikur Anbesa Specialized Hospital.

4. METHOD

4.1 Study Area and Period

The study was conducted at Tikur Anbesa Specialized Hospital (TASH) which is largest specialized and referral public hospital in Ethiopia. It is located in the capital city Addis Ababa with in Lideta sub city. In 1998, the hospital was given to Addis Ababa University's medical faculty as the major teaching hospital by the Ministry of Health. TASH has over 700 beds, 200 doctors, 130 specialists, 50 non-teaching doctors, 379 nurses, and 115 other health professionals dedicated to providing health care services. The hospital offers diagnosis and treatment for approximately 370,000 to 400,000 patients annually. The hospital receives patients who are referred from different health facilities in Addis Ababa or across the country (44). For this study, we selected TASH because it is the largest specialized referral hospital in Ethiopia. This makes it convinible to get patients who come from different parts of Ethiopia. This study was conducted from May 2020 to July 2020.

4.2 Study Design

A facility-based cross-sectional study was conducted among NCD patients attending Tikur Anbesa Specialized Hospital.

4.3 Source Population

The source population was all chronic non-communicable disease patients or their caregivers who are seeking treatment service at Tikur Anbesa Specialized Hospital.

4.4 Study Population

The study population was all chronic non-communicable disease patients or their caregivers who get health service at the selected NCD units at Tikur Anbesa Specialized Hospitals at the time of data collection period and who fulfill the eligibility criteria.

4.5 Eligibility Criteria

Inclusion criteria

- NCD patients or their caregivers who came to the selected NCD departments at the time of data collection.
- Patients who have a regular follow up at the hospital for the last 12 months.

Exclusion criteria

- Those who get health service cost reimbursement by their employer and;
- Multi morbid patients who have a communicable disease as one of their disease condition were not be included in this study.

4.6 Sample Size Determination

Sample size was calculated manually for each specific objective using a single population proportion formula. The sample size calculated for the third objective was taken as a final sample size because it yields the largest sample size which is, 420. It was calculated by taking household's out - of - pocket expenditure for non-communicable disease (54%) from the seventh National Health Account (18).

$$n = \frac{(Z_{\alpha/2})^2 \times P(1-P)}{d^2} = \frac{(1.96)^2 \times 0.54 \times (1-0.54)}{(0.05)^2} = 382$$

Where

- n = the desirable sample size
- $Z_{\alpha/2}$ = critical value at 95% level of significance (1.96)
- P = proportion of household out - of - pocket spending for non-communicable disease (0.54)
- d = acceptable marginal error (0.05)
- By considering 10 % non-response rate the final sample size become 420.

4.7 Sampling Procedures

Purposive sampling was used to select our study area since TASH is a referral hospital it gives service to patients who come from different parts of the country. It has also a higher number of patient flow. The sample size was proportionally allocated to the four NCD departments in the hospital by considering the number of patients attending those units in the year before the data collection year. Even though we planned to conduct a systematic random sampling by using an appointment logbook as a sampling frame at each unit, the patient flow was very low due to the COVID-19 pandemic. The hospital was providing consultation for patients using a phone because patients were not attending their appointment at their respective units due to the pandemic. As a result, all NCD patients who came to the selected department were included in the study until we obtained the desired sample size.

Table 1 : Number of Patients Attended the Four Non Communicable Disease Departments of Tikur Anbesa Hospital in 2018/19

NCD Departments at Tikur Anbesa Hospital	Number of patients attended in the year2011
Cardiac Clinic	18,588
Oncology Clinic	18,168
Renal clinic	14,892
Diabetic Clinic	10,152
Total	61,800

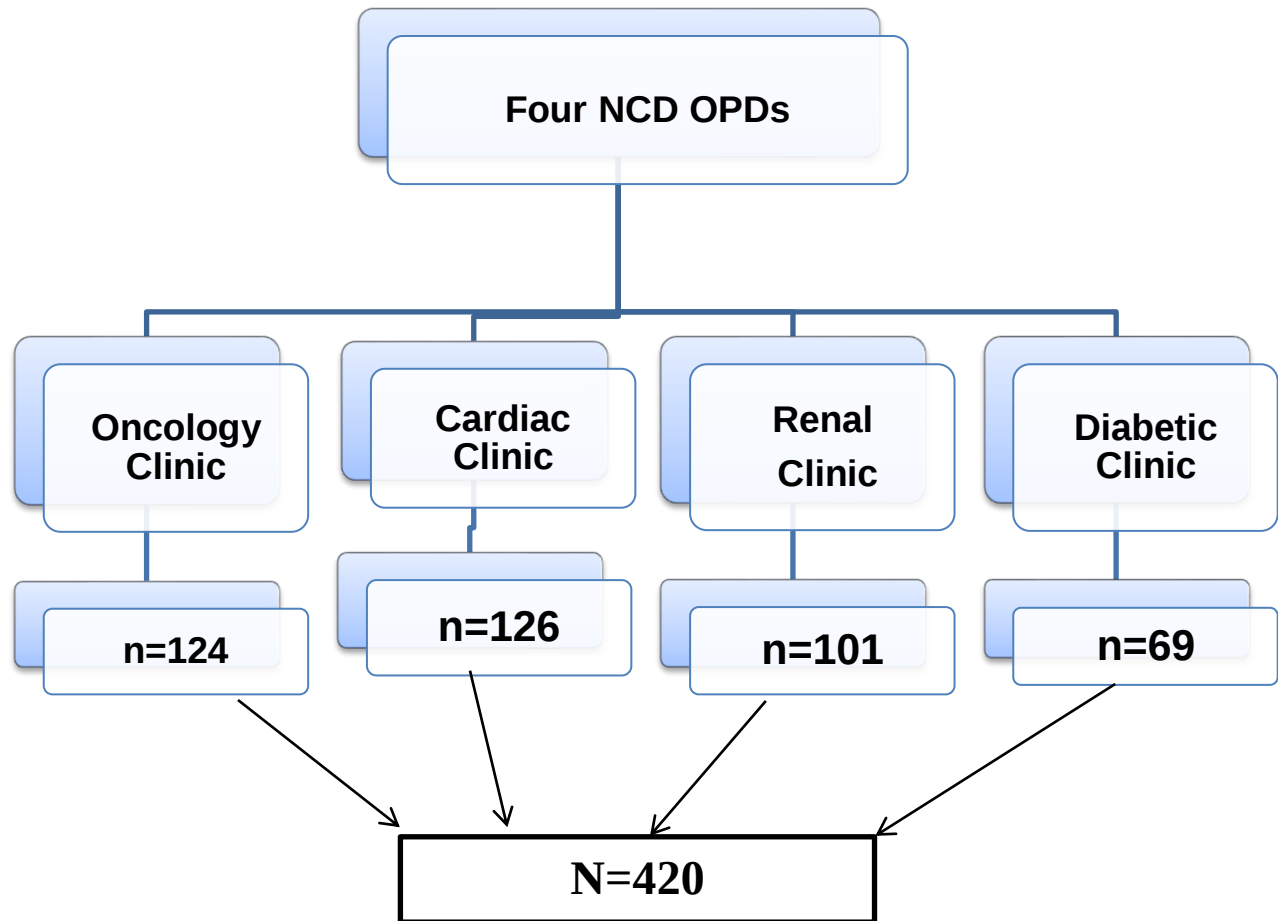


Figure 2: Schematic presentation of sampling procedure

4.8 Data Collection Procedures

Data were collected at the four NCD departments in TASH using pretested, trained interviewer-administered structured questionnaire. The questionnaire was adapted from a tool from WHO “Study on Global Ageing and Adult Health (SAGE) individual questioner” (45) and from a study on “Out-of-pocket expenditures for prevention and treatment of cardiovascular disease in general and specialized hospitals in Addis Ababa, Ethiopia”(21).

The questionnaire included: general Socio-demographic and Socioeconomic characteristics, health care utilization status, insurance status, number of NCDs that the patients are having, monthly out-of-pocket health expenditure for treatment of their chronic non-communicable conditions, monthly food and non-food expenditure of the household. Initially, the questionnaire

was prepared in English, then translated into Amharic for better communication with respondents, then translated back to English by a different person to ensure consistency. Data were collected by four data collectors who are health professionals BSc degree, in a face-to-face interview with our respondents.

4.9 Study Variables

4.9.1 Dependent Variable

- Number of OPD visit
- Hospitalization status
- Catastrophic Health Expenditure

4.9.2 Independent variables

- **Socio-demographic and economic variables:** age, sex, marital status, employment status, and educational status of the respondent and wealth quintile group of the household.
- **Insurance status:** insured or uninsured household
- **Number of NCD**
- **Number of OPD visit**
- **Hospitalization status**
- **Type of health facility visited:** public or both public and private

4.10 Measurement

Level of Health Care Utilization

The level of health care utilization was measured by asking respondents about their number of health facility visits for outpatient and inpatient services for the past 12 months prior to the study period. And the number of days they spent in a hospital if they used inpatient care.

Out-of-Pocket Health Expenditure

Yearly OOP expenditure for outpatient service was calculated by multiplying respondents' OOP expenditure for one OPD visit with the number of total OPD visits the respondents have done in the past 12 months. Out of pocket hospitalization cost was calculated the same way by adding

OOP costs for a recent IPD admission within the past 12 months and multiplying by the number of IPD admissions.

Catastrophic Health Expenditure

We defined a household as facing CHE when a percentage of the household's out-of-pocket health payments above a specified threshold. The threshold levels considered for calculation of catastrophic payments may differ according to country context (23, 46). In this study, we used total household expenditure and non-food expenditure as a denominator to measure catastrophic health expenditure by using different thresholds as a cutoff point (5%, 10%, 15%, 20%, 25%, and 40% of both total consumption expenditure and non-food expenditure).

- Therefore:

$$CHE = 1 \text{ if } \frac{OOP \text{ expenditure for CNCD}}{\text{Household non food expenditure or household consumption expenditure}} \geq \text{cutoff threshold}$$

$$CHE = 0 \text{ if } \frac{OOP \text{ expenditure for CNCD}}{\text{Household non food expenditure or household consumption expenditure}} < \text{cutoff threshold}$$

4.11 Operational Definitions

Catastrophic expenditure: Spending a high share of household income/expenditure for out of pocket health costs (> a specified threshold of total household consumption or non-food expenditure).

Chronic non-communicable disease: this study defined a person is having a chronic non-communicable disease if that person's condition had lasted or was expected to last twelve or more months and if the disease condition is not contagious.

Food expenditure: -the amount spent on all food substances by the household

Level of Health care utilization is defined as the quantity of health care services used by persons for the purpose of preventing and curing health problems, promoting maintenance of health and well-being, or obtaining information about one's health status and prognosis

Multimorbidity in this study multimorbidity was defined as the presence of more than one of the listed disease condition such as , Hypertension, Diabetes Mellitus, Arthritis, Asthma, Cataract, Mental illness, Malignancy, Stroke, Chronic kidney disease, and Heart disease, in one individual. To identify participants with multimorbidity, the number of NCDs was counted for each individual

Non-food expenditure: the amount spent on all household goods and materials other than food substances.

Out - of - pocket payments are payments made by households at the point of using any health goods or services offered by provider, without reimbursement from a third party.

4.12 Data Quality Management

To ensure the quality of data, training was given for the supervisor and data collectors before the start of data collection. The questionnaire was pretested to make sure its ability to measure the needed outcome and to check the capability of data collectors to perform the task. It was done at Saint Paul's Millennium Medical College on 21 (5% of the sample size) NCD patients before the actual data collection.

Since multimorbid respondent have a follow up in one or more of the selected NCD units, they might be enrolled in the study twice. So to avoid the repetition of interviews with the same respondents, explanation was given about the purpose and objective of our study and they were asked if they ever give an interview for a similar study during our study period. The data was also reviewed and checked for completeness and clarity by the supervisor and principal investigator prior to data entry.

4.13 Data Analysis Procedures

Data completeness was checked manually, data was entered and cleaned using epi data version 3.1 and exported to STATA V 14 for analysis. Descriptive statistic including proportion, percentage, frequency distribution, mean and standard deviation was used to summarize the data. Tables bar and pie charts were used to present study findings.

Depending on the nature of our dependent variables, we used different regressions. We performed negative binomial regression to examine the association between the number of OPD visits with the number of NCDs. Binary logistics regressions and multivariable logistic regressions were implemented to estimate the association between the inpatient service and number of NCDs and also to identify factors associated with CHE and independent variables at different denominators and cutoff threshold of CHE calculation. The following are the regression models used for analysis.

Model 1

$$\log(\text{NumberofOPDvisit}_i) = \gamma_0 + \gamma_1 \text{age} + \gamma_2 \text{marital} + \gamma_3 \text{edu} + \gamma_4 \text{emp} + \gamma_5 \text{facilitytype} + \gamma_6 \text{noNCD} \\ + \gamma_7 \text{insurance} + \gamma_8 \text{wealthq}$$

Model 2

$$\text{IPDadmission}_i = \varepsilon_0 + \varepsilon_1 \text{age} + \varepsilon_2 \text{marital} + \varepsilon_3 \text{edu} + \varepsilon_4 \text{resid} + \varepsilon_5 \text{emp} + \varepsilon_6 \text{facilitytype} + \varepsilon_7 \text{numNCD} \\ + \varepsilon_8 \text{insurance} + \varepsilon_9 \text{wealthq}$$

Model 3

$$\text{CHE40\%Texp}_i = \delta_0 + \delta_1 \text{age} + \delta_2 \text{edu} + \delta_3 \text{resid} + \delta_4 \text{emp} + \delta_5 \text{numNCD} + \delta_6 \text{facilitytype} + \delta_7 \text{IPDadmi} \\ + \delta_8 \text{wealthq} + \delta_9 \text{insuranc}$$

Model 4

$$\text{CHE40\%nonfood}_i = \chi_0 + \chi_1 \text{age} + \chi_2 \text{edu} + \chi_3 \text{resid} + \chi_5 \text{numNCD} + \chi_6 \text{facilitytype} + \chi_7 \text{IPDadmi} \\ + \chi_8 \text{lengthofstay} + \chi_9 \text{wealthq} + \chi_{10} \text{insuranc}$$

Model 5

$$CHE25t\exp_i = \alpha_0 + \alpha_1 age + \alpha_2 edu + \alpha_3 resid + \alpha_4 emp + \alpha_5 noNCD + \alpha_6 facilitytype + \alpha_7 IPDadmi + \alpha_8 insurance + \alpha_9 wealthq + \alpha_{10} frequofvisit$$

Model 6

$$CHE25\%nonfood_i = \beta_1 + \beta_2 age + \beta_3 resid + \beta_4 emp + \beta_5 noNCD + \beta_6 facilitytype + \beta_7 IPDadmi + \beta_8 insurance + \beta_9 wealthq + \beta_{10} lengthofstay$$

Odds ratio and incidence rate ratio with 95% Confidence interval was used to measure the strength of association between dependent and independent variables by using P-value < 0.05 to determine the level of statistical significance. Finally a post estimation analysis was performed to check if our logistic models were a good fit for our data and we also examined Variance Inflation Factors (VIF) to check if there is multicollinearity between independent variables.

4.14 Ethical Consideration

Ethical clearance was obtained from the Institutional Review Board of Addis Ababa University College of Health Sciences, School of Public Health. A formal letter was written to Tikur Anbesa Hospital from the AAU School of Public Health. Additionally, verbal consent from each study subject was obtained. The interview was undertaken with privacy. Respondent's name and identification were not mentioned to ensure the confidentiality of the study. Our participants were assured that they can withdraw from the interview at any time they want, and this study will not cause harm to participants except for taking a few minutes of their time.

4.15 Dissemination of Results

The result of this study will be submitted to Addis Ababa University, College of Health Sciences School of Public Health. The study findings will also be given to relevant bodies such as the Ministry of Health, Ethiopian Health Insurance Agency and Tikur Anbesa Specialized Hospital to serve as a current source of information on the issue. The main finding of this study will be published in peer-reviewed journals.

5. RESULTS

5.1. Socio-demographic and Economic Characteristics

Among patients who came to Tikur Anbesa specialized hospital NCD departments at the time of data collection, three hundred ninety-two respondents included in this study which is a 93.3 % response rate. From the total respondents, 48.7 % (191) were male and 78% were in age group 15-64. Also 68.6% of them were married and 31.3% were unmarried. Regarding respondent's educational status, 56.1% of them were less than primary school and 26.8% completed college /university. The majority (75.3%) live in Addis Ababa. Employment status of the respondent's showed that, 61.2% of them were unemployed. Participant's monthly average income was 3564ETB. The household wealth quintile was also calculated and the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.69.

Table 2: Socio demographic and economic characteristics of the respondents at Tikur Anbesa specialized hospital, 2020.

Respondent	Category	Frequency	Percent
Sex (n=392)	Male	191	48.72
	Female	201	51.28
Age (n=392)	1-14	16	4.08
	15-64	306	78.06
	65-82	70	17.86
Marital status (n=392)	Married	269	68.62
	Unmarried	123	31.38
Level of education (n=392)	Less than primary school	220	56.12
	High school completed	67	17.09
	College/university completed	105	26.79
Place of residency (n=392)	Addis Ababa	295	75.26
	Other	97	24.74
Employment status (n=392)	Working	152	38.78
	Not working	240	61.22
Wealth quintile (n=392)	Poorest	79	20.15
	Poor	79	20.15
	Middle	78	19.90
	Rich	78	19.90
	Richest	78	19.90

5.2 Self-Reported Disease and Health Condition

From the total respondents, 48.72 % and 44.13% reported having diabetic and hypertension respectively. Chronic kidney disease and heart disease were reported by 32.65% and 30.36% of respondents. Regarding their health condition, 40.56% of respondents reported having relatively medium health conditions and 4.59% reported having very poor health conditions. The mean number of NCD was 2.11 with SD =1.14.

Table 3: Self-reported disease and health condition of respondents at Tikur Anbesa Specialized Hospital, Addis Ababa, 2020

	Category	Frequency	Percent
Self-reported health condition	Very poor	18	4.59
	Poor	64	16.33
	Medium	159	40.56
	Good	108	27.55
	Very good	43	10.97
Self-reported disease NCD conditions	Diabetic mellitus	191	48.72
	Hypertension	173	44.13
	Chronic kidney disease	128	32.65
	Heart disease	119	30.36
	Malignancy	74	18.88
	Arthritis	61	15.56
	Stroke	36	9.18
	Cataract	22	5.61
	Asthma	17	4.36
	Mental illness	10	2.55

5.3 Prevalence of Multi Morbidity

Among the total study subjects, 263 (67.1 %) had more than one non-communicable disease condition (95%CI 62.2-71.5). The majority (77.19%) belonged to the age group 15-64 and 51.33 % of them were male. Regarding respondent's educational status, 57.41% of them were less than primary school and also 77.95 % live in Addis Ababa. Employment status of the respondent's showed that, 65% of them were unemployed. Multimorbid respondents in the fourth and fifth wealth quintile were relatively higher, 24.7% and 23.9% respectively. Among the multimorbid respondents, 156(59.3%) of them had 2 NCDs and the rest 107(40.7 %) had more than 3 NCDs.

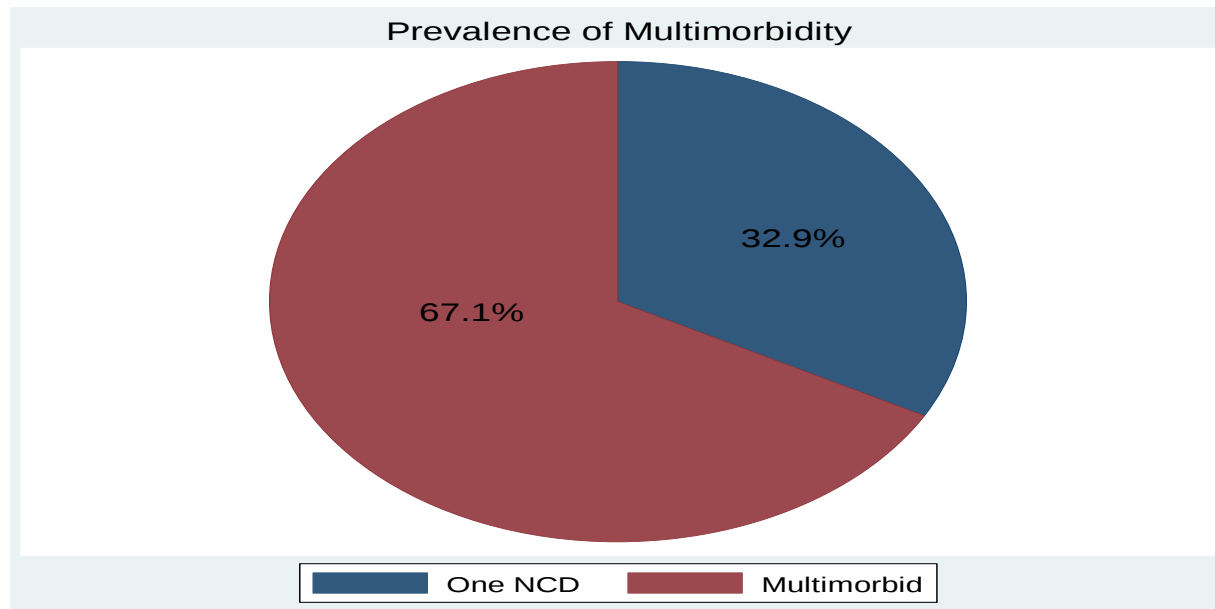


Figure 3: Prevalence of multimorbidity at Tikur Anbesa specialized hospital Non Communicable disease departments, Addis Ababa, 2020.

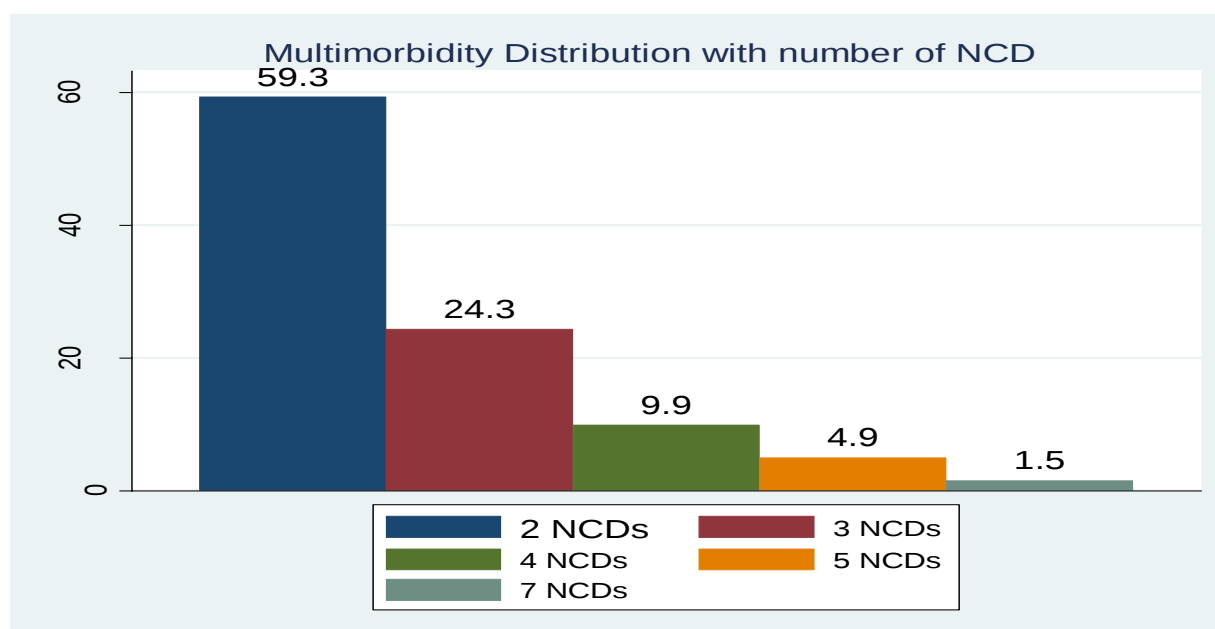


Figure 4: Bar chart presenting multi morbid distribution with number of Non Communicable Diseases at Tikur Anbesa Specialized Hospital, Addis Ababa, 2020.

Table 4: Socio-demographic and Economic characteristics of multi morbid respondents at Tikur Anbesa Hospital, 2020.

Respondent	Responses	Frequency	Percent
Sex (n=263)	Male	135	51.33
	Female	128	48.67
Age (n=263)	15-64	203	77.19
	65-82	60	22.81
Marital status (n=263)	Married	195	74.14
	Unmarried	68	25.86
Level of education (n=263)	Less than primary school	151	57.41
	High school completed	44	16.73
	College/university completed	68	25.86
Place of residency (n=263)	Addis Ababa	205	77.95
	Other	58	22.05
Employment status (n=263)	Working	92	34.98
	Not working	171	65.02
Wealth quintile (n=392)	First Quintile	40	15.21
	Second Quintile	42	15.97
	Third Quintile	53	20.15
	Fourth Quintile	65	24.71
	Fifth Quintile	63	23.95

5.4 Level of Health Care Utilization

All of our respondents have a medical follow up at Tikur Anbesa Specialized Hospital every month, two months, three months, and six months interval of months over the year. From the total, 24% of respondents had a regular follow up every month and 21% has every six months. As it can be understood from figure 5, the majority of respondents with more than one NCD have a medical follow-up every month and two months. On the contrary, most people with only one NCD have medical follow-up every six months interval. The mean number of OPD visits was 4.2 for those respondents having only one NCD and 8 for multimorbid respondents.

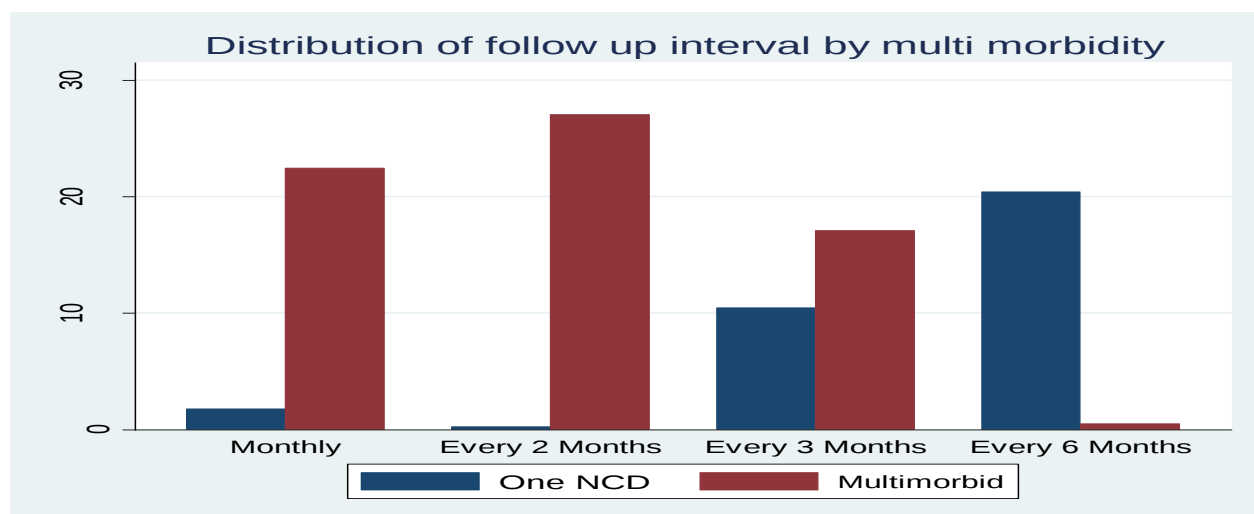


Figure 5 : Distribution of follow up interval by multi morbidity at Tikur Anbesa specialized hospital, 2020

The negative binomial regression result showed that for every one unit increase in the number of NCDs, the incident of OPD visits increased 20% (IRR= 1.2, 95%CI; 1.15-1.25, P-value < 0.001). Also an increased number of NCDs was associated with a higher likelihood of having hospitalization. For every one unit increase in NCDs, the odds of being admitted to a hospital was 1.5 times more (AOR= 1.5, 95%CI; 1.19- 2.00, P-value < 0.001).

5.5 Level of Out of Pocket Expenditure

For the total respondents average yearly OOP expenditure paid during an outpatient visit to get non-communicable disease conditions treatment was median of 9,185 ETB (IQR ;4,320-20,420). For the 33% of respondents that had been admitted to the hospital in the past 12 months prior to data collection, It is found that on average yearly IPD OOP payment was 3,991 ETB with SD 8,029 ETB. When we see total (in-patient and outpatient) yearly out of pocket expenditure for the treatments of non-communicable disease conditions, it was 17,274 ETB with SD being 20,465.

Mean yearly OOP payment for treatment for chronic NCD conditions was 7,484 ETB in respondents with only one NCD and it was 22,076 ETB in respondents with NCD multi morbidity. Both multi morbid and non multi morbid respondents paid relatively higher amount of money for drugs followed by diagnosis and relatively lower money was paid for registration.

For OPD visit a relatively increased amount of money was paid to buy medications and for diagnosis services. For IPD service increased amount of money was paid for hospital bed followed by medications and food/accommodation.

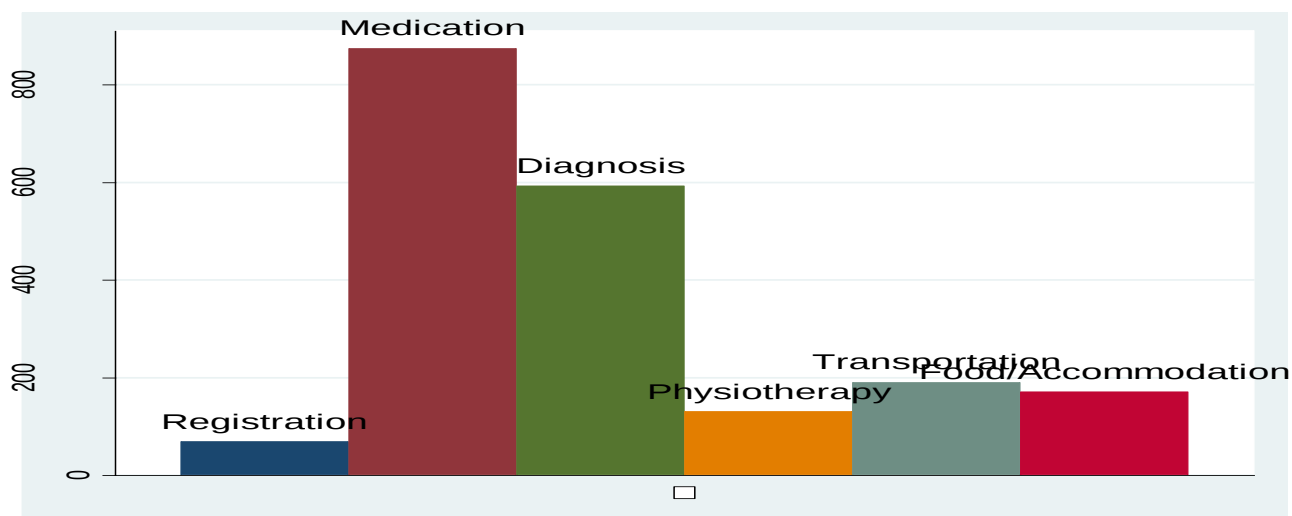


Figure 6: Out of pocket payment for Outpatient care by types of services at Tikur Anbesa Specialized Hospital, 2020

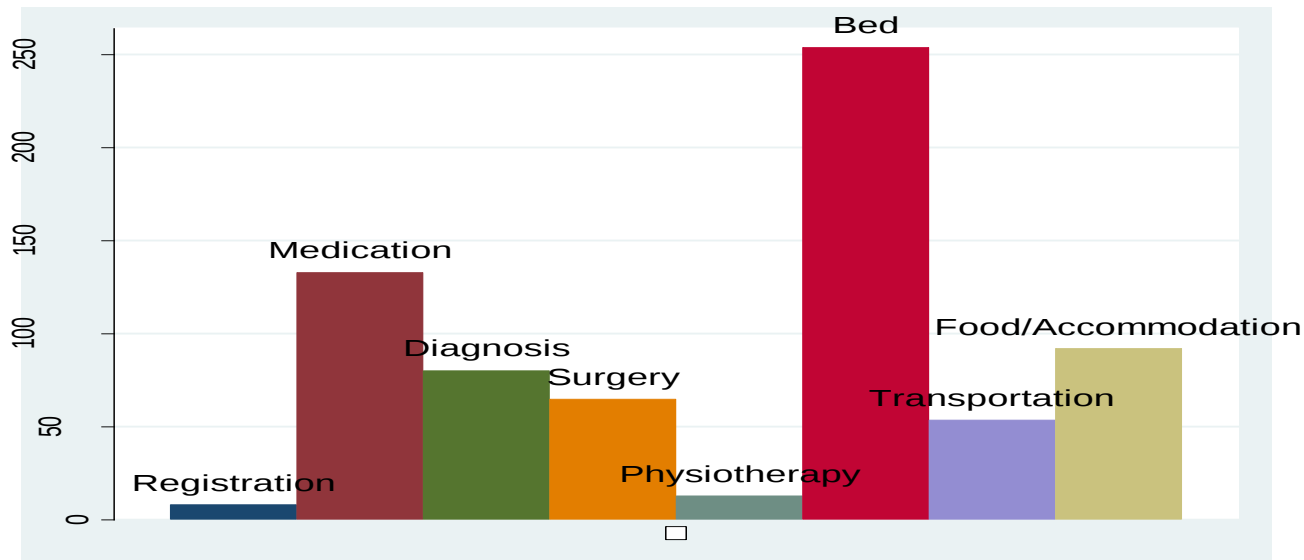


Figure 7: Out of pocket payment Inpatient care by types of services at Tikur Anbesa Specialized Hospital, 2020

5.6 Magnitude of Catastrophic Health Expenditure among Non-Communicable Disease multimorbid patients

The magnitude of CHE differs as we changed the denominator and the cutoff point. From the total multimorbid respondents, the proportion of households facing CHE as a share of total expenditure decreased from 91.2% to 13.6% as the threshold increased from 5% to 40%. CHE as a share of household non-food expenditure the proportion decreased from 98.8% to 38.7%, as the threshold increased from 5% to 40%.

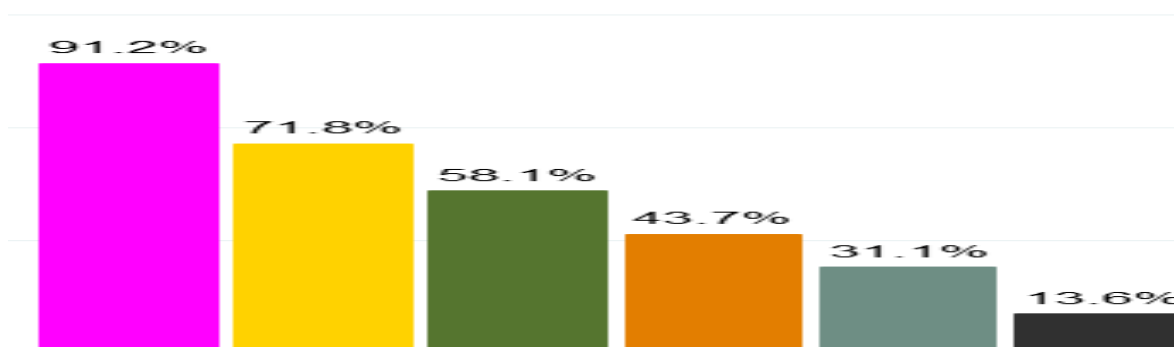


Figure 8: Magnitude of Catastrophic Health Expenditures as a share of household expenditure at Tikur Anbesa specialized hospital, 2020

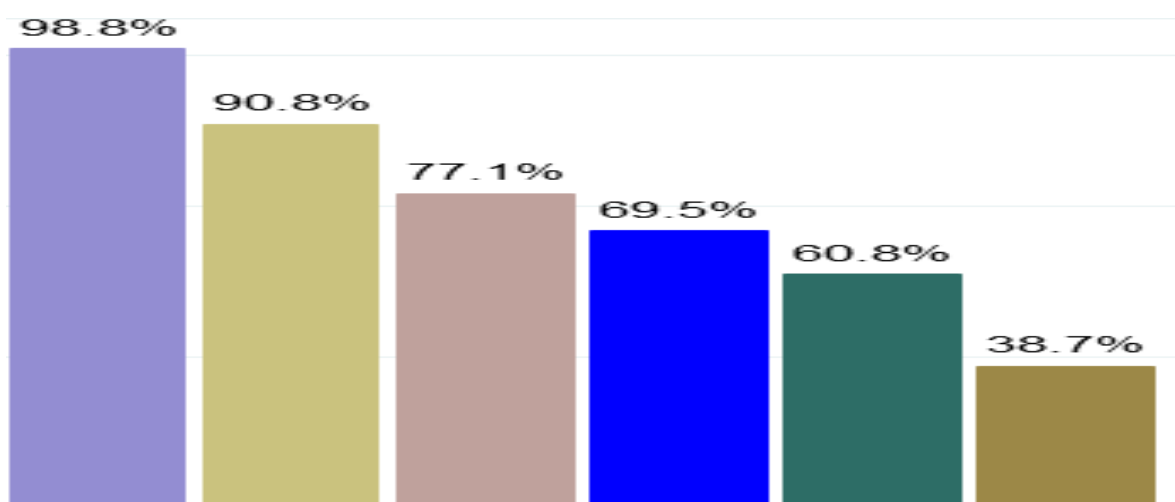


Figure 9: Magnitude of Catastrophic Health Expenditures as a share of household nonfood expenditure at Tikur Anbesa specialized hospital, 2020

5.7 Factors Associated with Catastrophic Health Expenditure for Chronic Non-Communicable Disease Multimorbidity

Binary multivariable logistic regressions to determine which factors were associated with incurring catastrophic health expenditure at a share of total household expenditure and non-food expenditure with 25% and 40% cut off point. Different socio-demographic, socioeconomic, and other factors related to health care utilization of the respondents were included in the regression. Variables with a p-value of less than 0.25 on bivariate analysis were transferred to multivariate analysis.

Among these variables which were entered to multivariate analysis at 40% cut off point of total household expenditure, being in the oldest age group(65-82) (AOR=2.1,95% CI;1.0-4.4), living outside of Addis Ababa (AOR=6.1,95% CI;2.8-13.1), having an increased number of NCD (AOR = 1.9, 95% CI;1.4-2.6), being at the richest wealth quintile (AOR= 0.11, 95% CI;0.02-0.5), not being a member of an insurance scheme(AOR=2.3,95%CI;0.9-5.6), having increased number of health facility visit (AOR=1.5,95%CI;1.3-1.7), not being admitted to a hospital(AOR=0.32,95%CI;0.15-0.68) were factors that were associated with incurring CHE at 40% total household expenditure.

At the 25% threshold level of OOP health payment as a share of total household expenditure, the likelihood of facing CHE was more for those who were unemployed (AOR = 5.1,95%CI;1.5 - 17.6) and for those who live outside of Addis Ababa (AOR=14.5, 95%CI;4.1- 50.9). Further, households who were not an insurance scheme member (AOR=3.295%CI; 1.2 - 8.6), a household with a member who was having an increased number of NCD (AOR=2.2, 95%CI; 1.3 - 3.9) had an increased likelihood of facing CHE as compared to those who are employed, live in Addis Ababa, member of an insurance scheme, who have one less decreased number of NCDs.

Likewise visiting both public and private health facilities (AOR =3.3, 95%CI; 1.2 - 9.2), having increased number of health facility visit (AOR = 1.2, 95%CI; 1.06 - 1.5) had increased likelihood of encountering CHE as compared to those who visited only public health facility, who had one less increased number of facility visit. On the contrary, being in the richest wealth quintile (AOR=0.06, 95%CI; 0.01- 0.38) and not being admitted to the hospital (AOR= 0.29,95%CI;0.11

- 0.78) had decreased the likelihood of facing CHE at the 25% threshold as compared to the poorest wealth quintile members and those who were admitted to a hospital.

OOP expenditure as a share of household non-food expenditure with 40% cutoff, there is an increased likelihood of facing CHE when an individual was at the oldest age group (65 – 82) (AOR= 2.3, 95%CI; 1.1 - 4.8), lives outside of Addis Ababa (AOR = 9.3, 95%CI; 3.7- 23.5), not being a member of insurance scheme (AOR=4.0, 95%CI; 1.8-8.6) as compared to the youngest age group (15- 64), who lives in Addis Ababa, insurance scheme members.

Moreover, respondents who have one increased number of NCD (AOR= 2.0, 95%CI; 1.3 - 3.0) and who had one more facility visit (AOR=1.2, 95%CI; 1.1- 1.3) had increased odds of facing CHE as compared to those who have one less number of NCD and having one less facility visit. Whereas, there is a decreased likelihood of facing CHE among those who were not admitted to hospital (AOR= 0.28, 95%CI; 0.09- 0.9) and those who are in the richest wealth quintile group (AOR=0.14, 95%CI; 0.04- 0.5).

Also, at CHE 25% cutoff point, the likelihood of experiencing CHE was increased among unemployed respondent (AOR=4.4, 95%CI; 1.79 - 11.2), who lives outside of Addis Ababa (AOR=5.8, 95%CI; 2.0- 16.2), who are not insurance scheme members (AOR= 3.18, 95%CI; 1.4 - 6.8), having one more increased number of NCD (AOR=1.9, 95%CI; 1.17 - 3.15), visiting both public and private health facilities (AOR=2.9, 95%CI; 1.3- 6.3), having one more increased health facility visit (AOR= 1.39, 95%CI; 1.2 - 1.5) as compared to employed, who lives in Addis Ababa, insurance scheme members, who have one less increased NCD, visiting only public hospitals and having one less decreased health facility visit.

On the contrary being in the richest wealth quintile (AOR=0.17, 95%CI; 0.04- 0.68) and not having another household member with NCD (AOR=0.39, 95%CI; 0.16-0.94) had decreased the likelihood of facing CHE at 25% as compared to those who were in the poorest quintile and those households who have another member with NCD conditions.

From this study, it is found that no statistically significant differences between respondents that experience CHE and those that don't experience CHE at different denominators in terms of sex, educational status, marital status, and family size.

Table 5: Factors associated with catastrophic out-of-pocket payments for treatment of chronic non communicable multi morbidity at Tikur Anbesa Specialized Hospital in Addis Ababa, Ethiopia, 2020.

		CHE as a share of total household expenditure		CHE as a share of household nonfood expenditure	
Variable	Number (%)	AOR(95%CI) at 40% cutoff	AOR(95%CI) at 25% cutoff	AOR(95%CI) at 40% cutoff	AOR(95%CI) at 25% cutoff
Age					
15- 64	186(70.72)				
65 – 82	77 (29.28)	2.126** (1.017-4.44)	1.706 (0.598 - 4.864)	2.314** (1.101 - 4.863)	1.743 (0.627 - 4.845)
Employment status					
Employed	135 (51.33)				
Unemployed	128 (48.67)	1.841* (0.879-3.855)	5.155*** (1.508 - 17.62)	2.538 (1.024 - 6.288)	4.490*** (1.797 - 11.22)
Place of Residency					
Addis Ababa	205 (77.95)				
Other	58(22.05)	6.170*** (2.887-13.18)	14.57*** (4.169 - 50.93)	9.395*** (3.757 - 23.50)	5.811*** (2.084 - 16.20)
Wealth quintile					
Poorest	40 (15.21)				
Poor	42 (15.97)	0.362 (0.101-1.29)	0.747 (0.146 - 3.823)	0.474 (0.136 - 1.654)	0.774 (0.194 - 3.093)
Middle	53 (20.15)	0.801 (0.291-2.20)	0.339 (0.071 - 1.602)	0.824 (0.243 - 2.794)	0.981 (0.243 - 3.957)
Rich	65 (24.71)	0.553 (0.199-1.539)	0.831 (0.192 - 3.591)	0.146 (0.360 - 3.650)	0.675 (0.173 - 2.638)
Richest	63 (23.95)	0.112*** (0.022-0.554)	0.0666*** (0.011 - 0.38)	0.149*** (0.040 - 0.558)	0.176** (0.045 - 0.68)
Insurance status					
Yes	94 (35.74)				
No	169 (64.26)	2.363* (0.987-5.658)	3.267** (1.232 - 8.660)	4.014*** (1.869 - 8.621)	3.182*** (1.478 - 6.851)
Number of	Mean = 2.6	1.936***	2.285***	2.047***	1.923***

NCD	SD = 1	(1.425-2.63)	(1.324 - 3.946)	(1.357 - 3.089)	(1.172 - 3.155)
Facility type					
Public	128 (48.67)				
Both public and private	135 (51.33)		3.356** (1.220 - 9.229)	1.844* (0.915 - 3.716)	2.959*** (1.378 - 6.353)
Hospital Admission					
Yes	86 (32.70)				
No	177(67.30)	0.326*** (0.156-0.680)	0.297** (0.113 - 0.781)	0.289** (0.092 - 0.910)	0.530 (0.139 - 2.025)
Frequency of visit	Mean =9.5 SD= 3.4	1.53*** (1.344-1.760)	1.271*** (1.064 - 1.520)	1.245*** (1.118 - 1.386)	1.390*** (1.212 - 1.595)

*** p<0.01, ** p<0.05, * p<0.1

6. DISCUSSION

This study aimed to assess the impact of non-communicable disease multimorbidity on health care utilization and out-of-pocket health expenditure at Tikur Anbesa Specialized Hospital. From this study it is found that the prevalence of multimorbidity was 67.1%. It also shows that number of NCDs had an effect on the health care utilization. Additionally, relatively increased OOP was paid by respondents who were having more than one NCD.

Catastrophic payments from out-of-pocket health expenditure to treat non-communicable disease multimorbidity decreases from 91.2% to 13.6% as the cutoff threshold increased from 5% to 40% when measured as a share of total household expenditure. CHE as a share of household non-food expenditure, the proportion decreased from 98.8% to 38.7%, as the threshold increased from 5% to 40%. The household member being in oldest age group, household with unemployed respondent, living outside of Addis Ababa, being in the poorest wealth quintile, admission to the hospital, having increased number of NCD, not being a member of an insurance system, going to both public and private health facilities and increased frequency of hospital visit have a statistically significant association with experiencing CHE.

A good deal of literature agrees that, multimorbidity is the co-occurrence of more than one chronic condition. But there is no uniform agreement on the list of disease conditions that are defined to classify multimorbidity(2). There is also no consensus on denominator and cutoff points to define CHE(23). Different literature uses different approaches. For these reasons, comparison between studies was challenging.

The study findings showed that 67.1 prevalence of multimorbidity which is similar to a study conducted in Ireland (66.2%) (47). And it was smaller than a study conducted in Switzerland (76.6%) (10), However, it was greater than a study in china (61.7%) (12). Additionally, in Australia the prevalence of multimorbidity was 56%, in Scotland (54.9%), in Japan (28.4%), and in India it was 8.9% (28, 34, 48, 49). Likewise in Spain there was 23.61% prevalence, 22.5% in South Africa and in south Ethiopia, Hawassa there was 17.8% prevalence (31, 33, 50).

Variations in a list of non-communicable diseases used for defining multimorbidity or a difference in the study population could explain these differences. For instance, the Australian study defined multimorbidity based on the most common chronic diseases in Australia, including cancer, heart disease, diabetes, arthritis, depression, and anxiety (34). A study in Hawassa defined Multimorbidity as the self-reported presence of non-infectious diseases diagnosed by a physician (33). Whereas, this study used self-reported diseases from the list of 2018/19's top ten chronic non-communicable diseases in Addis Ababa to define multimorbidity. There was also a difference in the study population across literature. Some studies use elderly subjects with known NCD conditions and subjects from the general population as their study population. So this could also be a possible explanation for differences in multimorbidity prevalence.

This study found out that, the incident rate of OPD visits has a 20% increase for every one-unit increase in the number of NCDs (IRR= 1.2, 95% CI; 1.15-1.25, P-value < 0.001). It agrees with a study in China that showed, one additional chronic non-communicable disease was associated with a 1.29 times increase in the number of health facility visits (AOR= 1.29 95% CI 1.27–1.31) (23). Similarly, an Indian study showed the mean number of OPD visits increased from 2.24 in respondents with one NCDs to 6.16 in those with more than one NCDs (regression coefficient = 0.28, p-value <0.0001) (28). Result from a cross-sectional study conducted in six middle-income countries: China, Ghana, India, Mexico, Russia, and South Africa also supported our result with a finding that showed an increased number of NCDs and an increased number of outpatient visits had strong association. (1).

A study finding in Switzerland also agrees with this study. It showed that the average number of consultations per year was 15.7 in the multimorbid sample compared to 4.4 in the non-multimorbid sample (10). In China, a higher number of chronic conditions were associated with a higher number of outpatient visits (Coefficient=0.25, 95% CI=0.24, 0.27) (12). A study that was done in 16 European countries also goes with this study by showing an increasing number of CNCDs was associated with a higher number of doctor visits (coeff = 0.29, 95% CI = 0.27–0.30,) (51).

Moreover the study finding goes in line with a study in Australia and Japan. Among respondents in the Australia study, those who visited health care provider four times or more times were among the multimorbid group (2). Similarly in Japan, there was an association between an increasing number of NCDs and a higher mean number of outpatient visits (49). Therefore, this may show that the number of chronic conditions was positively associated with having frequent hospital visits. Because most likely, multimorbid people visit health facilities for each of their disease conditions separately.

An increased number of NCDs was also associated with being admitted to a hospital. Likelihood of being admitted to a hospital is 1.5 times more for every one unit increase in NCDs (AOR= 1.5, 95%CI; 1.19- 2.00, P-value < 0.001). This goes with the Indian study that showed having more than one NCDs increased the likelihood of being hospitalized 1.59 times (AOR = 1.59, p-value <0.0001) (28). Switzerland's study had also a similar finding that showed multimorbid patients were 5.6 times more likely to be hospitalized compared to the non-multi morbid (10).

Similarly in the pooled analysis from six MICs also agrees with the finding of this study. It showed that the proportion of having hospital admission increased from 9% for those without any NCDs to 28% for those with NCD multimorbidity (AOR = 1.63, 95% CI = 1.52, 1.75) (1). Similarly, an Ireland finding showed, increased odds of one or more hospital admissions were associated with an increasing number of chronic conditions (P < 0.01) (47). As indicated by a study in 16 European countries, increased number of CNCDs was significantly associated with a higher likelihood of being hospitalized (AOR = 1.49, 95% CI = 1.42–1.55 (51). This might be due to NCD multimorbid patients might face complications due to the multiple disease conditions that make them needed close follow up near health professionals by being hospitalized.

This study found that, having more than one chronic non-communicable diseases conditions has an effect on increased health expenditure (mean yearly OOP payment for treatment for chronic non-communicable disease health conditions was 7484 ETB in respondents with only one NCD and it was 22076 ETB in respondents with NCD multimorbidity). Studies conducted on multimorbidity and health expenditure supports this study's finding. For instance, in Indian

cross-sectional study findings showed OOP incurred during the last health care visit was INR 272.1 for respondents with no NCDs to INR 454.1 for respondents with 2+ NCDs. Also in Switzerland's observational study finding shows health costs were 5.5 times higher in multimorbid patients and 32.6% cost was added for each additional chronic condition (10, 28).

Similarly the Australia and Spain also agrees with this study, OOP expenditure on medical and health-related purchases increased with the number of chronic conditions. Also in Spain the annual average cost for patients with one chronic disease was 637 EURO higher than that for people with none. Having additional two, three, or four disease condition becomes more expensive (31, 34). Additionally, in Ireland study on health care utilization and multimorbidity also support our finding. It showed that, mean total cost increased significantly for patients with an increasing number of chronic conditions compared to those with no chronic conditions ($P = 0.002$ for two chronic conditions; $P = 0.001$ for three chronic conditions; $P = 0.000$ for four chronic conditions and $p = 0.000$ for more than four conditions)(47). Hence this may indicate that people with multimorbidity are exposed to increased health care costs than people having one chronic disease conditions. This might be due to an increased number of medications cost and cost of investigation that are made for each of their disease conditions.

Even though there is a variation of CHE calculation and cut off threshold, our study result is consistent with other literature findings. This study found that multimorbid patients are exposed to CHE at different denominator of OOP payment for health and cut off point. Our findings correspond with a Pakistani study conducted on hypertension and diabetic patients which showed average expenditure share (as a percentage of total household expenditure) was 60% higher for households with a member having both diabetic and hypertension then households who had only one NCD(35). Likewise multimorbidity was associated with a substantially higher likelihood of experiencing CHE for the population in China ($AOR=1.29$, $95\% CI=1.26, 1.32$) (12). In a similar study in India, multimorbidity resulted high health expenditure ($\beta= 0.53$, $p=0.00$)(36).

This study found that household member with older age group has increased likelihood of facing CHE at 40% threshold of total consumption and non-food expenditure ($AOR= 2.1, 95\% CI; 1.0-4.4$, $P\text{-value} < 0.05$) and ($AOR= 2.3, 95\% CI; 1.1 - 4.8$, $P\text{-value} < 0.05$) respectively. The result

agrees with a study finding in Iran which showed a chance of households' exposure to CHE higher for the household with members over 65 years was OR=1.49 (0.05, 4.10)(52). Also in Vietnam, households with an older member are affected by CHE 1.9 times more (OR = 1.9; 95 % CI = 1.1–3.3),)(53).

Furthermore, studies in Kenya and Ethiopia also have a similar result that supports the finding of this study that states households with elderly members had increased odds of facing CHE (Kenya, OR =1.72, 95% CI 1.15–2.58)(54)(Ethiopia, AOR 1.2; 95% CI 1.1, 2.2; p= 0.047)(23). Therefore, this might be due to older people are at risk of age-related complications as a result they have increased health care need that can create a financial burden in the household. In addition to that the elderly might not be able to generate income for the household which will increase the risk of facing CHE.

The study found a statistically significant association between unemployed respondent's household and incurring CHE at both 25% of total expenditure and nonfood expenditure, (AOR=5.1, 95% CI; 1.5–17.6, P-value <0.001) and (AOR=4.4, 95% CI; 1.7–11.2, P value <0.001) which goes in line with a study in China and Kenya with (OR=1.30, 95% CI 1.06 to 1.60) and (OR =1.75, 95% CI 1.42–2.16) respectively (54, 55). This might be due to a decrease in household income related to having an unemployed household member who needs health care.

The study also found out that a household member who lives outside of Addis Ababa and comes to get treatment for his / her NCD condition has a substantially higher likelihood of experiencing CHE at all threshold levels (p-value < 0.001) which goes in line with studies in four LMICs (Argentina, China, India, Tanzania) which showed a significant positive association between facing CHE and place of residency (OR=2.69, 95% CI; 1.31–5.53)(56). Similarly in Kenya, households that were located outside the city and came to get health care are more likely to experience CHE (OR =1.38, 95% CI 1.14–1.67) (54).

Findings from this study was also supported by a study in Addis Ababa on CHE and CVD, that showed traveling to Addis Ababa for health care significantly increased the chance of facing CHE (AOR= 3.25, 95% CI: 1.79 - 5.90) (21). Therefore, traveling to the cities to get health care

services might result economic problems for the household due to expenses related to transportation, food, and accommodation during their stay in the city.

In this study, as compared to the poorest quintile a household who were at the richest quintile were less likely to face CHE at all levels of thresholds(p-value <0.001) many literature supports this result for instance, in China odds of facing CHE were significantly lesser among patients from wealthy households (55). In Vietnam, households belonging to the poorest quintile are more likely to face CHE (OR = 4.9; 95 % CI = 2.0–12.0) (53).In Bangladesh Households in the poorest quintile had four times more risk of catastrophic expenditure than the richest quintile . In Nigeria, the lower two wealth quintiles were more likely to face CHE than richest households (42, 57). In rural Ethiopia households in the lowest quintile had increased chance of experiencing CHE (AOR 10.8; 95% CI 3.8, 30.5; $p < 0.001$)(23). Therefore, this might indicate that the poor are more vulnerable to CHE related to increase OOP for health.

This study showed uninsured households had a higher risk of catastrophic payment at all cutoff points this goes in line with a study conducted in Iran in which health insurance reduces the chance of households facing CHE (58). Our finding agrees with a China study which showed , catastrophic payments occurred more in patients without health insurance than in those with health insurance (OR, 6.9; 95% CI, 4.6 to 10.3) (14). Similarly , In Northeast Ethiopia, compared to non-insured households , insured households were 81% times less likely to encounter catastrophic health expenses(AOR = 0.19, 95% CI: 0.11–0.34) (41). However, in Turkey, uninsured households had a relatively lower risk of catastrophic payment (59). This variation may be due to the difference in the mechanism of implementation, coverage, and protective capacity of the insurance system applied in countries.

This study found having one additional NCD will increase the likelihood of incurring CHE by 1.9 – 2.2 times, in all four thresholds and two dominators. The result is consistent with a study in Bangladesh that showed for a single additional chronic illness, there was an increased risk of incurring catastrophic payments, by 1.47 times(42). It also goes with a study in China, households in which patients had ≥ 2 chronic diseases were more likely to experience CHE (60).Similarly in Australia, health expenditure increased with the number of conditions

increased(34). Therefore, these indicate that having an increased number of chronic NCD will cause people to pay extra expenses for NCD care and treatment, which will lead the household to face CHE.

In this study it is found that there is a significant association between visiting both private and public hospitals and facing CHE at 25% threshold of total consumption and non-food expenditure (AOR = 3.3 and 2.5 respectively) which is supported by a study in Bangladesh at which the risk of catastrophic expenditure was greater for households who used both public and private facilities(42). Moreover, a finding from Addis Ababa agrees with this study's finding ,it showed going to private hospitals increased the odds of CHE by 20 fold (OR=20.7, 95%CI; 10.2 - 42.04, p value<0.001)(21). Therefore, this might indicate that some services might be overpriced at private facilities and request higher payment compared with public health facilities.

Studies support our founding on the relationship between hospitalization and CHE which showed household member that doesn't encounter a hospital admission was 71% less likely experience CHE than households whose member were admitted to the hospital. In China has similar finding that showed , households whose members were hospitalized had two times higher chance of catastrophic health expenditure than households with NCD but not hospitalized (61). Similarly a study from Iran that stated households who receive inpatient services had 2.39 times more chances of facing CHE supports our result (52).

Moreover , In India, households with a hospitalized member had 1.7 more chances of experiencing CHE, which agree with this study's finding (62). Similarly in Addis Ababa, the odds of facing CHE among hospitalized subjects were about eight times more than that of the non-hospitalized subjects (OR=8.39, 95%CI (4.24, 16.59) p value<0.001)(21). This might be due to the need for inpatient care might be costly if there is a surgical procedure, longer duration of stay, disease complications related to having more than one NCDs. Hospital admission might also be unexpected that can affect the household's budget.

It is found that for one increase in additional health facility visits there was 1.2-1.5 times increase in odds of facing CHE which is consistent with a study in Iran that showed 1.5 times increased

chance of CHE for each additional (40). Therefore, having increased number of health facility visits might cause people to pay more OOP money and face CHE.

7. STRENGTH AND LIMITATION

7.1 Strength

- The study tried to contextualize the definition of multimorbidity by using Addis Ababa's top ten NCD conditions.
- The study used multiple methods to calculate CHE and its factors.

7.2 Limitation

- Conducting a facility-based survey was the study's limitation because some questions related to household expenditure were challenging for some respondents and a household survey might solve this problem.
- Answers asked related to expenditure and health care utilization was prone to recall bias.
- Unable to reviewing the patient chart and capture physician reported disease conditions were also the study's limitation. Because self-reported disease conditions might be under-reported by some respondents, they might hide some sensitive disease conditions like mental health issues and malignancy conditions. This also makes the study prone to information bias.

8. CONCLUSION

The study showed that 67% of respondents at Tikur Anbesa specialized hospital had more than one NCD. These multimorbid patients come to health facilities more frequently and are exposed to increase financial problems. The magnitude of CHE varied as the denominator and cutoff threshold changed. It is found that 91.2% to 13.6% magnitude of CHE as a share of total expenditure with a threshold going from 5% to 40%. Additionally, 98.8% to 38.7% magnitude of CHE was found as a share of household non-food expenditure with a threshold going from 5% to 40%.

CHE mostly affected those households with older members, unemployed members, and family members who come from out of Addis Ababa to get health care services. Respondents who were in the poorest wealth quintile, those who have increased number of NCD conditions, those households with hospitalized member, household who were not a member of an insurance system, those who use both public and private health facilities, and patients who visit health facility frequently were affected by CHE.

9. RECOMMENDATION

Policymakers

- To minimize the prevalence of NCD multimorbidity, awareness on the risk factors for acquiring NCDs should be given. And adequate management and follow-up should be provided for patients with NCD.
- An integrated health care delivery system should be planned for multimorbid patients.
- From our findings, the cost of drugs, diagnosis service, and hospital beds consist of a higher proportion of OOP. So, to minimize households' higher OOP payments for NCD treatment, the Provision of relatively affordable medicine and diagnostic services should be prioritized
- To protect households from spending catastrophic OOP expenditure, fee waiver system or service exemptions should be considered for those patients with multimorbidity, especially for those who are identified as poor, elderly, and unemployed.
- Since the study found households with multimorbid patients living outside of Addis Ababa are at elevated risk of experiencing CHE, initiatives towards solving the geographical inequity are needed.
- Insurance coverage should be increased in order to save nonmember households from paying out-of-pocket health expenses.

Health facilities

- To prevent multimorbid patients from frequent hospital visits for each disease condition, health facilities should provide comprehensive service or arrange parallel appointment schedules so that multimorbid patients can visit health facilities once and get the needed care for all their disease conditions in one visit.

Researchers

- Further research should be done on a large scale by including private facilities and regional states.
- More research should be done on multimorbidity to identify which particular NCD combination caused a greater financial burden on the households.

REFERENCES

1. Lee JT, Hamid F, Pati S, Atun R, Millett C. Impact of Noncommunicable Disease Multimorbidity on Healthcare Utilisation and Out-Of-Pocket Expenditures in Middle-Income Countries: Cross Sectional Analysis. *PLoS One*. 2015;10(7):e0127199.
2. Wang L. The health and economic burden of multimorbidity in Australia: University of Tasmania; 2017.
3. Organization WH. Tracking universal health coverage: 2017 global monitoring report. 2017.
4. Bergen N, Ruckert A, Labonte R. Monitoring Frameworks for Universal Health Coverage: What About High-Income Countries? *Int J Health Policy Manag*. 2019;8(7):387-93.
5. Organization WH. Impact of out-of-pocket payments for treatment of non-communicable diseases in developing countries: a review of literature. World Health Organization; 2011.
6. Organization WH. Tracking universal health coverage: first global monitoring report: World Health Organization; 2015.
7. Jan S, Laba T-L, Essue BM, Gheorghe A, Muhunthan J, Engelgau M, et al. Action to address the household economic burden of non-communicable diseases. *The Lancet*. 2018;391(10134):2047-58.
8. Metrics IfH, Evaluation. Findings from the global burden of disease study 2017. *Lancet* [Internet]. 2018.
9. Bank W. Estimated deaths by cause and region, 2000 and 201. World Bank; 2016.
10. Bahler C, Huber CA, Brungger B, Reich O. Multimorbidity, health care utilization and costs in an elderly community-dwelling population: a claims data based observational study. *BMC Health Serv Res*. 2015;15:23.
11. Grace Sum TH, Rifat Atun, Christopher Millett, Marc Suhrcke, Ajay Mahal, et al. Multimorbidity and out-of-pocket expenditure on medicines: a systematic review. *BMJ Global Health*. 2018;3:12.
12. Zhao Y, Atun R, Oldenburg B, McPake B, Tang S, Mercer S, et al. Multimorbidity, Health Service Use and Catastrophic Health Expenditure by Socio-Economic Groups in China: A Panel Data Analysis. *Health Service Use and Catastrophic Health Expenditure by Socio-Economic Groups in China: A Panel Data Analysis* (08/19/2019 06: 25: 50). 2019.

13. Shi W, Chongsuvivatwong V, Geater A, Zhang J, Zhang H, Brombal D. The influence of the rural health security schemes on health utilization and household impoverishment in rural China: data from a household survey of western and central China. *Int J Equity Health*. 2010;9:7.
14. Heeley E, Anderson CS, Huang Y, Jan S, Li Y, Liu M, et al. Role of health insurance in averting economic hardship in families after acute stroke in China. *Stroke*. 2009;40(6):2149-56.
15. Azzani M, Roslani AC, Su TT. Determinants of Household Catastrophic Health Expenditure: A Systematic Review. *Malays J Med Sci*. 2019;26(1):15-43.
16. Organization WH. Noncommunicable diseases country profiles 2018. 2018.
17. Bollyky TJ, Templin T, Cohen M, Dieleman JL. Lower-income countries that face the most rapid shift in noncommunicable disease burden are also the least prepared. *Health Affairs*. 2017;36(11):1866-75.
18. Health FDRoEMo. ETHIOPIA HEALTH ACCOUNTS 2016/17. Ethiopia Federal Democratic Republic of Ethiopia Ministry of Health; 2019.
19. Verguet S, Memirie ST, Norheim OF. Assessing the burden of medical impoverishment by cause: a systematic breakdown by disease in Ethiopia. *BMC Medicine*. 2016;14(1).
20. Kasahun GG, Gebretekla GB, Gecho YH, Woldemariam AA, Fenta TG. Catastrophic Healthcare Expenditure and Coping Strategies among Patients Attending Cancer Treatment Services in Addis Ababa, Ethiopia. 2020.
21. Tolla MT, Norheim OF, Verguet S, Bekele A, Amenu K, Abdisa SG, et al. Out-of-pocket expenditures for prevention and treatment of cardiovascular disease in general and specialised cardiac hospitals in Addis Ababa, Ethiopia: a cross-sectional cohort study. *BMJ global health*. 2017;2(2).
22. Aster E. THE FINANCIAL BURDEN OF OUT OF POCKET EXPENDITURE FOR TREATMENT OF DIABETIC MELLITUS IN ADDIS ABABA. 2018.
23. Hailemichael Y, Hailemariam D, Tirfessa K, Docrat S, Alem A, Medhin G, et al. Catastrophic out-of-pocket payments for households of people with severe mental disorder: a comparative study in rural Ethiopia. *Int J Ment Health Syst*. 2019;13:39.
24. CDC. Introduction to NCD Epidemiology. 2013.
25. MacMahon S, Calverley P, Chaturvedi N, Chen Z, Corner L, Davies M, et al. Multimorbidity: A priority for global health research. The Academy of Medical Sciences: London, UK. 2018.

26. Déruaz-Luyet A, N'Goran AA, Senn N, Bodenmann P, Pasquier J, Widmer D, et al. Multimorbidity and patterns of chronic conditions in a primary care population in Switzerland: a cross-sectional study. *BMJ open*. 2017;7(6).
27. Starfield B, Kinder K. Multimorbidity and its measurement. *Health Policy*. 2011;103(1):3-8.
28. Pati S, Agrawal S, Swain S, Lee JT, Vellakkal S, Hussain MA, et al. Non communicable disease multimorbidity and associated health care utilization and expenditures in India: cross-sectional study. *BMC health services research*. 2014;14(1):451.
29. Nguyen TN, Ngangue P, Bouhali T, Ryan BL, Stewart M, Fortin M. Social Vulnerability in Patients with Multimorbidity: A Cross-Sectional Analysis. *Int J Environ Res Public Health*. 2019;16(7).
30. Navickas R, Petric VK, Feigl AB, Seychell M. Multimorbidity: What do we know? What should we do? *J Comorb*. 2016;6(1):4-11.
31. Orueta JF, Garcia-Alvarez A, Garcia-Goni M, Paolucci F, Nuno-Solinis R. Prevalence and costs of multimorbidity by deprivation levels in the basque country: a population based study using health administrative databases. *PLoS One*. 2014;9(2):e89787.
32. Mini GK, Thankappan KR. Pattern, correlates and implications of non-communicable disease multimorbidity among older adults in selected Indian states: a cross-sectional study. *BMJ Open*. 2017;7(3):e013529.
33. Woldesemayat EM, Kassa A, Gari T, Dangisso MH. Chronic diseases multi-morbidity among adult patients at Hawassa University Comprehensive Specialized Hospital. *BMC Public Health*. 2018;18(1):352.
34. McRae I, Yen L, Jeon YH, Herath PM, Essue B. Multimorbidity is associated with higher out-of-pocket spending: a study of older Australians with multiple chronic conditions. *Aust J Prim Health*. 2013;19(2):144-9.
35. Datta BK, Husain MJ, Asma S. Assessing the relationship between out-of-pocket spending on blood pressure and diabetes medication and household catastrophic health expenditure: evidence from Pakistan. *Int J Equity Health*. 2019;18(1):9.
36. Pradhan J, Dwivedi R, Banjare P. Relying on whom? correlates of out of pocket health expenditure among the rural elderly in Odisha, India. *Ageing International*. 2017;42(3):306-23.

37. Sancho-Mestre C, Vivas-Consuelo D, Alvis-Estrada L, Romero M, Uso-Talamantes R, Caballer-Tarazona V. Pharmaceutical cost and multimorbidity with type 2 diabetes mellitus using electronic health record data. *BMC Health Serv Res.* 2016;16(1):394.
38. Safran DG, Neuman P, Schoen C, Kitchman MS, Wilson IB, Cooper B, et al. Prescription drug coverage and seniors: findings from a 2003 national survey: where do things stand on the eve of implementing the new medicare part D benefit? *Health affairs.* 2005;24(Suppl1):W5-152-W5-66.
39. Chuma J, Gilson L, Molyneux C. Treatment-seeking behaviour, cost burdens and coping strategies among rural and urban households in Coastal Kenya: an equity analysis. *Trop Med Int Health.* 2007;12(5):673-86.
40. Kavosi Z, Rashidian A, Pourreza A, Majdzadeh R, Pourmalek F, Hosseinpour AR, et al. Inequality in household catastrophic health care expenditure in a low-income society of Iran. *Health Policy Plan.* 2012;27(7):613-23.
41. Mekonen AM, Gebregziabher MG, Teferra AS. The effect of community based health insurance on catastrophic health expenditure in Northeast Ethiopia: A cross sectional study. *PLoS One.* 2018;13(10):e0205972.
42. Rahman MM, Gilmour S, Saito E, Sultana P, Shibuya K. Health-related financial catastrophe, inequality and chronic illness in Bangladesh. *PLoS One.* 2013;8(2):e56873.
43. Hajizadeh M, Nghiem HS. Out-of-pocket expenditures for hospital care in Iran: who is at risk of incurring catastrophic payments? *International journal of health care finance and economics.* 2011;11(4):267.
44. Addis Ababa University College of Health Sciences Background of Tikur Anbessa Hospital 2020 [Available from: <http://www.aau.edu.et/chs/tikur-anbessa-specialized-hospital/background-of-tikur-anbessa-hospital/>].
45. Organization WH. STUDY ON GLOBAL AGEING AND ADULT HEALTH Individual Questionnaire Wave 1 Set A.
46. Xu K, Evans DB, Kawabata K, Zeramardini R, Klavus J, Murray CJL. Household catastrophic health expenditure: a multicountry analysis. *The Lancet.* 2003;362(9378):111-7.
47. Glynn LG, Valderas JM, Healy P, Burke E, Newell J, Gillespie P, et al. The prevalence of multimorbidity in primary care and its effect on health care utilization and cost. *Fam Pract.* 2011;28(5):516-23.

48. Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *The Lancet*. 2012;380(9836):37-43.
49. Sum G, Ishida M, Koh GC, Singh A, Oldenburg B, Lee JT. Implications of multimorbidity on healthcare utilisation and work productivity by socioeconomic groups: Cross-sectional analyses of Australia and Japan. *PLoS One*. 2020;15(4):e0232281.
50. Phaswana-Mafuya N, Peltzer K, Chirinda W, Musekiwa A, Kose Z, Hoosain E, et al. Self-reported prevalence of chronic non-communicable diseases and associated factors among older adults in South Africa. *Glob Health Action*. 2013;6:20936.
51. Palladino R, Tayu Lee J, Ashworth M, Triassi M, Millett C. Associations between multimorbidity, healthcare utilisation and health status: evidence from 16 European countries. *Age Ageing*. 2016;45(3):431-5.
52. Ahmadi R, Shafii M, Ameri H, Askari R, Fallahzadeh H. Catastrophic Health Expenditure Before and After of the Implementation of Health Sector Evolution Plan. *medRxiv*. 2020.
53. Kien VD, Van Minh H, Giang KB, Dao A, Tuan LT, Ng N. Socioeconomic inequalities in catastrophic health expenditure and impoverishment associated with non-communicable diseases in urban Hanoi, Vietnam. *International Journal for Equity in Health*. 2016;15(1).
54. Barasa EW, Maina T, Ravishankar N. Assessing the impoverishing effects, and factors associated with the incidence of catastrophic health care payments in Kenya. *Int J Equity Health*. 2017;16(1):31.
55. Li C, Young B-R, Jian W. Association of socioeconomic status with financial burden of disease among elderly patients with cardiovascular disease: evidence from the China Health and Retirement Longitudinal Survey. *BMJ open*. 2018;8(3):e018703.
56. Huffman MD, Rao KD, Pichon-Riviere A, Zhao D, Harikrishnan S, Ramaiya K, et al. A cross-sectional study of the microeconomic impact of cardiovascular disease hospitalization in four low- and middle-income countries. *PLoS One*. 2011;6(6):e20821.
57. Janssens W, Goedecke J, de Bree GJ, Aderibigbe SA, Akande TM, Mesnard A. The Financial Burden of Non-Communicable Chronic Diseases in Rural Nigeria: Wealth and Gender Heterogeneity in Health Care Utilization and Health Expenditures. *PLoS One*. 2016;11(11):e0166121.

58. Rezapour A, Arabloo J, Tofighi S, Alipour V, Sepandy M, Mokhtari P, et al. Determining equity in household's health care payments in Hamedan province, Iran. 2016.
59. Ozgen Narci H, Sahin I, Yildirim HH. Financial catastrophe and poverty impacts of out-of-pocket health payments in Turkey. *Eur J Health Econ*. 2015;16(3):255-70.
60. Wang Z, Li X, Chen M. Catastrophic health expenditures and its inequality in elderly households with chronic disease patients in China. *International Journal for Equity in Health*. 2015;14(1):8.
61. Li Y, Wu Q, Xu L, Legge D, Hao Y, Gao L, et al. Factors affecting catastrophic health expenditure and impoverishment from medical expenses in China: policy implications of universal health insurance. *Bull World Health Organ*. 2012;90(9):664-71.
62. Mondal S, Kanjilal B, Peters DH, Lucas H. Catastrophic out-of-pocket payment for health care and its impact on households: Experience from West Bengal, India. *Future Health Systems, Innovations for equity*. 2010.

ANNEXES

Annex 1 Study Information Sheet

Addis Ababa University School of Public Health

Dear respondents:

My name is _____ I am here to collect data on behalf of Mizan Habtemichael, a post graduate student in Addis Ababa University, School of Public Health, Health System Management Track. For her in order to get this Master degree she is expected to do a research entitled *“Impact of Non-Communicable Disease Multi morbidity on Health Care Utilization and Out - Of - Pocket Health Expenditure at Tikur Anbesa Specialized Hospital Addis Ababa, Ethiopia, 2020.”*

The purpose of this study is to determine the prevalence of multimorbidity , To determine the level of out - of - pocket health expenditure for non-communicable disease multimorbidity and t o assess the magnitude of catastrophic health expenditure among non-communicable disease multimorbidity patients at Tikur Anbesa Specialized hospital by measuring magnitude and intensity of catastrophic health expenditure. The study will also help to identify possible factors that determine catastrophic out - of - pocket payment for treatment of more than one chronic non communicable disease and give recommendation based on the findings.

There for you are, kindly requested to answer questions for the following interview. The information you provide will be kept strictly confidential. You will be facing no harm by participating and you are also not obligated to answer any question you don't wish to answer. This interview may require 20-30 minutes. For any comment you can use the contact address.

Name: Mizan Habtemichael

Tel: 251-912-44-36-09

E-mail mizanhabe924@gmail.com

Annex 2 Informed Consent Form

I have read the document stated above or it has been read to me by the data collector as I Fully understand purpose, procedures all conditions. Therefore, I have voluntarily decided to:

- Agree _____
- Disagree _____ on participation of the study

And I confirmed it by signature _____ Date _____

Thank You for your willingness to participate.

- Name of the interviewer: _____
- Questionnaires ID number _____
- Name of department _____
- Date of data collected _____

Start time _____ Ended time _____ Signature _____

Checked by Supervisor: Name _____ Signature _____

Annex 3 Questionnaire (English Version)

Section 1: Socio-Demographic / Economic Characteristics

MRN or serial number _____

Department _____

101	Sex of respondent	1. Male 2. Female
102	Age of respondent	_____
103	Marital status	1. Married 2. widowed 3. Divorced 4. Single
104	What is the highest level of education that you have completed?	1. Less than primary school 2. High school completed 3. College/University Completed
105	Where is your place of residency?	1. Addis Ababa 2. Other
106	What is your employment status?	1. Student 2. Government 3. Private 4. Retired 5. Housewife 6. Other specify _____
107	How much is your monthly income ?	_____ ETB
108	Family size	_____

Section 2 Medical Information of the Patient

201	Do you have Hypertension	1. Yes 2. No
202	Do you have Diabetes	1. Yes 2. No
203	Do you have Joint pain (arthritis)	1. Yes 2. No
204	Do you have Asthma	1. Yes 2. No
205	Do you have Cataract or Glaucoma	1. Yes 2. No
206	Do you have Mental illness	1. Yes 2. No
207	Do you have Malignancy	1. Yes 2. No

208	Do you have Stroke	1. Yes 2. No
209	Do you have chronic kidney disease	1. Yes 2. No
210	Do you have heart disease	1. Yes 2. No
211	Do you have a regular follow up for your NCD conditions?	1. Yes 2. Noskip 213 and 214
212	How often is your follow up appointment	1. Every month 2. Every two months 3. Every three months 4. Every six months 5. Other_____
213	In which health facility is your regular follow up?	1. Public 2. Private 3. Both 4. other (specify)_____
214	How do you rate your health status	1. Very poor 2. Poor 3. Medium 4. Good 5. Very good

Section 3 Facility Visit

301	In the past 12 months, how many times did you get out patient service at the health facility due to your NCD conditions?	_____Times		
302	How many outpatient visits did you make for your NCD conditions in the last Four weeks:	_____		
303	What was the type of health provider that you visited	1. Public 2. Private 3. Both		
304	In the last 12 months, have you ever admitted to a hospital to get treatment for your NCDs?	1. Yes 2. No_____ go to section 4 and skip section 5		
305	In the last 12 months how many times were you admitted in the hospital due to this NCD conditions?	_____Times		
306	For How long were you stayed for?	Admission 1	Admission 2	Admission 3
		___ days/ months	___ days/ months	___ days/ months

307	What was the type of health provider that you visited	1.Public 2.Private 3.Both		

Section 4 Out Patient Care and out of Pocket Expenditure

401	How much did you / your household pay out of- pocket for		ETB
		1. Registration/ Consultation	
		2. Drugs/vaccines	
		3. Diagnosis/investigations (x-ray, lab etc.)	
		4. Physiotherapy	
		5. Transport (round trip) including that of person accompanying	
		6. Food and accommodation including that of person accompanying	
		7. Other (specify)	

Section 5 Inpatient Hospital Care and Out - Of - Pocket Expenditure

501	During last month admission how much did you / your household pay out of- pocket for		ETB
		1. Registration/ Consultation	
		2. Drugs/vaccines	
		3. Diagnosis/investigations (x-ray, lab etc.)	
		4. Surgical operation	
		5. Physiotherapy	
		6. Bed /accommodation	
		7. Transport (round trip) including that of person accompanying	
		8. Food and accommodation including that of person accompanying	
		9. Other (specify)	

Section 6 Insurance Status

601	Are you a member of an insurance system?	1.Yes 2. No
-----	--	----------------

Section 7 Household Assets

701	Home ownership	1.Private 2.Government 3.Rent 4.Other (specify)_____
702	In your house how many rooms are there?	_____ Rooms
703	How many rooms in the household are used for sleeping?	_____ Rooms
704	What are the main walls made of in your house?	1. Bamboo 2. wood with mud 3. Uncovered adobe 4. Covered adobe 5. Play wood 6. Carton 7. Cement 8. Stone with lime/cement 9. Cement blocks 10. Wood planks 11. Corrugated iron 12. Other (please Specify) _____
705	What is the main material of the roof in your house?	1. Corrugated Iron 2. Wood 3. cement Fiber /Concrete 4. leaf 5. Plastic Sheets 6. Bamboo 7. Other (please Specify) _____
706	What kind of toilet facility does your household have?	1.Pour flush toilet 2.Ventilated improved pit latrine 3.Pit latrine with slab 4.Pit latrine without slab 5.No latrine 6. Other (specify)_____
707	What is the main source of drinking water for members of your household?	1.Piped water 2.Protected well 3.Unprotected well 4.Protected spring 5.Unprotected spring 6.Surface water (River/stream/ 7.Pond/lake//Dam)

		8.Tanker 9.Bottled water 10.other (specify)____	
708	Does the house hold own agricultural land?	1.Yes 2.No.....Skip 709	
709	How many (local units) of agricultural land do members of this house hold own?	____Local units	
710	From the following list of animals how many of them do your household own?	Item	Quantity
		Cattle	
		Milk cows	
		Horses, donkey	
		Chickens	
		Goats	
		Sheep	
	Others(specify)____		
711	What source of energy does your household use for cooking?	1. Gas 2. Electricity 3. Kerosene 4. Wood 5. Coal 6. Other (specify)____	
712	How much of the following items do your household have?	Item	Quantity
		Radio	
		Computer	
		Television	
		Non-mobile telephone	
		Refrigerator	
		Table	
		Chair	
		Bed with cotton	
		Sponge/ spring mattress	
		Sofa	
		Watch	
		Bicycle	
		An animal-drawn cart	
		Car or truck	

		Bajaj	
		Mobile phone	
713	Does member of this household have a bank/microfinance account?	1.Yes 2.No	

Section 8 Essential consumptions for patient's household

801	How much is your household monthly expenditure for Food/food items	_____ETB/Month
802	How much is your household monthly expenditure for Utilities (electricity, water , telephone)	_____ETB/Month
803	How much is your household monthly expenditure for Education (School for children or self)	_____ ETB/Month
804	How much is your household monthly expenditure for House rent	_____ETB/Month
805	How much is your household monthly expenditure for Transport	_____ETB/Month
806	How much is your household monthly expenditure for Cosmetics	_____ETB/Month
807	How much is your household monthly expenditure for Clothes	_____ETB/Month
808	How much is your household monthly expenditure for Goods (properties) and utensils for the household use	_____ETB/Month
809	How much is your household monthly expenditure for Reimbursement of loan (describe, if it is related to health spending)	_____ETB/Month
810	How much is your household monthly expenditure for religious contribution ,idder	_____ETB/Month
811	How much is your household monthly expenditure for other household consumption	_____ETB/Month
812	Estimated total annual household expenditure	ETB
813	How much is the household's total monthly net(From all sources) income ?	Monthly

Annex 4 Study information sheet (Amharic Version)

የጥናት መረጃ ወረቀት

የተከበሩ መላሾች

የእኔ ስም _____ ነው የመጣሁት በአዲስአበባ ዩኒቨርሲቲ የድህረ ምረቃ ትምህርት ክፍል፣ የሕብረተሰብ ጤና ትምህርት ቤት፣ የጤና ስርዓት አስተዳደር ትምህርት ክፍል የድህረ ምረቃ ተማሪ የሆነችውን ሚዛን ህብተሚካኤል በመወከል መረጃ ለመሰብሰብ ነው።

ይህንን የሁለተኛ ዲግሪ ለማግኘት የተላላፊ ያልሆኑ በሽታዎች ከኪስ የሚከፈል ህክምና ወጪ በታካሚ ላይ የሚያደርሰውን ጉዳት ላይ የተኮረ ጥናት በጥቁር አንበሣ ሆስፔታል ውስጥ ማድረግ ይጠበቅባታል። የዚህ ጥናት ዓላማ ተላላፊ ላልሆኑ በሽታዎች በታካሚው እና በቤተሰቦቻቸው በሚወጡት ከፍተኛ የጤና ወጪዎች ምክንያት የሚደርስባቸውን አከናውኖ ጉዳት የሚለካ ነው። በተጨማሪም ጥናቱ በውጤቶቹ ላይ በመመርኮዝ ለሚመለከተው አካል ምክንያት ይሰጣል።

ስለዚህ ለሚቀጥለው ቃለ-መጠይቅ ጥያቄዎችን እንዲመልሱ በትህትና እጠይቃለሁ። የሰጡት መረጃ በጥብቅ በሚስጥር ይያዛል። በመሳተፍ ምንም ዓይነት ጉዳት አይገጥሙዎትም እንዲሁም መመለስ የማይፈልጉትን ማንኛውንም ጥያቄ የመመለስ ግዴታ የለብዎትም። ይህ ቃለ-መጠይቅ ከ10-20 ደቂቃዎችን ሊፈልግ ይችላል። ለማንኛውም አስተያየት የሚከተለውን አድራሻ መጠቀም ይችላሉ።

ስም: - ሚዛን ህብተሚካኤል

ስልክ: 251-912-44-36-09

ኢ-ሜል:- mizanhabet924@gmail.com

Annex 5 Informed consent form (Amharic version)

የፍቃደኝነት

ማረጋገጫ

ቅጽ

ከዚህ በላይ የተገለጸውን ሰነድ አንብቤዋለሁ ወይም መረጃ ሰብሳቢው ተነቦልኝ፤ ዓላማውን፣ ሁሉንም ሁኔታዎች ሙሉ በሙሉ ተረድቻለሁ፡፡ ስለዚህም ጥናቱ ላይ ለመሳተፍ

• _____ እስማማለሁ _____

• አልስማማም _____

ይህንንም _____ በፊርማዬ _____ አረጋግጫለሁ፡፡

ፊርማ _____ ቀን _____

በጥናቱ ለመሳተፍ ፈቃደኛ ስለሆኑ እናመሰግናለን፡፡

• የጠያቂው ሙሉ ስም _____

• የመጠይቅ ቁጥር _____

• የክፍል ስም _____

• መረጃው የተሰበሰበበት ቀን _____

➤ የመጠይቅ መጀመሪያ ሰዓት _____ የመጠይቅ ማብቂያ ሰዓት _____

ፊርማ _____

➤ ያረጋገጠው ተቆጣጣሪ ስም _____ ፊርማ _____

Annex 6 Questionnaire (Amharic Version)

ክፍል 1 - ማህበረሰባዊ እና ምጣኔ ሀብታዊ ሁኔታዎች

መለያ ቁጥር _____

የህክምና ክፍል _____

101	ፆታ	1. ወንድ 2. ሴት
102	እድሜ	_____ አመት
103	የጋብቻ ሁኔታ	1. _____ ያገባ 2. _____ የሞተበት 3. _____ ፍቺ 4. አላገባም
104	ያጠናቀቁት ከፍተኛ የትምህርት ደረጃ ምንድነው?	1. የመጀመሪያ ደረጃ ትምህርት ቤት ትምህርት 2. የሁለተኛ ደረጃ ትምህርት ቤት ትምህርት 3. ኮሌጅ / ዩኒቨርሲቲ ትምህርት
105	የመኖሪያ ቦታዎ የትነው?	1. _____ አዲስ አበባ 2. ሌላ፣ ይግለጹ _____
106	የሥራ ቅጥር ሁኔታዎ ምንድነው?	1. ተማሪ 2. የመንግሥት ተቀጣሪ 3. የግል ተቀጣሪ 4. ጡረታ ወጥቷል 5. የቤት እመቤት 6. ሌላ ይግለጹ _____
107	ወርሃዊ ገቢዎ ስንት ነው?	_____ ብር
108	የቤተሰብ አባላት ቁጥር	_____

ክፍል 2 - የጤና መረጃ

201	የደም ግፊት ህመም አለዎት?	1. አዎ 2. የለም
202	የስኳር ህመም አለዎት?	1. አዎ 2. የለም
203	የመገጠጠሚያ ህመም አለዎት?	1. አዎ 2. የለም
204	የአስም ህመም አለዎት?	1. አዎ 2. የለም
205	የአይን (ካታራክት ወይም ግላውማ) ህመም አለዎት?	1. አዎ 2. የለም
206	የአይምሮ ህመም አለዎት?	1. አዎ 2. የለም
207	የካንሰር ህመም አለዎት?	1. አዎ 2. የለም
208	ስትሮክ አጋጥሞት ያውቃል	1. አዎ 2. የለም

209	የኩላሊት ህመም አለዎት?	1. አዎ 2. የለም
210	የልብ ህመም አለዎት?	1. አዎ 2. የለም
211	ላለቦት ተላላፊ ያልሆኑ የህመም ሁኔታዎች መደበኛ የህክምና ክትትል አለዎት?	1. አዎ 2. አይ ----213 and 214 ዝለል
212	ክትትል የሚደረግሎት ቀጠሮዎምን በያህል ጊዜ ነው	1. በየወሩ 2. በየሁለትወሩ 3. በየሦስትወሩ 4. በየስድስትወሩ 5. ሌላ _____
213	የትኛውን የጤና ተቋም ነው መደበኛ ክትትልዎ?	1. የመንግስት 2. የግል 3. ሁለቱም 4. ሌላ (ይግለጹ) _
214	የጤና ሁኔታዎን እንዴት ይለካሉ?	1. በጣም ደካማ 2. ደካማ 3. መካከለኛ 4. ጥሩ 5. በጣም ጥሩ

ክፍል 3 - ህክምና የሚያገኙበት ድግግሞ

301	በላፊት 12 ወሮች ተላላፊ ያልሆኑ የህመም ሁኔታዎች መከንያዎን ያህል ጊዜ በጤና ተቋም ውስጥ የህክምና አገልግሎት አግኝተዋል?	_____ ጊዜ በመንግስት ተቋም _____ ጊዜ በግል ተቋም
302	በአላፊት አራት ሳምንታት ውስጥ ተላላፊ ያልሆኑ የህመም ሁኔታዎች መከንያዎን ስንት ጊዜ ህክምና አገኙ?	_____ ጊዜ
303	የጎበኙት የጤና አገልግሎት አቅራቢ ምን ዓይነት ነበር?	4. የመንግስት ተቋም 5. የግል ተቋም 6. ሁለቱም
304	በአላፊት 12 ወሮች ውስጥ ላለቦት ተላላፊ ያልሆኑ የህመም መከንያዎን ህክምና ለማግኘት ወደ ሆስፒታል ገብተው (ተኝቶ ህክምና አግኝተው) ያውቃሉ?	1. አዎ 2. የለም ወደሚቀጥለው ክፍል ይሂዱ
305	በአላፊት 12 ወሮች ውስጥ ላለቦት ተላላፊ ያልሆኑ የህመም መከንያዎን ምን ያህል ጊዜ በሆስፒታል ውስጥ ገብተዋል?	_____ ጊዜያት
306	ለምን ያህል ጊዜ በሆስፒታል ውስጥ ተኝተው ሲታከሙቆዩ	የመጀመሪያ _____ ቀናት ሁለተኛ _____ ቀናት ሶስተኛ _____ ቀናት
307	እርስዎ የገቡበት የጤና አቅራቢ ባለቤት ነት የማንነበር?	1. መንግስት 2. የግል

		3.ሁለቱም
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ክፍል 4-ለተመላላሽ ህክም ከኪስ የሚከፈል ገንዘብ

401	ባለፈው ወር ውስጥ ለተመላላሽ ህክምና እርስዎ ወይም ቤተሰብዎም ን ያህል ገንዘብ ከፈሉ	በመንግስት ተቀዋም _____ ብር በግል ተቀዋም _____ ብር		
402	ለሚከተሉት አገልግሎቶች ምን ያህል ክፍያ ገንዘብ ከፈሉ		በመንግስት ተቀዋም	በግል ተቀዋም
	2. ለካርድ		_____ ብር	_____ ብር
	8 መድሀኒት		_____ ብር	_____ ብር
	9 ምርመራ (ኤክስሬይ፣ ላብራቶሪ ወዘተ)		_____ ብር	_____ ብር
	10 ፊዚዮቴራፒ		_____ ብር	_____ ብር
	11 መጓጓዣ (አሰታሚ ንጮምሮ)		_____ ብር	_____ ብር
	12 ምግብ እና ማረፊያ (አሰታሚ ንጮምሮ)		_____ ብር	_____ ብር
	13 ሌላ (ይግለጹ)		_____ ብር	_____ ብር

ክፍል 5 - ተኝቶ መታከም አገልግሎት ከኪስ የሚከፈል ገንዘብ

501	ባለፈው ወር ውስጥ ተኝቶ ለመታከም እርስዎ ወይም ቤተሰብዎም ን ያህል ገንዘብ ከፈሉ	በመንግስት ተቀዋም _____ ብር በግል ተቀዋም _____ ብር		
502	ለሚከተሉት አገልግሎቶች ምን ያህል ክፍያ ገንዘብ ከፈሉ		በመንግስት ተቀዋም	በግል ተቀዋም
	10. ለካርድ		_____ ብር	_____ ብር
	11. መድኃኒት ይገኛል		_____ ብር	_____ ብር
	12. ምርመራ (ኤክስሬይ፣ ላብራቶሪ ወዘተ)		_____ ብር	_____ ብር
	13. ለቀዶጥና		_____ ብር	_____ ብር
	14. ፊዚዮቴራፒ		_____ ብር	_____ ብር
	15. ለአልጋ		_____ ብር	_____ ብር
	16. መጓጓዣ (ወደ ጤና አቅራቢው እና ወደ)		_____ ብር	_____ ብር
	17. ምግብ (አሰታሚ ንጮምሮ)		_____ ብር	_____ ብር
	18. ሌላ ወጪ		_____ ብር	_____ ብር

ክፍል 6 የጤና መድን ሁኔታ

601	የጤናመድንስርዓትአባልነዎት?	1. አዎ 2. የለም
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ክፍል 7 የቤት ንብረቶች

701	የሚኖሩበትቤትየማነው	1. _____ 2. _____ 3. _____ 4. ሌላ (ይግለጹ) _____	የግል የመንግስት የኪራይ
702	በቤትዎውስጥስንትክፍሎችአሉ?	_____ ክፍሎች	
703	በቤቱውስጥስንትክፍሎችለመተኛትያገለግላሉ?	_____ ክፍሎች	
704	በቤትዎውስጥዋናግድግዳዎችምንድንየተሰሩናቸው?	13. የቀርከሃ 14. የእንጨትእናየጭቃ 15. ያልተሸፈነእበት 16. የተሸፈነእበት 17. እንጨቶች 18. ካርቶን 19. ሲሚንቶ 20. ድንጋይከኖራ / ከሲሚንቶጋር 21. የሲሚንቶብሎኮች 22. የእንጨትጣውላዎች 23. በቆርቆሮየተሰራብረት 24. ሌላ (እባክዎንይግለጹ) _____	
705	በቤትዎውስጥያለውጣሪያየተሰራበትቁሳቁስምንድነው?	8. በቆርቆሮየተሠራብረት 9. እንጨት 10. ሲሚንቶ / ኮንክሪት 11. ቅጠል 12. የላስቲክ 13. የቀርከሃ 14. ሌላ (ይግለጹ) _____	
706	የእርስዎቤተሰብምንዓይነትየመጻዳጃቤትአለው?	1. ውሃያለውመጻዳጃቤት 2. አየርየሚያስገባየጉድጋድመጻዳጃቤት 3. መከለያየለውየጉድጋድመጻዳጃቤት 4. መከለያየሌለውየጉድጋድመጻዳጃቤት 5. መጻዳጃቤትየለም 6. ሌላ (ይግለጹ) _____	
707	ለቤተሰብዎአባላትየመጠጥውሃ ምንጭምንድነው?	1. የባንባውሃ 2. በደንብየተስተካከለየጉድጋድውሃ 3. በጥሩሁኔታያልተጠበቀየጉድጋድውሃ 4. የተጠበቀየምንጭውሃ 5. ያልተጠበቀየምንጭውሃ 6. የመስኖውሃ (ወንዝ / ጅረት / 7. ገንዳ / ሐይቅ // ግድብ)	

713	የዚህ ቤተሰብ አባል የባንክ ማይክሮፋይናንስ ሂሳብ አለው?	/	1. 2. አይ	አዎ
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ክፍል 8 የቤት ወጪ

801	ቤተሰብዎ በወር ለምግብ (ጤፍ፣ ስንዴ፣ ዘይት፣ አትክልት፣ ጥራጥሬ... ወዘተ) ምን ያህል ገንዘብ ያወጣል	_____ ብር/ወር
802	ቤተሰብዎ በወር ለኤሌክትሪክ፣ ለውሃ፣ ለስልክ ምን ያህል ገንዘብ ያወጣል	_____ ብር/ወር
803	ቤተሰብዎ በወር ለትምህርት ቤት ክፍያ ምን ያህል ገንዘብ ያወጣል	_____ ብር/ወር
804	ቤተሰብዎ በወር ለቤት ኪራይ ክፍያ ምን ያህል ገንዘብ ያወጣል	_____ ብር/ወር
805	ቤተሰብዎ በወር ለመጓጓዣ ክፍያ ምን ያህል ገንዘብ ያወጣል	_____ ብር/ወር
806	ቤተሰብዎ በወር ለሰሙና፣ አሞ፣ የግል እንክብካቤ መጠበቂያ እቃዎች ለመዋጋት ምን ያህል ገንዘብ ያወጣል	_____ ብር/ወር
807	ቤተሰብዎ በወር ለአልባሳት ጫማዎች ምን ያህል ገንዘብ ያወጣል	/ _____ ብር/ወር
808	ቤተሰብዎ በወር ለቤት ውስጥ መገልገያ እቃዎች (ለየወጥ ቤት መሣሪያዎች፣ ለፎጣዎች፣ ብርድል ብሶች፣ ወንበር፣ ጠረጴዛ ወዘተ) ምን ያህል ገንዘብ ያወጣል	_____ ብር/ወር
809	ቤተሰብዎ በወር እዳዎችን ለመክፈል ምን ያህል ገንዘብ ያወጣል	_____ ብር/ወር
810	ቤተሰብዎ በወር ለአብያተ ክርስቲያናት እና መስጊዶች መዋጮች፣ ለእድረ መዋጮች፣ የቀብር ሥነ ሥርዓት፣ ለበዓላት ምን ያህል ገንዘብ ያወጣል	_____ ብር/ወር
811	ቤተሰብዎ በወር ከላይ ላልተጠቀሱ ሌሎች የቤት ውስጥ ወጪዎች ምን ያህል ገንዘብ ያወጣል	_____ ብር/ወር
812	የቤተሰብ አጠቃላይ ወርሀዊ ወጪ ምን ያህል ነው	 ብር
813	የቤተሰብ አጠቃላይ ወርሀዊ ገቢ (ከተለያዩ ምንጮች ተደምሮ) ምን ያህል ነው	 በወር

Annex 7 Curriculum Vitae

Personal data		
Name	Mizan Habtemichael	
Date of birth	June 9, 1994	
Sex	Female	
Marital status	Single	
Nationality -	Ethiopian	
Address	Mob. 00251912-443609 Email:mizanhabte924@gmail.com	
Education		
2020	Addis Ababa University, College of Health Sciences, School of Public Health, Health System Management Tack, Addis Ababa, Ethiopia. MPH candidate	
2016	Addis Ababa University, College of Health Sciences, Medical Laboratory Sciences School. B.Sc. Medical Laboratory Technology, Addis Ababa, Ethiopia.	
2012	Dejazmach Wondirad Preparatory School, University Entrance Examination, Addis Ababa, Ethiopia.	
Experience	Institution	Duration
Junior Researcher	International Red Cross Red Crescent Climate Center	September 15 – December 4
Intern	JSI/ DUP	March ,2020
Medical Laboratory Technologist	Tikur Anbesa Specialized Hospital	Nov 2016 – March 2019
Training		
Project Management	Addis Ababa University, School of Commerce, 2020.	
Scientific writing and communication	Addis Ababa University, College of Health Sciences, School of Public Health,2020.	
Data analysis using SPSS	Addis Ababa University, School of Commerce,2020 May 8 – 19	
Malaria Laboratory Diagnosis and Quality Assessment	Addis Ababa University, ICAP-Columbia University Program in Ethiopia and PMI/USAID Ethiopia, 2016	
Appropriate Clinical Use of Blood, Blood Products and Clinical Training Skills (TOT)	Addis Ababa city health Bureau , Family Guidance Association of Ethiopia , National Blood Bank Service (NBBS)	
Computer skill		
Microsoft Office and Internet applications		
Statistical software application like SPSS, STATA and Epidata		
Language		
Amharic - Mother tongue.		
English – proficient in all the 4 skills.		

Reference		
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Mr Henok kebede	Tikur Anbesa specialized hospital laboratory	Phone – +251913035170 Email - kebedeh34@yahoo.com
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Annex 8 Assurance of Principal Investigator

DECLARATION

I declare that the thesis entitled “Impact of Non-Communicable Disease Multimorbidity on Health Care Utilization and Out of Pocket Health Expenditure at Tikur Anbesa Specialized Hospital “ is my original work and it has not been presented for a degree in Addis Ababa university or another university. I also declare that all the sources of material used for this thesis have been fully acknowledged.

Name of the student: Mizan Habtemichael Geberesilassie

Date of submission. _____

Signature _____

Place: Addis Ababa

This thesis has been submitted for examination with my approval as a University advisor

Name: Meseret Molla Kassahun(PhD)

Signature: _____