NON-COMMUNICABLE DISEASES REIMBURSEMENT TRENDS AND PREDICTORS TOWARDS UNIVERSAL HEALTH INSURANCE: A CASE OF THE NATIONAL HEALTH INSURANCE FUND IN TANZANIA.

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By

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A dissertation Submitted in (Partial) Fulfilment for the Degree of

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CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation titled *"**Non-Communicable Diseases Reimbursement Trends and Predictors Towards Universal Health Insurance: A Case of The National Health Insurance Fund in Tanzania"*** in (partial) fulfillment of the requirements for the degree award of Master of Health economic and Policy of Muhimbili University of Health and Allied Sciences**.**

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DECLARATION AND COPYRIGHT

I, **Othman Khamis Haji,** hereby declare that this dissertation is my original work and it has not been presented to any other University for similar or any other degree award.

Signature ---------- **Date: ……..**

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DEDICATION

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ABSTRACT

Background: Non-communicable diseases (NCDs) account for 74% of global deaths annually, among which cardiovascular diseases account for 13.72%. In Tanzania, the burden of NCD has been on the rise and it is estimated that hypertension has a prevalence of 26% and a prevalence of 9% and contributes to over one-third of all deaths (34%). Although the prevalence of NCDs is increasing the financial impact of these NCDs on the National Health Insurance Fund (NHIF) has not been fully explored.

Objective: The main objective is to assess distributions, and trends of the major NCDs and to determine NCD reimbursement predictors using from January 2021 to December 2023.

Method: A cross-sectional study design that used quantitative approaches to analyze secondary claims data from the NHIF database using the ICD-10. The data were analyzed using R Statistical software. Descriptive statistics were used to report and summarize the distributions, and reimbursement trends of the major NCDs, and multivariable log-linear regression analysis was deployed to determine the predictors for NCD reimbursement to NHIF.

Findings: We found that females and the old age group (50-65, 65, and above) accounted for most NCD reimbursement, with NCD-related claims increasing from 1,293,668 claims in 2021 to 8,748,323 claims in 2023. Cardiovascular and diabetes-related claims were the highest followed by cancers and chronic renal disease. Most claims originated from private facilities 40% in 2023 followed by Government facilities 32% in 2023. The overall NCD reimbursement rose from TZS 220.1 billion (2022) to TZS 235.8 billion (2023), whereby cancers related claims having the highest average reimbursement per patient from TZS 1,110,464 to TZS 1,166,545 making the most expensive NCD to manage. We identified that NCD types, age group, sex, facility level, and type of facility ownership were predictors of NCD reimbursement.

Conclusion and Recommendation: This study highlights that elderly individuals and females make up a significant portion of NHIF beneficiaries with NCD claims. NCD reimbursements by the NHIF have risen with cardiovascular diseases dominating the claims, while cancers and chronic renal diseases are the most costly to manage. NCD

reimbursements correlate with identified predictors. Notably, private and zonal hospitals are associated with higher reimbursements. The NHIF should enforce effective referral systems and prioritize prevention and NCD treatment at primary and public facilities, which can deliver quality care at lower costs.

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ABBREVIATIONS

CKD	–	Chronic kidney disease
CVD	–	Cardiovascular diseases
DALYs	–	Disability Adjusted Life Years
DFF	–	Direct Facility Funding
HBF	–	Health basket funds
HIV	–	Human Immunodeficiency Virus
ICD-10	–	International Classification of Disease- 10^{th} Edition
ICMIS	–	Integrated Claims Management System
LMIC	–	Lower- and Middle-Income Countries
NCDs	–	Non-Communicable Diseases
NHIF	–	National Health Insurance Fund
OOP	–	Out-of-Pocket Payment
PAHO	–	The Pan American Health Organization
RBF	–	A Result based funding
SDG	–	Sustainable Development Goal
TZS	–	Tanzania Shillings
UHC	–	Universal Health Coverage
UHI	–	universal health insurance
USD	–	United States Dollar
WHO	–	World Health Organization
WHS	–	World Health Survey

DEFINITION OF TERM.

Non-Communicable Diseases- a wide spectrum of chronic diseases that result from multi-faceted factors which may be genetic, physiological, environmental, or behavioral factors.

Major NCDs- Refers to the six categories of NCDs namely Cardiovascular diseases, Diabetes Mellitus, Cancers, Chronic renal diseases, Chronic respiratory diseases, and Mental Illnesses.

The financial burden of NCDs- refers to the economic impact and strain imposed on individuals, and the healthcare systems due to the costs associated with prevention, diagnosis, treatment, and management of chronic diseases.

Reimbursement Cost: refers to the claim amount that is accepted by the NHIF and paid for a particular ill health condition treated at an accredited provider.

Policyholder- A member enrolled in any of the health insurance scheme premiums.

Premium- refers to the health insurance plan within a health insurance scheme.

Universal Health Care- refers to ensuring that all people have access to primitive, preventive, curative, and rehabilitative health services of quality, when and where they need them, without financial hardship.

Item Code: This is a unique number assigned to identify a particular service item from the NHIF benefit package and claim database eg: The item code for Admission charges 21.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Non-communicable diseases (NCDs) are the spectrum of chronic diseases that result due to multi-faceted factors which may be genetic, physiological, environmental, or behavioral factors. The main types of NCDs include cardiovascular diseases, diabetes, cancers, chronic kidney diseases, chronic respiratory diseases, injuries, and mental health-related diseases (1). These major categories of NCDs have become the leading causes of morbidity and mortality globally. The World Health Organization (WHO) reported that NCDs claim 41 million each year which is equivalent to 74% of all deaths globally. Among NCDs, cardiovascular diseases are responsible for 17.9 million deaths annually worldwide, followed by cancers which claim 9.3 million deaths, chronic respiratory diseases (4.1 million), and diabetes with chronic kidney disease (2.0 million). Currently, all age groups are susceptible to risk factors associated with NCDs including unhealthy diets, physical inactivity, air pollution, tobacco smoke, and harmful use of alcohol (1).

Out of all NCD deaths, 77% occur in low and middle-income countries (LMICs), with 17 million NCDs deaths occurring from individuals less than 70 of age. In the African region, the WHO in 2019 estimated that NCDs caused 37% of all deaths, increasing from 24% in the year 2000(2). Cardiovascular deaths are estimated to be 13% of total deaths in Africa, and cancers have 5.7% of global cancer incidence with 7% of global cancer deaths occurring in Africa. Diabetes accounts for 24millions people in the region and is expected to rise by 129% in 2045(2).

In Tanzania, the NCD burden has been on the rise and it is estimated that Cardiovascular diseases like Hypertension have a prevalence of 25.9% and diabetes 9.1% as per the WHO STEP survey in 2012, this growing prevalence has been associated with changes in lifestyle, urbanization, and an aging population(3). This burden accounted for 34% of all deaths annually in 2019 rising from 27% in 2012, whereby the four major types of NCD (cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes) are leading

causes of the age-standardized mortality causing 556 per 100,000 deaths in male and 498 per 100,000 death in female in 2021(4).

The growing burden of NCDs results in higher healthcare costs, which directly and indirectly impact the economy of a particular country as these diseases are expensive in their management and require long duration hence necessitating resource reallocation and hence negatively impacting the economy of a particular country (1). The Pan American Health Organization (PAHO) and WHO estimate that by the year 2030, the NCDs will cost the global economy about 30$ trillion US dollars and will push millions of people below the poverty line. Also, it is estimated that about $7 trillion in US Dollar economic loss will be contributed by LMICs (5).

Despite the growing burden of the NCDs globally as they contributed to half of the global deaths in 2014 but still receive less financing from International Aid for health accounting for less than 2% (US$492 million out of US$36 billion) in contrast to HIV that contributed to only 4% of global disease burden but received 29% of global aid funds for health (6). In Tanzania, the rising burden of the NCDs coincides with the expensive nature of their management as the country's expenditure on NCDs as a percentage of current health expenditure (CHE) has risen from 7% in 2019/2020 to 24% in 2021/2022(7).

Henceforth, the treatment and management of NCDs in general are costly, and specifically in developing countries households and individuals are directly paying the treatment cost for NCDs leading to catastrophic health expenditures. Although in developing countries with social health insurance systems for all individuals, health insurance plays a key role as the alternative financing mechanism for costly chronic disease treatments(8).

In Tanzania, the National Health Insurance Fund is a statutory social health insurance scheme that mandatorily enrolls all public employees and their dependents as well as voluntarily insuring other formal and informal sectors currently covering 8% of Tanzania's population. The NHIF has a responsibility to ensure equitable access to quality healthcare services for all its members through a wide range of networks of accredited service providers within Tanzania. The fund offers comprehensive NCD services to its members through its benefits package and reimburses service providers through mainly fee-for-service and a co-

copayment and service bundle in some cases. However, in recent years following the advancement of technology in the healthcare industry, everlasting communicable diseases and the growing burden of NCDs have affected the NHIF's financial stability (9).

Tanzania has strengthened its health systems to attain the Sustainable Development Goal (SDG) 3 which requires the country to ensure good health and well-being for all by the year 2030. This is realized through Universal Health Coverage (UHC) where the country has undertaken several reforms in health systems, including strengthening and decentralization of health funding whereby the donor funds through Result-Based Funding (RBF) and Health Basket Funds (HBF) are directly funded to the facilities through Direct Facility Financing (DFF) (10).

The country recently in December 2023 passed the law for Universal Health Insurance (UHI) that requires all Tanzanians to be enrolled in a health insurance scheme where all residents will be mandatorily enrolled by the Health Insurance Scheme. A special subsidized fund that will provide a basic healthcare package to individuals in extreme poverty will be established. This is expected to be a significant step for the country toward UHC by 2030 whereby all individuals will have access to quality health care without financial hardship (11).

The UHI is expected to remarkably increase coverage of Tanzanians within the health insurance systems. With the prevailing communicable diseases and the growing burden of NCDs among individuals of all ages, hence it is not very well known the magnitude of the financial burden that the NCD would impose on social health insurance schemes like NHIF. Evidence shows that an individual with health insurance who has NCDs is likely to have twice the healthcare utilizations compared to an individual with NCDs with no health Insurance, this leads to an increased financial burden on social health insurance (12).

The existing social health insurance (NHIF) is already being overwhelmed and its resources are being strained by the need for specialized treatments, medications, and long-term care for NCDs hence threatening its financial sustainability. Hence the extent and trends to which the NHIF is reimbursing the NCDs and their determinants is not fully explored as the country heading toward the UHI.

His study aims to assess the distribution, and trends of the major NCDs (mainly, cardiovascular, cancers, diabetes, chronic respiratory and chronic kidney disease, and mental illnesses conditions) and to determine their reimbursement predictors using NHIF claims data.

1.2 Statement of the Problem

Non-communicable diseases are currently imposing more economic losses than any other disease category. The global economic loss due to NCDs from 2011 to 2015 was estimated to be US 51 trillion, of which LMICs contributed USD 7 trillion (13). Adequate resources are essential to address the NCD burden in LMICs. A study done by Osetinsky B, et al in 2022 investigating sustainability challenges for the National Health Insurance Fund in Tanzania showed that in 2016 the NHIF spent 14.1% of its reimbursement to NCD and the burden of NCD was 3.1 times higher among the old age group category(14). Also, a similar study projected that if the NHIF has a 10% growth of its members annually by 2050 then it will have to spend USD 765 million on cardio metabolic-related NCDs compared to 41.2 million USD spent in 2020(14). According to the NHIF performance report of 2022/2023 indicates that its claims reimbursement budget has continued to increase surpassing its revenues(9).

However, the distribution, trend of NCD reimbursement, and the predictors associated with the rising reimbursement burden are not fully understood. Therefore, it is crucial to analyze the available claims data to determine the impact of managing the increasing burden of NCDs in the context of UHI.

1.3 Conceptual Framework

This conceptual framework provides the key variables and their relationship in each research objective. Trends of NCD reimbursement by the NHIF were determined by the number of NCD claims, types of major NCDs, and the reimbursement costs of NCD treatment, while the distribution of NCD claims and predictors of NCD reimbursements of the major NCD were determined using identified by sex type, age group of a member, type of NCD, a facility ownership type, level, and location. Hence all these variables lead to the assessment of the Reimbursement/Funding Burden of NCDs encountered by the NHIF towards UHI in Tanzania.

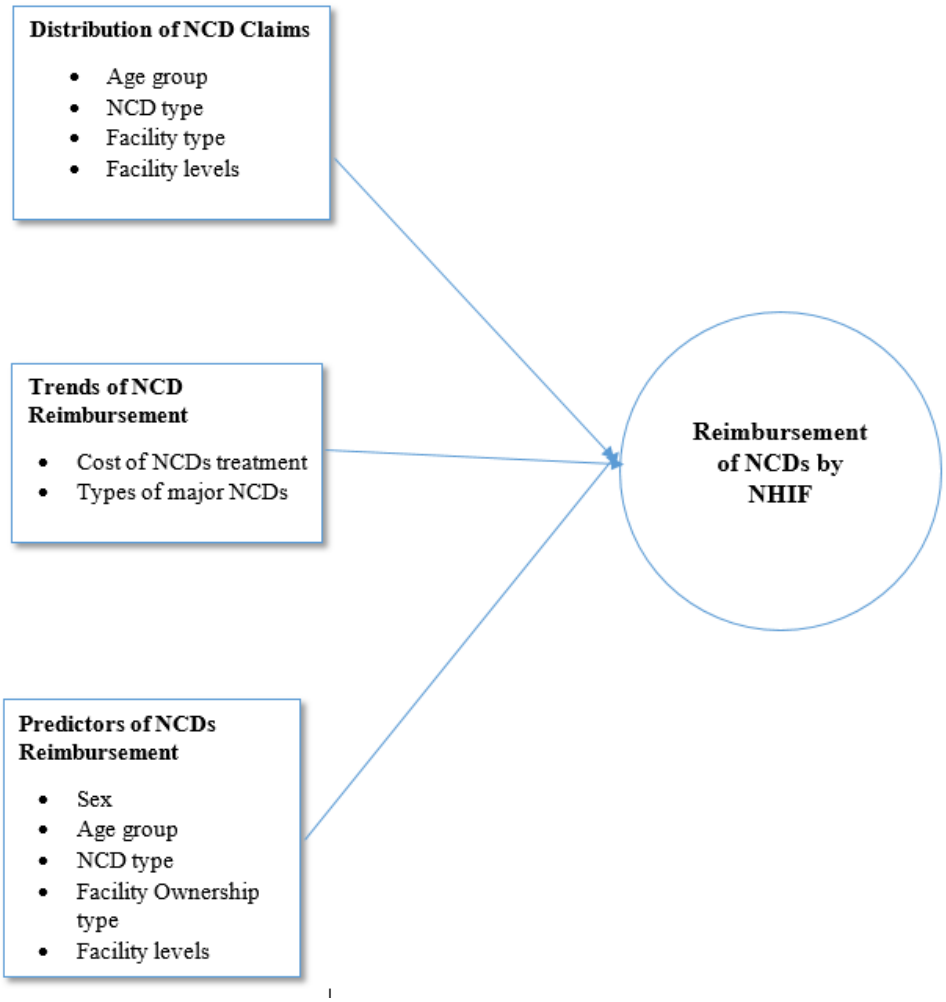


Figure 1: Shows the conceptual framework for the assessment of the financial burden of (NCDs) encountered by the NHIF towards UHI Tanzania. *(Source: Author).*

1.4 Rationale of the study

The findings of this study provide a prevailing status of NCD financing by the NHF and highlight potential predictors for the reimbursement of NCD. Hence the study contributes evidence of the possible impact of NCD financing through social health insurance. This evidence will be beneficial to all stakeholders involved in policy making in Health authorities, development partners, researchers, and health insurance during the planning and implementation of UHI by making actual consideration of the financial impact of NCD reimbursements by the health insurance schemes including NHIF.

1.5 Research Questions

1.5.1 Main Research Question

What are the trends and predictors of the major NCDs reimbursement by the NHIF towards Universal Health Insurance (UHI) in Tanzania?

1.5.2 Specific Research Questions

i. What is the pattern and distribution of the major NCD from 2021 to 2023?
ii. What are the major NCDs' reimbursement trends at the National Health Insurance Fund in Tanzania from January 2021 to December 2023?
iii. What are the predictors of the major NCDs reimbursement at National Health Insurance Fund Tanzania?

1.6 Research Objectives

1.6.1 Main Research Objective

To assess trends and predictors of major NCDs reimbursement at the NHIF towards Universal Health Insurance (UHI) in Tanzania.

1.6.2 Specific Research Objectives

i. To determine the pattern and distribution of the major NCD from 2021 to 2023.
ii. To assess major NCDs' reimbursement trends at the National Health Insurance Fund in Tanzania from January 2021 to December 2023.
iii. To assess the predictors of the major NCD funding/reimbursement at the National Health Insurance Fund Tanzania.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Non-communicable diseases have emerged as a significant public health challenge worldwide including LMICs like Tanzania. These diseases include cardiovascular diseases and cancers. Chronic Respiratory Disease, Diabetes mellitus, chronic kidney disease, and mental health illnesses are responsible for a substantial burden of morbidity and mortality globally.

In Tanzania, the NHIF plays a crucial role in providing financial protection to its members against the expenses associated with healthcare services, including managing NCDs. This literature review aims to explore the trends and distribution of major NCD reimbursement, assessing the predictors of NCD reimbursement at the NHIF in Tanzania.

2.2 The distribution and reimbursement trends of major NCDs at the National Health Insurance Fund

NCD management and treatment constitute a significant health challenge worldwide due to their expensive nature; hence, the health insurance system is one of the recommended health financing mechanisms to help reduce the detrimental impact of NCDs on the general public and prevent individuals from catastrophic health expenditures.

On the other hand, the NCDs have also been imposing a financial burden not only on the household but also on the health financing system as evidenced by various studies as follows;

The National Health Account in Tanzania has shown that NCD-related expenditures have increased substantially in the share of total health expenditure rising from TZS 388,854 million to TZS 1,584,812 million equivalent to 7% to 24% from 2019/2020 to 2021/2022(7).

Also, a study done by Osetinsky B, et al in 2022 investigating sustainability challenges for the NHIF in Tanzania showed that in 2016 the NHIF spent 14.1% of its reimbursement to NCD and the burden of NCD was 3.1 times higher among the old age group category(14). The same study projected that if the NHIF has a 10% growth of its members annually by 2050 then it will have to spend USD 765 million on cardio metabolic-related NCDs compared to 41.2 million USD spent in 2020(14).

Kathrin Durizzo et al. (Tanzania, 2022), in their study on mandatory health insurance in low-income countries, analyzed claims and suggested that NCDs-related services like cardiovascular procedures and cancer treatments had the highest mean value per claim(15).

Johan Albrecht, through their study reviewing the financial burden of NCDs in the European Union, revealed that out of the four main NCDs reviewed Cardio-vascular diseases CVD (ischemic heart disease and stroke), cancers, diabetes, and chronic respiratory disease, hence the CVD costs imposing burden and estimated to constitute about 7.6% of total health expenditure this followed with cancers being second disease imposing largest burden with an estimated 4-6% of the total health expenditure. The study also identified cost drivers for some NCDs by which inpatient care constitutes half the cost of the total NCDs cost or over 12% of total EU health care spending, this was followed by the costs of pharmacological treatment for NCDs (16).

A study by WANG Jia-hui, et al. examined the out-of-pocket and reimbursed expenses incurred by inpatients with major non-communicable chronic diseases in China. It was observed that among inpatients with the four major NCDs, those with cancer-related diagnoses had the highest estimated total self-paid medical expense for all hospital discharges in 2013 as well as the highest calculated self-paid hospitalization medical expense per capita for the inpatients from urban and rural regions). Additionally, the inpatients with cancer had the highest calculated medical expense per capita reimbursed through medical insurance payment. Nevertheless, the inpatients with cardiovascular or cerebrovascular conditions had the highest calculated total reimbursed medical expense for all hospital discharges in that year(17).

However, despite the literature search done, to our knowledge, there were no studies that have been found revealing the actual individual NCD reimbursement trends and distribution by the NHIF in Tanzania.

2.3 The predictors of the major NCD funding/reimbursement at the National Health Insurance Fund Tanzania

Non-communicable diseases are chronic conditions that involve long-term treatment which is relatively costly. Hence to protect individuals in the communities several studies have suggested on importance of integrating NCD interventions in community-based health

insurance (18). This also goes parallel with the importance of ensuring these health insurance schemes are sustainable and able to cope with the growing reimbursement cost of the covered NCDs. It is vital to determine the cost drivers and or the predictors leading to such high reimbursement costs.

Shen, Menghan, et al, 2020 in their study on the association between an increased reimbursement cap for chronic disease coverage and healthcare utilization in China. They suggested that the increase in monthly reimbursement cap for chronic disease under the Urban Employee Basic Medical Insurance is driven by drug expenditures. The patients with both hypertension and diabetes were likely to have increased outpatient visits by 18.1% using the chronic disease coverage with a low likelihood of inpatient services (19).

A study by Jui-Kun Chiang and Yee-Hsin Kao in Taiwan where assessed predictors of high healthcare costs in elderly patients with liver cancer end-of-life using health Insurance data from 1997 to 2011. The study evidenced that among the elderly with liver cancer receiving their end-of-life care, the significant healthcare cost predictors included intensive care, cardiopulmonary resuscitation, and anticancer treatment. Also, a high number of admission days, comorbidities of chronic kidney disease, esophageal bleeding, and receiving opioids were identified as predictors for high costs. Whereas only 10% of the study subjects had healthcare costs of more than US$ 5000 per person which accounts for 38.95% of the total healthcare cost of this population without such conditions (20).

Rui Min, et al, in their study, aimed to assess the socioeconomic disparities between hospitalized Chronic Kidney Disease (CKD) patients in urban and rural areas, selecting 501 CKD inpatients with urban or rural medical insurance from Wuhan's top six tertiary hospitals. Confronting the urban-rural gap in patients with chronic kidney disease evidence from inpatients with urban or rural medical insurance in central China. As influencing factors, socioeconomic and demographic data were obtained. Short duration, worsening domestic economic conditions, lower levels of education, and fewer hospitalizations were among the predictors assessed for healthcare reimbursement cost among CKD inpatients with Urban and Rural medical insurance, hence the study revealed Different correlations exist between the two insurance schemes. Male and low-education persons showed higher hospitalization expenses among hospitalized CKD patients with urban medical insurance). In contrast, among rural medical Insurance inpatients, no discernible variation in this regard

was discovered. It is therefore recommended that to increase fairness among various CKD patients, healthcare delivery and reimbursement models be revised and put into place. Additionally, improved national health education is necessary to stop CKD and offer early treatment. (21).

Henceforth, throughout the literature review, there was a paucity of the study focusing on predictors of reimbursing the NCDs in Sub-Saharan Africa and Tanzania in particular.

2.4 Research Gap

Throughout the literature review done to the best of our knowledge, we could not find the studies analyzing the reimbursement trends over time of the individual major NCDs by NHIF. Only one study reported NCD status in 2016 claims data only and a performance report by the NHIF in Tanzania reports a point estimate figure of the financial cost incurred by the fund in the financial year 2022/2023 hence the need for assessing this reimbursement trends of NCDs over some time.

Also, most studies reviewed focused on the financial burden of NCDs incurred by individuals/households and fewer studies outside of Sub-Sahara African Countries have studied the predictors of NCD reimbursements hence a strong need to explore the NCDs' reimbursement predictors for NHIF in Tanzania towards Universal Health Insurance.

CHAPTER THREE

3.0 METHODS

3.1 Study Design

A cross-sectional study design that used quantitative approaches to analyze secondary claims data from the NHIF database.

The cross-sectional study design has been selected for this study as it aimed to identify and describe multiple variables about NCD reimbursement during a particular period and hence to give more insight for further studies. Similarly, the time frame of conducting the study was short, making the cross-sectional design useful for this study to provide a snapshot of the NCDs reimbursement trends and predictors for projecting future reimbursement costs of NCDs to NHIF towards UHI.

The cross-sectional design was appropriate for analyzing data from the NHIF claims database as this design is readily useful in analyzing large amounts of data that are aggregated from multiple data points across the country and gives snapshot and insightful trends using descriptive statistics as well as establishing a relationship between variables by using measures like regression analysis.

The case study intended in this study is an instrumental case study where the outcome of this study is expected to inform more from what is currently known regarding NCDs reimbursements by the NHIF.

3.2 Study Setting

The study was conducted in Tanzania which is a lower middle-income country with a population of 61.7 million and a growth rate of 3.2% (Census 2022). Currently, the age-adjusted life year rate due to NCDs is almost similar to the communicable, neonatal, maternal, and nutritious diseases which have been decreasing for the past decade.

The study was conducted at NHIF Headquarters Dodoma, under close coordination with the Actuarial, Risk, and Research Unit, a unit responsible for all research-related matters within the NHIF.

The study included all claim data of beneficiaries with major categories of non-communicable diseases (Cardiovascular diseases, Diabetes Mellitus, Cancers, Chronic

Kidney and chronic respiratory diseases together with mental illness) between 2021 and 2023.

3.3 Sample Size

All NHIF beneficiaries who were diagnosed and had registered claims with NCDs (with special attention to Cardiovascular diseases, Diabetes Mellitus, Cancers, Chronic Kidney, and chronic respiratory diseases together with mental illnesses) from January 2021 to December 2023. Hence in 2021 (170, 3451), 2022 (453, 6181), and 2023 (520, 0231), eligible beneficiaries with NCD-related claims were included in this study.

The sample size scope of three years from January 2021 was informed of the fact that NHIF has started to fully employ the use of International Classification of Diseases Tenth version (ICD-10) codes in the mid-financial year of 2018/2019 in their claims from ICD 9 that was previously used, hence from the financial year 2019/2020 ICD 10 codes were fully integrated and all claims were reimbursed using the ICD 10 coding system. The stated scope provided unified data that were extracted with a similar description of the ICD 10 for the intended NCDs.

3.4 Study Participants Selection

All NHIF beneficiaries from the NHIF claims Database (Integrated Claims Management Information System-ICMIS) with at least one claim for the major NCDs from January 2021 to 2023 were selected using the ICD 10 codes.

Individuals with multiple claims were identified as per their co-morbidity and the service received was determined using ICD 10 codes and visit dates as every visit had a unique identification number (folio ID) that was assigned.

It is worth noting that the ICD 10 codes are the current diagnosis coding system used for billing by the NHIF claim reimbursements, hence the only way of identifying cost reimbursed to a certain disease with a specific NCD-related service was through fetching the particular ICD 10 code with particular item code of the intended disease and services from the NHIF claim database.

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion criteria

All NHIF clients with medical claims for the specified NCDs from January 2021 to December 2023 were included in this study.

3.5.2 Exclusion criteria

All NHIF beneficiaries with incomplete medical claims/information for the specified NCDs were excluded. Identified duplicate data falling within the sample were also excluded.

3.6 Data Source and Data Collection.

All data were extracted from the ICMIS electronic database that consists of records of all patients' utilization data received from the healthcare providers after they submit their medical bills for reimbursement from services issued for the fund's beneficiaries.

The data were accessed through the NHIF internal protocol whereby assigned personnel from the Actuarial and Research unit assisted in extracting data from the database using the data collection tool which is a customized Data Abstraction form (refer to appendix I).

The multiple small datasets were formed and summarized in Excel sheets to form an aggregated main dataset that includes all intended study variables like the demographic data including age and sex type, date of attendance and year, types of major NCDs, reimbursement cost of NCD treatment, a facility ownership type, level and location and information such as unique folio Identification numbers, ICD-10 diagnosis,

3.7 Study Perspective

Study perspective is a viewpoint from which a research question is examined, it determines the relevance of findings to different stakeholders. Therefore, this study employed a Payer's/Health insurance perspective as the study focused on assessing the organization responsible for social health insurance (NHIF). The Payer's perspective helped to analyze healthcare utilization distribution, trends, and determine reimbursement predictors, and eventually inform decision-making on health financing policy.

3.9 Investigation tool, validity, and reliability issues

A special checklist tool was used to collect data, and data extracted from the database as comma-separated values files were later summarized using Microsoft Excel 2016.

Data cleaning was done by using R statistical software (Version 4.4.0) and all duplicates, missing values (eg, data with missing age, and sex), and claims data outside the specified time frame were identified and removed from the dataset and those with value mismatch or misspelling (eg, Male and male variables) were unified to ensure its validity and reliability.

3.10 Data Analysis

All collected data were analyzed using R Statistical software (version 4.4.0). Descriptive statistics were used to report the data (means, medians, Interquartile ranges, percentages, and frequencies). The socio-demographic characteristics were presented in narrative, tabular form, and bar chart.

For the assessment of the distribution of NCD claims and reimbursement trends of major NCDs, a descriptive statistics analysis was carried out using mean and frequencies that summarized the reimbursement trend and distribution of the major NCDs from January 2021 to December 2023 while bar chart and tables were used to visualize the data**.**

The NCD reimbursement predictors at the National Health Insurance Fund were analyzed using multivariable logarithmic regression analysis (Log-linear regression model) to determine the association of reimbursement predictors and an increasing reimbursement cost of NCDs to NHIF. The findings were summarized using log coefficients, p-values, and percentages.

The multivariable Log-linear regression model was performed, in which multiple variables were analyzed to determine the association between dependent and independent variables.

Regression Equation for Multivariable Log-linear regression model;

$$\text{Log}(Y) = \beta_0 + \beta_1 \times X_1 + \beta_2 \times X_2 + \beta_3 \times X_3 \ldots\ldots\ldots \beta n \times Xn.$$

Where:

Y (Dependent variable) = Amount Accepted (NCD Reimbursement)

B_0 = Intercept

β = Coefficient for independent variable

X = Independent variables (Sex type, age group of a member, type of NCD, facility ownership type, and level).

It should be noted that the dependent variable in the model is NCD reimbursement which is the healthcare cost paid to providers, these costs are widely varying in range hence causing

the skewness of the data. Following regression assumptions test that was conducted initially using a multivariable linear regression model revealed that data are not normally distributed and non-linear. To overcome this challenge we log-transformed the dependent variable and a log-linear regression model was deployed.

The significance of the model was determined using Multiple and adjusted R-squared values, P-values, and regression assumptions, which were tested using normality, linearity, and multicollinearity using the Variance Inflation Factor (VIF).

3.11 Ethical Considerations

Ethical clearance was obtained from the Institutional Review Board (IRB) at Muhimbili University of Health and Allied Science with approval number MUHAS-REC-05-2024-2238. Similarly, approval from the NHIF was obtained.

All data that were extracted and used in this study are handled with confidentiality and privacy, as will ensure anonymity as well as limit access to data to only those authorized as well data protection will be ensured using protected files.

CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction

This chapter will present findings derived from analyzing secondary claims reimbursement data from the National Health Insurance Fund for three years between 2021 and 2023.

4.2 Demographic Characteristics

The results indicate that female beneficiaries account for more than half of the participants in this study, with 61%, 59%, and 59% in 2021, 2022, and 2023, respectively. The year 2021 had the highest median age of the participants 61 years with Interquartile ranges of 50 and 69 years. The largest age group in this study is 50-65 in 2021 (37%), 2022 (31%) and 2023 (31%). However, it was observed that the age group of 0-14 has a remarkable increase from 3.9% in 2021 to 11% in both subsequent years, suggesting a higher increase in reimbursements directed to the pediatric group with NCD (Table 1).

Table 1: Sex, Age, and Age Group distribution among patients reimbursed with NCD-related services from 2021 to 2023.

Characteristic	2021 (%)	2022 (%)	2023 (%)
Age			
Median Age (IQR)[1]	61 (50, 69)	55 (35, 66)	54 (35, 65)
Age-Group			
0 - 14	6,704 (3.9)	50,316 (11)	59,491 (11)
15 - 29	5,706 (3.4)	36,402 (8.0)	41,649 (8.0)
30 - 49	27,919 (16)	97,101 (21)	116,057 (22)
50 - 65	62,954 (37)	142,639 (31)	163,738 (31)
65+	66,941 (39)	126,989 (28)	138,923 (27)
Sex			
Female	103,099 (61)	267,176 (59%)	306,619 (59)
Male	67,125 (39)	186,271 (41%)	213,239 (41)

1= Median (IQR)

4.2.1. NCD claims Distribution by disease type, sex, age groups, facility levels, and ownerships from 2021 to 2023.

Throughout the study period, a total of 1,293,668, 6,928,425, and 8,748,3231 claims were observed in the years 2021, 2022, and 2023, respectively. This indicated a remarkable increase in the number of claims across years (Table 2).

The 50-65 age group NCD claims had an increasing trend. In 2021 (37.7%), 2022 (38.4 %,) and 2023 (39.4%). However, the age group 65 years and above had the highest number of NCD claims, in 2021 (46.8%), 2022 (43.7%), and 2023 (42.6%) respectively (Table 2).

Cardiovascular-related claims have been dominant across all years, with a significant increase from 1,107,528 claims in 2021 to 4,622,895 claims in 2022 (an increase of 317.4%). A similar trend has been noted for Diabetic claims that show a notable increase from 8.9% of total claims in 2021 to 21.3% in 2022 and remains stable at 20.8% between 2022 and 2023 (Table 2).

The results revealed revealing that Regional referral Hospitals have an increasing trend in claims from 28.5% in 2021 to 30.4% in 2023. National (2021 (14.9%) to 2023 (8.4%)) and Zonal Hospitals (2021 (30.7%) to 2023 (20.4). Similarly, District Hospitals (2021 (12.6%) to 2023 (13.6%)) and Primary Healthcare levels (2021 (5.2%) and 2023 (5.9%)). (Table 2).

Table 2: Distribution of claims by Disease, age group, Facility level, and Ownership types (2021-2023)

Characteristics	2021 N=1,293,668	%	2022 N = 6,928,425	%	2023 N = 8,748,323	%
Age Group						
0-14	28,913	2.2	207,846	3	215,304	2.5
15 - 29	19,783	1.5	145,100	2.1	173,261	2
30 - 49	151,627	11.7	887,239	12.8	1,189,432	13.6
50 - 65	487,458	37.7	2,661,257	38.4	3,446,870	39.4
65+	605,887	46.8	3,026,983	43.7	3,723,456	42.6
Claims Distribution by Disease						
Cardiovascular	1,107,528	85.6	4,622,895	66.7	5,909,128	67.5
Diabetes	115,581	8.9	1,477,017	21.3	1,815,405	20.8
Chronic Renal	4,919	0.4	279,935	4.0	363,101	4.2
Cancer	25,830	2.0	122,703	1.8	163,997	1.9
Mental	32,887	2.5	158,925	2.3	184,498	2.1
Chronic Respiratory	6923	0.5	266,950	3.9	312,194	3.6
Facility Level						
National Hospital	192,569	14.9	613,696	8.9	732,732	8.4
Zonal Hospital	397,044	30.7	1,498,742	21.6	1,784,609	20.4
RegionalHospital	279,945	21.6	1,975,598	28.5	2,661,351	30.4
District Hospital	118,741	9.2	872,994	12.6	1,192,650	13.6
Primary Healthcare	35,710	2.8	361,803	5.2	514,783	5.9
Clinics	184,351	14.3	1,446,320	20.9	1,826,480	20.9
Pharmacy	85,300	6.6	159,258	2.3	35,707	0.4
Diagnostic Centers	8	<0.1	14	0.0	11	0.0

N= Number of observations in each year

Figure 2 shows claims distribution by sex from 2021 to 2023, whereby Females had more claims across years under study compared to males, hence accounting for a larger portion of the NCD-related claims, with 59.3% in 2021 and maintained at 58% in both 2022 and 2023.

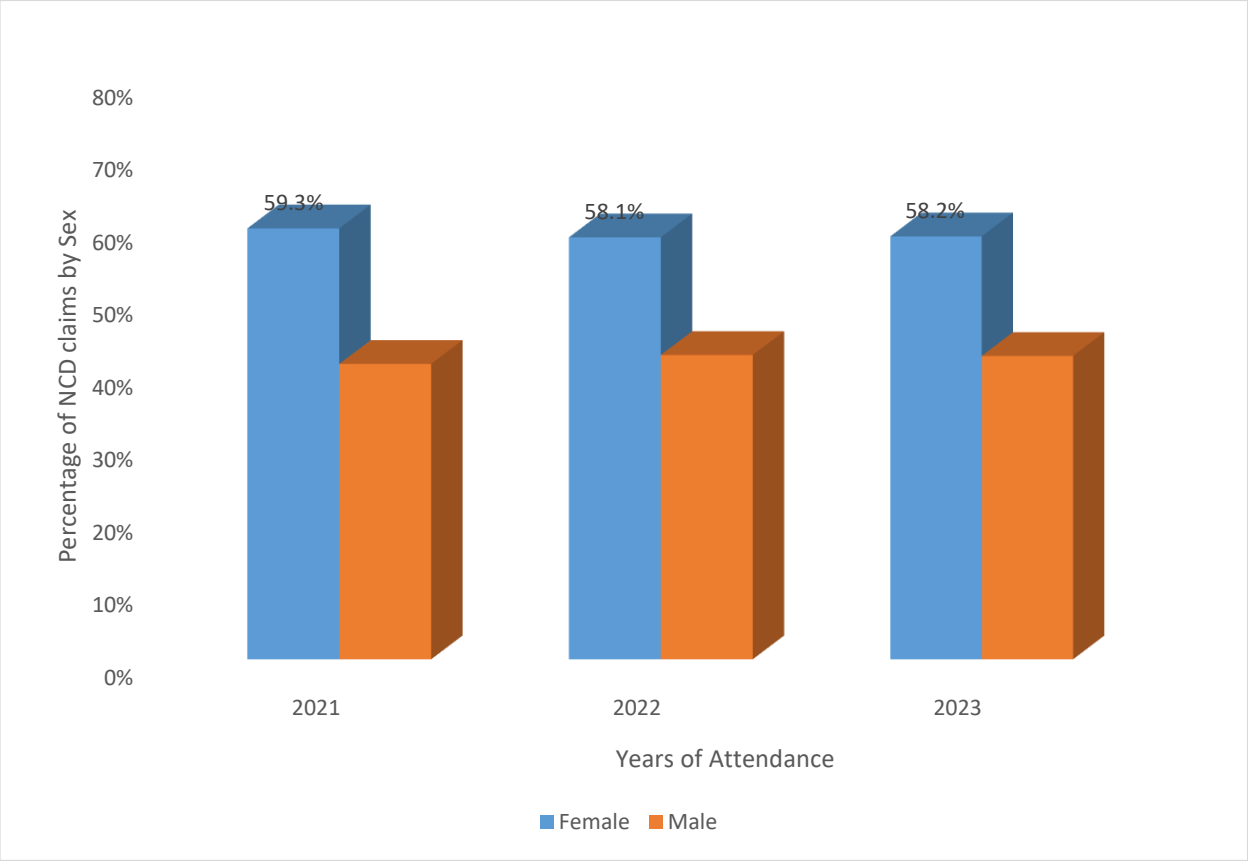


Figure 2: Showing NCD claims distribution by Sex from 2021 to 2023.

The NCD claims by facility ownership type, indicate that the highest portion of NCD-related claims originated from Private facilities, in 2021(47.9%), 2022 (42.9%), and 2023 (40%), followed by Government facilities with the second-highest number of NCD-related claims (Figure 3).

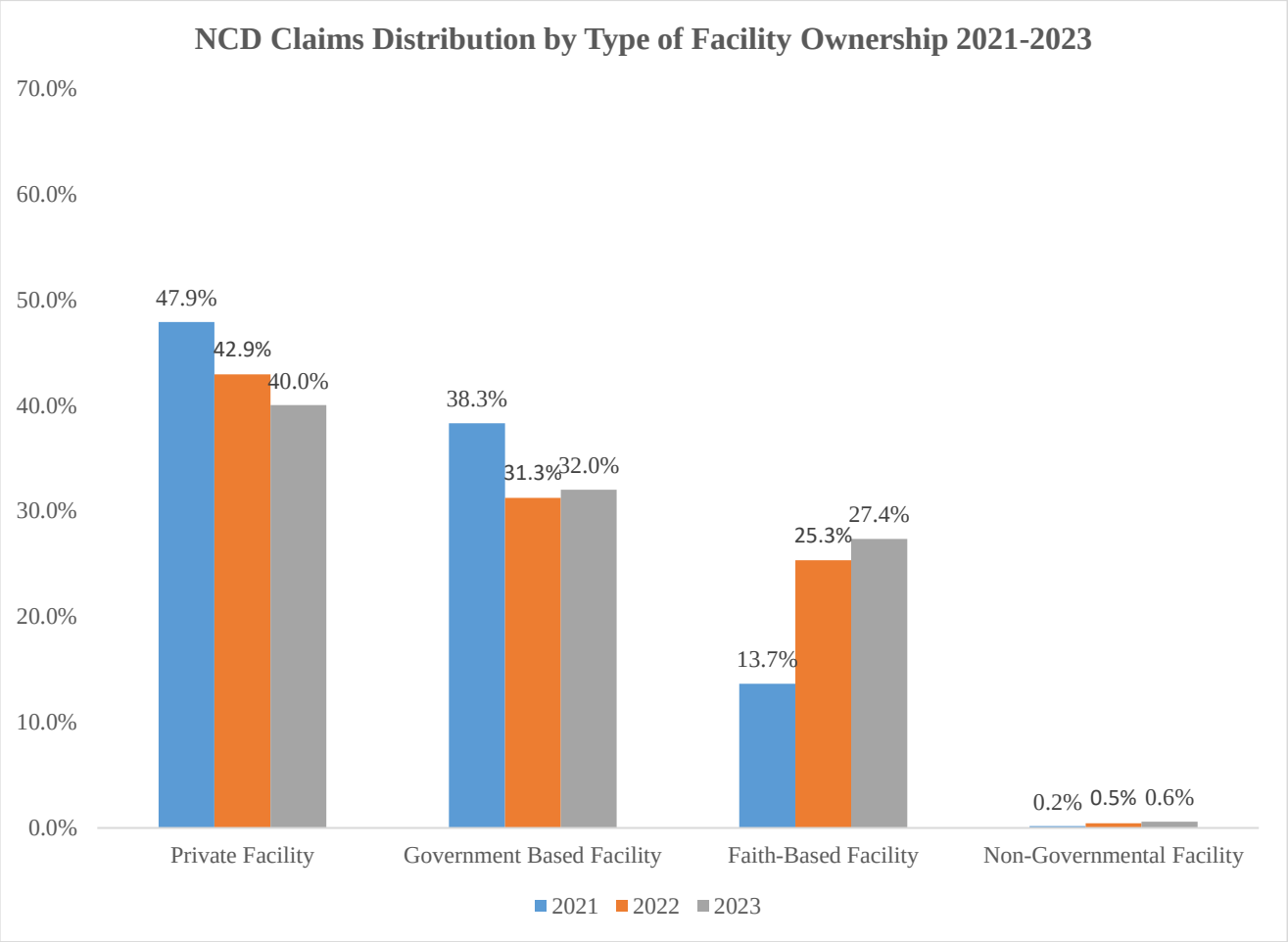


Figure 3: Showing NCD claims distribution by Type of Facility Ownership 2021 to 2023

4.3 NCDs' reimbursement trends at the NHIF from 2021 to 2023

The general NCD reimbursement trend over three years (2021 to 2023) was analyzed to determine various patterns and better understand the reimbursement costs incurred by the NHIF. **Table 3** below summarizes various parameters showing the overall NCD reimbursement trend and patterns annually from 2021 to 2023; these include the number of patients and visits, total reimbursement amount, average visits per patient, average reimbursement per visit, and patient and visit per patient ratio.

The overall annual NCD reimbursement by the NHIF surged from TZS 35.2 billion in 2021 to TZS 220.1 billion in 2022, an increase of 524%. This was followed by a moderate increase between 2022 and 2023, with a rise of 7% from TZS 220.1 billion in 2022 to TZS 235.8 billion, suggesting the growing financial burden of NCD toward NHIF. The number of visits per patient had increased over the study period. The NCD-related visits per patient increased

from 2.4 visits per patient in 2021 to 4.4 visits in 2023. There has been a relatively small decrease in both average reimbursement per visit (TZS 115,286 in 2022 to TZS 102,283 in 2023). Similarly, the average reimbursement per patient decreased from (TZS 485,426 in 2022 to TZS 453,643 in 2023) (Table 3).

Table 3: Overall NCD reimbursement trend from 2021 to 2023

Attendance Year	Number of Visits	Number of Patients	Reimbursed Amount (TZS "in billions")	Average visits per patient	Average Reimbursement per Visit	Average Reimbursement per Patient
2021	403,638	170,224	35.2	2.4	87,389	207,219
2022	1,909,289	453,447	220.1	4.2	115,286	485,426
2023	2,305,668	519,858	235.8	4.4	102,283	453,643

4.3.1 Annual Reimbursement Trend by NCD Categories from 2021 to 2023.

During the study period, the reimbursement trends of individual NCD disease categories were analyzed. The NHIF clients with cardiovascular diseases grew from 144,631in 2021 to 340,318 in 2023 with a tremendous increase in average visit per patient from 2.3 (2021) to 4.7 in 2023, this coincided with a more than two-fold increase in average reimbursement per patient from TZS 164,185 (2021) to TZS 374,090 in 2023. The number of patients who accessed Cancer-related services increased from 14,971(2021) to 86,272 (2023), with an average visit per patient rising from 2.3 to 3.7 but with a slight increase in average reimbursement per patient from TZS 1,110,464 to TZS 1,166,545 in 2023 (Table 4).

In the case of Diabetic diseases similar trend in increased number of patients with diabetic-related reimbursements was observed from 23,649 to 137,370 between 2021 and 2023. Making an average visit per patient rise from 1.8 to 4.4. The average reimbursement per patient increased from TZS 132,598 in 2021 to 350,077 in 2023. Chronic renal disease follows a similar trend, with an average visit per patient increasing from 1.7 to 5.5. The average reimbursement per patient shows wide variation, increasing from TZS 317,166 in 2021 to TZS 744,587 in 2023 (Table 4).

Table 4: Annual reimbursements by NCD categories (in Tanzanian shilling) from 2021 to 2023

Disease Category	Year	Number of Visits	Number of Patients	Reimbursed Amount (TZS "in billions")	Average Visits per Patient	Average Reimbursement per Visit (TZS)	Average Reimbursement per Patient (TZS)
Cardiovascular Diseases	2021	331,447	144,631	23.7	2.3	71,644	164,185
	2022	1,282,019	294,746	101.8	4.3	79,437	345,515
	2023	1,587,584	340,318	127.3	4.7	80,191	374,090
Cancer	2021	14,971	6,559	7.3	2.3	486,510	1,110,464
	2022	66,718	20,260	24.0	3.3	360,314	1,186,545
	2023	86,272	23,603	27.5	3.7	319,153	1,166,545
Diabetes	2021	41,770	23,649	3.1	1.8	75,073	132,598
	2022	512,347	119,580	45.4	4.3	88,523	379,282
	2023	610,052	137,370	48.1	4.4	78,829	350,077
Chronic Renal Diseases	2021	1,519	897	0.284	1.7	187,293	317,166
	2022	118,380	22,162	24.3	5.3	205,494	1,097,663
	2023	153,388	27,759	20.7	5.5	134,750	744,587
Chronic Respiratory Diseases	2021	5,316	4,668	0.140	1.1	26,473	30,148
	2022	196,281	109,026	12.2	1.8	62,293	112,147
	2023	230,851	126,937	7.4	1.8	31,844	57,913
Mental Illness	2021	18,041	12,369	0.682	1.5	37,852	55,210
	2022	74,931	40,246	12.3	1.9	164,530	306,326
	2023	85,931	46,411	4.9	1.9	56,746	105,067

4.4 Predictors of NCD reimbursement from the NHIF claims

The results revealed that all NCD categories, including Diabetes, Cancers, Mental illnesses, Chronic Renal and Respiratory diseases, were statistically significant (P-values <0.001). All the NCD types were associated with increasing reimbursement amounts with cancers at 120.1% associated with higher reimbursement, chronic renal diseases at 33.6%, and Diabetes at 7.3% were positively associated with an increase in reimbursement amount of the NHIF. Mental Illnesses -17.3% and Chronic Respiratory diseases -15.7% were associated with a decrease in reimbursement amount from the NHIF (Table 5).

The study found that age group is a statistically significant predictor for NCD reimbursement by which for a year gained across all age groups, specifically being in the age group 50-60 years (11.6%) and age group 65 and above (12.8%) are associated with an increase in higher NCD reimbursement amount for every year increase compared to the reference group (Table 5).

The Sex variables were found to be not statistically significant (p-value 0.006) whereby NCD reimbursement is (0.2%) higher in male the in their counterpart (Table 5).

It was noted that there was a statistical significance and association between the increase in NCD reimbursement amount and type of facility by ownership. On average NCD reimbursement is (3%) and (2%) higher among NCD claims originating from private and faith-based facilities respectively compared to the reference group (Governmental facilities). While NCD reimbursement was (12.2%) lower than NCD claims originating from Non-Governmental based facilities (Table 5)

It was also found that there was a statistical significance and association between the increase in NCD reimbursement amount and type of facility by their levels except for Diagnostic centers that were not statistically significant with a p-value (0.914). Only NCD claims from Zonal Hospital (2%) and Pharmacies (15%) were attributed to higher NCD reimbursement. Interestingly NCD claims from District hospitals (-55.5%) and Primary health care levels (-76%) were associated with the lowest NCD reimbursement by the NHIF (Table 5).

In terms of Administrative level, the study revealed that NCD claims originating from City, Municipal, and Town councils are associated with NCD reimbursement and are statistically significant (P-values <0.001). On average NCD reimbursement is 15% higher for claims originating from facilities located in city councils compared to the reference group (**Table 5**).

Table 5: Showing Predictor variables and their log and percentage coefficients, confidence interval, and p-values from the multivariable log-linear regression model.

Predictor	Log (Coefficient (95% CI))	Percentage coefficient ($e^{coefficient}$ -1)100)%	p-value
Age Group			
0-14	-	-	-
15 - 29	-0.10 [-0.11, -0.10]	-9.5	< .001
30 - 49	0.03 [0.03, 0.04]	3.0	< .001
50 - 65	0.11 [0.10, 0.11]	11.6	< .001
65+	0.12 [0.12, 0.13]	12.8	< .001
Disease Type			
Cardiovascular Diseases	-	-	-
Cancers	0.79 [0.78, 0.80]	120.1	< .001
Chronic Renal Diseases	0.29 [0.29, 0.30]	33.6	< .001
Diabetes	0.07 [0.06, 0.07]	7.3	< .001
Mental Illnesses	-0.19 [-0.20, -0.19]	-17.3	< .001
Chronic Respiratory Diseases	-0.17 [-0.18, -0.17]	-15.7	< .001
Sex			
Female	-	-	-
Male	0.00217 [0.00, 0.00]	0.20	0.006
Type of facility by Ownership			
Government Facility	-	-	-
Private Facility	0.03 [0.03, 0.03]	3.0	< .001
Faith-Based Facility	0.02 [0.02, 0.02]	2.0	< .001
Non-Governmental Facility	-0.13 [-0.14, -0.12]	-12.2	< .001
Type of facility by Level			
National Hospital	-	-	-
Zonal Hospital	0.02 [0.01, 0.02]	2.0	< .001
Regional Hospital	-0.34 [-0.34, -0.34]	-28.8	< .001
District Hospital	-0.80 [-0.81, -0.80]	-55.5	< .001
Primary Healthcare[1]	-1.49 [-1.50, -1.49]	-76.0	< .001
Clinics[2]	-0.34 [-0.35, -0.34]	-28.8	< .001
Pharmacy	0.14 [0.14, 0.15]	15.0	< .001
Diagnostic Centers	-0.03 [-0.57, 0.51]	-2.9	0.914
Administrative level			
District Council	-	-	-
City Council	0.14 [0.13, 0.14]	15.0	< .001
Municipal Council	0.08 [0.08, 0.08]	8.3	< .001
Town Council	-0.01 [-0.02, -0.01]	-1.0	< .001

Primary Healthcare[1] level is all health facilities level from health centers to dispensaries.

Clinics[2=] Involved all specialized clinics and Polyclinics.

Table 6 displays a summary of significant statistics from the Multivariable model whereby residual standard error (1.023) suggests that the prediction values of the model vary on average of 1.023 units away from the actual values. Multiple and Adjusted R- squared are both at 0.1572 and p-value of <2.2e-16 indicating that the model is statistically significant but has explanatory power of only 15.72% of the variance in the dependent variable (log(amount accepted)) is explained by the independent variables in the model.

Table 6: Summary of Significance Statistics

Statistic	Value
Residual Standard Error	1.023
Multiple R-squared	0.1572
Adjusted R-squared	0.1572
p-value	< 2.2e-16

Meanwhile, Table 7 below summarizes the results of the multi-collinearity assumption analysis, whereby the model was tested for correlations among the predictor variables. This was done using the Variance Inflation Factor (VIF) to assess the level of collinearity among predictor variables. The model revealed a low multicollinearity (VIF<5) among all predictor variables. Due to the robustness of the model, a Generalized Variance Inflation Factor (GVIF) was also used since the predictors' variables were categorical. Hence with sex variable had very low multicollinearity (1.020599) both in VIF and GVIF.

Table 7: Showing Multicolinearity as per Variance Inflation Factor (VIF)

Predictor	GVIF	Df	GVIF^(1/(2*Df))	Remark
Age group	1.196498	4	1.022678	Low multicollinearity
Sex	1.020599	1	1.010247	Very low multicollinearity
Facility Ownership Type	2.016036	3	1.123957	Slight multicollinearity
Disease Type	1.273033	5	1.024434	Low multicollinearity
Facility Level	3.09318	7	1.083999	Low multicollinearity
Facility location	1.901655	3	1.113069	Low multicollinearity
Average	**1.750167**		**1.063731**	Low multicollinearity(<5)

CHAPTER FIVE

5.0 DISCUSSION

This study assessed trends and predictors of NCD reimbursement by NHIF toward UHI. The study determined that females (61% and 59%) and elderly age participants from 50 years and above (76%, 59%, and 58%) across all years were dominant among individuals with the major NCD reimbursed by NHIF during the study period. In line with our study, prevailing evidence has suggested that the relationship of high NCD among females is attributed to the high prevalence of biological risk factors for NCDs(22). Also, a study done by Osetinsky B et al (Tanzania, 2023), using NHIF claims data suggested that the burden of NCD was 3.1 times higher among the old age group category(14). Shen Menghan et al. reported similar observations in their study on the association between an increased reimbursement cap for chronic disease coverage and healthcare utilization in China. Where the mean age was 64.2 years for the total sample and 64.7, 58.4, and 65.9 years for the three disease type groups (Hypertension, Diabetes, and Co-morbidity among the two), respectively. Also, the majority of those covered with Chronic disease schemes with NCD were female, with 57.66% (19). Similarly, Abdulrahman M. El-Sayed et al in their study suggested that women have been shown to have a higher risk of the onset of NCDs and poorer access to health services(23). Hence, this indicates the need for the NHIF to have targeted interventions for managing old-age members with NCD-related disease, including the introduction of preventive interventions for NCD in the benefit package.

The Distributions of claims by NCD categories from 2021 to 2023 show increasing patterns, whereby cardiovascular claims have been proportionately increasing throughout the study period and represented about two-thirds of all NCD claims between 2022 and 2023. This claims trend was not far from the distribution of diabetic-related claims that tremendously rose from 8.9% in 2021 to 21.3% and 20.8% in 2022 and 2023, respectively. Chronic renal disease and cancers had fewer claims across the years compared to Cardiovascular and diabetes but had rapidly growing trends. Hence these claims distribution highlights the increased healthcare demand due to cardiovascular diseases and diabetes as well as the growing burden of chronic renal disease and cancers. In a study by Munkhzul Radnaabaatar et al in South Korea in 2019, they assessed health insurance data to measure the burden of disease morbidity using YLD where they found that cardiovascular diseases, neoplasms, chronic respiratory diseases, and diabetes are among the top 20 diseases with a high burden

of disease morbidity (24). This was also ascertained by Yu and Kim (2010) in their study that used medical insurance data to determine the distribution of diseases from discharged patients where they found the following chronic disease distribution among others neoplasm (10.3%), circulatory diseases (11.5%) and respiratory diseases (15.5%) (25). Despite the intensive review to our knowledge, there is a paucity of evidence in social health insurance schemes like NHIF in Tanzania that specify claims distribution by diseases and years the same way as highlighted in this study. However, by ascertaining the distribution of NCD claims from the NHIF, the fund and the health authority could prioritize cost-effective interventions and evidence-based resource allocation in managing these complex NCDs.

The study provides insight into the general reimbursement trends for the NCD by NHIF from 2021 to 2023, where there is an increase in NCD reimbursement by NHIF that corresponds with a proportionate increase in NCD claims in the years during the study period. This was accompanied by almost doubling in the ratio of visits per patient which rose from 2.4 in 2021 to 4.4 in 2023. These patterns and trends indicate the higher frequency of attending health facilities for NCD management relates to a significant increase in reimbursements associated with NCD-related claims. These findings correlate with the study done by Xinqi Zhang 2021 in China that concluded that there is a strong association between having health insurance with multiple or any of the four major NCDs and an increase in healthcare utilization(26). Similar tendencies were reported by Giang NH et al, in Vietnam through their study that assesses the association of having health insurance, services, utilization, and economic burden of NCD. The study suggests that an individual with health insurance has NCDs is likely to have twice the healthcare utilizations compared to an individual with NCDs with no health Insurance. This leads to an increased financial burden on social health insurance (12). Despite the increase in the overall cost of NCD reimbursements, there is a noticeable decrease in average reimbursement per visit and average reimbursement per patient between 2022 and 2023, This could be indicative of comprehensive healthcare policy changes, the introduction of various insurance service controls, and improved efficiency and management strategies, all aimed at addressing the significant surge in reimbursement costs from the NHIF.

The study reveals the reimbursement trends for the NCD disease categories by which cardiovascular diseases display a remarkable increase in the number of visits per patient doubling from 2.3 (2021) to 4.7 (2023). This rapid rise in visit frequency led to increased reimbursement per patient from TZS 164,185(2021) to TZS 374,090 in 2023. These trends further reveal that NHIF reimburses more patients with cardiovascular disease compared to other NCDs. In contrast, annual reimbursement for cancer-related services exhibited a similar upward trend whereby visits per patient increased from 2.3 to 3.7(2021 to 2023 respectively). This correlates with the extremely high average reimbursement per patient ranging from TZS1,10,464 to TZS 1,166,545 despite a moderate decline of the average reimbursement per visit from 486,510 in 2021 to 319,153(2023). These reimbursement trends for individual NCD categories correspond with the findings by Johan Albrecht in 2019, through their study reviewing the financial burden of NCDs in the European Union revealed that out of the four main NCDs reviewed Cardio-vascular diseases (CVD), cancers, diabetes, and chronic respiratory disease. The CVD costs impose a burden and are estimated to constitute about 7.6% of total health expenditure this is followed by cancers being the second disease imposing the largest burden with an estimated 4-6% of the total health expenditure (16). This was also observed and aligned in the study by WANG Jia-hui, et al,(China, 2021) (17). These studies affirm the high growing reimbursement burden by the NHIF observed during the study period.

Moreover, these trends signaling that cancer treatment is the most expensive NCD to manage might impose the largest burden on NHIF towards UHI without proper mitigation measures. The fund should invest in prevention interventions as suggested in WHO Best Buys and impose mandatory planned screening for its members which is in contrast to the current practice by the NHIF. Another way of curbing the financial burden of these NCDs is by enhancing cost-cutting mechanisms by reducing adverse selection and moral hazards among the funds' beneficiaries.

Our study has reported the NCD reimbursement Predictors from the NHIF and unveiled the significant association between increased reimbursement amount for NCD-related claims (the Amount accepted) and predictors like Age Group, Sex, Disease type, Facility level, Type of facility ownership, and Geographic location of the health facility. Hence, the study findings signify that for those with any of the six major NCD categories, an increase in age is correlated with an increase in NCD reimbursement, with the highest increase being in the

age group 50-60 years and age group 65 and above. This relationship between the elderly age group and NCD is expected as this age group is associated with a high prevalence of NCD risk factors as suggested in the Tanzania STEPS survey(3) and similar findings were reported by Sapkota BP et al (22), and M. Linardakis et al(27). This also coincides with a study by Wagner et al., who analyzed data from WHS, demonstrating that adults in households with health insurance coverage were 38% more likely to seek care for chronic diseases (28). This underscores the importance of the fund to enhancing preventive care and working together with health authorities in promoting a healthy lifestyle especially for middle-aged members to reduce the elderly group with NCDs that impose a financial burden on the fund in managing those conditions.

We determined types of NCD, including Diabetes, Cancers, Mental illnesses, and Chronic Renal and Respiratory diseases as significant predictors for NCD reimbursement, with Cancers with 120.1% higher reimbursement compared to the reference group (Cardiovascular diseases), followed by the chronic renal diseases and Diabetes which are 33.6% and 7.3% higher reimbursement amount respectively. These findings correspond with prevailing evidence by Shen Menghan, et al, 2020 in their study on the association between an increased reimbursement cap for chronic disease coverage and healthcare utilization in China. They found that the increase in monthly reimbursement cap for chronic disease under the Urban Employee Basic Medical Insurance is driven by drug expenditures, where the patients with both hypertension and diabetes were likely to have increased outpatient visits by 18.1% using the chronic disease coverage with low likelihood of inpatient services (19). Another study by Jui-Kun Chiang and Yee-Hsin Kao in Taiwan where assessed predictors of high healthcare costs in elderly patients with liver cancer end-of-life using health Insurance data from 1997 to 2011, The study evidenced that among elderly with liver cancer receiving their end of life care, the significant healthcare cost predictors including intensive care, cardiopulmonary resuscitation, anticancer treatment, and a high number of admission days, comorbidities of chronic kidney disease, esophageal bleeding, and receiving opioids. Whereas only 10% of the study subjects had healthcare costs of more than US$ 5000 per person which accounts for 38.95% of the total healthcare cost of this population without such conditions (20).

Our study highlights the relationship between increasing NCD reimbursements by NHIF to the level of health care facilities whereby treating NCD at Zonal Level Hospitals is associated with a 2% higher reimbursement amount compared to the reference group, this is explained by the nature of NCD services rendered at this level, availability and accessibility of the zonal facilities that have higher catchment areas with advancement in technologies and availability of specialist personnel which is all adding to reimbursement weight. In contrast, lower-level facilities were found to be associated with decreasing reimbursement amounts, meaning the NHIF is reimbursing less amount when these major NCDs are managed from regional-level hospitals to primary healthcare levels. Surprisingly, In Tanzania, despite current policies requiring NCD services to be provided at primary healthcare levels, most of these services are provided at the hospital level, which is costly, as shown in this study. Evidence is consistent with these as R. Peck et al., in their study assessing the preparedness of Tanzanian health facilities for outpatient primary care of hypertension and diabetes, shows most primary healthcare levels were under-prepared for the provision of NCD care (29). Other evidence suggests that most of the lower-level health facilities are under-budgeted to care for NCD services, as shown by Ashraful Kabir et al, in their study on assessing Health system readiness for NCD at the primary care level(30). In their study, Vu Duy Kien et al. indicated the same, where they found some barriers to health insurance reimbursement for NCDs at the primary healthcare level despite these levels being cost-effective in NCD management (31).

In this study, we identified that the type of facility by ownership is a significant predictor for NCD reimbursement by NHIF. NCD claims originated from privately based health facilities associated with 3% higher NCD reimbursement compared to the Government facilities. This finding is coherent with a study by Callum Brindley et al, which suggests that NCD costs are far higher in the private sector compared to the public-based facilities but due to various determinants, including convenience, less waiting time, perceived quality of care, higher socio-economic profile(32). The same has been attested by Sisira Kumara, A. in 2020 through their study done in Sri Lanka which suggested that those with health insurance have less likelihood of using public facilities while having an increased likelihood of utilizing private facilities for seeking NCD-related care (33). The increase in reimbursements to healthcare providers has been also linked with fraudulent activities, as evidence shows that the estimated global loss due to health insurance fraud is estimated to be 6% of total

healthcare spending(34). The issue of fraud in health care is attributed to systemic inefficiencies, lack of quality care, and accuracy of reimbursement data as well as inflating medical claims and their reimbursement(35),(36). In Tanzania, the issue of fraud in NHIF reimbursement is not very well studied but there is evidence elsewhere relating the inflated reimbursement from private healthcare providers that eventually led to extensive scrutiny and delayed reimbursement from the health insurance providers(37).

5.1 Strengths and Limitations

This study is one of its kind that assess the major NCDs and determine the reimbursement cost by their specific disease categories using a large claims data. Also, they used national data from the NHIF beneficiaries hence the findings could be generalized for the context of NCDs and social health insurance in Tanzania. To the best of our knowledge, this study is the first one that has provided a piece of evidence on the determinants of NCD reimbursements by the NHIF in Tanzania.

The study involved only those members who received NCD-related care and their claims registered on the NHIF claim database for the period from January 2021 to December 2023. The study might be limited as it is based on identifying and studying reimbursement trends and patterns of the major six NCD types using ICD 10 hence there might be under/over-reporting based on the documentation quality of the claims data. There has been a large variation in the sample size between the years 2021 and 2022 across variables in our study, this could be due to missing data in some months as it might have been affected by system misbehaviors. Another limiting factor could the model used to analyze the data yielded an explanatory power of 15.7% which is relatively but the study provides significant results that can be used by the fund and other stakeholders in strategizing the management of NCD as the country heading toward UHI. Lastly, another limitation that might hinder the result of our study is the inflated/over-reimbursement that might be due to fraudulent activities that have not been incorporated in this study hence this could be determined in further studies.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

In general, this study has highlighted that the elderly and females are dominant among NHIF beneficiaries with NCD claims proportionately increasing along with hospital visits reflecting potential higher healthcare utilization. The NCD reimbursement trend by the NHIF during the study period has been on the rise. Cardiovascular diseases have the majority of the claims while cancers and chronic renal diseases are the most expensive NCDs managed by the NHIF.

The magnificent rise in these major NCD reimbursements along with the identified predictors including age groups, NCD types, health facility level, and facility ownership is attributed to higher reimbursement whereby by private hospitals and zonal hospitals associated with the substantial increase in NCD reimbursements. Therefore as the need for NCD-related care is on the rise, enforcing referral systems is inevitable so that NCD managements are centered at the lower hospital levels including primary healthcare levels and public facilities. These facilities should be empowered and strengthened to provide quality NCD care since they are evidenced to have lower reimbursement costs compared to other higher levels and private facilities.

Following the country being in the realm of rolling nationwide UHI, the NHIF should prioritize cost-effective interventions and employ cost containment measures from its payment mechanism including limiting fees for service and introducing a diagnosis-related grouping system, co-insurance, etc. Expansion of revenue pooling so as to cope with the increasing financial burden imposed by these complex NCDs is an important step to be attained.

6.2 Recommendations

- The NHIF should develop and implement focused interventions in managing NCD claims reimbursement including reviewing its provider payment methods (eg, shifting from fee for service to other payment modalities).
- The NHIF should consider introducing NCD preventive interventions in its benefits package.
- (including mandatory screening for certain age groups and promotion of healthy lifestyles)
- The NHIF should collaborate with the Ministry of Health to ensure the establishment of priority-setting mechanisms to include the most cost-effective NCD interventions for its benefit package.
- The NHIF should work with the Ministry of Health to enforce the referral system policy and ensure NCD treatment are centered in primary healthcare levels.
- The NHIF, universities, research institutes, and other stakeholders should conduct further extensive studies to determine the long-term financial impact of NCD on health insurance and the projection of NCD reimbursement cost upon implementing the UHI.

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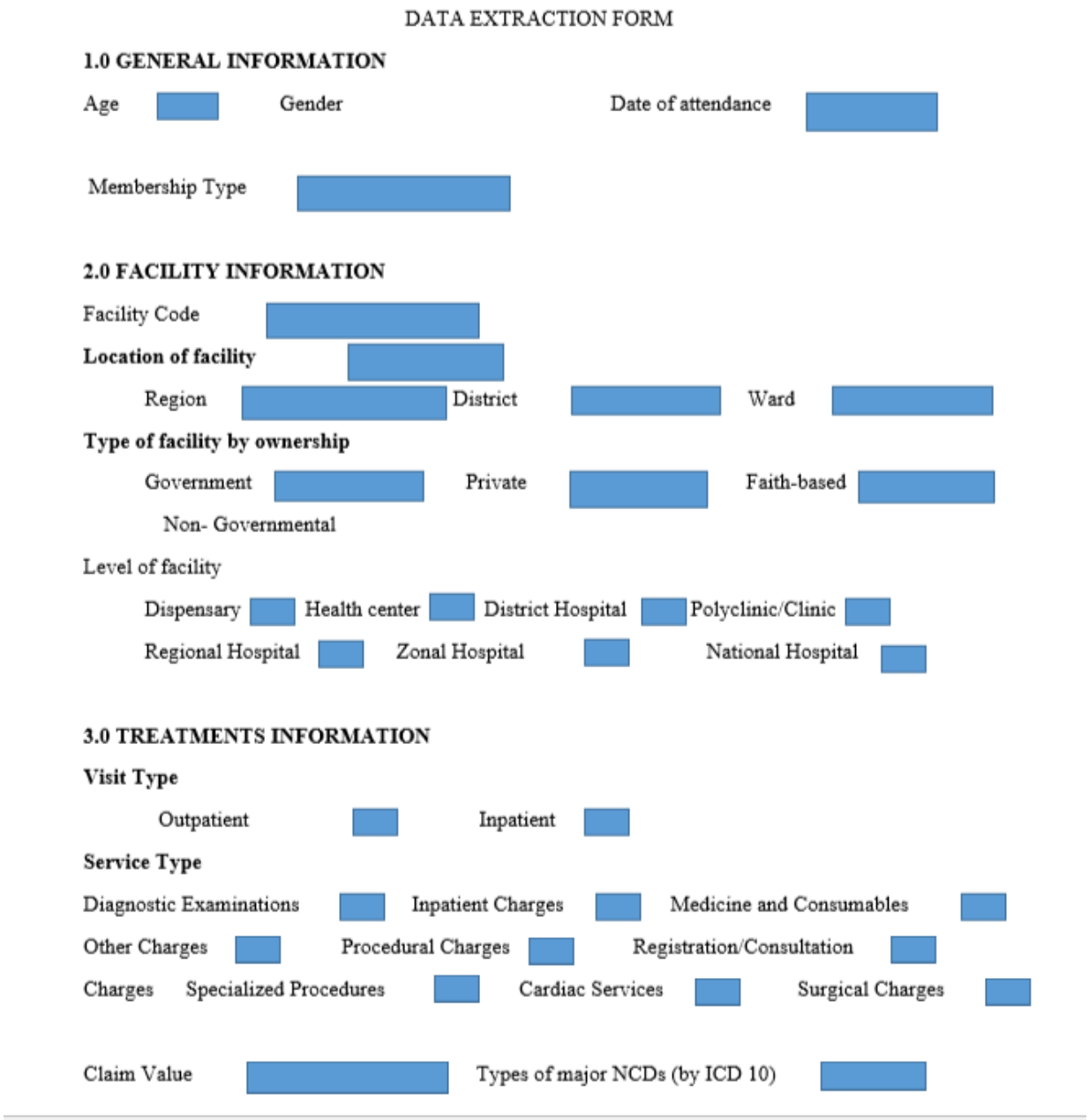
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APPENDICES

Appendix 1: Data Extraction Form



DATA EXTRACTION FORM

1.0 GENERAL INFORMATION

Age Gender Date of attendance

Membership Type

2.0 FACILITY INFORMATION

Facility Code

Location of facility

Region District Ward

Type of facility by ownership

Government Private Faith-based

Non- Governmental

Level of facility

Dispensary Health center District Hospital Polyclinic/Clinic

Regional Hospital Zonal Hospital National Hospital

3.0 TREATMENTS INFORMATION

Visit Type

Outpatient Inpatient

Service Type

Diagnostic Examinations Inpatient Charges Medicine and Consumables

Other Charges Procedural Charges Registration/Consultation

Charges Specialized Procedures Cardiac Services Surgical Charges

Claim Value Types of major NCDs (by ICD 10)

Appendix 2: Ethical Clearance

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATIONS

Ref. No.DA.282/298/01.C/2238 Date: 03/05/2024

MUHAS-REC-05-2024-2238
OTHMAN KHAMIS HAJI
SHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: NON-COMMUNICABLE DISEASES (NCDS) REIMBURSEMENT/FUNDING TOWARDS UNIVERSAL HEALTH INSURANCE: A CASE OF THE NATIONAL HEALTH INSURANCE FUND (NHIF) IN TANZANIA.

Reference is made to the above heading,

I am pleased to inform you that the Chairperson has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 16/05/2024
EXPIRATION DATE OF APPROVAL: 16/05/2025

STUDY DESCRIPTION:
Purpose:
The purpose of this quantitative cross-sectional study design is to assess the funding trends of major NCDs at the National Health Insurance Fund (NHIF) towards Universal Health Insurance (UHI) in Tanzania from January 2020 to December 2022.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2015458.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contraveries or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

Dr. Nahya S. Masoud

For Chairperson, MUHAS Research and Ethics Committee

Muhimbili University of Health and Allied Sciences
DIRECTOR
Research & Publications
Box 65001

Appendix 3: Introduction Letter

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.555/2022 06th May, 2024

Director General,
National Health Insurance Fund
P.O. Box 1437,
DODOMA

Re: INTRODUCTION LETTER OF OTHMAN KHAMIS HAJI

The bearer of this letter is Othman Khamis Haji (HD/MUH/T.555/2022), a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MSc. Healh Economics & Policy.

As part of his studies he intends to do a study titled: **"Non Communicable Diseases(NCDS) Reimbursement/ Funding Towards Universal Health Insurance: A Case of the National Health Insurance Fund (NHIF) in Tanzania."**

The research has been approved by the Chairman of University Senate.

Kindly provide him the necessary assistance to facilitate the conduct of his research.

We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES
c.c. Othman Khamis Haji

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix 4: Permission Letter

UNITED REPUBLIC OF TANZANIA

MINISTRY OF HEALTH

NATIONAL HEALTH INSURANCE FUND

ISO 9001:2015 CERTIFIED

In reply, please quote:

Ref. No. **AE.17/324/01/89** Date: 8.05.2024

VICE CHANCELLOR,
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
P.O. BOX 65001
DAR ES SALAAM

Re: **APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED NON COMMUNICABLE DISEASES (NCDS) REIMBURSEMENT/FUNDING TOWARDS UNIVERSAL HEALTH INSURANCE: A CASE OF THE NATIONAL HEALTH INSURANCE FUND (NHIF) IN TANZANIA**

Please refer to your letter with **Ref. DA./298/01.C/2192**, dated 3 May, 2024 regarding the above-captioned heading.

2. The Fund is pleased to inform you that it has granted permission to **Othman Haji** to collect data on his academic project titled ***"Non Communicable Diseases (NCDS) Reimbursement/Funding Towards Universal Health Insurance: A Case Of The National Health Insurance Fund (NHIF) In Tanzania."***

3. The collected data from NHIF should be used for the academic research purposes and treated with strict confidentiality. The student is required to share the findings of this research project with NHIF.

4. Sincerely yours.

Baraka J. Maduhu
For: **DIRECTOR GENERAL**

NHIF House Tambukareli, Jakaya Kikwete Road, P.O. Box 1437, Dodoma, Tel: +255262963888, Email: info@nhif.or.tz, Website: www.nhif.or.tz

Appendix 5: Turnitin Receipt

turnitin

Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

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Assignment title:	Proposal check
Submission title:	OKH_FINAL_THESIS_REPORT
File name:	FINAL_OKH_Thesis_Report_draft_THREE_220724.docx
File size:	522.51K
Page count:	52
Word count:	11,958
Character count:	68,135
Submission date:	22-Jul-2024 01:29PM (UTC+0300)
Submission ID:	2307334919



MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCE

DISSERTATION REPORT

TITLE:

NON-COMMUNICABLE DISEASES (NCDS) REIMBURSEMENT FUNDING TRENDS AND PREDICTORS TOWARDS UNIVERSAL HEALTH INSURANCE: A CASE OF THE NATIONAL HEALTH INSURANCE FUND (NHIF) IN TANZANIA.

By

OTHMAN KR. HAJI

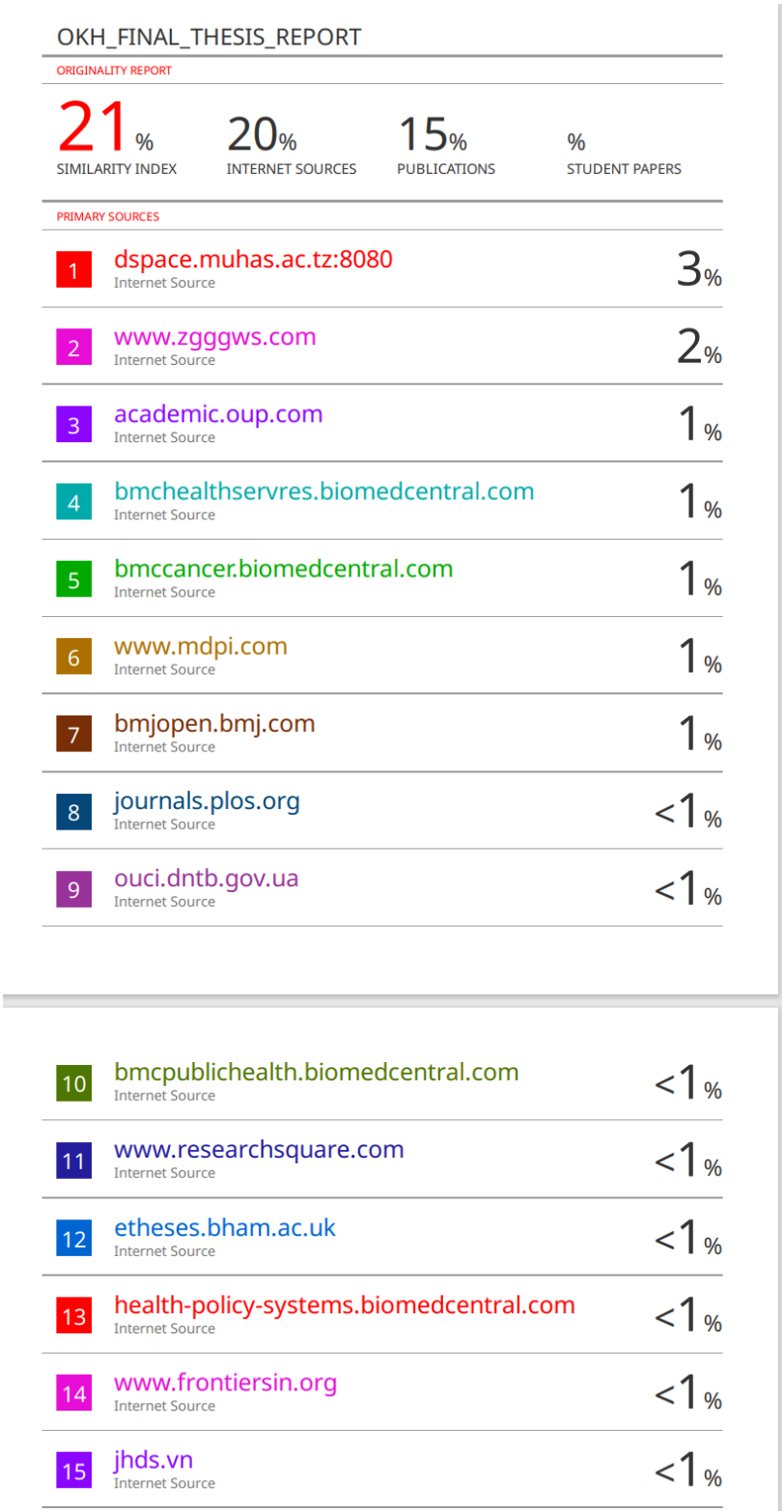
REG NO: HD/MUHAS/2022

PROGRAMME: MSc. Health Economics and Policy.

A Dissertation Submitted in Partial Fulfilment of the requirements for the degree award of Master of Health Economics and policy of Muhimbili University of Health and Allied Sciences

July 2024

Appendix 6: Plagiarism reports



OKH_FINAL_THESIS_REPORT

ORIGINALITY REPORT

21%	20%	15%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	dspace.muhas.ac.tz:8080 Internet Source	3%
2	www.zgggws.com Internet Source	2%
3	academic.oup.com Internet Source	1%
4	bmchealthservres.biomedcentral.com Internet Source	1%
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6	www.mdpi.com Internet Source	1%
7	bmjopen.bmj.com Internet Source	1%
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9	ouci.dntb.gov.ua Internet Source	<1%
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