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Prof. Dr. Steffen Fleßa

Revisiting the nexus between poverty and health insurance through the lens of Universal Health Coverage in the Democratic Republic of Congo

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Alexis Biringanine Nyamugira

geboren am 12.03.1992

in Bukavu, DR Kongo

Dekan: Prof. Dr. jur. Stefan Harrendorf

1. Gutachter: Herr Prof. Dr. rer. pol. Steffen Fleßa
2. Gutachter: Herr Prof. Dr. rer. pol. Walter Ried

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Chapter One: Introduction

1.1. Contextual Background

In recent years, Universal Health Coverage (UHC) has emerged as a critical goal for global health systems, particularly in Low- and Middle-Income Countries (LMICs), to enhance health outcomes, alleviate poverty, and foster economic stability. Despite its importance, the Democratic Republic of Congo (DRC) faces profound challenges in achieving UHC, attributable to weak institutions, pervasive poverty, inadequate health infrastructure, and limited health insurance coverage (Moreno-Serra & Smith, 2012; Nyamugira et al., 2022). The DRC's socioeconomic and political instability further complicates efforts to provide accessible and affordable healthcare. With a population exceeding 95 million, the nation's health financing is predominantly reliant on Out-Of-Pocket (OOP) expenses, which account for approximately 90% of the total health expenditure, thereby restricting access to essential health services for a significant portion of the population (Barroy et al., 2014; Dimbuene et al., 2022; Nyamugira et al., 2022).

In many LMICs, such as the DRC, poverty and health are closely intertwined. Poor health can trap communities in poverty, while poverty exacerbates health issues by limiting access to healthcare services, nutritious food, and clean water.

It is documented mainly that LMICs exhibit poorer health outcomes compared to wealthier nations, with the poor suffering disproportionately. Factors such as limited access to healthcare, inadequate nutrition, and substandard living conditions exacerbate health disparities. Addressing these issues is crucial for improving health equity within and across countries (Freeman et al., 2020; Jetter et al., 2019).

This is a cyclical relationship in which insufficient income prevents proper healthcare for sick household members, and poor health reduces productivity and income. Thus, the poor are trapped in a vicious cycle where poverty breeds ill health, and ill health perpetuates poverty. Addressing both economic and health factors is crucial to breaking this cycle and improving health outcomes (Ouadika, 2020).

Despite abundant natural resources, the DRC remains one of the world's poorest nations. Data from 2018 indicates that approximately 73% of the population, equaling nearly 60 million individuals, lived on less than $1.90 per day (Sasidharan & Harpreet, 2022). This pervasive poverty directly affects access to healthcare, leading to high maternal and child mortality rates, widespread infectious diseases, inadequate healthcare infrastructure, and ultimately, poor health outcomes (Laokri et al., 2018; Nyamugira et al., 2022).

Health insurance is essential for UHC, offering financial risk protection and ensuring access to necessary health services. It helps manage healthcare costs and enables equitable access, reducing financial hardship. According to (WHO, 2021; LEAD, 2020) , health insurance is integral to UHC, acting as a financial safeguard against the high costs of healthcare, which can drive people into poverty and exacerbate inequalities. Achieving UHC relies significantly on health insurance, which ensures access to various health services, including preventive measures, health promotion, medical treatment, rehabilitation, and palliative care (WHO, 2021) .

A well-designed health insurance system can safeguard families against the economic hardships of OOP expenses, thereby preventing impoverishment and reducing health disparities. Affordability is key to UHC, and a comprehensive financing system is required to avoid financial hardships. This includes various mechanisms to fund health services, which can differ from country to country. Financial risk protection can be assessed by tracking fewer families driven into poverty due to healthcare costs (WHO, 2021).

In the DRC, health insurance has low coverage and high OOP costs, with only 5% of the population insured. The insurance landscape includes employer-sponsored plans, community-based mutual health organisations, and voluntary enrollment schemes, with employer-sponsored plans being the dominant scheme (Dimbuene et al., 2022; Nyamugira et al., 2022; Nyamugira et al., 2024)

1.2. The problem statement

Despite the DRC's official commitment to UHC since 2009, significant challenges persist in achieving meaningful health insurance coverage and financial risk protection for its population. The disparities in health insurance uptake, particularly among the poorest and most vulnerable groups, underscore a critical issue in the country's health system. These disparities have a direct effect on health outcomes, leading to higher morbidity and mortality rates among those who lack access to comprehensive health services.

Research on UHC, insurance and poverty in developing countries often encounters two main challenges: endogeneity and the insufficient availability of high-quality data.

Endogeneity can occur when a bidirectional relationship between health outcomes and insurance coverage exists. Moreover, the issue of reverse causality makes it unclear whether UHC enhances health outcomes or if healthier nations are more likely to implement UHC (Levy & David, 2008; Moran et al., 2021). At the individual level, it is difficult to determine whether health insurance leads to improved economic outcomes or if individuals who are already economically better off are more likely to obtain

health insurance. This ambiguity arises because, while health insurance may provide financial protection and reduce OOP healthcare costs, thereby improving economic stability, it is also possible that individuals with better economic status have more resources and information to obtain health insurance. Additionally, in developing countries, it is not always clear that wealthier individuals are more likely to hold health insurance due to factors such as informal employment, lack of awareness, and limited access to insurance markets. This further complicates understanding of the direction of influence between health insurance and economic conditions.

The second issue concerns the lack of sufficient high-quality data. Ideally, longitudinal data on health insurance coverage would ensure consistency in maintaining insurance coverage. However, the data available on insurance coverage in the DRC are limited to either cross-sectional data or aggregate longitudinal data at the national level. Furthermore, the quality of both cross-sectional and aggregate longitudinal data in the DRC may be compromised due to the country's administrative capacity constraints (Hoogeveen & Utz, 2020).

To address these challenges, our study employs a combination of cross-sectional, aggregate longitudinal data alongside data from interviews and focus group discussions. Our methodology integrates both quantitative and qualitative analyses, such as breakpoint analysis, thematic analysis, and weighted logistic regression models. Furthermore, it is essential to mention the existing gap in research on health insurance, poverty, and the progress towards universal health coverage in the DRC.

1.3. Research Objectives

The research aims to fulfil three main objectives. First, it scrutinizes the Democratic Republic of the Congo's progress in implementing universal health coverage. Second, it assesses health insurance coverage among various Congolese sub-groups. Finally, it explores the Congolese community's perceptions, knowledge, and understanding of health insurance.

In line with these objectives, the study aims to answer three central research questions:

- Are the course of financial risk protection and health outcomes indicators associated with DRC's commitment to Universal Health Coverage?
- What are the socioeconomic and demographic patterns of health insurance coverage in the DRC, and which sub-groups and regions need the most support to improve coverage and eventually achieve universal health coverage (UHC)?
- What are Congolese people's perceptions, knowledge, and understanding of health insurance?

1.4. Conceptual framework:

Universal Health Coverage (UHC) is a health policy framework designed to ensure everyone can access essential health services without experiencing financial hardship. The World Health Organization (WHO) supports UHC as a basic human right and a key element of sustainable development. It is specifically highlighted in the Sustainable Development Goals (SDGs), especially in Goal 3.8, which targets achieving UHC by 2030 (Debie et al., 2022; Ranabhat et al., 2023).

The conceptual framework highlights the complex and interrelated relationship between poverty, health insurance, and UHC. Poverty and health significantly impact each other, affecting individuals' access to healthcare and overall well-being. Poverty can result in a lack of health insurance, while the absence of affordable healthcare can worsen poverty. UHC aims to address these issues by ensuring that everyone, regardless of income, can access quality healthcare without facing financial difficulties.

Liao et al. (2022) argue that poverty worsens health risks, creating a vicious cycle where poor health leads to financial instability and vice versa. Lack of health insurance can result in high out-of-pocket medical costs, driving vulnerable populations further into poverty. Effective health insurance, especially for low-income individuals, alleviates these burdens, offers financial protection, and promotes socioeconomic stability.

Poverty significantly affects access to affordable healthcare by creating barriers such as high medical costs, insufficient and inadequate insurance coverage, geographical limitations, and low health literacy. Poor health is both a cause and a consequence of poverty. High healthcare costs can deter individuals from obtaining necessary medical care, perpetuating a cycle of deteriorating health and financial instability. In low-income settings, the economic burden of seeking healthcare—including direct costs such as consultations and medications, as well as indirect costs like transportation—exacerbates poverty (Van Hees et al., 2019).

Poverty and out-of-pocket healthcare payments significantly impact individuals and communities. High direct and indirect healthcare costs can lead to financial strain, delayed or forgone medical care, and worsened health outcomes, perpetuating the cycle of poverty. In LMICs, OOP health expenditures significantly contribute to driving poverty. Previous studies have shown that high levels of OOP spending can result in Catastrophic Health Expenditures (CHE), which can push households into poverty and exacerbate financial insecurity for vulnerable populations (Bolongaita et al., 2023; Mitchell et al., 2021). The threshold relationship between out-of-pocket (OOP) spending and poverty suggests that expenditures exceeding certain levels—often cited as 10% or 25% of a household's budget—can be detrimental, straining the resources needed for basic necessities (Mitchell et al., 2021; Smith et al., 2024)

The relationship between poverty and healthcare costs is further complicated by social determinants such as income inequality, education, and geographic disparities in healthcare access. Marginalized groups, especially those without health insurance, are at a greater risk of experiencing out-of-pocket-related poverty, which significantly impacts their health outcomes and economic opportunities (Zou et al., 2019).

In LMICs, various health insurance models exist, including Social Health Insurance, Private Health Insurance, and Community-Based Health Insurance (CBHI). Social Health Insurance often involves mandatory enrollment and is funded through payroll taxes, while Private Health Insurance and CBHI typically rely on voluntary participation and target vulnerable populations (Ifeagwu et al., 2021)

Health insurance significantly enhances access to healthcare by reducing out-of-pocket costs and providing financial protection. It improves access to healthcare utilisation, which leads to better health outcomes. Health insurance also plays a crucial role in mitigating poverty by providing financial protection and facilitating access to necessary health services.

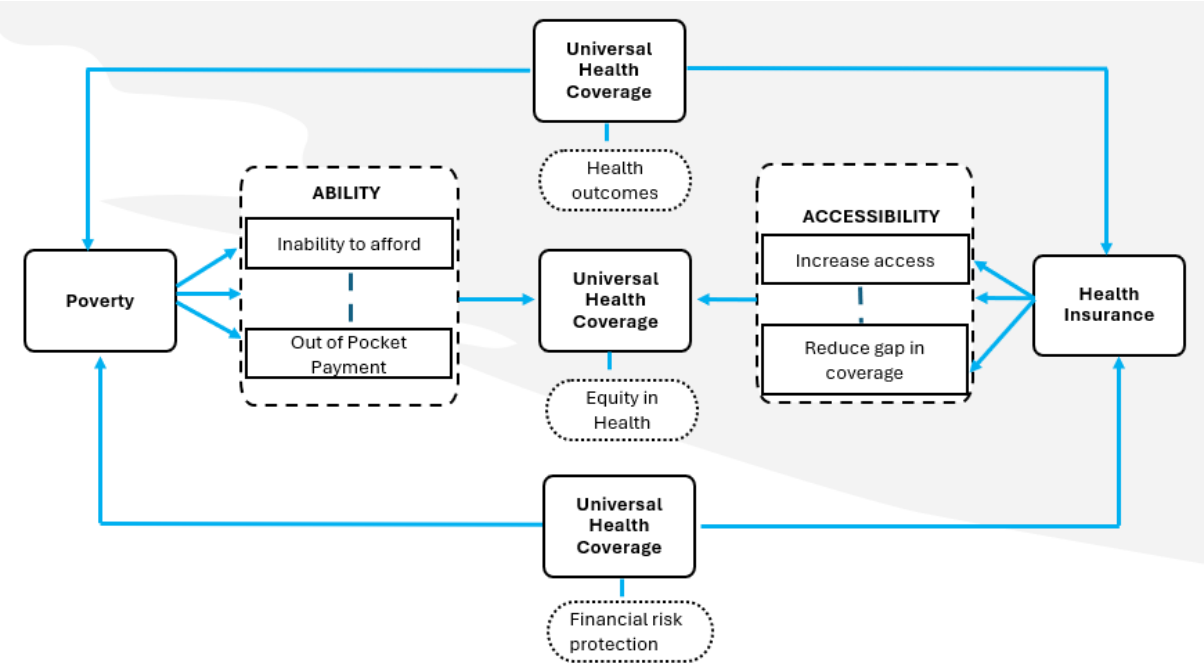
Health insurance is crucial in promoting health equity by reducing disparities in access to care and enhancing population health outcomes. By aligning with health equity plans and expanding access to value-based care, health insurance can help establish a more equitable healthcare system, ensuring that all patients receive high-quality care regardless of their insurance type (Khatri et al., 2024).

Some studies also suggest that health insurance may risk compromising equity. Although health insurance schemes can improve healthcare utilisation and offer financial protection for their members, they may also risk compromising equity by potentially excluding high-risk and vulnerable individuals in society (Kutzin, 2012).

On another note, additional barriers to health insurance enrollment persist, particularly among marginalised groups such as ethnic minorities and those with low awareness of available options. These obstacles contribute to ongoing inequalities in health access and outcomes, further entrenching cycles of poverty (Van Hees et al., 2019).

Overall, poverty and health insurance are closely intertwined, influencing the ability to afford healthcare and the improvement of accessibility and coverage. Health insurance is a crucial component of UHC, a comprehensive health policy framework. UHC's significance lies in its potential to enhance health outcomes, address health disparities, and provide financial protection, particularly for vulnerable and marginalised populations.

Figure 1: Conceptual Framework



Source: own based on the literature

1.5. DRC's National Health Policies

In this section, we provide an overview of the Democratic Republic of Congo to establish the context for our study. The subsequent section details the various government health programs and policies.

1.5.1. Study area in a brief context

The Democratic Republic of Congo is the second largest country in Africa, with approximately 2.34 million square kilometers. As of 2023, the population of the DRC is estimated to be approximately 102 million, making it the fourth most populous country in Africa and the fifteenth globally. This population has experienced substantial growth, with projections suggesting that by 2050, the population could reach around 215 million (Worldometer, 2024).

The country has a youthful population, as evidenced by its age structure with a median age of 19 years and a relatively low life expectancy of 55.3 years, which falls significantly below the global average of approximately 71 years (Countrymeter, 2024). The age dependency ratio is 4.8%, indicating a significant proportion of dependents relative to the working-age population.

In recent years, the education system in the DRC has undergone significant challenges related to governance, funding and access. For example, as of 2010, only 2.5% of the country's GDP was allocated

to education, ranking DRC among the lowest educational spending globally[1]. Additionally, only 27% of students achieved the minimum level of proficiency at the end of primary school, highlighting severe deficiencies in educational outcomes.

The country's economy is predominantly driven by the extractive sector, especially mining, which plays a crucial role in its economic activities. For instance, in the economic outlook of 2024, mining exports are projected to account for 98% of total exports and 39% of the GDP. Agriculture, industry, and services contribute 19.7%, 43.6%, and 36.7% to the GDP, underscoring a heavy reliance on industrial activities, particularly mining. Despite the potential for agricultural revival and industrialisation, the DRC faces significant socioeconomic barriers, including extreme poverty, inadequate infrastructure, and a weakened educational system (Bertelsmann Stiftung, 2024).

Despite its natural resources, including diamonds, coltan, and copper, the DRC remains one of the world's poorest countries, with over 70% of its population living on less than $1.90 daily. This paradox is exacerbated by inadequate infrastructure, a weak educational system, and a political landscape characterised by clientelism and corruption, all stifling economic growth and deepening poverty. Furthermore, ongoing conflicts, especially in the eastern regions, have stalled development, resulting in severe humanitarian crises and the displacement of millions (Bertelsmann Stiftung, 2024).

The overall economic situation in the DR Congo is further complicated by the effects of ongoing violence, particularly in the eastern regions. Political instability, infrastructure deficiencies, health crises, weak financial institutions, and a weakened educational system further exacerbate the challenges, hindering economic development and growth.

1.5.2. DRC's health programs and policies

The Democratic Republic of the Congo faces significant challenges in implementing UHC due to insufficient funding, heavy reliance on unpredictable external aid, mismanagement and corruption, geographical disparities in resource allocation, high out-of-pocket expenditures, political instability, health workforce shortages, and limited health insurance coverage and inappropriate health programs and policies.

The country's health expenditures are critically low, hindered by significant financial constraints due to inadequate budget allocations and pervasive corruption, further impeding the government's capacity to

[1] Spotlight on Basic Education Completion and Foundational Learning in the Democratic Republic of Congo 2022.

deliver essential services. With OOP payments comprising an average of 55.9% of total health expenditures, many families face the risk of financial ruin due to medical costs(Laokri et al., 2018)

To gain insight into the DR Congo government's various health programs and policies, we analysed three strategic documents in-depth. These documents are the foundation of our analysis: (1) Plan Directeur de Développement Sanitaire 2000-2009, (2) Plan National de Développement Sanitaire PNDS 2011-2015 and PNDS 2016-2020.

1. Plan National de Développent Sanitaire 1

Priorities

- Institutional reform;
- Globalization of health services;
- Integration of health services;
- Overall health services improvement;
- Social mobilization and information for health.

Source of funds

- It was anticipated that the current strategic program would receive up to 15% of its funding from the government's global budget. The remaining 85% was expected to be covered by technical and financial partners, as well as households. However, no specific percentages were provided to indicate how much each of these entities would contribute.

2. Plan National de Développent Sanitaire 2

Priorities

- Development of health zones – zone de santé;
- Support the development of health zones;
- Strengthen leadership and governance of the health sector;
- Strengthen inter-sector collaboration.

Source of funds

- The strategic program's funding was planned to come from the government, technical and financial partners, and households. Of the total funding, households contribute only 7%, while the government and technical and financial partners provide 31% and 62%, respectively.

3. Plan National de Développent Sanitaire 3

Priorities

- Enhance the development of health zones, and ensure high quality of healthcare.
- Improve governance and management of the health sector by defining appropriate regulation and normalization of the sector.

Source of funds

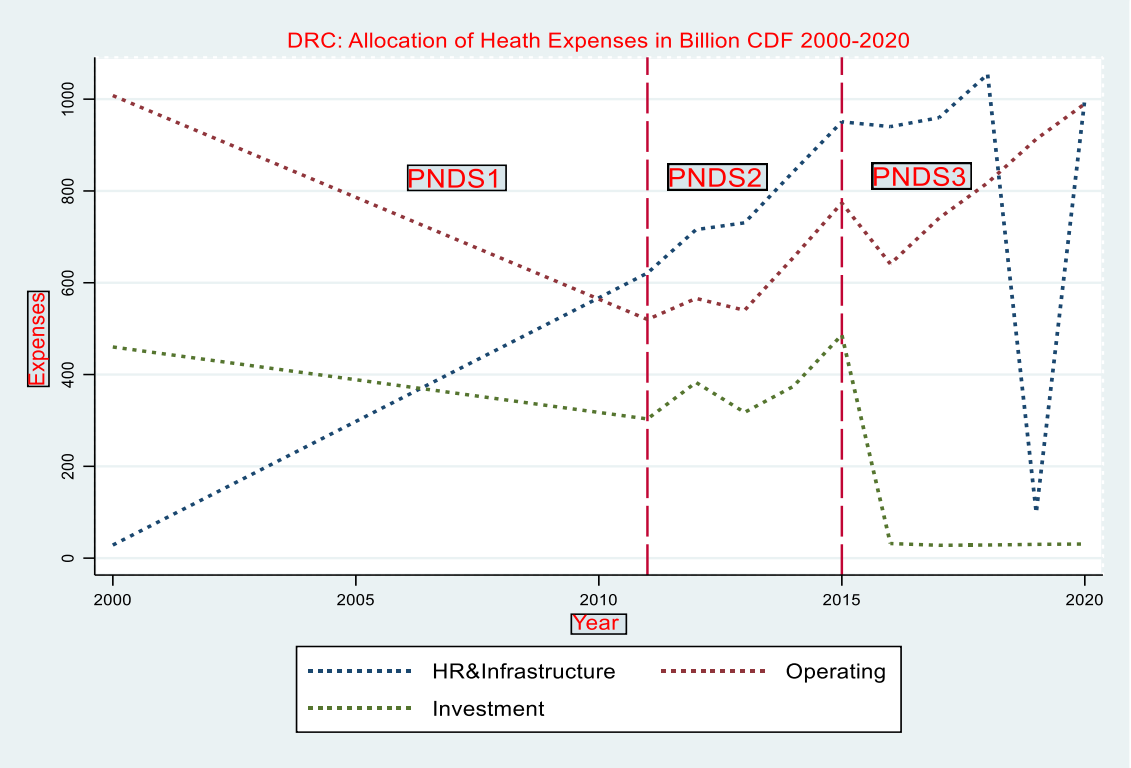
- This strategic plan was anticipated to be funded by households, the government, private entities, and technical and financial partners. Households are expected to finance up to 40% of the plan, while technical and financial partners will contribute 38%. The government and private entities are expected to fund 15% and 7%, respectively.

Overall comments on the 3 strategic plans

- The 3 strategic plans recognise the importance for the DRC to align with the recommendations of UHC. Although UHC prioritises access to health services, especially for poor and vulnerable individuals, DRC's strategic programs do not clearly define how households can easily access health services. None of the 3 strategic programs outlines a clear policy to enable the population to access healthcare through health insurance.

- There is a consensus on UHC as a social and technical goal that can only be achieved through country-led initiatives. However, in DRC, all the strategic programs suffer from weak implementation of planned actions due to a lack of secure funding, inadequate supervision, and insufficient structured monitoring at all levels.

Figure 2: Allocation of health expenses



Source: own conception based on PNSD1, 2 and 3

We divided the above figure to reflect the contents of the three strategic documents. This enables us to analyse how funds are allocated across three key expenditure categories: human resources and infrastructure, operating and investment expenses.

During the pre-adherence to UHC, the most significant proportion of expenses was allocated to operating costs, with a substantial share directed towards purchasing drugs and medicine, staff remuneration, and building maintenance. Investment expenses were the second priority, with a significant portion of funds dedicated to renovating infrastructure and buildings. Lastly, expenditures on the development of human resources were the lowest priority, with a notable share of resources allocated to the development of a National Health Information System and the training of nurses and health zone managers.

In the second strategic plan (PNDS 2011-2015), the most significant portion of expenses was allocated to human resource development, accounting for 44% of the total expenses. Operating expenses

accounted for 35%, while investment expenses made up only 21%. This illustrates a shift in priorities from the first strategic plan to the second, with a greater emphasis on human resource development during this period. However, the investment component was not prioritised in this plan.

In the last strategic plan (PNDS 2016-2020), the share of expenses allocated to investments has significantly decreased, representing only 6% of the total costs. Human resources development, the National Health Information System, and health system financing were prioritised during this period, accounting for 48% of the overall expenses. Notably, this is the first strategic plan to include a health-financing component, though it lacks a clear definition of a health insurance mechanism. Operating expenses comprise 46% of the overall costs, with a significant portion consumed by purchasing drugs and medicines. None of the three strategic plans clearly indicate how households finance their health expenses through health insurance.

1.6. Outline of the dissertation

The subsequent chapters of this dissertation are structured as follows. Chapter Two presents progress towards universal health coverage (UHC) in the Democratic Republic of Congo (DRC). The study uses secondary data from the World Development Indicators and the WHO database to investigate the effects of DRC's commitment to achieving UHC. The study employs a novel methodological approach, breakpoint analysis, to identify changes in financial risk protection and health outcomes indicators post-2009.

Chapter three investigates the relationship between poverty, financial inclusion, and health insurance uptakes in the Democratic Republic of Congo. This study estimates the prevalence of health insurance coverage and associated socioeconomic factors in the DRC using the nationally representative household survey of the 2017/2018 DRC Multiple Indicator Cluster Survey (MICS). The study applies weighted logistic regression models to identify regions and subgroups with low health insurance coverage.

Chapter four uses a qualitative approach to investigate perceptions of health insurance and coping strategies in its absence, utilising data from interviews and focus group discussions with participants from selected health zones in the DRC. The study also explores the reasons behind the low health insurance uptake in the DRC, addressing why people do not opt for health insurance in the country.

Chapter Two: Towards the achievement of Universal Health Coverage in the Democratic Republic of Congo: Does the country walk its talk?

2.1. Background

According to the World Health Organization (WHO), health spending remains unequal across countries. The United States alone accounts for 42% of global health spending. France, Germany, Japan, the United Kingdom and the USA account for more than 60% of global health spending (WHO, 2016). In 2015, the WHO estimated that, globally, around 400 million people lack access to at least one essential health service and that approximately 100 million are impoverished every year because of healthcare costs (WHO, 2015; Ntembwa & Lerberghe, 2015). Universal Health Coverage (UHC) means that everyone in the population has access to preventive, curative and rehabilitative healthcare when they need it and at an affordable price (Carrin et al., 2005; Ko et al., 2018). UHC aims to ensure that healthcare benefits are distributed based on the need for care and not on the ability to pay (Njagi et al., 2018; Russell, 2004).

The achievement of UHC requires a commitment to three fundamental principles: (i) mobilising adequate resources to ensure coverage, (ii) providing quality care through strengthening the health service delivery system and (iii) ensuring that health services are accessible to all impoverished and vulnerable individuals (WHO, 2014). Protecting people from catastrophic health expenditures is widely accepted as a desirable health policy objective. Therefore, catastrophic payments from individuals' available income can drop many households into poverty (Xu et al., 2003).

Previous findings support that the poor have a higher incidence and higher out-of-pocket payments, so they are more likely to incur catastrophic health expenditures than the well-off (Chuma & Maina, 2012; Njagi et al., 2018; Okedo-Alex et al., 2019; Onwujekwe et al., 2010, 2012). To reduce the incidence of catastrophic health payments, the World Health Organisation recommends that total out-of-pocket expenses should not exceed 15-20% of national health expenditures (Xu et al., 2003). Lower-income countries lag behind on the road to UHC, especially many African countries. Although they have experienced good economic growth in the past two decades, improvements in health outcomes have been slow and uneven in many African countries (Fenny et al., 2021). In 2018, the average government spending on healthcare in lower-income countries was only US$ 9 per capita, representing 1.2% of the Gross Domestic Product with a marginal contribution of social health insurance, which was only greater than US$ 5 per capita in some countries (WHO, 2016).

In Africa, health-financing strategies vary broadly by geographic region and social context. According to Cotlear et al. (2015) the notable differences between countries regarding their health financing strategies

show how health systems are influenced by social, cultural, economic and political factors resulting from the country's context-specific. Although Universal Health Coverage (UHC) has become a political priority for many African countries, achieving it has been challenging.

In the Democratic Republic of Congo, per capita health expenditure remains low and largely below what other low-income countries have invested (Begg et al., 2014). According to Barroy et al. (2014), at USD 13 per capita, DRC spends less than one-tenth the average of the rest of sub-Saharan Africa on health. In 2019, the country allocated only 3.5% of its GDP and 8.5% of its budget to health financing. At a rate of 846 deaths per 100.000 births over 2007-2014, DRC´s rate of maternal mortality was higher than the average of the sub-Saharan Africa of 510 (Barroy et al., 2014). In their research, Laokri et al. (2018) also emphasised the need for well-trained human resources for health who do not meet international standards in DRC´s rural areas. In the same rural areas, health facilities encounter large shock-outs of essential drugs, and the population travels long distances to attend health facilities. Therefore, the financing gap for health is high as the country aims to achieve the UHC strategic objectives (Laokri et al., 2018).

Out-of-pocket payments account for more than 90% of household health expenditure (Barroy et al., 2014) as most Congolese are not part of any risk-sharing systems. If at all, the population of this country relies on voluntary community-based health insurance schemes (Laokri et al., 2018). Therefore, on the path towards UHC, the DRC opted for a social system based on health insurance, in which community health insurances have a predominant role (Criel et al., 2020). This policy is an element of healthcare reforms that are part of the global agenda for universal access to health. In March 2016, along with other countries, the DRC agreed on a revised roadmap towards UHC in Brazzaville with a key UHC policy drawing attention to insufficient coverage in the country and to the fact that the contribution of informal sector households cannot meet the financing requirements (Kabinda et al., 2017).

In 2009, the Democratic Republic of Congo joined the International Health Partnership. In 2016, IHP membership was transferred to UHC 2030. On the one hand, this commitment towards UHC holds the DRC accountable for providing financial risk protection by reducing household out-of-pocket payments, contributing to the impoverishment of many Congolese. On the other hand, the DRC government has used this commitment as a critical instrument to hold donors more accountable for their obligations.

Our study examines changes and trends over time since committing to achieve the UHC on financial risk protection and health outcomes indicators. Specifically, we examine indicators related to the second and third principles of the UHC, which aim to ensure that health services are accessible to all impoverished and vulnerable individuals and that the country is mobilising adequate resources for health financing. It

is crucial to examine the time-related effects of different public health policies adopted by the country to understand progress towards UHC in the context of DRC's poverty, conflicts and fragility.

Although we acknowledge the existence of other essential plans and policies like Plan Directeur de Développement Sanitaire (PNDS) 2000-2009, PNDS 2011-2015 and PNDS 2016-2020, in this research, we devote much attention to the time-related effects of the DRC's commitment towards the UHC on financial risk protection and health outcomes indicators. The three strategic plans recognise the importance of the DRC aligning with the UHC's recommendations. However, DRC´s strategic plans do not clearly define how a household can easily access health services. All the strategic plans do not specify a clear policy that allows the population to access healthcare through health insurance. As a result, roughly 90% of health financing in the country originated from households out of pocket.

Hence, our study answers the following question: Are the course of financial risk protection and health outcomes indicators associated with DRC's commitment to UHC? This study highlights the changes and trends over time since joining the UHC on financial risk protection and health outcomes indicators.

2.2. Methods

2.2.1. Study design

Universal Health Coverage (UHC) is an initiative aiming to provide all people with access to needed health services. DRC joined this initiative in 2009. We collected two types of indicators to measure progress towards UHC. The first category of indicators measures financial risk protection, and the second measures health outcomes. The main objective of our research is to analyse whether changes have occurred in the financial protection and health outcomes indicators between 2000 and 2018. If applicable, we also analyse when these changes happened.

2.2.2. Data sources

Our data originated from the World Development Indicators (WDI) of the World Bank and was complemented by the World Health Organization (WHO) database. The WDI is a compilation of comparable statistics about global development from officially international sources such as the WHO. The WHO database has a wide range of global health and well-being data sourced from the states of its members. The data collection is monitored by the World Bank (WB); the WHO data and the United Nations Inter-agency Group data are collected on an annual basis. Database closing is conducted at the

end of each year with regard to the antedating year. Our study is based on data collected by the end of 2018.

Similarly, financial risk protection data are collected annually. These are aggregate data by groups computed by the WB based on the groupings for the respective fiscal year in which WHO and WB released the data. However, the main sources of health outcomes data are vital registration systems and direct or indirect estimates based on sample surveys or censuses. This data is collected annually and compiled by the United Nations Inter-agency Group. Our research uses annual data from 2000 to 2018 to ensure balanced observation periods before and after the declaration of the DRC to adhere to UHC.

2.2.3. Variables

Table 1: Definition of variables

Dependent Variables				UHC Category
Acronyms	Name	Definition	Source	
OOP	Out of pocket as % of current health expenditures.	This indicator estimates how much households in DRC spend directly out of pocket on health. It calculates the share of out-of-pocket payments over the total current health expenditures.	WHO	Financial Risk Protection
GHE	Government health expenditure as % of general government expenditure	According to the WHO, this indicator reflects the extent to which healthcare is a priority for a country.	WB	
HI	Health Insurance (CHI) as % of Current Health Expenditure	Health insurance combines voluntary HI and social HI (compulsory and from the government).	WHO	
TRADOM	Transfers from domestic government revenue (allocated to health purposes), as % of current health expenditure	This indicator refers to the funds allocated from domestic government revenues for health purposes. It shows the role of central and local governments in providing revenues for health financing schemes.	WHO	
TRAFOR	Transfers distributed by the government from foreign origin, as % of current health expenditure	This indicator shows transfers originating abroad (bilateral, multilateral, or other types of foreign funding) distributed through the general government. The financing scheme receiving these funds has the government as the provider of the funds, but the funds themselves are of foreign origin.	WHO	
LRMD	Lifetime Risk of Maternal Death	The lifetime risk of maternal death is the probability that a 15-year-old girl will die from complications of pregnancy or childbirth over her lifetime; it takes into account both.	WB	Health Outcomes
PDC	Probability of dying among children ages 5-9 years (per 1,000)	This indicator shows the likelihood of dying among children with ages comprised between 5-9 years old.		
IMMUN	Immunization, DTP3 (% of children ages 12-23 months)	*Immunization*, Diphtheria, Pertussis, and Tetanus (*DTP3*). *Child immunization* measures the percentage of *children ages 12-23 months* who received *vaccinations* before 12 *months* or at any time before.	WB	
		Control Variables		
GDP	GDP growth (annual %)	*The Gross Domestic Product growth shows how fast the economy is growing.*	WB	

GGFC	General government final consumption expenditure (% of GDP)	This indicator consists of expenses incurred by the government in its production of non-market final goods and services (except Gross Fixed Capital Formation) and market goods and services provided as social transfers in kind; in % of GDP.	WB
EDS	External debt stocks (% of GNI)	*This indicator shows in % of GNI the debt owed to non-residents repayable in currency, goods, or services.*	WB

Table 1 exhibits the variable used for our models. We retained 5 indicators to capture financial risk protection while the health outcomes component is measured by 3 indicators. Overall, we have 8 indicators that define the basis for our parametric breakpoint regression approach which is applied to estimate changes and trends over time in relation to the year when DRC joined the UHC initiative.

2.2.4. Statistical methods

Data on financial risk protection and health outcomes are described using descriptive statistics of central location (mean, median), the variability (standard deviation, interquartile range), and minimum/maximum. To examine our research question, we first compared the two observation periods (2000 - 2009 vs. 2010 - 2018) for all of the outcomes using the non-parametric two-sample Wilcoxon rank-sum test (Wilcoxon, 1992). This test requires at least ordinal measurements and computes the ith rank of the pooled samples:

$W_{n_1,n_2} = \sum_{i=1}^{n_1+n_2} R\,(X_i)$.

The test makes use of the U-statistic for each sample (Mann & Donald, 1947):

$$U_1 = n_1 * n_2 + \frac{n_1 * (n_1 + 1)}{2} - R_1$$

$$U_2 = n_1 * n_2 + \frac{n_2 * (n_2 + 1)}{2} - R_2$$

Here, R_1, R_2 represent the sum of ranks in each sample and n_1, n_2 the respective number of observations. The minimum of U_1, U_2 is compared with critical values to accept/reject $H_0: P(X < Y) = P(X > Y)$ vs. $H_1: P(X < Y) \neq P(X > Y)$. Due to ties in the data, approximate p-values were calculated. The Wilcoxon test allows conclusions on differences in the overall distribution prior to and after the DRC's declaration to adhere to UHC.

In addition, the parametric approach of breakpoint regression has been applied (Muggeo, 2003). Synonyms of breakpoint regression are: change point, join point, or piecewise regression (Xu et al., 2020). This modelling approach enables for the identification of changes in the outcome determined as trends or slopes and the location of change points (Ingram et al., 2018). Breakpoint regression has found

several scientific applications: it has been applied, e.g., for the detection of changes in climate over time (Werner et al., 2015) and in time-series data (Taljaard et al., 2014). One study examined annual aggregated data on suicides and found that changes in suicide methods over time coincided with governmental interventions i.e. the results suggested strong associations between an intervention imposed on the population and the observed data on suicides (Puzo et al., 2016). To identify breaks or location(s) of changes over time, the linear predictor of a linear regression model is specified, e.g. for one breakpoint, by:

$$y = \beta_0 + \beta_1 * time + \beta_2 * (time - \psi)_+ + \epsilon.$$

Here, the breakpoint is represented by the parameter ψ, β_0 is the model intercept, β_1 the slope of time, and β_2 the difference in slopes introduced by a change of an association over time. The latter is computed by $(time - \psi)_+ = (time - \psi) \times I(time > \psi)$ with $I(\cdot)$, the indicator function, being one if time is greater than ψ the breakpoint. We used the R package *segmented (*Muggeo, 2008*)* in our study which estimates the optimal breakpoint in an iterative approach requiring only a vector of start parameters for ψ_{start}, the length of this vector corresponds to the number of assumed breakpoints. Several linear models are then fitted until convergence to find the optimal estimate of a breakpoint $\hat{\psi}$ (Muggeo, 2008). To define the optimal number of breakpoints the use of the bayesian information criteria $BIC = -2ln(\mathcal{L}) + k * log(n)$ (Burnham & David, 2004) is recommended for breakpoint regression (Tiwari et al., 2005) *(*Muggeo, 2008*)*. Only estimates and respective confidence intervals will be provided for the parametric approach as the computation of p-values has been shown to be slightly biased (Muggeo, 2008). For all outcomes, we compared models using none, one, two, or three breakpoints and presented adjusted R squared as well as BIC statistics. All statistical analyses were conducted using R version 4.1.1 (R Core Team, 2021).

2.3. Results

2.3.1. Descriptive statistics

Except for the Lifetime risk of maternal death (LRMD, Table 2), the data were completely available for all outcomes and indicators. For most measurements, skewed distributions were found when comparing the locations of the mean and median (Table 3).

Table 2: Description of variables

Variables	Definition	n	Mean	Median	St dev	Min	Max	Q1	Q3	IQR
OOP in %	Out of pocket	18	55.9	46.4	16.3	37.2	79.0	39.4	69.4	30.0
GHE in %	Government Health expenditure	18	3.0	2.5	0.8	2.5	4.7	2.5	3.8	1.4
HI in %	Health Insurance	18	1.3	0.0	1.8	0.0	4.8	0.0	3.0	3.0
TRADOM in %	Government transfer to health from domestic revenue	18	8.1	7.0	4.6	2.6	16.1	5.2	13.8	8.6
TRAFOR in %	Government's transfer to heath from foreign origin	18	12.6	15.8	9.8	0.0	27.8	9.7	22.5	12.8
LRMD in %	Lifetime risk of maternal death	17	4.0	3.7	1.0	2.7	5.9	3.2	4.4	1.1
PDC in %	Probability of dying among children	18	17.2	16.4	3.4	11.9	23.1	14.3	18.6	4.3
IMMUN %	% of immune children	18	50.9	60.0	18.8	18.0	75.0	54.0	68.0	14.0
GDP %	Annual growth of GDP	18	3.4	6.1	4.5	-6.9	9.5	2.9	6.9	4.0
GGFC %	Government final consumption in % of GDP	18	6.6	6.9	1.6	2.1	9.1	5.9	8.2	2.3
EDS	External debt stock in % of GNI	18	92.5	63.1	88.7	9.6	283.9	16.7	93.3	76.6

Figure 3: shows the degree of linear dependence between our variables. We observe mainly very strong correlations (ρ>0.5) among our variables. To avoid the problem of collinearity in the parametric approach and to ensure the independence of our predictor variables, we only consider GDP as a possible covariate additionally to time.

Figure 3: Bivariate correlations of outcomes and covariates

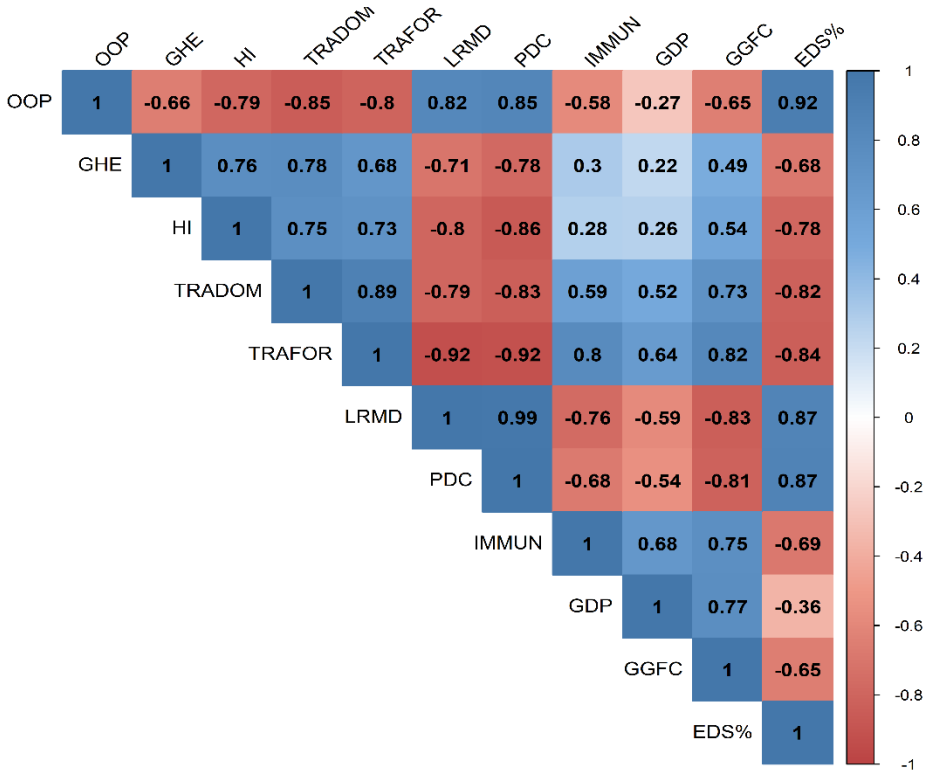


Table 3: Financial risk protection and health outcomes before and after joining the UHC by DRC

Outcomes	Median: 2000 - 2009	Median: 2010 - 2018	Difference in location	Confidence interval	p-value
OOP	68.83	39.36	-29.41	[-32.28; -14.38]	<0.001***
GHE	2.49	3.84	1.35	[0.49; 1.42]	<0.001***
HI	0.00	2.97	2.97	[1.61; 3.80]	<0.001***
TRADOM	5.24	13.84	7.86	[5.34; 9.91]	<0.001***
TRAFOR	10.09	22.51	13.02	[7.23; 18.86]	<0.001***
LRMD	4.25	3.28	-1.02	[-1.50; -0.55]	<0.001***
PDC	18.35	14.30	-4.10	[-5.40; -2.70]	<0.001***
IMMUN	57.00	63.00	9.87	[-3.00; 27.00]	0.141

Median values for financial risk protection and health outcomes indicators before and after DRC´s commitment to UHC. Significance of differences tested using Wilcoxon rank sum test *** p < 0.01, ** p < 0.05, * p < 0.1

Table 3 presents the results of the Wilcoxon rank-sum test. A decrease in out-of-pocket (OOP) from 68.83% to 39.36% has been found, which presents a considerable difference that is also statistically significant at the 1% level. Decreases were also found for the variable LRMD (from 4.25% to 3.28%) and the outcome PDC (18.35 to 14.30 %); both differences are significant at 1%. Moreover, both variables showed a strong linear association (Figure 3) supporting a simultaneous change.

Regarding the variable GHE,

Table 3 shows an increase in the proportion of funds allocated to the health sector from 2.49% to 3.84%. This result is also significant at the 1% level. Similarly, we found increases after 2009 for HI, TRADOM, and TRAFOR; all of these changes are significant at the 1% level. For the variable IMMUN, the positive change in the percentage of immune children was not statistically significant and increased from 57% to 63%.

2.3.2. Results from breakpoint-regression

We use the Bayesian Information Criteria (BIC) to determine the best number of breakpoints for each outcome (

Table 4). According to the BIC, the best model for each outcome was similar to the model with the highest value of adjusted R square. Therefore, our results suggest that all outcomes are not subject to linear trends over time. A single breakpoint has been estimated for GHE, HI, and TRAFOR variables. A model

with two breakpoints was estimated for the OOP, TRADOM, and PDC variables. Finally, only the variable LRMD and IMMUN suggest a model with three breakpoints. Among all our outcomes, only the variable IMMUN yields strong results when adjusted for GDP. This shows a strong influence of GDP on the percentage of immune children. The rest of our outcomes support models without adjusted GDP. Column 2 indicates if the breakpoint regression model was adjusted for GDP (yes/no).

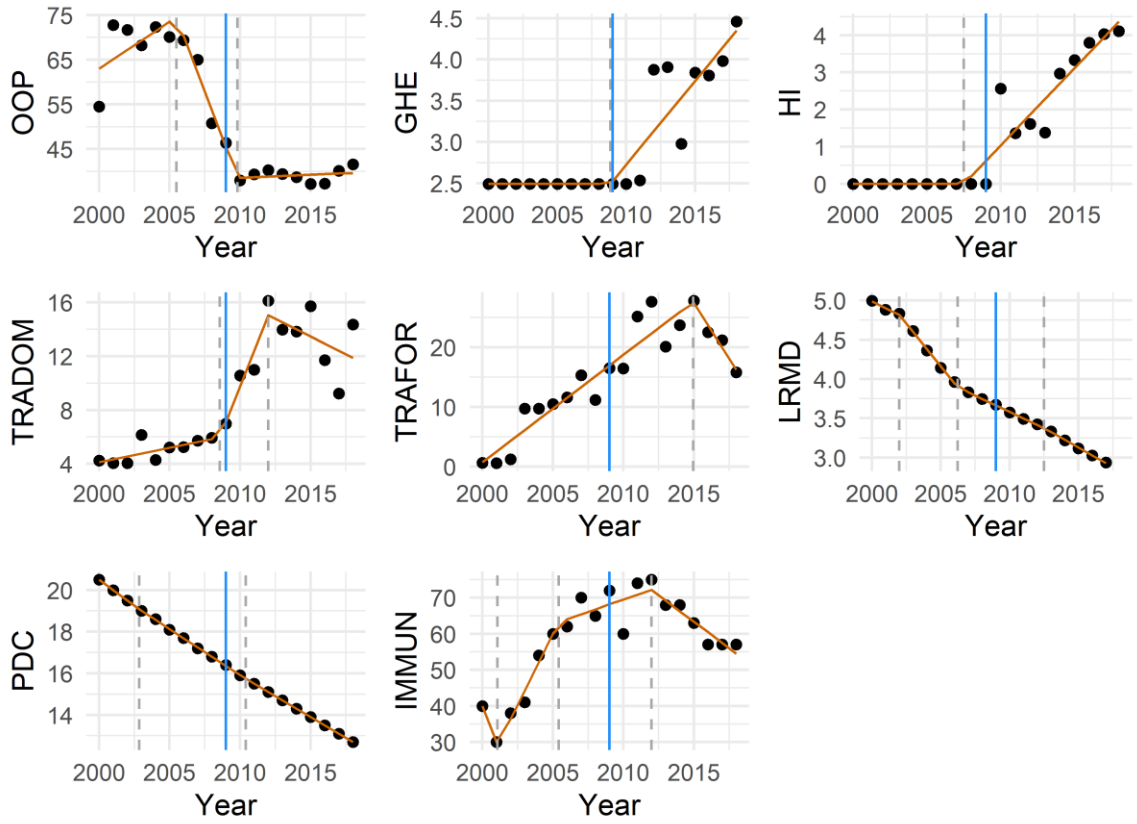
Table 4: Model selection: best number of breakpoints

Outcomes	Adjusted for GDP	adj. R2 (LM)	adj. R2 (1 BP)	adj. R2 (2 BP)	adj. R2 (3 BP)	BIC (1 BP)	BIC (2 BP)	BIC (3 BP)	Best no. of BPs
OOP	no	0.692	0.769	0.928	0.920	138.251	**119.153**	124.060	2
OOP	yes	0.704	0.859	0.932	0.926	130.462	119.538	123.554	2
GHE	no	0.658	0.806	0.658	0.756	**20.108**	27.318	30.314	1
GHE	yes	0.692	0.792	0.692	0.766	22.993	27.144	30.654	1
HI	no	0.785	0.900	0.888	0.785	**38.595**	44.011	49.673	1
HI	yes	0.824	0.894	0.824	0.824	41.492	47.703	47.703	1
TRADOM	no	0.704	0.740	0.879	0.704	94.456	**83.041**	93.403	2
TRADOM	yes	0.695	0.803	0.878	0.869	90.819	84.643	88.381	2
TRAFOR	no	0.704	0.884	0.874	0.704	**105.044**	109.806	119.297	1
TRAFOR	yes	0.752	0.878	0.864	0.883	107.594	112.611	112.118	1
LRMD	no	0.964	0.995	0.995	0.999	-49.608	-44.746	**-82.680**	3
LRMD	yes	0.971	0.997	0.999	0.999	-56.102	-80.789	-82.265	3
PDC	no	0.999	1.000	1.000	0.999	-64.350	**-79.153**	-32.198	2
PDC	yes	0.999	1.000	1.000	1.000	-77.672	-78.161	-72.846	2
IMMUN	no	0.317	0.815	0.791	0.317	129.292	134.732	150.577	1
IMMUN	yes	0.482	0.802	0.842	0.886	132.225	130.824	**127.156**	3

BP = breakpoint; adj. R2 = adjusted R squared; LM = linear model; BIC = bayesian information criterion; **bold text** = preferred model

After the selection of the best number of breakpoints for each outcome, Table 5 shows the results of the parameters estimated using the breakpoint regression. Our approach estimates the direction and magnitude of changes in the outcomes found for different time-periods separated by the estimated breakpoints. For the OOP variable, a strong decrease of 8.3% per year from 2005 to 2009 was found (Table 5, Figure 4), i.e. before the DRC declared adherence to the UHC. During the Post-2009 period, we observed a slight increase in the OOP, but this increase is not statistically significant. Hence, results from the parametric approach affirm considerable changes in OOP (Figure 4:). However, changes set in earlier than 2009. Prior to 2005 and after 2009, the annual OOP data were almost stationary, although on different levels.

*Figure 4: Best models: breakpoints estimation for financial risk protection and health outcomes indicators**



* This figure illustrates the course of all outcomes over time. On the y-axis the percentage of respective outcomes is found, the x-axis refers to time measured in years. Dashed vertical lines (grey) indicate the estimated breakpoints and the blue vertical line indicates the year of DRC's commitment to UHC.

The slope estimates indicate the direction of change within respective time periods (segments). The range of respective segments is shown in the last column. Note that the breakpoint regression approach considers time as a continuous variable; therefore, estimated breakpoints do not reflect discrete numbers.

Table 5: Model parameter estimation

Outcome	Segments	Segment slope	Slope estimate	Confidence interval	Range
OOP	1	slope1	2.099	[0.08; 4.12]	2000 - 2005.5
	2	slope2	-8.332	[-12.11; -4.55]	2005.5 - 2009.8
	3	slope3	0.141	[-0.95; 1.23]	2009.8 - 2018
GHE	1	slope1	0.000	[-0.09; 0.09]	2000 - 2008.8
	2	slope2	0.203	[0.13; 0.28]	2008.8 - 2018
HI	1	slope1	0.000	[-0.17; 0.17]	2000 - 2007.5
	2	slope2	0.415	[0.31; 0.52]	2007.5 - 2018
TRADOM	1	slope1	0.215	[-0.21; 0.64]	2000 - 2008.6
	2	slope2	2.649	[1.19; 4.11]	2008.6 - 2012
	3	slope3	-0.531	[-1.31; 0.25]	2012 - 2018
TRAFOR	1	slope1	1.800	[1.43; 2.17]	2000 - 2014.9
	2	slope2	-3.732	[-6.53; -0.94]	2014.9 - 2018
LRMD	1	slope1	-0.084	[-0.11; -0.06]	2000 - 2002
	2	slope2	-0.219	[-0.23; -0.2]	2002 - 2006.2
	3	slope3	-0.083	[-0.09; -0.07]	2006.2 - 2012.5
	4	slope4	-0.098	[-0.11; -0.09]	2012.5 - 2018
PDC	1	slope1	-0.500	[-0.53; -0.47]	2000 - 2002.9
	2	slope2	-0.442	[-0.45; -0.43]	2002.9 - 2010.4

	3	slope3	-0.400	[-0.41; -0.39]	2010.4 - 2018
IMMUN*	1	slope1	-9.841	[-25.77; 6.09]	2000 - 2001.1
	2	slope2	7.895	[3.19; 12.6]	2001.1 - 2005.4
	3	slope3	1.360	[-0.53; 3.25]	2005.4 - 2012
	4	slope4	-2.954	[-5.82; -0.09]	2012 - 2018

* the linear model has been adjusted for time and GDP.

Figure 4: reveals only one breakpoint for the variable GHE corresponding to the post-adherence period. The General Health Expenditure (GHE) as a percentage of the General Government Expenditures depicts a positive slope of 0.2, showing a marginal improvement in the government's funds allocated to healthcare. However, we also found an increase in the variable HI by 0.42% per year in 2007. Although this improvement is not statistically significant, we observe a slight increase in insurance uptake in DRC. Before the adherence to UHC, the trend was constant and only increased after 2009. Similar results are shown for HI, which increases post-2009 with a changing point in 2007.

For both, TRADOM and TRAFOR, Figure 4: shows consistent increases for more than 10 years, starting in 2000. We observed two breakpoints for TRADOM and only one breakpoint in 2015 for TRAFOR. The sharp and constant increase of TRADOM began in 2008 and declined from 2012 onwards. Table *5* depicts the respective slopes for both variables. We observe a sharp increase in TRADOM of 2.6% annually, which started one year prior to UHC´s commitment. In 2012, TRADOM significantly decreased by 0.5%. Surprisingly, in 2014, the variable TRAFOR decreased to an average point of 3.7% per year, which is statistically significant. However, this indicator increased by 1.8% in 2000.

Overall, LRMD decreased significantly over the entire observation time. Figure 4: also shows that changes have set in earlier than 2009. Although the variable LRMD has decreased over the period, this improvement was not aligned with the declaration of adherence to UHC. The same pattern has been observed for PDC. The probability of dying among children decreased by 0.4% per year from 2002. We also have found a decrease in 2010 of the same magnitude for this variable prior to UHC´s adherence.

The variable IMMUN is the only outcome adjusted for GDP with 3 breakpoints. The first change of 7.9% was set in 2011 and is statistically significant, which supports an improvement in the number of immune children prior to 2009. In 2005, the variable IMMUN improved by 1.4%, but this change is not statistically significant. Finally, we have identified a decrease of 2.9% in 2012, corresponding to the period post-2009.

2.4. Discussion

1. Out of Pocket and Health Insurance

Although the trend of the variable OOP is positive during the post-2009 period, our results suggest that this increase is not statistically significant. Before 2009, there was a strong decrease in the variable OOP from roughly 70% to 40%. After 2009, OOP appears stationary at roughly 40% with a marginal positive trend over the post-2009 period. This considerable change in OOP before 2009 may have multiple reasons, e.g., it also reflects the benefits of a dozen international initiatives addressing health care in the DRC (Ntembwa & Lerberghe, 2015). Further, such change can also be associated with the reliance of people on auto-medication or non-professional treatment. (OCDD&INS, 2021).

Over the last decade, several health-financing mechanisms have been developed in DRC to avoid catastrophic health expenditure. However, those mechanisms mainly cover formal employees, such as government employees partially covered by the government´s budget. Some employees from the formal private sector are covered by their employers as defined by the labour laws. Lastly, a few community-based health insurances have also been developed (MSP, 2016). However, it is important to note the lack of initiatives that promote health insurance among the poorest, who represent roughly 73% of the population, as estimated by the World Bank in 2018.

Moreover, in DRC, only a minor segment of the population did not finance directly their health expenses. A report from *les comptes Nationaux de la santé* shows that 6% and 3% of the population did not have to pay out of pocket to cover their health expenditure in 2010 and 2013. Overall, the poorest in Africa have disproportionately less access to health services and are more exposed to impoverishing expenditures than non-poor people. As a case in point, in DRC, only 0.7% of men and 1% of women from the poorest quintile report receiving health insurance services, while 12% of men and 15.3% of women from the wealthiest quintile have declared to benefit from health insurance (DHS, 2014).

Regarding health insurance coverage, we found a positive effect in the uptake of health insurance after the DRC adhered to the UHC. This indicator presents a positive trend during the period post-2009. However, much effort should be undertaken to ensure household financial protection. A study conducted in 59 countries by (Xu et al., 2003) shows that reducing reliance on OOP payments is essential for financial protection, as a 1% increase in the proportion of total health expenditure from OOP payments is associated with an average increase in the proportion of households facing catastrophic payments of 2.2%. Similarly, the WHO found that only when direct payment falls to 15-20% of total health expenditures does the incidence of financial catastrophe and impoverishment fall to negligible levels (WHO, 2010b).

In DRC, over the period under this study, the average values of OOP and HI as a percentage of health expenditures are 55.9% and 1.3% respectively.

2. Government Health Expenditures

Our findings indicate a slight improvement in the variable GHE after the adherence of DRC to the UHC. Before the adherence to UHC, the trend was constant and only increased after 2009. Our results show that, on average, the DRC´s government has spent only 3% on health, with a per capita health expenditure of USD 13 (Barroy et al., 2014). This result indicates that DRC´s government did not commit to meeting its engagement to reach at least 15% of annual budgets to improve the health sector as stipulated in the Abuja Declaration (WHO, 2010a). Although there is no consensus to determine the funding needs for UHC, a recent study from Agyepong et al. (2017) showed that targets that aim to include 5% of GDP, 15% of government expenditure and USD 86 per capita are interesting benchmarks. Almost all of the DRC´s health strategic plans report poor governance, lack of commitment and weak institutions as the main obstacles to achieving the country´s health target. Therefore, an improvement of public financial management, together with a systematic approach to implementing reforms, should be undertaken for better health spending.

3. Government´s transfer to health from domestic and foreign origin

Our results suggest an improvement in the government´s transfers from domestic origins while the government´s transfers from foreign sources decreased post-2009. In 2008, the funds allocated to health from domestic origins significantly increased by 2.6%. A downward trend was observed in 2012 with a statistically significant slope of 0.5%. This trend shows a lack of consistency in prioritising health for the country. In their studies, Govender et al. (2008) show that many countries lag behind the Abuja target as they continue spending on debts. As a point in case, over the past decades, East and Southern Africa paid an average of USD 14 per capita annually in debt servicing, which is much more than their average per capita spending on health (UNDP, 2002). Moreover, there is no sufficient evidence between external and internal financing for health spending. In some countries, increased external funding was not associated with falling shares of government spending on health, and the opposite has occurred. (Govender et al., 2008).

In many African countries, donors are an essential funding source. However, donor funding is often unreliable and unsustainable in the long term. Our results show similar evidence, as the flow of funds from foreign origins is unsustainable in helping DRC reach the UHC. The WHO suggested that mandatory

pre-payment financing mechanisms are the core of domestic healthcare financing, including tax and other government revenues (WHO, 2010b).

While some countries have succeeded in closing the funding gap from domestic sources, others will continue to require sustained health financing reforms and development assistance. However, government or individual contributions should be viewed as essential health funding. In this regard, a fiscal policy choice that improves tax collection efficiency and compliance is vital for health financing (Agyepong et al., 2017).

4. Progress in health outcomes

Overall, we observe a slight improvement in the health outcomes variables. The progress in maternal death (variable LRMD), as well as in childhood mortality (variable PDC), has set in before 2009. No changes were observed for these two statistically significant variables. LRMD has decreased from roughly 4% to 3%, while PDC has reduced from 18% to 14%. These changes could be attributable to essential investments from the private sector and NGOs in building hospitals and healthcare in remote areas, but no data is available to substantiate that.

Although there is a significant improvement in the percentage of immune children, the difference between before and after 2009 is not statistically significant for the variable IMMUN. However, the change of this variable set in before 2009 with a statistically significant slope of 7.9%. The upward trend continued in 2005 with a slope of 1.4%. However, in 2012, this variable decreased significantly, with a slope of roughly 3%.

A study from Agyepong et al. (2017) confirms that sub-Saharan Africa´s health challenges are numerous and wide-ranging to the extent that health outcomes are worse in fragile countries, rural areas, urban slums, and conflict zones among the poor, disabled and marginalised people. This result supports DRC´s context, which accounts for 54% of the rural population and 73% of the poverty rate, considering the threshold of USD 1.90 of consumption per day. In Africa, the maternal mortality ratio remains at a very high frequency of around 400 per 100.000 live births, with the most significant challenge being neonatal mortality (Agyepong et al., 2017)In the same study, Agyepong et al. (2017) concluded that it will take more than 110 years before African newborns have the same chance of survival as newborns in high-income countries, suggesting that efforts above and beyond the Millennium Development Goal are necessary to reduce the maternal mortality ratio to less than 70 per 100,000 live births.

According to Le Gargasson et al. (2013), DRC was the third-largest recipient of the Global Alliance for Vaccines and Immunization (GAVI) funds. Although we recognise that such initiatives have fostered

progress in immunisation performance, our results suggest that this effort should continue in order to meet the set goal for UHC. In the same spirit, Le Gargasson et al. (2013); (Moreno-Serra & Smith, 2012) found that GAVI support has increased DTP3 coverage and immunisation, but the government should undertake additional efforts to ensure the sustainability of routine immunisation programs.

2.5. Limitations

This study is based on publicly available data from the WHO World Bank. The institution mentions the high quality of the data published; however, also acknowledges challenges in data acquisition in fragile states (Hoogeveen & Utz, 2020)The quality of the data used in this study rests on the DRC's administrative capacities, which might still be too restricted. Limited monitoring of the data collection process may also affect the validity of the provided data. It is, therefore, possible that some trends and changes found in this study might be biased upwards or downwards. Nevertheless, the key message of this study will be unaffected as the DRC has to increase its efforts to comply with UHC.

2.6. Conclusion

DRC´s UHC journey started in 2009. This paper has examined the changes in financial risk protection and health outcomes indicators during a 9-year interval (2010-2018) after DRC has committed to UHC. We implemented the parametric approach of breakpoint regression to detect whether the UHC journey has brought changes and when exactly the changes have occurred. Although OOP has improved, the results from the breakpoint regression support an adverse effect of DRC´s commitment toward UHC on household direct spending on health. Health insurance coverage is still deficient in DRC; we observe positive effects on health insurance coverage with progress over time. DRC's government should invest a lot in improving the conditions of the health insurance market by defining new health insurance programs while setting norms and regulations for the overall system. The effect on health insurance and OOP reliance is minor due to adopting initiatives that focus on and favour wealthier people than the poorest, roughly representing 73% of the population.

Our results suggest an improvement in the government´s transfers from domestic sources while the government´s transfers from foreign sources decrease. In 2008, the funds allocated to health from domestic sources increased until 2012, when a negative breakpoint was identified. This trend shows a lack of consistency in prioritising health for the country.

This study's results support the target defined by the Abuja declaration, as we found that DRC's government does not allocate sufficient funds to achieve UHC. While the increase in the government's transfers to health from domestic origins is not sustainable, the effect on the transfers from foreign sources was not identified, suggesting that either the government did not properly allocate donors' funds or donors did not meet their commitment.

Overall, the risk of maternal death has decreased significantly. Similar results appear for the probability of dying among children. However, the changes observed post-2009 are not statistically significant. These changes might be attributable to important investments from the private sector and NGOs in building hospitals and health centres in remote areas.

There is no conclusive effect on the indicator related to children who received vaccinations. In DRC, the vaccination rate of children mainly originates from donor initiatives such as GAVI, which has supported access to the vaccine among children in the country. These donor initiatives are important but primarily unsustainable and unpredictable. Moreover, DRC´s government should undertake additional efforts and provide infrastructure like electricity, roads, and refrigerators in short supply to deliver vaccines to remote health centres.

Therefore, our work suggests that although DRC's UHC journey has slightly contributed to improving the financial risk protection and health outcomes indicators, much effort should be undertaken. In general, we make an essential empirical contribution relevant to the development and public policy towards achieving UHC. Using the case of DRC, we illustrate that many developing countries adhere to international initiatives but do not align their national policies to meet and monitor progress toward the set global agenda.

Our results reveal that the prevention of catastrophic health expenditure is still not a priority for the country and mainly for the majority of the poorest, even after the DRC´s UHC journey has started. Hence, as we approach 2030, DRC´s government should pour into a well-structured and realistic operational plan with the target goal of reducing the household´s financial burden of health expenses on households with a clear focus on the informal sector and poor households. The operational plan should focus on access to health insurance policies, which the country lacks. Achieving Universal Health Coverage in the Democratic Republic of Congo will require a set of differentiated policies for social groups. It is obvious that the poorest will not be able to pay out-of-pocket fees or an insurance premium. Thus, it might require mobilising additional revenues to extend health coverage to the poorest. There is growing awareness that the "poorest of the poor" requires national (and international) solidarity. However, in DRC, the majority of people are near-poor, i.e., they do not belong to the "poorest of the poor" but are constantly

at risk of falling back into extreme poverty once an adverse event strikes them. For instance, the majority of the rural population of DRC works in the informal sector or subsistence farming. Under “normal conditions”, they can survive, but even a mild disease of the bread earner or a major disease of a family member might bring them back beyond the poverty line. These people might be able to pay a token for social protection, but they will definitely also require a subsidy for their social protection contribution. To generate additional revenue and accelerate UHC's agenda, the country should invest more in an effective tax collection system. With the extra revenue, the government could define an incentive programme to subsidise health insurance and healthcare for the majority of the poorest and the near-poor in the informal sector and rural areas.

Mandatory health insurance might be an option in the long term to expand coverage to the wealthy quintile and the minority of the middle class. It should help generate additional funds to support the government incentive programme.

Technology to support health policies should also be prioritised towards achieving UHC as the country faces logistical and infrastructure issues to monitor UHC´s progress in a vast country of 0.23 times as big as Europe. Setting technology at the centre of every health policy will enable the country to collect important data, mostly unavailable at the national level. Therefore, the country can rely on available data to promote information sharing and build accurate policies. Finally, DRC´s government should implement appropriate health insurance policies through well-organised social health insurance (voluntary community-based health), as many Congolese are involved in the informal sector to reduce OOP spending. The government can also subsidise hospital services for the poor. Implementing a robust monitoring and evaluation strategy will also improve the household´s health outcomes as the country strives to implement appropriate and context-based health insurance regulations.

Chapter Three: Health insurance uptake, poverty and financial inclusion in the Democratic Republic of Congo

3.1. Introduction

Achieving Universal Health Coverage in the context of under-resourced health systems is challenging. In the Democratic Republic of Congo (DRC), 90% of health financing originates from private households out of pocket (OOP) (Nyamugira et al., 2022). The high volume of OOP expenditure is a primary indicator of the poor financial protection provided by the health financing system in the DRC. Additionally, government expenditure using domestic resources for health is also low, i.e., it was less than 1 dollar (USD 0.84) per capita over 2007-2017 and accounted for only 8.1% of the total health expenditure over 2000-2018 (Barroy et al., 2014; Nyamugira et al., 2022). The DRC received comparably strong financial support from international donors, but its health system has been undermined by several years of war and a continuing lack of government financing (Lordemus, 2022).

Many high-income countries have relied on government- or employer-based Health Insurance (HI) or a mix of both to achieve UHC (Savedoff et al., 2012). By contrast, many low-income countries rely more on Community-Based Health Insurance (CBHI) schemes as alternative health financing options to OOP payments. However, CBHI plays a minor role in the DRC, as only 10% of the insured population in the DRC is covered under a CBHI scheme compared to 81% covered by employer-based HI. Moreover, many Congolese people in the informal sector are excluded from the insurance system (MSP, 2010).

In addition, access to health insurance in the DRC is linked to household income and economic status. Using data from the Demographic and Health Survey (DHS 2013/2014), Barroy et al. (2014) confirmed that 0.7% of men and 1% of women in the poorest quintile reported that they had insurance, whereas 12% of men and 15.3% of women in the wealthiest quintile had insurance.

Empirical research has identified various socioeconomic and demographic patterns of health insurance coverage in low-income countries (LIC). These factors include marital status, age, gender, level of education, household income, wealth index, religion, place of residence, sex of the household head, household size, ethnicity, poor health quality, health characteristics, etc. (Adebayo et al., 2015; Agbadi et al., 2021; Allcock et al., 2019; Anaba et al., 2022; Kazungu & Edwine, 2017; Kimani et al., 2014). One factor that is also crucial for the HI coverage but frequently neglected, is financial inclusion. There is some evidence that the fact whether potential customers have a bank account or not determines whether they will have health insurance coverage (Dupas & Robinson, 2013; Prina, 2015). Worldwide, about 64 % of adults have financial institution accounts (Demirgüç-Kunt et al., 2018), the respective figure for Sub-Saharan Africa is about 35 % (World Bank Group, 2015), while only 17 % of the population of DRC had

a bank account. The interdependency between the financial dimension and the health of a population seems to be closer than many people think.

In addition, several systematic reviews show that health insurance in LIC is associated with a positive impact on financial protection, an improvement in access to healthcare and a moderate effect on the health of the insured (Comfort AB et al., 2013; Erlangga et al., 2019; Gabani et al., 2022; Habib SS et al., 2016; Rahman et al., 2022). On the other hand, empirical results confirm that in LIC, health insurance programs support better-off population sub-groups while leaving behind underserved populations (Agbadi et al., 2021; Doris et al., 2022; Wagstaff, 2010)

Based on these insights, health insurance systems improved, but coverage remains low today. More reforms are required to increase coverage and strive to achieve UHC.

The Democratic Republic of Congo is in the process of reforming its health financing to achieve UHC. However, these reforms are hardly based on evidence, as most research on health insurance coverage was conducted outside the DRC. Consequently, there is limited empirical evidence on health insurance coverage in the DRC. To maximise the effects of strategies and policies towards achieving UHC, health insurance policies should target the sub-groups in the population with the highest needs. Therefore, identifying and targeting these sub-groups in the population is crucial to ensure the highest level of health insurance coverage.

Building on a nationally representative cross-sectional survey conducted in 2017-18 (MSP, 2010), this study intends to provide evidence of the socioeconomic and demographic patterns of health insurance in the DRC. This research aims to assess the prevalence of Health Insurance (HI) among the sub-groups in the Congolese population. This study aims to identify the sub-groups and regions of residence of the Congolese population with the highest needs of health insurance coverage in order to support health-policy makers in this country with an evidence-based approach to stimulate focus on those groups which need the most, support so that health insurance coverage can be increased and UHC eventually achieved.

3.2. Methods

3.2.1. Data collection

DRC Multiple Indicator Cluster Survey (MICS) is a nationally representative cross-sectional survey conducted in the DRC by the National Institute of Statistics (Institut National de la Statistique) of the DRC´s Ministry of Planning with technical and financial support from UNICEF. The primary concern of MICS surveys is the generation of reliable social and health statistics; for this purpose, core indicators on

mortality, nutrition, child health, and further are collected in general but also with a special focus on women and children. Among the six rounds of the MICS, DRC has only taken part in MICS1 (1995), MICS2 (2001), MICS4 (2010), and MICS6 (2017-2018).

Our study uses the MICS6, which comprises survey data collected by 620 trained supervisors, team leaders, and enumerators who conducted face-to-face interviews using standardized questionnaires. Enumerators visited the households selected in the sample, where they directly asked the respondents the survey questions and documented their responses. Data was collected from a large and geographically spread group of people and covers the whole country of the DR Congo. A small group of the population was selected at each stage of the survey.

Data in the MICS survey was collected using the following standard questionnaires: Household questionnaire (with water quality testing questionnaire, when included), questionnaire for individual women aged 15-49 years, questionnaire for individual men aged 15-49 years, questionnaire for children age 5-17 years, and questionnaire for children under 5 years of age. The MICS database used in this study is specifically designed to gather reliable, internationally comparable data on approximately 130 key indicators, enabling the assessment of the well-being of children, women, and men across the domains of health, education, and child protection (Meda et al., 2019).

3.2.2. Study design and settings

This study uses individual and household datasets from the 2017/2018 DRC Multiple Indicator Cluster Survey (MICS) (MSP, 2010). The global MICS program was developed by UNICEF in the 1990s as an international household survey program to support countries in collecting internationally comparable data on a wide range of indicators related to the situation of children and women and the living conditions of populations (MSP, 2010)The survey generates key indicators, providing disaggregated data on health, education, nutrition, social protection, and domestic violence, along with socioeconomic, demographic, and geographic characteristics at the individual and household levels. In this study, the existence of health insurance represents the primary outcome.

The DRC MICS´s sampling frame used for the implementation of the survey design was based on the last Population and Housing Census of 1984, which was 33 years before the start of the survey. Compared with the first census in 1984, the sampling in 2017/18 was modified with respect to the change in the primary units (cities, towns, and villages) based on diverse factors such as population displacement and the security situation to account for changes in the administrative structure. Details of the MICS design and methodology are described elsewhere (MSP, 2010).

Following a standardized protocol, the survey employed a multistage, stratified cluster probability sampling design to establish a representative sample of households proportional to population size at the national and provincial levels. A decentralization process initiated in 2015 set the number of provinces from 11 to 26, including the city capital of Kinshasa. This new decentralization was accounted for in the 2018 MICS. Within each province, urban areas (towns and cities) and rural areas were defined as the main sampling strata. Households were selected in the following stages. Within each stratum, a specified number of clusters were selected systematically with probability proportional to size. Subsequently, the HH samples were selected from the sampled clusters. In total, 30 HH were selected from each sampled cluster using a systematic random sampling method. Thus, 721 clusters and 21,630 households were selected. Of these, 20,792 households, 21,756 women (15-49 years), and 6,113 men (15-49 years) were successfully interviewed. Figure 5 summarizes the results of the sampling of the 2018 MICS in the DRC.

3.2.3. Study population

The study used data from all the respondents regardless of the health insurance providers, which can be a Community-Based Health Insurance, HI provided by the employer, social security funds, a private HI, or any other HI provider, i.e., the study population of this study is identical to the study population of the MICS-Palu 2018 population. The MICS survey collects data on households and administers questionnaires to women and men aged 15-49 years. Therefore, it is possible that household heads are (much) older than 50 years. Likewise, the children of the respondents included in the sample could be younger than 15 years.

3.2.4. Study variables

3.2.4.1. Outcome variable

The outcome variable used in this study was health insurance coverage provided by Community-Based Health Insurance, HI provided by the employer, social security funds, a private HI, or any other HI provider. Our dependent variable determines the health insurance status of the respondent, providing information on whether the respondent is insured or not. This was a dichotomous variable with a “Yes” or “No” response option where “Yes” indicates that the respondent is covered by any health insurance.

3.2.4.2. Covariates

Based on empirical research, we selected variables on the socio-economic characteristics of respondents, and their households and geographical conditions. At the individual level, the variables included marital status (1: married and 0: not married), age, education level, place of residence (urban

and rural), province of residence, and the wealth quintile. At the household level, we retained the following variables: religion of the HH head, ethnicity of the HH head, education level of the HH head, gender of the HH head, age of the HH head and wealth index quintile of the HH.

The age of the respondents was categorized into four groups (1: 15-19 years; 2:20-29years; 3:30-39 years; 4:40-49 years). For the age of the HH head, we added one category comprising respondents aged 50 years old and above. The education level of the respondent and household head was categorized into four groups (0: without formal education; 1: primary; 2: high school; 3: higher).

In 2015, governmental decentralization increased the number of provinces from 11 to 26. In the DRC MICS 2017-2018, most of the newly created provinces do not have sufficient information on health insurance. Therefore, to make the province categories relevant for the analysis of health insurance status, we recategorized the provinces in MICS 2017-2018 into 11 old provinces: Kinshasa, Bas Congo, Bandundu, Equateur, Province Orientale, Nord Kivu, Sud Kivu, Maniema, Katanga, Kasai Oriental, and Kasai Occidental.

The wealth index is a composite indicator of wealth. This indicator was used as a proxy measure of the socioeconomic status of a household. To construct the wealth index, a principal component analysis is conducted using information on the ownership of consumer goods, dwelling characteristics, access to water and sanitation, and other assets related to the household´s wealth. The DRC MICS dataset provides five categories for the wealth index variable: 1: poorest; 2: second; 3: third; 4: fourth and 5: richest (MSP, 2010).

3.2.5. Data analysis

3.2.5.1. Descriptive statistics

Given that the DRC MICS is cross-sectional and based on a multistage sampling design, we used the svy command in STATA to adjust for sample design and sample weight during all analyses in this study. Data analysis was performed using STATA version 16. The characteristics of the study population were described using frequencies and percentages. Chi-square tests were used to examine the association between participant characteristics and health insurance uptake

We calculated Lorenz curves to document the distribution of health insurance coverage across the wealth status of the respondents (Gastwirth, 1972). Overall, on the x-axis, we plotted the respondents from the lowest to the highest wealth quintile. The y-axis plots the cumulative distribution of the share of health insurance coverage. A perfect equality would mean that the cumulative distribution of HI coverage coincides with a straight diagonal line. The Gini coefficient was calculated to support inequality analysis.

A Gini coefficient of 1 indicates perfect inequality while a coefficient of 0 indicates that health insurance coverage is equally distributed over the wealth group of the population.

3.2.5.2. Consideration of sampling design (weighting)

With regard to the cross-sectional and multistage sampling design, we use 76 strata composed of towns, cities, and rural areas as our first stage. The *Primary Sampling Units* (PSU), which was available in the MICS dataset, served as the main sampling unit. The household number was used thereafter as the stratum within our sampling units, which is our first and only stage of analysis. Sampling weight observations were available in the MICS dataset and calculated as follows:

$$W_{hi}^{l} = \frac{1}{f_{hi}^{l}} \text{ for i=1..}n_i\text{, h=1..}n_h\text{, } l \in \{town, quartiers, villages\}$$

with

W_{hi}^{l}	sampling weight for PSU i in stratum h in location l; i=1..n_i, h=1..n_h, $l \in \{town, quartiers, villages\}$
f_{hi}^{l}	probability of inclusion of a household for the PSU *i* in the stratum *h;* i=1..n_i, h=1..n_h, $l \in \{town, quartiers, villages\}$
P_{shi}^{l}	probability of selection of the sampling unit at the stage s of the PSU i within the stratum h for location l; i=1..n_i, h=1..n_h, $l \in \{town, quartiers, villages\}$
n_i	number of PSU
n_h	number of strata
π	probability of insurance coverage

Because the primary sampling units are of different types, the method to compute the probability of inclusion is specific to each type of stratum for the following variables: marital status, age of the respondents, education, place of residence, province, and wealth quintile. At the HH level, we use the religion of the HH head, ethnicity, size of the HH, gender of the HH head, education, age of the head of the HH, and bank account ownership (see Table 6).

For each stratum, the probability of inclusion is calculated as

$$f_{hi}^{l} = P_{1hi}^{l} \cdot P_{2hi}^{l} \cdot P_{3hi}^{l} \text{ for i=1..}n_i\text{, h=1..}n_h\text{, } l \in \{town, quartiers, villages\}$$

Aligned with the sampling plan, the sampling probabilities were considered in this study using survey methodology implemented in STATA. The details of this computational method are described elsewhere (MSP, 2010). The record linkage between different MICS datasets and the consideration of sampling

weights were aligned with the recommendations created by MICS officials. The Stata command merge was used to account for the different units of analysis between individuals and household files. We use key variables to uniquely identify each case to facilitate the merging (Meda et al., 2019). Consequently, the variables cluster numbers and household numbers were retained as the key variables. Individual data were used as the base, and the correct household for each member was located. Details on merging MICS data are described elsewhere (MSP, 2010).

3.2.5.3. Regression models

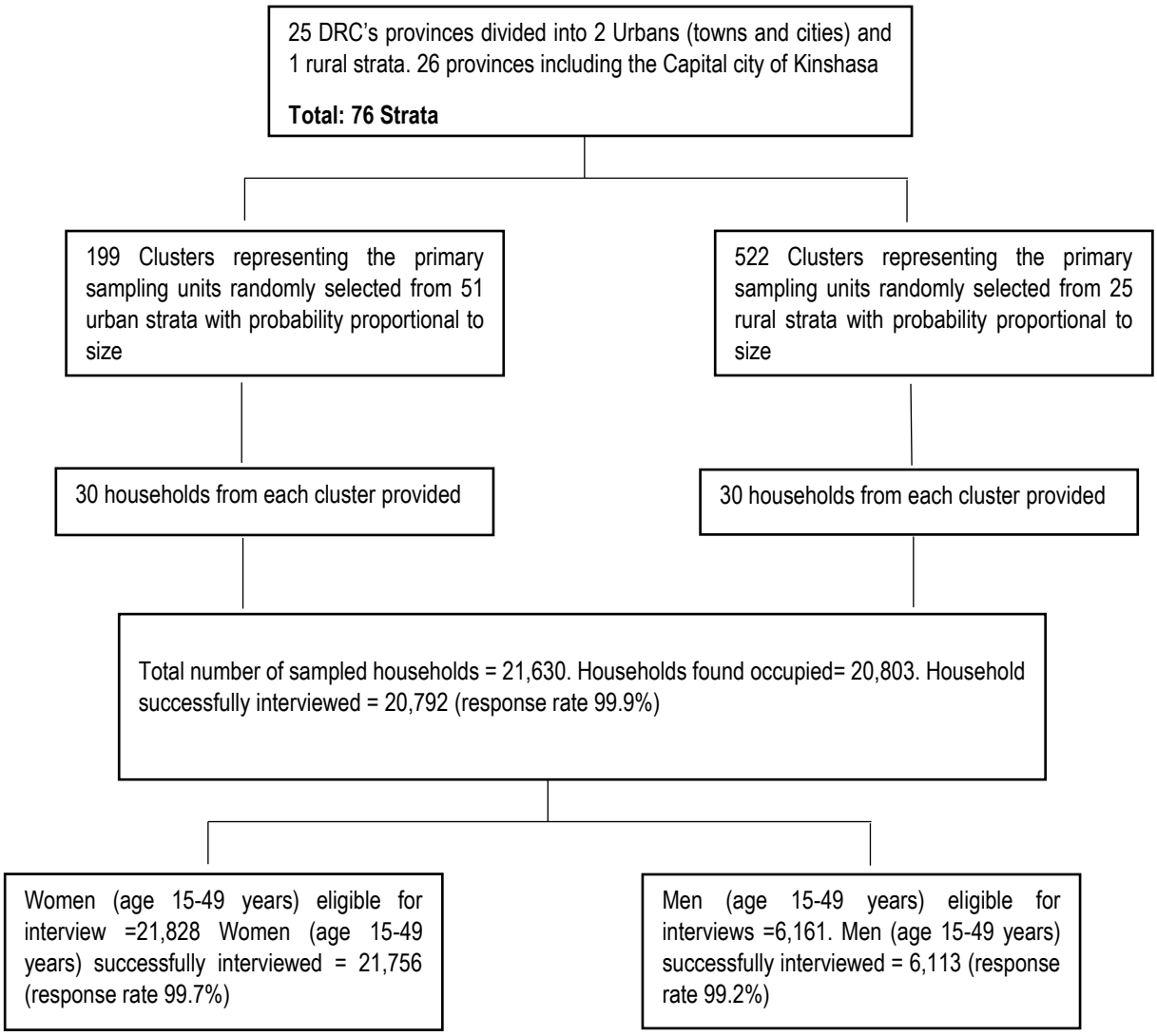
Weighted logistic regression models were used to assess the association between the independent variables and insurance uptake. We used logistic regression to estimate the univariate odds ratios of each candidate variable as well as the adjusted odds ratio after considering further covariates (marital status, age of the respondents, education, place of residence, province, and wealth quintile). At the HH level, we use the religion of the HH head, ethnicity, size of the HH, gender of the HH head, education, age of the head of the HH, and bank account ownership. Finally, logistic regression was employed to identify relevant predictors of health insurance uptake among participants. Our results were reported at a 95% confidence level.

Table 6: Variables collected in MICS DRC used in this study

Variables	Definition
Individual characteristics	
Marital status	1=married or living with a partner; 0=never been in a union, widowed, divorced or separated
Age	Categorical variable from 15 to 49 years old. MICS data interviews both men and women aged 15-49 years. 1:15-19years; 2:20-29years; 3:30-39years; 4:40-49years;
Education	Level of education of the respondents. 0: Pre-Primary/None; 1: Primary; 2: high school; 3: Higher Note: In the DRC, the primary and high schools last for 6 years each. Looking at the MICS questionnaire, it is important to mention that for individuals who started high school. It cannot be safely assumed that the high school was also completed.
Place of residence (Residence)	Categorical variable showing whether the respondent lives in urban: (1) or Rural (0).
Province	10 DRC's provinces plus the capital city of Kinshasa 1: Kinshasa ; 2: Bas-Congo ; 3: Bandundu ; 4: Equateur ; 5: Province Orientale ; 6: Nord-Kivu ; 7: Sud-Kivu ; 8: Maniema ; 9: Katanga ; 10: Kasai Oriental ; 11: Kasai Occidental
Wealth index quintile	Indicates the wealth of the respondent based on the household assets 1: Poorest; 2:Second; 3: Middle; 4: Fourth; 5: Richest
HH characteristics	
Religion of the head of the HH	Categorical variable defining the religious beliefs of the HH head. 1: Animism; 2: Catholic; 3: Protestant; 4: Other
Ethnicity of the head of the HH	Categorical variable defining the ethnicity group of the HH head. 1: Minority group (Other); 2: Bantou; 3: Soudanais;
Size of the HH	Represents the number of persons living in the same house. 1: 1-5 persons; 2: 5-10 persons; 3: 10+ persons
Education of the head of the HH	Level of education of the HH head. We use the same categories as for the individual respondents.
Gender of the head of the HH	Represents the gender of the head of the HH, which is either male (1) or female (0).
Age of the head of the HH	Categorical variable build on the available information from MICS 1:15-19years; 2:20-29years; 3:30-39years; 4:40-49years; 5: 50+ years
Bank account ownership	Yes/No response to the following question: Does any member of the HH have a bank account? Yes= 1 ; No= 0

Figure 5: Flow chart showing the selection of the study population.

Source: own, based on (MSP, 2010)



3.3. Results

3.3.1. Descriptive summary

Descriptive statistics for the demographic and socio-economic characteristics of respondents aged 15-49 are presented in Table 8 & Table 9 and were stratified by the health insurance status (insured versus uninsured). Out of 21,692 women, about 95.7% were non-insured, and 4.3% were insured. Almost similarly for men, out of 6,104, about 95.9% were non-insured, and 4.1 % were insured. Most of the women were married, aged 20-29 years, attended high school education, lived in rural residences, were from Bandundu province, and belonged to the poorest and second wealth quintile.

The analysis of household heads demonstrated similar results. Most of the female respondents had a household head of Catholic or Protestant religions, belonged to the ethnicity of Bantou, had a high school education, had a male as a household head, fell into the age category of 50+ years, and belonged to a household in which only 10% reported having a bank account.

The results for male respondents were quite similar to those of their female counterparts. Most of the men were married and belonged to the age group of 20-29 years, had a high school education, belonged to a rural residence, were living in Bandundu province, and belonged to the poorest and second wealth quintile. In comparison to the results of the characteristics of household heads for female respondents, most of the male respondents had a household head of Catholic religion, belonged to the ethnicity of Bantou, had a high school education, had a male as a household head, fell into the age group of 30-39 years and belonged to a household in which only 10% reported having a bank account.

Based on the results in Table 7, we find that most of the insured population in the DRC uses employer insurance. This differs from the idea that CBHI emerged as an alternative health financing to OOP in developing countries. Only 14% of the female-insured population and 12% of the male-insured population use CBHI, confirming the low rate of CBHI uptake. The uptake of the social security scheme, a government-led HI program, is as low as it is for the private-led HI scheme. The other type of insurance covers only 1% of the female and 3% of the male respondents. In the MICS report, nothing specific defines modality in the "other category" of HI.

The comparison analysis for female respondents showed the same proportion of insured and non-insured married and unmarried and an identical proportion of insured and non-insured women in the different age groups. Women with formal education and living in urban areas were more likely to be insured. A higher proportion of women living in Kinshasa and Katanga had health insurance coverage compared to women from the provinces of Maniema and Equateur. Health insurance coverage was concentrated more in the fourth and richest wealth quintiles. Except for religion, ethnicity and HH size, there was strong evidence of associations between the socioeconomic and demographic characteristics of the HH head and health insurance status (see p-value for chi-square test, Table 8). There was also a strong association between HI coverage and bank account ownership.

Compared to female respondents, male respondents show an identical proportion of insured and non-insured individuals among different age groups, independent of their marital status. Similar to the results for women, men with formal education living in urban areas were more likely to be covered by health insurance. Additionally, a higher proportion of men living in Kinshasa and Katanga had health insurance coverage than men from the provinces of Maniema and Kasai Oriental. Health insurance coverage was

concentrated more in the fourth and richest wealth quintile. Except for religion, HH size, gender, and age of the head of the HH, there was strong evidence of an association between socioeconomic and demographic characteristics of the HH head and health insurance status (see p-value for chi-square test, Table 9). There is also a strong association between HI coverage and bank account ownership.

Figure 7 and Figure 8 Illustrate the DRC map showing the percentage per province of total insured respondents over the male and female population.

3.3.2. Results from the regression model

The estimates of unadjusted odds ratios (OR) and adjusted odds ratios (adjOR), as well as corresponding 95% confidence intervals (CI) of weighted multiple regression models, are presented in Table 10 and Table 11. At the unadjusted analysis level, the results for women show that health insurance enrolment was significantly associated with education level, area and province of residence, individual´s wealth quintile, education level of the head of the HH, age of the HH head, and bank account ownership ($p<0.05$).

At the unadjusted analysis level, male respondents' results support that health insurance enrolment was significantly predicated by educational level, area and province of residence, wealth quintile, education level of the head of the HH, and bank account ownership.

At the adjusted analysis level, it was found that more educated women were roughly 8 times (adjOR: 7.69; 95% CI: 2.02 – 29.27) more likely to be covered by health insurance compared to women without formal education. There was almost no difference between women residing in the capital city of Kinshasa and women living in other provinces. However, women in the higher wealth index quintile were more likely to be covered by health insurance than those in the poorest quintile. Women from the middle, fourth and richest wealth index quintiles were more than twice, eight times, and ten times more likely to be covered by health insurance compared to the poorest wealth quintiles, respectively. However, except for HH, who declared having a member with a bank account, household characteristics were not likely to explain the insurance coverage of women. A woman belonging to a HH whose at least one member had a bank account was 2 times (adjOR: 1.78; 95% CI: 1.24 – 2.57) more likely to be covered by health insurance than a household without a bank account.

In comparison to their women counterparts, at the adjusted analysis level, the results show that at the 5% level, men belonging to the richest wealth quintile were twenty times (adjOR: 20.12; 95% CI: 2.96 – 36.69) more likely to be covered by health insurance compared to men in the poorest wealth quintile. Similar to women´s results, the results show that men´s household characteristics do not explain the

probability of being covered by health insurance, except for the variable bank account ownership. A man belonging to a HH where at least one member had a bank account was 2 times (adjOR: 2.27; 95% CI: 1.11 – 4.68) more likely to be covered by health insurance than a household without a bank account.

Table 7: Health insurance providers by gender. Source: (MSP, 2010)

Type of Insurance providers	Women		Men	
	n	%	n	%
CBHI	125	13.6%	31	12.4%
Employer	756	81.4%	203	82.2%
Social security	19	2.2%	3	1.0%
Private HI	21	2.4%	6	2.3%
Other	7	0.9%	9	3.4%
Total	930	100%	250	100%

Table 8: Demographic and socio-economic characteristics of female respondents by insurance status. Source: (MSP, 2010)

	Female respondents			
Variables	Frequency (weighted) (%)	Insured (%) (n=930)	Non-insured (%) (n=20762)	p-value for chi-square test
Individual characteristics				
Marital status				
Not married	8996 (41.5)	4.77	95.23	**0.1345**
Married	12693 (58.5)	3.95	96.05	
Age (years)				
15-19	5215 (42.0)	4.37	95.63	**0.6015**
20-29	7400 (34.1)	3.84	96.16	
30-39	5976 (27.5)	4.51	95.49	
40-49	3101 (14.3)	4.81	95.19	
Education status				
Pre-primary/none	3037 (14.0)	0.48	99.52	**<0.001**
Primary	6105 (28.1)	1.21	98.79	
High School	11200 (51.6)	5.41	94.59	
Higher	1349 (6.2)	17.51	82.49	
Residence				
Rural	11194 (51.6)	1.33	98.67	**<0.001**
Urban	10498 (48.4)	7.45	92.55	
Province				
Kinshasa	3795 (17.5)	11.56	88.44	**<0.001**
Bas-Congo	1541 (7.1)	3.91	96.09	
Bandundu	2634 (12.1)	1.51	98.48	
Equateur	1259 (5.8)	0.37	99.63	
Province Orientale	2494 (11.5)	2.76	97.24	
Nord-Kivu	1920 (8.9)	4.66	95.34	
Sud-Kivu	1692 (7.8)	5.79	94.21	
Maniema	212 (1.0)	0.00	100.00	
Katanga	3027 (14.0)	3.41	96.59	
Kasai oriental	1504 (6.9)	0.32	99.68	
Kasai occidental	1613 (7.4)	1.41	98.59	
Wealth index quintile				
Poorest	4026 (18.6)	0.44	99.56	**<0.001**
Second	3988 (18.4)	0.68	99.32	
Middle	3973 (18.3)	1.30	98.70	
Fourth	4480 (20.7)	4.89	95.11	
Richest	5225 (24.1)	11.7	88.23	
Household characteristics				

Religion of the HH head				
Animism (traditional religion)	591 (2.7)	2.37	97.63	**0.2707**
Catholic	6414 (29.6)	4.06	95.94	
Protestant	6015 (27.7)	5.37	94.63	
Other[2]	8658 (39.9)	3.85	96.15	
Ethnicity of the HH head				
Minority group[3]	461 (2.1)	3.67	96.33	**0.0456**
Bantou	20414 (94.1)	4.41	95.59	
Soudanese	815 (3.8)	1.53	98.47	
Size of the HH				
1-5 Persons	8775 (40.5)	3.44	96.56	**0.2519**
6-10 Persons	10815 (49.9)	4.83	95.17	
10+ Persons	2101 (9.7)	5.03	94.97	
Education of the HH head				
Pre-primary/none	2396 (11.0)	0.95	99.05	**<0.001**
Primary	4890 (22.6)	1.29	98.71	
High School	11773 (54.3)	3.56	96.44	
Higher	2625 (12.1)	16.22	83.78	
Gender of the HH head				
Female	6186 (28.5)	2.71	97.29	**0.0003**
Male	15505 (71.5)	4.92	95.08	
Age of the HH head				
15-19	170 (0.8)	0.19	99.81	**0.0031**
20-29	2819 (13.0)	1.16	98.84	
30-39	6204 (28.6)	4.13	95.87	
40-49	5875 (27.1)	5.56	94.44	
50+	6623 (30.5)	4.74	95.26	
Bank account ownership				
No	19438 (89.6)	2.93	97.07	**<0.001**
Yes	2253 (10.4)	16.01	95.71	

Table 9: Demographic and socio-economic characteristics of male respondents by insurance status. Source: (MSP, 2010)

	Male respondents			
Variables	Frequency (weighted) (%)	Insured (%) (n=250)	Non-insured (%) (n=5854)	p-value for chi-square test
Individual characteristics				
Marital status				
Not married	3043 (49.9)	3.98	96.02	**0.8423**
Married	3054 (50.1)	4.22	95.78	
Age (years)				
15-19	1474 (24.2)	2.19	97.81	**0.1874**
20-29	1874 (30.7)	4.64	95.36	
30-39	1693 (27.7)	4.42	95.58	
40-49	1062 (17.4)	5.22	94.78	
Education status				
Pre-primary/none	516 (8.5)	0.10	98.90	**<0.001**
Primary	1385 (22.7)	1.68	98.32	
High School	3532 (57.9)	3.03	96.97	
Higher	669 (11.0)	17.74	82.26	
Residence				
Rural	3127 (51.2)	1.01	98.99	**<0.001**
Urban	2977 (48.8)	7.32	92.68	
Province				
Kinshasa	1067 (8.4)	8.79	91.21	**0.0015**
Bas-Congo	463 (3.6)	1.46	98.54	
Bandundu	7318 (57.7)	0.35	99.65	
Equateur	404 (3.2)	1.84	98.16	

[2] Others include : Armée du salut, Kimbanguiste, Musulman, Eglise de reveil, Temoin de Johavah, without religion.
[3] Minority group comprises : other ethnicity, pygmée, chamite and nilotique.

Province Orientale	710 (5.6)	2.60	97.40	
Nord-Kivu	498 (3.9)	8.03	91.97	
Sud-Kivu	427 (3.4)	9.30	90.70	
Maniema	68 (0.5)	0.89	99.11	
Katanga	905 (7.1)	4.20	95.80	
Kasai oriental	382 (3.0)	0.00	100.00	
Kasai occidental	448 (3.5)	0.51	99.49	
Wealth index quintile				
Poorest	1011 (16.6)	0.31	99.69	**<0.001**
Second	1177 (19.3)	0.63	99.37	
Middle	1138 (18.6)	1.27	98.73	
Fourth	1288 (21.1)	4.10	95.90	
Richest	1490 (24.4)	11.53	88.47	
Household characteristics				
Religion of the HH head				
Animism (traditional religion)	159 (2.6)	1.93	98.07	**0.6107**
Catholic	1915 (31.4)	4.82	95.18	
Protestant	1565 (25.7)	3.38	96.62	
Other	2462 (40.4)	4.13	95.87	
Ethnicity of the HH head				
Minority group	145 (2.4)	0.59	99.41	**0.0081**
Bantou	5718 (93.7)	4.30	95.70	
Soudanese	240 (3.9)	1.23	98.77	
Size of the HH				
1-5 Persons	2819 (46.2)	4.64	95.36	**0.2375**
6-10 Persons	2908 (47.6)	3.26	96.74	
10+ Persons	377 (6.2)	6.39	93.61	
Education of the HH head				
Pre-primary/none	516 (8.5)	0.10	99.90	**<0.001**
Primary	1385 (22.7)	1.68	98.32	
High School	3533 (57.9)	3.03	96.97	
Higher	669 (11.0)	17.74	82.26	
Gender of the HH head				
Female	906 (14.8)	4.36	95.64	**0.7885**
Male	5198 (85.2)	4.04	95.96	
Age of the HH head				
15-19	63 (1.0)	0.00	100.00	**0.5970**
20-29	900 (14.7)	2.73	97.27	
30-39	1802 (29.5)	4.74	95.26	
40-49	1616 (26.5)	4.93	95.07	
50+	1722 (28.2)	3.48	96.52	
Bank account ownership				
No	5469 (89.6)	2.69	97.31	**<0.001**
Yes	634 (10.4)	16.21	83.79	

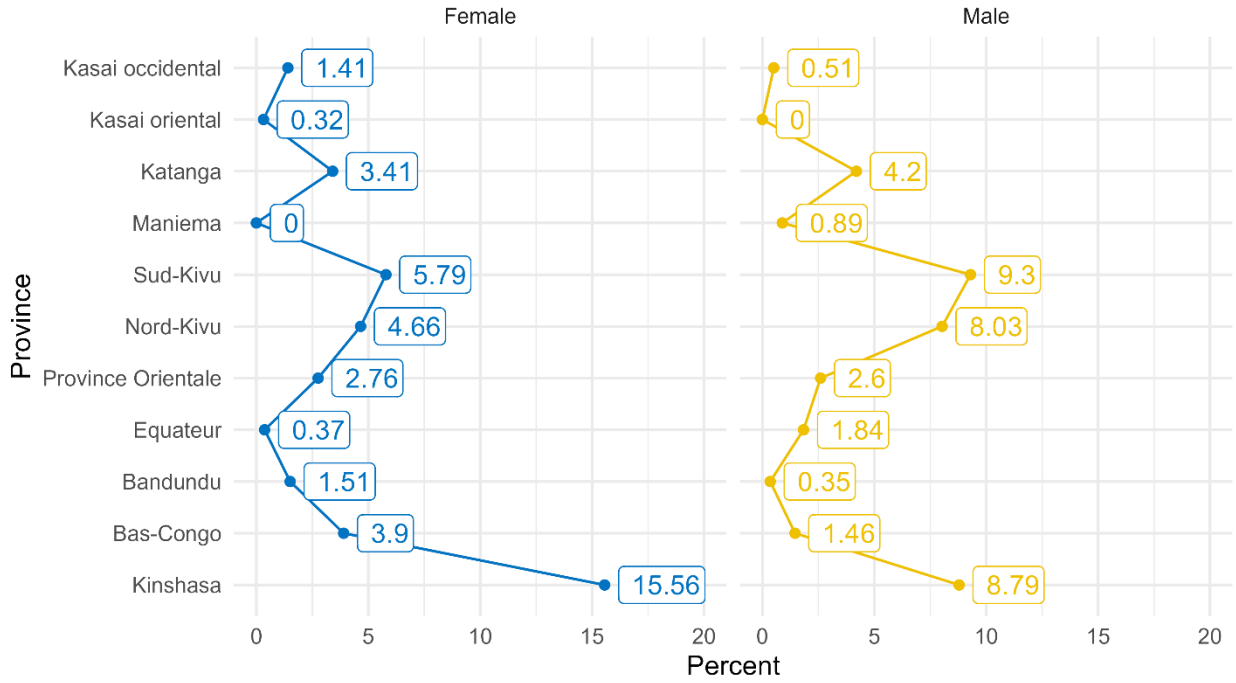


Figure 6 Health insurance coverage in the DRC. Source: own, based on (MSP, 2010)

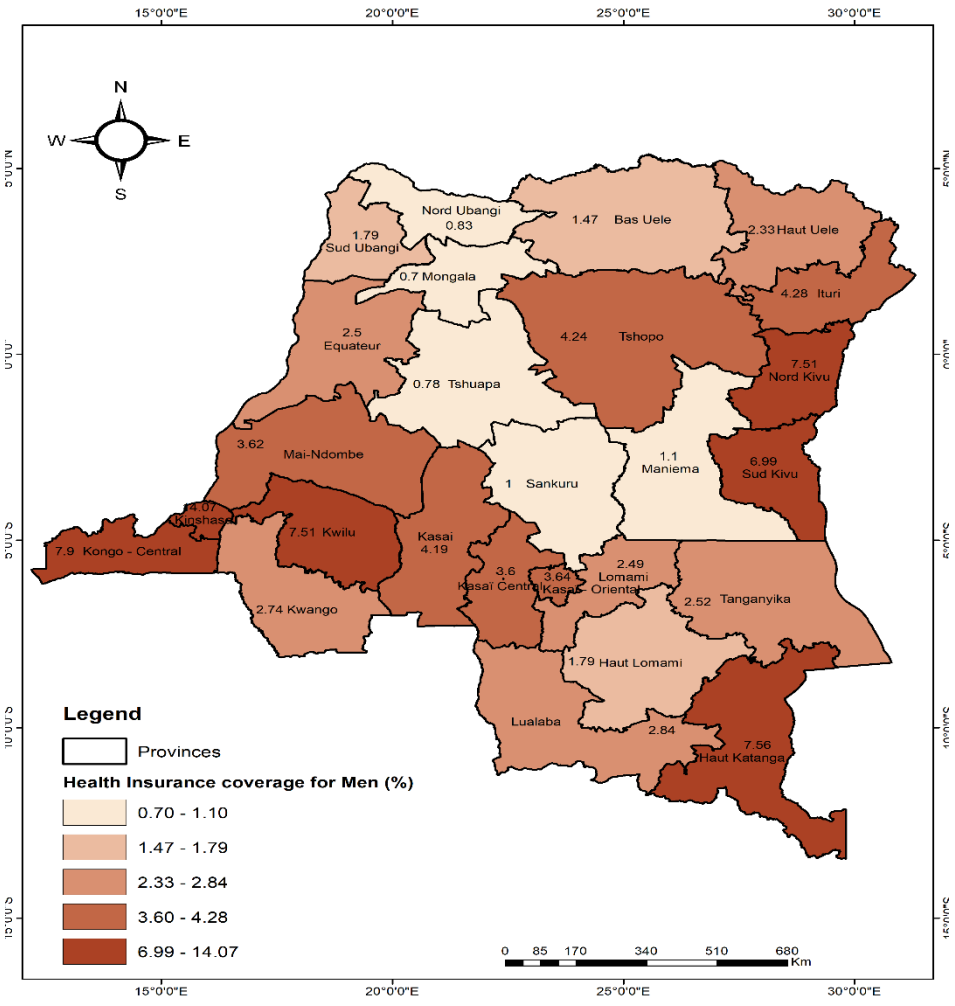


Figure 7 Health insurance coverage in the DRC for male respondents. Source: own, based on (MSP, 2010) using ArcGIS

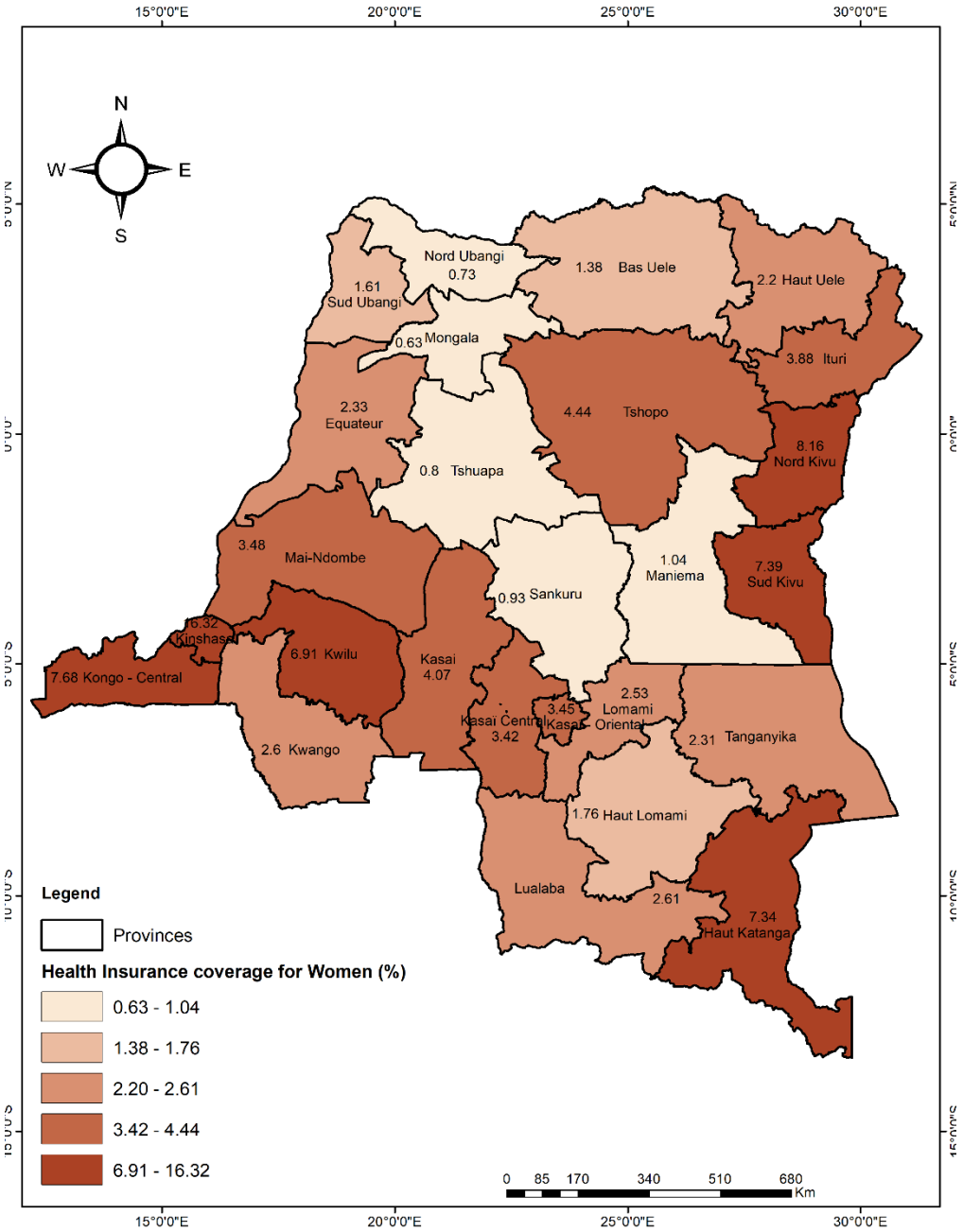


Figure 8 Health insurance coverage in DRC for female respondents. Source: own, based on (MSP, 2010) using ArcGIS

Table 10 Results of the regression: determinants of health insurance uptake in DRC (MIC 2019), N women =21692. Source: own

	Women			
Variables	**Odds Ratio (95% Confidence Interval Unadjusted OR**	**P-value**	**Adjusted OR**	**P-value**
Individual characteristics				
Marital status				
Not married	1.00		1.00	
Married	0.82 (0.64-1.06)	0.135	1.41 (0.89-2.22)	0.143
Age (years)				
15-19	1.00		1.00	
20-29	0.87 (0.61-1.26)	0.469	0.65 (0.45-0.96)	0.029
30-39	1.03 (0.76-1.41)	0.832	0.76 (0.47-1.23)	0.256
40-49	1.11 (0.73-1.67)	0.635	0.83 (0.52-1.32)	0.435
Education status				
Pre-primary/none	1.00		1.00	
Primary	2.54 (0.66-9.79)	0.174	2.41 (0.61-9.57)	0.209
High School	11.87 (3.49-40.41)	<0.001	4.42 (1.33-14.69)	0.016
Higher	44.05 (12.50-155.25)	<0.001	7.69 (2.02-29.27)	0.003
Residence				
Rural	1.00		1.00	
Urban	5.99 (3.40-10.55)	<0.001	0.59 (0.25-1.36)	0.215
Province				
Kinshasa	1.00		1.00	
Bas-Congo	0.31 (0.10-0.94)	0.039	0.52 (0.21-1.28)	0.156
Bandundu	0.12 (0.05-0.25)	<0.001	0.52 (0.21-1.26)	0.149
Equateur	0.03 (0.01-0.05)	<0.001	0.93 (0.04-0.23)	<0.001
Province Orientale	0.22 (0.11-0.45)	<0.001	0.65 (0.31-1.37)	0.258
Nord-Kivu	0.37 (0.18-0.76)	0.007	0.43 (0.23-0.80)	0.008
Sud-Kivu	0.47 (0.19-1.16)	0.102	0.62 (0.22-1.72)	0.361
Maniema	NA		NA	
Katanga	0.27 (0.12-0.61)	0.002	0.55 (0.24-1.26)	0.155
Kasai oriental	0.02 (0.00-0.07)	<0.001	0.92 (0.29-0.30)	<0.001
Kasai occidental	0.11 (0.03-0.36)	<0.001	0.77 (0.21-2.88)	0.701
Wealth quintile				
Poorest	1.00		1.00	
Second	1.55 (0.54-4.45)	0.413	1.20 (0.42-3.38)	0.736
Middle	2.99 (0.88-10.14)	0.079	2.04 (0.61-6.80)	0.243
Fourth	11.68 (3.31-41.22)	<0.001	8.22 (2.60-25.98)	<0.001
Richest	30.30 (9.19-99.86)	<0.001	10.42 (2.96-36.69)	<0.001
Household characteristics				
Religion of the HH head				
Animism (traditional religion)	1.00		1.00	
Catholic	1.74 (0.54-5.65)	0.353	0.93 (0.27-3.25)	0.914
Protestant	2.34 (0.71-7.68)	0.160	2.10 (0.61-7.17)	0.238
Other[4]	1.65 (0.50-5.43)	0.408	0.78 (0.23-2.63)	0.684
Ethnicity of the HH head				
Minority group	1.00		1.00	
Bantou	1.21 (0.52-2.82)	0.657	1.21 (0.49-3.00)	0.69
Soudanese	0.41 (0.15-1.10)	0.077	1.95 (0.75-5.12)	0.172
Size of the HH				

[4] Other include: Armée du salut, Kimbanguiste, Musulman, Eglise de reveil, Temoin de Johavah, without religion.

1-5 Persons	1.00		1.00	
6-10 Persons	1.42 (0.98-2.08)	0.067	1.09 (0.71-1.68)	0.692
10+ Persons	1.49 (0.77-2.88)	0.239	0.89 (0.50-1.61)	0.709
Education of the HH head				
Pre-primary/none	1.00		1.00	
Primary	1.36 (0.47-3.99)	0.569	0.99 (0.32-3.02)	0.984
High School	3.86 (1.56-9.56)	0.004	1.23 (0.43-3.55)	0.695
Higher	20.24 (8.70-47.08)	<0.001	2.27 (0.86-5.95)	0.096
Gender of the HH head				
Female	1.00		1.00	
Male	1.86 (1.32-2.62)	<0.001	1.42 (0.94-2.15)	0.095
Age of the HH head				
15-19	1.00		1.00	
20-29	6.01 (1.36-26.55)	0.018	3.09 (0.61-15.56)	0.172
30-39	22.06 (5.15-94.49)	<0.001	7.60 (1.52-38.05)	0.014
40-49	30.18 (6.83-133.45)	<0.001	8.50 (1.66-43.47)	0.010
50+	25.51 (5.98-108.75)	<0.001	6.35 (1.17-34.27)	0.032
Bank account ownership				
No	1.00		1.00	
Yes	6.31 (4.54-8.78)	<0.001	1.78 (1.24-2.57)	0.002

Table 11 Results of the regression: determinants of health insurance uptake in DRC (MIC 2019), N men = 6104. Source: own.

	Men			
Variables	**Odds Ratio (95% Confidence Interval Unadjusted OR**	**P-value**	**Adjusted OR**	**P-value**
Individual characteristics				
Marital status				
Not married	1.00		1.00	
Married	1.06 (0.58-1.94)	0.842	1.84 (0.74-4.55)	0.188
Age (years)				
15-19	1.00		1.00	
20-29	2.17 (0.90-5.24)	0.084	1.83 (0.70-4.79)	0.217
30-39	2.07 (0.86-4.94)	0.103	0.99 (0.32-3.02)	0.980
40-49	2.46 (1.13-5.32)	0.023	1.01 (0.33-3.08)	0.988
Education status				
Pre-primary/none	1.00		1.00	
Primary	5.03 (0.52-49.02)	0.164	4.59 (0.12-169.40)	0.407
High School	19.80 (2.64-148.40)	0.004	10.64 (1.33-263.25)	0.148
Higher	106.97 (13.79-829.57)	<0.001	8.65 (0.43-174.82)	0.159
Residence				
Rural	1.00		1.00	
Urban	7.71 (3.81-15.59)	<0.001	0.66 (0.17-2.61)	0.553
Province				
Kinshasa	1.00		1.00	
Bas-Congo	0.15 (0.02-1.07)	0.059	0.43 (0.66-2.85)	0.383
Bandundu	0.04 (0.01-0.15)	<0.001	0.33 (0.68-1.58)	0.164
Equateur	0.19 (0.08-0.45)	<0.001	1.95 (0.69-5.50)	0.206
Province Orientale	0.28 (0.12-0.64)	0.003	1.76 (0.51-6.10)	0.369
Nord-Kivu	0.91 (0.27-3.02)	0.872	2.36 (0.93-5.97)	0.069
Sud-Kivu	1.06 (0.28-4.07)	0.927	4.80 (1.59-14.45)	0.005
Maniema	0.09 (0.02-0.46)	0.004	1.26 (0.21-7.64)	0.804

Katanga	0.46 (0.18-1.18)	0.106	1.44 (0.53-3.88)	0.475
Kasai oriental	NA		NA	
Kasai occidental	0.05 (0.01-0.22)	<0.001	0.59 (0.10-3.32)	0.541
Wealth quintile				
Poorest	1.00		1.00	
Second	2.02 (0.40-10.33)	0.397	2.00 (0.42-3.38)	0.422
Middle	4.12 (0.85-19.93)	0.078	3.42 (0.61-6.80)	0.157
Fourth	13.68 (2.94-63.68)	0.001	8.73 (2.60-25.98)	0.045
Richest	41.71 (9.39-185.16)	<0.001	20.12 (2.96-36.69)	0.010
Household characteristics				
Religion of the HH head				
Animism (traditional religion)	1.00		1.00	
Catholic	2.57 (0.32-20.37)	0.370	0.45 (0.43-4.70)	0.504
Protestant	1.78 (0.21-14.84)	0.595	0.34 (0.30-3.83)	0.383
Other5	2.19 (0.29-16.39)	0.446	8.74 (0.45-4.80)	0.520
Ethnicity of the HH head				
Minority group	1.00		1.00	
Bantou	7.54 (1.02-55.89)	0.048	3.70 (0.38-35.92)	0.259
Soudanese	2.10 (0.21-21.18)	0.530	2.73 (0.23-32.97)	0.428
Size of the HH				
1-5 Persons	1.00		1.00	
6-10 Persons	0.69 (0.42-1.13)	0.144	0.62 (0.35-1.12)	0.111
10+ Persons	1.40 (0.50-3.96)	0.523	0.79 (0.25-2.53)	0.693
Education of the HH head				
Pre-primary/none	1.00		1.00	
Primary	17.38 (1.98-152.46)	0.010	22.91 (1.95-268.63)	0.013
High School	31.89 (4.28-237.68)	0.001	23.64 (2.57-217.15)	0.005
Higher	219.71 (28.48-1695.334)	<0.001	72.023 (6.13-845.75)	0.001
Gender of the HH head				
Female	1.00		1.00	
Male	0.92 (0.52-1.65)	0.789	0.41 (0.21-0.80)	0.009
Age of the HH head				
15-19	1.00		1.00	
20-29	0.78 (0.21-2.85)	0.703	0.63 (0.13-2.92)	0.551
30-39	1.38 (0.69-2.76)	0.362	1.47 (0.59-3.65)	0.405
40-49	1.44 (0.72-2.86)	0.303	1.74 (0.75-4.04)	0.198
50+	Omitted		Omitted	
Bank account ownership				
No	1.00		1.00	
Yes	7.01 (3.70-13.29)	<0.001	2.27 (1.11-4.68)	0.026

[5] Other include: Armée du salut, Kimbanguiste, Musulman, Eglise de reveil, Temoin de Johavah, sans religion.

3.4. Inequality in health insurance coverage

Figure 9 provides the average health insurance coverage (with a 95% confidence interval) over the wealth index quintiles, bank account ownership with respect to the total population in the respective quintile, and bank account ownership status. Although insurance coverage is generally low in the DRC, the figure confirms that health insurance does not cover almost the entire population in the poorest wealth quintile. In contrast, the coverage ratio steadily increases with wealth. The same results are observed for bank account ownership, as HI coverage is predominant among the people from households with a member holding a bank account. However, even for the wealthiest quintile, less than 15 % of the population was insured. Similarly, the results show that less than 20% of the respondents from households owning a bank account are covered by HI. Figure 9 shows Lorenz-Charts as an instrument to demonstrate inequality in health insurance coverage among different income groups and bank account ownership. Health insurance coverage was disproportionately distributed among the population, from the poorest to the wealthiest group. The results also confirm disproportionate HI coverage among HH reporting having a bank account compared to those without one. This result is confirmed by the value of the Gini coefficient, which is approximately 98%, demonstrating a high inequality in accessing health insurance in the wealth quintile of the population from poorest to richest and for HH with a bank account compared to HH without a bank account.

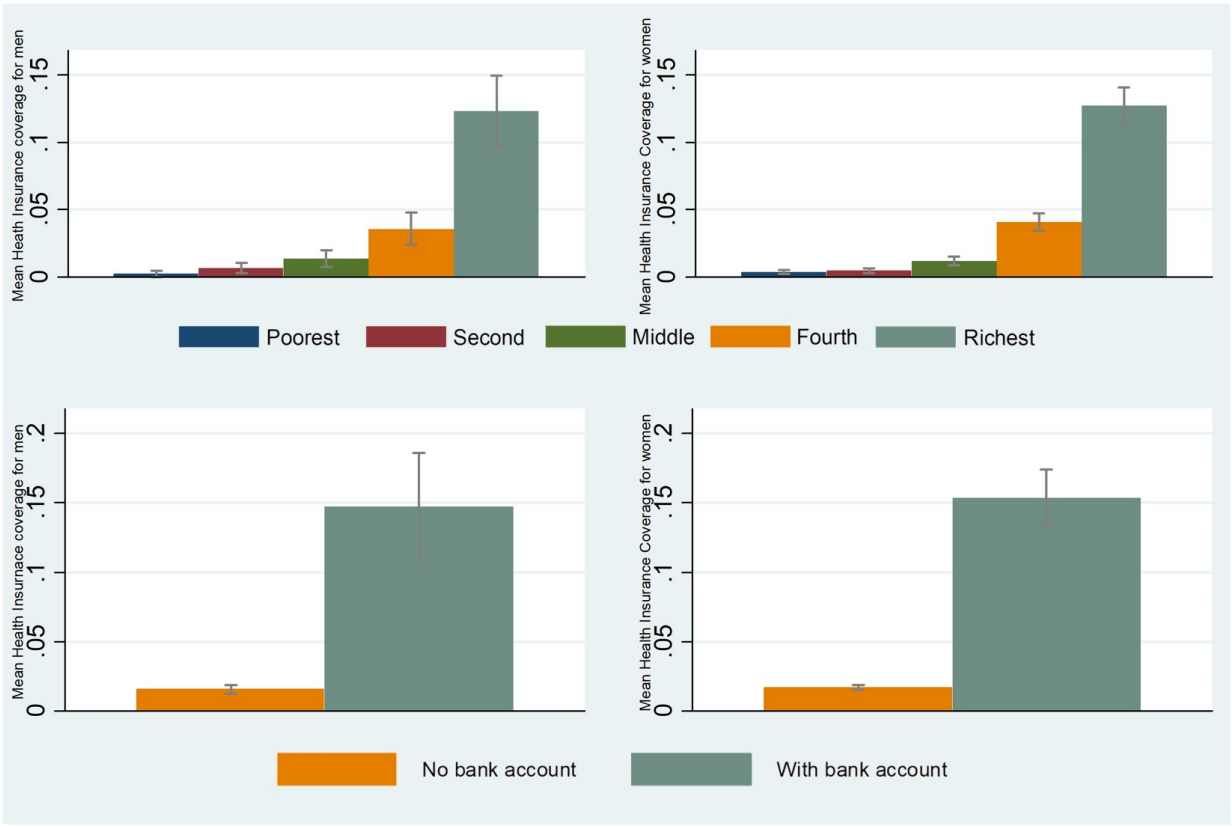


Figure 9 Health insurance coverage over wealth index quintiles and bank account ownership. Source: own, based on (MSP, 2010)

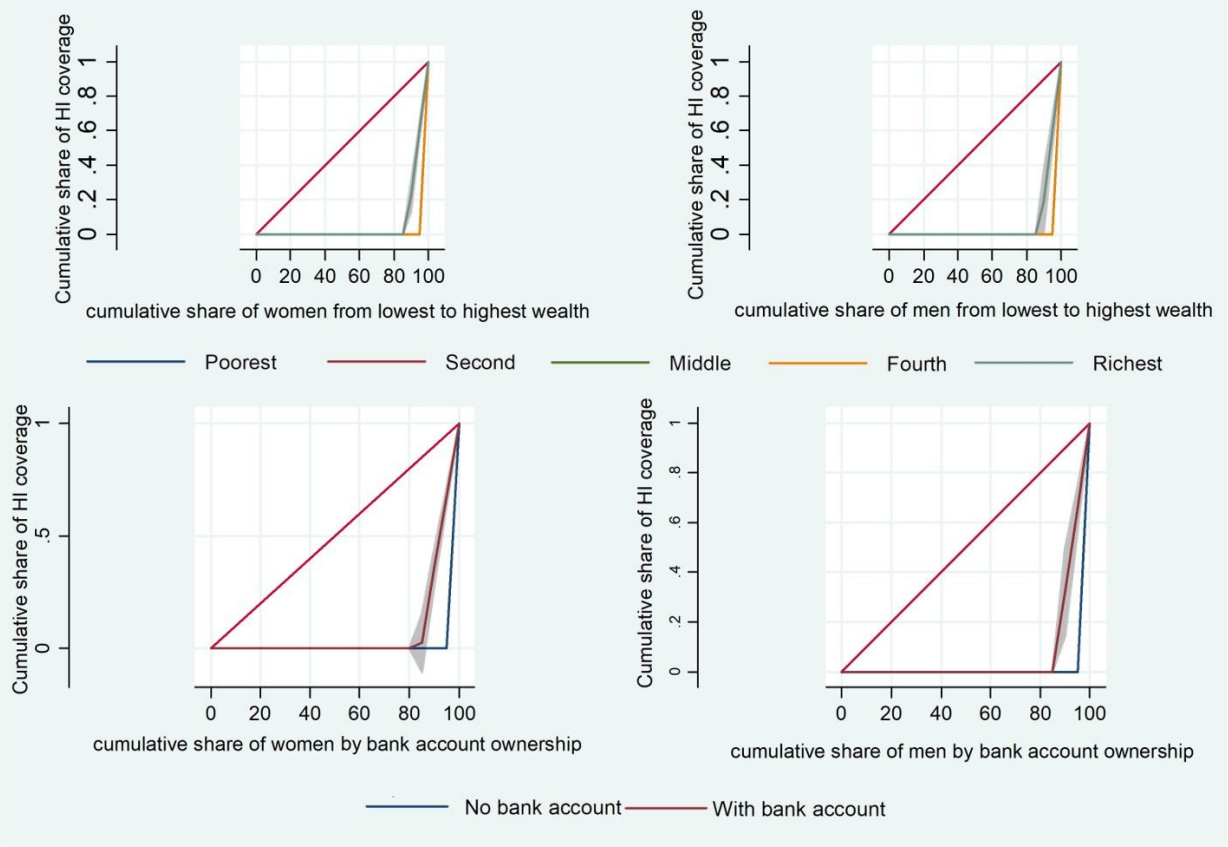


Figure 10 Concentration curves for health insurance coverage against wealth rank and bank account ownership. Source: *own, based on (MSP, 2010)*

3.5. Discussion

The study investigated the subgroups and regions of residence of the Congolese population with the highest need for health insurance. The results showed that approximately 4% of male and female respondents had health insurance coverage in the DRC, with hardly any difference between the genders, which is a very low rate even by African standards. This result is consistent with the findings of Dimbuene et al. (2022), who reported a low HI uptake of 5% for women of reproductive age in the DRC. Shao et al. (2022) also confirmed a low HI coverage in the DRC of 2.8%. Previous studies conducted in contexts similar to those of the DRC, and covering 36 SSA, have also found low HI coverage in countries like Chad, where only 0.9% of the population own a health insurance policy (Barasa et al., 2021; Dong et al., 2009; Doris et al., 2022).

Multi-country studies in Sub-Saharan Africa confirmed a low HI coverage of 8.5%, with significant cross-country variation ranging from the highest HI coverage of 62.4% in Ghana to the lowest level of coverage of 0.9% in Chad (Amu et al., 2021; Barasa et al., 2021). Similar results were found in a study by Shao et al., with coverage ranging from 57.9% in Gabon to 1.1% in Cameroon (Shao et al., 2022).
Similar to previous studies, a high prevalence of poverty mainly explains the low level of insurance uptake in the DRC, the dominance of the informal sector, and the weak commitment of the government to provide tax-funding HI mechanisms (Barasa et al., 2021; Lagomarsino et al., 2012).

The authors concluded that countries with the highest rate of HI coverage are those in which governments strongly commit to achieving UHC through social insurance schemes and innovative health financing strategies. These countries also have high GDP per capita and promote access to insurance for vulnerable populations through premium exceptions or premium subsidisation by the government (Amu et al., 2021; Shao et al., 2022). In their study, Barasa et al. (2021) concluded that countries with HI coverage greater than 20% featured substantial funding from tax revenues used to subsidise health insurance premiums of vulnerable populations. Consequently, the authors encourage LMICs to favour tax-funded HI mechanisms to enhance coverage.

Our findings reveal disparities in health insurance coverage among individuals residing in urban and rural areas depending on their provinces. For both male and female respondents, there was a higher prevalence of health insurance coverage among respondents living in the capital city of Kinshasa compared with respondents from other provinces. Previous studies found that urban dwellers are more likely to be covered by health insurance than rural populations (Agbadi et al., 2021; Anaba et al., 2022; Dong et al., 2009; Shao et al., 2022). From a statistical standpoint, our study did not show differences in HI coverage between rural and urban populations when further covariates such as wealth index and education were considered in adjusted models. Our results align with those of Salari et al. whose findings indicate insufficient evidence that rural or urban residence impacts HI uptake (Salari et al., 2019). Therefore, the authors concluded that there was no difference in the probability of enrolling in an HI scheme between rural and urban residents.

Our results show consistent disparities in HI coverage between respondents with and without formal education. More educated women were eight times more likely to have HI than uneducated women. At the household level, male respondents whose HH heads had a formal education were 72 times more likely to own an HI than those whose HH heads were uneducated. Our results align with several studies conducted in other SSA contexts, whose findings support the idea that educational status is among the

highest contributors to inequality in health insurance coverage (Adebayo et al., 2015; Barasa et al., 2021; Doris et al., 2022; Shao et al., 2022). A similar study conducted in the DRC using a different dataset found that one year of completed education increased by 10% the likelihood of owning HI among Congolese women of reproductive age (Dimbuene et al., 2022).

Following the argument of Shao et al. (2022), more educated individuals are generally informed about health-related expenditures and have sufficient income to pay for insurance plans. A study conducted in 36 SSA countries also found that high levels of education are concentrated among the rich (Barasa et al., 2021). Moreover, less educated individuals are likely to encounter difficulty in understanding HI mechanisms and their benefits due to their inability to access information (Anaba et al., 2022). A similar study in Ghana has shown that access to information was a key factor in owning a HI, confirming that educated individuals are more empowered to make health-seeking decisions (Kansanga et al., 2018)In the DRC, the correlation between education and access to information might not sufficiently explain the higher coverage rate of educated respondents. In fact, in many SSAs, and particularly in the DRC, more educated individuals are more likely to hold formal employment in either the public or private sectors.

From our results, it is evident that HI coverage in the DRC is concentrated among the wealthiest. Female respondents in the richest wealth quintile were ten times more likely to own HI than their counterparts in the poorest wealth quintile. The same results occurred for male respondents, where respondents in the wealthiest quintile were 20 times more likely to own HI. In the DRC, the demand for health insurance aligns with consumer theory to the extent that a change in price and income influences the demand of rational consumers (Begg et al., 2014). Consequently, HI is expected to be a normal good with a positive income elasticity of demand, implying that the rich are more likely to insure (Schneider, 2004). Our results corroborate the findings of Adebayo et al. (2015), who found that wealthier households and individuals were more likely to own HI than poor individuals in countries such as Cameroon, Burkina Faso, and Nigeria. In the same context as the DRC, Dimbuene et al. (2022) found similar results demonstrating that women of reproductive ages living in better-off households had higher chances of being covered by an HI than those from poor households. In their study, Doris et al. (2022) revealed that households in the lowest income quintile were 19% less likely to own HI than those in the wealthier group. Empirical research argues that enrollment and willingness to pay for HI in LMICs are pro-rich and explained by factors such as greater exposure of wealthier people to the media and higher income levels to purchase premiums (Barasa et al., 2021; Doris et al., 2022).

Overall, there is a lack of appropriate public policies to foster HI uptake among poor and marginalised people in the DRC. In a study conducted in 36 SSA countries, the authors demonstrated that countries with HI coverage greater than 20% are characterised by publicly owned HI that is significantly tax-funded instead of voluntary contributions. In addition, in these countries, all poor people receive full government subsidies, while people in the informal sector receive partial subsidies to ensure large HI coverage (Barasa et al., 2021).

Doris et al. (2022) showed that even in countries where governments target or subsidise the most vulnerable groups, rich people have almost twice the odds of owning a HI compared to the poor population, i.e. the discrepancy between the wealthiest and the poorest decreases compared to the current situation in DRC. Ghana´s HI program provides premium exemptions for indigents, pregnant women, children, and people above 70 years of age, while in Rwanda, the HI exempts the poorest 16% of households from premiums. However, it is worth mentioning the study by Barasa et al. (2021) indicating that Ghana and Rwanda were among countries in the 36 SSA countries with the highest HI coverage of respectively 58.2% and 78.7%.

Households with bank accounts are more likely to have HI coverage. With regard to female and male respondents, an individual from an HH with a bank account had twice the odds of enrolling in health insurance compared with an individual from an HH where no members had a bank account. There is a lack of evidence to demonstrate the link between health insurance coverage and financial inclusion. Our study fills this research gap and shows that financial inclusion is very likely to contribute to inequality in health insurance coverage. Health insurance can potentially reduce the risk of catastrophic healthcare expenditures and improve health outcomes. A Study in Ghana showed that access to financial services improved the utilisation of health services (Asante et al., 2022)According to the study, the average older adult with access to financial services had 1.071 more chances to use health services than those without access to financial services. (Asante et al., 2022). Xiao and Tao (2022) investigated the link between financial inclusion and health in 18 Asian countries and found that financial inclusion positively impacted improving population health. Using data from 20 frontier markets, Ofusu et al. revealed that high financial inclusion causes higher levels of human development by ensuring equality of income distribution to the poor and the informal sectors (Ofosu-Mensah Ababio et al., 2021)Churchill found similar results, supporting the idea that financial inclusion significantly reduces poverty and improves health. (Churchill & Marisetty, 2020).

3.6. Policy implications

1. Access to information to the uneducated population

Our results demonstrated that 80% of health insurance coverage was concentrated among people with formal education. Therefore, public policy should focus on individuals without formal education to reduce inequality in HI coverage by designing health insurance mechanisms that adapt to their needs. On another level, more awareness campaigns should be designed to target less educated individuals. These campaigns should simplify health insurance mechanisms and benefits to ensure everyone can understand and access the required information regardless of their education level.

2. Poverty alleviation and economic disparities

As the study shows, health insurance coverage was concentrated among the wealthiest in the DRC. Therefore, unless the country sets a strategy to focus on this subpopulation, it will remain neglected, and Universal Health Coverage in the DRC will take a long time to achieve. Hence, it is crucial to design and implement health insurance mechanisms that are affordable and beneficial for low-income households. This could involve sliding-scale premiums based on income or government-subsidized programs for those in poverty.

3. Promoting financial inclusion

Although there is a lack of research directly linking financial inclusion and health insurance coverage, our results support previous research showing that financial inclusion positively impacts health outcomes through poverty and inequality reduction. As a result, financial inclusion has the potential to accelerate HI coverage in the DRC and ensure UHC. From a public policy perspective, efforts should be devoted to improving financial inclusion through sound regulation and supervision of the financial sector, as well as the promotion of digital finance via mobile banking and financial education.

Overall, policies should also focus on fostering formal employment and ensuring these employment opportunities come with health insurance benefits. Given that the government plays a crucial role in achieving Universal Health Coverage, policies should also be implemented at the national level to establish tax-funded health insurance mechanisms that can enhance coverage.

By implementing policies that address these areas, the DRC can improve health insurance coverage, reduce healthcare inequalities, and move closer to achieving Universal Health Coverage.

3.7. Limitations

This study used cross-sectional data obtained from the MICS database. The database contains self-reported data on health insurance coverage, educational level, wealth, and information on bank account ownership. Although it is generally agreed that MICS data are of high quality, self-reported data may lead to misclassification and possible bias. For example, the information on educational level may be subject to information bias; participants who have attended high school do not need to have graduated from high school. Second, it is preferable to collect longitudinal data on health insurance coverage to ensure consistency in maintaining health insurance coverage. Consequently, a follow-up longitudinal study on the prevalence of health insurance coverage in the DRC would provide more robust insights about currently found associations, e.g., between financial inclusion and HI coverage.

3.8. Conclusion

To increase health insurance coverage in the DRC, government, private, and donor initiatives should prioritise programs with a focus on individuals without formal education. In most African contexts and the DRC in particular, formally educated individuals generally earn higher incomes, belong to wealthier subgroups of the population, and have access to information that is key to assessing the benefits of owning HI. Additionally, the DRC government should ensure that uneducated people receive as much information related to health and benefit from being covered by health insurance. In the short term, the Congolese government may initiate pilot projects with premium exemptions and subsidisation for vulnerable population subgroups. In the long run, the government should ensure formal employment for most of the population as a prerequisite for a proper collection of individual premiums. Finally, increasing the financial inclusion of the Congolese population may have an additional impact on health insurance coverage. Previous studies conducted in Africa have demonstrated that financial inclusion is important to reduce poverty and inequality and improve health outcomes. Based on our results, we encourage the Congolese government to establish national programs to improve the country's financial inclusion as this will positively impact poverty reduction and health insurance coverage.

Chapter Four: Exploring health insurance as a financial buffer in Maternal and Child Health in the Democratic Republic of Congo

4.1. Introduction

Health systems in many low- and lower-middle-income countries are predominantly financed through out-of-pocket (OOP) payments. The negative implications of OOP payments are widely documented: they adversely impact the demand for healthcare, contribute to household poverty, and exacerbate inequities (Ifeagwu et al., 2021; McIntyre et al., 2018). In the Democratic Republic of Congo (DRC), for instance, 90% of health financing is sourced from private household OOP expenditure (Nyamugira et al., 2022). This heavy dependency on OOP payments highlights the limited financial protection provided by DRC's health financing system (Nyamugira et al., 2022).

In many low-income countries, a healthcare financing mechanism predominantly reliant on OPP payments continues to impede healthcare accessibility (Amu & Dickson, 2016; E et al., 2006). According to Dimbuene et al. (2022), the incidence of catastrophic health expenditures in Sub-Saharan Africa reaches 16.5%. This situation leads to households resorting to selling assets, depleting savings, taking on loans, or neglecting other essential needs to cope with financial shocks associated with healthcare expenses, perpetuating a cycle of poverty (Maritim et al., 2023). Health insurance is an important instrument for reducing OOP and its negative consequences. It involves the pooling of resources and risk and has been widely acknowledged as a means to promote equity in healthcare, safeguard households from catastrophic health expenditures, and improve access to healthcare, particularly for impoverished and vulnerable populations(Amo-Adjei et al., 2016; Sommers et al., 2013).

In many African countries, including the DRC, health insurance programs, both voluntary and mandatory, are being promoted as the main sources of healthcare funding aiming to advance towards Universal Health Coverage (UHC). Despite these efforts, the DRC faces significant obstacles in healthcare accessibility, with health insurance coverage remaining less than 5%. This situation is further complicated by distinct disparities across various provinces and among different socioeconomic groups (Nyamugira et al., 2022) elucidate that approximately 82% of the DRC's insured population relies on employer-provided insurance, while a mere 12% have coverage through community-based health insurance.

Despite intensified efforts to enhance Maternal and Child Health during the Millennium Development Goals era and beyond, over a quarter of a million maternal deaths continue to occur annually worldwide (Alkema et al., 2016). Sub-Saharan Africa remains particularly affected, accounting for over half of global maternal and child mortalities (Alkema et al., 2016; Liu et al., 2016).

The Sustainable Development Goals (SDGs) have identified the reduction of maternal, neonatal, and under-5 mortalities as key global health policy targets. Specifically, the post-2015 SDG 3 projected a new target to decrease the global maternal mortality rate to less than 70 per 100,000 live births by 2030 (Begg et al., 2014; Nations, 2015). Achieving these targets necessitates improved access to high-quality and affordable maternal healthcare services, particularly in underserved regions.

The significant influence of effective health insurance on households is well-documented in the literature and is often associated with enhanced health outcomes. This effect is especially pronounced among women, who regularly necessitate services related to maternal and child health. Moreover, health insurance serves to buffer against the risk of unforeseen health crises and curtail OOP expenses (Xu et al., 2003).

Previous empirical studies supported that access to health insurance significantly enhances the overall quality of healthcare, particularly maternal and child healthcare. The possession of health insurance has been positively correlated with the increased utilisation of essential maternal healthcare services, including antenatal care (ANC), skilled delivery, and postnatal care (PNC). This evidence underscores the critical role of health insurance in improving maternal healthcare outcomes (Agbadi et al., 2021; Gouda et al., 2016; Khan & Singh, 2016). According to Khan and Singh (2016), women with health insurance coverage exhibited a 9% to 11% higher likelihood of utilising ANC, PNC, and skilled delivery services. Similarly, research conducted in Tanzania found that having health insurance was positively associated with the recommended timing of antenatal care and the practice of skilled delivery (Damian et al., 2020).

Contrary to this block of literature, it is important to note that, despite some governments' adoption of free maternal healthcare policies, out-of-pocket payments in maternal and child healthcare persist. The persistence of OOP payments can be attributed to factors such as the unavailability of drugs in health facilities, loss of health facility revenues, and delays in reimbursement (Alatinga et al., 2024; Kumbeni et al., 2023; Meda et al., 2019; Opwora et al., 2015). For instance, in Ghana, where the national health insurance scheme comprehensively covers maternal health services, delays in government reimbursements have resulted in out-of-pocket expenditures by women at public healthcare facilities seeking high-quality healthcare. This situation potentially reduces the utilisation of maternal health services and threatens the progress made in Maternal and Child Health Outcomes (Kumbeni et al., 2023).

Based on the above, it is crucial to understand individuals' perceptions and knowledge bases, focusing on women, regarding health insurance and their expectations of the government's role in promoting access to healthcare.

Our research centred on pregnant women and those recently giving birth in the DRC. This study fills the research gap in understanding the financial burden of healthcare on Maternal and Child Health in the DRC and the capacity of women to evaluate the benefits of health insurance coverage.

Building on the insights gathered from focus group discussions, this study aimed to shed light on our respondents' understanding and perception of health insurance and their healthcare financing mechanism. The objectives of the study are threefold: (1) to evaluate respondents' perceptions, knowledge, and understanding of health insurance, (2) to explore the mechanisms of healthcare financing, and (3) to assess the potential role of the government in providing access to healthcare.

4.2. Methods

4.2.1. Study settings

This research was carried out in the health zones near Bukavu, the capital city of the South Kivu province, one of the largest provinces in the east of the Democratic Republic of Congo (DRC). South Kivu is divided into 34 health zones (Makali et al., 2021)Our study employed a comprehensive qualitative approach and included pregnant women and those who had recently given birth from hospitals located in two health zones: the urban Kadutu health zone and the rural Miti-Murhesa/Mudaka health zone. These health zones were selected based on the criterion of having benefited from the Free Maternity Program implemented by the Congolese Government.

The Free Maternity Program was initiated by the government of the Democratic Republic of Congo (DRC) and launched in South Kivu in November 2023. This program provides free childbirth services and covers eligible postnatal care, but only at selected healthcare facilities that have contracted with the DRC government for this pilot phase.

The data used in this study was obtained through Focus Group Discussions (FGDs) held at 3 healthcare facilities located in the two previously mentioned health zones. Our study participants were pregnant women and new mothers, who were chosen because they are more likely to require medical care before and after giving birth. As a result, they are thought to possess a strong understanding of the financial burden of healthcare and the value of having health insurance coverage. This assumption guided our selection of these groups for the study.

4.2.2. Data collection

Participants were met at the hospital, and authorizations were secured from the participating health facilities to conduct FGDs with pregnant women visiting the hospital for prenatal care and consultations.

Similarly, authorizations were obtained before interviewing women who had recently delivered during their free time.

FGDs were conducted between December 2023 and February 2024. The responsible medical staff identified potential participants and organised the FGD after introducing us to them.

All study participants provided their informed verbal consent after receiving both verbal and written information about the study. They were duly notified that their participation was entirely voluntary, and they had the discretionary right to withdraw at any time without explanation.

We conducted 12 FGDs, with each group comprising 5 participants, except for FGD 7, which had only 4 participants. Each individual in the FGD was assigned a unique number to ensure participant anonymity. For example, a participant in the first focus group discussion was designated as GD11, indicating she is part of Group Discussion 1 and her individual number is 1. On average, each group discussion lasted for two and a half hours.

In the first round, individual questions were addressed to each participant (n=59). These questions comprised socio-economic topics such as the number of births, educational level, household size, monthly household income, and the employment status of the respondent's spouse.

The FGDs explored key topics, including the perception, knowledge, and understanding of health insurance, healthcare financing mechanisms, and the potential role of the government in providing access to healthcare.

The first author conducted the FGDs, assisted by two enumerators who hold a Master's and bachelor's degree in economics. The initial questionnaire, written in English, was translated into French and Swahili to facilitate the discussions. However, the discussions were conducted entirely in the local language, Swahili. The FGDs were audio-recorded, and detailed field notes were taken.

4.2.3. Data analysis

Our focus group discussion analysis followed the principles of the reflexive thematic analysis described by Byrne (2022). According to Braun and Clarke (2012), reflexive thematic analysis is a readily approachable and theoretically adaptable interpretive method used in qualitative data analysis, which facilitates the identification and analysis of recurring patterns or themes within a specific data set.

According to Braun and Clarke (2012) and cited in Byrne (2022), reflexive thematic analysis involves six phases: familiarizing with data, generating initial codes, generating themes, reviewing these themes, defining and naming each theme, and finally producing a comprehensive report that weaves the analytical narrative together with data.

Braun and Clarke (2021) note that Thematic Analysis (TA) is a time-consuming process that evolves as the researcher navigates the different phases. Consequently, despite following the six sequential phases, the analysis is not linear. Instead, it is recursive and iterative, requiring the researcher to move back and forth through the phases as necessary.

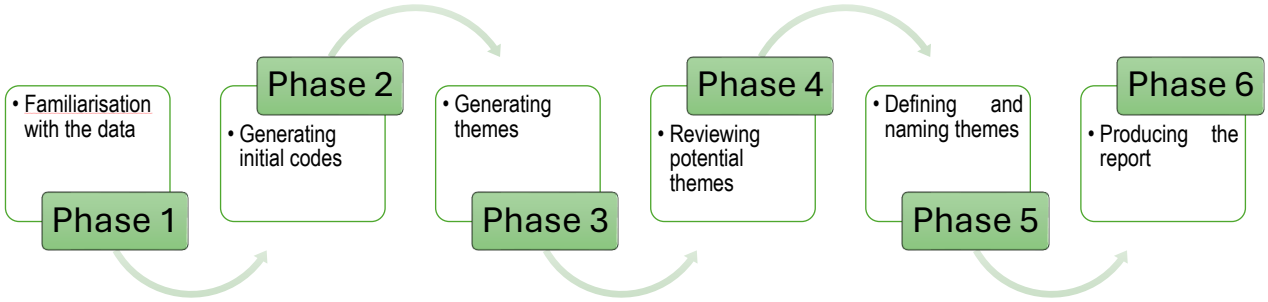


Figure 11: The six phases analytical process under the reflexive thematic analysis

Source: Own based on Byrne (2022)

4.3. Results

4.3.1. Descriptive statistics

Table 12 presents detailed descriptive data of the participants in our focus group discussion. The focus group discussion for our survey included pregnant (59 %) and recently delivered women (41%). The average profile of the respondents indicated that each participant has, on average, experienced 4 childbirths (1-11) and resides in a household of 6 members (2-14). The health insurance coverage among participants was low, with only 3% of respondents being insured.

Table 12: Socio-economic characteristics of participants in the FGDs

Indicators (n=59)	**Values**
Number of childbirths	Average: 4 births; Range: 1 to 11 births
Insurance coverage status	Insured: 2 (3%); Uninsured: 57 (97%)
Status (pregnant or delivered women)	Pregnant 35 (59%); Delivered women: 24 (41%)
HH size	Average: 6 persons; Range: 2 to 14 persons
Educational level	Illiterate/ none: 7 (12%); Primary: 3 (5%); High School: 44 (75%); University: 5 (8%)
Monthly HH Income-range	<100 USD: 18 (31%); 101-200 USD: 26 (44%); 201-300 USD: 10 (17%); > 300 USD: 5 (8%)
Employment status of the respondents' spouses	Small-scale business Operator: 22 (37%); Small Farmers: 5 (8%); Taxi-Drivers: 7 (12%); Unemployed: 14 (24%); Other[6]: 11 (19%)

Source: own based on collected data

In terms of education, a significant majority (75%) of the respondents have completed high school, while a small fraction (12%) have never attended school, and a smaller segment (8%) attended university studies. The household income distribution shows a significant concentration in the 101-200 USD monthly income bracket. However, it's noteworthy that 31% of the respondents reported earnings of less than 100 USD per month, while a mere 8% earned more than 300 USD.

Regarding the employment status of the respondents' spouses, 37% are engaged in small-scale business activities, while 24% are unemployed. This information provides a comprehensive overview of the socioeconomic background of the participants in our survey.

4.3.2. Emerged themes and sub-themes

From our qualitative analysis drawing from the reflective thematic analysis approach emerged four main themes: (1) perception of health insurance, (2) financial challenges for healthcare financing, (2) the role of the government in facilitating access to healthcare, and (3) coping strategies for healthcare financing. These themes encompass an array of sub-themes, including perceived benefits and risks of health insurance, perceived high cost of healthcare, the government's role in health facility accessibility and affordability of health insurance, and the reliance on family assistance, community support, and personal savings, etc. as shown in Figure 12.

[6] The category "other" include primary school teachers, dressmakers, bankers, butcher, and barbers.

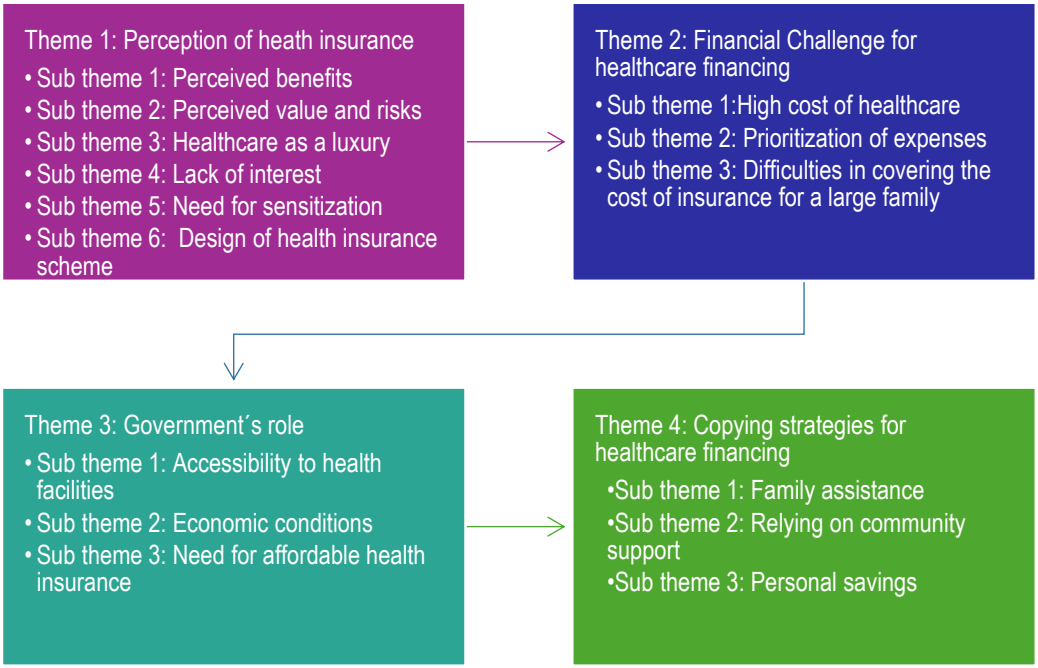


Figure 12: Emerged themes and sub-themes.

Source: own based on the results from our analysis

1. Theme 1: Perception of health insurance

Table *13* summarizes the participants' statements on how they perceive the benefits of health insurance.

Sub-theme 1: Perceived benefits of health insurance

Participants identified distinct benefits associated with health insurance coverage. These include accessing healthcare facilities for appropriate treatment during illness, which can prevent the risks associated with self-medication in the absence of proper medical consultation. Further, health insurance coverage can facilitate access to specialised services such as diagnostic imaging and enable transfers to more comprehensively equipped medical facilities.

Table 13: Perception of health insurance

Sub Themes	***Explanation***
1.1 Perceived benefits	Participants acknowledged that health insurance could alleviate financial strain, facilitate access to healthcare, and reduce fear of financial issues related to borrowing money for healthcare.
1.2 Perceived value and risks	Some participants perceive that health insurance might not offer the best value for money, especially when compared to other financial mechanisms like the informal saving group (Association Villageoise d'Epargne et de Crédit).
1.3 Healthcare as a luxury	Due to financial constraints, healthcare is viewed as a luxury, with participants resorting to it only when home remedies fail.
1.4 Lack of interest and coverage	Some participants were not interested in health insurance due to a lack of understanding about its benefits and how it works.
1.5 Need for sensitisation	Participants suggested the need for more education on the benefits of health insurance. Participants who understood health insurance saw it as a way to access healthcare without fear of the costs.
1.6 Design of Health Insurance Scheme	Some health insurance schemes are church-based and require church membership for enrolment.

Source: own based on the Focus Group Discussion

Positive perceptions regarding health insurance include reduced out-of-pocket costs, enhanced self-esteem and access to high-quality healthcare. As articulated by one of the respondents:

> *"The absence of health insurance compels us to rely heavily on family members, especially when faced with significant medical bills. I recall the repercussions this created within my family: it raised much suspicion, fostered total dependency, and led to a lack of respect within the family and suspicion".*
>
> (Participant GD14; 2 births; HH size: 5; Secondary Education, HH income - range: 101-201 USD).

Another group of participants identified several key benefits of health insurance that could significantly improve their healthcare experiences and financial stability. They expressed that having coverage would ease their financial burdens and give them greater access to necessary healthcare services.

> *"Health insurance will allow me to pay for maternity services easily because I've always paid more than $200 for each birth."*
>
> (Participant GD125; 7 births; HH size: 9; Secondary Education, HH income range: 201-300 USD).

Other participants expressed appreciation of the health insurance scheme for financial risk protection:

"While every benefit comes with a drawback, this is particularly true regarding insurance. The limitation of our health insurance providers is that it does not fully cover healthcare costs, which represents a financial burden for larger families where children frequently fall ill. However, they also have advantages when only a small portion of the healthcare cost is paid out-of-pocket, while the insurance covers most of the costs. This is a significant advantage, making mutual health insurance a beneficial option for families with many children."

(Participant GD73; 11 births, HH size: 14, secondary education level, HH income range: less than 100 USD).

"For me, having health insurance means that I no longer worry about the cost of caring for myself and my children. I can go to any hospital and get treatment without having to rely on friends, family, and colleagues to pay for healthcare."

(Participant GD124; 2 births; HH size: 3; secondary education level, HH income: < 100 USD).

Perceived value and risk of health insurance

Participants perceive health insurance as a potential loss if no health issues arise within the coverage period, thus influencing their decision-making regarding health insurance uptake. For instance, one participant states:

"I had paid for health insurance but remained healthy throughout the year. If I had invested that money into a Saving and Credit Association (AVEC) instead, I would have earned back my money with interest. Furthermore, in case of an illness, I could still borrow money from the AVEC to cover any hospital bills."

(Participant GD53; 7 births; HH size: 6; secondary education level, HH income: < 100 USD).

Healthcare as a luxury

Participants consider healthcare as a luxury service, given that without health insurance coverage, they can only afford to seek it when home remedies prove ineffective.

"When a child falls sick, we, quite honestly, don't immediately rush to the hospital each time. Our initial response is usually to purchase paracetamol to manage the child's fever temporarily. If we are familiar with herbal remedies that can address the child's specific illness, we also opt for

those. The primary reason for these measures is our lack of immediate funds to afford a hospital visit." (Participant GD33; 3 births; HH size: 5; secondary education level, HH income: < 100 USD).

Lack of interest and limited coverage of existing health insurance scheme

Participants with experience in health insurance describe elements such as distance from healthcare facilities, selective coverage of diseases and limited number of covered family members as weaknesses of the current health insurance system.

"I am a member of a mutual health insurance scheme. I have insurance booklets for myself and my children. My membership is through the teachers' health mutual, as my husband is a teacher. However, the hospital associated with our scheme, Mukongola Hospital, is over 85 km away in Kabare, which makes it extremely inconvenient to access. In situations when either I or my children are sick, it's challenging to travel to this hospital for treatment. If the illness is serious, there's a risk that the patient might not survive the journey. Another issue with this health mutual is that it only covers the parents and four children per family. Any additional children will have to bear the full cost of their healthcare. Furthermore, our mutual health insurance only covers certain illnesses, making it partial insurance."

(Participant GD32; 6 births; HH size: 8; Secondary education level, HH income: 201-300 USD).

Need for sensitization.

Respondents have identified key barriers to health insurance uptake reflecting on their perception of health insurance. These included a lack of accurate information and inadequate awareness campaigns, mistrust in health insurance organizers and a lack of successful stories from already insured people, which participants believed would have guided their decision to adopt health insurance. Overall, participants underscored a lack of information, leading to scepticism about health insurance's legitimacy. These insights highlight the need for more accurate information dissemination, building trust, and sharing experiences to encourage health insurance uptake.

"I don't know exactly what to tell you. In fact, I know absolutely nothing about mutual health insurance; I need someone to educate me. However, to tell the truth, I'm not that interested. For instance, if you have 10 children, it's difficult to enrol them all in the mutual health insurance scheme. It costs a lot of money."

(Participant GD114; 8 births; HH size: 10; secondary education level, HH income - range: 101-200 USD).

Another group of participants reported scepticism and mistrust towards health insurance organisers, underscoring the need for credible information and transparency to encourage participation.

"The topic of health insurance, particularly community health insurance (mutuelle de santé), can be quite complex. Sometimes, individuals managing them do not inspire the utmost confidence. However, if they demonstrate seriousness and reliability, it is crucial to understand the importance of a community health insurance scheme and partner health facilities. Only then we can consider joining."

(Participant GD15, 7 births, secondary education level, HH size: 10; HH income - range: 201-300 USD).

Design of Health Insurance Scheme

The design of the health insurance program, specifically the misconstrued belief that it is exclusively for a certain group, is a significant barrier. This hurdle discourages potential beneficiaries, causing them to abandon acquiring health insurance coverage immediately.

I have a different reason. One day, I was at the Chai Parish[7]I had heard about Community Health Insurance, but when I asked questions, the person told me that the health mutual was only for Catholics. As soon as I heard that, I was discouraged and immediately gave up.

(Participant GD23; 5 births; HH size: 7; secondary education level, HH income: 201-301 USD).

2. Theme 2: financial challenges for healthcare financing

The participants of the focus groups expressed several financial challenges of healthcare financing as exhibited in Table *14*.

Table 14: financial challenges for healthcare financing

Themes	***Sub Themes***	***Explanation***
Financial Challenge for Healthcare Financing	• High cost of healthcare	Participants perceive a significant financial burden associated with healthcare-related to childbirth and newborn care.

[7] Chai Parish is one of the catholic church in the town of Bukavu, east of the Democratic Republic of Congo

• Prioritization of expenses • Difficulties in covering the cost of insurance for a large family	There was a significant struggle in prioritising household needs and health insurance uptake, with some prioritizing food and children´s education and others prioritizing healthcare, depending on the situation. Participants felt that health insurance could be expensive, especially for families with many children. The per-child fee structure can deter individuals from subscribing to health insurance, particularly those with larger families.

Source: own based on the Focus Group Discussion

Perceived high cost of healthcare

While our respondents reported relatively low costs associated with prenatal consultations, they perceive a significant financial burden associated with childbirth and newborn care, contingent on pregnancy complications and delivery methods. Specifically, cesarean section deliveries often result in substantial financial challenges when managing hospital bills.

Comments included:

> *"This marks my third pregnancy now. My previous second pregnancy was punctuated by significant distress. Financial constraints were a primary concern, as my husband was unemployed then, making it difficult to manage the accumulating medical expenses. Following a surgical procedure - a cesarean section - additional health complications emerged. Consequently, the total cost escalated to approximately $500, which induced considerable hardship. I was required to stay in the maternity ward for an extended duration, exceeding seven weeks. During this challenging period, my immediate family, extended family, and friends were instrumental in providing support. Their assistance was invaluable, and without it, navigating the complexities of this situation would have been impossible."*
>
> (Participant GD11; 3 births; HH size: 5; Secondary Education, HH income range: < 100 USD).

> *"This is my 2nd pregnancy now. But for the 1st pregnancy, I remember a bad experience. I didn't even have the money to pay. My husband doesn't have a job, so although I could manage, it was hard to pay the bill. I'd had a caesarean. I paid $300. It was a pain. I was in the maternity ward for over 7 weeks. My family, in-laws and friends rallied around to help me. Without their help, I don't know how I could have left the hospital."*

(Participants GD121; 2 births; HH size: 4; Illiterate, HH income-range: < 100 USD).

Other participants reported that healthcare costs depend on pregnancy complications and delivery methods. However, in all cases, the financial burden remains challenging.

“I have experienced two surgical procedures in the past, specifically, two caesarean section deliveries. The costs for these procedures were substantial; I had to pay $190 and $210, respectively, at the Docs/Goma medical facility. In contrast, my first two deliveries, one conducted at CBCA and the other at DOCS/GOMA, were considerably cheaper, costing me $28 and $50 each. The financial burden of these medical expenses is indeed challenging to manage. However, we continually strive to navigate these financial hurdles.”

(Participant GD23; 5 births; HH size: 7; Secondary Education, HH income range: 201-300 USD).

"The payment of the maternity bill depends on the method of delivery. When I had a C-section and had to pay USD 270, it was challenging. I made the payment in small instalments and stayed in the hospital for three weeks. I'm not sure how my husband managed to make the payments. After all, I'm not privy to men's affairs or how they acquire money.”

(Participant GD114; 8 births; HH size: 10; Secondary Education, HH income-range: 101-200 USD).

Prioritization of expenses

Choosing between health insurance coverage and other household expenses presents a significant challenge. Some of our respondents reported that, in some cases, they balance the immediate need for essentials like food and rent with the longer-term security offered by health insurance, which could potentially safeguard against substantial future healthcare.

“When it comes to choosing between paying for an insurance policy and other necessities, I determine what to prioritize based on the urgency and importance of each need. Food is undoubtedly a top priority due to its immediate and vital necessity. However, I would prioritise paying for an insurance policy when it comes to other expenses such as buying clothes or paying

rent. This is because insurance provides a form of financial security for unforeseen health expenses, which can be more critical in the long run."

(Participant GD44; 3 births; HH size: 5; Secondary Education, HH income-range: < 100 USD).

In a context without a health insurance safety net, the decision often boils down to weighing the severity of a child's illness against the immediate need for food, creating a dilemma between health and sustenance.

"If I only have 10,000fc (the equivalent of 2.5 USD), and my child is sick, my priority is to go to the hospital first. But if it's not that serious, my first priority is to buy food for the whole family."

(Participant GD92; 1 birth; HH size: 5; Secondary Education, HH income-range: 101-200 USD).

"Personally, I prioritize other expenses over healthcare. When it comes to spending on food, I prioritize health insurance. Most of the time, my children undergo primary healthcare. In this case, I prefer to buy food because primary healthcare can wait."

(Participant GD122; 5 births; HH size: 6; Secondary Education, HH income range: 101-200 USD).

Difficulties in covering the cost of insurance for a large family

The current design of the health insurance scheme, which charges a per-child fee, can be prohibitively expensive for larger families. This cost structure often results in families, especially those with many children, opting out of the insurance, thereby inhibiting the uptake of health insurance.

"The primary concern for many families is the high number of children. For instance, if the cost per child for health insurance is $6, the total cost can become prohibitive for larger families. This often leads to families opting out of the insurance scheme. I experienced this firsthand: when I had only one child, I was able to afford the insurance. However, now that I have six children, the cost of enrolling everyone in the mutual health insurance scheme has become untenable".

Participant GD55; 5 births; HH size: 6; Primary Education, HH income-range: < 100 USD).

3. The government´s role in health insurance uptake

Table 15 presents participants' opinions on the potential governmental role in increasing the uptake of health insurance.

Table 15: The government´s role in health insurance uptake

Themes	***Sub Themes***	***Explanation***
The government´s role in health insurance uptake	• Accessibility to health facilities	Participants expressed concerns about the lack of health facilities offering government-supported programs like free maternity which also hinders easy accessibility to healthcare.
	• Economic constraints	Respondents raised concerns about daily living costs and employment conditions versus health insurance.
	• Need for affordable health insurance	Participants suggest that the government should provide affordable and subsidised health insurance.

Source: own based on the Focus Group Discussion

Proximity to health facilities improves health insurance coverage

The government plays a crucial role in facilitating accessibility to health facilities. Some participants expressed concerns about the insufficient number of health facilities offering government-supported programs, which hinders accessibility to healthcare.

> *"In our village, you'll come across people eager to join the mutual health insurance scheme. However, there's no health facility in the entire village. The same issue applies to the free maternity program[8], with only a selected few facilities authorised to provide it. This situation necessitates considering the considerable distance a pregnant woman would need to travel to access a health facility."*
>
> (Participant GD53; 7 births; HH size: 6; Secondary Education, HH income range: < 100 USD).

Economic conditions as a key factor in improving health insurance coverage

According to some respondents, the struggle to meet daily living costs, mainly feeding a large family on a low income, hampers the ability to save or invest in health insurance. In the same line, some participants

[8] In December 2023 when we conducted our data collection, the Congolese government initiated a pilot phase of a program providing free of charge maternity and birth delivery. This program selected a limited number of participated health facilities.

reported that there is a call for the government to create job opportunities, which they believe would enable families to afford health insurance coverage.

> *"The government's free maternity program is not widely recognized. Furthermore, even though the program is intended to be free, pregnant women still end up purchasing necessary medicines, in the subsequent month. I think the government should focus on providing jobs for our husbands, which would enable them to bear the maternity costs themselves."*
>
> (Participant GD52; 4 births; HH size: 6; Primary Education, HH income-range: < 100 USD).

> *"Savings is a complex concept in our village. Consider a scenario where an individual earns 1 USD a day and has 10 children to support. Even if the government covers maternity costs, the ability to save is still severely challenged. The high exchange rate for the dollar exacerbates this situation. If it were reduced, we could afford to pay for maternity care as we did in the past, as the maternity cost is relatively less expensive compared to other living expenses. Therefore, there's a need for the government to devise effective strategies to support families in financial distress."*
>
> (Participant GD54; 3 births; HH size: 5; Secondary Education, HH income range: < 100 USD).

Some respondents suggest that the government can play a pivotal role in accelerating healthcare access by creating job opportunities, particularly for their spouses, to enhance household income. They also advocate for free secondary education, which could allocate more family resources towards healthcare needs.

> *"The government doesn't provide us with adequate support for healthcare access. Care for illness takes precedence over maternity care because of its unpredictability, and the burden it places on our resources. The government should ensure job opportunities for spouses and offer free secondary education. These two expenses - healthcare and education, are more crucial to us than free maternity care."*
>
> (Participant GD73; 11 births; HH size: 14; Secondary Education, HH income-range: < 100 USD).

The government has a fundamental role to play in accessing affordable health insurance.

Participants recommend that the government facilitate access to affordable health insurance programs through interventions such as subsidies or cash transfers.

> *"Personally, my family's expenses don't allow me to consider health insurance. If, for example, the government were to cover a few expenses, this would create a change in my family and I would allocate the little money I manage to earn each month to health insurance. I have mentioned that I prioritize family expenses, which means health insurance comes second, even though it's beneficial to have an insurance policy since illnesses don't give any warning."*
>
> (Participant GD113; 2 births; HH size: 6; Secondary Education, HH income range: 101-200 USD).

4. Coping Strategies for healthcare financing

As illustrated in Table 16, during the focus group discussion, participants articulated various coping strategies for financing healthcare in the absence of health insurance coverage.

Table 16: Copying strategies for healthcare financing

Themes	***Sub Themes***	***Explanation***
Copy strategies for healthcare financing	• Family assistance	Participants often rely on their families to help cover the costs of healthcare.
	• Relying on community support	Participants relied heavily on borrowing from family, friends, and neighbours to cover the costs of healthcare.
	• Personal savings	Participants use their personal savings or income to pay for healthcare costs.

Source: own based on the Focus Group Discussion

Family assistance as a copy strategy for healthcare financing

Many respondents reported not having health insurance to cover the costs of their antenatal care or childbirth. Despite this, some have devised strategies to manage these expenses. As a coping mechanism, certain respondents begin to accumulate savings as soon as they contemplate having a newborn. This proactive financial planning is perceived as a personal insurance substitute, providing a buffer to accommodate its associated costs. While some respondents rely on family assistance, others reported engaging in savings schemes like Association Villageoise d'Epargne et de Crédit (AVEC) to accumulate funds for future healthcare needs.

"I gave birth via caesarean section. My bill of 150 USD was partially paid by my husband (50 USD), and the rest was covered by my in-laws. I spent a month in the hospital after giving birth."

(Participant GD103; 2 births; HH size: 3; Secondary Education, HH income-range: 101-200 USD).

Community support plays a fundamental role in accessing healthcare

The absence of health insurance coverage often leads individuals to adopt alternative coping mechanisms to access healthcare, which could compromise the quality of care received. Extended hospital stays can exacerbate the financial burden on patients and their families. Furthermore, such circumstances may result in delayed recovery, potential income loss, and heightened emotional distress due to the uncertainty of handling healthcare expenses.

"There are occasions when we find ourselves with absolutely no financial resources at home, and even the father of the child is unable to contribute. In such situations, he often turns to his family members for financial assistance. As someone who frequently requires a cesarean section to deliver, this can be especially challenging. Some hospitals charge as much as $300 to $600 for a cesarean birth, which can be a substantial burden if you have no funds available. It's risky to opt for a smaller hospital to save costs, as they may not provide adequate care. Therefore, we often choose larger hospitals, even though they are more expensive, because they guarantee a certain standard of care, regardless of pregnancy complications. When faced with such considerable hospital bills, the father usually takes it upon himself to find the money, even going so far as to ask for help from extended family members like older siblings or aunts. If he manages to secure $20, for instance, that amount is immediately put toward the hospital bill. This process often results in my having to stay in the hospital for an extended period after giving birth. Over the following days, the father will then explain the situation to his own father, who may contribute an additional sum, perhaps $50, more or less. This allows us to gradually reduce the hospital bill until it's fully paid. This is the reality of my situation, as I frequently require cesarean sections for childbirth. I am also interested in hearing about the experiences of those who give birth normally."

(Participant GD31; 7 births; HH size: 10; Secondary Education, HH income-range: 101-200 USD).

Relying on community support for healthcare financing results in extended stays in hospitals.

> *"I gave birth via C-section. My bill of USD 150 was paid by my husband in small increments. He also received help from his family and friends. As a result, I spent several weeks in the hospital. I wasn't pleased to return home 9 weeks after giving."*
>
> (Participant GD115; 4 births; HH size: 6; Secondary Education level, HH income range: +300 USD).

> *"In my case, my husband borrows 25000FC (equivalent to 10 USD) from friends and family, then goes to work in other people's fields to repay it. He earns 4000FC (equivalent to 1.5 USD) a day. That's what we do every time I have to give birth. I don't work and I save nothing. We are too poor and I can barely find enough to eat."*
>
> (Participant GD61; 8 births; HH size: 9; illiterate, HH income-range: < 100 USD).

Personal Savings as a coping strategy for healthcare financing

One participant shared their experience of the financial burdens associated with pregnancy-related health complications, detailing the costs incurred for antenatal care, medical consultations, and additional necessary expenses, highlighting the importance of early financial planning.

> *"In my personal experience, the commencement of pregnancy was simultaneously accompanied by the emergence of health complications. This necessitated my compulsory payment for antenatal consultation (Consultation Pré-natale- CPN), which I used to receive at the HGRB[9], costing me a sum of USD 3 per month because the consultation is planned for every month. These fees are paid for the injection (syringe), vaccine, doctor's consultation, and some medications. But here at the CBCA[10], we only pay $5 for the entire period of antenatal care. Additionally, whenever a medical consultation was required, consultation fees were charged. There were further expenses in the form of ultrasound examinations and infection tests (laboratory investigations). Aside from healthcare costs, I also had to cater for clothing needs for my upcoming child. In conclusion, it is important to establish a savings fund to cover these*

[9] HGRB is a healthcare facility standing for Hôpital General de Référence de Bukavu
[10] CBCA is another healthcare facility in the same city

financial obligations, and this financial planning should ideally begin from the moment of conceiving a child."

(Participant G13; 2 births; HH size: 4; illiterate, HH income-range: 101-200 USD).

Participants articulated various individual saving strategies to finance maternity and newborn healthcare. These strategies include saving money at home in wooden boxes or concealing it under their beds and setting aside a specific amount from their daily earnings. Notably, these self-initiated savings strategies are often supplemented by financial contributions from their husbands, revealing a cooperative approach towards managing healthcare costs within families.

"In my case, I occasionally save money to avoid the risk of lacking funds for childbirth expenses. My husband is well aware of this because if we ever run out of money, he dislikes asking for help from relatives. That's why he manages to set aside small deposits in the logbook and a small cash box at home to prevent this shock related to childbirth. This allows us to cover these expenses for the entire duration of the pregnancy: paying for prenatal care, various tests, maternity bills, medications, baby care, food at home, and my clothing."

(Participant GD21; 5 births; HH size: 7; University Education, HH income-range: 101-200 USD).

"We save at home using wooden crates, which are hung either on the bedroom wall or placed under the bed. These crates are similar in design to a letterbox. Access to these savings is strictly limited and only permitted for specific purposes, such as addressing maternity costs, treating family illnesses, or funding other important family projects. Some individuals also take out microcredits from their respective groups, such as AVEC."

(Participant GD74; 5 births; HH size: 7; illustrate, HH income-range: 101-200 USD).

The coping strategy of saving a portion of money allocated for food expenses to finance healthcare might lead to a decrease in the overall budget for food in the household, potentially affecting the quality and quantity of food available. This could result in insufficient nutrition for the family members, particularly affecting the health of children and pregnant women, who have specific and often higher nutritional needs.

"For me, I already have a certain amount of experience and there are certain mistakes I can no longer make. To anticipate the various expenses, especially those linked to maternity, from conception to childbirth, I save. When my husband gives me money for food, I keep just 1000fc (equivalent to 0.4 USD) on the side and after a month, I accumulate more or less 30,000fc (equivalent to 12 USD). This enables me to get on and even buy clothes for my newborn child. In short, I'm saving up to pay the maternity bill."

(Participant GD81; 4 births; HH size: 7; Secondary Education, HH income-range: 101-200 USD).

Some families invest their savings in goat breeding to cope with the financial burden of maternity healthcare. When it's time for childbirth, the goats are sold to cover the expenses, effectively turning their livestock into health insurance.

"In outpatient care scenarios, health facilities often allow patients to leave before fully paying their bill. However, this flexibility is not extended to childbirth cases, with the rationale being that mothers have had a nine-month period to prepare financially. In response, some women who have minimal savings resort to buying goats, which they raise at home. When the time for childbirth arrives, the husband sells these goats to cover the associated expenses. However, if a woman is unable to pay, there is a provision in place: a designated room called "CIDOSE" that houses women who have given birth but have not yet paid their maternity bills in full. These women can stay in this room for up to two months until their husbands can pay the outstanding bill. Unfortunately, this system has its drawbacks. Newborns often become sick during this period, and without the means for payment, the hospital does not provide appropriate healthcare.

(Participant GD51; 4 births; HH size: 8; Secondary Education, HH income-range: 101-200 USD).

4.4. Discussion

Results from our study indicate a health insurance coverage rate of less than 4% among participants. This low uptake can be primarily attributed to factors identified in the focus group discussions, including financial constraints, lack of information, and perceived value relative to the cost of insurance schemes. The low uptake of health insurance observed in our study is consistent with findings from previous research using country-level data, which reported health insurance coverage rates of less than 5%, predominantly through employer-based and community health insurance schemes (Dimbuene et al., 2022; Nyamugira et al., 2024). Previous studies have also demonstrated an association between low

health insurance coverage and a high incidence of poverty (Adebayo et al., 2015; Barasa et al., 2021; Dimbuene et al., 2022; Nyamugira et al., 2024).

Most of our respondents lacked awareness regarding health insurance, its importance, and its functionality. Previous studies examining factors that influence the selection of insurance plans have identified a lack of cost transparency and a perceived deficiency in reliable information for distinguishing between different insurance plans as significant barriers to health insurance uptake (Furtado et al., 2016; Yagi et al., 2022). In their study, Barasa et al. (2021) found that exposure to media, commonly used to disseminate health insurance information, was positively associated with health insurance enrolment in sub-Saharan African countries.

Our respondents reported a negative perceived value of health insurance relative to its premium. This perception can be attributed to low levels of access to health information, as well as inadequate health and health insurance literacy. According to Call et al. (2021), Health insurance literacy refers to the extent to which individuals possess the knowledge, ability, and confidence to find, evaluate, and use information about health plans to select the most suitable plan for their financial and health needs, and effectively utilise it once enrolled. In their study, Edward et al. (2018) found a strong association between adequate general health literacy and possessing adequate health insurance literacy, and having health insurance coverage.

Similarly, (Amoah & David, 2018); Pignone et al. (2005) supported the idea that sufficient health literacy enables individuals to understand and effectively navigate their health system, leading to better health outcomes, such as timely healthcare access, reduced emergency room visits, and lower preventable mortality rates. Conversely, low health literacy is associated with limited healthcare access and difficulties in interpreting health information, as evidenced by a study among urban women in Ghana (Sarkar et al., 2010).

Without health insurance coverage, our respondents reported various coping strategies to access healthcare, including family and community support, informal borrowing, and personal savings. However, most acknowledged the benefits of owning health insurance, noting that it often prevents the need to reduce consumption or schooling of children to finance healthcare and avoids extended hospital stays.

Consistent with our findings, prior research indicates that obtaining credit from formal lenders is a less immediate and effective method of obtaining financing during a health shock than receiving financial support from family or friends. This suggests that informal networks may be crucial in providing timely assistance when faced with urgent healthcare expenses (Garcia-Mandicó et al., 2021; Islam & Pushkar, 2012).

However, our results indicate that health shocks lead to a reduction in household consumption and necessitate the trading of livestock to finance health expenses. In contrast, a study from Bangladesh by Islam and Pushkar (2012) demonstrates that households borrowed from microcredit organisations are better equipped to cope with health shocks. These households are less likely to liquidate livestock for immediate financial needs, suggesting that access to microcredit can provide a crucial buffer against the economic impacts of health-related expenditures. This underscores the importance of financial instruments in enhancing household resilience to health shocks.

Building on the argument of Strupat and Florian (2018), which demonstrates that both borrowing and remittances are key instruments to cover liquidity shortages for the direct payment of healthcare expenses, Garcia-Mandicó et al. (2021) show that the introduction of a public health insurance scheme reduces the need to rely on borrowing and remittances to cope with the financial consequences of a health shock. In Ghana, Garcia-Mandicó et al. (2021) showed that, due to the National Health Insurance Scheme, the incidence of remittances and the amount received for health financing decreased significantly by 6% and USD 5, respectively.

Our findings demonstrate that, in the absence of health insurance, households often reduce their investment in their children's human capital. Consistent with this,Garcia-Mandicó et al. (2021) show that the introduction of a public health insurance scheme in Ghana has led to increased school attendance among children. This highlights the potential of public health insurance to alleviate financial burdens and enhance educational outcomes by mitigating the need for households to divert resources away from their children's education in response to healthcare expenses.

4.5. Conclusions

Our research sheds light on the pressing issue of low health insurance coverage among pregnant women and new mothers in selected health zones of DRC, with a rate of less than 4%, which is consistent with national data showing coverage rates of less than 5%. This low uptake is attributed to financial constraints, lack of information, perceived low value relative to cost, and inadequate health and health insurance literacy. As previous studies have indicated, limited health insurance coverage is often associated with higher poverty rates and restricted access to timely healthcare.

Our findings emphasise the necessity of effective communication and education on health insurance. Individuals with better health literacy are more likely to understand and use health insurance, enhancing health outcomes. The negative perception of health insurance value suggests the need for more transparent and easily accessible information on the benefits of health insurance plans.

Without adequate health insurance, households rely on coping mechanisms such as family support, informal borrowing, and personal savings, which can lead to decreased investments in essential areas such as children's education. Our results align with previous research, suggesting that access to financial instruments, such as microcredit, can provide a buffer against the economic impacts of health shocks. Additionally, implementing health insurance schemes can alleviate financial burdens, reduce reliance on informal networks, and enhance both healthcare access and educational outcomes.

Consequently, increasing health insurance coverage through targeted interventions and health literacy could play a pivotal role in enhancing health and socioeconomic conditions, particularly for mothers and children in the DRC.

Chapter five: Conclusion and policy implications

This dissertation investigates the efforts and obstacles the Democratic Republic of Congo faces in achieving Universal Health Coverage. It focuses on financial risk protection, health outcomes, health insurance uptake, and the socioeconomic factors influencing health insurance coverage. Additionally, it examines the perceptions and coping strategies of the Congolese population regarding health insurance.

The research provides a detailed analysis of the relationship between health insurance, UHC, poverty, and financial inclusion in the DRC. The findings offer insights into the feasibility and implementation of UHC in LMICs, especially those dealing with poverty, socioeconomic inequality, and fragile health systems.

Key findings underscore the crucial role of health insurance in achieving UHC, emphasising its potential to provide financial risk protection, improve health outcomes, and reduce inequities. Despite some progress, the study identifies significant gaps in the DRC's pursuit of UHC.

5.1. Key findings

1. Financial risk protection and health outcomes

- Despite the DRC's commitment to UHC, our research finds that financial risk protection has only marginally improved. The reliance on OOP expenses remains high, particularly among the poorest segments of the population. Health insurance coverage is extremely low, with only 5% of the insured population, primarily benefiting wealthier individuals.
- Health outcomes have seen slight improvements, mainly attributable to investments by the private sector and international organisations, but the changes are not statistically significant.
- Government health expenditures are insufficient, averaging only 3% of the total budget, far below the recommended 15% stipulated in the Abuja Declaration.
- Foreign aid is unpredictable and unsustainable, further complicating the country's health financing landscape.

2. Health insurance uptake and socioeconomic factors

- The dissertation demonstrates the low prevalence of health insurance coverage (less than 5%) and its uneven distribution across provinces and socioeconomic strata. Factors such as

education, wealth, and financial inclusion are strongly associated with insurance uptake, pointing to systemic barriers that must be addressed to expand coverage. Health insurance coverage in the DRC is mostly concentrated among the wealthiest and most educated individuals. Education and wealth are strongly associated with higher insurance uptake.

- There is a significant disparity in health insurance coverage between urban and rural areas, with urban residents, particularly those in the capital city of Kinshasa, having higher coverage rates.
- Financial inclusion is positively associated with health insurance uptake, highlighting the role of financial services in enhancing health insurance coverage.

3. Perception of health insurance and coping strategies

- The low health insurance coverage in the country is primarily due to financial constraints, lack of information, and perceived low value relative to premium costs.
- In the absence of health insurance, households resort to coping strategies such as family support, informal borrowing, and reducing investment in children's education.
- Enhanced health literacy is positively associated with health insurance adoption and better health outcomes, underscoring the importance of disseminating transparent information about insurance benefits.

5.2. Policy implications

1. Improving health financing

- The DRC government should increase its health budget to at least 15% of the total budget, as recommended by the Abuja Declaration. This would help achieve substantial financial protection for households and reduce the reliance on OOP expenses. The DRC must allocate more domestic resources to health, ensuring predictable and adequate funding for UHC initiatives. Leveraging innovative financing mechanisms and strengthening partnerships with international donors could enhance sustainability.
- There is a need for a more sustainable and predictable financing mechanism, including the introduction of mandatory pre-payment financing mechanisms such as taxes and government revenues.

2. Enhancing health insurance coverage

- The government, private sector, and donors should prioritise programs targeting provinces with low coverage and individuals without formal education to increase health insurance coverage.
- Implementing pilot projects for premium exemptions and subsidies for vulnerable populations in the short term and ensuring formal employment for the majority of the population in the long term could facilitate the proper collection of premiums and enhance coverage. Through tailored contributions, the government could also integrate informal sector workers into health insurance schemes.

3. Promoting financial inclusion and health literacy

- Efforts should be devoted to improving financial inclusion through sound regulation and supervision of the financial sector and promoting digital finance via mobile banking and financial education. Enhancing financial inclusion through increased access to banking services and digital financial tools could indirectly boost health insurance uptake. Policies encouraging savings and affordable credit could empower households to invest in health insurance.
- Public policy should focus on individuals without formal education by designing health insurance mechanisms that adapt to their needs and conducting awareness campaigns to disseminate simplified information about health insurance. Raising awareness about the benefits of health insurance and improving health literacy are critical. Community engagement campaigns should address misconceptions about insurance, emphasise its value, and foster trust in health systems.

4. Target intervention for vulnerable population

- The government should implement health insurance schemes that are affordable and beneficial for low-income households, involving sliding scale premiums based on income or government-subsidized programs for those in poverty.
- Enhanced health literacy campaigns should be designed to target less educated individuals, ensuring they understand and access health insurance benefits.

While this dissertation provides valuable insights into the progress and challenges of achieving Universal Health Coverage in the Democratic Republic of Congo, several limitations should be acknowledged.

This dissertation encounters several limitations primarily related to data quality and availability. While generally considered high-quality, the reliance on publicly available data from the WHO and World Bank is constrained by data acquisition challenges in fragile states like the DRC. The administrative capacities

in the DRC might be limited, leading to potential biases in the reported trends. Additionally, the use of cross-sectional data in Chapter Three restricts the ability to infer causality, and self-reported data may introduce misclassification and information bias, such as inaccuracies in reporting educational levels or health insurance status.

Moreover, the scope of analysis in this dissertation is predominantly quantitative, which may not fully capture the qualitative aspects of health insurance perceptions and experiences. Although Chapter Four includes interviews and focus group discussions, a more extensive qualitative approach could provide a richer context. The study's reliance on existing data sources also limits the ability to explore the nuanced, localised factors affecting health insurance uptake.

Future research should use higher-quality, longitudinal data, incorporate mixed-methods approaches, and focus on vulnerable populations to develop more effective and tailored policy interventions to address these limitations.

REFERENCE LIST

Adebayo, E. F., Olalekan A. Uthman, Charles S. Wiysonge, Erin A. Stern, Kim T. Lamont, & Ataguba, J. E. (2015). A systematic review of factors that affect uptake of community-based health insurance in low-income and middle-income countries. *BMC Health Services Research*, *15*(1), 1-13.

Agbadi, P., Joshua, O., Alberta, L., Henry, O. D., Abdul-Aziz, S., & Bright, O. A. (2021). Socioeconomic and demographic correlates of nonenrolment onto the national health insurance scheme among children in Ghana: Insight from the 2017/18 Multiple Indicator Cluster Survey. *Preventive Medicine Reports*, *22*.

Agyepong, I. A., Sewankambo, N., Binagwaho, A., Coll-Seck, A. M., T., C., Ezeh, A., & Piot, P. (2017). The path to longer and healthier lives for all Africans by 2030: the Lancet Commission on the future of health in sub-Saharan Africa. *Lancet*, *390(10114)*, 2803-2859.

Alatinga, K. A., Abiiro, G. A. K., Edmund, W. K., Emmanuel Kofi Gyan, Hsu, V., & Moyer, C. A. (2024). Burden of out-of-pocket payments for maternal healthcare and its catastrophic effects in the era of free maternal and child health policy in Ghana. *SSM-Health Systems*.

Alkema, L., Doris, C., Daniel, H., Sanqian, Z., Ann-Beth, M., Alison, G., & Doris, M. F. e. a. (2016). Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with

scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. *The Lancet*, *387*(10017), 462-474.

Allcock, S. H., Elizabeth, H. Y., & Manjinder, S. S. (2019). Sociodemographic patterns of health insurance coverage in Namibia. *International Journal for Equity in Health*, *18*(1), 1-11.

Amo-Adjei, J., Anku, P. J., Amo, H. F., & Effah, M. O. (2016). Perception of quality of health delivery and health insurance subscription in Ghana. *BMC Health Services Research*(16), 1-11.

Amoah, P. A., & David, R. P. (2018). Health literacy and health: rethinking the strategies for universal health coverage in Ghana. *Public Health*, *159*, 40-49.

Amu, H., & Dickson, K. S. (2016). Health insurance subscription among women in reproductive age in Ghana: do socio-demographics matter? *Health Economics Review*, 1-8.

Amu, H., Seidu, A.-A., Ebenezer Agbaglo, Robert Kokou Dowou, Edward Kwabena Ameyaw, Bright Opoku Ahinkorah, & Kissah-Korsah, K. (2021). Mixed effects analysis of factors associated with health insurance coverage among women in sub-Saharan Africa. *PLoS One*, *16*. https://doi.org/e0248411

Anaba, E. A., Akua, T., Foday, R. S., & Theopista, F. (2022). Factors associated with health insurance enrolment among ghanaian children under the five years. Analysis of secondary data from a national survey. *BMC Health Services Research*, *22*(1), 1-8.

Asante, D., Bismark Asante, B. A., Williams Agyemang-Duah, & Twumasi, M. A. (2022). Effect of financial services access on health services utilisation among rural older adults in Ghana. *International Journal of Social Welfare*, *31*(4), 492-505.

Barasa, E., Jacob, K., Peter, N., & Nirmala, R. (2021). Examining the level and inequality in health insurance coverage in 36 sub-Saharan African countries. *BMJ global health*, *4*.

Barroy, H., Francoise, A., Serge, M., & Hadia, S. (2014). Investing in universal health coverage: opportunities and challenges for health financing in the Democratic Republic of Congo.

Begg, D., Gianluigi Vernasca, Stanley Fischer, & Dornbusch, R. (2014). *EBOOK: Economics*.

Bertelsmann Stiftung, B. (2024). *Country Report — Congo, DR*.

Bolongaita, S., Yeeun Lee, K. A. J., Øystein A., H., Mieraf, T., Tolla, J. L., & Stéphane, V. (2023). Financial hardship associated with catastrophic out-of-pocket spending tied to primary care services in low-and lower-middle-income countries: findings from a modeling study. *BMC medicine*, *21*(356).

Braun, V., & Clarke, V. (2012). Thematic analysis. In H. E. In: Cooper, Paul M. Camic, A. T. Debra L. Long, D. E. R. Panter, & Kenneth J. Sher. (Eds.), *APA handbook of research methods in psychology*. Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological. American Psychological Association.

Braun, V., & Clarke, V. (2021). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*, *18*(3), 328–352. https://doi.org/https://doi.org/10.1080/14780887.2020.1769238

Burnham, K. P., & David, A. R. (2004). Multimodel Inference: Understanding AIC and BIC in Model Selection. *Sociological Methods & Research*, *33*(2), 261–304.

Byrne, D. (2022). A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Quality & quantity*, *56*(3), 1391-1412.

Call, K., Thiede, A. C., Giovann, A., Sarah, L. H., & Alisha, B. S. (2021). Health insurance literacy: how best to measure and does it matter to health care access and affordability? *Research in Social and Administrative Pharmacy*, *6*(17), 1166-1173.

Carrin, G., James, C., & Evans, D. (2005). *Achieving universal health coverage: developing the health financing system*. Geneva: World Health Organization

Chuma, J., & Maina, T. (2012). Catastrophic health care spending and impoverishment in Kenya. *BMC Health Services Research*(12), 1-9.

Churchill, S. A., & Marisetty, V. B. (2020). Financial inclusion and poverty: a tale of forty-five thousand households. *Applied Economics*, *52*(16), 1777-1788.

Comfort AB, Peterson LA, & LE, H. (2013). Effect of health insurance on the use and provision of maternal health services and maternal and neonatal health outcomes: a systematic review. *Journal of Health Population*, *31*, 81-105. https://doi.org/ https://doi.org/10.3329/jhpn.v31i4.2361

Cotlear, D., Nagpal, S., & Smith, O. (2015). *Going universal: how 24 developing countries are implementing universal health coverage from the bottom up*. World Bank Publications

Countrymeter. (2024). Democratic Republic of Congo Population. In *Democratic Republic of the Congo population (2024) live — Countrymeters*.

Criel, B., Waelkens, M.-P., & Kwilu Nappa, F. (2020). Can mutual health organisations influence the quality and the affordability of healthcare provision? The case of the Democratic Republic of Congo. *PLoS One*, *15*(4), e0231660.

Damian, D. J., Judges, Y. T., Beatrice, J., Rune, P., Michael, J. M., & Msuya, S. E. (2020). Factors influencing utilization of skilled birth attendant during childbirth in the Southern highlands, Tanzania: a multilevel analysis. *BMC pregnancy and childbirth*, *20*, 1-11.

Debie, A., Resham B., K., & Yibeltal, A. (2022). Successes and challenges of health systems governance towards universal health coverage and global health security: a narrative review and synthesis of the literature. *Health research policy and systems*, *20*(1).

Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). *Measuring financial inclusion and the fintech revolution.* (The Global Findex Database, Issue.

DHS. (2014). DRC: Demograhic Health Survey.

Dimbuene, Z. T., Raphael, M. N., & Kikhela, P.-D. N. (2022). Poverty, education and health insurance coverage among women of reproductive ages in the Democratic Republic of Congo: a cross-sectional and multilevel analysis. *BMJ open*, *12*.

Dong, H., Allegri, M. D., Gnawali, D., Souares, A., & Sauerborn, R. (2009). Drop-out analysis of community-based health insurance membership at Nouna, Burkina Faso. *Health policy*, *92*(2-3), 174-179.

Doris, O. A., Blerina Krasniq, Brady Hooley, Fabrizio Tediosi, & Fink., G. (2022). Equity in health insurance schemes enrollment in low and middle-income countries: A systematic review and meta-analysis. *International Journal for Equity in Health*, *21*(1), 1-12.

Dupas, P., & Robinson, J. (2013). Savings constraints and microenterprise development: Evidence from a field experiment in Kenya. *American Economic Journal: Applied Economics*, *5*(1), 163-192.

E, V. D., O, O. d., RP, R.-E., A, S., SR, A., & C, G. (2006). Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data.

Edward, J., Sarah, M., Fatma, M., Phillip, G., Mark, V. W., & Idali, T. (2018). The impact of health and health insurance literacy on access to care for Hispanic/Latino communities. *Public Health Nursing*, *3*(35), 176-183.

Erlangga, D., Marc Suhrcke, Shehzad Ali, & Bloor, K. (2019). The impact of public health insurance on health care utilisation, financial protection and health status in low-and middle-income countries: A systematic review. *PLoS One*, *14*(8).

Fenny, A. P., Yates, R., & Rachel, T. (2021). Strategies for financing social health insurance schemes for providing universal health care: a comparative analysis of five countries. *Global Health Action*, *14*(1).

Freeman, T., Hailay Abrha, G., Clare, B., Elsa, R. J. G., Jennie, P., David, S., . . . Fran, B. (2020). Why do some countries do better or worse in life expectancy relative to income? An analysis of Brazil, Ethiopia, and the United States of America. *International Journal for Equity in Health*, *19*, 1-19.

Furtado, K. S., Kaphingst, K. A., Perkins, H., & Politi, M. C. (2016). Health insurance information-seeking behaviors among the uninsured. *Journal of Health Communication*, *21*(2), 148-158.

Gabani, J., Sumit Mazumdar, & Suhrcke, M. (2022). The effect of health financing systems on health system outcomes: A cross-country panel analysis. *Health Economics*.

Garcia-Mandicó, S., Arndt, R., & Christoph, S. (2021). The social value of health insurance: Results from Ghana. *Journal of Public Economics*, *194*.

Gastwirth, J. L. (1972). The estimation of the Lorenz curve and Gini index. *The review of economics and statistics*, 306-316.

Gouda, H. N., Andrew, H., Raoul, B. I., Willibald, Z., & Eliana, J.-S. (2016). PLoS One 11. *The impact of healthcare insurance on the utilisation of facility-based delivery for childbirth in the Philippines*, *12*.

Govender, V., McIntyre, D., & Loewenson, R. (2008). *Progress towards the Abuja target for government spending on health care in East and Southern Africa*.

Habib SS, Perveen S, & Maqbool H, K. A. (2016). The role of micro health insurance in providing financial risk protection in developing countries-a systematic review. *BMC Public health*, *16*. https://doi.org/https://doi.org/10.1186/s12889-016-2937-9

Hoogeveen, J., & Utz, P. (2020). Data collection in fragile states: innovations from Africa and beyond. *Springer Nature*.

Ifeagwu, S. C., Yang, J. C., Parkes-Ratanshi, R., & Brayne, C. (2021). Health financing for universal health coverage in Sub-Saharan Africa: a systematic review. *Global health research and policy*, *6*, 1-9.

Ingram, D. D., Malec, D. J., & Makuc, D. M. (2018). National center for health statistics guidelines for analysis of trends.

Islam, A., & Pushkar, M. (2012). Health shocks and consumption smoothing in rural households: Does microcredit have a role to play? *Journal of development economics*, *2*(97), 232-243.

Jetter, M., Sabine, L., & David, S. (2019). The intimate link between income levels and life expectancy: global evidence from 213 years. *Social Science Quarterly*, *100*(4), 1387-1403.

Kabinda, J., Mitashi, P., & Chenge, F. (2017). Couverture sanitaie universelles (CSU): comment financer l'inclusion du secteur informel en République Démocratique du Congo (RDC).

Kansanga, M. M., Joseph Asumah Braimah, Antabe, R., Yuji Sano, E. K., & Luginaah, I. (2018). Examining the association between exposure to mass media and health insurance enrolment in Ghana. *The International journal of health planning and management*, *33*(2). https://doi.org/e531-e540

Kazungu, J. S., & Edwine, W. B. (2017). Examining levels, distribution and correlates of health insurance coverage in Kenya. *Tropical Medicine & International Health*, *22*(9), 1175-1185.

Khan, S. M., & Singh, K. (2016). The association between health insurance coverage and skilled birth attendance in Ghana: a national study. *Maternal and child health journal*, *20*, 534-541.

Khatri, R. B., Aklilu, E., Daniel, E., Eskinder, W., Frehiwot, N., Anteneh, Z., & Assefa, Y. (2024). Enablers and barriers of community health programs for improved equity and universal coverage of primary health care services: A scoping review. *BMC primary care*, *25*(1), 35.

Kimani, J. K., Remare, E., Charlotte, W., & Ben, B. (2014). Determinants of health insurance ownership among women in Kenya: evidence from the 2008–09 Kenya demographic and health survey. *International journal for equity in health*, *13*(1), 1-8.

Ko, H., Hwajun Kim, C.-g. Y., & Kim, C.-y. (2018). Social capital as a key determinant of willingness to join community-based health insurance: a household survey in Nepal. *Public Health*, *160*, 52-61.

Kumbeni, M. T., Afaya, A., & Apanga, P. A. (2023). An assessment of out of pocket payments in public sector health facilities under the free maternal healthcare policy in Ghana. *Health Economics Review*, *13*(1), 8.

Kutzin, J. (2012). Anything goes on the path to universal health coverage?

Lagomarsino, G., Alice Garabrant, Atikah Adyas, Richard Muga, & Otoo., N. (2012). Moving towards universal health coverage: health insurance reforms in nine developing countries in Africa and Asia. *The Lancet*, *380*(9845), 933-943.

Laokri, S., Rieza, S., & David, R. H. (2018). Assessing out-of-pocket expenditures for primary health care: how responsive is the Democratic Republic of Congo health system to providing financial risk protection? *BMC Health Services Research*, *18*, 1-19.

Le Gargasson, J. B., Breugelmans, J. G., Mibulumukini, B., Da Silva, A., & Colombini, A. (2013). Sustainability of National Immunization Programme (NIP) performance and financing following Global Alliance for Vaccines and Immunization (GAVI) support to the Democratic Republic of the Congo *Vaccine*, *31(15)*, 1886-1891.

LEAD, A. (2020). *The Importance of Universal Health Care in Improving Our Nation's Response to Pandemics and Health Disparities*.

Levy, H., & David, M. (2008). The impact of health insurance on health. *Annu. Rev. Public Health*, *29*(1), 399-409.

Liao, P., Xun, Z., & Wanlu, Z. (2022). Endogenous health risks, poverty traps, and the roles of health insurance in poverty alleviation. *Health Economics Review*, *12*(1).

Liu, L., Shefali, O., Dan, H., Yue, C., Jamie, P., Jun, Z., . . . Black, R. E. (2016). Global, regional, and national causes of under-5 mortality in 2000–15: an updated systematic analysis with implications for the Sustainable Development Goals. *The Lancet*, *388*(10063), 3027-3035.

Lordemus, S. (2022). Does Aid for Malaria Increase with Exposure to Malaria Risk? Evidence from Mining Sites in the DR Congo. *Oxford Bulletin of Economics and Statistics*.

Makali, S. L., Malembaka, E. B., Lambert, A.-S., Karemere, H. B., Eboma, C. M., Mwembo, A. T., . . . Macq, J. (2021). Comparative analysis of the health status of the population in six health zones in South Kivu: a cross-sectional population study using the WHODAS. *Conflict and health*(15), 1-11.

Mann, H. B., & Donald, R. W. (1947). On a Test of Whether One of Two Random Variables Is Stochastically Larger Than the Other. *The Annals of Mathematical Statistics*, 50-60.

Maritim, B., Koon, A. D., Kimaina, A., Lagat, C., Riungu, E., Laktabai, J., . . . Goudge, J. (2023). It is like an umbrella covering you, yet it does not protect you from the rain": a mixed methods study of insurance affordability, coverage, and financial protection in rural western Kenya. *International Journal for Equity in Health*, *22*(1).

McIntyre, D., Obse, A. G., Barasa, E. W., & Ataguba., J. E. (2018). *Challenges in financing universal health coverage in sub-Saharan Africa*. Oxford research encyclopedia of economics and finance.

Meda, I. B., Baguiya, A., Ridde, V., Ouédraogo, H. G., Dumont, A., & Kouanda, S. (2019). Out-of-pocket payments in the context of a free maternal health care policy in Burkina Faso: a national cross-sectional survey. *Health Economics Review*, *9*, 1-14.

Ministère de la Santé Publique. (2016). *Plan national de développement sanitaire 2016–2020: vers la couverture sanitaire universelle*.

Ministère de la santé publique de la RDC. (2010). *Plan Nationalde Développement Sanitaire 2011-2015*.

Mitchell, P., Alan, C., Vikki, E., & Guddi, S. (2021). Pushing poverty off limits: quality improvement and the architecture of healthcare values. *BMC Medical Ethics*, *22*, 1-13.

Moran, J. L., John D., S., Graeme J., D., & Australian & New Zealand Intensive Care Society (ANZICS), C. F. O. R. E. C. (2021). Modelling hospital outcome: problems with endogeneity. *BMC Medical Research Methodology*, *21*(1), 124.

Moreno-Serra, R., & Smith, P. C. (2012). Does progress towards universal health coverage improve population health? *The Lancet*, *380*(9845), 917-923.

Muggeo, V. M. R. (2003). Estimating Regression Models with Unknown Break-Points. *Statistics in Medicine*, *22*(19), 3055–3071. https://doi.org/https://doi.org/10.1002/sim.1545

Muggeo, V. M. R. (2008). Segmented: An r Package to Fit Regression Models with Broken-Line Relationships.". *R News*, *1*(8), 20-25.

Nations, U. (2015). *Global strategy for women's, children's and adolescent health: 2016–2030*. New York

Njagi, P., Arsenijevic, J., & Groot, W. (2018). Understanding variations in catastrophic health expenditure, its underlying determinants and impoverishment in sub-Saharan African countries: a scoping review. *Systematic reviews*, *7*(1), 1-23.

Ntembwa, H. K., & Lerberghe, W. V. (2015). *Improving health system efficiency. Democratic Republic of the Congo. Improving aid coordination in the health sector. Health Systems Governance & Financing*.

Nyamugira, A. B., Richter, A., Germaine, F., & Flessa, S. (2022). Towards the achievement of universal health coverage in the Democratic Republic of Congo: does the Country walk its talk? *BMC Health Services Research*, *22*(1), 1-13.

Nyamugira, A. B., Steffen, F., & Adrian, R. (2024). Health insurance uptake, poverty and financial inclusion in the Democratic Republic of Congo. *Sustainable Development*, *32*(4), 3293-3312.

Observatoire Congolais du Développement Durable, & Institut National de la Statistique. (2021). *Enquête par Grappes à Indicateurs des ODD, 2020 : Rapport final*.

Ofosu-Mensah Ababio, J., Edward Attah-Botchwey, Eric Osei-Assibey, & Barnor, C. (2021). Financial inclusion and human development in frontier countries. *International Journal of Finance & Economics*, *26*(1), 42-59.

Okedo-Alex, I. N., Ifeyinwa Chizoba Akamike, O. B. E., & Chigozie, J. U. (2019). A review of the incidence and determinants of catastrophic health expenditure in Nigeria: Implications for universal health coverage. *The International journal of health planning and management*, *34*(4).

Onwujekwe, O., Hanson, K., & Uzochukwu, B. (2010). Are malaria treatment expenditures catastrophic to different socio-economic and geographic groups and how do they cope with payment? A study in southeast Nigeria. *Tropical Medicine & International Health*, 18-25.

Onwujekwe, O., Hanson, K., & Uzochukwu, B. (2012). Examining inequities in incidence of catastrophic health expenditures on different healthcare services and health facilities in Nigeria. *PLoS One*, *7*(7), e40811.

Opwora, A., Evelyn, W., Toda, M., Noor, A., Edwards, T., Fegan, G., . . . Goodman, C. (2015). Implementation of patient charges at primary care facilities in Kenya: implications of low adherence to user fee policy for users and facility revenue. *Health Policy and Planning*, *30*(4), 508-517.

Ouadika, S. A. B. (2020). Health shocks and vulnerability to poverty in Congo. *Humanities and Social Sciences Communications*, *7*(1), 1-8.

Pignone, M., Darren, A. D., Stacey, S., Nancy, B., & Kathleen, N. L. (2005). Interventions to improve health outcomes for patients with low literacy: A systematic review. *Journal of general internal medicine*(20), 185-192.

Prina, S. (2015). Banking the poor via savings accounts: Evidence from a field experiment. *Journal of development economics*, *115*, 16–31.

Puzo, Q., Ping, Q., & Lars, M. (2016). Long-Term Trends of Suicide by Choice of Method in Norway: A Joinpoint Regression Analysis of Data from 1969 to 2012. *BMC Public health*, *16*(1), 1–9.

R Core Team. (2021). R: A Language and Environment for Statistical Computing. https://doi.org/https://www.R-project.org/.

Rahman, T., Dominic Gasbarro, & Alam, K. (2022). Financial risk protection from out-of-pocket health spending in low-and middle-income countries: a scoping review of the literature. *Health research policy and systems*, *20*(1), 1-23.

Ranabhat, C. L., Shambhu, P. A., Chiranjivi, A., & Chun-Bae, K. (2023). Universal health coverage evolution, ongoing trend, and future challenge: a conceptual and historical policy review. *Frontiers in public health*, *11*(1041459).

Russell, S. (2004). The economic burden of illness for households in developing countries: a review of studies focusing on malaria, tuberculosis, and human immunodeficiency virus/acquired immunodeficiency syndrome. The Intolerable Burden of Malaria II. *American Journal of Tropical Medicine and Hygiene*.

Salari, P., Akweongo, P., Moses Aikins, & Tediosi, F. (2019). Determinants of health insurance enrolment in Ghana: evidence from three national household surveys. *Health Policy and Planning*, *34*(8), 582-594.

Sarkar, U., Andrew, J. K., Jennifer, Y. L., Nancy, E. A., Robert, N., Andrea, L., & Dean, S. (2010). The literacy divide: health literacy and the use of an internet-based patient portal in an integrated health system results from the Diabetes Study of Northern California (DISTANCE). *Journal of Health Communication*(15), 183-196.

Sasidharan, S., & Harpreet, S. D. (2022). A Snapshot of Poverty, Diseases and war–the Democratic Republic of the Congo. *Disaster Medicine and Public Health Preparedness*, *16*(5), 1765-1768.

Savedoff, W. D., Ferranti, D. d., Amy, L. S., & Victoria, F. (2012). Political and economic aspects of the transition to universal health coverage. *The Lancet*, *380*(9845), 924-932.

Schneider, P. (2004). Why should the poor insure? Theories of decision-making in the context of health insurance. *Health Policy and Planning*, *19*(6), 349-355.

Shao, L., Yiting Wang, X. W., Ji, L., & Huang, R. (2022). Factors associated with health insurance ownership among women of reproductive age: a multicountry study in sub-Saharan Africa. *PLoS One*, *17*(4). https://doi.org/e0264377

Smith, E. R., Pamela Espinoza, M. M., Osondu Ogbuoji, C. C.-C., Henry E., R., & Shrime, M. G. (2024). Modeling the global impact of reducing out-of-pocket costs for children's surgical care. *PLOS Global Public Health*, *4*(1).

Sommers, B. D., Buchmueller, T., Decker, S. L., Carey, C., & Kronick, R. (2013). The Affordable Care Act has led to significant gains in health insurance and access to care for young adults. *Health affairs*, *32*(1), 165-174.

Strupat, C., & Florian, K. (2018). Crowding out of solidarity? Public health insurance versus informal transfer networks in Ghana. *World Development*(104), 212-221.

Taljaard, M., Mckenzie, J. E., & Ramsay, C. R. (2014). The use of segmented regression in analysing interrupted time series studies: an example in pre-hospital ambulance care. *Implementation Science*, *9*, 1-4.

Tiwari, R. C., Cronin, K. A., William, D., Eric, J. F., Binbing, Y., & Siddhartha, C. (2005). Bayesian Model Selection for Join Point Regression with Application to Age-Adjusted Cancer Rates. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, *54*(5), 919–939.

UNDP. (2002). *Financing the development goals: An analysis of Tanzania, Cameroon, Malawi, Uganda and Philippines*.

Van Hees, S. G., Timothy, O. F., Miranda, H., Marleen, D., Sarah, P., Lena, M. B., & Ernst, J. S. (2019). Leaving no one behind? Social inclusion of health insurance in low-and middle-income countries: a systematic review. *International journal for equity in health*, *18*, 1-19.

Wagstaff, A. (2010). Social health insurance reexamined. *Health Economics*, *19*(5), 503-517.

Werner, R., Dimitar, V., Dimitar, D., & Veneta, G. (2015). Study of Structural Break Points in Global and Hemispheric Temperature Series by Piecewise Regression. *Advances in Space Research*, *56*(11), 2323–2334. https://doi.org/https://doi.org/https://doi.org/10.1016/j.asr.2015.09.007

Wilcoxon, F. (1992). Individual Comparisons by Ranking Methods. *In Breakthroughs in Statistics*(Springer), 196–202.

World Bank Group. (2015). *The Little Data Book on Financial Inclusion*.

World Health Organisation. (2010a). *The Abuja declaration: ten years on*.

World Health Organisation. (2010b). *Health Systems Financing: The Path to Universal Coverage*.

Worldometer. (2024). World population. In: DR Congo Population (2024) - Worldometer.

Xiao, W., & Tao, R. (2022). Financial Inclusion and Its Impact on Health: Empirical Evidence From Asia. *Frontiers in public health*, *10*.

Xu, J., Lin, Y., Yang, M., & Zhang, L. (2020). Statistics and Pitfalls of Trend Analysis in Cancer Research: A Review Focused on Statistical Packages. *Journal of Cancer*, *11*(10), 2957.

Xu, K., Evans, D. B., Kawabata, K., Zeramdini, R., Klavus, J., & Murray, C. J. L. (2003). Household catastrophic health expenditure: a multicountry analysis. *Lancet*, *362(9378)*, 111-117.

Yagi, B. F., Jamie, E. L., Aaron, M. S., Madeline, R. F., Judith, E. S., & Renuka, T. (2022). Association of health insurance literacy with health care utilization: a systematic review. *Journal of general internal medicine*, 1-15.

Zou, Q., Xiaoqun He, Zhong Li, W. X., & Liang, Z. (2019). The effects of poverty reduction policy on health services utilization among the rural poor: a quasi-experimental study in central and western rural China. *International Journal for Equity in Health*, *18*, 1-11.

Research Papers

Research Paper 1: Towards the achievement of Universal Health Coverage in the Democratic Republic of Congo: Does the country walk its talk?

DOI: https://doi.org/10.1186/s12913-022-08228-3

Research Paper 2: Health Insurance Uptake, Poverty and Financial Inclusion in the Democratic Republic of Congo.

DOI: **https://doi.org/10.1002/sd.2841**

Research Paper 3: Exploring health insurance as a financial buffer in Maternal and Child Health in the Democratic Republic of Congo.

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