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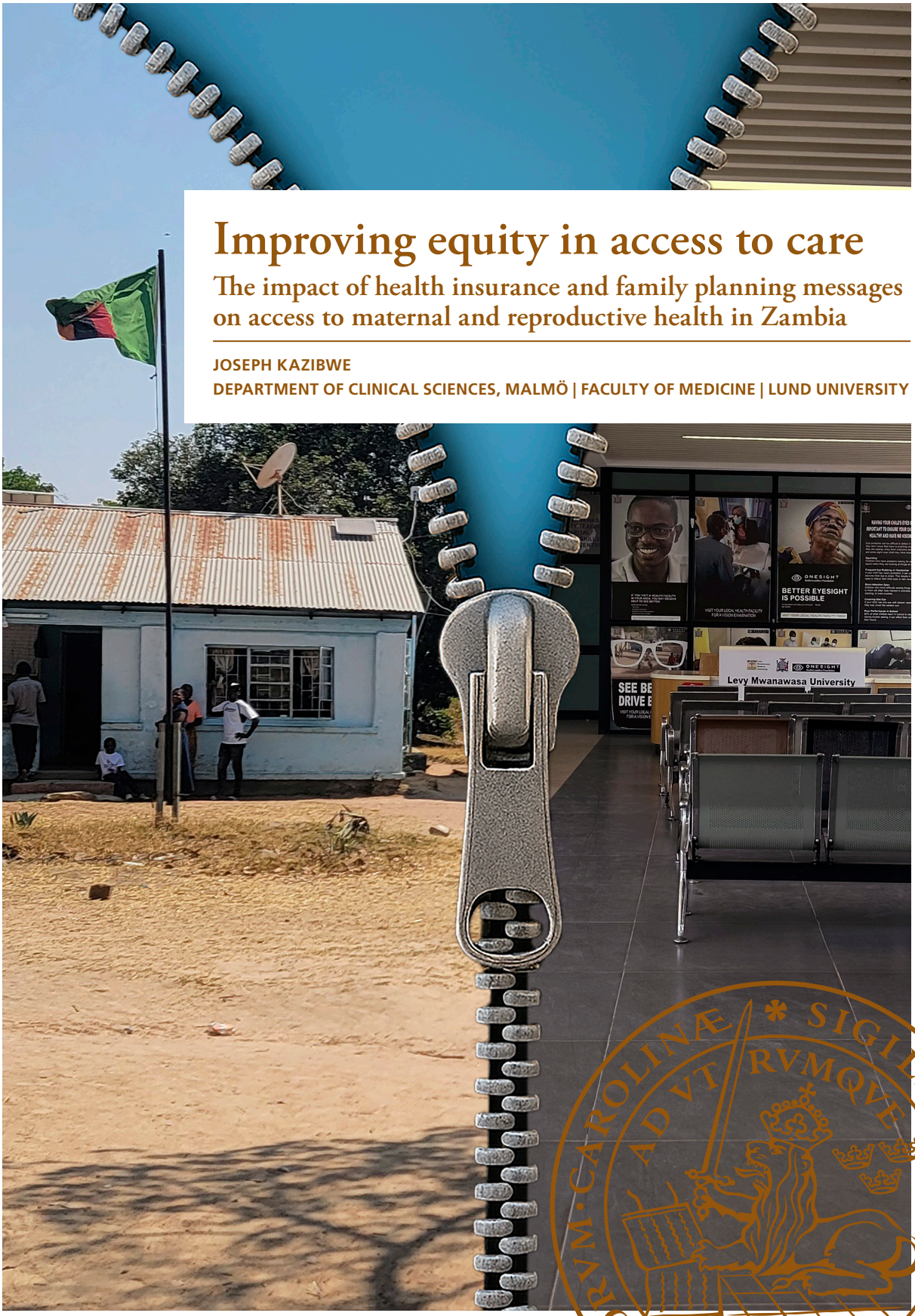


# Improving equity in access to care

## The impact of health insurance and family planning messages on access to maternal and reproductive health in Zambia

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Improving equity in access to care

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## The impact of health insurance and family planning messages on access to maternal and reproductive health in Zambia

Joseph Kazibwe

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DOCTORAL DISSERTATION

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**Author:** Joseph Kazibwe

**Title and subtitle:** Improving equity in access to care: The impact of health insurance and family planning messages on access to maternal and reproductive health in Zambia

**Abstract:**

**Introduction:** Equitable access to maternal and reproductive health (MRH) services remains a major challenge in low- and lower-middle-income countries (LLMICs), including Zambia. Despite health system reforms such as the National Health Insurance Scheme (NHIS) and family planning (FP) communication strategies, disparities persist, particularly among socioeconomically disadvantaged populations. This thesis investigates the impact of health insurance and FP message delivery on MRH service utilisation and equity in Zambia to generate evidence to inform policy and improve access to essential health services like contraception, antenatal care (ANC), delivery care, and postnatal care (PNC).

**Methods:** To address the aim of this thesis, several methods were used. Study I was a systematic review of peer reviewed literature published between 2010 and 2023, assessing the impact of not-for-profit health insurance on MRH service utilisation and financial protection in LLMICs. Study II analysed Zambia Demographic and Health Survey (DHS) data from 2007, 2013/14, and 2018 (N=19,973 sexually active women aged 15 – 49) to assess inequality and inequity in modern contraceptive use and unmet need using Erreygers Concentration Index (EI) and decomposition analysis. Study III used causal inference methods (logistic regression, augmented inverse probability weighting [AIPW]) to estimate the impact of FP message delivery modes, mass media, counselling, and both, on contraceptive use (N=19,958). Study IV involved qualitative interviews with 21 stakeholders involved in NHIS implementation, analysed using inductive content analysis in NVivo 14.

**Results:** This review found that health insurance significantly increased MRH service utilisation in LLMICs, particularly facility-based delivery (up to 20.3 percentage points), ≥4 ANC visits (2–11 percentage points), and skilled birth attendance. However, it had limited impact on early ANC, PNC, and contraceptive use. Financial protection improved in some contexts, with notable reductions in out-of-pocket expenditure (e.g., Indonesia: 1,136,966 Indonesian Rupiah for non-contributory insurance). In Zambia, modern contraceptive use increased from 37.3% in 2007 to 49.8% in 2018, while unmet need rose to 19.8%. Inequality in contraceptive use was pro-rich (EI declining from 0.2046 to 0.1124), and unmet need was pro-poor (EI from –0.0484 to –0.0427). Education and contraceptive counselling reduced inequality, while living with a partner increased it. FP messages delivered via counselling and mass media significantly increased contraceptive use. AIPW estimates showed average treatment effects (ATE) of 3.4% for mass media, 14.6% for counselling, and 17.1% for both. However, exposure to FP messages declined over time, especially mass media (from 43.95% in 2007 to 22.88% in 2018). Logistic regression confirmed the highest odds of contraceptive use among those exposed to both counselling and mass media (AOR=1.73), followed by counselling alone (AOR=1.47), and mass media (AOR=1.18). Stakeholder interviews revealed implementation challenges for NHIS, including political interference, exclusion of poor and informal sector populations, urban bias in provider accreditation, and financial sustainability concerns. Participants emphasized the need for reforms to improve equity and efficiency.

**Conclusion:** Health insurance and FP communication strategies positively influence MRH service utilisation and equity, but their impact is uneven across socioeconomic groups. Insurance schemes should be redesigned to include vulnerable populations, and FP messaging should prioritize high-quality counselling and integrated delivery approaches. Persistent inequalities in contraceptive use and unmet need highlight the need for targeted, context-sensitive interventions. Strengthening governance, expanding coverage, and monitoring equity outcomes are essential for Zambia and similar LLMICs to achieve universal health coverage and improve maternal health outcomes.

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*Dedication: To all those that lost a loved one because they could not access or pay for the healthcare they needed.*

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# Abstract


**Introduction**

Equitable access to maternal and reproductive health (MRH) services remains a major challenge in low- and lower-middle-income countries (LLMICs), including Zambia. Despite health system reforms such as the National Health Insurance Scheme (NHIS) and family planning (FP) communication strategies, disparities persist, particularly among socioeconomically disadvantaged populations. This thesis investigates the impact of health insurance and FP message delivery on MRH service utilisation and equity in Zambia to generate evidence to inform policy and improve access to essential health services like contraception, antenatal care (ANC), delivery care, and postnatal care (PNC).

**Methods**

To address the aim of this thesis, several methods were used. Study I was a systematic review of peer reviewed literature published between 2010 and 2023, assessing the impact of not-for-profit health insurance on MRH service utilisation and financial protection in LLMICs. Study II analysed Zambia Demographic and Health Survey (DHS) data from 2007, 2013/14, and 2018 (N=19,973 sexually active women aged 15 – 49) to assess inequality and inequity in modern contraceptive use and unmet need using Erreygers Concentration Index (EI) and decomposition analysis. Study III used causal inference methods (logistic regression, augmented inverse probability weighting [AIPW]) to estimate the impact of FP message delivery modes, mass media, counselling, and both, on contraceptive use (N=19,958). Study IV involved qualitative interviews with 21 stakeholders involved in NHIS implementation, analysed using inductive content analysis in NVivo 14.

**Results**

This review found that health insurance in LLMICs significantly increased MRH service utilisation, particularly facility-based delivery (up to 20.3 percentage points), ≥4 ANC visits (2–11 percentage points), and skilled birth attendance. However, it had limited impact on early ANC, PNC, and contraceptive use. Financial protection improved in some contexts, with notable reductions in out-of-pocket expenditure (e.g., Indonesia: 1,136,966 Indonesian Rupiah for non-contributory insurance). In Zambia, modern contraceptive use increased from 37.3% in 2007 to 49.8% in 2018, while unmet need rose to 19.8%. Inequality in

contraceptive use was pro-rich (EI declining from 0.2046 to 0.1124), and unmet need was pro-poor (EI from –0.0484 to –0.0427). Education and contraceptive counselling reduced inequality, while living with a partner increased it. FP messages delivered via counselling and mass media significantly increased contraceptive use. AIPW estimates showed average treatment effects (ATE) of 3.4% for mass media, 14.6% for counselling, and 17.1% for both. However, exposure to FP messages declined over time, especially mass media (from 43.95% in 2007 to 22.88% in 2018). Logistic regression confirmed the highest odds of contraceptive use among those exposed to both counselling and mass media (AOR=1.73), followed by counselling alone (AOR=1.47), and mass media (AOR=1.18). Stakeholder interviews revealed implementation challenges for NHIS, including political interference, exclusion of poor and informal sector populations, urban bias in provider accreditation, and financial sustainability concerns. Participants emphasized the need for reforms to improve equity and efficiency.

**Conclusion**

Health insurance and FP communication strategies positively influence MRH service utilisation and equity, but their impact is uneven across socioeconomic groups. Insurance schemes should be redesigned to include vulnerable populations, and FP messaging should prioritize high-quality counselling and integrated delivery approaches. Persistent inequalities in contraceptive use and unmet need highlight the need for targeted, context-sensitive interventions. Strengthening governance, expanding coverage, and monitoring equity outcomes are essential for Zambia and similar LLMICs to achieve universal health coverage and improve maternal health outcomes.

# Abbreviations

| | |
|---|---|
| AAAQ | Availability, Accessibility, Acceptability, and Quality Framework |
| AI | Artificial Intelligence |
| AIPW | Augmented Inverse Probability Weighting |
| ANC | Antenatal care |
| AOR | Adjusted Odds Ratio |
| ATE | Average Treatment Effects |
| CBHI | Community-Based Health Insurance |
| CCI | Corrected Concentration Index |
| CHE | Current Health Expenditure |
| CI | Concentration Index |
| DHO | District Health Office |
| DHS | Demographic Health Survey |
| EI | Erreygers Concentration Index |
| FLS | Family Life Survey |
| FP | Family Planning |
| GDP | Gross Domestic Product |
| HTA | Health Technology Assessment |
| IPW | Inverse Probability Weighting |
| IUDs | Intrauterine Devices |
| LAM | Lactational Amenorrhea Method |
| LLMICs | Low- and Lower-Middle-Income Countries |
| LMICs | Low- and Middle-Income Countries |
| MICS | Multiple Indicator Cluster Surveys |
| MMR | Maternal Mortality Ratio |

| | |
|---|---|
| MoH | Ministry of Health |
| MRH | Maternal and Reproductive Health |
| NCDs | Non-Communicable Diseases |
| NHIF | National Health Insurance Fund |
| NHIMA | National Health Insurance Management Authority |
| NHIS | National Health Insurance Scheme |
| OOP | Out of Pocket |
| OOPE | Out of Pocket Expenditure |
| PFHI | Publicly Funded Health Insurance |
| PICO | Population, Intervention, Control and Outcome |
| PNC | Postnatal Care |
| PPP | Purchasing Power Parity |
| PRISMA | Preferred Reporting Items for Systematic Reviews and Meta-Analysis |
| PSM | Propensity Score Matching |
| RIF | Regression of Recentred Influence Function |
| ROBINS-I | Risk of Bias in Non-randomised Studies of Interventions |
| SDGs | Sustainable Development Goals |
| SHI | Social Health Insurance |
| SSA | Sub Saharan Africa |
| UHC | Universal Health Coverage |
| USAID | United States Agency for International Development |
| USD | United States Dollars |
| WHO | World Health Organization |
| ZamStats | Zambia Statistics Agency |
| ZDHS | Zambia Demographic and Health Survey |
| ZMW | Zambian Kwacha |

# Populärvetenskaplig sammanfattning

I Zambia, liksom i många låg- och lägre medelinkomstländer, är tillgången till mödra- och reproduktiv hälsa (MRH) fortfarande ojämlik. Trots reformer som införandet av en nationell sjukförsäkring (NHIS) och satsningar på familjeplaneringskommunikation, kvarstår stora skillnader i vårdanvändning mellan olika samhällsgrupper. Denna doktorsavhandling undersöker hur sjukförsäkring och familjeplaneringsbudskap påverkar tillgången till MRH-tjänster, med särskilt fokus på jämlikhet.

Avhandlingen bygger på fyra studier. Den första är en systematisk översikt av 17 studier från Afrika och Asien som visar att sjukförsäkring generellt ökar användningen av vård vid graviditet och förlossning. Kvinnor med försäkring hade större sannolikhet att få minst fyra mödravårdsbesök, föda på vårdinrättning och få hjälp av utbildad personal. Däremot var effekten på preventivmedelsanvändning, eftervård och ekonomiskt skydd mindre tydlig.

Den andra studien analyserade data från nästan 20 000 kvinnor i Zambia mellan 2007 och 2018. Resultaten visar att användningen av moderna preventivmedel ökade från 37% till nästan 50%, men att behovet av preventivmedel som inte tillgodoses också ökade. Dessutom var preventivmedelsanvändning vanligare bland rika kvinnor, medan ouppfyllda behov var vanligare bland fattiga. Utbildning och rådgivning minskade ojämlikheten, medan samboende ökade den.

Den tredje studien undersökte hur olika sätt att kommunicera familjeplaneringsbudskap påverkar användningen av preventivmedel. Budskap via massmedia, rådgivning eller båda metoder ökade användningen, men rådgivning hade störst effekt. Kombinationen av rådgivning och massmedia gav den största ökningen (+17 procentenheter), medan massmedia ensam hade minst effekt (+3 procentenheter). Över tid minskade exponeringen för budskap, särskilt via massmedia, vilket kan bero på förändrade medievanor.

Den fjärde studien bestod av intervjuer med 21 nyckelpersoner inom NHIS. De lyfte fram flera utmaningar: politisk påverkan, bristande inkludering av fattiga och informella arbetare, urban snedfördelning av vårdgivare och ekonomisk ohållbarhet. Många ansåg att privata vårdgivare gynnades mer än offentliga, trots att de senare betjänar majoriteten av befolkningen.

Sammanfattningsvis visar avhandlingen att sjukförsäkring och familjeplaneringskommunikation kan förbättra tillgången till MRH-tjänster, men att effekten varierar beroende på individens socioekonomiska bakgrund och hur insatserna genomförs. För att uppnå jämlik vård rekommenderas att försäkringssystem utformas så att de inkluderar utsatta grupper, att rådgivning prioriteras, att kommunikationsstrategier kombineras och att insatserna följs upp med fokus på jämlikhet.

# Popular science summary

In Zambia and many other low- and lower-middle-income countries (LLMICs), access to maternal and reproductive health (MRH) services remains a major challenge. Despite global commitments to Universal Health Coverage (UHC), many women still face financial, geographic, and social barriers to essential services like contraception, antenatal care (ANC), delivery care, and postnatal care (PNC). This doctoral thesis explores how health insurance and family planning (FP) communication strategies affect access to MRH services in Zambia, with a particular focus on equity.

**What was studied?**

The thesis is based on four interconnected studies using both quantitative and qualitative methods. It draws on data from nearly 20,000 women aged 15–49 from Zambia's Demographic and Health Surveys (DHS) conducted in 2007, 2013/14, and 2018. It also includes a systematic review of 17 studies from LLMICs and interviews with 21 stakeholders involved in Zambia's National Health Insurance Scheme (NHIS).

**Key findings**

*1. Health insurance improves access but unevenly*

Health insurance in LLMICs was found to significantly increase the use of MRH services, especially facility-based deliveries (up to 20.3 percentage points), receiving at least four ANC visits (2–11 percentage points), and skilled birth attendance. However, it had limited impact on early ANC visits, PNC, and contraceptive use. In some countries, insurance reduced out-of-pocket expenses, for example, in Indonesia, non-contributory insurance saved women over 1 million Indonesian Rupiah.

Importantly, the benefits of insurance were not equally distributed. Wealthier and urban populations were more likely to be enrolled and benefit, while poorer and rural populations were often excluded. In Zambia, the NHIS has struggled to include informal sector workers and the poor, raising concerns about equity.

*2. Contraceptive use is rising, but inequality and inequity persist*

Between 2007 and 2018, modern contraceptive use in Zambia increased from 37.3% to 49.8%. However, unmet need for contraception also rose to nearly 20%. The thesis found that contraceptive use was more common among wealthier women (pro-rich inequality), while unmet need was concentrated among poorer women

(pro-poor inequity). Education and access to contraceptive counselling helped reduce inequality, while living with a partner tended to increase it, possibly due to limited decision-making autonomy in relationships.

*3. Access to family planning messages is advantageous especially through counselling*

Study III examined how different modes of delivering FP messages like mass media, counselling by health workers, or both affected contraceptive use. All methods increased use, but receiving FP messages through both counselling and mass media had the strongest impact (17.1 percentage points), followed by counselling (14.6 percentage points). Mass media alone had a modest effect (3.4 percentage points).

However, exposure to FP messages through mass media declined sharply over time, from 44% in 2007 to just 23% in 2018. Counselling was more common among poorer women, while mass media reached wealthier groups. This suggests that counselling is not only more effective but also likely to be more equitable.

*4. Stakeholders raise concerns about Zambia's NHIS*

Interviews with NHIS stakeholders revealed several challenges. Political interference was seen as a major barrier to effective implementation. The scheme was also criticized for excluding poor and informal sector populations and favouring urban private providers over public ones. Financial sustainability was another concern, with health insurance premium collections falling short of reimbursement needs.

Stakeholders called for reforms to improve equity, efficiency, and transparency in the NHIS, including better provider accreditation, standardized tariffs, and stronger monitoring.

**Why does this matter?**

The thesis highlights that while health insurance and FP communication strategies can improve access to MRH services, their impact is not evenly felt. Without deliberate efforts to include marginalized groups, these interventions risk widening existing inequities.

For Zambia and similar countries, the findings suggest that:

- Insurance schemes must be redesigned to include poor and informal sector populations.
- FP messaging should prioritize high-quality counselling and integrated delivery approaches.
- Monitoring and evaluation systems should track equity outcomes, not just overall service use.
- Governance reforms are needed to ensure transparency and financial sustainability.

### What's missing and what's next?

The thesis identifies several research gaps:

- More studies are needed on the long-term impact of health insurance on MRH and financial protection.
- The declining impact of the modes of delivery of FP messages, especially mass media, needs further investigation.
- The impact of different types of FP counselling and digital communication platforms on modern contraception should be explored.
- Cost-effectiveness of using combined modes of delivery of FP messages (e.g., counselling and mass media) on modern contraception remains unknown.

### Conclusion

This thesis provides valuable insights into how health financing and communication strategies can improve maternal and reproductive health in Zambia. It shows that progress is possible but only if equity is placed at the center of reform. By expanding coverage, investing in counselling, and adapting communication strategies, Zambia and other LLMICs can move closer to achieving health for all.

# List of papers

**Study I: Kazibwe**, **J.**, Tran, PB., Kaiser, AH., Kasagga, SP., Masiye, F., Ekman, B., Sundewall, J. (2024). The impact of health insurance on maternal and reproductive health service utilisation and financial protection in low- and lower middle-income countries: a systematic review of the evidence, BMC Health Service Research, 24(1), 432. https://doi.org/10.1186/s12913-024-10815-5

**Study II: Kazibwe, J.,** Masiye, F., Klingberg-Allvin, M., Ekman, B., & Sundewall, J. (2024). Inequality in modern contraceptive use and unmet need for contraception among women of reproductive age in Zambia. A trend and decomposition analysis 2007–2018, BMC Reproductive Health, 21(181) (2024). https://doi.org/10.1186/s12978-024-01909-8

**Study III: Kazibwe, J.**, Sundewall, J., Masiye, J., Kolak, M., Klingberg-Allvin, M., Ekman, B. (2025). Impact of family planning messages on modern contraceptive use. An observational study of women of reproductive age in Zambia 2007 – 2018 *(Manuscript)*

**Study IV: Kazibwe, J.**, Sundewall, J., Masiye, F., Owusu, L., Tran, PB., Chama-Chiliba, CM., Ekman, B., Svensson, P. (2025). Equity and financial sustainability in question: A qualitative study of stakeholders' perceptions towards the implementation of the National Health Insurance Scheme in Zambia. *(Manuscript)*

# Preface

This thesis is the culmination of years of research, reflection, and collaboration aimed at understanding and improving equity in access to maternal and reproductive health (MRH) services in Zambia. The journey began with a simple yet pressing question: has the introduction of the National Health Insurance Scheme (NHIS) improved MRH? Unfortunately, the question was not answered given the challenges beyond our control, especially COVID, that derailed setting up a quasi-experiment. The question evolved into: how can health systems better serve those who are most vulnerable, particularly women in low-resource settings? As a person with a public health background, I have witnessed firsthand the barriers that many women face in accessing essential health services, barriers that are often rooted in socioeconomic inequality, policy gaps, and systemic inefficiencies.

The idea for this research was born out of Zambia's recent health financing reforms, particularly the introduction of NHIS, and the ongoing efforts to promote family planning through various communication strategies. These developments presented a unique opportunity to examine how financing and information interventions interact to shape health-seeking behaviour and service utilisation. More importantly, the developments offered a lens through which to explore the equity implications of these reforms.

This thesis comprises four studies, each contributing a distinct perspective to the overarching aim of assessing the impact of health insurance and family planning messages on MRH service utilisation and equity. The first study synthesises global evidence from low- and lower-middle-income countries, while the second and third draw on nationally representative data from Zambia to analyse patterns of inequality and the effectiveness of communication strategies. The fourth study provides qualitative insights from stakeholders involved in NHIS implementation, highlighting the political, institutional, and financial dynamics that influence reform outcomes.

Throughout this work, I have been guided by a commitment to equity not just as a theoretical concept, but as a practical imperative for health system design and policy. I have also been inspired by the resilience of the communities I have worked with, and the dedication of colleagues, mentors, and institutions that have supported this research.

It is my hope that the findings of this thesis will inform policy and practice in Zambia and beyond, contributing to more inclusive, responsive, and equitable health systems.

# Introduction

Universal access to maternal and reproductive health (MRH) services like modern contraception, antenatal care, delivery care, and postnatal care, remains a cornerstone in achieving global health equity, upholding the right to health, and advancing sustainable development[1]. However, significant disparities in access to these essential services persist worldwide, particularly among socioeconomically disadvantaged populations. These inequities are especially pronounced in low- and middle-income countries (LMICs), such as Zambia, and are associated with adverse maternal health outcomes, including elevated maternal mortality rates, unmet need for contraception, and limited access to institutional delivery and skilled birth attendance.

The disparities in access to MRH are deepened by gender inequities, policy context, health beliefs, environment and demographics[2]. Gender roles and expectations can reinforce or ease inequities in access to MRH. In patriarchal societies, men usually make decisions including in relation to MRH, yet many of them have limited knowledge on MRH[3,4]. Only 57% of women of reproductive age make informed decisions on MRH[1]. Policy environments play a critical role in shaping access to MRH by affecting infrastructure, referral systems and resource availability, which can either ease or exacerbate barriers to care[5–9]. A study of 113 LMICs found that supportive policies were linked to increased MRH utilisation[10]. However, persistent disparities in access continue to drive high maternal mortality rates, especially in LMICs.

Addressing these disparities is critical to achieving the Sustainable Development Goals (SDGs), particularly SDG 3.7, which aims to ensure universal access to sexual and reproductive health services[11,12]. Souza et al argue that a multipronged approach is required to improve the MRH and hence reduce maternal mortality[13].

Health financing reforms, such as the introduction and expansion of health insurance schemes, and strategic communication interventions, including family planning messaging, are some of the key strategies to improve access to MRH services. Health insurance can reduce financial barriers to care[14], while family planning messages can influence health-seeking behaviour and modern contraceptive use [15–19]. However, evidence on the effectiveness of these interventions in reducing inequities in access to care remains scarce in the Zambian and similar contexts.

This thesis investigates the impact of health insurance and family planning messages on access to maternal and reproductive health services in Zambia, with a particular focus on equity. It comprises four studies: a systematic review of health insurance's impact on MRH service utilisation and financial protection in low and lower middle income countries (LLMICs); an estimation and decomposition analysis of inequality in contraceptive use and unmet need in Zambia; an evaluation study assessing the impact of mode of delivery of family planning messages on modern contraceptive use; and a qualitative study of the perceptions of stakeholders towards the implementation of the National Health Insurance Scheme in Zambia.

By combining quantitative and qualitative methods, this thesis aims to generate evidence to inform policy and practice on how to improve equitable access to and utilisation of MRH services. The findings will contribute to the broader discourse on health equity, offering insights into the design and implementation of interventions that can effectively reach underserved populations.

# Foundations of access to care and analytical framework

## Access to care: the foundations

Access to care is a dynamic and multifaceted process and not a static outcome. It encompasses a series of interactions between individuals and the health system, shaped by both supply and demand factors[20,21]. While many definitions of access to care emphasize physical proximity or availability of services, this narrow focus overlooks the broader structural, social, and systemic factors/characteristics that influence individuals to obtain the care they need[21].

The English term "access" typically implies the ability to enter, use, or approach something such as a place or person[22]. In healthcare, this has often translated into a focus on physical access: the geographic and logistical factors that enable or hinder the use of health services. However, access to care goes beyond mere physical presence of facilities. It involves the capacity of individuals to recognize their need for care, seek appropriate services, and receive timely, effective, and respectful treatment[21,23].

Some researchers define access as the actual use of health services, conditional upon the presence of a need[21,24]. This definition introduces an important equity dimension, suggesting that true access is not simply about availability, but about the alignment between need and utilisation. In this view, access is meaningful only when individuals who have a need for care obtain it, and the health services provided are appropriate to the respective health needs. However, this perspective tends to emphasize the demand side of the health system, potentially neglecting the role of supply-side factors such as service quality, provider attitudes, and health system responsiveness.

Mooney contributed to the discourse on equity in healthcare by proposing seven distinct definitions of equity[20], highlighting the complexity of the concept. He argued that access to care must be understood as a function of both supply and demand, and that equity cannot be achieved without addressing barriers on both sides[21]. This dual perspective forms the conceptual basis for this thesis.

In this thesis, access to care is defined as the opportunity or ease with which individuals or communities obtain healthcare services that meet their needs. This definition is based on the argument by Norman Daniels that access to care should comprise of fulfilling an individual's health needs and the opportunity to get the care[25]. This conceptualization recognizes access as a process involving several interrelated stages: identifying a need for care, seeking care, reaching care, receiving care, and benefiting from care. Each stage is influenced by a range of factors, including socioeconomic status, health literacy, cultural norms, policy environments, and health system design[2,21,23].

Understanding access as a process that involves stages allows for a more nuanced analysis of the barriers and facilitators that shape health-seeking behaviour and service delivery. It also provides a good foundation for evaluating interventions, such as health insurance schemes and family planning messages, that aim to improve equity in access to MRH services. Below is a description of the analytical framework used in the thesis, showing the interplay between supply and demand factors on equity in access to care.

# Analytical framework

This thesis applies the Levesque framework to analyse access to care[21]. According to Levesque et al, access to care is a process involving five steps that is i) perception of need, ii) seeking care, iii) reaching care, iv) utilization of care, v) consequences of care. The Levesque framework describes the supply side (health system/provider) and demand side (patient) factors that influence access to care throughout the process from identifying the need for care, getting care to the resultant outcomes[21]. The factors that can influence access to care on the supply side are categorised into five domains that is 1) Approachability; 2) Acceptability; 3) Availability and accommodation; 4) Affordability; 5) Appropriateness. On the other hand, the demand side factors, classified as "abilities of the population" are categorised into five abilities that is 1) Ability to perceive need; 2) Ability to seek; 3) Ability to reach; 4) Ability to pay; and 5) Ability to engage (Figure 1)[21].

The domains can be described as follows. Approachability is the realisation of the population that services exist and can be accessed in the event of healthcare need. Levesque et al[21] argue that the approachability is influenced by the practices within the health system, for example provision of outreach services, provision of information regarding available health services and treatments can help improve approachability. Acceptability is the cultural and social suitability of care or services provided. Availability and accommodation relate to reachability of the services either physically or digitally by the population in a timely manner. Availability and accommodation cover the distribution, concentration of services and contextual

factors like transportation system, building access, availability of human resources for health etc. Affordability relates to the cost of the care, are people willing to pay for it? This can be in terms of financial resources, time, flexibility at work etc. Appropriateness relates to the care provided versus the needs of the individual. The care provided should be suited to satisfy the needs of the individual by being adequate and of good quality.

The abilities of the population can be explained as follows. The ability to perceive need is the realisation of a person that they have a health-related challenge that can be resolved by obtaining care. Ability to seek relates to a person having a choice to look for or get care, that is having personal capacity and autonomy to seek care. Ability to reach relates to the capability of an individual to get to the relevant point to receive services. For example, having knowledge of getting to the health providers, ability to get transport to the health facility/health providers. Ability to pay is the capacity of an individual to cover the expenses related to receiving care. Ability to engage related to the involvement of the individual (patient) in the decision making about their treatment enhancing ownership and increasing willingness for treatment continuation and completion as needed.

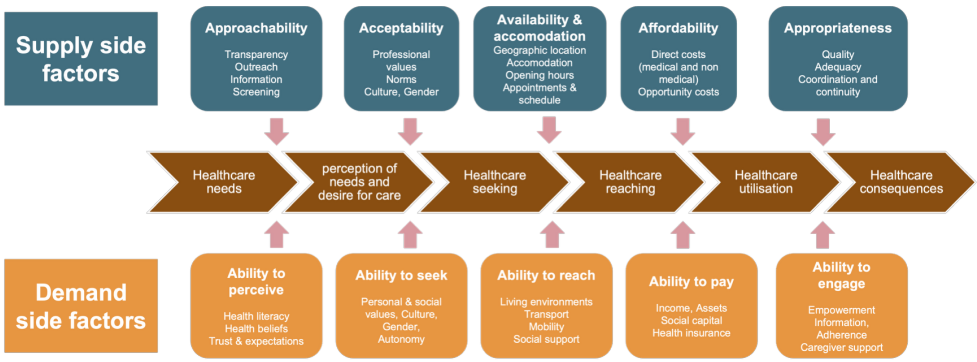


**Figure 1**:Illustration of the analytical framework based on the Levesque framework

Source: Created by author based on Levesque framework[21]

It is the interaction between the dimensions and abilities that result into access to care. The Levesque framework has been credited by other researchers for providing a comprehensive picture of access to care compared to other existing frameworks[23] like Andersens' Behavioural Model of Health Services Use[26], and the Availability, Accessibility, Acceptability, and Quality framework (AAAQ framework)[27]. The framework is helpful for identifying the barriers to and enablers for access to care and lays a rigorous foundation for investigating equity in access to care.

# Linking the analytical framework to the thesis studies

## Study I

Study I examines the impact of public health insurance on the utilisation of MRH services and financial protection in LLMICs. It focuses on two key areas:

i. The impact of health insurance on MRH service utilisation.
ii. The impact of health insurance on financial protection.

The first focus area, utilisation of MRH services, aligns directly with the fifth step "utilisation of care" in the Levesque framework. This step involves measuring service use and assessing whether having health insurance increases or decreases access. While this connection is direct, it also reflects the influence of earlier steps in the framework, such as healthcare seeking and reaching, which are shaped by all demand-side (population abilities) and supply-side (health system domains) factors.

The second focus area, financial protection, relates to multiple steps in the framework, including healthcare seeking, reaching, utilisation, and consequences. Financial protection is often assessed after care is sought, typically by examining whether individuals experience catastrophic health expenditures. However, it also encompasses the ability to overcome financial barriers before and during care-seeking. For example, reaching care may depend on having the financial means for transportation, and affordability affects whether or which services can be accessed. This aspect of Study I is influenced by Levesque's supply-side domains such as availability, accommodation, affordability, and appropriateness, as well as demand-side abilities including the ability to reach, pay, and engage.

## Study II

Study II explores inequalities in modern contraceptive use and unmet need for contraception, focusing on how demographic, socioeconomic, and health system factors shape access. Cultural beliefs and individual perceptions also play a significant role in determining the need for contraception, choice of contraceptive method, and continued use.

This study aligns with the utilisation step of Levesque's framework, as it assesses the distribution of contraceptive use in relation to individuals' health needs and socioeconomic characteristics. However, to understand inequality and inequity, the study also considers earlier steps in the access to care process from recognizing a health need to ultimately using services. By examining disparities in contraceptive use, Study II engages with all five domains of access (availability, affordability, appropriateness, approachability, and acceptability) and the corresponding population abilities (ability to perceive, seek, reach, pay, and engage), as outlined in the framework.

## Study III

Study III investigates how different modes of delivering family planning messages influence the use of modern contraceptives. These messages provide essential health information on the importance, availability, suitability, and timing of modern contraception. By enhancing individuals' knowledge, family planning messages support informed decision-making, helping people recognize their need for contraception, decide whether to use it, choose and continue to use the most appropriate method. The messages also play a critical role in debunking myths, misconceptions and cultural biases surrounding contraceptive use.

The mode of delivery significantly affects both the reach and impact of these messages. For example, access to mass media may be limited for individuals with lower socioeconomic status, introducing an equity dimension. Study III evaluates three delivery modes: mass media, family planning counselling and a combination of both.

Each mode differs in communication style and accessibility. Mass media typically offers one-way communication, while counselling provides interactive, two-way engagement, allowing individuals to ask questions tailored to their personal needs. These differences influence whether individuals recognize their need for contraception, seek services, access providers, and continue using contraception appropriately.

In relation to the framework, Study III spans multiple steps: recognizing need, desiring care, seeking care, reaching care, utilizing services. All five population abilities (perceive, seek, reach, pay, engage) and supply-side domains (approachability, acceptability, availability, affordability, appropriateness) are relevant in explaining how the mode of message delivery affects contraceptive use.

## Study IV

Study IV explores stakeholder perceptions of the implementation of Zambia's NHIS, a health financing reform aimed at improving access to quality care, increasing investment in the health sector, and enhancing financial protection. These goals are closely aligned with Zambia's broader objective of achieving UHC.

Given that study IV focuses on implementation of the reform, the following steps in Levesque's framework are covered: healthcare seeking, reaching care, utilizing services, and experiencing consequences of care. By examining stakeholder views on NHIS implementation, Study IV engages with all five supply-side domains (approachability, acceptability, availability, affordability, and appropriateness) and all five population abilities (ability to perceive, seek, reach, pay, and engage). These dimensions are essential for understanding and explaining stakeholder perceptions towards NHIS and how the scheme influences access to care and the equity of its impact across different population groups.

# Aim of the thesis

To analyse the impact of health insurance and modes of delivery of family planning messages on access to maternal and reproductive health services in Zambia.

## Specific aims

1. To assess the existing evidence on the causal impact of health insurance on maternal and reproductive health service utilisation and financial protection in low- and lower middle-income countries.
2. To investigate the level of inequality in current use of modern contraception and unmet need for contraception among sexually active women of reproductive age in Zambia.
3. To evaluate the impact family planning messages received through mass media and counselling by health workers on modern contraceptive use among women of reproductive age in Zambia.
4. To explore stakeholders' perceptions towards the implementation of the National Health Insurance Scheme in Zambia.

# Background

## Access to care globally

Globally, access to healthcare is still a challenge with half of the population unable to receive the health care they need and healthcare costs borne by the patients are still a stumbling block derailing the progress towards universal health coverage (UHC)[28–30]. Despite the progress made in UHC service coverage index from 45% in 2000 to 68% in 2021, approximately two billion people are facing catastrophic or impoverishing health spending with approximately 344 million being dragged into poverty due to out-of-pocket (OOP) expenditure on health[29]. At least two billion people lack access to medicines[31].

The challenges exist despite countries' ratification of the UHC under SDGs: goal 3. UHC is seen as the panaceas for health inequities and has been defined to entail that all people and communities have access to the full range of quality health services they need, when and where they need them, without experiencing financial hardship[32]. The services include a full continuum of essential health services, from health promotion and prevention to treatment, rehabilitation, and palliative care. UHC is comprised of two targets i) coverage of essential health services (SDG 3.8.1); and ii) catastrophic health spending (and related indicators) (SDG 3.8.2)[33].

The UHC progress is measured using two indices in line with the two major targets: i) coverage of essential health services and ii) catastrophic health spending. The essential health services coverage index is defined as the average coverage of essential services based on tracer interventions that is reproductive, maternal, newborn and child health, infectious diseases, non-communicable diseases and service capacity and access, among the general and the most disadvantaged population[34]. Catastrophic health expenditure index is defined as the proportion of population with household expenditures on health greater than 10% of total household expenditure or income[35].

Despite early gains, progress toward UHC has stagnated since 2015 [30]. The World Health Organization (WHO) has warned that the global trajectory is off track [29], with widening inequalities contributing to this slowdown [30]. Disparities in access are evident across geographic, socioeconomic, and demographic lines, between rural and urban populations, rich and poor households, and other marginalized groups [36–44]. For instance, while over two billion people lack access to medicines, just 15% of

the global population consumes more than 90% of pharmaceutical products. Rural populations, particularly in LMICs, continue to face persistent disadvantages in accessing timely and appropriate care [38–42,44].

Although the ambition to achieve UHC remains strong among LMICs, significant gaps persist. As of 2021, LLMICs reported UHC service coverage rates between 40% and 60% [34], and OOP expenditures remain disproportionately high [45]. These financial burdens not only limit access but also exacerbate poverty and inequality, undermining the broader goals of health equity and sustainable development.

# Access to maternal and reproductive health

MRH is pivotal in public health and a critical indicator of health system performance. This PhD thesis focuses on MRH because it encompasses essential services that directly affect the health and survival of women and newborns and is sensitive to existing socioeconomic inequalities [46]. MRH includes a continuum of care, contraception, ANC, delivery care, and PNC, each of which plays a vital role in reducing maternal morbidity and mortality, improving reproductive outcomes, and promoting gender equity.

Maternal and reproductive health is covered in the SDG 3 specifically target 3.1. SDG target 3.1 aims to reduce the global maternal mortality ratio (MMR) to less than 70 maternal deaths per 100,000 live births by 2030. MMR can be defined as the number of maternal deaths during a given time period per 100,000 live births during the same time period thereby quantifying the risk of maternal death relative to the number of live births[47]. There has been a declining trend in MMR globally but the SDG target 3.1is still far from reach especially in low-income settings. As of 2020, Sub-Saharan African (SSA) countries accounted for approximately 70% (202,000) of all global maternal deaths and had a MMR of 545 (with a range of 477 – 654) per 100,000 live births[47]. Zambia's MMR was estimated at 157 (with a range of 100 – 201) maternal deaths per 100,000 live birth which is still far from the desired target of 70 maternal deaths per 100,000 live births[47].

Timely receipt of quality MRH reduces the risk of maternal mortality. Some of the WHO guidelines for MRH are described below. ANC, essential during pregnancy, has been defined by the WHO as the care provided by skilled health-care professionals to pregnant women and adolescent girls to ensure the best health conditions for both mother and baby during pregnancy. ANC comprises risk identification, prevention, and management of pregnancy-related or existing diseases and health education and promotion. The WHO recommends that a pregnant woman has a minimum of eight ANC visits/contacts during pregnancy[48]. The recommended distribution of ANC contacts during pregnancy is as follows, one ANC contact in the first trimester (first contact should be before end of the 12$^{th}$ week

of pregnancy), two ANC contacts within the second trimester and five ANC contacts within the third trimester[48]. This is a 2016 update which increased the recommended number of ANC visits from the previously recommended four ANC visits during pregnancy to eight[49].

Delivery care is the care received by a pregnant woman during childbirth. Pregnant women are recommended to have institutionalised deliveries in places like hospitals, health centres with adequate facilities to provide safe childbirth and PNC. The delivery should be attended by skilled health workers for example, a midwife, doctor, among others. It is also recommended that a woman that has given birth should stay in the health facility for at least 24 hours after birth.

For PNC, the WHO recommends that each woman that has given birth should receive a minimum of four PNC contacts. The first PNC contact should be received within the first 24 hours after birth. The first PNC contact involves regular assessment of vaginal bleeding, uterine tonus, fundal height, temperature, and heart rate (pulse) starting from the first to 24 hours after birth. The second PNC contact should take place between 48 and 72 hours, the third PNC contact between 7 and 14 days, and lastly during the sixth week after birth[50,51].

The guidelines are clear, but their implementation have proved challenging in some settings especially in LLMICs. For example, the average number of ANC contacts during pregnancy is lower than what is recommended by the WHO[52]. Several barriers to access to MRH have been reported including transportation barriers, economic factors, cultural beliefs, lack of family support and poor care quality[53,54]. Inequalities in access to care are highlighted as one of the impediments to MRH related care. Pons-Duran et al. found wealth, education, and area of residence as major contributors to inequality among reproductive-age women, while marital status was the primary factor for adolescent girls[55]. Melesse et al. documented major inequalities in adolescent sexual and reproductive health across 33 countries, with persistent gender gaps in sexual debut and marriage age, leaving adolescent girls particularly vulnerable[56]. Despite the increasing utilisation of MRH services, it should be noted that inequalities are increasing in some settings in SSA further favouring the rich and powerful groups of the society. For example, the pro-poor inequality in health facility delivery and skilled birth attendance changed to pro-rich inequality in Guinea, a trend that raises further concerns[57].

Consequently, several LLMICs still have high MMR (accounting for 94% of all maternal deaths globally)[58], far from the set reduced target of 70 deaths per 100,000 live births. Therefore, there is a need to employ interventions that could stimulate and sustain the implementation of the WHO MRH guidelines so that their intended objectives and targets are fulfilled. Some of such interventions are the implementation of health insurance and the provision of health information on MRH.

# Contraceptive use and communication interventions

Contraceptive use is a key component of reproductive health and a proven intervention for reducing maternal mortality [59,60]. Access to modern contraceptive methods enables women to plan, space, and limit pregnancies, thus contributing to lowering the risk of pregnancy-related complications, improving maternal and child health outcomes, and enhancing women's autonomy and socio-economic opportunities [59]. WHO and numerous global health bodies recognize access to contraception as a fundamental human right and a critical component of UHC[61].

Contraceptive use remains uneven across regions and populations despite its proven benefits. Globally, contraceptive prevalence among women of reproductive age (15–49 years) has steadily increased [62]. As of 2021, approximately 966 million women of reproductive age were using some form of contraception out of the 1.9 billion in this age group [62]. Of these, 91% were using modern methods, such as oral contraceptives, injectables, implants, intrauterine devices (IUDs), and condoms, while 92 million relied on traditional methods like withdrawal or calendar-based approaches[62]. Promisingly, the proportion of women whose need for contraception is satisfied by modern methods rose from 67% in 1990 to 77% in 2021, reflecting global progress in family planning initiatives [62].

This progress, however, masks persistent and significant disparities. An estimated 164 million women globally still experience unmet need for contraception, defined as women who wish to avoid pregnancy but are not using any method of contraception [62]. The reasons for this unmet need are multifaceted and include health system limitations, geographic inaccessibility, socio-cultural norms, misinformation, religious beliefs, and personal or partner opposition [60,63–65]. These barriers are particularly pronounced in SSA, where only 56% of women in need of contraception have their need met [62]. SSA continues to lag behind global averages in contraceptive prevalence, with modern contraceptive use estimated between 17% and 22% in multi-country studies [66,67].

The regional disparities within SSA are stark. While some countries have made remarkable progress, others continue to struggle [68]. Notably, Ethiopia, Eswatini, Guinea-Bissau, Madagascar, Malawi, Rwanda, Uganda, and Zambia were among the top ten countries globally that achieved the greatest increases in modern contraceptive use [62]. These successes highlight the potential for improvement when supportive policies, community engagement, and health system strengthening are in place. However, countries in West and Central Africa have shown slower progress, reflecting deep-rooted structural and cultural challenges [68].

Within countries, inequalities in contraceptive use are also evident [69–75]. Studies consistently report pro-rich disparities, where women from wealthier households are significantly more likely to use modern contraception than those from poorer households [69,72,76]. These inequalities are further stratified by urban-rural residence,

educational attainment, marital status, and age [69–75]. For example, urban women with secondary or higher education are more likely to access and use contraception compared to their rural, less-educated counterparts. Such disparities underscore the need to further explore and understand the extent and causes of the disparities to identify and develop targeted interventions that address both supply-side and demand-side barriers.

One of the most widely recommended strategies to increase contraceptive use and reduce inequalities is communication and education [69]. Raising awareness about the benefits, availability, and safety of modern contraception can empower individuals to make informed reproductive choices [16,18,66]. Over the past decades, SSA countries have implemented various information campaigns and outreach programs aimed at promoting modern contraception. These efforts often involve family planning messages delivered through mass media (radio, television), community health workers, posters, and interpersonal counselling.

Evidence suggests that family planning messages can positively influence contraceptive behaviour [16,18,66]. In several SSA countries, exposure to such messages has been associated with increased use of modern contraception [16,18,66]. However, the impact of these messages is not uniform across settings. Contextual factors, such as cultural norms, literacy levels, media access, and trust in health systems, play a significant role in shaping the effectiveness of communication interventions[18,77].

More importantly, the mode of delivery of family planning messages appears to influence their impact. For instance, radio campaigns have been found to increase contraceptive use in some countries but not in others [78,79]. Television, while effective in urban areas, may have limited reach in rural communities[19]. Interpersonal communication, such as counselling by health workers, offers personalized support and can address individual concerns[80–87], but its scalability could be constrained by human resource limitations.

Despite the importance of communication strategies, there is a scarcity of studies that comprehensively examine the impact of different modes of message delivery on contraceptive use in SSA. Most existing research focuses on mass media, particularly radio and television [16,78,79], while neglecting other potentially effective channels such as mobile health (mHealth), community theatre, peer education, and social media. Furthermore, few studies explore how combinations of communication methods might work synergistically to enhance uptake.

Given these gaps, there is a pressing need to investigate the effectiveness of diverse communication interventions in promoting modern contraceptive use. Understanding which strategies work best, for whom, and under what conditions can inform the design of more responsive and equitable family planning programs.

# Health insurance and access to care

Health insurance is increasingly recognized as a key strategy for advancing UHC in LLMICs. It aims to reduce financial barriers to healthcare, improve service utilisation, and protect individuals from catastrophic health expenditures[14,88,89]. In LLMICs, health insurance schemes vary widely in design, financing mechanisms, and target populations. The most common types include Social Health Insurance (SHI)[14,89–91], Publicly Funded Health Insurance (PFHI)[92–94], Community-Based Health Insurance (CBHI)[95,96] and private for-profit health insurance.

SHI is typically financed through mandatory contributions from employees and employers, pooled into a central fund[89]. SHI schemes are often managed by government agencies and are designed to cover formal sector workers. Over time, SHI has evolved to include mixed models where governments also contribute premiums for certain population groups. SHI is prominent in countries like Ghana and Indonesia, where it has been associated with increased utilisation of maternal health services such as antenatal care and facility-based deliveries[97].

PFHI refers to schemes where the government fully finances the premiums, often targeting poor and vulnerable populations who cannot afford to contribute [92–94]. PFHI is particularly relevant in settings with large informal sectors and limited capacity to collect premiums. India's Rashtriya Swasthya Bima Yojana is a notable example of PFHI, designed to provide financial protection for low-income households[98].

CBHI, also known as mutuelles de santé in French, is a voluntary, non-profit model typically managed at the local level (community level) [95,96]. It involves pooling resources from community members to cover basic health services. CBHI is often implemented in rural areas where formal insurance mechanisms are absent [95,96]. Rwanda's CBHI program is one of the examples, demonstrating success in expanding coverage and improving access to care[99].

Private for-profit health insurance is health insurance provided by private entities with the intention of making a profit. Such insurance schemes therefore have higher premiums and are risk averse compared to other types of health insurance. Many private health insurance schemes ask for pre-enrolment medical examination, have variable premiums based on the pre-existing conditions or risk of falling ill, have variable benefit packages/health cover based on amount paid in premiums, require copayments which can come in different forms. This type of insurance has been singled out to improve financial protection but mostly among the rich that can afford the premiums, therefore further instigating social and health inequities along the socioeconomic divide of the communities/populations[100].

In addition to the above types of schemes, some countries operate mixed models, combining contributory and non-contributory elements to enhance inclusivity, for

example in Indonesia[101]. These schemes may offer tiered benefits or subsidize premiums for specific groups, such as the poor or informal sector workers.

This thesis focuses on the not-for-profit health insurance and therefore, its scope excludes private insurance. Thus, despite the differences in the types of health insurances included in this thesis, all types of health insurance in LLMICs share the common goal of pooling financial risk and ensuring pre-paid access to essential health services. However, their effectiveness depends on factors such as scheme design, enrolment strategies, benefit packages, and political commitment[88,102,103] which could explain the variance across countries, regions and population subgroups. Therefore, understanding these models is crucial for designing equitable and sustainable health financing reforms in resource-constrained settings.

The categorization of health insurance schemes in LLMICs is becoming increasingly complex due to the diverse policies and operational models adopted across countries. Schemes differ in key characteristics such as whether they are contributory or non-contributory, voluntary or compulsory, and in terms of their governance structures, benefit packages, and financing mechanisms [100]. As a result, health insurance programs vary significantly in terms of who they cover, what services are included, how they are managed, and the costs involved (e.g., premiums, co-payments). Given this diversity, it is essential to systematically measure, monitor, and evaluate the impact of these reforms on population health and financial protection. Such evaluations can help identify gaps, inform policy adjustments, and ensure that health insurance schemes are effectively contributing to improved health outcomes and equity.

Studies have demonstrated that health insurance positively influences the utilisation of health services in LLMICs. A systematic review by Erlangga et al. found that public health insurance schemes significantly increased access to healthcare services, with majority of reviewed studies reporting improved utilisation[103]. The review also noted moderate evidence of improved health outcomes and financial protection, although results were not uniformly consistent across all settings[103].

In Africa, countries like Ghana, Rwanda, Senegal are some of those known for having public not-for-profit health insurance. In Ghana, the NHIS has been associated with increased facility-based deliveries and antenatal care visits[104]. Bonfrer et al. found that NHIS enrolment significantly improved maternal health service utilisation, particularly among urban and wealthier populations. However, the scheme has faced challenges in enrolling informal sector workers and rural residents[104]. In Rwanda, CBHI coverage was found to increase chances of having skilled birth attendance[99]. The scheme's integration into the national health system and its tiered premium structure have contributed to high enrolment rates, especially in rural areas[105]. Senegal's health insurance model has been implemented through subsidies to CBHI schemes targeting low-income populations. Bousmah et al. found that PFHI significantly increased the likelihood of facility-based deliveries and

antenatal care visits among the poor, demonstrating the potential of government-financed schemes to reach underserved groups[106]. A meta-analysis by Eze et al. across multiple African countries confirmed that CBHI schemes significantly increased healthcare utilisation, especially outpatient services and maternal care[96]. Insured households were more than twice as likely to deliver in health facilities compared to uninsured households[96].

The impact of health insurance varies not only by country but also across regions and population subgroups. For example, while Ghana's NHIS has improved access in urban areas, rural populations continue to face barriers due to limited facility availability and lower enrolment rates [107–109]. In contrast, Rwanda's CBHI has achieved relatively equitable coverage across rural and urban settings, thanks to strong government commitment and community engagement[110].

Regional disparities are also evident. West African countries such as Nigeria and Mali have struggled with low insurance coverage and limited impact on service utilisation, often due to fragmented schemes and weak institutional capacity[111]. In East Africa, countries like Ethiopia and Kenya have made progress through CBHI and SHI models, but challenges remain in scaling up coverage and ensuring sustainability [112].

Population subgroups such as women in the informal sector, adolescents, and the poorest quintiles often experience lower enrolment and benefit less from insurance schemes. Barasa et al. found that health insurance coverage in Sub-Saharan Africa is frequently pro-rich and urban-biased[112]. This inequity undermines the potential of health insurance to achieve universal access and calls for targeted strategies to include marginalised groups.

From a health equity standpoint, the expansion of health insurance in LLMICs presents both opportunities and challenges[14,89,103]. On one hand, insurance schemes can reduce disparities in access to care by removing financial barriers. On the other hand, if poorly designed or implemented, they can exacerbate existing inequalities[112]. It is essential to examine how health insurance schemes are implemented in specific countries, particularly in early adopters like Zambia, to generate insights that can guide policy reforms aimed at improving population health, financial protection and promoting health equity.

Equity in health insurance requires inclusive enrolment strategies, equitable benefit packages, and geographic coverage that reaches underserved areas. Rwanda's CBHI could be seen as a model for equity, with its income-based premium structure and government subsidies for the poorest. In contrast, Ghana's NHIS, while successful in increasing overall utilisation, has been criticised for favouring formal sector workers and wealthier households[112].

Gender equity is another important dimension to the impact of the health insurance. Despite the finding that health insurance could improve utilisation of health

services, there is no generalisable evidence on the impact of health insurance on MRH and financial protection of women receiving MRH services. Comfort et al. who reviewed literature on the effect of health insurance on maternal health services utilisation in LMICs found that health insurance increased utilisation of some of the services, for example facility-based delivery and delivery by a skilled attendant[113]. However, the study included a mix of types of health insurances including private insurance. Further, Comfort et al. did not address the impact of health insurance on financial protection of women receiving MRH. This, therefore, necessitates a comprehensive review to assess the available evidence on the impact of public health insurances on utilisation of MRH services and financial protection.

**Cover photo**

The cover photo is a combination of two pictures:

The picture on the left is Chibwe Health Center in Kapiri Mposhi District, Central Province with some patients standing outside.

On the right is one of the waiting areas for pregnant women receiving ANC at Levy Mwanawasa University Hospital in Lusaka City, Lusaka Province. On the wall are pictures with information on the importance of spectacles or eyeglasses.

# Study context

## Zambia

Zambia is the country of focus for this thesis. Zambia is a landlocked country located in Southern Africa, bordered by eight countries: Angola, Botswana, the Democratic Republic of Congo, Malawi, Mozambique, Namibia, Tanzania, and Zimbabwe, making it a strategic hub for regional trade and integration. Zambia has a total land area of approximately 752,618 square kilometres, with ten provinces as shown in Figure 2.

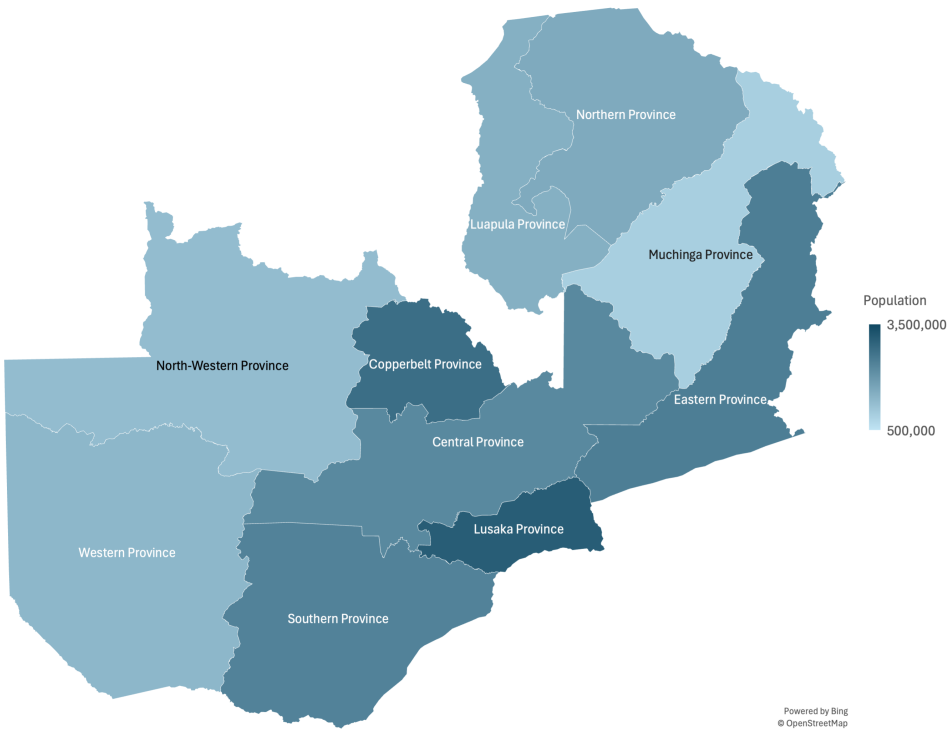


**Figure 2:** Map of Zambia showing the population by province
Source: Created by author based on data from the Zambia 2022 Census of Population and Housing report[114]

Zambia's population was estimated at 19.7 million based on the census carried out in September 2022 of which approximately 51% are female[115]. Majority of the population resides in rural areas (55.3%)[115]. The population density is still low at 26.2 people per square kilometre. Lusaka and Copperbelt provinces are the most densely populated and urban areas in the country. The population annual growth rate stands at 2.8%, reflecting a relatively high fertility rate[116]. The country is experiencing a demographic shift, with a median age of 18.3 years as of 2022[115]. This youthful population presents both opportunities and challenges, particularly in terms of employment, education, and healthcare demand.

Classified as a low-income country by the World Bank, Zambia's gross domestic product (GDP) of approximately $26.3 billion, a GDP per capita of $1,235.1 as of 2024[116]. The economy has historically depended on copper mining, which remains the country's primary export and a major source of government revenue. However, Zambia has made efforts to diversify its economy through investments in agriculture, tourism, and manufacturing. Despite these efforts, Zambia faces significant development challenges. Poverty remains widespread, with 71.7% of the population living below $3.00 per day (purchasing power parity – PPP) as of 2022 [116]. The unemployment rate stands at 11.3%[115] and inflation is relatively high at 15.0% in 2024[116]. Access to basic services is uneven, with only 51.1% of the population having access to electricity and substantial disparities between urban and rural areas [116].

# Zambia's Health System

The health system of Zambia is decentralised with the Ministry of health (MoH) at the top, followed by the provincial health office, district health office, health facilities and lastly communities. The health facilities hierarchy has four levels including the community level, the district, province, and lastly national level. At community level, there are health posts that are manned by community health assistants. The assistants usually undergo a one-year training before deployment. Services offered at this level are primary health services. Each community health post is intended to cover 500-1000 households. Community health posts are supervised by the district health offices (DHO)[117].

The district level has two types of health facilities, that is the health centres and the level one hospital. The health centres are staffed with a clinical officer, nurse, or environmental health technician. Both types of facilities are supervised by the DHO. Level two hospitals, also known as general hospitals, are located at provincial level, providing secondary care. Level two hospitals are supervised by the provincial health office. Level three hospitals, also known as central hospitals, provide tertiary care. This level of hospitals is supervised by the MoH.

The Zambia health system has three types of providers; the public, private not-for-profit/faith-based (e.g health facilities owned by Churches Health Association of Zambia) and private for-profit. The public health facilities (owned by the government) make up the largest portion of all health facilities in the country (2810 facilities – 85%) followed by the private for-profit facilities (381 facilities – 12%). Lastly privately not-for-profit/faith-based health facilities make up 3% (105 facilities)[118].

The funding for health, current health expenditure (CHE), increased from Zambian Kwacha (ZMW) 611.8 billion (USD1,239.2 million) in 2017 to ZMW629.4 billion (USD1,461.8 million) in 2021[119]. The CHE per capita has equally increased from USD71.7 in 2017 to USD75.1 in 2021[119]. The CHE as a percentage of GDP has shown an increasing trend from 4.8% to 6.8%[119]. The government CHE as a percentage of GDP has remained constant (2.5%)[119]. OOP expenditure as a source of financing for health is still considerable, contributing over 7% of the CHE and generally showing a gradual decline over time (Figure 3)[119,120].

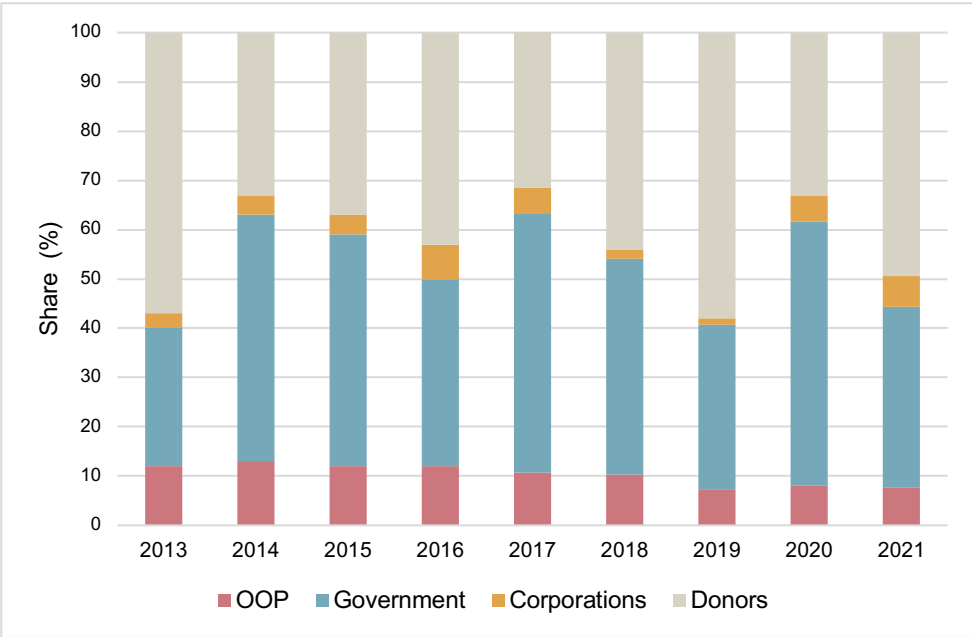


**Figure 3:** Share (%) of health expenditure by source 2013-2021
Source: Created by author based on data extracted from the National Health Accounts[119,120], OOP is out of pocket expenditure

Zambia faces health system financing challenges of insufficient funding and inefficient utilisation of resources for health. The government CHE has been generally constant over the years as a percentage of GDP and with donors contributing close to 50% of the CHE[119]. Several inefficiencies have been reported

within the health system[121–123] and there is a growing interest to address them[124]. External funding for health has been volatile and at times unpredictable, disrupting health programs. Furthermore, the country has been constrained by growing inflation and increasing domestic and external debt, which limits the ability to increase government funding for health[119,125,126].

As part of managing the health financing challenges, the government introduced a NHIS and has rolled out devolution of health planning activities and decision making to lower-level governments[127]. Prior to the start of health insurance, the major funders of the health system were government, development/cooperating partners, and households throughout of pocket[119,120]. Therefore, the introduction of the national health insurance in Zambia was partly to generate additional revenue for the health sector[128]. In addition, it was seen as means to address other health financing challenges in Zambia including pooling of resources and purchasing[128].

# Maternal and reproductive health in Zambia

Zambia continues to face significant challenges in MRH, despite some progress in service coverage. The MMR remains high at approximately 187 deaths per 100,000 live births, well above the SDG target of fewer than 70 [47,115,129]. Access to skilled care during pregnancy and childbirth is uneven, particularly in rural and low-income areas.

According to the 2024 Zambia Demographic and Health Survey (ZDHS), about 55% of women of reproductive age were using modern contraceptives, while 16% had an unmet need for contraception[129]. Additionally, about 31% of births still occur at home, often without skilled assistance [130]. This trend is largely attributed to barriers such as long distances to health facilities, poor infrastructure, and financial constraints [131–134]. For instance, a study by Kaiser et al. estimated the average cost of delivery at USD 28.76, focusing mainly on non-medical expenses[135]. Another study by Fontanet et al. found that delivery costs ranged from USD 36.66 at health facilities to USD 40.01 when maternal waiting shelters were used [136], figures that can be financially burdensome for low-income families.

To address these issues, the Zambian government has implemented several strategies targeting key components of the health system, including governance, service delivery, health information, and financing. MRH services are provided free of charge in public facilities as part of the Ministry of Health's essential health service package [137]. Additionally, NHIS covers a wide range of MRH services, including contraception, ANC, delivery (both normal and caesarean), and PNC, with costs reimbursed for enrolled members [138,139]. Furthermore, under the National Health Strategic Plan (2022–2026) [137], Zambia aims to improve MRH outcomes by:

Increasing the use of modern contraception among married and sexually active unmarried women to 60% by 2026 (from 50% and 43% respectively).

Ensuring that at least 60% of pregnant women attend their first ANC visit within the first trimester.

Raising the proportion of deliveries attended by skilled health personnel from 69% in 2021 to 80% by 2026.

Increasing the share of women receiving PNC within 48 hours of delivery from 51% in 2021 to 60% by 2026.

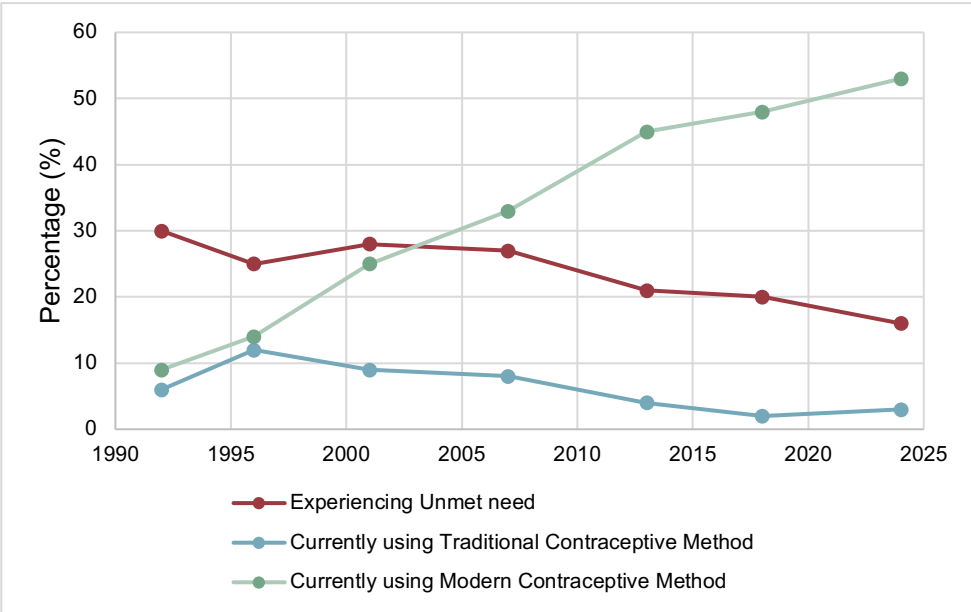


**Figure 4:** Trend of contraceptive use among married women of reproductive age in Zambia over time
Source: Created by author based on data extracted from Zambia demographic and health survey reports[129,140,141].

The use of modern contraceptives is on the rise, while unmet need among married women aged 15–49 is declining (Figure 4) [129,142]. These improvements are linked to higher education levels among women, exposure to family planning messages, and personal experiences with maternal mortality [142]. However, disparities persist, particularly among uneducated women in rural areas, due to limited access and decision-making power regarding contraceptive use [142–145]. These inequalities may hinder Zambia's ability to meet its MRH targets.

Given the limited evidence on the extent of these disparities and the effectiveness of interventions, further research is essential. Understanding the scope of inequities and identifying targeted strategies will be crucial to enhancing contraceptive use and reducing maternal health disparities in Zambia.

# National Health Insurance Scheme (NHIS) of Zambia

In October 2018, the Government of Zambia enacted the National Health Insurance Act, establishing the legal framework for the country's national health insurance system. This legislation led to the creation of three key entities: the NHIS, the National Health Insurance Management Authority (NHIMA), and the National Health Insurance Fund (NHIF)[146].

The NHIS, established under Section 12 of the Act, is designed to ensure universal access to quality health care services as defined in its benefit package. It serves as the operational arm of Zambia's health financing reform, receiving all contributions mandated by the Act and managing payments for insured services [147]. Membership in the scheme is compulsory for all Zambian citizens and established residents aged 18 and above, with specific exemptions. These include individuals who are mentally or physically disabled and unable to work, persons aged 65 and above, those classified as poor and vulnerable by the Ministry of Community Development and Social Welfare, and any other groups designated by the Minister [146,148].

The NHIMA, established under Section 4 of the Act, is an autonomous statutory body responsible for administering and managing the NHIS. Its functions, outlined in Section 5, include overseeing the operation of the scheme, managing the NHIF, developing and updating the benefit package, registering members, issuing membership cards, processing and reimbursing claims, conducting research, and advising the Minister of Health on health insurance policy. NHIMA is also tasked with ensuring that poor and vulnerable populations are adequately covered and protected from health service deprivation[146].

The NHIF, created under Section 41 of the Act, is the central fund through which all financial transactions of the scheme are managed. It comprises contributions from members, parliamentary appropriations, and other sources of income, including interest accrued. The fund is used to pay for insured health services accessed by members, cover administrative and operational costs, and support programs that promote access to care[146].

Together, these institutions form the backbone of Zambia's health insurance strategy to progress towards UHC by pooling financial resources, reducing out-of-pocket expenditures, and improving equity in access to health services[149].

The NHIMA membership can be categorised into three groups:

1. *Primary contributing members*: individuals registered with NHIMA and pay premiums
2. *Primary non-contributing members*: individuals registered with NHIMA but exempted from paying premiums for example pensioners.
3. *Beneficiaries*: individuals registered with NHIMA as dependants of a primary NHIMA member.

As of 2022, NHIMA had about 1.45 million validated active members, with 60.1% from the formal sector. Majority of the members were male (67.2%) (Figure 5)[150].

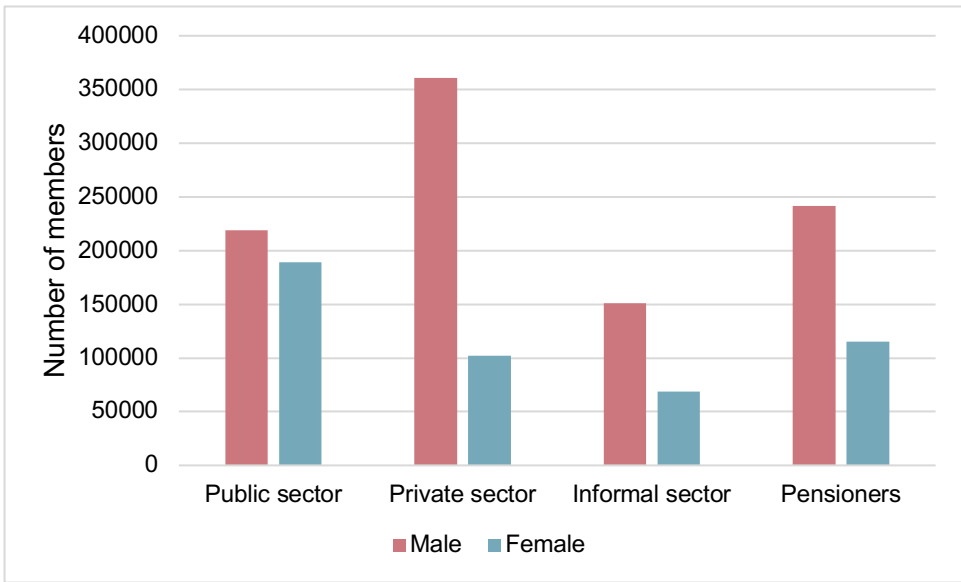


**Figure 5**: Number of NHIMA membership by category and sex
Source: Created by author based on data extracted from the Actuarial analysis of the Zambia National Health Insurance Scheme and costing of the extension of coverage to Social Cash Transfer beneficiaries report[150].

NHIMA has accredited over 450 health facilities across Zambia, including public, private for-profit, and private not-for-profit institutions, as well as outlets that supply medications and reagents [151]. NHIS was expected to enhance equity in healthcare access and improve service quality [152,153]. Early studies highlighted strong interest among healthcare facility operators and owners to participate as providers, although awareness of the scheme remained limited [154,155]. Despite this enthusiasm, providers have reported several challenges, including delays in NHIMA's preauthorization processes, a limited benefit package, and overcrowding, particularly in private facilities [155].

As outlined in its 2023–2026 Strategic Plan, NHIMA aims to expand its membership to 17 million people by 2026[151]. To achieve this, the agency has launched various initiatives, such as public sensitization campaigns, establishing accessible registration points, simplifying premium payment processes, leveraging online platforms for registration and member verification, and opening offices closer to communities. However, despite these efforts, the ambitious membership target remains elusive due to persistent implementation challenges.

One key issue is the gap between policy and practice. For instance, while the National Health Insurance Act exempts both pensioners and the poor and vulnerable from paying premiums, only pensioners have benefited in practice from this provision. A time-limited pilot project funded by the Global Fund is currently underway to enrol up to 20,000 poor individuals into the scheme, with the Fund covering their premiums[151,156].

Although NHIMA's goals are ambitious and NHIS holds great potential, there is a lack of comprehensive evidence on how the scheme is being implemented in practice. Further exploration is needed to inform future policy reforms and strengthen the scheme's impact.

# Key terminology and definitions

**Financial protection** is the ability of the household to access the care they need without experiencing financial hardship.

**Health equity** refers to the absence of avoidable systematic disparities in health outcomes and access to health services across different population groups. Achieving equity is central to UHC, which aims to ensure that all individuals receive the health services they need without suffering financial hardship regardless of who they are. Equity in this thesis focuses on the concept of horizontal equity, which can be defined as the principle of equal treatment for individuals with equal need for healthcare, regardless of their other characteristics[24]. In contrast, vertical equity considers that individuals with differing needs receive care that is proportionate to those respective needs[24]. The majority of theoretical and empirical health research on equity has predominantly focused on horizontal rather than vertical equity[157].

**Health inequalities** are the observable systematic differences in health outcomes or service use between populations subgroups or social groups within the same population or as a gradient across a population ranked by social position[158].

**Health Insurance** in this study refers to not-for-profit entity that protects members from paying at the point of seeking health care to avert financial hardship, through pooling resources in the form of periodic premiums payable by members. In this thesis, I focus on health insurance as an entity and not a function.

**Unmet need for limiting** refers to a situation where a woman does not want to have any more children but is not using any form of contraception during sexual intercourse[159].

**Unmet need for spacing** refers to a situation where a woman wants to delay having children for a period of time, plans to have children in the future, but is not currently using any contraception during sexual intercourse.[159]

**Wealth index** is a composite measure that is meant to reflect a household's cumulative living standard. It is the basis on which wealth status quintiles are categorised. The wealth index used in this thesis is as defined and measured by the DHS.

# Data and Methods

## Summary of data and methods

The data and methods used in the thesis are summarised in Table 1.

**Table 1: Summary of the data and methods used in study I – IV**

| | **Study I** | **Study II** | **Study III** | **Study IV** |
|---|---|---|---|---|
| **Study design** | Systematic review | Repeated cross sectional | Quasi experimental | Qualitative |
| **Population** | Women of reproductive age in LLMICs | Women of reproductive age in Zambia | Women of reproductive age in Zambia | NHIS key stakeholders in Zambia |
| **Data source** | Published peer reviewed literature | DHS 2007, 2013/14, 2018 | DHS 2007, 2013/14, 2018 | In depth interviews |
| **Intervention** | Public health insurance | – | Mode of delivery of FP messages | NHIS |
| **Outcomes** | Contraceptive use<br>ANC outcome<br>Delivery care outcomes<br>PNC outcomes | Modern contraceptive use<br>Unmet need for contraception | Modern contraceptive use | – |
| **Analysis** | Descriptive analysis | Concentration curves<br>Estimation of Erreygers concentration index<br>Inequality decomposition | Logistic regression<br>Augmented Inverse Probability Weighting | Inductive content analysis |

# Data

Study I reviewed published quantitative studies of quasi experimental design. Studies II and III analysed individual level data collected under the DHS program. Study IV relied on primary qualitative data.

## Demographic and Health Survey Data (quantitative)

The quantitative DHS data is nationally representative and consists of household survey data covering a wide range of population, health and nutrition indicators. For the health relevant indicators, DHS covers the following: child health, family planning (knowledge and contraceptive use), fertility, maternal health (antenatal, delivery and postnatal care), unmet need for family planning, wealth, among others at the individual level[160]. DHS surveys are conducted periodically in specific countries, mostly LMICs of which Zambia is one. In Zambia, DHS have been administered eight times starting in 1992 and with the most recent one in 2024[161]. The DHS in Zambia is implemented by Zambia Statistics Agency (ZamStats) and Ministry of Health, technically assisted by ICF International, and financially supported by the United States Agency for International Development (USAID)[141].

The DHS employs a rigorous sampling strategy, using the national census population as the sampling frame, and enumeration areas determined based on the number of households in each location. An enumeration area is a geographical area consisting of on average 110 to 130 households[140,141]. DHS followed a two-stage stratified sampling design involving i) selection of clusters (enumeration areas) where the probability of selection is weighted by size of the cluster and ii) systematic sampling of households from each selected cluster where a fixed number of households is selected. This makes the results representative at national and provincial level[141].

Based on the representativeness and methodological rigor, the DHS data was chosen as a reliable source of data collected in Zambia. On that note, this thesis utilised three rounds of DHS, that is 2007, 2013/14 and 2018 for both Studies II and III. The 2024 DHS round could not be included in this thesis due to delays in data release following United States government funding cuts to USAID.

## Qualitative data

The qualitative data used in this thesis was in-depth interviews conducted with stakeholders involved in the implementation of the NHIS. This data was in three forms, the audio recording, the transcripts of the interviews and interview notes. This data was utilised for study IV.

# Study participants

This thesis included two types of study participants. Study II and III had sexually active women of reproductive age (15–49-year-old) as the study participants while study IV included NHIS stakeholders. A person was considered sexually active if they had had sex in the last 30 days prior to the interview date[159] while a person was considered an NHIS stakeholder if they are or were directly or indirectly involved in the implementation of the NHIS[162].

# Variables

## Outcome variables

The outcome variables in this thesis can be categorised into maternal and reproductive health service utilisation and financial protection. The service utilisation outcomes covered contraceptive use, antenatal care, delivery care and postnatal care. The contraceptive use related variables were the main outcome variables while the rest were outcome variables considered only in study I.

*Contraceptive use*

There are two contraceptive use related outcomes: that is current use of modern contraception and unmet need for modern contraception.

**Current use of modern contraception** refers to the situation where the study participant was using any of the modern contraceptive method at the time of the interview. The modern methods of contraception included female sterilization, oral contraceptives, IUDs, injectables, implants, female or male condoms, diaphragms, contraceptive foams or jellies, the lactational amenorrhea method (LAM), and the standard days method[159,163]. Current use of modern contraception was based on variable 313 (V313) of the DHS that classifies current use of contraception as modern or traditional method used[164]. This outcome, current use of modern contraception, is a categorical variable coded as 1 for yes and 0 for no. This outcome was considered in studies I, II & III.

**Unmet need for modern contraception** was defined as a scenario where a woman is not using contraception, yet she does not want to get pregnant (Figure 6)[159,165]. Unmet need for modern contraception is determined by responses provided to 15 DHS questionnaire questions[165]. Based on the responses to these questions, one will be classified as not experiencing unmet need for contraception, experiencing unmet need for limiting, or experiencing unmet need for spacing. It is those categorised as experiencing one of the two forms of unmet need that were classified as experiencing unmet need for contraception. Unmet need for modern contraception was an outcome in study II.

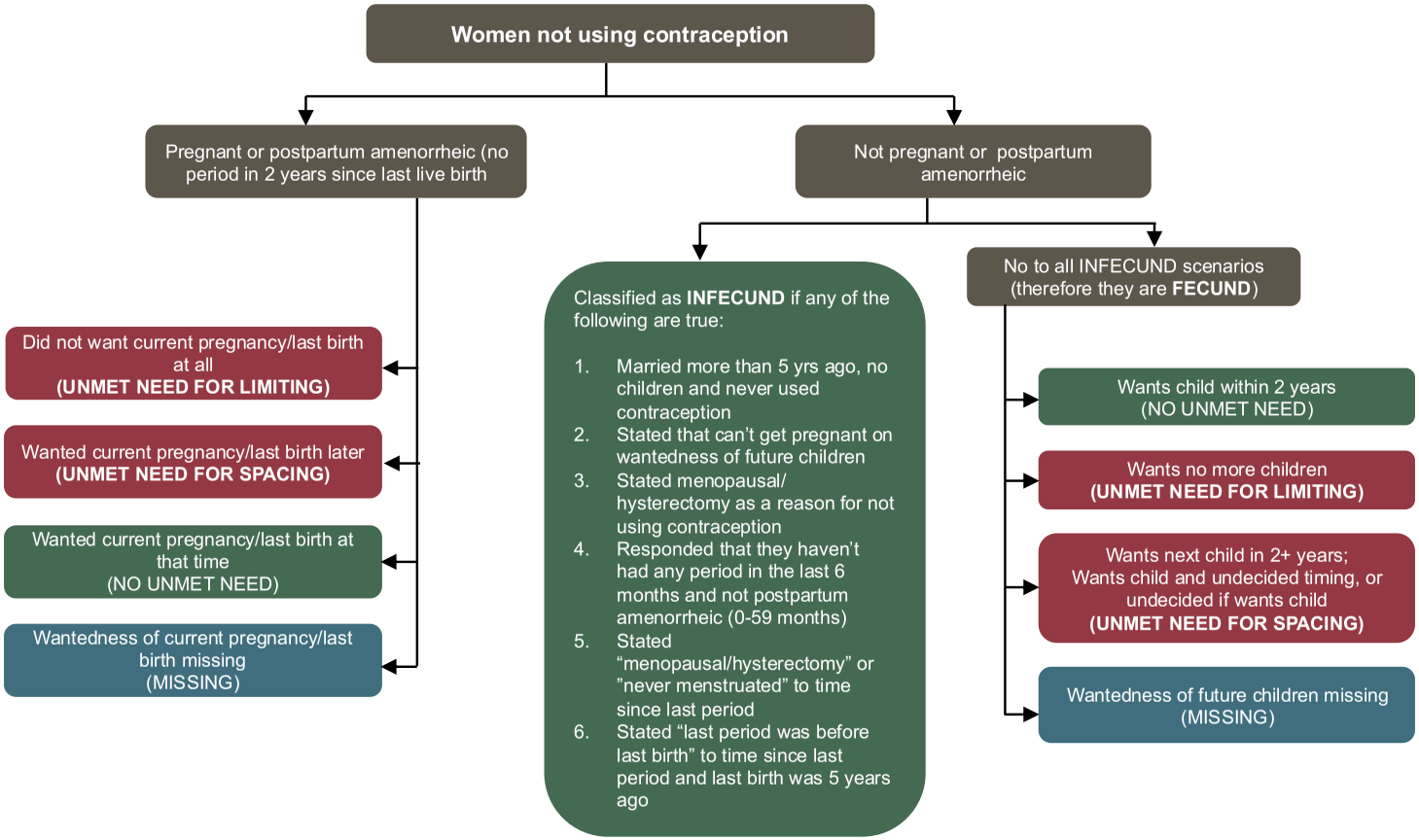


**Figure 6:** Diagram showing determination of unmet need for contraception based on the demographic and health survey definition.
Source: Created by author based on an illustration and DHS definition for unmet need[165,166].

*Antenatal care (ANC)*

The antenatal related outcomes in study I, were classified into four. These includes timing of ANC, frequency of ANC visits, attended to by skilled staff during ANC visit and the components of ANC visit.

*Delivery care*

Delivery care related outcomes, considered in only study I, were classified into three; that is place of delivery, delivery by skilled personnel, and type of delivery.

*Postnatal care*

Postnatal care related outcomes, covered in only study I, were classified into three that is attendance of postnatal care, timing of postnatal care and being seen by skilled staff during postnatal care.

*Financial protection*

Financial protection related outcome variables included out of pocket expenditure due to delivery and financial hardship.

## Exposure variables

Study III analysed the impact of family planning messages on current modern contraceptive use. Three modes of delivery of the family planning messages were analysed:

*Mass media*

This refers to receipt of family planning messages through only traditional mass media that is radio, television and or newspapers. This variable is termed as "mass media" hereafter.

*Family planning counselling*

This refers to receiving family planning messages exclusively through or during family planning counselling sessions provided by a health professional or field worker either at a health facility or within the community. It is hereafter referred to as "family planning counselling".

*Both family planning and mass media*

This exposure variable refers to the receipt of family planning messages through only both family planning counselling and mass media. It is hereafter referred to as "both family planning and mass media".

### Independent variables

The identification of independent variables in the thesis was informed by study I which reviewed articles that had investigated the impact of health insurance on maternal and reproductive health. The independent variables consist of participants' demographic characteristics, including age group, wealth status, highest educational level, religion, employment status, number of children (parity), sex of the household head, insurance status, survey year, and union status (living with a partner, regardless of marital status). Directed acyclic graphs (DAGs)[167] were used to show the relationship between the variables.

## Analytical approaches

The thesis utilised four analytical approaches. Study I used evidence synthesis, Study II inequality and inequity analysis, Study III impact evaluation and Study IV qualitative content analysis.

### Evidence synthesis (Study I)

*Methodological approach*

To assess available evidence on causal impact of health insurance on maternal and reproductive health service utilisation and financial protection in LLMICs, the systematic review methodology, a type of evidence synthesis, was used. The systematic review used the Population, Intervention, Control and Outcome (PICO) framework[168] and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines[169]. A study protocol for study I was developed and registered with PROSPERO, CRD42021285776. Below is the PICO framework (Table 2) used to scope out the study.

A systematic review was conducted to evaluate evidence on how health insurance affects maternal and reproductive health service use and financial protection in LLMICs.

**Table 2: PICO framework for evidence synthesis**

| Domain | Definition as per the study |
|---|---|
| **P**opulation | Women of reproductive age in LMICs |
| **I**ntervention | Health insurance |
| **C**ontrol | Uninsured women |
| **O**utcomes | - Contraceptive use<br>- ANC<br>- Delivery care<br>- Financial protection |

The systematic review included the following steps, identification of a list of keywords, development of a search strategy, development of inclusion and exclusion criteria, title and abstract screening, full text reading and selection of studies, data extraction, analysis and reporting.

The keywords were identified based on the PICO framework and included the following words: impact, health insurance, utilisation, maternal and reproductive health (MRH), and financial protection. A search string including all variations of keywords was developed and customised to each electronic databases. Databases searched in this study were Web of Science, Medline, Embase, CINAHL, Scopus and Cochrane. The dataset search was conducted on 31st October 2021 with an update done on 23rd of May 2023. All articles found as a result of the search were uploaded to Covidence for screening and full text reading.

Prior to screening, clearly defined inclusion and exclusion criteria were established to guide the selection of articles for this study. Inclusion criteria consisted of articles published in English from 2010 onwards that examined the impact of not-for-profit health insurance on MRH and/or financial protection, utilizing experimental or quasi-experimental designs. Exclusion criteria encompassed studies focused on private insurance, non-experimental or qualitative research, articles published in languages other than English, and those for which the full text was unavailable.

Upon upload of the articles onto Covidence, deduplication was carried out, followed by title and abstract screening by at least two independent researchers (JK, PT and SPK). Full text reading was then conducted to identify the articles that fulfilled the inclusion criteria.

A data extraction template was developed to record the extracted data. Information extracted included author, year of publication, target group, study design, country, geographic location, level of health facility, study participants, type of insurance, year of implementation of insurance, source of data, year of data collection, analysis methods used, description of the insurance, type of membership, enrolment requirements, services covered by insurance, services received, insurance coverage, premium, reimbursement rates, co-payments, reported impact (adjusted and unadjusted), and correction of self-selection among others[170].

The quality of the articles was assessed using two steps, that is assessing the risk of bias in each study using the Risk of Bias in Non-randomised Studies of Interventions (ROBINS-I)[171,172] and using GRADE criteria to categorise each article according to the level of certainty of the evidence[173–175].

The extracted data was reported narratively, with summaries presented in tables, and the impacts categorised as positive and significant, positive but not significant, negative and significant, or negative but not significant.

## Inequality and inequity analysis (Study II)

*Methodological approach*

Inequality and inequity analyses were conducted to estimate the level of inequality and inequity in the use of modern contraception and identify the likely causes. Although the methods outlined in this section are commonly used for analysing inequality, they were also applied to assess inequity, as one of the two outcome variables reflected an unmet need. The two outcome variables analysed in this section are current use of modern contraception and unmet need for contraception.

Inequality and inequity in modern contraceptive use were analysed through graphical illustrations (line graphs and concentration curves), estimation of the inequality index and decomposition of inequality and inequity.

*Graphical illustration of inequality and inequity*

Two forms of illustrations were used to assess the existence and magnitude of inequality and inequity in modern contraceptive use.

i) Construction of line graphs

The line graphs were a representation of the proportion of the participants currently using modern contraception and those experiencing unmet need for contraception in each of the wealth quintile across the years.

ii) Construction of the concentration curves.

A concentration curve is a graphical representation of the relationship between a benefit variable (for example health indicator/outcome) and a ranked socio-economic variable (that is continuous)[159]. The concentration curve plots the cumulative proportion of the outcome variable against the cumulative proportion of the population, ranked by a socio-economic indicator, such as the wealth index in this case [176]. This allows for visual comparison of how the outcome is distributed across different socio-economic groups.

The concentration curve was constructed as follows. The cumulative proportion of a health-related variable is plotted on the y-axis against the cumulative proportion of the population, ranked by the wealth index plotted on the x-axis, progressing from the poorest to the richest. A 45-degree diagonal line, referred to as the line of equality, serves as a benchmark, originating from the bottom-left corner of the graph (intersection of the x and y axes). When the concentration curve lies above this line, it reflects a pro-poor distribution of the health variable; conversely, a curve below the line indicates a pro-rich distribution [177].

*Estimation of inequality index (the concentration index and corrected concentration index)*

Inequality can be measured by estimating the concentration index (CI). The CI is a bivariate, rank-dependent metric corresponding to twice the area between the concentration curve and the line of equality (the 45-degree diagonal). The CI ranges from -1 to 1, where a value of zero indicates equal distribution across socioeconomic groups, negative values suggest a pro-poor distribution, and positive values reflect a pro-rich distribution [176].

Despite CI being used to measure inequality, concerns about its accuracy have been raised as explained in Study II[159]. Applying the CI to binary outcome variables (e.g., 0/1 indicators), the CI is likely to produce biased estimates due to the influence of the variable's mean on the index's bounds. Therefore, considering that the mean of the health variable (outcome variable) influences the bounds of the CI, comparison of populations with different means of the health variable becomes difficult [178,179]. Specifically, as the mean of a binary health variable increases, the range of possible CI values narrows [179], making cross-population comparisons challenging. Moreover, the socioeconomic ranking derived from the CI will differ depending on whether the analysis focuses on inequalities in health or ill health [178].

To overcome the challenges with CI, a corrected concentration index (CCI) was used. CCI, is also known as the Erreygers index (EI)[180].

*Decomposition of the EI*

The decomposition of the EI was intended to identify the causes of the inequality [181]. Numerous studies have employed the decomposition method developed by Wagstaff et al.; however, it has been criticized for its one-dimensional nature, as it emphasizes the health outcome variable while neglecting the ranking variable (socioeconomic status variable – wealth index)[182]. Therefore Wagstaff et al.'s decomposition approach misses to consider the covariance between the health outcome variable and the rank variable. The decomposition in this thesis followed the general method for decomposing the causes of socioeconomic inequality in health described by Heckley et al. that applied the regression of recentred influence function (RIF)[182]. All analysis was conducted using Stata 17.

## Estimation of impact (Study III)

*Methodological approach*

The impact of the modes of delivery of family planning messages on modern contraceptive use was determined using two analytical approaches, that is logistic regression and causal inference techniques. Prior to determining impact, pairwise correlations among the independent variables were assessed to identify potential

multicollinearity. Highly correlated variables were excluded from the models to minimize collinearity and ensure the robustness of the estimates.

*Logistic regression*

Logistic regression was used as the first approach because it is well-suited for modelling binary outcomes like contraceptive use and provided a clear baseline for assessing impact while adjusting for confounders. It also helped identify potential issues such as multicollinearity, thereby informing the setup of more advanced causal inference methods.

*Estimation of average treatment effects*

The data used in study II and III is unrandomized and therefore, is exposed to selection bias. To account for possible selection bias and heterogeneity, the Average Treatment Effects (ATE) was estimated using three causal inference methods: Augmented Inverse Probability Weighting (AIPW)[183] – base case, Inverse Probability Weighting (IPW) [184], and Propensity Score Matching (PSM)[185]. These approaches enabled a robust comparison between individuals exposed to specific message delivery modes and those who received no messages. AIPW, which combines regression adjustment and IPW, offers double robustness, producing reliable ATE estimates if either the treatment or outcome model is correctly specified [183].

*Post estimation checks*

Post-estimation checks were conducted to validate causal assumptions. This included assessing the overlap assumption using graphical tools and comparing covariate distributions across treatment groups. We evaluated the consistency of treatment effect estimates by comparing results across all three methods and used bootstrap resampling (100 iterations) to test the stability of the standard errors and confidence intervals. Statistical significance was determined using 95% confidence intervals. All analyses were performed using Stata version 18.

## Qualitative content analysis (Study IV)

*Methodological approach*

Considering the area of focus of this part of the thesis, health insurance, a health financing mechanism and a critical element of any health system, I had chosen to use the directed content analysis approach[186] to analyse the collected data given the available frameworks that could be deployable. However, based on the objective to be addressed, "perceptions towards implementation of the NHIS", it required a more nuanced analysis of the information provided by the study participants. Further, there was need to prevent the forcing of information to fit a given framework let alone disregarding some important information because it does not fit a given

framework. To that background I choose to go with conventional qualitative content analysis[187–189] as the appropriate approach for the analysis.

*Qualitative data processing and content analysis*

The interviews were transcribed verbatim and imported into NVivo 14 software[190] for qualitative analysis using inductive content analysis[189]. The analytical process began with a familiarization phase, involving repeated reading of transcripts and listening to recordings. Key units of meaning were identified from the explicit content and coded. These initial codes were then organized into broader categories, which served as the foundation for developing sub-themes through deeper, interpretive (latent) analysis. This iterative process ultimately led to the identification of overarching themes that captured the core patterns and insights emerging from the data. A flowchart showing the relation between the categories and the respective overarching themes was developed.

# Use of artificial intelligence

Artificial intelligence (AI) was used in this thesis to improve text clarity by checking grammar and refining language. Additionally, AI was used to translate text from English to Swedish. The AI tool applied was Copilot. Importantly, AI was not involved in any data analysis or interpretation of results. I take full responsibility for the content of this thesis.

# Ethical considerations

This thesis utilised both secondary and primary data, as stated earlier. Secondary data included published literature used in study I and anonymised data collected by the DHS used in studies II and III. Such data is exempt from ethical approval as it does not include any traceable personal data. On the other hand, primary data was used for study IV and required ethical approval.

*Ethical approval*

Primary data collection and use was executed in accordance with established ethical standards for research involving human participants. Ethical approval was obtained from the University of Zambia Biomedical Research Ethics Committee (Reference No. 6227-2025). The approval process ensured that the study design, data collection procedures, use and participant protections met the principles of respect for persons, beneficence, and justice. It was ensured that participants were treated with dignity and that their rights were safeguarded throughout the research process.

*Informed consent process*

Prior to participation, institutions involved with the NHIS were contacted to explain the research objectives and were asked to nominate suitable participants. These individuals received detailed study information by email or office visits. Interested participants were given a written consent form outlining discussion topics, and interviews were scheduled at mutually convenient times and locations.

On the agreed date for the interview, the informed consent document was revisited and explained prior to start of the interview. The informed consent document contained information on the purpose of the study, the nature of involvement, benefits and risks of participation and the procedures to be followed during the interview. Participants were informed that their participation was entirely voluntary and that they could withdraw from the study at any time without any consequences or providing any reason. This enabled the potential participant to make an informed choice on whether to participate in the study or not. In addition, participants were encouraged to ask questions and seek clarification before the start of the interview or at any point of the interview. If the potential participant remained interested in taking part in the study, the consent form was then signed.

*Participant rights*

Participants were made aware of their full range of rights in accordance with ethical research practices and international standards. These rights included voluntary participation, right to withdraw from the study at any point, right to refuse to answer any question, right to privacy and confidentiality. These rights were communicated both verbally and in writing, and participants were reassured that their decision to participate was voluntary and would not affect their access to services or relationships with institutions involved in the study.

*Confidentiality and data protection*

To protect the privacy of participants, confidentiality measures were implemented. All interviews were audio-recorded with participant consent and transcribed verbatim. During transcription, any personally identifiable information, including names, job titles, and institutional affiliations, was removed or replaced with neutral descriptors. Each participant was assigned a unique code, which was used throughout the analysis to maintain anonymity.

The anonymized transcripts and audio recordings were securely stored on a password-protected cloud server hosted by Lund University, with access restricted to the core research team. No data were shared with third parties. In reporting the study findings, only pseudo-anonymized quotations were used, and care was taken to ensure that no individual could be identified from the published material.

*Compliance with GDPR*

Given the study's affiliation with a European institution, all data handling procedures were designed to comply with the General Data Protection Regulation (GDPR). A data management plan was developed, ensuring transparency, accountability, and respect for participant autonomy. All data were used solely for the purposes of this research and stored in a manner that upholds privacy.

*Ethical dilemmas and mitigation strategies*

Study IV involved participants sharing what could be politically sensitive information about institutional practices or political dynamics. While these insights were valuable for the research, they raised concerns about potential repercussions if identities were inadvertently revealed. To mitigate this risk, such information was not provided in the report as quotes. Further, precautions were taken in reporting to remove any contextual clues that could lead to identification of the study participant.

Another dilemma involved participants expressing discomfort or hesitation when discussing certain topics, such as the financial situation of NHIMA and issues pertaining recruitment. In these instances, I refrained from probing further and proceeded to other topics. This approach helped with maintaining trust and ensured that participants felt safe and respected.

A third ethical challenge related to power dynamics, particularly when interviewing individuals in lower-level positions within institutions. Some participants may have felt obligated to participate due to institutional affiliations. To address this, the consent process emphasized the voluntary nature of participation and clarified that their decision would not affect their standing or relationships within their organization.

# Study Results

## Summary of results

This thesis finds that inequities in access to MRH care remain a challenge in Zambia as well as in other LLMICs. The inequities and inequalities in MRH access are driven by several factors including the individual's highest level of education attained, access to health information, partner characteristics and financial barriers. Access to MRH is positively impacted by health insurance and modes of delivery of family planning messages. However, the level of impact is varied based on socioeconomic position of the individual and implementation process of the insurance scheme. There is limited existing evidence on the impact of health insurance on contraception, PNC and financial protection.

## Evidence on the impact of health insurance on MRH (Study I)

*Number of relevant studies included*

The search of the electronic databases, after removal of duplicates, yielded 11,988 studies. A total 17 studies were included in the systematic view after title and abstract screening and full text reading. Figure 7 below illustrates the processes involved in the selection of the 17 studies[170].

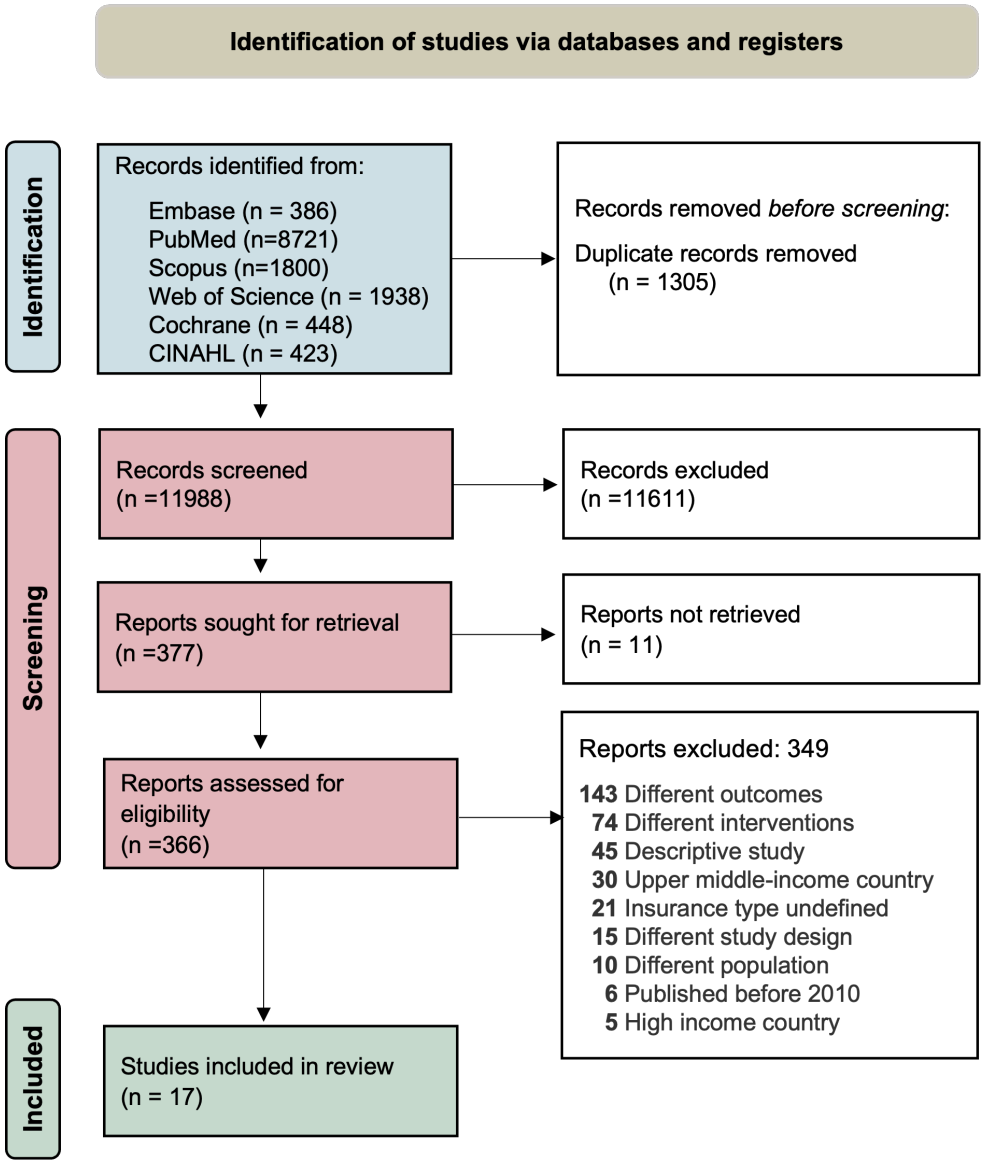


**Figure 7:** PRISMA flow chart

Source: Created by author

*Characteristics of the included studies*

All seventeen studies included in the review were of quasi-experimental designs, which are non-randomized approaches used to assess interventions with the intent of establishing causal relationships between the intervention and observed outcomes[191]. Ghana and Indonesia had three studies each, followed by the Philippines and Mauritania with two studies each. Single studies were identified from Tanzania, Egypt, Rwanda, Ethiopia, India, and Senegal (see Table 1). Additionally, one study spanned multiple countries, Ghana, Rwanda, and Indonesia[192].

The majority of the studies (n = 14) were nationally representative, while the remaining three were conducted within specific regions of their respective countries[106,193,194]. All the three studies were exclusively situated in rural contexts, with none focusing solely on urban populations. All studies targeted female participants of reproductive age, beginning at 15 years, with most (n = 13) specifically examining women aged 15 to 49.

The studies investigated three types of health insurance: social health insurance (e.g., Ghana), community-based health insurance (e.g., Rwanda), and publicly funded health insurance (e.g., India). Data sources were predominantly secondary (n = 14), with frequent use of DHS, Multiple Indicator Cluster Surveys (MICS), and the Family Life Survey (FLS) data.

**Table 3: Characteristics of included studies**

| S/N | Study | Study design | Country | Representation | Setting (Rural/ urban) | Target group/study population | Type of insurance | Source of data |
|---|---|---|---|---|---|---|---|---|
| 1 | Samarakoon et al 2020[195] | Quasi experimental | Indonesia | National | Both | Women aged 15-45 | Social HI | IFLS 2000 and 2007 |
| 2 | Agbanyo et al 2021[196] | Quasi experimental | Ghana | National | Both | Women aged 15-49 that had delivered in the last 5 years | Social HI | DHS 2008 & 2014 |
| 3 | Ravit et al 2020[197] | Quasi experimental | Mauritania | National | Both | Women aged 15-49 that had delivered in the last 2 years | CBHI | MICS 2015 |
| 4 | Chang et al 2018[99] | Quasi experimental | Rwanda | National | Both | Women aged 15-49 that had delivered in the last 5 years | CBHI | DHS 2005, 2008, 2010 |
| 5 | Rashad et al 2019[198] | Quasi experimental | Egypt | National | Both | Women aged 15-49 that had delivered in the last 5 years | Social HI | DHS 2014 |
| 6 | Gouda et al 2016[199] | Quasi experimental | Philippines | National | Both | Women aged 15-49 that had delivered in the last 5 years | Social HI | DHS 2014 |
| 7 | Philibert et al 2017[200] | Quasi experimental | Mauritania | National | Both | Women aged 15-49 that had delivered in the last 5 years | CBHI | DHS 2001, NSIMM 2003 & MICS 2007, 2011 |
| 8 | Anindya et al 2020[201] | Quasi experimental | Indonesia | National | Both | Women aged 15-49 that had delivered in the last 5 years | Social HI | DHS 2017, 2012 |
| 9 | Kuwawenaruwa et al 2019[193] | Quasi experimental | Tanzania | Regional | Rural | Women that had delivered in the last 12 months | Social HI | Survey |
| 10 | Aizawa 2019[202] | Quasi experimental | Indonesia | National | Both | Women aged 15-49 that had delivered in the last 5 years | Social HI | IFLS-6 |
| 11 | Bonfrer et al 2016[104] | Quasi experimental | Ghana | National | Both | Women aged 15-49 that had delivered in the last 5 years | Social HI | DHS 2008 |
| 12 | El Omari et al 2021[203] | Quasi experimental | Philippines | National | Both | Indigent Women aged 15-49 that had delivered in the last 2 years | Social HI | DHS 2013 |
| 13 | Wang et al 2017[192] | Quasi experimental | Ghana, Indonesia & Rwanda | National | Both | Women aged 15-49 that had delivered in the last 5 years | Social HI | GDHS 2008, IDHS 2012 & RDHS 2010 |
| 14 | Kofinti et al 2022[204] | Quasi experimental | Ghana | National | Both | Women aged 15-49 that had delivered in the last 5 years | Social HI | DHS 2014 |
| 15 | Bousmah et al 2022[106] | Quasi experimental | Senegal | Regional | Rural | Women aged 15-49 that had delivered in the last 2 years | CBHI | Survey |
| 16 | Mussa et al 2023[194] | Quasi experimental | Ethiopia | Regional | Rural | Women of reproductive age | CBHI | Survey |
| 17 | Garg et al 2023[205] | Quasi experimental | India | National | Both | Women having a delivery in the last one year | PFHI | IFLS-5 |

HI- Health Insurance, CBHI- Community Based Health Insurance, IFLS-n Indonesia Family Living Standards Survey (n stands for the round), NSIMM- National Survey on Infant Mortality and Malaria, GDHS- Ghana Demographic and Health Survey, IDHS- Indonesia Demographic and Health Survey, RDHS- Rwanda Demographic and Health Survey, MICS- Multiple Cluster Survey, DHS- Demographic and health survey

*Quality of the studies*

The quality of the included studies was generally rated as moderate. Twelve studies were judged to have a high certainty of evidence, while two were rated as moderate [206–217]. Two studies [218,219] were assessed as having low certainty, and one study [220] was rated as very low. The majority of studies (n = 15; 88.2%) were classified as having a moderate risk of bias, whereas two studies [219,220] were identified as having a serious risk of bias (Figure 8).

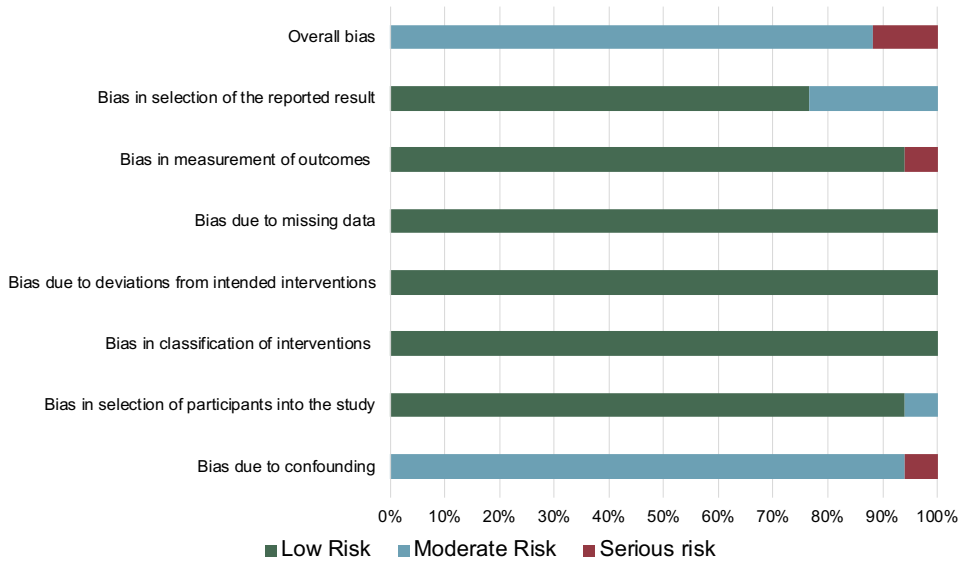


**Figure 8:** Assessment of the risk of bias of the studies according to the seven domains, using the ROBINS-I tool

*Indicators used to measure impact on utilisation of MRH and financial protection in LMICs*

Delivery care and ANC related indicators were the most reported on indicators in the studies (Table 4). Delivery at health facility (n=14) and receiving at least 4 ANC visits (n=9) were the most popular measures of impact. More indicators, in terms of number, were used to measure the impact of health insurance on utilisation of MRH compared to financial protection. The most measured financial protection related indicator was cost of delivery (n=4).

**Table 4:Indicators used by studies to measure impact on utilisation of MRH and financial protection in LMICs**

| Objective | Category of indicator | Indicator subcategory | Indicator | Studies (N=17) | |
|---|---|---|---|---|---|
| | | | | Total (n) | Proportion (%) |
| Utilisation | Contraception | Contraceptive use | Contraceptive use | 3 | 17.6 |
| | ANC | Timing of ANC | Having first ANC visit in first trimester | 1 | 5.9 |
| | | | Time to first ANC visit | 1 | 5.9 |
| | | Frequency of ANC visits | At least 4 ANC visits | 9 | 52.9 |
| | | | Number of ANC visits during a pregnancy | 2 | 11.8 |
| | | | Number of ANC visits in 1st trimester | 2 | 11.8 |
| | | | Number of ANC visits in 2nd trimester | 1 | 5.9 |
| | | | Number of ANC visits in 3rd trimester | 1 | 5.9 |
| | | Place of ANC visit | ANC at health facility | 1 | 5.9 |
| | | Skilled staff during ANC visit | ANC with skilled staff | 3 | 17.6 |
| | | Components of ANC visits | Complete assessment in ANC | 1 | 5.9 |
| | Delivery | Place of delivery | Delivery at health facility | 14 | 82.4 |
| | | Skilled staff during delivery | Delivery assisted by skilled attendant | 7 | 41.2 |
| | | Type of delivery | C section delivery | 3 | 17.6 |
| | | Safety of delivery | Maternal near miss | 1 | 5.9 |
| | Postnatal care | Postnatal care attendance | Postnatal care | 4 | 23.5 |
| | | Timing of postnatal care | PNC before leaving facility | 1 | 5.9 |
| | | | PNC after discharge | 1 | 5.9 |
| | | | Postnatal care at health facility <2 month | 1 | 5.9 |
| | | Skilled staff during postnatal care | PNC with skilled provider | 1 | 5.9 |
| Financial protection | Cost of services to the patient | OOPE due to ANC | OOPE due to ANC | 1 | 5.9 |
| | | OOPE due to delivery | OOPE due to delivery | 4 | 23.5 |
| | | | OOPE due to C-section | 1 | 5.9 |
| | | OOPE due to PNC | OOPE due to PNC | 1 | 5.9 |
| | | Financial hardship | Financial distress after c-section | 1 | 5.9 |
| | | | CHE | 1 | 5.9 |

OOPE– Out of pocket expenditure

*Magnitude of the impact of health insurance on MRH utilisation and financial protection.*

Health insurance generally increased significantly the chances of receiving at least four ANC visits by between two to eleven percentage points. However, it does not increase the chances of receiving the ANC visits within the first trimester of the pregnancy nor being seen by a skilled attendant during ANC visit. There was a difference in impact on the number of visits during pregnancy between contributory and non-contributory health insurance. Contributory health insurance increased the number of ANC visits during pregnancy while non-contributory insurance did not in Senegal.

The impact of health insurance on delivery care was positive and significant for both the delivery at health facility and delivery assisted by skilled attendant indicators. It should be noted that the magnitude of impact of non-contributory health insurance was greater than that of contributory insurance on delivery at a health facility and a reduction of out-of-pocket expenditure (OOPE) on delivery in Indonesia (Table 5)

**Table 5: Reported magnitude of impact in each of the studies**

| Authors | Country | Sample size | Measure | Effect size | Lower bound | Upper bound | Standard error | Standard deviation | Significant at 95% CI |
|---|---|---|---|---|---|---|---|---|---|
| **At least 4 ANC visits** | | | | | | | | | |
| Ravit et al 2020 | Mauritania | 1496 | ATE | 0.11 | 0.06 | 0.16 | | | Significant |
| Rashad et al 2019 | Egypt | 9960 | ATT | 0.041 | | | 0.01 | | Significant |
| Philibert et al 2017 | Mauritania | 3520 | Absolute risk | 0 | -0.05 | 0.05 | | | Not Significant |
| Anindya et al 2020 | Indonesia | 5705 | ATT | 0.074 | 0.048 | 0.099 | | | Significant |
| Bonfrer et al 2016 | Ghana | 2002 | ATT | 0.07 | | | | | Significant |
| El Omari et al 2021 | Philippines | 3648 | ATE | 0.085 | | | | 0.109 | Significant |
| Wang et al 2017 | Ghana | 1753 | ATT | 0.0771 | | | 0.0257 | | Significant |
| Wang et al 2017 | Indonesia | 14318 | ATT | 0.026 | | | 0.006 | | Significant |
| Wang et al 2017 | Rwanda | 6016 | ATT | 0.0195 | | | 0.0203 | | Significant |
| Mussa et al 2023 | Ethiopia | 1564 | ATE | 0.004 | -0.056 | 0.063 | | | Not Significant |
| **Number of ANC visits during a pregnancy** | | | | | | | | | |
| Kofinti et al 2022 | Ghana | 4169 | ATE | 0.432 | | | 0.101 | | Significant |
| Bousmah et al 2022 | Senegal (contributory) | 804 | ATE | 0.565 | | | 0.18 | | Significant |
| Bousmah et al 2022 | Senegal (non-contributory) | 983 | ATE | −0.325 | | | 0.36 | | Not significant |
| **Number of ANC visits in 1st trimester** | | | | | | | | | |
| Aizawa 2019 | Indonesia (non-contributory insurance) | 3717 | ATE | –0.0823 | | | 0.0597 | | Not significant |
| Aizawa 2019 | Indonesia (contributory insurance) | 3314 | ATE | 0.0721 | | | 0.0717 | | Not significant |
| Wang et al 2017 | Ghana | 1753 | ATT | 0.0184 | | | 0.0365 | | Not significant |
| Wang et al 2017 | Indonesia | 14318 | ATT | 0.017 | | | 0.008 | | Significant |
| Wang et al 2017 | Rwanda | 6016 | ATT | 0.017 | | | 0.0206 | | Not significant |
| **ANC with skilled staff** | | | | | | | | | |

| Authors | Country | Sample size | Measure | Effect size | Lower bound | Upper bound | Standard error | Standard deviation | Significant at 95% CI |
|---|---|---|---|---|---|---|---|---|---|
| Philibert et al 2017 | Mauritania | 4029 | Absolute risk | 0.06 | 0.01 | 0.11 | | | Significant |
| Bonfrer et al 2016 | Ghana | 2002 | ATT | 0.05 | | | | | Not significant |
| Mussa et al 2023 | Ethiopia | 1564 | ATE | 0.017 | -0.053 | 0.087 | | | Not significant |
| **Delivery at health facility** | | | | | | | | | |
| Agbanyo et al 2021 | Ghana | 8818 | Marginal effects | 0.203 | | | 19.56 | | Significant |
| Ravit et al 2020 | Mauritania | 2602 | ATE (District hospital) | 0.04 | 0 | 0.08 | | | Significant |
| Rashad et al 2019 | Egypt | 9960 | ATT | 0.034 | | | 0.01 | | Significant |
| Gouda et al 2016 | Philippines | 1376 | ATT | 0.0973 | | | 0.035 | | Significant |
| Philibert et al 2017 | Mauritania | | Absolute risk | −0.04 | -0.09 | 0.13 | | | Not Significant |
| Anindya et al 2020 | Indonesia | 5705 | ATT | 0.102 | 0.075 | 0.127 | | | Significant |
| Aizawa 2019 | Indonesia (non-contributory insurance) | 3720 | ATE | 0.203 | | | 0.0122 | | Significant |
| Aizawa 2019 | Indonesia (contributory insurance) | 3317 | ATE | 0.13 | | | 0.0125 | | Significant |
| Bonfrer et al 2016 | Ghana | 2002 | ATT | 0.12 | | | | | Significant |
| Wang et al 2017 | Ghana | 1837 | ATT | 0.1058 | | | 0.0319 | | Significant |
| Wang et al 2017 | Indonesia | 14954 | ATT | 0.049 | | | 0.009 | | Significant |
| Wang et al 2017 | Rwanda | 6122 | ATT | 0.0745 | | | 0.0186 | | Significant |
| Kofinti et al 2022 | Ghana | 4169 | ATE | 0.062 | | | 0.017 | | Significant |
| Bousmah et al 2022 | Senegal (contributory) | 804 | ATE | 0.349 | | | 0.08 | | Significant |
| Bousmah et al 2022 | Senegal (non-contributory) | 983 | ATE | 0.238 | | | 0.12 | | Significant |
| Mussa et al 2023 | Ethiopia | 1564 | ATE | -0.005 | -0.065 | 0.056 | | | Not Significant |
| **Delivery assisted by skilled attendant** | | | | | | | | | |

| Authors | Country | Sample size | Measure | Effect size | Lower bound | Upper bound | Standard error | Standard deviation | Significant at 95% CI |
|---|---|---|---|---|---|---|---|---|---|
| Ravit et al 2020 | Mauritania | 2400 | ATE | 0.08 | 0.04 | 0.12 | | | Significant |
| Chang et al 2018 | Rwanda | 1913 | Odds Ratio | 1.158 | | | 0.038 | | Significant |
| Anindya et al 2020 | Indonesia | 5705 | ATT | 0.03 | 0.015 | 0.045 | | | Significant |
| Bonfrer et al 2016 | Ghana | 2002 | ATT | 0.1 | | | | | Significant |
| El Omari et al 2021 | Philippines | 3648 | ATE | 0.234 | | | | 0.074 | Significant |
| Kofinti et al 2022 | Ghana | 4169 | ATE | 0.068 | | | 0.016 | | Significant |
| Mussa et al 2023 | Ethiopia | 1564 | ATE | -0.008 | -0.072 | 0.056 | | | Not Significant |
| **C section delivery** | | | | | | | | | |
| Ravit et al 2020 | Mauritania | 1796 | ATE | −0.01 | −0.05 | 0.03 | | | Not Significant |
| Philibert et al 2017 | Mauritania | 4029 | Absolute risk | −0.02 | -0.04 | -0.01 | | | Significant |
| Bonfrer et al 2016 | Ghana | 2002 | ATT | 0.06 | | | 0.016 | | Significant |
| **Postnatal care** | | | | | | | | | |
| Rashad et al 2019 | Egypt | 9960 | ATT | 0.03 | | | 0.016 | | Not Significant |
| Philibert et al 2017 | Mauritania | 3996 | Absolute risk | −0.01 | -0.07 | 0.05 | | | Not Significant |
| Anindya et al 2020 | Indonesia | 5705 | ATT | 0.04 | 0.022 | 0.057 | | | Significant |
| El Omari et al 2021 | Philippines | 3648 | ATE | 0.093 | | | | 0.156 | Significant |
| **Reduction of OOPE due to delivery** | | | | | | | | | |
| Aizawa 2019 | Indonesia (non-contributory insurance) | 3720 | ATE | 1,136,966 IDR | | | | | Significant |
| Aizawa 2019 | Indonesia (contributory insurance) | 3317 | ATE | 676,402 IDR | | | | | Significant |
| Garg et al 2023 | India | 33345 | ATE | 22.89 INR | | | | | Not significant |

ATE- Average treatment effect, ATT- Average treatment effect on the treated, IDR- Indonesian Rupiah, INR- Indian Rupee, OOPE– Out of pocket expenditure

# Inequality and inequity in modern contraceptive use (Study II)

*Characteristics of study participants*

A total of 19,973 participants were included in this analysis, comprising 3,779 in 2007, 9,010 in 2013/14 and 7,148 in 2018. The proportion of people currently using modern contraception generally increased over the years from 37.26% in 2007 to 49.75% in 2018. The proportion of people experiencing unmet need generally increased from 15.27% in 2007 to 19.78% in 2018, peaking at 21.31% in 2013/14.

Across all three survey periods, 2007, 2013/14, and 2018, the majority of participants were aged between 20 and 34 years, accounting for 63.16%, 58.16%, and 56.62% of participants respectively. Most participants resided in rural areas, with proportions ranging from 56.28% to 64.73%. Primary education remained the highest level attained by most participants, ranging between 58.24% and 51.39%. Male-headed households were predominant, exceeding 86.40% in all survey years. Employment levels were relatively high, with more than half of the participants working at the time of each interview. Over 88.20% of respondents were in a union, that is, living with a partner.

Fewer than half of the participants reported receiving family planning messages through mass media, and this proportion declined notably from 43.95% in 2007 to 22.88% in 2018. Health insurance coverage remained low throughout, with fewer than 10% of participants reporting any form of coverage. While most demographic characteristics varied across the survey years, the distribution of educational attainment showed relative consistency. Table 6 outlines the characteristics of study participants, classified by contraceptive use and demographic factors across the survey years 2007, 2013/14, and 2018.

**Table 6: Characteristics of study participants (study II)**

| Year | 2007 | | 2013/14 | | 2018 | | BE test |
|---|---|---|---|---|---|---|---|
| **Variable** | Frequency | % | Frequency | % | Frequency | % | P value |
| **Contraception variables** | | | | | | | |
| **Modern contraceptive use** | (N=3,779) | | (N=9,010) | | (N=7,184) | | **0.043** |
| No | 2,371 | 62.74 | 4,813 | 53.42 | 3,610 | 50.25 | |
| Yes | 1,408 | 37.26 | 4,197 | 46.58 | 3,574 | 49.75 | |
| **Unmet need for contraception** | (N=3,779) | | (N=9,010) | | (N=7,184) | | **0.000** |
| No | 3,202 | 84.73 | 7,090 | 78.69 | 5,763 | 80.22 | |
| Yes | 577 | 15.27 | 1,920 | 21.31 | 1,421 | 19.78 | |
| **Demographic characteristics** | | | | | | | |
| **Age group** | (N=3,779) | | (N=9,010) | | (N=7,184) | | **0.022** |
| 15-19 | 339 | 8.97 | 767 | 8.51 | 610 | 8.49 | |
| 20-24 | 802 | 21.22 | 1,589 | 17.64 | 1,399 | 19.47 | |
| 25-29 | 905 | 23.95 | 1,920 | 21.31 | 1,394 | 19.40 | |
| 30-34 | 680 | 17.99 | 1,731 | 19.21 | 1,275 | 17.75 | |
| 35-39 | 463 | 12.25 | 1,372 | 15.23 | 1,120 | 15.59 | |
| 40-44 | 319 | 8.44 | 968 | 10.74 | 807 | 11.23 | |
| 45-49 | 271 | 7.17 | 663 | 7.36 | 579 | 8.06 | |
| **Province** | (N=3,779) | | (N=9,010) | | (N=7,184) | | **0.000** |
| Central | 375 | 9.92 | 785 | 8.71 | 729 | 10.15 | |
| Copperbelt | 395 | 10.45 | 905 | 10.04 | 746 | 10.38 | |
| Eastern | 539 | 14.26 | 1,172 | 13.01 | 935 | 13.02 | |
| Luapula | 364 | 9.63 | 860 | 9.54 | 741 | 10.31 | |
| Lusaka | 448 | 11.85 | 998 | 11.08 | 875 | 12.18 | |
| Muchinga | - | | 802 | 8.90 | 662 | 9.21 | |
| Northern | 404 | 10.69 | 902 | 10.01 | 648 | 9.02 | |
| North-western | 394 | 10.43 | 854 | 9.48 | 560 | 7.80 | |
| Southern | 483 | 12.78 | 1,080 | 11.99 | 760 | 10.58 | |
| Western | 377 | 9.98 | 652 | 7.24 | 528 | 7.35 | |
| **Place of residence** | (N=3,779) | | (N=9,010) | | (N=7,184) | | **0.004** |
| Urban | 1,492 | 39.48 | 3,939 | 43.72 | 2,534 | 35.27 | |
| Rural | 2,287 | 60.52 | 5,071 | 56.28 | 4,650 | 64.73 | |
| **Highest level of education** | (N=3,779) | | (N=9,003) | | (N=7,184) | | 0.307 |
| No education | 447 | 11.83 | 898 | 9.97 | 696 | 9.69 | |
| Primary | 2,201 | 58.24 | 4,816 | 53.49 | 3,692 | 51.39 | |
| Secondary | 950 | 25.14 | 2,827 | 31.40 | 2,400 | 33.41 | |
| Higher | 181 | 4.79 | 462 | 5.13 | 396 | 5.51 | |
| **Religion** | (N=3,771) | | (N=8,986) | | (N=7,184) | | **0.000** |
| Catholic | 687 | 18.22 | 1,523 | 16.95 | 1,234 | 17.18 | |
| Protestant | 3,018 | 80.03 | 7,364 | 81.95 | 5,843 | 81.33 | |
| Muslim | 15 | 0.40 | 41 | 0.46 | 40 | 0.56 | |
| Other | 51 | 1.35 | 58 | 0.65 | 67 | 0.93 | |

| Year | 2007 | | 2013/14 | | 2018 | | BE test |
|---|---|---|---|---|---|---|---|
| **Variable** | Frequency | % | Frequency | % | Frequency | % | P value |
| **Sex of head of the household** | (N=3,779) | | (N=9,010) | | (N=7,184) | | **0.006** |
| Male | 3,314 | 87.70 | 7,786 | 86.42 | 6,211 | 86.46 | |
| Female | 465 | 12.30 | 1,224 | 13.58 | 973 | 13.54 | |
| **Currently working** | (N=3,773) | | (N=8,973) | | (N=7,184) | | **0.000** |
| No | 1,729 | 45.83 | 3,753 | 41.83 | 3,514 | 48.91 | |
| Yes | 2.044 | 54.17 | 5,220 | 58.17 | 3,670 | 51.09 | |
| **Wealth status** | (N=3,779) | | (N=9,010) | | (N=7,184) | | **0.014** |
| Poorest | 687 | 18.18 | 1,595 | 17.70 | 1,617 | 22.51 | |
| Poorer | 699 | 18.50 | 1,846 | 20.49 | 1,568 | 21.83 | |
| Middle | 803 | 21.25 | 2,048 | 22.73 | 1,484 | 20.66 | |
| Richer | 909 | 24.05 | 1,923 | 21.34 | 1,290 | 17.96 | |
| Richest | 681 | 18.02 | 1,598 | 17.74 | 1,225 | 17.05 | |
| **Currently in a union** | (N=3,779) | | (N=9,010) | | (N=7,184) | | **0.000** |
| No | 412 | 10.90 | 956 | 10.61 | 844 | 11.75 | |
| Yes | 3,367 | 89.10 | 8,054 | 89.39 | 6,340 | 88.25 | |
| **Exposed to FP messages through media** | (N=3,779) | | (N=9,010) | | (N=7,184) | | **0.000** |
| No | 2,118 | 56.05 | 5,543 | 61.52 | 5,540 | 77.12 | |
| Yes | 1,661 | 43.95 | 3,467 | 38.48 | 1,644 | 22.88 | |
| **Received contraceptive counselling** | (N=3,779) | | (N=9,010) | | (N=7,184) | | **0.000** |
| No | 2,614 | 69.17 | 5,627 | 62.45 | 4,523 | 62.96 | |
| Yes | 1,165 | 30.83 | 3,383 | 37.55 | 2,661 | 37.04 | |
| **Health insurance coverage** | (N=3,776) | | (N=9,003) | | (N=7,184) | | **0.000** |
| No | 3,497 | 92.61 | 8,731 | 96.98 | 7,024 | 97.77 | |
| Yes | 279 | 7.39 | 272 | 3.02 | 160 | 2.23 | |

FP: family planning
BE: Bartlett's equal-variances test

*Graphical illustration of inequality and inequity*

i) Line graphs

The line graphs (Figure 9) below show the proportion of participants using modern contraception and those with unmet need for contraception across wealth quintiles over three survey years. The proportion of participants currently using modern contraceptives generally increased with each successive wealth quintile, being lowest among those in the poorest group and highest among those in the richest group. On the other hand, the proportion of participants experiencing unmet need

for contraception generally decreased across wealth quintiles, with those in the richest group reporting the lowest levels of unmet need.

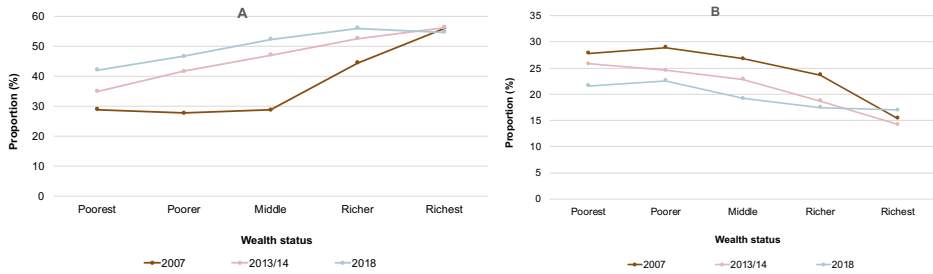


**Figure 9:** Graph A illustrates the proportion of participants currently using modern contraception per wealth quintile and graph B illustrates the proportion of participants experiencing unmet need for contraception by wealth quintile across the years.

### ii) Concentration curves

*Inequality in modern contraceptive use*

The concentration curves of modern contraception by rank of the wealth index reveal that modern contraceptive use is pro-rich across the three years because the curve is below the line of equality. This implies that participants that use modern contraception are mostly those that are better off based on the wealth index. However, there was generally a decreasing trend of inequality across the years. Upon close examination of the curves, the inequality was found to be significant with no crossovers on the line of equality (Figure 10).

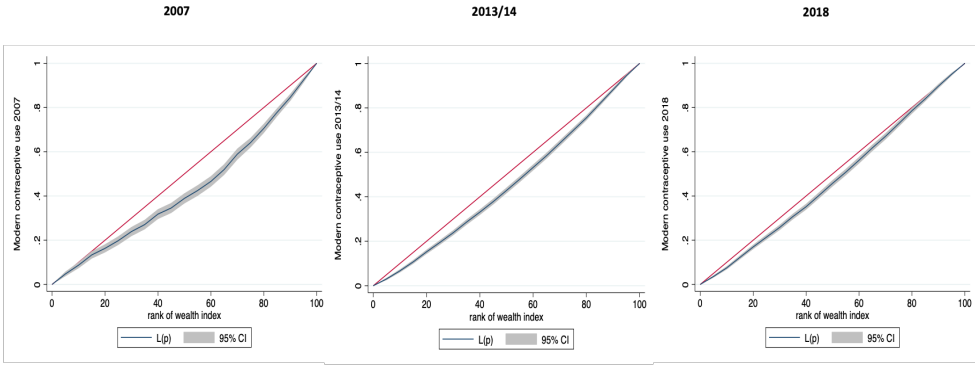


**Figure 10:** Concentration curves for current use of modern contraception for the years 2007, 2013/14 and 2018

*Inequity in modern contraceptive use*

The unmet need for contraception over the years is generally pro-poor (Figure 11). The curve is above the line of equality indicating that most people experiencing unmet need for contraception are those with lower wealth index. However, it should be noted that the inequity in contraceptive use shows a declining trend over the three years.

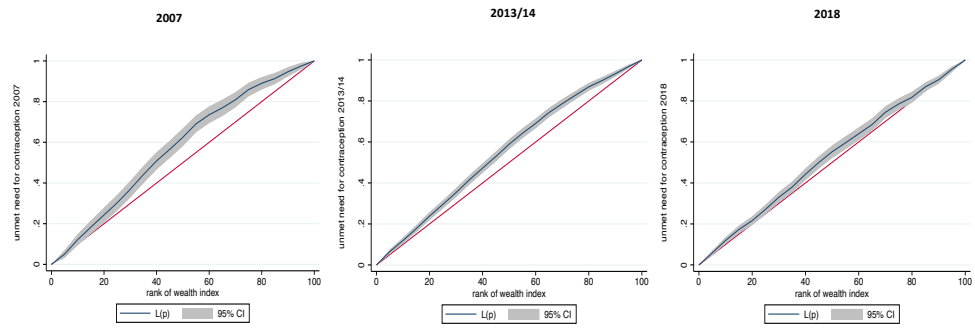


**Figure 11:** Concentration curves of unmet need for contraception for the years 2007, 2013/14 and 2018

*Estimates of inequality in modern contraceptive use and its causes*

The inequality estimates of modern contraceptive use, reflected in Table 7 as EI, are positive and significant across the three years. This means that modern contraceptives are used more by participants in the wealthier half of the population compared to their counterparts in the less wealthy half. The inequality decreases

with time where the highest level of inequality in modern contraceptive use was in 2007 and the lowest in 2018.

The highest level of education attained, living with a partner and accessing contraceptive counselling were found to significantly influence the level of inequality. Education and receiving contraceptive counselling reduce inequality while living with a partner increases inequality in modern contraceptive use.

**Table 7: The inequality estimate (Erreygers index) for modern contraceptive use and its decomposition**

| | 2007 (N=3779) | | | 2013/14 (N=9010) | | | 2018 (N=7184) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coeff. | 95% confidence interval | | Coeff. | 95% confidence interval | | Coeff. | 95% confidence interval | |
| | | Lower bound | upper bound | | Lower bound | upper bound | | Lower bound | upper bound |
| **CCI (EI)** | 0.2046** | | | 0.1816* | | | 0.1124*** | | |
| **Variable** | | | | | | | | | |
| **Age group** | | | | | | | | | |
| 15-19 | Ref | | | | | | | | |
| 20-24 | 0.0209 | -0.1227 | 0.1645 | -0.0932 | -0.2163 | 0.0299 | 0.0622 | -0.0518 | 0.1761 |
| 25-29 | 0.0290 | -0.1314 | 0.1893 | -0.0927 | -0.2126 | 0.0270 | 0.0935 | -0.0264 | 0.2134 |
| 30-34 | 0.0317 | -0.1058 | 0.1693 | -0.1025 | -0.2210 | 0.0161 | 0.0165 | -0.1048 | 0.1378 |
| 35-39 | 0.0603 | -0.1040 | 0.2245 | -0.0669 | -0.1970 | 0.0633 | 0.0495 | -0.0774 | 0.1763 |
| 40-44 | 0.2077* | 0.0357 | 0.3796 | -0.1123 | -0.2389 | 0.0142 | -0.0433 | -0.1763 | 0.0896 |
| 45-49 | 0.0851 | -0.1054 | 0.2755 | -0.1440 | -0.2951 | 0.0071 | -0.0915 | -0.2460 | 0.0629 |
| **Highest level of education** | | | | | | | | | |
| No education | Ref | | | | | | | | |
| Primary | -0.0576 | -0.1785 | 0.0633 | -0.1878 *** | -0.2912 | -0.0843 | -0.1779 ** | -0.2790 | -0.0767 |
| Secondary | 0.1087 | -0.0334 | 0.2509 | -0.1782 ** | -0.2959 | -0.0606 | -0.1432 * | -0.2641 | -0.0222 |
| Higher | 0.1238 | -0.2193 | 0.4669 | -0.0225 | -0.2214 | 0.1764 | -0.4430** | -0.7107 | -0.1753 |
| **Sex of household head** | | | | | | | | | |
| Male | Ref | | | | | | | | |
| Female | 0.0188 | -0.1374 | 0.1750 | 0.0359 | -0.0680 | 0.1397 | -0.0216 | -0.1326 | 0.0893 |
| **Currently working** | | | | | | | | | |
| No | Ref | | | | | | | | |
| Yes | 0.0070 | -0.0713 | 0.0852 | 0.0441 | -0.0199 | 0.1080 | 0.0139 | -0.0666 | 0.0944 |
| **Currently in a union** | | | | | | | | | |
| No | Ref | | | | | | | | |
| Yes | 0.0138 | -0.1831 | 0.2106 | 0.1856 ** | 0.0641 | 0.3071 | 0.0994 | -0.0409 | 0.2400 |

| | 2007 (N=3779) | | | 2013/14 (N=9010) | | | 2018 (N=7184) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coeff. | 95% confidence interval | | Coeff. | 95% confidence interval | | Coeff. | 95% confidence interval | |
| | | Lower bound | upper bound | | Lower bound | upper bound | | Lower bound | upper bound |
| **Exposed to FP messages through media** | | | | | | | | | |
| No | Ref | | | | | | | | |
| Yes | 0.0598 | -0.0180 | 0.1376 | -0.0193 | -0.0850 | 0.0464 | -0.0538 | -0.1246 | 0.0170 |
| **Accessed contraceptive counselling** | | | | | | | | | |
| No | Ref | | | | | | | | |
| Yes | -0.1030 * | -0.2052 | -0.0009 | -0.0400 | -0.1037 | 0.0236 | -0.1028 ** | -0.1725 | -0.0331 |
| **Health insurance coverage** | | | | | | | | | |
| No | Ref | | | | | | | | |
| Yes | 0.0814 | -0.1432 | 0.3059 | 0.1186 | -0.1527 | 0.3899 | 0.2093 | -0.1429 | 0.5615 |
| **Place of residence** | | | | | | | | | |
| Urban | Ref | | | | | | | | |
| Rural | -0.0919 | -0.2091 | 0.0253 | -0.0280 | -0.0945 | 0.0386 | 0.0301 | -0.0448 | 0.1049 |

*Estimates of inequity in contraceptive use*

Inequity in contraceptive use is significantly pro-poor indicating that the poorer half of the population experience unmet need for contraception more than the wealthier half. The inequity was EI -0.0484 in 2007, increased to EI -0.0940 in 2013/14 and later declined to EI -0.0427 in 2018. It should be noted that living with a partner significantly increases inequity in contraceptive use.

# Impact of the modes of delivery of family planning messages on modern contraception (Study III)

*Characteristics of study participants by mode of delivery of family planning messages*

The total number of study participants included in the analysis was 19,958. Provinces with the largest proportion of participants were Eastern province (13.23%), Lusaka Province (11.61%), Southern Province (11.11%) and Copperbelt (10.25%). The age groups with the highest and lowest proportions were 20–24-year-olds (21.13%) and 45–49-year-olds (7.58%) respectively. Majority of the participants had primary school as their highest level of education (53.62%), live with a partner (89.69%), and currently working (54.75%). Further, most participants reside in rural areas (60.13%).

Out of the total sample, 10,841 participants reported receiving family planning messages through one of three modes of delivery, while 9,117 had not received any such messages (Table 8). The likelihood of receiving family planning messages via mass media increased with higher wealth status, whereas the likelihood of receiving messages through counselling declined as wealth increased.

**Table 8: Study participants characteristics**

| Variable | Reference group | | Mass media | | FP counselling | | Both FP counselling & mass media | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **Province** | | | | | | | | | | |
| Central | 960 | 10.53 | 412 | 9.66 | 302 | 7.42 | 214 | 8.54 | 1,888 | 9.46 |
| Copperbelt | 892 | 9.78 | 594 | 13.92 | 289 | 7.1 | 271 | 10.81 | 2,046 | 10.25 |
| Eastern | 940 | 10.31 | 483 | 11.32 | 680 | 16.71 | 537 | 21.43 | 2,640 | 13.23 |
| Luapula | 904 | 9.92 | 386 | 9.05 | 440 | 10.81 | 234 | 9.34 | 1,964 | 9.84 |
| Lusaka | 1,012 | 11.1 | 622 | 14.58 | 381 | 9.36 | 302 | 12.05 | 2,317 | 11.61 |
| Muchinga | 890 | 9.76 | 377 | 8.84 | 411 | 10.1 | 190 | 7.58 | 1,868 | 9.36 |
| Northern | 1,001 | 10.98 | 336 | 7.88 | 381 | 9.36 | 225 | 8.98 | 1,943 | 9.74 |
| North western | 834 | 9.15 | 469 | 10.99 | 498 | 10.03 | 184 | 7.34 | 1,895 | 9.49 |
| Southern | 1,146 | 12.57 | 392 | 9.19 | 441 | 10.84 | 238 | 9.5 | 2,217 | 11.11 |
| Western | 538 | 5.9 | 195 | 4.57 | 336 | 8.26 | 111 | 4.43 | 1,180 | 5.91 |
| Total | **9,117** | **100** | **4,266** | **100** | **4,069** | **100** | **2,506** | **100** | **19,958** | **100** |
| **Age group** | | | | | | | | | | |
| 15-19 | 1,013 | 11.11 | 258 | 6.05 | 300 | 7.37 | 143 | 5.71 | 1,714 | 8.59 |
| 20-24 | 1,675 | 18.37 | 692 | 16.22 | 931 | 22.88 | 488 | 19.47 | 3,786 | 18.97 |
| 25-29 | 1,786 | 19.59 | 907 | 21.26 | 919 | 22.59 | 605 | 24.14 | 4,217 | 21.13 |
| 30-34 | 1,519 | 16.66 | 826 | 19.36 | 763 | 18.75 | 577 | 23.02 | 3,685 | 18.46 |
| 35-39 | 1,303 | 14.29 | 663 | 15.54 | 626 | 15.38 | 361 | 14.41 | 2,953 | 14.8 |
| 40-44 | 1,001 | 10.98 | 531 | 12.45 | 343 | 8.43 | 216 | 8.62 | 2,091 | 10.48 |
| 45-49 | 820 | 8.99 | 389 | 9.12 | 187 | 4.6 | 116 | 4.63 | 1,512 | 7.58 |
| Total | **9,117** | **100** | **4,266** | **100** | **4,069** | **100** | **2,506** | **100** | **19,958** | **100** |
| **Wealth index** | | | | | | | | | | |
| Poorest | 2,183 | 23.94 | 295 | 6.92 | 1.149 | 28.24 | 268 | 10.69 | 3,895 | 19.52 |
| Poorer | 2,093 | 22.96 | 551 | 12.92 | 1,060 | 26.05 | 406 | 16.2 | 4,110 | 20.59 |
| Middle | 2,087 | 22.89 | 791 | 18.54 | 936 | 23 | 519 | 20.71 | 4,333 | 21.71 |
| Richer | 1,717 | 18.83 | 1,173 | 27.5 | 601 | 14.77 | 630 | 25.14 | 4,121 | 20.65 |
| Richest | 1,037 | 11.37 | 1,456 | 34.13 | 323 | 7.94 | 683 | 27.25 | 3,499 | 17.53 |
| Total | **9,117** | **100** | **4,266** | **100** | **4,069** | **100** | **2,506** | **100** | **19,958** | **100** |
| **Highest level of education attained** | | | | | | | | | | |
| No education | 1,189 | 13.04 | 238 | 5.58 | 467 | 11.48 | 144 | 5.75 | 2,038 | 10.21 |
| Primary | 5,300 | 58.13 | 1,789 | 41.94 | 2,516 | 61.83 | 1,096 | 43.74 | 10,701 | 53.62 |
| Secondary | 2,385 | 26.16 | 1,747 | 40.95 | 1,013 | 24.9 | 1,029 | 41.06 | 6,174 | 30.94 |
| Higher | 240 | 2.63 | 490 | 11.49 | 73 | 1.79 | 235 | 9.38 | 1,038 | 5.2 |
| Missing | 3 | 0.03 | 2 | 0.05 | 0 | 0 | 2 | 0.08 | 7 | 0.04 |
| Total | **9,114** | **100** | **4,264** | **100** | **4,069** | **100** | **2,504** | **100** | **19,951** | **100** |
| **Religion** | | | | | | | | | | |
| Catholic | 1,542 | 16.91 | 799 | 18.73 | 657 | 16.15 | 444 | 17.72 | 3,442 | 17.25 |
| Protestant | 7,406 | 81.23 | 3,419 | 80.15 | 3,352 | 82.38 | 2,035 | 81.21 | 16,212 | 81.23 |
| Muslim | 43 | 0.47 | 16 | 0.38 | 26 | 0.64 | 11 | 0.44 | 96 | 0.48 |
| Other | 117 | 1.28 | 25 | 0.59 | 24 | 0.59 | 10 | 0.4 | 176 | 0.88 |
| Missing | 9 | 0.1 | 7 | 0.16 | 10 | 0.25 | 6 | 0.24 | 32 | 0.16 |
| Total | **9,110** | **100** | **4,266** | **100** | **4,069** | **100** | **2,506** | **100** | **19,958** | **100** |

| Variable | Reference group | | Mass media | | FP counselling | | Both FP counselling & mass media | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % |
| **Union** | | | | | | | | | | |
| No | 1,065 | 11.68 | 492 | 11.53 | 338 | 8.31 | 162 | 6.46 | 2,057 | 10.31 |
| Yes | 8,052 | 88.32 | 3,774 | 88.32 | 3,731 | 91.69 | 2,344 | 93.54 | 17,901 | 89.69 |
| Total | **9,117** | **100** | **4,266** | **100** | **4,069** | **100** | **2,506** | **100** | **19,958** | **100** |
| **Currently working** | | | | | | | | | | |
| No | 4,457 | 48.89 | 1,722 | 40.37 | 1,795 | 44.11 | 1,015 | 40.5 | 8,989 | 45.04 |
| Yes | 4,630 | 50.78 | 2,540 | 59.54 | 2,270 | 55.79 | 1,486 | 59.3 | 10,926 | 54.75 |
| Missing | 30 | 0.33 | 4 | 0.09 | 4 | 0.1 | 5 | 0.2 | 43 | 0.22 |
| Total | **9,117** | **100** | **4,266** | **100** | **4,069** | **100** | **2,506** | **100** | **19,958** | **100** |
| **Sex of household head** | | | | | | | | | | |
| Male | 7,872 | 86.34 | 3,676 | 86.17 | 3,533 | 86.83 | 2,217 | 88.47 | 17,298 | 86.67 |
| Female | 1,245 | 13.66 | 590 | 13.83 | 536 | 13.17 | 289 | 11.53 | 2,660 | 13.33 |
| Total | **9,117** | **100** | **4,266** | **100** | **4,069** | **100** | **2,506** | **100** | **19,958** | **100** |
| **Place of residence** | | | | | | | | | | |
| Urban | 3,085 | 33.84 | 2,502 | 58.65 | 1,092 | 26.84 | 1,279 | 51.04 | 7,958 | 39.87 |
| Rural | 6,032 | 66.16 | 1,764 | 41.35 | 2,977 | 73.16 | 1,227 | 48.96 | 12,000 | 60.13 |
| Total | **9,117** | **100** | **4,266** | **100** | **4,069** | **100** | **2,506** | **100** | **19,958** | **100** |
| **Parity** | | | | | | | | | | |
| No child | 956 | 10.49 | 465 | 10.9 | 122 | 3 | 95 | 3.79 | 1,638 | 8.21 |
| One child | 1,265 | 13.88 | 579 | 13.57 | 603 | 14.82 | 393 | 15.68 | 2,840 | 14.23 |
| Two children | 1,361 | 14.93 | 705 | 16.53 | 652 | 16.02 | 442 | 17.64 | 3,160 | 16 |
| Three children | 1,240 | 13.6 | 646 | 15 | 581 | 14 | 406 | 16.2 | 2,873 | 14.4 |
| Four children | 1,068 | 11.71 | 524 | 12.28 | 554 | 13.62 | 355 | 14.17 | 2,501 | 12.53 |
| More than five children | 3,227 | 35.4 | 1,347 | 31.58 | 1,557 | 38.26 | 815 | 32.52 | 6,946 | 34.8 |
| Total | **9,117** | **100** | **4,266** | **100** | **4,069** | **100** | **2,506** | **100** | **19,958** | **100** |
| **Year of DHS** | | | | | | | | | | |
| 2007 | 1,607 | 17.63 | 1,138 | 26.68 | 511 | 12.56 | 523 | 20.87 | 3,779 | 18.93 |
| 2013/14 | 3,922 | 43.02 | 2,193 | 51.41 | 1,606 | 39.47 | 1,274 | 50.84 | 8,995 | 45.07 |
| 2018 | 3,588 | 39.36 | 935 | 21.92 | 1,952 | 47.97 | 709 | 28.29 | 7,184 | 36 |
| Total | **9,117** | **100** | **4,266** | **100** | **4,069** | **100** | **2,506** | **100** | **19,958** | **100** |

Household head– is a person considered responsible for the household and self identifies as such. S/he can be designated based on economic status, age or sex.
FP– Family planning
DHS– Demographic and health survey

*Trends of the proportions of the mode of delivery of family planning messages vs the reference group over the years.*

The share of individuals receiving family planning messages through counselling increased steadily from 13.5% in 2007 to 27.2% in 2018. At the same time, the proportion of those who did not receive any family planning messages also rose,

from 42.5% to 49.9%. Across all survey years, the largest segment, over 40%, consistently reported no exposure to family planning messages through any mode. In contrast, there was a declining trend in the use of mass media and the combined use of counselling and mass media for message delivery (Figure 12).

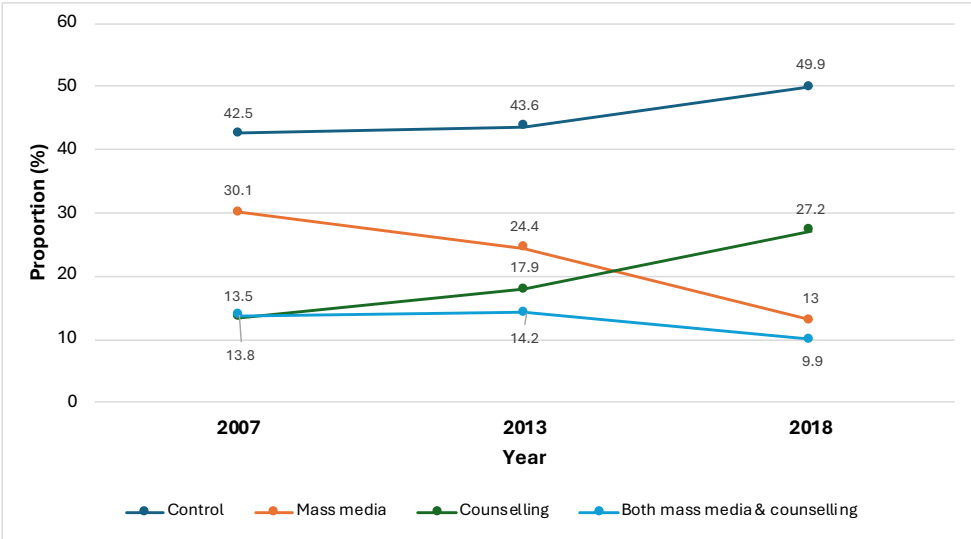


**Figure 12:** Proportion of study participants in each mode of delivery of family planning messages and the reference group

*Logistic regression of the modes of delivery of family planning messages and modern contraceptive use.*

Logistic regression analysis revealed that receiving family planning messages through any of the three delivery methods significantly increased the odds of using modern contraceptives both before and after adjusting for key background characteristics, compared to no receiving any message (Table 9). Among the modes of delivery, receiving messages through a combination of mass media and counselling was associated with the highest likelihood of modern contraceptive use (AOR 1.73), followed by counselling alone (AOR 1.47), and mass media alone (AOR 1.18).

**Table 9: Logistic regression of modes of delivery of family planning messages and modern contraceptive use**

| Mode of delivery of FP messages | Unadjusted models | | | | Adjusted models | | | |
|---|---|---|---|---|---|---|---|---|
| | COR | Lower bound | Upper bound | P value | AOR | Lower bound | Upper bound | P value |
| Mass media | 1.33*** | 1.21 | 1.46 | 0.000 | 1.18** | 1.06 | 1.31 | 0.002 |
| Counselling | 1.66*** | 1.50 | 1.84 | 0.000 | 1.47*** | 1.31 | 1.65 | 0.000 |
| Both Mass media & counselling | 2.19*** | 1.96 | 2.44 | 0.000 | 1.73*** | 1.55 | 1.94 | 0.000 |

95% confidence interval; * P value ≤ 0.05, ** P value ≤ 0.01, *** P value ≤ 0.001
COR– Crude Odds Ratios, AOR– Adjusted Odds Ratios

*Average treatment effects of the modes of delivery of family planning messages on modern contraceptive use*

The ATE of different modes of delivery of family planning messages on modern contraceptive use, estimated using AIPW approach were positive and significant. All three modes of delivery, mass media, counselling, and their combination, resulted in significant increases in modern contraceptive use (Table 10). The highest impact was observed among individuals that received messages through both counselling and mass media, with a 17.06 percentage point increase. Counselling alone resulted in a 14.55 percentage point increase, while mass media alone had the smallest effect, contributing to a 3.37 percentage point rise in modern contraceptive use. The estimates of impact using other treatment effect estimators were similar to the AIPW based estimates.

**Table 10: Impact of mode of delivery of family planning messages on the utilisation of modern contraceptives estimated using augmented inverse probability weighting (AIPW)**

| Mode delivery of FP messages | N | Coefficient (ATE) | P value | 95% confidence interval | |
|---|---|---|---|---|---|
| | | | | Lower bound | Upper bound |
| Mass media | 13,306 | 0.0337*** | 0.001 | 0.0130 | 0.0544 |
| FP counselling | 13,113 | 0.1455*** | 0.000 | 0.1272 | 0.1639 |
| Both FP counselling & mass media | 11,553 | 0.1706*** | 0.000 | 0.1457 | 0.1954 |

* P value ≤ 0.05, ** P value ≤ 0.01, *** P value ≤ 0.001
FP – family planning

*Trend of impact of modes of delivery of family planning messages on modern contraception over the years*

Table 11 shows a general decline over time in the impact of the modes of delivery of family planning messages on modern contraception. Nonetheless, receiving messages through counselling alone or through a combination of counselling and mass media consistently showed a significant positive impact across the years. In contrast, the impact of receiving messages through mass media alone was not statistically significant in 2018.

**Table 11: Trend of the impact of different modes of delivery of family planning messages by year**

| Mode of delivery of FP messages | 2007 | | | 2013/14 | | | 2018 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ATE | Lower bound | Upper bound | ATE | Lower bound | Upper bound | ATE | Lower bound | Upper bound |
| Mass media | 0.075*** | 0.036 | 0.113 | 0.043*** | 0.016 | 0.072 | -0.011 | -0.052 | 0.03 |
| FP counselling | 0.168*** | 0.12 | 0.217 | 0.146*** | 0.117 | 0.175 | 0.134*** | 0.107 | 0.162 |
| Both FP counselling & mass media | 0.198*** | 0.141 | 0.256 | 0.188*** | 0.154 | 0.222 | 0.118*** | 0.074 | 0.162 |

* P value ≤ 0.05, ** P value ≤ 0.01, *** P value ≤ 0.001
FP – family planning

*Post estimation checks*

The overlap assumption was examined and found to have been satisfied because the plots demonstrated sufficient common support (overall) in all treatment groups (supplementary material 02).

# Perceptions of stakeholders on NHIS implementation (Study IV)

A total of 21 participants, stakeholders involved in the implementation of NHIS, were interviewed. The interviews yielded three overarching themes: i) Politics and political interest can make or break the scheme, ii) There are winners and losers in terms of equity and iii) Pointing at the need for financial sustainability of NHIS. The themes had a total of six subthemes and 18 data categories as shown in Figure 13.

## Politics can make or break the scheme

This theme reflects the pivotal role of political dynamics and interests in shaping the success or failure of the scheme. The theme yielded two sub-themes as described below.

*NHIMA operations and policies are influenced by political interests and need more support and direction*

We found that politics is an integral part of the implementation of the NHIS. It is perceived to affect the organisation, governance and operation of the scheme. Participants called for greater autonomy in decision-making by the scheme, while also emphasizing the need for sustained political support to demonstrate commitment and mobilize public participation in the NHIS.

*Enhancing evidence-informed and transparent governance in NHIMA*

This sub-theme reveals a recurring concern of the perceived lack of integration of empirical evidence, transparency, and stakeholder engagement in the formulation and implementation of NHIS policies.

## There are winners and losers in view of equity

This theme highlights the differential impact of NHIS implementation across population and health provider subgroups.

*Witnessing the creation of a fractured system with well served and poorly served areas and people*

We find that participants are fearful of NHIS widening health inequities, especially with access to quality health services. The poor and those in the informal sector are disadvantaged despite NHIMA interventions.

*Needing to improve distribution of NHIS benefits among the public and private providers*

We found that the allocation of NHIS resources is perceived to be skewed toward private providers, prompting concerns about underfunding the public healthcare sector.

## Pointing at the need for financial sustainability of NHIS

This theme reflects perceptions towards the implementation of the NHIS focusing on the critical importance of ensuring financial sustainability of the scheme.

*Continuing to implement strategies to tackle health insurance inefficiencies*

This sub-theme emphasizes the need for NHMA to become financially self-reliant, expressing concern over a growing financial deficit driven by rising healthcare demand, limited revenue, and reliance on unstable donor funding.

*Managing expectations: rising skepticism over NHIS's sustainability*

We find a growing skepticism about the scheme's viability, citing a disconnect between its intended design and practical implementation.

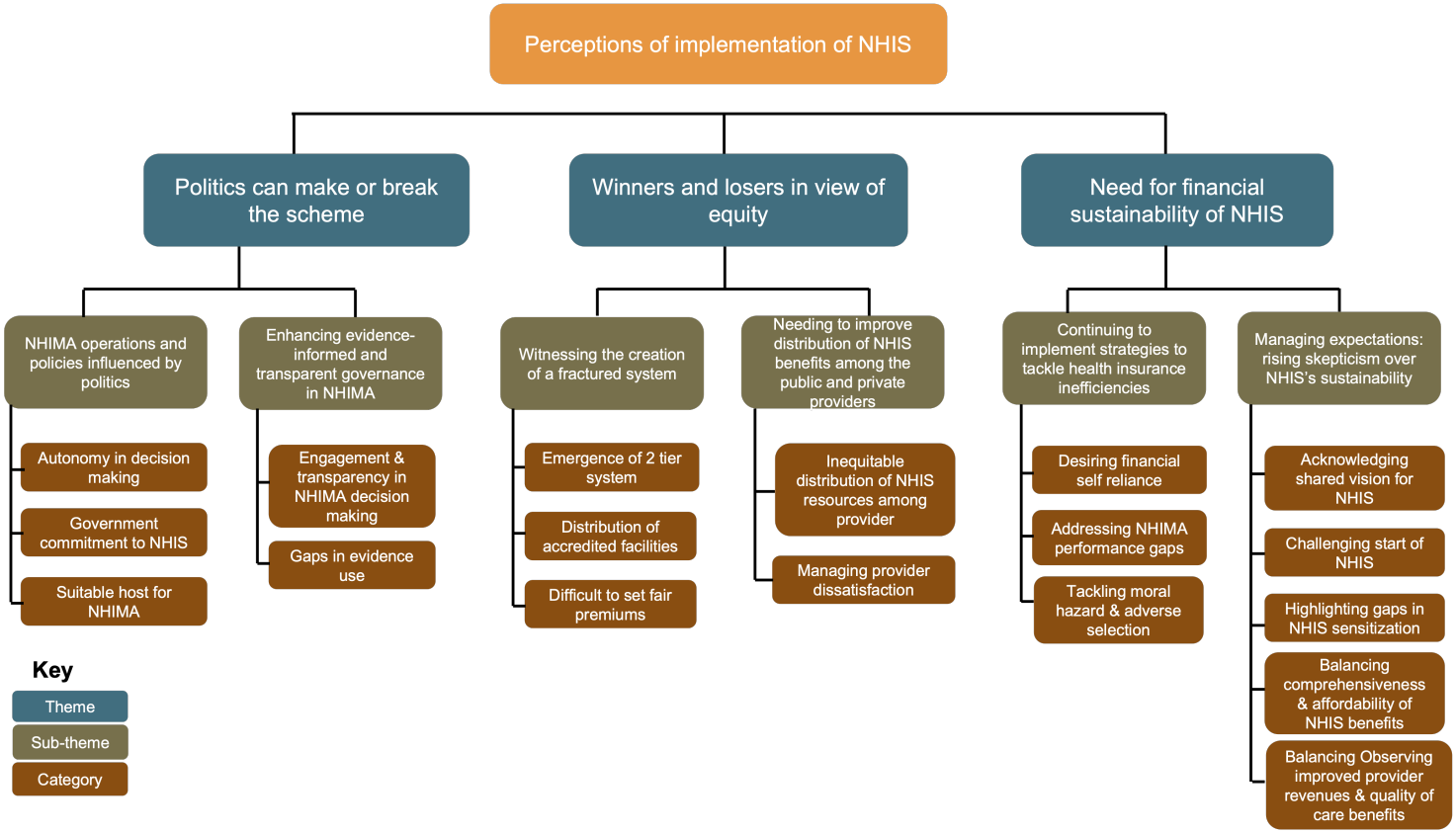


**Figure 13:** Themes, sub-themes and categories of the study

# Discussion

Improving equity in access to MRH services remains a central challenge for many LLMICs, including Zambia. Over the past two decades, Zambia has implemented a range of health system reforms aimed at expanding access, reducing financial barriers, and promoting reproductive autonomy. Among these reforms, the introduction of the NHIS and the scaling up of family planning communication strategies stand out as key interventions. This thesis set out to examine how these health financing and information strategies have influenced equity in access to care.

This section summarises the findings of each study and uses an integrated approach to discuss the findings. The section also covers the limitations and policy implications of the thesis and shares areas for further research.

## Main findings

**Study I**

Despite the theoretical promise of health insurance, empirical evidence on its causal impact in LLMICs has been mixed. Study I found that health insurance had a positive significant impact on ANC and delivery care while it did not increase contraceptive use, PNC and financial protection. The outcomes that were positively significantly impacted include receiving at least 4 ANC visits, delivery at a health facility and delivery attended by a skilled attendant. There was a scarcity of studies reporting on the impact of health insurance on contraception and financial protection.

The vulnerable people, who cannot afford premiums, and are usually excluded from health insurance schemes, seemed to benefit more as non-contributing members compared to their counterparts. Non-universal health insurance may be exacerbating disparities within the population especially between those that are enrolled and those that are not.

**Study II**

Study II found that there was an increase in modern contraceptive use from 37.3% in 2007 to 49.8% in 2018, but unmet need for modern contraception remained considerable at 19.8% in 2018. There was pro-rich inequality in modern contraceptive use across the years, where wealthier women were more likely to use modern contraception than poorer women. Unmet need was pro-poor, with poorer women more likely to experience unmet need than wealthier women.

Disparities in contraceptive use and unmet need persist, particularly in LLMICs like Zambia. These disparities are shaped by socioeconomic status, education, geographic location, and access to health information and services.

**Study III**

Study III found that all three modes of delivery of family planning messages significantly increased modern contraceptive use compared to individuals that did not receive any messages. However, the magnitude of the impact varied by mode of delivery of the messages. Messages delivered through mass media had the least impact, followed by counselling only. Receiving messages through both counselling and mass media had the greatest impact (5 times the impact of messages received through mass media).

Study III revealed a declining trend in the impact of messages delivered through each of the three communication modalities over time, particularly for mass media. In 2018, the effect of mass media on contraceptive use was no longer statistically significant. Family planning messages delivered through mass media was more commonly accessed by women in higher wealth quintiles. Counselling was more prevalent among women in lower wealth quintiles.

**Study IV**

Study IV suggests that successful implementation of the Zambian health insurance scheme depends not only on technical design but also on political commitment, stakeholder engagement, institutional capacity to ensure financial sustainability of the scheme. The study had three overarching themes concerning political dynamics within the scheme, equity and financial sustainability within the scheme.

Stakeholders consistently emphasized the influence of politics on NHIS implementation. They highlighted political commitment to support the scheme as a need for its success and point at political interference as a current major challenge. There were concerns that the scheme is exacerbating inequities, where people that are better-off are benefiting more from the scheme while those in the informal sector, rural areas, poor and vulnerable are excluded and disadvantaged. Further, the

private providers were seen as benefiting more from the NHIS than public providers, yet it is the public providers that serve the majority of the population.

The study further showed that financial sustainability of the scheme was a concern. Some of the challenges that the scheme needs to address included unfair tariffs, moral hazard, adverse selection, weak monitoring of the providers, unaffordable benefit package and duplication of functions thus increasing administrative costs for the scheme.

## Inequalities, inequities in MRH and their causes

There was notable increase in modern contraceptive use among sexually active women between 2007 and 2018 in Zambia by over ten percentage points as shown in Study II. This upward trend reflects national efforts to expand access to contraceptive services, including the deployment of community health workers, integration of family planning into maternal health services, and dissemination of health information[141]. Despite this advancement, unmet need for contraception remained high, fluctuating over fifteen percentage points and showing an increasing trend. This suggests that while more women are using modern contraception, a substantial proportion still face barriers to accessing their preferred contraceptive methods or any contraception.

The findings in Study II and III reveal a persistent equity gap in modern contraceptive use, with wealthier individuals benefiting more from contraceptive services than the poorer individuals. The poorer individuals face greater barriers to access the care. Study II shows that the wealthier half of the population use more contraception than the poorer half of the population reflecting the existing inequality in modern contraceptive use. On the other hand, still in Study II, unmet need for contraception was more concentrated in the poorer half of the population compared to the wealthier half of the population, reflecting the existing inequity in contraceptive use.

These inequalities and inequities in modern contraceptive use have been reported to be prominent in SSA[69,72,76] consistent with the findings of this thesis. Fentie et al. who analysed inequality in modern contraception in 47 SSA countries found pro-rich inequality in the use of modern contraception [69].

Study II identified the highest level of education attained, contraceptive counselling, being in a union and wealth status as the key drivers of inequality in modern contraceptive use. Education level was found to increase contraceptive use, similar to other studies[75,221]. Women with primary or secondary education were significantly more likely to use modern contraception, contributing to pro-rich inequality. Education enhances knowledge, autonomy, and access to health

services[75,221,222]. However, Nguyen noted that the benefits of the education vary with one's social locality such as residence (rural/urban), education of the spouse, where those residing in rural areas or and have spouses with lower education attainment are disadvantaged[221].

Study II shows that receiving counselling from health workers was associated with reduced inequality, particularly in 2007 and 2018. Counselling provides personalized information and addresses misconceptions, improving uptake among disadvantaged groups[81]. The findings of Study II are further substantiated by those of Study III where family planning counselling was found to positively impact modern contraceptive use, similar to other settings [84–86,223,224]. Surprisingly, being in a union (living with a partner) increased inequality in 2013/14, as individuals in unions were less likely to use modern contraception compared to their unmarried peers. This disparity by marital status may reflect gender dynamics and limited decision-making autonomy within relationships[81].

For inequity in contraceptive use reflected by the concentration of unmet need by wealth status, the decomposition analysis in Study II revealed education, employment status and insurance coverage as drivers. Further, Study IV provided indications on how health insurance can also exacerbate such inequity. Higher education was associated with lower unmet need, contributing to pro-poor inequity. Educated individuals are more likely to be knowledgeable and access family planning services[75]. Working individuals had lower unmet need, suggesting that economic empowerment facilitates access to contraception and reduces inequities in contraceptive use[225]. Individuals with health insurance coverage had lower unmet need, although coverage was extremely low (only 2.2% in 2018). Studies have reported that health insurance can increase contraceptive use[226] which could have an impact on reducing unmet need. Similar to contraceptive use, being in a union increased inequality in unmet need, possibly due to limited reproductive autonomy.

Interestingly, in Study II, place of residence (urban vs. rural) had mixed effects across the years. In 2013/14, rural residence was associated with reduced inequality in unmet need, possibly due to targeted outreach programs. However, individuals in urban areas generally had better access to services, reinforcing the need for context-specific strategies. These findings align with broader literature showing that socioeconomic status, education, and access to health information are critical determinants of contraceptive use[69,227].

# Impact of health insurance on MRH and financial protection; an equity perspective

Study I focused on existing evidence of the impact of health insurance on MRH service utilisation and financial protection, while Study IV focused on implementation of health insurance scheme, offering insights on how the implementation process may impact equity in access to care.

The strongest and most consistent evidence from Study I relates to the positive impact of health insurance on antenatal care and delivery care. Specifically, insurance coverage was associated with increased likelihood of receiving at least four ANC visits, delivering at a health facility, having a skilled birth attendant present during delivery. These findings are consistent with prior reviews that have shown health insurance to be positively associated with facility-based delivery and skilled attendance[88,102,103]. The positive impact was consistent even among population subgroups that are usually marginalised in public health insurance systems in LLMICs; for example, Acharya et al who looked at the impact of insurance among people in the informal sector[102].

The mechanisms through which insurance improves ANC and delivery care utilisation are likely multifaceted. Insurance reduces financial barriers at the point of service[89], increases predictability of costs to be incurred if any, and may incentivize providers to improve service quality due to existing incentives to attract more patients to the providers' respective health facilities[97,152]. This was evidenced in the findings of Study IV that found that stakeholders asserted that NHIS had stimulated and improved quality of care in both private and public health facilities. Furthermore, Study IV confirms that in some contexts, insurance schemes have also bundled maternal services into their health benefit packages, for example in Zambia where all MRH services are covered by the NHIS[139], enabling all members of the insurance scheme to access such services without paying. This increases the chances of improving access to MRH services.

Study I shows that the impact of health insurance schemes varies significantly across countries and type of scheme. For instance, Rwanda's CBHI yielded modest improvements[192], whereas Indonesia's non-contributory scheme demonstrated more substantial effects[202]. These differences highlight the importance of scheme design, implementation quality, and contextual factors such as health system capacity and geographic accessibility. In Study IV, the NHIS stakeholders provided insights into some of the insurance design characteristics and contextual factors that could influence and explain the differential impact of health insurance between countries or regions. For example, the amount paid in premiums by members, which health services are covered, and strategies for accreditation of providers.

Further, disaggregating the impact by contribution type (contributory versus non-contributory), reveals critical equity considerations. In many LLMICs, contributory schemes often exclude vulnerable groups, such as the poor and informal sector workers, who cannot afford to pay premiums. As a result, those most in need are left without coverage. Notably, non-contributing members tend to benefit more from insurance schemes than those who pay premiums. In Study IV, it was noted that the poor, vulnerable and those in the informal sector are majorly excluded from the scheme in Zambia. This has left those in the formal sector and registered members of the scheme along with their respective families benefiting from the NHIS. It was suggested by the study participants in Study IV for government to contribute premiums for the poor and vulnerable. This underscores the need for insurance schemes to have both contributory and non-contributory members so that individuals unable to contribute financially can still be included in the scheme. It should be noted that contributory schemes have often been highlighted as unsuccessful in enabling countries to make meaningful progress towards UHC[228–230]. The findings of this thesis emphasize that integrating the poor and vulnerable populations into health insurance schemes is vital for countries aiming to achieve UHC through implementing health insurance schemes.

Study I included several studies that reported different impacts by socioeconomic status, urban/rural residence, and education level. Barasa et al. found that insurance schemes in SSA tend to be pro-rich, with higher coverage and utilisation among wealthier populations[112], further raising questions about the equity impact of health insurance[229]. If schemes disproportionately benefit the better-off, they may inadvertently exacerbate health disparities as expressed in Study IV. Conversely, well-designed schemes with targeted subsidies and inclusive enrolment strategies can promote equity.

In contrast to ANC and delivery services, the evidence on health insurance's impact on PNC and contraceptive use in Study I, was limited in terms of number of studies reporting on the same and inconclusive. Only a half of the studies reporting on PNC found a significant positive impact, and just three studies examined contraceptive use, with no consistent effect observed. This gap is concerning given the importance of PNC and contraception in reducing maternal mortality and unintended pregnancies. The lack of impact may reflect several factors: benefit package exclusion of PNC and contraceptive services are not explicitly covered or reimbursed in some health insurance schemes, limiting their uptake. Secondly, cultural and social barriers, for example stigma, misinformation, and gender norms may deter women from seeking care even when services are covered. The findings align with broader literature suggesting that insurance alone may be insufficient to drive uptake of services that are influenced by behavioural, cultural, or informational factors[19,231].

One of the core objectives of health insurance is to provide financial protection against CHE and impoverishment due to health expenditure incurred while

receiving healthcare. However, Study I found scanty and inconclusive evidence on whether insurance schemes in LLMICs have achieved this goal in the context of MRH services. Only a handful of studies reported on financial protection indicators such as OOP payments, CHE, or financial distress. Among these, results were mixed. For example, Aizawa found a significant reduction in OOP payments for delivery services in Indonesia[202], while Garg et al. found no significant impact in India[205]. This finding is consistent with prior reviews that have noted the difficulty of measuring financial protection and the limited availability of high-quality data[97,103]. In addition, some insurance schemes may have co-payments, limited coverage for indirect costs (e.g., transport), and exclusions to certain services, which can undermine the financial protection effect of insurance. It should be noted that in Study IV, the perception was that NHIS has improved financial protection among the members. This could be because NHIMA does not require copayments from the members.

The lack of evidence on financial protection, as shown in Study I, is particularly concerning given that LLMICs continue to experience high levels of OOP spending. In 2019, OOP accounted for 43.2% of total health expenditure in low-income countries and 48.2% in lower-middle-income countries, compared to a global average of 18%[232]. Without robust financial protection, insurance schemes risk failing to deliver on one of their core promises and makes it difficult to understand the equity situation within the health system.

Study IV also raises a concern financial sustainability of insurance schemes that are widely perceived as financially unsustainable[233]. Stakeholders reported that premium collections were insufficient to cover reimbursements, leading to deficits. This was suspected to stem from increasing demand for health services, particularly for non-communicable diseases (NCDs), alongside generous benefit packages that strained resources. Additional factors such as duplication of functions, outsourcing to third parties, and weak gatekeeping mechanisms were perceived to contribute to financial inefficiency. The absence of a referral system allowed patients to bypass primary care, increasing costs. Moral hazard and adverse selection were also identified, particularly among private providers and informal sector members, respectively. Weak monitoring and enforcement mechanisms limited NHIMA's ability to control costs and ensure compliance.

The financial constraints faced by NHIMA may warrant government support as desired by participants in Study IV to ensure that the scheme remains financially buoyant. However, this may be problematic given the current perceived inequity in the implementation of the NHIS that has excluded majority of the vulnerable, poor and those in the informal sector. Coverage among the poor and vulnerable in Zambia's NHIS was described as limited, with few targeted efforts to enrol these groups. While donor-funded pilots and media campaigns were mentioned, their impact has been minimal. This mirrors challenges in other LMICs, where

contributory schemes struggle to include informal workers due to income variability and weak enforcement mechanisms[112,233].

In Study IV, stakeholders expressed concern about the disproportionate flow of NHIS resources to private providers. Despite serving a smaller segment of the population, private facilities received higher reimbursements due to elevated tariffs and perceived quality. Public providers, which cater to the majority, were seen as underfunded. This imbalance was attributed to the freedom of patient choice and the referral of patients from public to private facilities for diagnostics and medications. Stakeholders argued for standardized tariffs and strategic purchasing applying tools like health technology assessment (HTA) to ensure efficient and equitable resource allocation.

## The equity view of the impact of the mode of delivery of family planning messages on MRH service access

The findings of Study III suggest that receiving family planning messages through counselling is more effective than mass media alone, and that combined exposure yields the greatest impact. This aligns with global evidence showing that personalized, interactive communication tends to be more influential in changing health behaviours than one-way messaging[81,223]. It also resonates with the findings of Study II where counselling was found to reduce unmet need for contraception. The following section discusses the impact of different modes of delivering family planning messages on modern contraceptive use.

*Mass Media*

Mass media campaigns via radio, television, and newspapers, have long been used to disseminate family planning messages. In Zambia, such campaigns have been supported by government and development partners to raise awareness and normalize contraceptive use. While Study III found a statistically significant impact of messages delivered through mass media on contraceptive use, the effect size was modest. This is consistent with findings from Babalola et al., who reported that using mass media to disseminate family planning messages increased contraceptive use in sub-Saharan Africa, but with limited impact among certain subgroups[16]. Similarly, Glennerster et al. found that mass media had minimal influence on contraceptive uptake in Burkina Faso, highlighting the importance of message content and audience targeting[17].

The declining impact of mass media over time, as observed in Study III, may reflect changing media consumption patterns, particularly among younger populations who increasingly rely on digital platforms.

*Counselling by health workers*

Counselling emerged as a more effective method to impact contraceptive use compared to mass media, with consistent positive impact across all survey years. Counselling allows for tailored information, clarification of doubts, and shared decision-making, which are critical for overcoming misconceptions and building trust. This finding is supported by Cavallaro et al., who concluded that high-quality counselling significantly improves contraceptive uptake and continuation[81]. Other studies in India, Pakistan, and Ethiopia have similarly shown that counselling during maternal health visits or community outreach increases contraceptive use[84,85].

In Zambia, counselling is often delivered by nurses, midwives, and community health workers, either at health facilities or through outreach. The study's results underscore the importance of investing in training, supervision, and integration of counselling into routine services.

*Receiving family planning messages through both counselling and mass media*

The highest impact was observed among women who received family planning messages through both counselling and mass media. This suggests a synergistic effect, where mass media raises awareness and normalizes contraception, while counselling provides the depth and personalization needed to translate intention into action. Integrated communication strategies have been recommended by WHO and other agencies as best practice for health promotion[234]. In LLMICs, combining mass media with interpersonal communication has been shown to improve outcomes in areas such as immunization, HIV prevention, and maternal health[15].

Study III revealed a declining trend in the impact of all three communication modalities over time. This is concerning as it calls for identification of more suitable modes of delivery of family planning messages. It was especially concerning for the use of mass media where in 2018, the impact of the messages delivered through mass media on modern contraceptive use was no longer statistically significant. This could be explained by further fragmentation of mass media; the rise of digital platforms may have reduced the reach and influence of traditional media. In addition, there could be message fatigue where repetition of similar messages without creativity or innovation may lead to reduced engagement with the information. The declining trend of the impact of counselling could be reflective of a declining quality of the counselling. The quality of counselling depends on provider skills, time allocated to the counselling session, and motivation of the health workers, which may vary across the years.

These trends highlight the need for adaptive communication strategies that respond to changing media landscapes and audience preferences. Digital health interventions, such as mobile apps and social media campaigns, may offer new opportunities for reaching younger and tech-savvy populations.

Study III provided further equity perspectives along the socioeconomic distribution of the population. Individuals in higher wealth quintiles received family planning messages from mass media more than those in lower quintiles and the reverse is true for counselling. Given the dwindling impact of mass media delivered family planning messages over time, it is likely that those in higher wealth quintiles will be more negatively affected than their counterparts. On the other hand, counselling was more prevalent among women in lower wealth quintiles suggesting that counselling may be a more equity-enhancing modality, reaching underserved populations who may lack access to media or formal education. Given the persistent inequalities in contraceptive use (as shown in Study II), scaling up counselling could help close the equity gap.

However, it should be noted that the study also found that over 45% of participants did not receive any family planning messages through any mode of delivery. About half of those that did not receive any family planning messages were in the lowest two wealth quintiles, majority reside in the rural areas and have primary school as their highest level of education. This underscores the need for targeted outreach, particularly in rural areas, those with low education or and poor.

## Applying the Levesque Framework: reflections of access and equity in health

Access to healthcare is a multidimensional concept that extends beyond the mere presence of services. It encompasses the interplay between health systems and individual capabilities, shaping whether people can recognize, seek, and ultimately receive care. This section reflects on access and equity in health through the application of the Levesque framework, drawing insights from studies comprising this thesis. By analysing both demand- and supply-side factors, the discussion highlights equities perspectives in healthcare access.

*Approachability of the health services and ability to perceive healthcare need*

Access to care begins with an individual's recognition of their health needs and awareness that services exist to address those needs. This ability to perceive need for care, is shaped by factors such as health knowledge, personal experiences, and current health status.

Study III examined how disseminating health information can enhance access to services, focusing on modern contraception. Family planning messages aimed to empower individuals to assess whether they should initiate or continue contraceptive use, aligning with the "ability to perceive" dimension of the Levesque framework. However, findings revealed that message reach was skewed toward wealthier individuals, who are typically more educated and health literate.

Conversely, those with lower education and socioeconomic status, who often have greater informational needs, were less likely to receive these messages. Targeting these groups more effectively could improve their ability to recognize contraceptive needs. While family planning messages have significant potential to influence contraceptive uptake, their impact could be influenced by equitable dissemination. Strategies to broaden message reach, particularly among disadvantaged populations, are essential.

On the supply side, Study III also found that counselling-based delivery of family planning messages was more effective than mass media. This may reflect the greater approachability of counselling, which included both facility-based and community outreach sessions. Community-based counselling, for example, brought services closer to people, increasing awareness of available contraceptive options and how to access them. Study IV highlighted similar issues regarding the approachability of the health system following the introduction of NHIS. Stakeholders noted that many people, especially in rural areas, were unaware of the scheme's existence, benefits, and enrolment process. They emphasized the need for extensive public sensitization to increase membership. The findings in studies III&IV underscores the importance of ensuring transparency, outreach, and accessible information to help individuals understand what the health system offers and encourage care-seeking behaviour.

*Acceptability of health services and ability to seek*

Acceptability refers to the alignment between the cultural and social appropriateness of health services and the values, norms, and autonomy of individuals.

Study III highlighted that the mode of communication significantly influences acceptability. Family planning counselling provided by health workers had a greater impact on contraceptive use compared to mass media messages. This difference can be explained by the interpersonal nature of counselling, which allows for dialogue and tailored information. Counselling offers health workers an opportunity to understand clients' needs and provide culturally and contextually appropriate guidance, thereby meeting client expectations. In contrast, mass media messages are generalized for broad audiences and may fail to resonate with individual circumstances, reducing their effectiveness.

Study I found inconclusive evidence regarding the impact of public health insurance on PNC utilisation. This may relate to the acceptability of PNC services. For example, in some cultural settings, newborns are kept indoors for extended periods, making it difficult for mothers to attend facility-based PNC visits. Such practices illustrate a mismatch between health system norms and community cultural beliefs. Addressing this gap may require culturally sensitive solutions, such as home-based PNC visits, to improve adherence.

From a system perspective, Study IV identified intermittent premium payments as a challenge for Zambia's NHIS. Seasonal earners, such as farmers, often pay

premiums irregularly and can only access care when payments are up to date. The requirement for monthly contributions disadvantages these groups, reflecting a lack of alignment between insurance design and the economic realities of members. This misalignment can reduce willingness to participate in and utilize health insurance.

Collectively, these findings underscore that acceptability is shaped by interpersonal interactions, cultural norms, and institutional arrangements. Efforts to improve acceptability should therefore address these elements simultaneously to ensure that health services are both appropriate and responsive to users' needs.

*Availability and accommodation of health services and ability to reach*

Availability refers to the presence of sufficient, functioning health services and facilities, including their geographic distribution and seasonal accessibility. It emphasizes whether essential services exist in adequate quantities and are positioned to meet population health needs.

Study IV illustrates the Levesque framework domain of availability of health services through stakeholder perspectives on the distribution of NHIMA-accredited facilities, the breadth of the NHIS benefit package, and operational policies like reimbursement, and patient choice. Stakeholders noted that NHIMA had accredited numerous facilities, including private providers, and offered a broad benefit package that included MRH services. This expansion increased service availability for NHIS members. Similarly, Study I found that including MRH services in insurance benefit packages significantly improves access compared to situations where they are excluded. Therefore, a broader benefit package therefore enhances the likelihood of service use.

In addition, health insurance relies on prepayment and risk pooling within a population, creating a predictable and stable client base for the health market. This assurance encourages providers to commit to delivering services, thereby improving the availability of care. By ensuring financial continuity, health insurance enables facilities to offer more consistent and sustained healthcare services. However, timely reimbursement of providers is crucial because Study IV found that intermittent payment of provider claims by the NHIS could interrupt the continued delivery of services to members.

Further, Study IV also revealed concerns about facility distribution, as most accredited facilities were concentrated in urban areas. To address this imbalance, NHIMA began accrediting lower-level facilities, although service options at these facilities remain limited. Additionally, providers invested in expanding infrastructure, such as constructing new wards and improving patient comfort, to attract and retain clients. These efforts were likely incentivized by NHIMA policies, including fee-for-service reimbursement and patient choice, demonstrating how health financing mechanisms can stimulate service availability.

On the demand side, the thesis finds that NHIS interventions have focused primarily on supply-side measures. Despite accrediting lower-level facilities, many remain physically distant for rural members, imposing high transportation costs that NHIMA does not cover. These barriers can prevent individuals from accessing care, highlighting the need for strategies that address both availability and accommodation of health services and ability to reach to promote equitable access.

*Affordability of health services and ability to pay*

The availability and accommodation of health services alone do not guarantee access to care. Financial barriers often prevent individuals from utilizing care, even when services are present. Affordability of the health services, both for the health system and ability to pay for individuals, therefore become critical.

Within the Levesque framework, the supply-side aspect of affordability is evident in Study IV, where stakeholders acknowledged the broad NHIS benefit package but expressed concerns about its financial sustainability. While a comprehensive package increases service availability and utilisation, it also imposes significant costs on the scheme. Stakeholders feared that Zambia's NHIS might struggle to sustain its current package. To address this, insurance schemes must design benefit packages that balance affordability with essential service coverage. Since NHIS, in part, aims to advance UHC, essential health services should remain a priority even when resources are limited. Tools such as HTA can guide priority setting to ensure that included services deliver maximum value for money. Study IV further suggests that reforms expanding entitlements should be paired with efficiency-oriented measures that enable responsible management of available resources and strengthen service delivery capacity to maintain availability of services.

On the demand side, the ability to pay is illustrated across Studies I, II, III, and IV. Health insurance, examined in Studies I and IV, reduces financial barriers by separating payment from the point of care, offering financial protection to members. However, Zambia's NHIS is largely contributory, excluding individuals unable to afford premiums. This creates equity challenges, exposing these populations to financial hardship and catastrophic health expenditure. Similarly, Studies II and III show that access to modern contraception was higher among wealthier individuals, indicating that purchasing power strongly influences service utilisation.

*Appropriateness of health services and ability to engage*

Appropriateness refers to the extent to which health services meet an individual's health needs in terms of quality, safety, and continuity of care. Quality encompasses the scientific and technical adequacy of services, their effectiveness, and their ability to provide ongoing care. The ability to engage relates to the individual's involvement in decision-making about their health, being able to interact with health workers, express preferences, and participate in choosing suitable remedies.

On the supply side, Study IV found that stakeholders perceived improvements in the quality of care at NHIMA-accredited facilities following the implementation of the NHIS. These improvements were driven by providers' desire to attract more patients, incentivized by NHIMA's fee-for-service reimbursement mechanism. This payment model likely encouraged providers to enhance service quality, which in turn promotes utilisation and better health outcomes.

In Study III, messages delivered through family planning counselling proved more effective on impacting modern contraceptive use than those delivered via mass media. This difference can be partly attributed to the engagement opportunities that counselling provides. Interpersonal communication fosters dialogue, enabling clients to participate in decisions and take ownership of outcomes. This engagement likely explains the greater impact of counselling on modern contraceptive use compared to mass media.

However, Study IV also revealed that NHIMA was perceived as less inclusive in decision-making processes within the NHIS. Limited stakeholder engagement may undermine ownership and support for the scheme. Strengthening participatory mechanisms and involving a broader range of stakeholders is essential to build trust, promote ownership, and mobilize support.

# Limitations

This thesis provides valuable understandings into the impact of health insurance and modern contraceptive use communication modalities on maternal and reproductive health in Zambia, however, there are limitations to be acknowledged. These limitations pertain to the scope of the studies, methodological constraints, data availability, and contextual factors that may have influenced the interpretation and generalizability of the findings.

Study I, the systematic review, was limited to studies that investigate causal inference published since 2010. This led to inclusion of only quasi-experimental studies. This excluded potentially relevant cross-sectional studies that may have offered complementary insights. Further, the review relied on published literature, which may be subject to publication bias, with studies reporting positive effects more likely to be published than those with null or negative findings.

The study participants in Studies II & III were restricted to sexually active women aged 15–49 years, as defined by the DHS. Unfortunately, the definition of being sexually active was limited to only those that had self-reported having had sexual intercourses within 30 days prior to the interview. This may have excluded sexually active individuals that had had sex days prior to the 30-day window. Additionally, DHS data was self-reported introducing the possibility of recall bias and social

desirability bias, particularly on sensitive topics such as contraceptive use and sexual activity.

Study III focused on three modes of delivery of family planning messages, that is mass media, counselling, and both mass media and counselling, but did not account for the content, frequency, or quality of the messages received. These factors are likely to influence the effectiveness of communication interventions. Furthermore, the study did not disaggregate mass media by type (e.g., radio vs. television), and did not include digital platforms, which are increasingly relevant in Zambia's evolving media landscape. Including these aspects would have provided a more comprehensive picture of the impact.

Study IV, a qualitative study, while rich in policy implementation detail, was based on a purposive sample of 21 stakeholders. Despite making effort to include diverse perspectives, from government officials, NHIMA staff, researchers, and civil society, some key actors, such as representatives from the Ministry of Labour and Social Security and Parliament, were not interviewed. Their absence may have limited the comprehensiveness of the political and institutional analysis. Additionally, the timing of data collection coincided with media coverage of NHIMA's financial challenges, which may have influenced participants to emphasize implementation difficulties over successes.

The thesis did not involve primary quantitative data collection, relying instead on secondary data sources (DHS) and existing literature. While these sources are robust and nationally representative, the DHS data sets used in this thesis were more than six years old than and therefore do not capture emerging trends.

The thesis did not include the estimation of the quantitative impact of the NHIS on MRH. This portion of the thesis was excluded due to challenges pertaining data collection following USAID funding withdrawal.

Despite these limitations, the thesis offers a comprehensive and multi-method analysis of equity in access to maternal and reproductive health services, providing a strong foundation for policy reforms and future research.

# Methodological considerations

In Study II, Heckley's general decomposition method was applied to identify the drivers of socioeconomic inequality in modern contraceptive use and unmet need for contraception. This approach is advantageous because it directly decomposes rank-dependent inequality measures, such as EI, and requires fewer identifying assumptions compared to traditional regression-based methods. It also provides a flexible framework for analysing inequality across different health outcomes. However, its coefficients do not reflect each factor's contribution to the variance in

health outcomes, making interpretation challenging. Shapley decomposition addresses this limitation by quantifying the percentage contribution of each variable to the model's explained variance, typically using $R^2$[235–237]. Combining both methods would allow for a dual perspective: Heckley's approach for inequality decomposition and Shapley for variance-based contribution, offering a more comprehensive understanding of the determinants of health disparities.

Study III included individuals that were sexually active. Despite this being an appropriate group to investigate considering their risk to unintended pregnancies, it was a shame not to full drill down to a more specific group that are experiencing unmet need for contraception. It would have been beneficial to investigate the sexually active individuals experiencing unmet need to make the results more appropriate to inform policy intended to expand contraceptive use.

The analysis of transcribed interviews in Study IV took a qualitative content analysis method. However, I had wanted to use directed content analysis utilising established political economy and health system frameworks, but the frameworks were so restrictive based on the richness of the data. This was a wakeup call to always plan the analysis earlier before data collection. The data I had was not aligned with the method I wanted to use because I hadn't designed the interview guide with the analysis in mind.

# Implications

The findings from this thesis offer some implications for Zambia and other similar LMICs seeking to improve equity in access to maternal and reproductive health services described below.

*Design of the health benefit packages for health insurance schemes*

The health benefit package is one of the core elements of an insurance scheme, spelling out the health services and medical procedures that the members of the scheme can utilise under the scheme. This thesis reveals the need for a participatory process for the establishment and update of the health benefit package. Allowing broad participation of stakeholders will increase the chances of developing a package that is responsive to the needs of the population and stimulates ownership and averts discontent among the stakeholders.

*Health insurance population coverage*

The Zambia NHIS has covered individuals in the formal sector but majority of those in informal sector and poor are left out which is similar to other insurance schemes within SSA. Majority of the time it is the poor and those in the informal sector are the less privileged. The NHIS should consider including an equity perspective in the

coverage of the population by prioritizing the inclusion of poor and informal sector populations. To make progress on equity in population coverage, countries could consider subsidizing premiums for the left-out populations, flexible payment mechanisms, and targeted outreach to enhance the public's knowledge about the benefits and responsibilities of being part of an insurance scheme.

*Investment in high-quality counselling services*

Counselling by health workers has proven to be the most effective and equity-enhancing method of passing on information on contraceptive use to increase modern contraceptive use. Governments should consider enhancing access to family planning counselling to the public especially women.

*Strategic use of multiple modes of communication of contraceptive information*

The use of multiple methods in communicating contraceptive information provided more impact on modern contraception compared to the use of single methods separately. Governments should strategically consider using multiple delivery methods of family messages to increase chances of their impact on modern contraceptive use.

*Strengthen governance, transparency and institutional autonomy*

Findings highlight the challenges with direct political influence over NHIMA operations. This creates a risk of undermining NHIMA's autonomy as a statutory agency mandated to implement NHIS thus undermining its effectiveness and public trust. NHIMA should be granted greater autonomy, guided by a clear and transparent operational policy and inclusive governance structures. Stakeholder engagement, including civil society, researchers, and local governments, should be institutionalized in decision-making processes.

*Improve supply side equity in service provision and delivery*

The accreditation strategy deployed by NHIMA led to the uneven distribution of accredited providers/health facilities between the rural and urban areas with majority of the providers concentrated in urban areas yet most of the population resides in rural areas. NHIMA should consider avenues of expanding the reach of the scheme by accrediting more health facilities in rural and underserved areas. In addition, public providers should be prioritized in resource allocation, and tariff setting given the proportion of the population they serve.

*Raise awareness and enhance financial sustainability*

The Zambia NHIS currently faces financial difficulties. The amount collected through insurance contributions is not sufficient to reimburse services provided, which threatens the financial sustainability of the scheme. This is partly explained by an overly expansive benefits package. To become financially sustainable, NHIS must revise the benefit package to match contributions collected, implement

gatekeeping mechanisms to control costs, and reduce duplication of services. In addition, strategic purchasing and health technology assessment (HTA) can enhance efficient resource utilisation within the scheme.

*Monitor and evaluate equity in health and financial outcomes*

There is a lack of data. There should be routine monitoring of service utilisation, financial protection, and other relevant indicators in a way that incorporates reporting on equity to assess progress and identify lessons learnt in improving equity. Evidence should be disaggregated by wealth status, geography, highest level of education, and gender among others to identify gaps and inform targeted interventions.

# Further research

This thesis provides a clear understanding of aspects of equity in access to care in LMICs with focus on Zambia. While it provides such evidence, there are some areas that require further investigation.

*Longitudinal impact of health insurance on postnatal care and financial protection*

The evidence on the impact of health insurance on postnatal care and financial protection outcomes such as reduction in out-of-pocket payments, catastrophic health expenditure, and impoverishment was limited and inconclusive. Future research should employ longitudinal designs to assess how insurance affects household financial resilience over time, especially among vulnerable populations. More research directed towards investigation of the impact of health insurance on postnatal care should be encouraged.

*Explanation of the declining impact of modes of communication of contraceptive information*

The discovered gradual reduction of the impact of the different modes of communication of contraceptive information on modern contraceptive use was not explained by this thesis. It is therefore necessary to carry out further investigation to understand why there is such a declining level of impact. In addition, additional research should be conducted to determine whether the trend of reduction is maintained when recently collected data is used.

*Impact of family planning counselling*

In this thesis, family planning counselling included counselling at health facility and counselling done within the communities away from the health facility. The impact of family planning counselling was not disaggregated by the form of counselling and neither did I investigate the quality of the counselling. Further research should

be carried out to assess the impact of the different forms and attributes of counselling on modern contraceptive use to understand what attributes contribute to the most towards the impact of counselling.

*Impact of separate mass media methods (radio, TV, newspapers) and digital health communication*

This thesis investigates the impact of mass media as a single method of relaying contraceptive information without disaggregating the impact by type of mass media. It is necessary to investigate the impact of relaying contraceptive information by each separate type of mass media on modern contraceptive use to identify the more impactful ones. In addition, the rise of digital platforms calls for the investigation to assess the impact of digital platforms and digital health communication strategies on health outcomes. Studies should assess the reach, credibility, and impact of social media campaigns, mobile health applications, and online counselling, as well as the spread and mitigation of misinformation.

*Cost-effectiveness of combined interventions*

Communication of contraceptive information through combined modes like counselling and mass media showed the highest impact on modern contraceptive use. However, such interventions require more resources than single modes of communication, yet the cost-effectiveness of such integrated approaches remains unknown. Future research should evaluate the economic efficiency of dual-channel interventions to guide resource allocation and future interventions.

*Implementation research on NHIS reform*

Stakeholder interviews revealed governance, equity, and sustainability challenges in NHIS implementation. Further research is needed to evaluate the impact of the different reform strategies that have been implemented by NHIMA to identify suitable interventions and further reforms where necessary. Furthermore, political economy analyses are warranted to predict and manage contextual barriers.

Future evaluations should incorporate distributional analyses to assess who benefits from insurance and who is left behind. This includes examining impacts across wealth quintiles, geographic regions, and vulnerable groups such as adolescents, migrants, and people with disabilities.

# Conclusions

This thesis synthesized findings from four studies examining the impact of health insurance and family planning communication on MRH in Zambia.

Zambia has made notable progress in MRH, marked by increased use of modern contraception and expanded coverage under the NHIS. These reforms have contributed to perceived improvements in quality of care, greater patient choice, and additional resources for the health sector. The evidence shows that while progress has been made, significant challenges remain in achieving equitable and sustainable access to care. To advance UHC and reproductive rights, Zambia must design inclusive insurance schemes, invest in high-quality counselling, strengthen governance, and expand coverage to underserved populations. Monitoring and evaluation should guide continuous improvement in implementation of health policies/interventions, and digital platforms should be leveraged in the communication of health information to reach younger audiences and counter misinformation.

These lessons are not only relevant for Zambia but also for other LMICs seeking to build equitable and resilient health systems. By integrating financing and communication strategies, and placing equity at the center of reform, countries can move closer to the goal of health for all.

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