Impact of Health Insurance on Access to Health Services for Mothers and Children in West Africa

MSc Thesis

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Preface

This thesis did not require any ethical approvals.

For the systematic review, Joshua Dadjo (first author) and Sanni Yaya designed and conceptualize this study. Thereafter, Joshua Dadjo designed the search strategy with the assistance of a librarian. He and Olumuyiwa Omonaiye conceptualized the protocol and Joshua Dadjo drafted it. Sanniy Yaya and Olumuyiwa Omonaiye edited the manuscript along with Joshua Dadjo. Once the protocol was completed, Joshua Dadjo carried out the search. Screening was done in collaboration with Olumuyiwa Omonaiye. Data extraction, analysis methodological assessment and drafting of the protocol and review was done by Joshua Dadjo. The review manuscript was drafted by Joshua Dadjo and edited by Sanni Yaya and Olumuyiwa Omonaiye

For the cross-sectional study, the study was conceptualized and designed by Joshua Dadjo, Sanni Yaya and Bright Ahinkorah. Joshua Dadjo obtained data from the Demographic Health Survey website and worked with Bright Ahinkorah to clean, analyse and weigh the data. Joshua Dadjo drafted the article, and the manuscript was edited by Bright Ahinkorah and Sanni Yaya.

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"If you pour yourself out for the hungry and satisfy the desire of the afflicted, then shall your light rise in the darkness and your gloom be as the noonday."

Isaiah 58:10

Impact of Health Insurance on Access to Health Services for Mothers and Children in West Africa

Abstract /Résumé
[le français suit]

Background

The Sustainable Development Goals provides targets that foster greater mobilization of global resources and efforts. SDG Goal 3 *Ensure healthy lives and promote well-being for all at all ages,* sets targets for the reduction of maternal mortality rates and mortality rates for children under-five. Health insurance coverage is thought to provide access to needed primary services to accomplish these goals. West Africa is the region of the world with the highest burden of disease and it is unclear if insurance coverage does provide needed access to services. The articles within this thesis examine whether or not health insurance provides greater access to primary services for mothers and children, while determining other factors to be considered.

Method

For the systematic review, we carried out a search on four databases. Eligible studies included mother's under-five and children in West Africa. The primary outcome was insurance impacting the rate of utilization of services. Data was extracted using standardized form, and methodology was assessed using the Joanna Briggs Institute forms.

Our cross-sectional study used DHS data from 10 West African countries. Data was cleaned, weighed and analyzed using Stata. The independent variable was health insurance, and the variable of outcome was making a minimum of four antenatal care visits. Data was analyzed

using binary logistic regression and we presented results using crude and adjusted odds ratio at 95% confidence interval.

Results

The narrative synthesis was chosen for the review. We found that in most study settings, insurance increased access to services. The cross-sectional study found that women with insurance were more likely to make the recommended number of ANC visits than their uninsured counterparts (aOR [95% CI] =1.55 [1.37-1.73]). Socio-economic status also impact access to services.

Conclusion

Health insurance does increase access to services and should be pursued as a viable long-term policy, but access is still dependent on socio-economic status. Due to the COVID-19 pandemic, burden of disease of the region and systems challenges, other solutions should be pursued in the near-term. Future investigation should consider the role of equity as a guiding principle.

Contexte

Les objectifs de développement durable fournissent des cibles qui favorisent une plus grande mobilisation des ressources et des efforts mondiaux. L'objectif 3 des ODD, *Assurer une vie saine et promouvoir le bien-être de tous à tout âge,* fixe des cibles pour la réduction des taux de mortalité maternelle et des taux de mortalité des enfants de moins de cinq ans. La couverture de l'assurance maladie est censée permettre l'accès aux services primaires nécessaires pour

atteindre ces objectifs. L'Afrique de l'Ouest est la région du monde où la charge de morbidité est la plus élevée et il n'est pas clair si la couverture d'assurance fournit effectivement l'accès nécessaire aux services. Les articles de cette thèse examinent si l'assurance maladie permet ou non un meilleur accès aux services primaires pour les mères et les enfants, tout en déterminant d'autres facteurs à prendre en compte.

Méthode

Pour la revue systématique, nous avons effectué une recherche sur quatre bases de données. Les études éligibles concernaient les mères de moins de cinq ans et les enfants en Afrique de l'Ouest. Le résultat primaire était l'impact de l'assurance sur le taux d'utilisation des services. Les données ont été extraites à l'aide d'un formulaire standardisé, et la méthodologie a été évaluée à l'aide des formulaires du Joanna Briggs Institute.

Notre étude transversale a utilisé les données des EDS de 10 pays d'Afrique de l'Ouest. Les données ont été nettoyées, pesées et analysées à l'aide de Stata. La variable indépendante était l'assurance maladie, et la variable de résultat était la réalisation d'un minimum de quatre visites de soins prénatals. Les données ont été analysées à l'aide d'une régression logistique binaire et nous avons présenté les résultats à l'aide d'un ration de probabilité brut et ajusté à un intervalle de confiance de 95%.

Résultats

La synthèse narrative a été choisie pour l'examen. Nous avons constaté que dans la plupart des contextes d'étude, l'assurance augmentait l'accès aux services. L'étude transversale a révélé que les femmes assurées étaient plus susceptibles d'effectuer le nombre recommandé de

visites de CPN que leurs homologues non assurées (aOR [IC 95%] =1,55 [1,37-1,73]). Le statut socio-économique a également un impact sur l'accès aux services.

Conclusion

L'assurance maladie augmente effectivement l'accès aux services et devrait être poursuivie comme une politique viable à long terme, mais l'accès dépend toujours du statut socio-économique. En raison de la pandémie de COVID-19, de la charge de morbidité de la région et des défis systémiques, d'autres solutions doivent être recherchées à court terme. Les recherches futures devraient considérer le rôle de l'équité comme un principe directeur.

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Abbreviations

MDG-Millennium Development Goals

SDG- Sustainable Development Goals

MMR- Maternal Mortality Ratio

ORI- Obstetrical Risk Insurance

NHIS- National Health Insurance Schemes

SSA-Sub Saharan Africa

List Appendices

Chapter 1: Introduction

1.1 Problem Statement

Though many studies have investigated the impact of health insurance on access and use of services, few have considered West Africa (1–3). This region faces the most elevated levels of MMR (4) and under-five mortality (5) in the world. These issues are exacerbated by increasingly elevated levels of poverty, income inequality, youth unemployment and slow economic growth (6). Most cases of child and maternal mortality could be avoided if patients had access to skilled birthing assistance and appropriate facilities (2). Current literature considers catastrophic costs and the lack of insurance as an important barrier to access to services (2,7), in accord with the WHO's view of UHC as a fundamental need for increased well-being of all (8). Current evidence does not indicate whether health insurance will directly lead to increased access to services for mothers and children in West Africa. It is important to establish, for the benefit of policy makers, based on available data, the impact health insurance will have on access to services for children and mothers.

1.2 Background

1.2.1 Millennial Development Goals and Sustainable Development Goals

In September of 2000, the 191 member states of the United Nations signed the Millennial Development Goals(9). Included in these 8 goals was the reduction of child mortality and improving maternal health by 2015. The decade and a half of efforts and investments that followed lead to the decrease of MMR ratio and under-five deaths in children by more than half. Additionally, the number of women who benefited from skilled birth assistance rose by 59% between 1990 and 2014(9). Despite these efforts by 2015, only around half of women globally receive the recommended amount of antenatal care(9). Then came the 17 Sustainable

Development Goals, signed by the UN in 2015 in the intention to continue and expand the work done in the previous 15 years. The third goal, *Ensure Healthy Lives and Promote Well-Being at All Ages* includes targets such as the continued reduction of the under-five mortality and MMR rates, as well as expansion of access to contraceptives, lowering the adolescent fertility rate and expanding access to immunization(10). So far, billions have been pledged or invested towards these goals, including a $1.4 billion commitment over 10 years by the Canadian Government(11). Specifically, the SDG set out the reduction of under-five mortality to less than 25 in 1000, neonatal mortality lowered to less than 12 in 1000 and MMR to 70 per 100 000 live births as targets(10).

1.2.2 Burden of Child And Maternal Health & Socio-Economic Status In Western Africa

Western Africa is known to have the world's highest MMR rates in the world(4) and one of the highest rates for under-five mortality in children, including at the neonatal stage(5). The MMR in Western Africa range from the low 300 in 100 000 live births in Benin and Ghana, to around 500 in Cameroon and Niger to over 900 per 100 000 live births in Nigeria(12). The unfortunate reality is that most deaths are preventable. When it comes to mothers, hemorrhage, exacerbation of pre-existing conditions by pregnancy, eclampsia and sepsis are major causes of maternal deaths (13). Whereas for children, specifically newborns, the main cause of death is complications during birth, such as intrapartum events, preterm births or infections(14). In both cases, appropriate and timely medical care is the solution through mostly low-tech and cost-effective technologies (14), that are often accessible when a mother is giving birth in the presence of skilled workers in appropriate facilities. Mothers would also be aided if they

accessed services earlier, but as noted in a few studies, less then a third of women get their recommended ANC services in SSA (15).

As a whole, West Africa has seen strong periods of economic growth, with average growth in the region being over 4% from 2014 to 2016 (16). The growth remains vulnerable, as seen in Guinea and Liberia where weak economic growth was further stunted by the 2015 Ebola crisis (10). West Africa as a whole is one of the world's poorest regions, marked by stark income inequality (6). For example, according to Oxfam, the five richest men in Nigeria have a combined wealth greater than the nation's national budget (6). Finally, West Africa is the only region in the world where there are increases in levels of poverty, exacerbated by high rates of youth unemployment, malnutrition and infant mortality. (17)

1.2.3 Universal Health Coverage, Health Systems funding

UHC is defined as the ability for people to access and use all necessary health services at a substantial quality without incurring catastrophic financial costs(8). Specifically the WHO sets out equity in access, strong quality of health services and protection against financial risk as important tenants of UHC (18). Therefore, the goals of UHC include increases access to essential medical services, while decreasing the rate of catastrophic costs to consumers. A strong argument for UHC is its role in Malawi(19). Malawi ranked 174 out of 187 on the Human Development Index, with a GDP of US 494.40$ per capita(19). The implementation of UHC was marked by policies targeting areas with poor indicators through increased funding, training and retraining health care staff and human resources (15). These efforts have lead to an increases in overall coverage, and stronger health indicators, such as lowering the under-five mortality rate (15).

When it comes to health systems funding, the WHO identified certain solutions in a 2010 report (20). It notes that an initial step to securing needed health funding is prioritization of health care by national governments, something sorely lacking in Western Africa. For instance, the report notes that very few SSA countries spend more that 15% of their national budget on health care, making it impossible for them to provide UHC. Increased funds would be facilitated by valuable discourse between officials from health agencies and members of the executive branches of government as well as increasingly effective tax collection methods. Finding new sources of revenue such as taxes on tobacco or unhealthy products is a valuable avenue, as these taxes could lower poor health behaviours while bringing in important revenue. Finally, the report noted that as in the example of Malawi, LMICs will usually struggle to gather their own funding regardless of the use of best practices. Bringing in NGOs and international funding streams is often instrumental in establishing effective and durable health systems (20).

1.3 Research Questions and Objective

Research Questions:

1. What is the impact of catastrophic expenditure on access and utilisation of health care services for mothers and children under five in Western Africa?
2. What is the impact of health insurance on access and utilization of services for mothers and children under five in Western Africa?

Research Objectives:

1. To identify what is known in literature about the impact of catastrophic expenditure on access and utilization of health care services for mothers and newborns in Western Africa through a systematic review.

2. To describe and understand the impact of health insurance on access and utilization of services for mothers and newborns in West Africa through a cross-sectional study.

1.4 Rationale for the Thesis

Though many studies have discussed the impact of health insurance on access to medical services, few have considered Western Africa as a whole. This region has the most elevated MMR and under-five mortality rates in the world, despite decades of targeted efforts. Specifically, according to UNICEF, MMR range from 300 to 999 deaths per 100,000 live births(13). The solution to this issue is widely believed to be the implementation of UHC, as most causes of death could be effectively dealt with through primary care providers. Yet, little is known about the impact of current efforts in increasing access to services. As the MMR and under-5 mortality rates are abnormally high, it is possible that UHC without additional efforts in other areas is insufficient. As there exists many methods of attaining universal coverage, and many barriers to coverage and to access to services despite coverage, it would be valuable for decision makers to understand what the impacts of UHC on access to needed health services are. The high socio-economic cost of continued inaction in Western Africa is increasingly detrimental to a region that faces already sever development challenges. This study hopes to contribute to the current body of knowledge, in the hopes advancing the cause of mothers and children in Western Africa.

Chapter 2: Literature Review

This review was conducted using Medline databases on the OVID platform and accessing full text that were open-access or using the University of Ottawa library.

2.1 Burden of Disease and Barriers in Western Africa

Every two minutes, a woman is killed by complications related to pregnancy somewhere in the world(2). This fact is made more tragic, when one considers that most deaths are preventable using proven and inexpensive technologies(2). When it comes to children, in 2010, of the 7.7 million deaths in children under-five, 3.1million occurred during the neonatal stage, the first 28 days(2). The burden of child and maternal deaths is evidently too elevated on a global stage—but these impacts are found in high concentration in Western Africa and focused on various segments of the population. For example, younger mothers were found to take an outsized portion of the burden of MMR because of high adolescent fertility rates coupled with slow progress in dealing with adolescent MMR(21).

As most deaths in children under-five and women could be easily prevented, it is important to consider what are the factors that would reduce access to care for a patient in need. Namely, socioeconomic inequities and cultural norms present themselves as important barriers in the access to antenatal and neonatal care in Western Africa. These barriers are effective, as 50% of women in SSA do not give birth in health facilities (22), while one study found that in eight West African countries, 80% of rural women gave birth at home without the help of skilled attendants (23). Notably, a study in Ghana found that the majority of women in selected rural Ghanaian communities did not access antenatal services at least eight times, as recommended by the WHO(24), and did not access them on time (25).

First, distance is known as a reason why women did not seek skilled care in Ghana (26). Distance decreases the ability to access care for the poor, as they often lack the means to reach services (27). In Uganda, the proportion of children who accessed services diminished the further away they were from providers (28). The effect of distance is more pronounced on rural populations, as a study showed that in 8 West African countries, 80% of women living in rural areas gave birth at home, without a skilled birth attendant(29). In fact, there exist an important rural versus urban gap, where the concentration of resources in urban settings limit access for rural populations, even in the case of insured persons (2). The result is a significantly higher under-five mortality rate in rural vs urban setting (30).

Second, education has an important impact. One study that focused on this issue detailed consistent reports in literature that utilization of health services can be directly linked with the mother's formal education (29). They state that women's education enables them to identify symptoms, seek care and demand appropriate quality (29). Additionally, studies also found that a poorly educated head of the household could negatively impact the likelihood of a mother accessing needed services (7). Furthermore, the unpredictable cost of health services is known to be an important barrier to access to services (31).

Third, various cost presents themselves as significant barriers. In the case of child delivery, theses sums can represent a high proportion of a family's annual income, potential driving them into deep poverty (27). The impact of cost is accentuated when considering that it is impossible to predict the cost of delivery and save up to pay the fees and that in addition, the services offered would be essential and irrefusable (27). As mentioned, distance impacts the poor's ability to reach services, and this is often because cost to travel are too elevated (7). One

of the primary means of lowering costs is through health insurance, though this presents another cost barrier—paying premiums (32).

Finally, some barriers are cultural. Women in Western Africa often live under the authority of the head of the household, usually their husband, they need his permission to access services, even when he is away. This "standing permission" is in important barrier as it limits access to services even if all other obstacles are removed (33), because women's ability to make decisions related to the well-being of themselves and their children are reduced.

2.2 Insurance

As recently as May of 2019, the WHA called for UHC as a way to address CHE, inequities and grow access to health care worldwide (34). The issue of CHE is severely more pronounced in Western African countries, as they have the highest levels of catastrophic health expenditure in the world (35). Also, lack of coverage has ramification for costs to patients, as it has also been shown to negatively impact care seeking attitudes (32).

In an effort to deal with this issues, LMICs have commonly employed one of two systems: community based health insurance, or schemes, and social or national health insurance(7). CBHIs tend to focus on covering those who are not covered by other schemes(7). It utilises a resource pooling approach through various social structures, such as families, community groups or religious groups(18) (28) Large sums are needed to start these systems, but they remain relatively easy to set-up and have been appearing in LMICs globally (32). CBHI has been linked to increase use of outpatient services without increases in inpatient services, lower rates of CHE, higher use of services for children under five and overall improvement in health indicators such as immunization rates and under-five mortality (28) More significantly, CBHI has been linked to lowering out-of-pocket costs, therefore lower CHE(32). Social health

insurance schemes are commonly found in the developed world, and have recently appeared in LMICs such as Ghana (26) and Nigeria (36). These systems fare poorly in most LMIC's because of institutional capacity weaknesses and small tax bases (32). Nigeria's system has been described as suffering of insufficient financial management, including poor funding and a weak financial safety net for the poor (33). Ghana's system has a premium cost setting system that has excluded many poor people (3). These two countries issues are representative of others, who struggle to appropriately manage their SHI. Common challenges include poor distribution of services, inability to evolve to deal with complications related to pregnancy, insufficient staffing and lack of appropriate equipment (21). As some studies have shown that insurance membership is associated with greater likelihood of accessing services (23), yet barriers, such as distance to services, have been found to limit the use of services, and therefore, maintain high mortality rates (3).

Other than state or community funded insurance programs, one method of reducing CHE has been removal of user fees. User fee removal has been championed as a pro-poor policy that has been showed to increase the number of births in facilities (37). Yet the removal of user fees seems to benefit women in higher socio-economic groups, who would be more likely to access services in any case (38).

Chapter 3: Paper 1

Health Insurance Coverage and Access to Child and Maternal Health Services in West Africa: a systematic review

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3.1 Abstract

Background

The third Sustainable Development Goal *Ensure Healthy Lives and Promote Well-Being at All Ages* set numerous targets on child and maternal health. Universal health insurance is broadly seen as a solution to fulfill these targets. West Africa is known to have the most severe maternal mortality and under-five mortality rates in the world. This review seeks to understand whether health insurance does provide increased access to services for mothers and children in this region.

Methods

A search was conducted of four databases. Eligible studies were from West African countries. The population of interest was mothers and children, and the outcome of interest was the impact of health insurance on access to services. Data was extracted using a standardized form. Joanna Briggs Institute Critical Appraisal tool was used for methodological assessment.

Results

Following screening, we retained 49 studies representing 51 study setting. In most study settings, health insurance increased access to services. Other determinants of access were socio-economic factors such as wealth and education.

Conclusions

Study findings suggests that health insurance may be a viable long-term strategy to alleviate West Africa's burden of high maternal and child mortality rates. An equity lens must guide future policy developments and significant research is needed to determine how to provide access reliably and sustainably to services for mothers and children in the near and long-term.

Keywords:

Maternal and child; Insurance; Health coverage; West Africa; Services

3.2 Background

In January of 2016, world leaders ratified the 17 Sustainable Development Goals (SDG) (39). These goals built on the Millennium Development Goals (MDG), which were adopted in the year 2000(40). The SDGs sought to build on the success of the MDGs, which were used as a tool to galvanize global attention on an important set of social issues such as poverty, health and education (41). Like the MDGs, the SDGs were meant to set goals and mobilize the international community around those goals with an emphasis on lasting sustainable change (41). Recent reports indicate the continued interest of the international governments, with combined investments of over $20 trillion in 2015 a figure that could reach over $30 trillion per year in 2030 (42).

The third SDG, *Ensure Healthy Lives and Promote Well-Being at All Ages* set numerous targets including the reduction of maternal mortality (MMR) to less than 70 per 100,000 live births and ending the preventable death of children under 5 by attaining rates of 25 per 1,000 live births (10). Currently, the international community is not on track to meet these targets, and the COVID-19 pandemic has caused further delays (43).

The highest MMR and under-five mortality rates in the world are in West Africa (4,5). This region has MMR rates from around 300 in 100 000 live births in Ghana, to around 500 in Cameroon and Niger to over 900 per 100 000 live births in Nigeria (12). Therefore, there is significant work to be done before achieving the SDG 2030 targets. The major causes of death for mothers such as hemorrhage and eclampsia (13), and children such as preterm birth and infection (14), could be addressed using low-tech and low cost health technologies available in primary care settings (14).

The World Health Organization (WHO) has identified facility-based deliveries with skilled birth attendants and appropriate antenatal (ANC) and postnatal care as key interventions to reduce MMR and child-mortality rates and the global community has endeavoured to strengthen access to these services, though there have been limited impacts. For example, in many countries such as Niger, Nigeria and Guinea, less than 50% of woman use a skilled birth attendant (13), delivery undertaken by skill birth attendant are known to significantly reduce the risk of maternal or neonatal death (44). Regarding the use of ANC, it is only around half of women in Mali, Burkina Faso, Cote d'Ivoire and Benin that make the recommended number of visits (13). ANC is key to early detection of potential risk and complications and has been linked to decreased incidences of mortality and low birth rate (45).

One important barrier of access to maternal and child health services is their cost. Simple medical interventions can lead to catastrophic health expenditure , which can represent a high proportion of a family's annual income, potentially driving them into deep poverty (27). SDG Goal 3 includes universal health coverage, including financial protection (10), a measure touted by the World Health Assembly as key to growing access to healthcare worldwide (34). This is especially meaningful for West Africa, the region with the most pronounced incidence catastrophic health expenditures(35).

Universal health coverage in the region has been pursued using one of two types of schemes: community-based health insurance , or schemes, and social or national health insurance (7). Community-based health insurance tends to focus on covering those who are not covered by other schemes by leveraging social structures such as families or religious groups to build sufficient risk-sharing pools (28). Community-based health insurance are expensive to set up but easy to maintain and have been used in low and middle income countries (LMIC) globally (32).

There have been specific links between community-based health insurance and decreased incidences of catastrophic health expenditure. Community-based health insurance has been linked to increased use of outpatient services without increases in inpatient services, lower rates of catastrophic health expenditure. (32). The second type of scheme is a nationally managed social health insurance scheme. These are commonly found in the developed world, and have recently appeared in Ghana (26) and Nigeria (36). These systems fare poorly in most LMIC's because of institutional capacity weaknesses and small tax bases (32). Common challenges include poor distribution of services, insufficient staffing, and lack of appropriate equipment (21).

Though many studies have evaluated the impact of health insurance on accessing needed services for mothers and children, few have considered West Africa as a region. Due to its elevated burden of maternal and child mortality rates disease, this region deserves further study as policymakers seek to improve outcomes. This systematic review will narratively synthesize current knowledge on the impact of health insurance on access to child and maternal health services. It will provide comprehensive information on the relationship between insurance status and use of services, and services and identify relevant co-determinants.

3.3 Methods

The methodology of this review is based on a previously published protocol (46).

3.3.1 Information Sources and Search Strategy

The search for this review was conducted October 20th, 2020, by JD (see Appendix 3.1). Studies were retrieved using a range of terms and combinations of MeSH terms and/ or text on MEDLINE complete, Embase, CINAHL complete and Global Health. The search strategy was created by JD in collaboration with a librarian. Terms selected pertained to the population of

interest, the countries of interest, relevant primary medical services and terms related to health insurance.

3.3.2 Eligibility Criteria

This review includes studies of which the population of focus is mothers and children under the age of 5 in West African countries (see Appendix 3.2). The assumption was there would be a limited number of available studies, so we did not exclude based on the year of publication. The relevant intervention is health insurance. The types of funding received by a health insurance scheme did not impact selection and there was no exclusion based on the type of health service, though special attention was paid to prenatal and neonatal services. The primary outcome was the impact of health insurance on rate of utilization and access to services. Though similar in the observed outcome, access is defined as the unobstructed possibility of use of services and utilization is defined as consuming or using a health service. The secondary outcome is gaps in the literature where the study may examine this question but not formalize a conclusion. A tertiary outcome of interest is other factors that may be a determinant of access to services. The types of studies included were observational studies such as cross-sectional or cohort designed studies that were published in peer-review journals in English or in French.

3.3.3 Selection and Critical Appraisal

All the results of the search were exported to Covidence (Veritas Health Innovation Inc.), where duplicate studies were automatically removed. JD screened the titles and abstracts, and full text were screened by both JD and OO using primary and secondary outcomes. JD and OO also used the Joanna Briggs Institute critical appraisal tools for observational studies to assess their methodological quality (47) (see Appendix 3.3).

3.3.4 Data Extraction

A collection form was developed and identified the following categories: study setting (country), study aim(s), sample characteristics, data collection methods, rates of coverage, rates of utilization and access to services for mothers and newborns, other factors and barriers that affect rates of access and utilization, types of coverage, and cost of coverage to the consumer.

3.3.5 Synthesis Method

After considering pragmatic factors such as availability of time, resources, and the pertinent format for the aims of this review, the narrative synthesis was selected. This format is ideal for concisely analyzing findings (48). Synthesis without meta-analysis was deemed appropriate (49) as the specific health services received will vary from study to study. This variation could lead to a greater diversity in findings than is appropriate for a proper meta-analysis (50).

3.4 Results

3.4.1 Search results and Study Characteristics

Overall, the search on four databases produced 1355 references that were imported for screening (Figure 1). Six hundred and twenty-one (621) duplicates were removed, and seven hundred and thirty-four (734) references were screened by title and abstract. Five hundred and eighty (580) titles were excluded and of the one-hundred and fifty (150) references that went through full-text screening, 49 references met the inclusion criteria. These studies were published between 1988 and 2020.

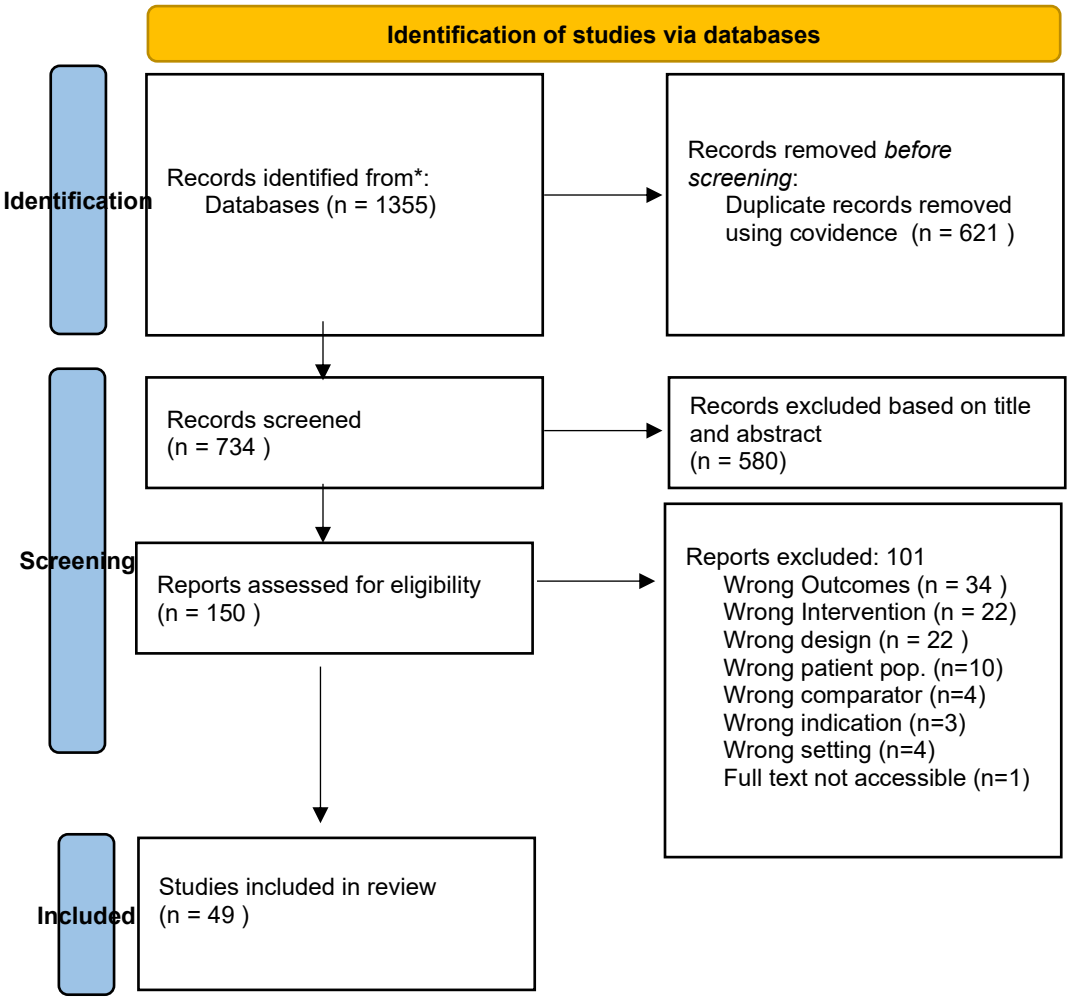

Figure 1. Prisma Flow Chart for Systematic Review

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

Though 49 studies were screened, there are a total of 51 distinct evaluations in different countries (Table 1). Figure 2 presents the breakdown of countries presented in selected studies.

Ghana was the setting for more than 65% of the studies, followed by Nigeria with 17% of the studies. Of note, our search only found studies conducted in 9 of the 16 eligible countries (see Appendix 3.2). Most of the studies, 42 of 49, were cross-sectional observational studies, many of which used data provided by DHS national surveys or MICS surveys. The sample sizes ranged significantly from a few hundred to many thousands (200-33,500), and 45 of 49 studies focused on women of reproductive age while 7 of the 49 focus on children under 5 (6 some studies considered both mothers and children). Finally, most studies—34-- were published in the five years preceding this review.

Table 1. Summary of Narrative Synthesis Findings

Author Name and date	Study Setting	Rates of Utilization and Access to Services.
Abrokwah 2014	Ghana	Uninsured pregnant women spend much more compared to insured pregnant women. Insurance status raises the number of prenatal care visits by 24%.
Adeniran 2020	Nigeria	45.5% of women who got cesarean delivery are health insured while 54.6% paid out of pocket.
Adewuyi 2018	Nigeria	53.5% have at least 4 antenatal visits.
Adinma 2011	Nigeria	26.7% pre-intervention to 85.6% post intervention.
Adu 2018	Ghana	89.2% for min ANC, PNC is 73.3%, FBD is 74.2%.

Afaya 2020	Ghana	Participants who were insured with the NHIS were 3 times more likely to utilize the ANC compared to those who were not-insured [OR = 3.42 (95%CI: 1.72–6.82), p<0.001].
Aliyu 2017	Nigeria	First visit was in first trimester for 37.2% of those with insurance, 57.4% second trimester, 5.4% for third trimester.
Amoakoh-Coleman 2015	Ghana	73.9% of those with insurance got skilled delivery.
Arthur 2012	Ghana	87.8% of those with health insurance attend ANC at least 4 times; 73.2% of those without health insurance attend ANC at least 4 times.
Asundep 2013	Ghana	Women without insurance are less likely to make recommended ANC visits (AOR=1.01 (0.49-2.08).

Atake 2020	Togo	FBD: 94.13% in urban, 58.38% in rural. ANC: 72.84% urban and 48.23% rural; Access to health insurance significantly increases the likelihood of using antenatal care and hospital deliveries.
Bagnoli 2019	Ghana	61% of insured children used health care facilities vs 33% for uninsured children when sick; if simply seeking treatment or advice 85% ins,67% non-insured.
Bonfrer 2016	Ghana	Results from the PSM reveal that NHIS membership had a similar positive effect on ANC visits (7 pp, $p = 0.027$) for the poor. We find significant effects on attended deliveries as a result of NHIS enrollment (11 pp, $p = 0.003$).
Bosomprah 2015	Ghana	87% at least 4 ANC, those with registered NIHS cards more likely to make the visit.
Brals 2017	Nigeria	FBC: 80.8% women with insurance and 56.1% women without insurance.
Browne 2016	Ghana	The odds of having skilled Delivery increased threefold among insured women; 63% more likely to attend post-natal care.
Brugiavini 2016	Ghana	NHIS is significantly and positively correlated with formal antenatal check-up intake (marginal effect always positive and statistically significant).
Delamou 2015	Guinea	Referrals increased 17% in 4 years.

Dixon 2014	Ghana	57% make first ANC visit in first trimester.
Dwumoh 2014	Ghana	The prevalence of immunization among children with valid NHIS membership card seen at time of interview was 34.3%.
Enuameh 2016	Ghana	Possession of a valid health insurance card was positively linked to facility-based delivery (AOR = 1.90; 95% CI =1.29–2.81),
Fassin 1988	Senegal	21.9% did no consultations with healthcare professionals, 9.8% to a private clinic, the rest to a public service. For mothers, 77.4% of those with insurance consulted health professionals; 78.3% of those without insurance accessed health services; For children, 85% with insurance consulted, 72.2% without insurance consulted.
Frimpong 2014	Ghana	In hospital and HCs, health insurance registration did not affect the place of delivery (OR¼0.78, 95% CI¼0.51, 1.20). In CHCs, on the other hand, insured clients were significantly more likely to deliver at a health facility than other clients (OR¼1.67, 95% CI¼1.06, 2.63).

Ganle 2019	Ghana	90.4% made at least 4 ANC visits, insurance is a predictor of FBD.
Ibrahim 2014	Ghana	Low birth weight rate decreased after introduction of NHIS.
Ibrahim 2015	Ghana	Better low weight at birth rate after 2003 NIHS.
Johnson 2016	Ghana	SBA 44% in 1993, 58% in 2008,
Khan 2016	Ghana	Women with health insurance are 74% more likely to use SBA than women without health insurance. 87% had for or more ANC visits 68% used SBA.

Lambon-Quayefio 2017	Ghana	92% FBD, lower antenatal attendance, FBD for mothers with NHIS than without.
Lawani 2016	Nigeria	Only 6.7% of enrollees had more than 4 ANC visits, 36.7% for non-enrollees; 93.3% had 4 or less where 63.3% for non-enrollees
Mati 2018	Togo	Of those using skill-based attendants (SBA), 5.5% were insured; of those not using SBA, 34.3% insured
Mensah 2010	Ghana	Results suggest that members are more likely to use prenatal care, deliver in hospitals and be attended by trained professionals compared to non-members. They are also less likely to experience birth complications and infant deaths.
Moyer 2013	Ghana	The odds of access to family planning services for the poor are higher among those who have no insurance (OR = 1.374, 95% CI: 1.011–1.867, $p \leq 0.05$) compared to those with insurance.

Nketiah-Amponsah 2013	Ghana	The results point out that women who own health insurance have an approximate 18 percentage point propensity to deliver in a public allopathic health facility compared with women who deliver at home without professional assistance.
Ogundele 2020	Nigeria and Ghana	The odds of access to family planning services for the poor are higher among those who have no insurance (OR = 1.374, 95% CI: 1.011–1.867, p ≤ 0.05) compared to those with insurance.
Okusanya 2016	Nigeria	Health-insured pregnant women did not use preventive measures like the LLINs and slept less often under LLINs than women without insurance.
Owoo 2013	Ghana	Women who have access to health insurance also have a greater intensity of antenatal care utilization
Philibert 2017	Mauritania	52% min ANC, 62 % FBD, However, the number of deliveries in health care centers increased more rapidly in districts with ORI than in those with no ORI (adjusted OR¼2.34; 95% CI¼1.64–2.32; P<0.05; Only qualified antenatal care increased with ORI (OR¼1.53; 95% CI¼1.12–2.06; P¼0.008). In contrast, rates of caesarean delivery and modern contraceptives significantly increased more rapidly in districts with no ORI (for caesarean delivery: OR¼0.42; 95% CI¼0.22–0.78; P¼0.006 and for modern contraceptive use: OR¼0.42; 95% CI¼0.27–0.68; P<0.001).

Ravit 2020	Mauritania	76.7% of enrolled women have 4 ANC visits vs 62.4%; These results are consistent with the primary objective of the ORI implementation in Mauritania, which is to increase access to maternal healthcare. However, the authors found no statistically significant effect of ORI on PNC or neonatal mortality.
Renaudin 2007	Mauritania	Most women living in the catchment area of the participating health facilities deliver in one of them (81.8%), 78% of enrolled women have benefited from an ultrasound scan versus 25% outside; the post-natal consultation rate is 81% in the zone versus 50% outside.
Sakeah 2017	Ghana	Women with insurance were more likely to have attended ANC at least 4 times, 86% made 4 or more ANC visits.
Salihu 2016	Nigeria	57.5% of visits were from insured people; insured people were more likely to make un-schedule visits or emergency room visits.

Schoeps 2015	Burkina Faso	Child mortality rates for uninsured children were higher (21 per 1000) compared to insured 11 in 1000.
Singh 2015	Ghana	This paper adds to the limited evidence that NHIS members use more maternal health services than nonmembers.
Smith 2008	Senegal, Mali, Ghana	In Senegal, almost 73% of women surveyed sought prenatal care at a modern health facility within the first trimester and 54% reported four or more prenatal visits, with little difference by membership status. In contrast, in Mali, only 35% of women sought early prenatal care and reported four or more visits, with members significantly more likely to positively report both outcomes than non-members. In Ghana, prenatal care utilization is higher than in Senegal and Mali. The average number of prenatal visits was six, with 83% of women reporting four or more prenatal care visits and insignificant differences by membership status. Rates of delivery at a health facility range from 65% in Mali to 76% in Senegal. In Senegal, approximately 93% of insurance scheme members with delivery coverage delivered at a modern health facility versus 71% of non-members and members without delivery coverage. In Mali, 94% of members and 65% of nonmembers had a facility delivery. In Ghana, a higher proportion of members (75%) than non-members (65%). lower, CBHI membership is significantly and positively associated with both the use of prenatal and delivery care.

Tsawe 2020	Sierra Leone	Facility-based deliveries use doubled from 2008 (25.3%) to 2013 (54.9%), also skilled birth attendant increased.
Twum 2018	Ghana	Women with insurance are 39.5 times more likely to have minimum of 4 ANC visits vs those who don't have ANC. Women with insurance are 5.281 times more likely to FBD than those without. Women *without insurance* are 12 times more likely to receive Postnatal care.
Wang 2014	Ghana	Proportion of women with at least one ANC visit is higher among women with health insurance than without, though propensity matching showed this influence was not significative. Health insurance is positively matched with FBD.
Yaya 2019	Ghana	72.4% of FBD; 86.6% at least 4 ANC.

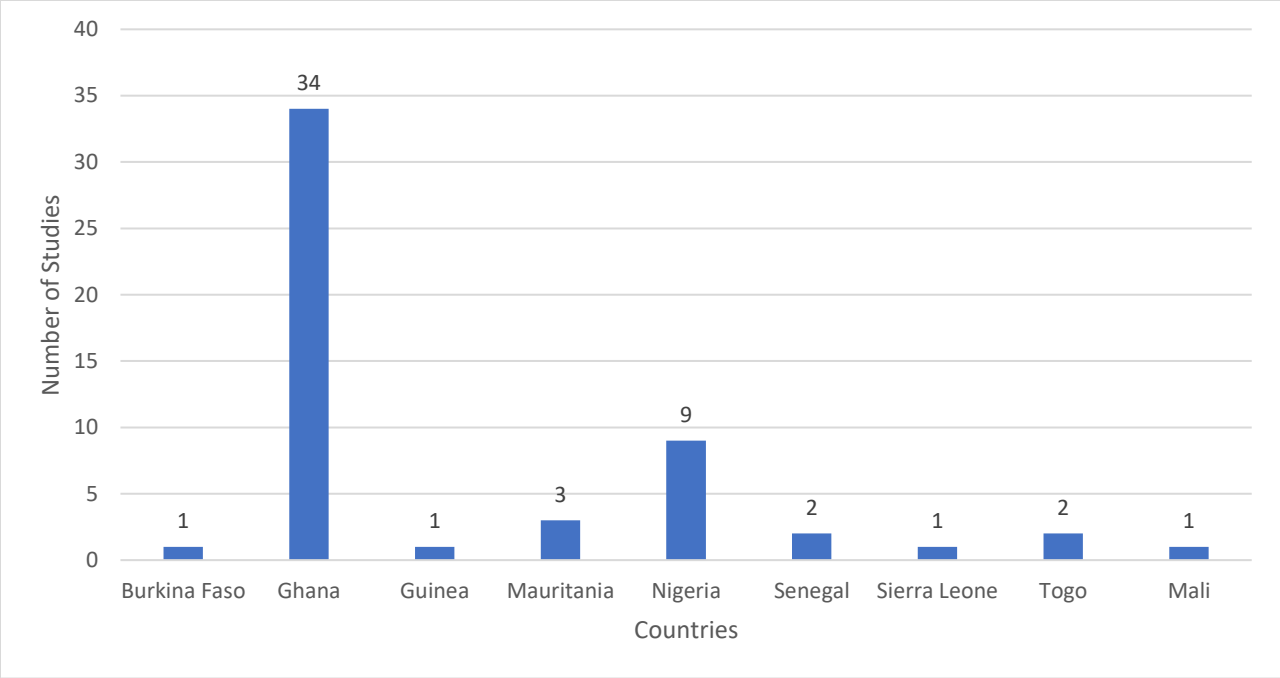

Figure 2. Number of studies per country

3.4.2 Quality Appraisal

There were four types of observational studies obtained: cohort studies (4), cross-sectional studies (41) text and opinion (1) and quasi-experimental (2). The relevant JBI assessment questionnaires were used to assess the studies methodological quality (47). All 49 studies were retained and included following their quality appraisal (see Appendix 3.2 and 3.5)

3.4.3 Narrative synthesis of findings

The primary outcome was the impact of health insurance on rate of utilization and access to services. All 49 studies satisfied the primary outcome, with 37 studies reported that health insurance increased access and use of services. These studies reported findings on multiple types of services in several ways. Twenty three (23) studies found that women who were insured were more likely to access antenatal care services (7,26,51–71), 15 studies linked insurance to increased use of facility-based delivery (53,55,67–69,72–79,79,80) and 12 studies linked

insurance to use of skilled birth attendants (53,55,62,72,77,80–85). Also, 3 studies noted increased access to post-natal care (55,65,82). Specifically, one study noted that insured women were 3 times more likely to use ANC compared to the uninsured (56) while another noted insured women were 2.5 times more likely to make facility based deliveries (67). Additionally, one study noted that women with insurance are 74% more likely to use skilled birth attendants (62). The studies that focused on children concluded that insured children were more likely to use health care facilities or seek advice or treatment, more likely to be immunised, and less likely to be born underweight. (67,86–91).

In contrast, 5 of 51 study settings did not establish a positive link between health insurance and access to services (72,91–94). In those cases, health insurance did not seem to promote use of primary care services. One study noted that mothers without health insurance made more facility-based deliveries than their insured counterparts (92).

The major provider of health insurance was nationalized social schemes because most of the studies were in Ghana and Nigeria, two countries with national health insurance schemes (NHIS) and small private markets in the case of Nigeria (53,54,75). Various iterations of community-based health insurance were found in Burkina Faso and Senegal (72,95) and obstetrical risk insurance was reported in Mauritania and Guinea (31,38,96). Premiums were charged, but options exist to subsidize premiums in some countries (95) and in others, premiums are income-tested (52). The secondary outcome was only observed in one study where health insurance lowered child-mortality rates but did not propose conclusive evidence that this was due to increased use of primary health services (95).

For the tertiary outcomes, other determinants of access of services discussed were elements related to cost such as wealth, cost of services or employment status, where it was

determined that wealthier women, women with skilled employment and women for whom the cost of service was not a barrier had better utilization of services. (26,51,58,60,61,64,68,70,71,74,76,78–83,85–87,91–93). More educated women were more likely to use primary services (26,51,54,56–58,61,62,66,67,74,81,82,86,87,92) as were women who lived in an urban setting or within a few kilometers from services (54–58,62,65,68,70,75,79,80,84,86,87,92). Married women seem to be more likely to access services (56,66,68,81) and older women were also more likely to use services (52,63,69,80,92,93). Other factors mentioned were exposure to the media (80), reimbursement times (53), perception of services and potential issues (67,72), religious belief (84), being unaware of pregnancy and being in good health (71), and having previously had health insurance (78). For those studies that reported the rate of insurance for the population of interest which is presented in Figure 3. Of note, in just over half study settings, less than half the population is covered by health insurance.

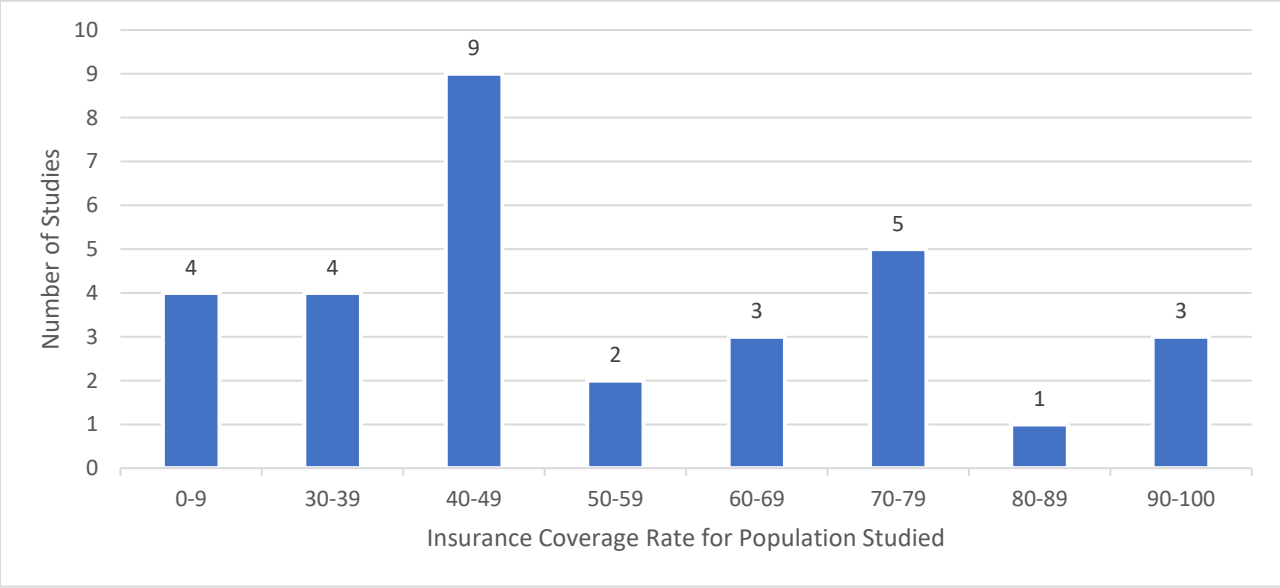

Figure 3. Insurance Coverage Rates in Study Settings

3.5 Discussion

3.5.1 Key findings

This systematic review's key finding is that in 49 studies conducted in Western Africa from 1988 to 2020, mothers and children with health insurance were more likely to access primary health services than their uninsured counterparts. For mothers, they were more likely to access antenatal care, facility-based deliveries, and skilled birth attendants. For children, they were more likely to have access to needed services and to be immunised. Very few studies found that insurance did not increase access and several studies outlined other determinants of access to primary care.

These findings are meaningful for several reasons. First, they endorse the SDG 3 strategy of employing health insurance with a focus on financial protection as a tool to reduce MMR and under-five mortality rates. The findings seem to justify the decision to choose health insurance and not user-fee removal as the strategy to reduce catastrophic health expenditure. Additionally, not only does this review observe increased access, but it also includes studies that suggest decreased mortality(95). This is especially important because it demonstrates the long-term value of the multi-trillion-dollar investments made annually by the global community. It also points to health insurance as a meaningful, long-term solution to the severe incidence of MMR and under-five mortality in West Africa.

Secondly, our findings are consistent with evidence that proposes that community-based health insurance are moderately effective (97–100). Studies included in this review have shown that community-based health insurance can lead to a reduction in child mortality (95) but are not apt at providing access to primary services for mothers in other contexts (72). This is important as these systems are known to have faced many challenges throughout SSA (101), which means

that in implementing UHC, community-based health insurance is an option that would require a different approach. One possible path forward, as proposed by Odeyemi (101) would be to ensure proper support for community-based health insurance by national government's through legislative and financial supports, while including beneficiaries of the schemes in their design and delivery (101). Future studies should seek to determine factors for success of these systems in West Africa, with a specific view to establishing principles for successful implementation. They should also seek to identify how community-based health insurance and NHIS could co-exist to the benefit of most citizens.

Third, our findings on the impact of other determinants are consistent with evidence throughout SSA and other LMICS (102–104). This means that socio-economic status remains a significant barrier to accessing health insurance and would suggest that an equity lens that focuses on providing access to women who are poor or very poor, less educated and are distant from health services. This is important as a number of studies have argued that NHIS, by their design, are less accessible to those who need health services the most, or do not go far enough in protecting consumers from catastrophic expenditure or providing high-quality care (105–107). Strikingly, 4 of the 5 studies that concluded that insurance did not increase access to services were in countries with NHIS (72,92–94).

We also found that in most populations studied, less than half of the population was enrolled in a health insurance scheme. This reinforces the suggestions that inequities exist within health systems in the region. Set against the backdrop of significant wealth inequality in West Africa (6), our findings would suggest that equity is a necessary component in accomplishing SDG goal 3. Future investigations should seek to understand the key components of an equity lens in the development of health systems in West Africa and how to implement such a lens.

3.5.2 Policy Implications and Future studies

Though this review retained 49 studies, it is evident that the total scope is narrow. Future studies should seek to include more countries in the region. Furthermore, there is a clear need to invest in research in other West African countries, including capacity building where needed. This study points to the need to better understand determinants of enrollment and as mentioned, employ an equity lens. Of note, this review does not comment on quality of care as a determinant of use, though some of the studies retained do mention it (74,86). Future investigations should consider whether there is a relationship between health insurance and perception of health service quality. This is especially meaningful in a region of the world where access to high-quality health services is difficult for poorer people (106).

Some of the studies retained for this review focused on Obstetrical Risk Insurance (ORI) in Mauritania (31,38,65). They found that ORI significantly increased access to facility-based deliveries. The possibility of an insurance scheme that is solely focused on maternal health should be intriguing, especially as the COVID-19 pandemic has severely reduced global health initiatives. Policymakers could consider ORI as a targeted tool to increase access to primary health services for pregnant women. This ought to be done with a focus on equity and could be used to target hot spots.

Finally, one proposal for eliminating catastrophic health expenditure has been the removal of user fees. User fee removal has been championed as a pro-poor policy that has been shown to increase the number of births in facilities (37). Yet the removal of user fees seems to benefit women in higher socio-economic groups, who would be more likely to access services in any case (38). User-fee removal along with ORI could be part of a strategy to quickly increase

the number of women and children who access primary services. Policymakers should investigate this and other strategies that would rapidly increase access to needed services.

3.5.3 Strengths and limitations

The strength of this study is that most of the data obtained is from within the past five years. This review has also considered studies that have been assessed and methodologically sound. This study's biggest limitation is the narrow scope of the available study settings. Major countries such as Cameroon and Benin are missing from this study, and the missing information from those countries could skewer our findings.

3.6 Conclusion

This systematic review of 51 study settings provides evidence of the positive impact of health insurance on access to health services for mothers and children in West Africa. Its findings are also consistent with evidence on the determinants of access to services. It makes numerous suggestions for future study and policy action with an emphasis on equity as a guiding principle. As policymakers consider next steps in the wake of the pandemic, the focus should be on rapid solutions to provide access to services, while long-term and sustainable systems are built up.

Chapter 4: Paper 2

Health Insurance Coverage and Antenatal Care Services Utilization in West Africa: a multi-country analysis of demographic and health surveys

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4.1 Abstract

Introduction

In recent decades, there has been significant focus towards the improvement of maternal mortality indicators in developing nations. Though progress has been made around the world, West Africa has maintained an elevated burden of disease. Broader access to primary care services through health insurance coverage is a proposed solution. As limited evidence exist, we sought to understand the relationship between health insurance coverage and the recommended number of at least four antenatal care (ANC) visits.

Methods

DHS data from 10 West African countries was weighted, cleaned and analysed. The total sample was 79, 794 women aged 15 to 49. Health insurance coverage was the independent variable and the variable of outcome was making a minimum of four ANC visits. The data were analysed using binary logistic regression. The results were presented using crude and adjusted odds ratio at 95% confidence interval.

Results

Approximately 86.73% of women who had health insurance had the number of recommended minimum ANC visits, compared to 55.15% for women without insurance. In total, 56.91% of the total sample attended a minimum of four ANC visits. Women with health insurance were more likely to make the minimum recommended number of ANC visits than their non-insured-peers (aOR [95% CI] =1.55 [1.37-1.73]). Our findings also confirmed other studies on the determinants of use ANC service.

Conclusion and Policy Implications

Health insurance is a significant determinant in accessing primary care services for pregnant women, but currently limited as few in the region have access to it. In the wake of the COVID-19 pandemic, policy makers should prioritize rapid solutions to provide primary care while setting the infrastructure for long-term and sustainable options such as public health insurance.

Keywords: Health insurance; Primary care, Health expenditure, West Africa, Health systems, Maternal health

4.2 Introduction

In September 2000, the United Nations signed the Millennial Development Goals, which included the reduction of child mortality and improving maternal health by 2015 (1). The MDG investments led to the decrease of MMR ratio and under-five deaths in children by more than half (1). Additionally, skilled birth assistance rose by 59% between 1990 and 2014, though only half of women received the recommended antenatal care services. (9). To build on these gains, the international community pursued the 17 Sustainable Development Goals Specifically, the SDG set out the reduction of under-five mortality to less than 25 in 1000, neonatal mortality lowered to less than 12 in 1000 and MMR to 70 per 100 000 live births as targets as part of the third goal, *Ensure Healthy Lives and Promote Well-Being at All Ages* (10). So far, billions have been pledged or invested towards these goals, including a $1.4 billion commitment over 10 years by the Canadian Government (11). Per the UN's progress update on the SDG's in 2020, member states were not on track to meet the targets for the third goal prior. The COVID-19 pandemic will cause further delays in progress and threaten decades of progress (43).

As a whole, West Africa has experienced meaningful economic growth for the last quarter century (108), with average growth in the region being over 4% from 2014 to 2016 (16). At the national level, economic growth is vulnerable to health crises as seen in Guinea and Liberia during the 2015 Ebola crisis (10). The COVID-19 pandemic has reversed the trends of the last 25 years, leading to a 3.3% contraction of the sub-Saharan African economy in 2020 (108). Despite the economic trends on the continent, West Africa is one of the world's poorest regions, marked by stark income inequality (6). For example, according to Oxfam, the five richest men in Nigeria have a combined wealth greater than the nation's national budget (6). West Africa is the only region in the world where there are increases in levels of poverty, exacerbated by high rates of youth unemployment, malnutrition and infant mortality (17).

Despite the decades of investment, Western Africa is known to have the world's highest MMR rates (4) and one of the highest rates for under-five mortality in children, including at the neonatal stage (5). The majority of deaths could be prevented with low-tech, cost-effective technologies available during facility-based delivery or in the presence of skilled birth attendants (14). For mothers, deaths are often caused by hemorrhage, exacerbation of pre-existing conditions by pregnancy, eclampsia and sepsis (13). For children, specifically newborns, the main cause of death is complications during birth, such as intrapartum events, preterm births, or infections. Preventative services would be key in strengthening outcomes for mothers yet as noted in a few studies, less then a third of women attend the minimal recommend number of antenatal services in sub-Saharan Africa (15).

Universal health coverage is the ability for people to access and use all necessary health services at a substantial quality without incurring catastrophic financial costs (8). Specifically equity in access, strong quality of health services and protection against financial risk are the key

elements of UHC according to the WHO (18), meaning UHC should lead to increased access to essential medical services and decreased rates of catastrophic costs to consumers.

Globally, low and middle income countries have employed one of two systems: community based health insurance (CBHI), or schemes, and social or national health insurance (7). CBHIs tend to focus on covering those who are not covered by other schemes (7) by taking a resource pooling approach that uses social structures such as families, community groups or religious groups (18) (28). CBHI has been linked to a greater use of outpatient services without increases in inpatient services, lower rates of community health expenditure including lower out-of-pocket costs, higher use of services for children under five and overall improvement in health indicators such as immunization rates and under-five mortality (28). Social health insurance schemes are commonly found in the developed world, and have recently appeared in LMICs such as Ghana (26) and Nigeria (36). Lack of institutional capacity and small tax bases often weaken these systems and keep them from attaining full coverage (32). For example, Nigeria's system has been affected by poor financial management, including poor funding and a weak financial safety net for the poor (33). Ghana's system has a premium cost setting system that has excluded many poor families (3). These are two examples of the challenges that many LIMIC face. Other challenges are poor distribution of services, inability to evolve to deal with complications related to pregnancy, insufficient staffing and lack of appropriate equipment (21). As some studies have shown that insurance membership is associated with greater likelihood of accessing services (23), yet barriers, such as distance to services, have been found to limit the use of services, and therefore, maintain high mortality rates (3).

There is much evidence on the link between increased health coverage and access to maternal health services globally, yet few studies have specifically considered West Africa. This

region is worthy of unique consideration due to its elevated burden of disease and the lack of progress that has been made in improving child and maternal health indicators. In turn, UHC is believed to help lower barriers to access for basic, life-saving primary care services such as antenatal care. Therefore, it would be valuable for policy makers within the international development community to consider if the impact of increased health coverage in this unique region is sufficient because the elevated and persistent burden of disease may indicate that UHC without additional efforts in other areas is insufficient. Therefore, this study seeks to fill the gap in the literature by using data from the most recent Demographic Health Statistic surveys for ten West African countries, to observe the relationship between health insurance and access to antenatal care for mothers.

4.3 Methods

4.3.1 Study Design

We pooled DHS data from the women's files of the most recent (2010-2019) Demographic Health Surveys (DHS) of 10 West African countries that are part of the DHS programme. The DHS are nationwide surveys of LMIC collected every 5 years. They are cross-sectional and gather information on health and other population characteristics. The DHS adopts a two-stage stratified sampling technique to collect the nationally representative data from the respondents. The two-stage sampling process begins with the selection of clusters usually called enumeration areas (EAs). This is followed by the selection of households for the survey. For this particular study, data came from DHS' questionnaires for women. This is a standard model questionnaire that has been applied throughout the globe (109). The sample size was 79, 794 participants. Data in the form of datasets can be accessed through the DHS website. The selected countries had the relevant maternal health data needed for this study.

4.3.2 Variable

Outcome Variable

The outcome variable was four or more ANC visits. The exact question in the DHS questionnaire was "how many times did you receive antenatal care during this pregnancy?"(110,111). Respondents either gave a number or indicated they did not know. Up until 2020, the WHO recommended women make at least four ANC visits, though this recommendation was raised to eight visits in 2021 (112). Less than four ANC visits was coded as "no" and four or more was coded as "yes".

Explanatory variable

The main explanatory variable was health insurance coverage. The question asked was "are you covered by any health insurance?." Respondents answered yes or no (110,111) and since this data is binary, no further coding was needed.

Covariates

Ten variables linked to various socio-economic demographics were added as covariates. These were age, marital status, education, place of residence, wealth, birth order, head of household gender, frequency of reading the newspaper, listening to the radio and watching television. Age ranges were 15-24, 25-29, 30-34, 35-39, 40-44 and 45-49. Marital status was coded as n married, married, cohabitating, widowed, divorced and no longer living together. Educational levels were no education, primary, secondary and higher education. The wealth index was a quintile of five categories: poorest, poor, middle, richer and richest. The birth order was re-coded into two categories: 1 to 3 and 4 or more. The head of household gender was either male or female and the place of residence was urban or rural. Exposure to radio, television or newspaper were

divided in four categories: not at all, less than once a week, at least once a week and almost every day.

4.3.3 Statistical Analysis

We used STATA version 16.1 for Windows. Data for the 10 countries was pooled to ease the analysis and interpretation. A weighing factor ($\frac{v005}{1000000}$) was applied to adjust for over and under reporting. The pooled and weighed data was cleaned to drop non-observed data points and certain variables were recoded (ANC visits and Birth Order). The analysis was descriptive and multivariable. For the descriptive analysis a X^2 test was used to express the relationship between the outcome and explanatory variables. The multivariable analysis was conducted on all the explanatory variables. We conducted a bivariate (Model I) and multivariable (Model II) logistic regression. Alongside their adjusted odds ratio with their corresponding confidence interval (95%).

4.4 Results

4.4.1 Health insurance coverage and Minimum of Four ANC Visits

Table 1 presents the results of the analysis. The total sample was 79, 794 women aged 15-49. Approximately 86.73% of women who had health insurance had the number of recommended minimum ANC visits, compared to 55.15% for women without insurance. In total, 56.91% of the total sample attended a minimum of four ANC visits. The highest prevalence of four or more ANC visits was in Ghana (87.7%) and the lowest prevalence in Nigeria (32.93%). The overall prevalence of health insurance coverage was 5.58%, with the highest in Ghana (66.96%) and the lowest in Benin (0.85%).

Table 1: Minimum of four ANC visits by explanatory variables (n= 79, 794)

Variables	Weighted N	Weighted %	P-value	X^2
Health Insurance			<0.001	1700
No	41,554	55.15		
Yes	3,864	86.73		
Age			<0.001	189.21
15-19	2805	50.85		
20-24	9048	55.25		
25-29	11913	57.43		
30-34	9923	59.42		
35-39	7197	58.92		
40-44	3382	56.37		
45-49	1147	51.11		
Marital status			<0.001	387.86
Not married	2376	63.34		
Married	35710	55.04		
Cohabiting	5255	65.53		
Widowed	534	61.3		
Divorced	597	63.04		
No longer living together	938	70.88		
Educational level			<0.001	6900
No education	19985	44.24		
Primary	8812	63.55		
Secondary	13784	78.15		
Higher	2831	91.02		
Wealth Index			<0.001	4500
Poorest	6611	39.38		
Poorer	8066	47.86		
Middle	9120	56.17		
Richer	10401	66.04		
Richest	11214	79.18		
Birth Order			<0.001	563.24
1 to 3	26655	61.57		

4 or more	19759	51.83		
Head of Household Gender			<0.001	462.34
Male	37151	55.25		
Female	8252	65.82		
Place of residence			<0.001	3800
Urban	21463	72.53		
Rural	23950	47.71		
Exposure to newspaper			<0.001	1700
Not at all	39347	54.35		
Less than once a week	3734	81.64		
At least once a week	2302	82.96		
Almost every day	29	71.02		
Exposure to radio			<0.001	3200
Not at all	13296	44.28		
Less than once a week	12148	61.05		
At least once a week	19132	66.9		
Almost every day	837	66.06		
Exposure to television			<0.001	4600
Not at all	19742	45.59		
Less than once a week	8855	63.85		
At least once a week	16014	74.21		
Almost every day	801	77.21		

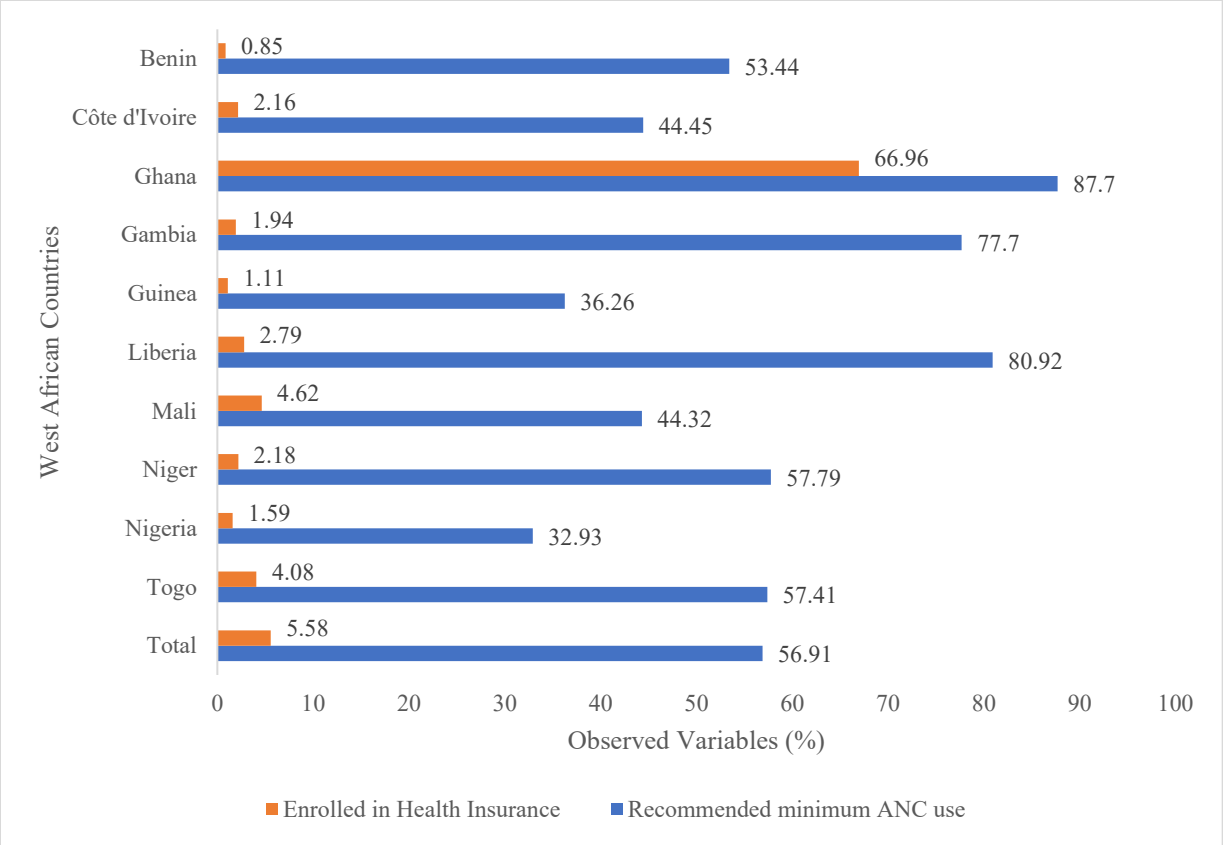

Figure 1: Recommended ANC use and Health Insurance Coverage in 10 West African Countries

4.4.2 Socio-Demographic Characteristics and Making the Minimum of Four ANC Visits

Accessing the minimum recommended ANC services increased slightly per age bracket, peaking at the 30-34 year age range. Only 55% of married women made the minimum number of ANC visits compared to 63.34% of non married women and increasing from there for other non-married marital statuses. Educated women and wealthier women made the minimum ANC visits at a higher rate then their less educated and poorer counterparts. Women in urban settings made the minimum recommended visits at a significantly higher rate than rural women. Mothers made the minimum ANC visits more often for their first three children then for the fourth and additional children. The gender of the head of the household also had an impact with 65.82% of women attending minimum ANC visits in homes where women are the head, versus 55.82% where men

are the head. Finally, women with elevated exposure to radio, television and newspaper made their minimum recommended ANC visits at a higher rate then those with lower exposure to those mediums.

Table 2: Logistic regression results on the association between health insurance coverage and four or more ANC visits

Variables	Model I cOR	95% CI		p-value	Model II aOR	95% CI		p-value
Health Insurance								
No **(reference)**								
Yes	5.03	4.61	5.45	<0.001	1.55	1.37	1.73	<0.001
Age								
15-19 **(reference)**								
20-24	1.20	1.13	1.28	<0.001	1.06	0.99	1.13	0.12
25-29	1.31	1.23	1.38	<0.001	1.23	1.14	1.32	<0.001
30-34	1.41	1.32	1.50	<0.001	1.43	1.32	1.54	<0.001
35-39	1.42	1.33	1.51	<0.001	1.54	1.41	1.66	<0.001
40-44	1.23	1.14	1.32	<0.001	1.49	1.35	1.62	<0.001
45-49	1.08	0.98	1.19	0.12	1.50	1.33	1.67	<0.001
Marital status								
Not married **(reference)**								
Married	0.74	0.69	0.79	<0.001	1.44	1.32	1.57	<0.001
Cohabiting	1.08	0.99	1.17	0.07	1.45	1.31	1.59	<0.001
widowed	0.91	0.78	1.04	0.16	1.47	1.22	1.71	<0.001
divorced	0.89	0.76	1.02	0.09	1.22	1.01	1.43	0.03
No longer living together	1.32	1.15	1.49	<0.001	1.40	1.19	1.61	<0.001
Educational level								
No education **(reference)**								
Primary	2.13	2.05	2.22	<0.001	1.55	1.48	1.62	<0.001
Secondary	4.04	3.88	4.20	<0.001	2.09	1.98	2.20	<0.001
Higher	11.75	10.26	13.24	<0.001	4.03	3.45	4.60	<0.001
Wealth Index								
Poorest **(reference)**								
Poorer	1.41	1.35	1.46	<0.001	1.38	1.31	1.44	<0.001
Middle	1.89	1.81	1.97	<0.001	1.75	1.67	1.84	<0.001

Richer	2.61	2.50	2.73	<0.001	2.29	2.16	2.42	<0.001
Richest	4.55	4.33	4.78	<0.001	3.31	3.07	3.56	<0.001
Birth Order								
1 to 3 **(reference)**								
4 or more	0.71	0.69	0.73	<0.001	0.82	0.78	0.85	<0.001
Head of Household Gender								
Male **(reference)**								
Female	1.55	1.49	1.61	<0.001	1.14	1.08	1.19	<0.001
Place of residence								
Urban **(reference)**								
Rural	0.41	0.40	0.43	<0.001	0.97	0.93	1.02	0.21
Exposure to newspaper								
Not at all **(reference)**								
Less than once a week	3.44	3.17	3.70	<0.001	1.08	0.99	1.18	0.10
At least once a week	3.68	3.31	4.05	<0.001	0.92	0.81	1.03	0.13
Almost every day	2.19	0.88	3.50	0.11	0.64	0.25	1.03	0.06
Exposure to radio								
Not at all **(reference)**								
Less than once a week	1.99	1.92	2.06	<0.001	1.32	1.27	1.38	<0.001
At least once a week	2.48	2.39	2.56	<0.001	1.39	1.33	1.45	<0.001
Almost every day	2.33	2.05	2.60	<0.001	1.39	1.33	1.45	<0.001
Exposure to television								
Not at all **(reference)**								
Less than once a week	2.03	1.95	2.11	<0.001	1.13	1.07	1.18	<0.001
At least once a week	3.14	3.02	3.25	<0.001	1.26	1.20	1.33	<0.001
Almost every day	3.94	3.33	4.55	<0.001	1.26	1.03	1.49	0.02
Country								
Benin **(reference)**								
Côte d'Ivoire					0.37	0.71	0.03	<0.001
Ghana					3.96	3.46	4.46	<0.001
Gambia					3.26	3.03	3.48	<0.001
Guineau					0.51	0.47	0.55	<0.001
Liberia					3.47	3.18	3.76	<0.001
Mali					0.61	0.57	0.65	<0.001
Nigeria					1.09	1.03	1.15	0.002
Niger					0.42	0.39	0.45	<0.001

Togo					1.07	0.98	1.16	0.156

4.4.3 Logistic regression analysis results on health insurance coverage and minimum ANC visits

Table 2 presents regression analysis results. The logistic regression analysis shows that the odds of attending minimum require ANC visits are higher for those with insurance than without (aOR [95% CI] =1.55 [1.37-1.73]). We also found that 35- to 39-year-old women are more likely to make the minimum ANC visits then their younger or older peers (aOR [95% CI] =1.54[1.41-1.66]). Married women had the lowest odds of attending the minimum recommended ANC visits (aOR [95% CI] =1.44 [1.32-1.57]), compared to women who are cohabitating (aOR [95% CI]) =1.45 [1.31-1.59]) or no longer living with their spouse (aOR [95% CI] =1.40 [1.19-1.61]).Regarding education, more educated women had higher odds of making the recommended visits with women with post-secondary education having the strongest odds (aOR [95% CI]= 4.03 [3.45-4.60]). The richest women are more likely to make the required minimum ANC visits (AOR [95% CI] =3.31 [3.07-3.56]) than poorer women (aOR [95% CI] =1.38 [1.31-1.44]). For the fourth or more births, the odds off making the minimum number of visits was lower (aOR [95% CI] =0.82 [0.78-0.85]) than for the first to third birth. Homes where heads of households are women were more likely to make the minimum ANC visits (aOR [95% CI] =1.14 [1.08-1.19]) than homes with men as the head of household. Women in rural settings were less likely to make the recommended number of ANC visits (aOR [95% CI] =0.97 [0.93-1.02]) then their urban counterparts. Finally, any exposure to newspapers, radio or television increased odds of making the minimum number of visits, with small variations between the levels of exposure. Finally, making the minimum recommended ANC visits was highest in Ghana (aOR [95% CI] =3.96 [3.46-4.46]) and lowest in Cote d'Ivoire (aOR [95% CI] =0.37 [0.03-0.71]).

4.5 Discussion

In this study, we examined the relationship between health insurance and making the recommended number ANC visits in ten West African countries for whom recent DHS data was available. We also looked at other socio-demographic characteristic to study their relationship with making ANC visits. Our results show that women with health insurance have greater odds of making their recommended number of visits than their non-insured counterparts. This is likely because insurance provides sufficient protection from catastrophic expenditure and because insurance can be linked to other socio-economic indicators, such as wealth and education, that are known determinants of ANC use (113). This finding is comparable to that of previous studies of the impact of insurance on ANC use in LMICS (2,3,7,114), where researchers found that insurance can meaningfully lower catastrophic cost to make services more accessible, though barriers, such as premiums, can limit its overall impact. As only 5.6% of women have health insurance, protection against catastrophic expenditure through insurance is seemingly limited to a select few. Of note, a majority of women without health insurance are still able to make the minimum required ANC services. These findings suggest there are other, more affordable strategies to make ANC services more accessible.

This study found that women aged 35-39 have the highest odds of accessing the recommended number of ANC services, similar to findings in countries throughout Africa (115,116), as are our findings that women who live in urban settings are more likely to access services then their rural counterparts (113).

When comparing countries, the odds of making the minimum number of ANC visits were highest in Ghana, which has a national health insurance scheme. The second and third placed

countries were Liberia and Gambia, countries without national health insurance schemes. Liberia has received significant global assistance to support its health infrastructure (117) and based on this research the influx of high skilled international health workers and global attention supplemented gaps in the health infrastructure. Additionally, Gambia does not have a national scheme but does have limits on user fees and has made it a priority to reduce out-of-pocket spending (118). Both countries perform better than Nigeria, a country with a national health insurance scheme.

Though a majority of the sample made the recommended number of ANC visits, the data suggests access is not equitable. Women of higher socio-economic status seem to be more likely to attend minimum ANC visits, based on the increased odds of wealthy and educated women and women who live in urban settings. This confirms the findings of Okedo-Alex et al. (113). Through a systematic review of 74 studies, they identified education and wealth to be important factors in the uptake of ANC services. Specifically, the authors note affordability could be an issue. It is likely these women are better protected from catastrophic expenditure, including through coverage by a national scheme which are often inequitable (106). It is also possible that many national or regional insurance schemes have policies that favour the enrollment of rich individuals (3). Women who are educated are more likely to be employed, knowledgeable of the services they would need or able to exercise greater autonomy in accessing these services all of which are determinants of accessing ANC services (119). Therefore, these combined findings speak to the need for continued efforts to increase women's education which, in consequence ought to benefit their health and prosperity.

This study also examines the impact of marital status. Married women are less likely to access the needed services, than women who are separated from their spouse or cohabitating. Available evidence suggest that wealth is a determinant in separation and divorce as women are more willing to leave their spouse if they have the resources they need (120), meaning wealth could be at the source of the difference we observe in martial status. Education is not observed to have the same determining role in divorces (120).

Our results on the gender of the head of the household would initially suggest that when women are leaders in their home, they or those under their care are more likely to get the required care they need and contribute to existing evidence on the impact of men on access to antenatal care services for women. Those studies suggest male involvement in pregnancy can be increased by education, increasing in turn women's participation in ANC (121–123). Therefore, our findings would propose that in West African countries, one way of increasing minimum attendance of ANC is increasing the involvement of men as the majority of women having children are married and the majority of households are lead by men. Further investigations ought to be pursued.

4.6 Strengths and Limitations

This multi-country analysis used comparable data to examine health insurance and other socio-demographic characteristics. Our findings confirm a number of other studies while providing novel information. Our main limitation is there is limited data for this region of the world. Therefore, our findings depend on only 10 countries in West Africa, including the richer countries and may ignore some realities from poorer countries. Our findings would be strengthened if data from more country became available.

4.7 Conclusion and Policy Implications

In conclusion, this study indicates that in West Africa, women with health insurance have much greater odds of making the minimum ANC visits, though only 5.6% of women in the sample have insurance. This study also suggest that health insurance is an important determinant of accessing ANC services, though other factors are to be considered. Future studies should seek to establish the determinants of health insurance coverage as to assess if coverage is equitably accessed throughout West Africa. Specifically, because this study found such strong links between ANC access and education, future studies should examine education levels among insured women. Future investigations could also consider whether woman with health insurance are also more likely to access other primary care services such as facility-based delivery and skilled birth attendants.

This study has important implications for international health policy. As noted in the 2020 progress report (43), though global gains were being made, the rate of progress was not enough to satisfy the targets of SDG goal 3. This progress was further stunted by the COVID-19 pandemic and its impact on health system throughout the world. As the purpose of these targets is to avoid deaths that would not occur if basic primary health services were available, it is imperative the international community reorient itself to achieve the targets of SDG 3, by prioritizing policies and strategies that would have rapid and immediate impacts.

This study provides some insight on how to re-orient those efforts. First, a majority of women do not have health insurance, yet within that population, a majority still access recommended ANC services. This suggest other strategies to reduce cost, such as capping or eliminating user-fees, may be more accessible and effective to a broader number of women. Studies have found that reducing or eliminating user fees help the poorest and least educated the

most (37), those who according to this study, are the least likely to make the recommended number of ANC visits. This may occur because these strategies require less infrastructure and less effort on the behalf of patients who do not need to take administrative steps such as registering. These strategies are also more likely to be adopted and operated at local levels and easily stood up in areas of acute needs. In fact, evidence has shown that the introduction or removal of user fees have immediate and abrupt impact on health services utilisation (124). Our findings indicate that women who were exposed to radio, television or newspapers on a regular basis were more likely to make the recommended number of ANC visits. Therefore, these channels of public communication could be used to raise awareness concerning changes in policy.

Furthermore, as noted earlier, evidence in this study on the impacts of marital status and household gender suggest that efforts to lower catastrophic expenditure should be paired with efforts to educate men alongside women on the need to access primary care services during pregnancy. The experience of organizations such as Médecins Sans Frontières (117) in managing these dynamic health systems would be invaluable in seeking rapid gains in the post-COVID world.

These proposed solutions could have immediate impact, but there is little evidence of their long-term sustainability or impact (124). A public health insurance scheme is a long-term solution that has proven its sustainability throughout the world, and has had positive impacts in Ghana (69). West African countries will face several barriers to setting up a public health insurance system that is equitable. The experience of Ghana and Nigeria suggest that poor institutional capacity due to limited financial resources and mismanagement will be among those barriers (3,33). Building capacity in these areas will be crucial in building the health systems that will provide meaningful access to services for the most vulnerable women in the region. Therefore, major global health

institutions should focus on helping countries build their capacity to manage their public system. Finally, closing the wealth inequality gap that exist in West Africa (6) will be essential to building the capacity of health systems. One approach is to reform tax policies and strengthen collection systems. In doing so, countries would secure more financial resources and allow greater redistribution into social programs benefiting the poor, including health insurance.

Chapter 5: Integrated Discussion and Conclusions

5.1 Integrated Discussion

This chapter will present an integrated discussion and the final conclusions of this thesis.

The purpose if this thesis was to study the impact of health insurance on access to health services for mothers and children in West Africa, the region of the world with the worst rates of under-five mortality and MMR (44). My findings confirm that health insurance does provide greater access to essential primary services, but other socio-economic factors also play a significant role in accessing health care.

Chapter 3's systematic review sought to examine the current literature to understand the impact of health insurance on catastrophic expenditure in accessing services for mothers and children in West Africa. The narrative synthesis include 49 articles, most of which concluded that insurance does provide greater access to services.

Chapter 4's cross sectional study sought to understand the impact of health insurance on utilization of the recommended number of antenatal care services for mothers in West Africa. Using DHS data from 10 countries, we found that insurance was significantly associated with making the recommended number of ANC visits.

The causes of death for mothers and children in West Africa can be addressed through the use of simple health technologies. The findings of this thesis endorse the strategy of universal health insurance as a method to provide more women and children with life saving services, which are often preventative in nature. It justifies the tens of trillions in funding by the global community (42) and confirms the strategy proposed by SDG Goal 3 (10) and is similar to findings in other LMICS (125).

However, this thesis points to significant shortcomings surrounding these systems. Our systematic review revealed that in most studies, less than half of the population had access to insurance. Furthermore, the cross-sectional study found that in 10 West African countries, only 5.6% of women had health insurance. This suggest that in the past years, governments and international organizations have failed to meaningfully expand coverage of health insurance. This also means that for national schemes such as those in Ghana and Nigeria, there is significant room for improvement.

This thesis proposes a few reasons for these failures. First, these failures are a possible downstream impact of the pronounced income inequality in the region (6). This inequality is accentuated by flaws in governance such as weak tax bases and financial mismanagement (32). Therefore, these systems are not given the resources they need to be successful. In consequence, my findings would suggest that the lack of resources contributes to further inequalities, as those with higher socio-economic indicators such as being rich or educated are much more likely to access services than their poorer, less educated counterparts. This is most likely because these individuals have enough resources to navigate around the systemic issues or are themselves beneficiaries of the inequities within health systems.

Furthermore, other studies have indicated that existing structures do not consider democratic principles in the design and operationalization of schemes and therefore, exclude the voices of those impacted the most by these systems (101). This means these systems are not well-informed and are less likely to be responsive to the needs of communities. This is especially impactful because those eligible for these schemes likely have little input in what services are included in insurance packages, which then means they are less likely to enroll into these schemes as they will not reflect their needs.

Though this study focused on financial protection, the other elements of universal health insurance—universal accessibility and the provision of high quality care, must be fully enacted for the entire system to function adequately (18). Therefore, it is likely the shortcomings noted in this thesis are not simply due to insufficient financial protection, but lack of access to insurance and poor quality of care. Once more, these issues will present greater barriers for the most socio-economically disadvantaged.

The proposed gaps in system building mirror the strategies proposed by the World Bank to implement pro-poor universal health insurance: expanding coverage while ensuring it is equitable, expanding the benefit package and providing incentives for effective delivery by health-care professionals, raising revenues to build long-standing systems, improving the quality of care and strengthen accountability (19). At the heart of this strategy is the need for equity: those most in need of services are to be front of mind when designing and expanding health insurance schemes. In many scenarios, this may mean scaling up services for the poor at a faster rate, and using resources from the rich to pay for such services. A lack of equity could be considered the root cause of systemic issues related to health insurance and therefore, equity must be a guiding principle as the global community works with regional stakeholders towards implementation of universal health coverage in West Africa.

Despite the shortcomings in the current insurance schemes, this thesis endorses health insurance as a meaningful long-term strategy. Building health insurance systems is arduous work that can take many decades. Western countries have had the benefit of time to build systems that remain imperfect, and though West African nations can benefit from international examples, it will likely take many more years to provide sufficient and adequate protection to all, especially

in the wake of the COVID-19 pandemic. Therefore, it is imperative that rapid solutions be considered in the near-term.

This thesis proposes a few options. First, obstetrical risk insurance schemes in Mauritania (31,126) provide an example of a targeted scheme that could be rapidly scaled as national or community based health insurance schemes. These programs could be designed to specifically ensure access to important services such as antenatal and post-natal care, facility-based delivery and skilled birth attendants. A second option would be caping or removing user fees. Some research has suggested the impact of these schemes is moderate because the abrupt increases in access is linked to reduced quality (37). Nonetheless, reducing user-fees has been linked to significant increase of the use of services (37,124) and could provide a short term solution while broader systems are being built. For both proposed options, other adjustments such as strengthening human resources, may provide greater stability.

There are several future studies to be proposed out of this thesis. There is a need for more data. The systematic review found studies from 9 of 16 eligible countries, while recent DHS data was only available for 10 countries. If meaningful solutions are to emerge, policy makers will require a better view of the landscape. Data is at the core of that increased understanding. Equity as a guiding principle means there would be explicit efforts to collect data from more disadvantaged community, such as those living in rural areas. Future investigation should seek to evaluate existing schemes based on the fundamental tenants of universal health coverage, with the goal of determining gaps and proposing ways forward. They should build on the excellent methodological quality of past studies, as noted by the JBI assessment carried out in chapter 3.

Furthermore, economic and cost-benefit analysis on the value of different universal care models should be carried out in communities throughout West Africa. Those studies out to

consider factors unique to the region such as youth unemployment and limited economic growth and tease out the links between economic growths and strong public management of health systems.

These proposed paths forward should consider relevant socio-economic factors where there may be space for more immediate action. For example, beyond wealth and education, this thesis found that if a woman is the head of a household, women are more likely to make the recommended number of visits (AOR=1.14 [1.08-1.19]. Furthermore, by examining literature, we found that male involvement in pregnancy can be increased by education, which then increased use of services by women (121,123). Educating men on the benefits of antenatal care is likely a much less arduous short-term action compared to eliminating extreme poverty. Proposing these types of targeted actions should be included in future strategies.

Finally, policy makers ought to consider how to work with countries to target some of the fundamental shortcomings within their health systems, including funding and governance. International organizations must take a collaborative approach and seek to leverage existing strengths, while providing help where gaps are identified. For the long-term success of this region, efforts to support West Africa should seek to empower its citizens.

5.2 Strengths and Limitations

This thesis has a few limitations. As noted, there was a lack of available data in both the cross-sectional study and the systematic review. Available data came from the richest countries in the region, potentially skewing our findings. Furthermore, DHS data is secondary, and we have no influence over the selection and measurement of the variables. As the data is self-reported, the chances of recall and reporting bias cannot be ignored. DHS surveys collected

women's insurance status at the time of survey and women's insurance status could have been different at the time when health care was sought.

The strength of this thesis is that its findings are confirmed by existing literature and the data that is available is relatively recent. It also provides a number of policy solutions and proposes principles to guide future considerations.

5.3 Conclusion

Together, papers 1 and 2 highlight the positive impact health insurance has on access to services for mothers and children in West Africa. The outstanding socio-economic data and poor rate of enrollment indicates the need for immediate near-term solutions to provide protection from catastrophic health expenditure, as health insurance schemes are built. This thesis provides important insights and potential strategies to alleviate the significant burden of MMR and under-five mortality in West Africa. This is especially important as the progress on SDG Goal 3 was slow, even before the COVID-19 pandemic (43). The large-scale evaluation of the landscape in West Africa also confirms that the overall approach of health insurance is worthy of the trillions that are spent every year, though there is work to be done in fine tuning this approach. Despite the size of the task ahead of us, this study confirms that the work that has begun is worthy of expansion and continued commitment.

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Appendices

Appendix 3.1 Search Strategy for Systematic Review

Ovid **MEDLINE**(R) ALL 1946 to September 12, 2020 Strategy formed on September 11, 2020

1	Mothers/
2	(mother? or maternal).ti,ab.
3	exp Infant/
4	Child, Preschool/
5	(infant? or toddler? or newborn? or child*).ti,ab.
6	(preschool adj3 child*).ti,ab.
7	1 or 2 or 3 or 4 or 5 or 6
8	exp Insurance, Health/
9	(health adj3 (insurance or coverage)).ti,ab.
10	insurance.ti,ab.
11	8 or 9 or 10
12	exp Africa, Western/
13	west* africa.ti,ab.
14	12 or 13
15	exp Health Services/
16	perinatal care/ or prenatal care/
17	((perinatal or prenatal) adj3 care).ti,ab.
18	(health adj2 (service? or care)).ti,ab.
19	(maternal adj2 health).ti,ab.
20	exp Maternal Health Services/
21	15 or 16 or 17 or 18 or 19 or 20
22	7 and 11 and 14 and 21
23	exp Female/
24	exp Pregnancy/
25	exp Delivery, Obstetric/ or exp Developing Countries/
26	exp Prenatal Care/ed, og, st, sn, td [Education, Organization & Administration, Standards, Statistics & Numerical Data, Trends]
27	exp Senegal/
28	exp Benin/
29	exp Burkina Faso/
30	exp Ivory Coast/

31	exp Gambia/
32	exp Ghana/
33	exp Liberia/
34	exp Mali/
35	exp Nigeria/
36	exp Sierra Leone/
37	exp Togo/
38	exp Cape Verde/
39	exp Guinea/
40	exp Guinea-Bissau/
41	exp Mauritania/
42	exp Niger/
43	exp Saint helena/
44	Côte d'Ivoire
45	7 or 23 or 24
46	14 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43
47	21 or 25 or 26
48	11 and 45 and 46 and 47

Appendix 3.2 List of Eligible Countries

List of West African Countries

were included in this review

Benin
*Burkina Faso
Cape Verde
Gambia
*Ghana
*Guinea
Guinea-Bissau
Ivory Coast
Liberia
*Mali
*Mauritania
*Nigeria
Niger
Saint Helena
*Sierra Leon
*Senegal
*Togo

Appendix 3.3 Joanna Briggs Institute Assessment Tool Forms

Analytical Cross-sectional Study

	Yes	No	Unclear	Not applicable
1. Were the criteria for inclusion in the sample clearly defined?	□	□	□	□
2. Were the study subjects and the setting described in detail?	□	□	□	□
3. Was the exposure measured in a valid and reliable way?	□	□	□	□
4. Were objective, standard criteria used for measurement of the condition?	□	□	□	□
5. Were confounding factors identified?	□	□	□	□
6. Were strategies to deal with confounding factors stated?	□	□	□	□
7. Were the outcomes measured in a valid and reliable way?	□	□	□	□
8. Was appropriate statistical analysis used?	□	□	□	□

Overall appraisal: Include □ Exclude □ Seek further info □

Cohort Study

	Yes	No	Unclear	Not applicable
1. Were the two groups similar and recruited from the same population?	□	□	□	□
2. Were the exposures measured similarly to assign people	□	□	□	□
3. to both exposed and unexposed groups?				
4. Was the exposure measured in a valid and reliable way?	□	□	□	□

5. Were confounding factors identified?	□	□	□	□
6. Were strategies to deal with confounding factors stated?	□	□	□	□
7. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	□	□	□	□
8. Were the outcomes measured in a valid and reliable way?	□	□	□	□
9. Was the follow up time reported and sufficient to be long enough for outcomes to occur?	□	□	□	□
10. Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	□	□	□	□
11. Were strategies to address incomplete follow up utilized?	□	□	□	□
12. Was appropriate statistical analysis used?	□	□	□	□

Overall appraisal: Include □ Exclude □ Seek further info □

Text and Opinion

	Yes	No	Unclear	Not applicable
1. Is the source of the opinion clearly identified?	□	□	□	□
2. Does the source of opinion have standing in the field of expertise?	□	□	□	□
3. Are the interests of the relevant population the central focus of the opinion?	□	□	□	□
4. Is the stated position the result of an analytical process, and is there logic in the opinion expressed?	□	□	□	□
5. Is there reference to the extant literature?	□	□	□	□
6. Is any incongruence with the literature/sources logically defended?	□	□	□	□

Overall appraisal: Include □ Exclude □ Seek further info □

Quasi-Experimental

	Yes	No	Unclear	Not applicable
1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	□	□	□	□
2. Were the participants included in any comparisons similar?	□	□	□	□
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	□	□	□	□
4. Was there a control group?	□	□	□	□
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	□	□	□	□
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	□	□	□	□
7. Were the outcomes of participants included in any comparisons measured in the same way?	□	□	□	□
8. Were outcomes measured in a reliable way?	□	□	□	□
9. Was appropriate statistical analysis used?	□	□	□	□

Overall appraisal: Include □ Exclude □ Seek further info □

Appendix 3.4 Supplementary Data Extraction Table for Paper 1

Author Name and date	Study Title	Study Aim	Sample Characteristics	Data Collection Methods	Study Design	Rates of Health Insurance Coverage	Other Factors and Barriers	Types of Coverage	Cost of Coverage to Consumer
Abrokwah 2014	The effect of social health insurance on prenatal care: the case of Ghana.	This study evaluates whether Ghana's social health insurance improved prenatal care use, reduced out-of-pocket expenditures, and increased the number of prenatal care visits.	There were 1,012 observations for the analysis. survey collecting information on socio-demographic characteristics of the population, education, health, employment and time use, migration, housing conditions and household agriculture. The third section of the survey includes information on health including condition of	This study uses data from the most recent round of the Ghana Living Standards Survey (GLSS) round five (GLSSV) conducted by the Ghana Statistical Service (GSS) in 2005/06. The survey utilized a two-stage stratified random sampling design. A total of 550 enumeration areas were included at the first stage of sampling, followed by a fixed take of 15 households per enumeration area. The distribution of the selected enumeration areas into the ten regions	Cross-sectional design	36% of participants had health insurance.	Insured women were older.	NHIS	$0.40 for insured, $2.40 for uninsured which is 2% of their income.

			illness, prenatal care use, health expenditures, and insurance status.	or strata was based on proportionate allocation using the population					
Adeniran 2020	Comparative analysis of caesarean delivery among out-of-pocket and health insurance clients in Ilorin, Nigeria.	This study compares the pregnancy events and financial transactions for CD among OOP and health-insured clients.	200 women who had CD as OOP (100participants) or health-insured clients (100 participants) over 30 months at Anchormed Hospital.	Participants were recruited by multistage sampling and selected randomly. They were divided into two groups of OOP payers and the health-insured.	Cross-sectional design	n/a	The time for reimbursement is longer for public vs shorter plans; This report supports the assertion that NHIS in Nigeria is more accessible to individuals of higher socio-economic status.	Private and Public insurances	n/a
Adewuyi 2018	Prevalence and factors associated with underutilization of antenatal care	This study investigates the prevalence and factors associated with underutilizati	19,652 mothers with complete information on ANC attendance/non-attendance for their most recent childbirth in the	We analyzed the 2013 Nigeria Demographic and Health Survey dataset with adjustment for the sampling weight and the cluster	Cross-sectional design	1.5% overall; 0.6% rural, 3.5% urban	Region, urban/rural, marital status, wealth, employment status	NHIS	n/a

	services in Nigeria: A comparative study of rural and urban residences based on the 2013 Nigeria demographic and health survey.	on of ANC services with a focus on the differences between rural and urban residences in Nigeria.	five years preceding the 2013 survey.	design of the survey.					
Adinma 2011	Effect of government -community healthcare co-financing on maternal and child healthcare in Nigeria.	0	240 women of reproductive age group (15–49 years) from Igboukwu eachwith at least one child under five-year old.It study was conducted Obiuno health centre with Ihuokpala health centre. Participants were from Igboukwu (intervention area) ,	4141 women aged 15-49 who had live births in 5 preceding years. DHS focused F5on women ANC, FBD facility-based delivery & PNC.	Cross-sectional design	n/a study observes before and after co-financing scheme	Distance, transportation and education.	Co-financing model government-community	n/a

			Ekwuluobia (control area).						
Adu 2018	The effects of individual and community-level factors on maternal health outcomes in Ghana.	This study focuses on impact of individual and community level-factors on maternal outcomes.	4141 women aged 15-49 who had live births in 5 preceding years. DHS focused on women ANC, FBD facility-based delivery & PNC.	This study utilizes clustered sampling design to avoid over-sampling or under-sampling of respondents. The 2014 GDHS applied standardized weights to ensure representative data across all regions including rural areas of Ghana.	Cross-sectional design	70.10%	Distance not a problem for 69.8%.	NHIS	n/a
Afaya 2020	Women's knowledge and its associated factors regarding optimum utilisation of antenatal care in rural Ghana: A cross-sectional study.	This study seeks to determine predictors of delayed ANC attendance among Nigerian women of reproductive age group.	A total of 322 women who gave birth and attended the postnatal clinic were recruited for the study.	A cross-sectional design was applied to collect data among eligible participants between October 2018 and January 2019.	Cross-sectional design	76.10%	Distance, martial status and education.	NHIS	n/a

Aliyu 2017	Predictors of delayed Antenatal Care (ANC) visits in Nigeria: secondary analysis of 2013 Nigeria Demographic and Health Survey (NDHS).	This study seeks to determine predictors of delayed ANC attendance among Nigerian women of reproductive age group.	20, 467 women who had a live birth in the five-year period before the survey; this number turned out to be 20,467. Their characteristics against the timing of initiation of antenatal care (ANC) is given in Table 1.	Data for this study came from NDHS 2013 which was a nationally representative sample of women in reproductive age group (15-49 years).	Cross-sectional design	n/a	Education, media exposure, place of residence (rural less than urban). Education and wealth are indicators of ANC in the first trimester. Having health insurance is a significant predictor of third trimester ANC initiation relative to first trimester	n/a	n/a

Amoakoh-Coleman 2015	Predictors of skilled attendance at delivery among antenatal clinic attendants in Ghana: a cross-sectional study of population data.	This study identifies demographic, maternal and community predictors of skilled attendance at delivery among women who attend antenatal clinic at least once during their pregnancy in Ghana.	A total of 2041 women who had a live birth in the 5 years preceding the survey, and attended an antenatal clinic at least once, during the pregnancy.	Comprehensive information on the sampling techniques and survey procedures applied for data collection in the Ghana DHS have been published in detail elsewhere.	Cross sectional design	42.8% covered by health insurance	Marital status, education and wealth.	NHIS	
Arthur 2012	Wealth and antenatal care use: implications for maternal health care utilisation in Ghana.	This study investigates the effect of wealth on maternal health care utilization in Ghana via its effect on Antenatal care use.	Women within the aged between 15-49 with a live birth in the five years preceding the survey.	Using secondary data from the 2008 Ghana Demographic and Health survey. The questionnaire consists of questions on demographic indicators, health status, illnesses, and visits to a doctor, health behavior such as questions on	Cross-sectional design	Unclear	Wealth, education, location, employment status.	NHIS	n/a

				smoking, drinking alcohol, physical activity, and eating habits.					
Asundep 2013	Determinants of access to antenatal care and birth outcomes in Kumasi, Ghana.	This study investigates factors that influence antenatal care utilization and their association with adverse pregnancy outcomes among pregnant women in Kumasi.	Pregnant women, 19 years and older, who resided in Kumasi at the time of conception or moved to Kumasi within 1–2 months following conception and presented to the study hospitals or TBAs for delivery. Women with singleton, spontaneous, vaginal deliveries occurring without complications between July	Quantitative cross-sectional study in two health facilities in Kumasi, Ghana, using a questionnaire to obtain certain information.	Cross-sectional design	96.9% insured	Cost, lack of insurance, being unaware of pregnancy, and not being sick were reasons that statistically influenced ANC attendance.	NHIS	

			and November 2011. Women with pregnancy-induced hypertension or pre-eclampsia were excluded.						
Atake 2020	Socio-economic inequality in maternal health care utilization in Sub-Saharan Africa: Evidence from Togo.	This study aimed to measure socio-economic inequality in maternal health care (MHC) utilization during pregnancy and delivery.	Women aged 15–49 and living in the selected households or present the night before the survey, all men aged 15–59 as a sub-sample of every second household.	The data were obtained from the last two rounds of the 1998 and 2013 Togo Demographic and Health Survey. Three types of questionnaires were used: (i) a household questionnaire, (ii) an individual questionnaire for women aged 15–49 years and (iii) an individual questionnaire for men aged 15–59 years.	Cross-sectional design	n/a	Higher education and socio-economic class linked to higher access.	NHIS	n/a
Bagnoli 2019	Does health insurance improve health for all? Heterogeneous effects	This study showed whether health insurance is successful in	Survey focused on women and children with the final sample including 7902 under 5, include information on	Survey included health insurance membership, including rapid diagnostic blood test for children. It is representative at	Cross-sectional (MICS)	54% of children are insured (free for children)	Gender, education, distance and wealth.	NHIS	Free for children

	on children in Ghana.	improving health	health insurance membership.	the national level, the administrative regions and urban and rural areas; includes geographical and household locations					
Bonfrer 2016	The effects of Ghana's National Health Insurance Scheme on maternal and infant health care utilization.	This study aims to evaluate its early effects on maternal and infant healthcare use.	2002 children from 1959 mothers (43 mothers were pregnant with twins), with a mean duration between birth and interview of 11 months.	DHS Data 2008	Cross-sectional design	39.8% of children have mothers in NHIS	n/a	NHIS	
Bosomprah 2015	Health insurance and maternal, newborn services utilisation and under-five mortality.	This study aims to investigate the association of NHIS membership with antenatal visits (ANC), postnatal visits (PNC) and under-five mortality.	10,627 women aged 15–49 years, 2,528 had a live birth in the two years preceding the study. Complete responses were obtained on 7550 children under age 5 from their mother/caregiver.	The MICS 2011 was used for this analysis	MICS	40.30%	Wealth.	NHIS	

Brals 2017	The effect of health insurance and health facility-upgrades on hospital deliveries in rural Nigeria: a controlled interrupted time-series study.	This study evaluated the effect of the introduction of a multifaceted voluntary health insurance programme on hospital deliveries in rural Nigeria.	All deliveries during the 4-year baseline period (1 May 2005–30 April 2009) or 4-year follow-up period (1 May 2009–30 April 2013) from women aged 15–45 years at the time of delivery were eligible for this study (see the Supplementary Materials for more information on the survey questions, potential recall bias and data construction). Within the surveyed households, 40.7% of 1131 women of reproductive age delivered during the baseline period [42.2% (n	Household survey	Interrupted time series design	61.4% insured at time of delivery	Distance	Public-private partnership, Kwara State government	2.4USD per person/ per year

			¼ 664) in the programme area and 38.5% (n ¼ 467) in the control area] and 37.8% of 1005 women of reproductive age delivered during the follow-up period [42.1% (n ¼ 604) in the programme area and 31.4% (n ¼ 401) in the control area] (Figure 1). Of these women who delivered, 239 delivered in both study periods (162 in the programme area and 77 in the control area).						

Browne 2016	Health insurance determines antenatal, delivery and postnatal care utilisation: evidence from the Ghana Demographic and Health Surveillance data.	This study aims to evaluate the effect of maternal health insurance status on the utilisation of antenatal, skilled delivery and postnatal care.	A total of 6180 households, 5300 women and 5000 men were identified for interviews. All women and men of reproductive age in all the selected households, aged 15–49 and 15–59 3000 women aged 15–49 years were interviewed. More than 90% of the women were married and 60% of them had health insurance coverage. More than half of the women lived in poverty, had two to four children and engaged in manual labour. Approximately one-third of the women had	This population-based cross-sectional study used the 2008 Ghana DHS data (GDHS). In summary, a two-stage stratified cluster sampling technique was applied to identify households that were interviewed.	Cross-sectional design	40%	Education health & physical accessibility.	NHIS	n/s

			difficulty in reaching the health care facility, and two-fifths of them had no education.						
Brugiavini 2016	Extending health insurance in Ghana: effects of the National Health Insurance Scheme on maternity care.	This study aims to investigate how the National Health Insurance Schemes (NHIS) in Ghana affects the utilization of maternal health care services and medical out-of-pocket expenses.	11,835 were successfully interviewed. Interviews were completed with 9,396 women while 4,388 men were successfully interviewed.	We use nationally representative household data from the 2014 Ghana Demographic and Health Surveys (GDHS) which includes three main questionnaires (the Household Questionnaire, the Women's Questionnaire and the Men's Questionnaire).	Cross-sectional design	n/a	Education and wealth: higher education linked to higher enrollment to NHIS.	NHIS	

Delamou 2015	How has the free obstetric care policy impacted unmet obstetric need in a rural health district in Guinea?	This study aims to assess the changes in coverage of obstetric care according to the Unmet Obstetric Need concept before (2008) and after (2012) the implementation of the free emergency obstetric care policy in a rural health district in Guinea.	All women who underwent obstetric intervention at the district hospital of Kissidougou between 1st January 2008 to 31 December 2008 (before) and 1st January 2012 to 31 December 2012 (after) were included in the study.	Data were collected between April and June 2014. The socio-demographic and clinical characteristics of patients included age, parity, residence (rural/urban), mode of admission (direct admission/ referral from health centres), and maternal indication for C-section or MOI. Maternal and neonatal health outcomes were woman alive (yes/no), child alive (yes/no), as reported in hospital medical records	Cross-sectional design	Free obstetric care policy	n/a	Free obstetric service	
Dixon 2014	National health insurance scheme enrolment and antenatal care among women in	This study was to examine whether enrollment in the National Health Insurance Scheme	4916 women aged 15-49 were interviewed from 11 778 households. Data were collected by a team of trained interviewers	DHS 2008	Quantitative study DHS household surveys (qualitative household surveys)	41.60%	Education, wealth are indicators as well as religion (Christian more often than Muslim or	NHIS	

	Ghana: is there any relationship ?	(NHIS) affects the likelihood and timing of utilising antenatal care among women in Ghana.	under the supervision of senior staff from the Ghana Statistical Service (GSS) with technical input from ICF Macro International, Inc. (Ghana Statistical Service 2009).				traditionalist) .		
Dwumoh 2014	Determinant of factors associated with child health outcomes and service utilization in Ghana: multiple indicator cluster survey conducted in 2011.	The study seeks to determine the association between NHIS membership, socio-economic status, geographic location and other relevant background factors on child health service utilization and outcomes.	A total of 7550 households with 7626 children under-five years of age were used for the study. The proportion of males to females was 49.8% and 50.2% respectively. The median age of the children was 30 months with 29 months as the interquartile range.	Data from the Multiple Indicator Cluster Survey 2011 (Secondary data) which is a nationally representative household sample survey of 12,150 households in 810 enumeration areas (EAs) were used.	MICS	86.20%	Wealth, mother's education, geographic location.	NHIS	n/a

Enuameh 2016	Factors Influencing Health Facility Delivery in Predominantly Rural Communities across the Three Ecological Zones in Ghana: A Cross-Sectional Study.	This study explored factors influencing delivery location in predominantly rural communities in Ghana.	Women aged 15 to 49 years old, who have had a live or stillbirth between January 2011 and April 2013 and be resident in the study area at the time of the study. If women had more than one pregnancy and delivery over the study period, the most recent pregnancy information was collected. Exclusion criteria were those who had an abortion or a miscarriage during the period of the study.	This study was conducted using survey in three predominantly rural areas of Ghana from July to September 2013.Questionnaire was developed based on the 2007 Ghana Maternal Health Survey	Cross-sectional design	46.4% had a valid health insurance card	Wealth.	NHIS	n/a

Fassin 1988	Who consults and where? Sociocultural differentiation in access to health care in urban Africa.	This study aims understand sociocultural differentiation in access to health care for developing countries.	500 women who have at least one child.	Interview of 10 women at a time.	Cross-sectional design	78.1% of mothers and 76.7% of children had health insurance.	Cost beyond consultation is elevated, town integration, disease category.	Public dispensaries, congregational health centres, general hospitals, and private clinics; 'others' were pharmacies, factory nursery rooms and health facilities outside the Dakar area.	n/a
Frimpong 2014	The complex association of health insurance and maternal health services in the context of a premium exemption for pregnant women: a case study in Northern Ghana.	We examine health insurance registration among pregnant women before or after the introduction of a premium exemption, and test whether registration increases utilization of maternal	1641 women in the district who have given birth since 2008.	The data for this study come from a survey conducted between June and August 2010 among a random sample of 1641 women who had given birth in KN districts since 2008.	Cross-sectional design	n/a	Increase in enrollment after premium exemption.	NHIS	n/a

		health services.							
Ganle 2019	Factors influencing the use of supervised delivery services in Garu-Tempane District, Ghana.	The purpose of this study was to estimate the prevalence of supervised delivery and determine factors that influence use of supervised delivery services in a local district of Ghana.	The study population was 322 postpartum women who delivered between January 2016 and December 2016 regardless of whether delivery was attended by skilled or unskilled attendants, and who were attending child welfare clinics.	A retrospective cross-sectional survey of 322 randomly sampled postpartum women who delivered between January and December 2016 in the Garu-Tempane District was conducted. Structured questionnaires were used to collect data. Descriptive, binary and multivariate logistic regression analysis techniques were used to analyse data.	Cross-sectional design	n/a	Religion, distance, needing partner approval, having at least 4 ANC.	NHIS	n/a

Ibrahim 2014	Do Infant Birth Outcomes Vary Among Mothers With and Without Health Insurance Coverage in Sub-Saharan Africa? Findings from the National Health Insurance and Cash and Carry Eras in Ghana, West Africa.	The primary aim of this study was to examine trends in LBW among infants delivered under the Cash and Carry system, compared to the NHIS. Chi-squared tests were used to determine changes in prevalence (and significance) of LBW.	The total number of birth records examined for this study was 7,895. This included 3,686 Cash and Carry and 4,209 NHIS live birth records.	This study used sampled birth records abstracted from birth registry folders at the Tamale Teaching Hospital (TTH), the primary referral hospital for the entire northern sector of Ghana.	Cross-sectional	n/a	n/a	NHIS	n/a
Ibrahim 2015	Levels and Determinants of Low Birth Weight in Infants Delivered Under the	This research determined the levels and odds ratios for low birth weight (LBW) infants	1433 infant delivery records	The study data were abstracted from the birth registry folders on the Labor and Maternity Ward at the Tamale Teaching	Retrospective static-group comparison	n/a	n/a	n/a	n/a

	National Health Insurance Scheme in Northern Ghana.	delivered under the National Health Insurance Scheme (NHIS) compared to LBW infants delivered under the previous ‘‘Cash and Carry’’ system in Northern Ghana.							
Johnson 2016	Two decades of maternity care fee exemption policies in Ghana: have they benefited the poor?	To investigate, the impact of maternity-related fee payment policies on the uptake of skilled birth care amongst the poor in Ghana.	The number of matched observations was 5088.	Use of Ghana DHS data from 1993,1998,2003 and 2008	Cross-sectional design	n/a	Wealth.	NHIS	2.5% monthly deduction from formal sector workers; Informal sector workers and people with no exemption pay annual premiums ranging from 7.20 to 48.00 Ghana Cedis, assessed based on income and ability to pay in addition to registration fees.

Khan 2016	The Association Between Health Insurance Coverage and Skilled Birth Attendance in Ghana: A National Study.	To examine the effect of insurance on skilled-birth attendance.	Our sample is 2 528 women who had a birth in the two years before the survey.	2011 national Ghana MICS	MICS	73%	Distance, education.	NHIS	Premium exemption for pregnant women
Lambon-Quayefio 2017	Determinants and the impact of the National Health Insurance on neonatal mortality in Ghana.	To investigate the factors that affect neonatal deaths as well as examine the effect of the Ghana Health Insurance on neonatal deaths in Ghana.	Specifically, the analysis makes use of information from the women's questionnaire which captures demographic and socioeconomic information on women within their reproductive ages (15–49). The data includes information on birth history dating 5 years	The study makes use of the 2014 Ghana demographic and health survey which is a nationally representative data constituting over 12,000 households.	Quantitative study DHS household surveys (qualitative household surveys)	n/a	Distance, education, wealth.	NHIS	n/a

			preceding the survey.						
Lawani 2016	Obstetric benefits of health insurance: A comparative analysis of obstetric indices and outcome of enrollees and non-enrollees in southeast Nigeria.	This study determined the obstetric benefits and compared the obstetric indices and pregnancy outcome of enrollees and non-enrollees of the national health insurance scheme (NHIS).	150 NHIS enrollees matched with non-enrollees	Using medical records	Cohort study	50% of participants were NHIS patients, 50% were not enrolled.	Age (majority of enrolees were 26-35); wealth (73.3% are poor).	NHIS	n/a

Mati 2018	Health insurance coverage and access to skilled birth attendance in Togo.	To examine the effect of the newly introduced national health insurance plan on access to skilled birth attendance (SBA).	The final weighted sample size was 4826 women (corresponding to an unweighted sample size of 4990). Most respondents were aged 25–29 years, had no education, and lived in rural areas (Table 1).	2014 Togo DHS study--using household questionnaires	Cross-sectional study	4% had insurance	Older patients were more likely to have insurance; Poor women were less likely to be covered by public or private insurance, more likely by community insurance; higher education meant higher odds of SBA.	NHIS, CBHI and private insurance	n/a
Mensah 2010	Ghana's National Health Insurance Scheme in the context of the health MDGs: an empirical evaluation using propensity	This study evaluates the NHIS to determine whether it is fulfilling its purpose in the context of the Millennium Development Goals #4 and #5 which deal with the	To procure our primary survey data, the authors used a combination of several sampling approaches, described below, collecting a sample 2000 respondents, comprising 400	Interviews with women drawn from two of the ten administrative regions of Ghana	Qualitative analysis (interviews)	47% insured in 2007	n/a	NHIS	n/a

	score matching.	health of women and children.	NHIS members and 1600 non-members as their potential comparisons.						
Moyer 2013	Understanding the relationship between access to care and facility-based delivery through analysis of the 2008 Ghana Demographic Health Survey.	To determine the types of access to care most strongly associated with facility-based delivery among women in Ghana.	4916 women aged 15–49 years.	2008 DHS study data	Cross-sectional design	Across the sample, 41.3% of respondents reported having health insurance, of which 93.8% reported being covered by Ghana's National Health Insurance scheme.	The bivariate analysis indicated that women who delivered in healthcare facilities had fewer issues with affordability, accessibility, and social access, and were more likely to have high previous healthcare utilization, than women who delivered at home.	NHIS	n/a

Nketiah-Amponsah 2013	Choice of Delivery Facility among Expectant Mothers in Ghana: Does Access to Health Insurance Matter?	To examine the effect of health insurance ownership among expectant mothers on facility-based delivery.	A total of 4,916 women aged 15–49 from 6,141 households were interviewed.	2008 DHS study data	Cross-sectional design	n/a	Cost, distance.	NHIS	Free
Ogundele 2020	Patterns of access to reproductive health services in Ghana and Nigeria: results of a cluster analysis.	To examine access to reproductive health care services in Ghana and Nigeria, the patterns of use of family planning and maternal care by women in these countries are explored.	The study included 4142 women from the DHS of Ghana and 7725 women from the DHS of Nigeria. Women were of reproductive age and had a child within the last year.	2013-2014 DHS Data. The indicators of reproductive care that were used in the cluster analysis is categorized as family planning services and maternal health services.	Cross-sectional design	n/a	Education, wealth, occupation.	NHIS	

Okusanya 2016	Birth plans and health insurance enrolment of pregnant women: a cross-sectional survey at two secondary health facilities in Lagos, Nigeria.	To evaluate birth plans and health insurance enrolment of pregnant women at secondary health care level.	440 women	This was a cross-sectional study at the Maternity Units of Surulere General Hospital (SGH) and Lagos Island Maternity (LIM). Surulere and Lagos Island are two of the 20 local government areas of Lagos state, southwest Nigeria. With purposive sampling, both facilities were selected from a list of public health facilities because they had an annual delivery of more than 1500 and a minimum of three resident consultant Obstetricians Gynaecologists.	Cross-sectional design	n/a	n/a	NHIS	n/a

Owoo 2013	National health insurance, social influence and antenatal care use in Ghana.	This study uses village-level data from the 2008 Ghana Demographic and Health Survey to investigate the effects of health insurance and social influences on the intensity of antenatal care utilization by Ghanaian women.	Data from 394 villages.	The study uses data from the 2008 Ghana Demographic and Health Survey.	Cross-sectional design	43%	Age and wealth.	NHIS	n/a
Philibert 2017	Maternal and neonatal health impact of obstetrical risk insurance scheme in Mauritania: a quasi-experimental before-	To assess the effectiveness of the ORI in increasing facility-based delivery rates, as well as increases in family planning, antenatal and postnatal care,	Data from 1041 births between 2000 and 2011	This study used nationally representative data from four recurring community surveys (ICSs) carried out in Mauritania: the Demographic and Health Survey (DHS) in 2001 (MEASURE DHS); the National Survey on Infant Mortality	Quasi-Experimental	n/a	n/a	ORI	The premium can be paid in one or two instalments and varies from 5500 ouguiyas (14 euros) in districts outside of the capital Nouakchott to 6500 ouguiyas (16 euros/18 USD) in Nouakchott. This remained lower

	and-after study.	caesarean delivery and neonatal health, from demographic and health survey data between 2002 and 2011. It also examined whether the effects of the ORI varied between strata of the population.		and Malaria (NSIMM) in 2003; and the Multiple Indicator Cluster Surveys (MICS) in 2007 and 2011. In all those four surveys a two-stage cluster random sampling was carried out. The selection was conducted among census districts at the first stage and among households at the second stage.					than in other public maternities where a delivery cost varies between 11 and 30 euros/12 and 34 USD for a caesarean-section up to 200 euros/224 USD. (Renaudin, Prual et al. 2007; Vinard 2011).
Ravit 2020	The impact of the obstetrical risk insurance scheme in Mauritania on maternal healthcare utilization: a propensity score matching analysis.	The objective of this study is to evaluate the impact of ORI enrolment on maternal and child health services	4172 women who delivered a live-born child within the 2 years before the interview.	Used nationally representative household data from the final MICS carried out in 2015 by the National Office of Statistics (NOS) with the assistance of UNICEF for data collection and analysis.	MICS	58% knew of ORI, 37% overall were enrolled	Number of visits and use of services before birth.	Obstetric risk insurance	n/a

Renaudin 2007	Ensuring financial access to emergency obstetric care: three years of experience with Obstetric Risk Insurance in Nouakchott, Mauritania.	Study of ORI in Mauritania	n/a	text and opinion	text and opinion	95%	Distance.	ORI	n/a
Sakeah 2017	Determinants of attending antenatal care at least four times in rural Ghana: analysis of a cross-sectional survey.	This study examined factors associated with ANC attendance in predominantly rural Ghana.	The authors included data for 1497 women in the analysis, with data for 3 women excluded because of missing key background information. The inclusion criteria were female sex reproductive age (15–49 years old); and delivery, including	This cross-sectional study was conducted as a situational analysis before starting the intervention of the Ghana Ensure Mothers and Babies Regular Access to Care (EMBRACE) Implementation Research conducted between August and September 2013. The study was carried out	Cross-sectional design	73%	Marital status, education, planning of pregnancy, education of men as decision makers.	NHIS	n/a

			stillbirth, within the two years preceding the survey.	using a questionnaire.					
Salihu 2016	Health services utilization and health status of insured versus uninsured Nigerian children with Sickle Cell Disease.	This study set out to determine for the first time in Nigeria the relationship of health services utilization and health status to insurance coverage (NHIS insured versus NHIS-uninsured) of children with SCD.	Data from the records of 100 randomly selected children. Children aged 1 to 12 attending the clinic within 12 preceding months without NHIS.	Use of medical records.	Cross-sectional design	Group of 100 patients, 50% covered.	n/a	NHIS	n/a

Schoeps 2015	Health insurance and child mortality in rural Burkina Faso.	To understand the effect of enrolment into community-based health insurance on mortality in children under 5 years of age in a health and demographic surveillance system in Nouna, Burkina Faso.	The analysis was based on 33,500 children who fulfilled the criteria of being born in 2000 or later and having spent time in the HDSS study area between their second month and fifth year of life.	Use of data in insurance databases, 2009 census for socio-economic data	Cross-sectional design	4.8% enrollment in CBHI.	n/a	CBHI	3$ US per year, 1$US for children, 50% subsidy is also available.
Singh 2015	Ghana's National Health insurance scheme and maternal and child health: a mixed methods study.	To describe women's experiences with the NHIS and to study associations between insurance and skilled facility delivery, antenatal care and early care-seeking	The quantitative assessment included a household survey with 1267 women and interviews with 62 community leaders, which is about one leader per community. The study included qualitative	Quantitative assessment used household survey, qualitative used interviews.	Mixed-methods study	19.2% had insurance for more than 3 years; 67.8% had insurance between 1-2 years; 92.9% have insurance while pregnant.	Distance, other expenses.	NHIS	n/a

		for sick children.	interviews including birth narratives with 20 mothers, 18 fathers, in-depth interviews with 5 health care providers and 3 focus groups with community leaders and key informants.						
Smith 2008	Community -based health insurance and access to maternal health services: evidence from three West African countries.	Recent household surveys in three West African countries: Senegal, Mali, and Ghana, to examine the relationship between CBHI membership and access to formal sector maternal health care.	Senegal: The number of women eligible for the maternal health questions was 269. Women who were less than 4 months pregnant and observations missing one or more explanatory variables were dropped, resulting in a maximum sample size of 191 women; Mali: A total of	Household survey	Cross-sectional design	n/a	Services included in benefit package.	CBHI	n/a

			2280 households were surveyed (1285 households in Bla and 995 in Sikasso) and 951 women were administered the maternal health module. The exclusion of women who were less than 4 months pregnant and observations with missing data resulted in a maximum sample size of 775; Ghana: A total of 1806 households (1307 in Nkoranza and 499 in Offinso) were sampled and 300 women of reproductive age were administered the maternal health module. Seven observations						

			were dropped due to missing data on explanatory variables, leaving a sample size of 293 women.						
Tsawe 2020	Factors associated with the upsurge in the use of delivery care services in Sierra Leone.	This study considered two main objectives: (i) to examine prevalence of delivery care services in Sierra Leone; and (ii) to identify sociodemographic factors associated with the use of the aforementioned health services.	For both data collection points, women of reproductive age (15-49 years) who were either usual household members or women present in the household on the night before the survey were eligible for interviews. 5651 women in 2008 and 12079 women in 2013.	The study uses two rounds (2008 and 2013) of the Sierra Leone Demographic and Health Survey (SLDHS) data sets. Statistics Sierra Leone in collaboration with the Ministry of Health and Sanitation of Sierra Leone, with support from various international agencies (i.e., ICF Macro/International, World Health Organization, etc.), collected the SLDHS data.	Cross-sectional design	n/a	Older women used services more; use of services increased with increase in socio-economic status; increased use of media, number of children and geography are other factors.	n/a	n/a

Twum 2018	Effectiveness of a free maternal healthcare programme under the National Health Insurance Scheme on skilled care: evidence from a cross-sectional study in two districts in Ghana.	This study aimed to evaluate if women registered with the insurance had a better chance of accessing maternal healthcare services in two districts in Ghana.	343 women of the reproductive age group 15–49. Women who had children aged between 3 and 12 months were selected to participate in the study.	Questionnaire administered to women	Cross-sectional design	38%	Employment (manual workers are more likely, even more likely are skilled labour), place of residence, marital status (married woman are more likely to have insurance) and education This could be attributed to the fact that as women with NHIS mostly do not encounter complications during labour, the need to access postnatal care service reduces.	CBHI	n/a

Wang 2014	Health insurance coverage and its impact on maternal health care utilization in low- and middle-income countries.	To assesses the levels of health insurance coverage in 30 LMICs and examine the impact of health insurance status on use of maternal health care use in eight countries spanning, Ghana and other countries throughout the world.	4916 women aged 15-49 were interviewed from 11 778 households. Data were collected by a team of trained interviewers under the supervision of senior staff from the Ghana Statistical Service (GSS) with technical input from ICF Macro International, Inc.	The data used in this study come from the 2008 Demographic and Health Surveys (DHS).	Cross-sectional design	40.1% of women covered in 2008; 38.8% is NHIS; 0.1 commercial; 0.1 employer 1.1 other.	n/a	NHIS, very little private and employer based.	n/a
Yaya 2019	Maternal healthcare insurance ownership and service utilisation in Ghana: analysis of Ghana Demographic and Health Survey.	The objective was to measure the prevalence of insurance ownership, types of services covered by the insurance and the association of	4,293 mothers aged 15–49 years.	This study was based on nationally representative Demographic and Health Survey in Ghana (GDHS 2014).	Cross-sectional design	69.10%	Age and education.	NHIS	n/a

		insurance ownership with the utilization of respective maternal health services in Ghana.							

Appendix 3.5 Methodological Assessment Using Joanna Briggs Institute Critical Assessment Tool

5.1 Cross-Sectional Studies	Abrokwah 2014	Adeniran 2020	Adewuyi 2018	Adinma 2011	Adu 2018	Afaya 2020	Aliyu 2017	Amoakoh-Coleman 2015	Arthur 2012	Asundep 2013	Atake 2020
1. Q1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Q2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3. Q3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4. Q4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5. Q5	No	No	No	No	No	No	No	No	No	No	No
6. Q6	No	No	No	No	No	No	No	No	No	No	No
7. Q7	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8. Q8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Include ?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

(Continued) 5.1 Cross-Sectional Studies	Bagnoli 2019	Bonfrer 2016	Bosomprah 2015	Browne 2016	Brugiavini 2016	Delamou 2015	Dixon 2014	Dwumoh 2014	Enuameh 2016	Fassin 1988	Frimpong 2014	Ganle 2019	Ibrahim 2014	Johnson 2016	Khan 2016
1. Q1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Q2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3. Q3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4. Q4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5. Q5	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
6. Q6	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
7. Q7	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8. Q8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Include ?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

(Continued) 5.1 Cross-Sectional Studies	Lambon-Quayefio 2017	Mati 2018	Moyer 2013	Nketiah-Amponsah 2013	Okusanya 2016	Owoo 2013	Tsawe 2020	Twum 2018	Wang 2014	Yaya 2019
1. Q1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Q2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3. Q3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4. Q4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5. Q5	No	No	No	No	No	No	No	No	No	No
6. Q6	No	No	No	No	No	No	No	No	No	No
7. Q7	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8. Q8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Include ?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

5.2 Quasi-Experimental Studies	Brals 2017	Druetz 2017	Philibert 2017
1. Q1	Yes	Yes	Yes
2. Q2	Yes	Yes	Yes
3. Q3	Yes	Yes	Yes
4. Q4	Yes	Yes	Yes
5. Q5	Yes	Yes	Yes
6. Q6	Yes	Yes	Yes
7. Q7	Yes	Yes	Yes
8. Q8	Yes	Yes	Yes
9.Q9	Yes	Yes	Yes
Include?	**Yes**	**Yes**	**Yes**

5.3 Cohort	Ibrahim 2015	Johnson 2016	Lawani 2016	Smith 2008
1. Q1	Yes	Yes	Yes	Yes
2. Q2	Yes	Yes	Yes	Yes
3. Q3	Yes	Yes	Yes	Yes
4. Q4	Yes	Yes	Yes	Yes
5. Q5	Yes	Yes	Yes	Yes
6. Q6	Yes	Yes	Yes	Yes
7. Q7	Yes	Yes	Yes	Yes
8. Q8	Yes	Yes	Yes	Yes
9.Q9	Yes	Yes	Yes	Yes
10. Q10	Yes	Yes	Yes	Yes
11.Q11	Yes	Yes	Yes	Yes
Include?	**Yes**	**Yes**	**Yes**	**Yes**

5.4 Text and Opinion	Renaudin 2007
1. Q1	Yes
2. Q2	Yes
3. Q3	Yes
4. Q4	Yes
5. Q5	Yes
6. Q6	Yes
Include?	**Yes**