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Examining the Association Between User Fee Exemptions and Maternal Healthcare Utilization in Northern Ghana

Martina Hilton-Ansah
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Walden University

College of Health Sciences and Public Policy

This is to certify that the doctoral study by

Martina Hilton-Ansah

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
2025

Abstract

Examining the Association Between User Fee Exemptions
and Maternal Healthcare Utilization in Northern Ghana

by

Martina Hilton-Ansah

MPH, Walden University, 2016

BS, Indiana University, 2008

Doctoral Study Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Public Health

Walden University

November 2025

Abstract

In Ghana, the user fee exemption policy, implemented in 2008, provides free maternal health services, which are a key component of the National Health Insurance Scheme (NHIS). Grounded in the Health Access Livelihood Framework, the purpose of this study was to determine the association between the user fee exemption policy and the utilization of antenatal care, facility-based delivery, and postnatal care in Northern Ghana, while controlling for sociodemographic factors. A quantitative approach was employed using secondary data from the Ghana Demographic and Health Surveys, encompassing women of reproductive age (15–49 years; $N = 6,948$). Logistic regression was used to determine if the independent variable, Year, is associated with the likelihood of patients receiving adequate facility delivery and postnatal care. The odds of facility delivery increased by 5% each subsequent year ($p = .01$, $OR = 1.05$, 95% CI [1.126, 1.149], Nagelkerke $R^2 = .653$). The odds of receiving postnatal care increased by 8.0% for each subsequent year over the observation period ($p < .001$, $OR = 1.08$, 95% CI [1.020, 1.040], Nagelkerke $R^2 = .057$). Conversely, linear regression results indicated a small but statistically significant decline in antenatal visits across the observed years ($B = -0.02$, $p = .012$). Results underscore the need for comprehensive, context-specific interventions beyond financial incentives to enhance equitable access and utilization of maternal health services in resource-limited settings. These findings can inform data-driven policies and targeted interventions to improve maternal healthcare utilization in Ghana.

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Dedication

I dedicate this work to my husband and children, who have been my avid cheerleaders for each step, and for enduring the ups and downs throughout this research journey. You are the epitome of my inspiration behind this achievement. To my family and loved ones, especially my mother and late father, this is for your unwavering encouragement and support which is indubitably foundational to this achievement. I will cherish this milestone always and credit it to your love and confidence in me.

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This dissertation represents the culmination of a journey marked by numerous challenges and milestones, ultimately reaching a defining achievement that transformed once distant aspirations into reality. I am deeply grateful to God for giving me the strength to persevere, even when at times it felt depleting. In addition, this achievement would not have been a success without the support and encouragement of many incredible people along the way. Thank you for all your invaluable contributions. To my program faculty, colleagues, and past research committee members at Walden University, thank you for your thoughtful discussions and recommendations throughout the various stages of this research process. It will never go unnoticed. I would especially like to recognize Dr. Stacy-ann Christian, Dr. William S. Davis, and Dr. Kaye Reynolds for your knowledge, constructive feedback, and steadfast guidance that have immensely contributed to shaping my academic growth. I am grateful for all the lessons learned.

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Section 1: Foundation of the Study and Literature Review

Introduction

Economic progress and human development are significantly influenced by having access to high-quality healthcare (Tunçalp et al., 2015). However, many Ghanaians, particularly women in the three northern regions, face inequities in healthcare access and affordability, hindering progress towards achieving the United Nations' Millennium Development Goals 4 (reducing child mortality) and 5 (improving maternal health) (Kolčić, 2013). As highlighted by Tunçalp et al. (2015), insufficient prenatal, postpartum, and perinatal care are the main reasons for preventable maternal and perinatal morbidity and mortality. Consequently, increasing access to these services will enhance the utilization of maternal healthcare, which is essential for significantly reducing preventable deaths in low-income countries like Ghana.

In line with the Sustainable Development Goals (SDGs), the World Health Organization (WHO) envisions a world where all expectant mothers and their babies receive high-quality care throughout pregnancy, childbirth, and the postpartum period (Tunçalp et al., 2015). When women receive comprehensive maternal healthcare, the risks of maternal, neonatal, and infant mortality are substantially reduced (Usman et al., 2021). Financial barriers, such as user fees and out-of-pocket expenses, have been identified as significant deterrents to seeking maternal health services (McCoy et al., 2010). To address these barriers, various governments and organizations have implemented policies such as user fee exemptions and payment subsidies to improve maternal healthcare utilization (Kruk et al., 2018).

Research on the impact of financial incentives on maternal healthcare utilization has produced mixed results, with some studies showing significant increases in utilization (Alhassan, et al., 2021; Ridde & Morestin, 2010; Gauthier & Wane, 2008) and others reporting limited or no impact (Witter & Garshong, 2009). These varying outcomes underscore the need for more rigorous research to examine the association between user fee exemptions and maternal healthcare services utilization, particularly in Northern Ghana, a region characterized by social and health disparities. Understanding the complex association between financial incentives and maternal healthcare services utilization is key for developing effective policies and programs to improve maternal and child health outcomes.

Section 1 of this study examines the association between user fee exemptions and maternal healthcare service utilization in rural northern Ghana. It highlights the problem of limited maternal healthcare service utilization and explores how the introduction of user fee exemptions relates to positive maternal healthcare outcomes in underserved communities. This section also outlines the study's purpose, research question, and hypotheses.

The Health Access Livelihood Framework (HALF) served as the theoretical framework which guided the research and its connection to the research question. The nature of the study details the rationale behind the research design, variables, and methodology for data collection and analysis.

An extensive literature review identifies key independent and dependent variables, covariates, and theoretical concepts relevant to the study from previous

research. Key terms are defined, assumptions are stated, and the scope, limitations, and significance of the study are discussed, emphasizing its potential contribution to positive social change.

Background

Research on free healthcare programs for maternal care in sub-Saharan Africa (SSA) has extensively investigated the effects of eliminating user fees. For instance, Bosu et al. (2007) examined the impact of removing user fees for maternal health services on maternal mortality rates (MMR) in two predominantly rural and impoverished areas of Ghana, finding a significant reduction in MMR. Access to high-quality healthcare has been linked to increased productivity and reduced household poverty, improving overall quality of life (Lagarde & Palmer, 2008). These findings suggest the shift from out-of-pocket (OOP) healthcare financing towards universal health coverage in developing nations like Ghana.

User fees have been identified as a major barrier to healthcare access and utilization (Lagarde & Palmer, 2008). Studies in low- and middle-income countries (LMICs) have shown that implementing or raising user fees can decrease the use of preventive and curative care. For instance, a study conducted in Kenya found that the introduction of user fees led to a significant decline in outpatient attendance at public health facilities (Mwabu et al., 1995). Similarly, research in Uganda demonstrated that increasing user fees resulted in reduced utilization of both outpatient and inpatient services, particularly among the poorest quintile of the population (Nabyonga et al.,

2005). Conversely, removing user fees in countries like South Africa and Colombia led to increased utilization of certain services (Lagarde & Palmer, 2008).

Improving financial access to services is important for expanding universal health coverage (UHC) in resource-limited settings. Recent health financing policies have focused on reducing financial barriers to healthcare, particularly for underserved populations. In SSA, lowering and eliminating user fees for public healthcare services has emerged as a critical strategy for achieving UHC (Cotlear & Rosemberg, 2018).

Despite most causes of maternal and newborn mortality being preventable, low utilization of health services remains a significant challenge in Ghana's three northern regions (GLSS 7, 2018). Previous government initiatives, such as the National Health Insurance Scheme (NHIS), have aimed to improve healthcare utilization. However, there is limited research on the association between user fee exemptions and maternal healthcare utilization in the three northern regions of Ghana. Research on the impact of user fees on healthcare quality, access, and utilization has yielded mixed results. Some studies have reported positive effects of introducing user fees (Akashi et al., 2004), while others have found negative effects of removing user fees on healthcare utilization (Jacobs et al., 2011; Chuma et al., 2009; Liu, 2004). The context in which policies are implemented influences the outcomes of user fee removal and healthcare utilization (Chama-Chiliba & Koch, 2016; Nimpagaritse & Bertone, 2011).

Therefore, it is important to assess the association between user fee exemption and maternal healthcare utilization, particularly antenatal care, facility-based delivery care, and postnatal care, using nationally representative data.

Problem Statement

Maternal mortality remains a critical global health challenge, disproportionately affecting LMICs (World Health Organization [WHO], 2010). In Ghana, the high cost of skilled maternal healthcare has been consistently identified as a major barrier to utilization, particularly for women in poverty. For instance, cost recovery rates in mission hospitals have been documented as exorbitant, reaching 152% for deliveries and 211% for cesarean sections, placing an immense financial burden on women seeking essential care. Compounding this, the underfunding of user fee exemption programs has created a disconnect between policy and practice; while exemptions exist in theory, they are not always honored due to insufficient reimbursement for healthcare providers (Witter & Garshong, 2009). This practical shortfall directly impedes the intended access to care for those most in need.

Ghana's NHIS, established in 2003 with implementation beginning in 2004, sought to provide financial protection for a broad spectrum of health services, including maternal healthcare (Ministry of Health, 2004). The specific policy of free maternal healthcare under the NHIS was introduced in July 2008. However, the NHIS's free exemption policy coverage remains limited, reaching just under 20% of the population, primarily benefiting formal sector workers and those who can afford voluntary coverage (NHIS, 2023). This limited reach of the NHIS, coupled with its primary benefit to formal sector workers and a small group of "indigents," raises significant questions regarding the sustained accessibility and affordability of maternal healthcare services for a substantial portion of Ghana's vulnerable populations. Despite Ghana's recent economic growth and

policy improvements (Akosua et al., 2011; Gottret & Schieber, 2006), disparities in healthcare access persist, particularly evident in rural areas where challenges such as inadequate infrastructure and limited access to essential medicines continue to hinder service delivery (Kaseje, 2006; McKay, 2015; WHO, 2010).

While existing literature has explored various facets of health financing in Ghana, including its challenges (Addae-Koranteng, 2013; Akazili et al., 2012; Akazili et al., 2011), the quality of service under the NHIS (Andoh-Agyei et al., 2018; Duku et al., 2018), and the determinants of enrollment and utilization (Browne et al., 2016; Brugiavini & Pace, 2016), a critical research gap remains. These studies predominantly focus on urban areas or analyze factors influencing general NHIS enrollment and service utilization. There is a pronounced absence of research specifically examining the nuanced association between user fee exemptions and maternal healthcare service utilization within Ghana's predominantly rural communities. Furthermore, while some studies have investigated the impact of user fees on healthcare utilization, their findings are often inconclusive and highly context-dependent (Akashi et al., 2004; Jacobs et al., 2011; Chuma et al., 2009; Liu, 2004; Chama-Chiliba & Koch, 2016; Nimpagaritse & Bertone, 2011). A lack of consensus persists regarding the direct association between user fee exemptions and maternal healthcare service utilization, with some evidence suggesting a weak link (Hatt et al., 2013). This research aims to address this critical gap by providing specific, empirical evidence from a context where such detailed analysis is currently lacking.

The Northern region of Ghana was deliberately chosen as the focus of this study due to its persistent and exacerbated health disparities, particularly in maternal health (World Bank, 2018). This region is characterized by high levels of poverty, limited healthcare infrastructure, and significant sociocultural barriers that actively hinder access to care (Dalinjong et al., 2017). For instance, geographically, Northern Ghana features vast, sparsely populated areas with poor road networks, directly impacting physical accessibility to health facilities, often requiring long and costly journeys (Akazili et al., 2011).

Economically, the Northern region consistently ranks among the poorest in Ghana (Ghana Statistical Service, 2014), making its population acutely vulnerable to the financial implications of healthcare, even with policies intended to mitigate cost. Despite the user fee exemption policy, the realities of limited NHIS coverage and potential informal charges at facilities mean that financial barriers likely persist for the poorest women in this region. Furthermore, the region faces persistent challenges related to the availability of healthcare services, including insufficient infrastructure, human resources, and essential medicines. Culturally, certain beliefs and practices in Northern Ghana may also influence women's decisions to seek skilled maternal care (Dalinjong et al., 2017).

Therefore, by focusing on Northern Ghana and using regionally representative data, this study provides highly relevant and context-specific insights into how user fee exemptions interact with multiple dimensions of access in a truly resource-limited setting, contributing significantly to the understanding of maternal healthcare utilization beyond mere financial considerations. I aimed to fill this research gap by specifically

investigating the association between user fee exemptions and maternal healthcare service utilization in the poorest rural communities of northern Ghana. Focusing on this specific context and population, the study contributes to a better understanding of how financial incentives relate to maternal healthcare utilization in resource-limited areas.

Purpose of the Study

This quantitative cross-sectional study investigated the association between the removal of user fees and the utilization of maternal healthcare services in rural communities of Upper West, Upper East, and Northern regions in Ghana. The study analyzed maternal healthcare utilization data to assess changes in utilization patterns before and after introducing the user fee exemption policy in 2008.

The study focused on three dependent variables: antenatal care utilization, the number of hospital deliveries, and postnatal care utilization. These variables serve as indicators to measure the association between the removal of user fees and maternal healthcare service utilization. The independent variable was the presence or absence of user fees. To control for potential confounding factors, the study also included socioeconomic variables such as age, education, and income levels.

Research Questions and Hypotheses

RQ1. Is there an association between the introduction of user fee exemption policy and the utilization of antenatal care by expectant mothers in the Upper East, Upper West, and Northern regions of Ghana, controlling for age, region, educational level, and economic status?

H₀1 (Null hypothesis). There is no association between the utilization of antenatal care and the introduction of the user fee exemption policy when controlling for sociodemographics.

H_a1 (Alternative hypothesis). There is an association between the utilization of antenatal care and the introduction of the user fee exemption policy when controlling for sociodemographics.

Measurement 1. Linear regression will be employed to assess the association between the user fee exemption policy and antenatal care utilization, adjusting for the specified covariates.

RQ2. Is there an association between the introduction of the user fee exemption policy and the number of hospital deliveries in the Upper East, Upper West, and Northern regions of Ghana, controlling for sociodemographics?

H₀2 (Null hypothesis). There is no association between the number of hospital deliveries and the introduction of the user fee exemption policy when controlling for sociodemographics.

H_a2 (Alternative hypothesis). There is an association between the number of hospital deliveries and the introduction of the user fee exemption policy when controlling for sociodemographics.

Measurement 2. Logistic regression will be used to determine the association between the user fee exemption policy and the number of hospital deliveries while controlling for the specified covariates.

RQ3. Is there an association between the introduction of the user fee exemption policy and the receipt of postnatal care by mothers in the Upper East, Upper West, and Northern regions of Ghana, controlling for sociodemographics?

H₀3 (Null hypothesis). There is no association between the utilization of postnatal care and the introduction of the user fee exemption policy when controlling for sociodemographics.

H_a3 (Alternative hypothesis). There is an association between the utilization of postnatal care and the introduction of the user fee exemption policy when controlling for sociodemographics.

Measurement 3. Logistic regression will be employed to assess the association between the user fee exemption policy and postnatal care utilization, adjusting for the specified covariates.

Theoretical and/or Conceptual Framework

Health Access Livelihood Framework

The Health Access Livelihood Framework (HALF) provides a valuable theoretical framework for examining the complex association between user fee exemptions and maternal healthcare utilization in Northern Ghana. This theoretical framework emphasizes the multidimensional nature of healthcare utilization, recognizing that it encompasses availability, accessibility, affordability, adequacy, and acceptability of services (Obrist et al., 2007). These dimensions interact with both the healthcare system itself and the broader socioeconomic context, including individual and community livelihood assets (Ensor, 2004).

Research applying HALF in SSA has consistently highlighted the significant role of financial barriers, particularly user fees, in hindering access to maternal healthcare services (Witter & Garshong, 2009). Even when healthcare fees are waived or exempted, the affordability of associated costs, such as transportation, medications, and informal payments, remains a persistent challenge (McCoy et al., 2010). These financial burdens often force individuals into precarious coping strategies, further exacerbating their vulnerability (Ensor, 2004).

Furthermore, HALF emphasizes the bidirectional association between poverty and healthcare access. While poor health can undoubtedly lead to economic hardship, poverty itself can also severely restrict access to healthcare, creating a vicious cycle (Kruk et al., 2018). This is particularly evident in the context of maternal healthcare, where financial constraints can prevent women from accessing essential antenatal, hospital delivery, and postnatal care services.

This study utilized the HALF framework to comprehensively analyze the association between user fee exemptions and maternal healthcare utilization in rural communities of Northern Ghana. This framework allows for the combination of diverse perspectives and a more comprehensive understanding of the nature of access and the interplay between financial and socioeconomic factors. Through the study, I aimed to inform the development of targeted interventions that can effectively address any barriers to maternal healthcare utilization, ultimately contributing to improved maternal health outcomes and reduced maternal mortality rates in the regions.

Nature of Study

The study examined user fee exemption policy and its association with maternal health service utilization in rural communities in the Upper West, Upper East, and Northern regions before and after the introduction of the user fee exemption policy.

The cross-sectional design was suitable for the study because it enables examination of the association of the dependent variables with the policy. In addition, the effect of the control variables could be examined. The study design helped to compare the independent variable and the dependent variables. The cross-sectional design was suitable for the study because it helped to examine the association of the dependent variables with the policy. In addition, the association of the control variables could be examined.

The independent variable was the implementation of the user fee exemption. This was the variable that was being manipulated or changed to observe its effect on other variables.

The dependent variables were as follows:

- utilization of antenatal care
- number of hospital deliveries
- utilization of postnatal care

These were the variables that were expected to change because of the introduction of the user fee exemption policy. The study measured the association between the independent variable (policy implementation) and these dependent variables (maternal healthcare service utilization). The dependent variables were measured using proxies

such as the utilization of maternal antenatal care services, postnatal care services, and the number of hospital deliveries in the chosen regions.

Antenatal care represents whether a woman had received antenatal care or not within the specified period of the study. For postnatal care, data were provided in a dichotomized way to indicate whether a woman received postnatal care in health facility or not. The number of hospital deliveries indicates the number of babies that were delivered in a health facility. Income level indicates the amount of money received or is the economic measure of an economic activity by the participants. Employment is defined as the participant's formal or informal activity in any form of employment in the 12 months prior to the survey. The nature of residence is defined as the level of development indicated by the relative population size of the area in which the participant resided at the time of the survey. The age of the participant at the time of the survey is defined as the age of the last birthday before the survey, and it is a continuous variable. Ethnicity is defined as the tribal affiliations of the participants. Access to healthcare is defined as the availability of healthcare services during pregnancy. The independent or intervention variable indicates the period of implementation of the user fee exemption policy.

The present study leverages secondary data from the Ghana Demographic and Health Surveys (GDHS) conducted in 2008, 2014, and 2022 by the Ghana Statistical Service (GSS). The DHS, funded by the U.S. Agency for International Development (USAID), are nationally representative household surveys that provide data on a wide range of population, health, and nutrition indicators. The large sample sizes and regular

intervals of these surveys enable comparisons over time and facilitate monitoring and impact evaluation. The DHS's comprehensive data collection allows this study to evaluate a subset of pregnant women, capturing their demographic variables and maternal healthcare utilization information, both before and after the implementation of the user fee exemption policy in 2008 under the NHIS. The DHS's inclusion of data on antenatal, delivery, and postnatal care, along with sociodemographic information specific to the Upper West, Upper East, and Northern regions, provides important information for the study's control variables.

The data were analyzed using SPSS. Logistic regression assessed the association of independent and control variables with antenatal care (categorical dependent variable) and postnatal care (categorical dependent variable) utilization. Additionally, multiple linear regression examined the relationship between independent and control variables and the number of hospital deliveries.

Literature Search Strategy

List of Accessed Library Databases and Search Engines

To obtain relevant literature for this study, several university libraries were utilized. In addition to these libraries, relevant studies were identified through EBSCO Host through the Walden University library, from the National Library of Medicine (PubMed), ProQuest Dissertations, and Google Scholar.

Key Search Terms

Terms commonly associated with healthcare financing and delivery were employed in these databases to collect relevant information. The words searched included

the following: *maternal health service utilization, OR user fee exemption, OR antenatal care AND postnatal care, hospital deliveries, OR health care financing, OR health care delivery, OR health care financing models, AND Ghana health care system.*

Scope of Literature Review

The literature review encompassed articles dating back to the 1990s and 2000s to capture foundational research on healthcare financing and delivery. While prioritizing studies from the past 5 years, the review also incorporated older literature to provide historical context and a comprehensive understanding of the evolution of healthcare financing and its implementation.

Theoretical Framework: The Health Access Livelihood Framework (HALF)

HALF served as the theoretical foundation for this study, providing a comprehensive lens to examine the complex association between user fee exemptions and maternal healthcare utilization in Northern Ghana. HALF, developed by Obrist et al. (2007), reflects the recognition that healthcare utilization is a multidimensional concept, encompassing not only the availability of services, but also their accessibility, affordability, adequacy, and acceptability. It emphasizes the interplay between the healthcare system, broader socioeconomic factors, and individual and community livelihood assets in shaping healthcare utilization and health outcomes.

Key Dimensions of Utilization

1. **Availability:** The presence and supply of healthcare services, including infrastructure, human resources, and essential medicines.

2. **Accessibility:** The geographical and physical reach of healthcare services, considering factors such as distance, transportation, and information availability.
3. **Affordability:** The financial capacity of individuals and communities to access healthcare services, including the cost of consultations, medications, and transportation.
4. **Adequacy:** The quality and appropriateness of healthcare services, including the availability of skilled personnel, essential equipment, and adherence to clinical guidelines.
5. **Acceptability:** The cultural and social appropriateness of healthcare services, considering factors such as language, gender sensitivity, and respect for patient autonomy.

Application of HALF in the Context of Maternal Healthcare in Northern Ghana

The HALF framework is particularly relevant to the study of maternal healthcare utilization in Northern Ghana, a region characterized by poverty, limited healthcare infrastructure, and sociocultural barriers to accessing care. Research applying HALF in SSA has consistently highlighted the significant role of financial barriers, particularly user fees, in hindering access to maternal healthcare services (Witter & Garshong, 2009). The removal of user fees through the exemption policy directly addresses the affordability dimension of access, potentially enabling more women to utilize essential maternal health services.

However, HALF also underscores the importance of considering other dimensions of utilization. Even when financial barriers are removed, challenges related to availability (e.g., the limited number of healthcare facilities and skilled birth attendants), accessibility (e.g., long distances to health facilities and poor transportation infrastructure), adequacy (e.g., shortages of essential medicines and equipment), and acceptability (e.g., cultural beliefs and practices that discourage healthcare utilization) can persist.

Comparison With Other Theoretical Frameworks

HALF distinguishes itself from other theoretical frameworks that examine healthcare utilization by explicitly incorporating the dynamic interplay between health systems, socioeconomic contexts, and individual/community livelihood assets. This focus on the broader context of utilization, particularly in resource-poor settings, sets it apart from more traditional models that primarily focus on individual-level factors or healthcare system characteristics.

The Andersen Behavioral Model

The Andersen behavioral model (ABM) is a widely used framework for understanding healthcare utilization. It posits that healthcare utilization is influenced by three primary factors: predisposing factors (e.g., demographics, social structure, health beliefs), enabling factors (e.g., income, insurance, transportation), and need factors (e.g., perceived and evaluated health status; Andersen, 1995). While the ABM acknowledges the role of enabling factors, including income and insurance, it does not explicitly consider the broader socioeconomic context and livelihood assets that can significantly impact healthcare utilization in resource-poor settings. HALF, in contrast, explicitly

incorporates these factors, providing a more nuanced understanding of the barriers to healthcare utilization in such contexts.

The Health Belief Model

The health belief model (HBM) focuses on individual perceptions and beliefs as key determinants of health behavior, including healthcare-seeking behavior (Janz & Becker, 1984). The HBM posits that individuals are more likely to engage in health-promoting behavior if they perceive themselves as susceptible to a health problem, believe the problem has serious consequences, perceive the benefits of taking action, and perceive few barriers to action. While the HBM provides valuable insights into individual decision-making processes, it may not fully capture the complex interplay of structural and contextual factors that influence healthcare access in resource-poor settings. HALF, by incorporating the broader socioeconomic context and livelihood assets, offers a more comprehensive understanding of the barriers to healthcare utilization beyond individual beliefs and perceptions.

The Three Delays Model

The three delays model focuses on the delays that women experience in seeking and receiving maternal healthcare, specifically in low-resource settings (Thaddeus & Maine, 1994). The model identifies three phases of delay: (a) delay in deciding to seek care, (b) delay in reaching a healthcare facility, and (c) delay in receiving adequate care at the facility. While the three delays model highlights critical barriers to maternal healthcare access, it primarily focuses on the healthcare system and individual decision-

making processes. HALF, in contrast, expands the analysis by considering the broader socioeconomic context and livelihood assets that can influence each phase of delay.

The Social Determinants of Health Framework

The social determinants of health (SDH) framework recognizes that health is influenced by a wide range of social, economic, and environmental factors, including income, education, employment, housing, and social support (Commission on Social Determinants of Health, 2008). While the SDH framework provides a valuable perspective on the broader determinants of health, it does not explicitly focus on the specific challenges of healthcare utilization in resource-poor settings. HALF, by integrating the SDH perspective with a focus on livelihood assets and vulnerability contexts, offers a more targeted approach to understanding and addressing barriers to healthcare utilization in these settings.

Advantages of HALF

HALF offers several advantages over other theoretical models in the context of this study:

1. **Comprehensive approach:** HALF adopts a holistic approach to understanding healthcare utilization, considering both the healthcare system and the broader socioeconomic context. This allows for a more nuanced analysis of the complex factors influencing maternal healthcare utilization in Northern Ghana.
2. **Focus on livelihood assets:** HALF explicitly recognizes the role of livelihood assets, such as income, education, and social networks, in shaping maternal

healthcare utilization. This focus is particularly relevant in resource-poor settings, where individuals' ability to access maternal healthcare is often contingent on their available resources and coping strategies.

3. **Emphasis on vulnerability contexts:** HALF acknowledges that individuals and communities face varying degrees of vulnerability, which can significantly impact their ability to access healthcare. This emphasis on vulnerability contexts allows for a more targeted approach to addressing the specific needs and challenges of different populations.
4. **Action-oriented:** HALF is not only a theoretical framework, but also a guide for action. It identifies the key dimensions of utilization and their interplay with livelihood assets and vulnerability contexts. HALF can inform the development of interventions that address both financial and nonfinancial barriers to healthcare utilization.

In conclusion, HALF provided a valuable theoretical foundation for this study, offering a comprehensive and nuanced understanding of the complex factors influencing maternal healthcare utilization in Northern Ghana. The framework's emphasis on the multidimensional nature of utilization and the interplay between financial and socioeconomic factors allows for a nuanced analysis of the association between user fee exemptions, payment subsidies, and maternal healthcare utilization. The insights generated from this study can inform the development of targeted interventions that address both financial and nonfinancial barriers to utilization, ultimately contributing to improved maternal health outcomes and reduced maternal mortality rates in the region.

Literature Review Related to Key Variables and/or Concepts

User Fee Exemptions

Financial barriers, including user fees and out-of-pocket expenses, have been identified as significant deterrents to utilization of maternal healthcare services, particularly for vulnerable populations in LMICs (Kruk et al., 2018). User fee exemption policies aim to alleviate these financial burdens and improve healthcare utilization. Numerous studies have explored the impact of such interventions on maternal healthcare utilization in LMICs, with varying results.

Some studies have reported positive associations between user fee exemptions and increased utilization of antenatal care (ANC), skilled birth attendance (SBA), and postnatal care (PNC; Gauthier & Wane, 2008; Ridde & Morestin, 2010). For instance, a study in Burkina Faso found that the removal of user fees for maternal healthcare services led to a substantial increase in ANC attendance and deliveries by skilled birth attendants (Ridde & Morestin, 2010). Similar findings have been reported in other African countries, such as Ghana, where the introduction of free maternal healthcare under the NHIS was associated with increased utilization of maternal health services (Dixon, 2014).

However, other studies have found mixed or limited effects of user fee exemptions and subsidies on maternal healthcare utilization. Some research suggests that these interventions alone may not be sufficient to overcome other barriers to access, such as geographical distance, cultural beliefs, and perceived quality of care (Witter &

Garshong, 2009). Moreover, the effectiveness of these policies can vary depending on the specific context, implementation strategies, and target population.

Health Financing

Healthcare financing varies considerably across different countries. Middle-income and high-income countries usually have a higher share of health spending compared to low-income countries. Most of the funding comes from the government budget through taxes, levies and social health insurance contributions. According to Barroy et al. (2017), public funding has increased over the past 15 years from an average of 48% to 51% of current health spending in middle-income countries and from 66% to 70% in high-income countries. According to the Abuja Declaration in 2001, the African Union member heads of state agreed to allocate at least 15% of annual expenditure to health care (Berkman et al., 2005). Fifteen years later in 2014, most African countries had increased the proportion of total public expenditure allocated to health care (WHO, 2016).

Utilization of Antenatal Care

Antenatal care (ANC) is a critical component of maternal healthcare, encompassing regular check-ups during pregnancy to monitor maternal and fetal health, provide vaccinations, and screen for potential complications. Studies have consistently shown a positive association between the removal of user fees and increased ANC utilization in LMICs.

A study found out that eliminating user fees for maternal healthcare services led to a substantial increase in ANC attendance (Ridde & Morestin, 2010). This finding

aligns with previous research in Ghana, where the introduction of free maternal healthcare under the NHIS was associated with increased utilization of ANC services (Dixon, 2014). The positive impact of user fee removal on ANC utilization can be attributed to the reduction of financial barriers, making these essential services more accessible to women, particularly those from lower socioeconomic backgrounds.

However, the effectiveness of user fee removal in increasing ANC utilization is not universal and ANC utilization can be influenced by various factors. For instance, a study in Kenya found that while the removal of user fees increased ANC attendance among women from lower socioeconomic groups, it did not significantly impact utilization among wealthier women (Ochako, et al., 2011). This suggests that the impact of user fee removal may vary depending on socioeconomic status, highlighting the need for targeted interventions to address the specific needs of different population groups.

Furthermore, research has shown that the timing and frequency of ANC visits are crucial for optimal maternal and fetal health outcomes. Early and frequent ANC attendance has been associated with reduced maternal and neonatal mortality rates, as well as improved detection and management of pregnancy complications (Kruk et al., 2018). Therefore, interventions aimed at increasing ANC utilization should focus not only on removing financial barriers, but also on promoting early and regular attendance through education and awareness campaigns.

The existing literature suggests a positive association between user fee exemptions and increased utilization of antenatal care in LMICs. However, the magnitude of this effect can vary depending on contextual factors and individual characteristics. To

fully understand the association between the user fee exemption policy and maternal healthcare utilization, it is essential to consider the specific needs of different population groups. This will help in the effective implementation of complementary interventions that promote early and regular ANC attendance.

Skilled Birth Attendance

Skilled birth attendance (SBA) is a critical indicator of maternal healthcare utilization and a key factor in reducing maternal and neonatal mortality. The World Health Organization (WHO) defines SBA as the presence of a skilled healthcare professional, such as a midwife, doctor, or nurse, during childbirth (WHO, 2018). These professionals are trained to manage normal deliveries and identify and manage complications that may arise during labor and delivery.

The presence of a skilled birth attendant during childbirth has been shown to significantly reduce the risk of maternal and neonatal mortality and morbidity. Studies have found that women who receive skilled birth attendance are more likely to have positive health outcomes, including lower rates of postpartum hemorrhage, infection, and neonatal mortality (Kruk et al., 2018).

Financial barriers, such as user fees, have been identified as a major obstacle to accessing skilled birth attendance in many LMICs (Witter & Garshong, 2009). User fee exemption policies have been implemented in several countries to address this issue and improve access to skilled birth attendance.

Research on the impact of user fee exemptions on skilled birth attendance has shown promising results. A study found out the removal of user fees for maternal

healthcare services led to a significant increase in the proportion of deliveries attended by skilled birth attendants (Ridde & Morestin, 2010). Similarly, in Ghana, the introduction of free maternal healthcare under the NHIS was associated with increased utilization of skilled birth attendance services (Dixon, 2014).

However, the effectiveness of user fee exemptions in increasing skilled birth attendance can vary depending on contextual factors, such as the availability and quality of skilled birth attendants, as well as other barriers to access, such as geographical distance and cultural beliefs (Witter & Garshong, 2009).

Utilization of Postnatal Care

Postnatal care (PNC) is essential for monitoring the health of both mother and newborn after childbirth and addressing any potential complications. Research on the association between user fee exemptions and PNC utilization has yielded mixed results. Some studies have reported positive associations between the removal of user fees and increased PNC utilization. For instance, a study in Ghana found that the introduction of free maternal healthcare under the NHIS was associated with increased utilization of postnatal care services (Dixon, 2014). This suggests that removing financial barriers can encourage women to seek essential postpartum care for themselves and their newborns.

However, other studies have found limited effects of user fee exemptions on PNC utilization, indicating that financial incentives alone may not be sufficient to address all barriers to accessing PNC services (Witter & Garshong, 2009). Nonfinancial barriers, such as distance to health facilities, lack of transportation, cultural beliefs, and perceived quality of care, can also play a significant role in determining PNC utilization. For

example, a study in rural Tanzania found that while the removal of user fees increased the initial uptake of PNC, it did not lead to sustained utilization due to other barriers, such as long waiting times and perceived poor quality of care (Mrisho et al., 2011).

These findings suggest that a multi-faceted approach is needed to improve PNC utilization in LMICs. While user fee exemptions can play a role in reducing financial barriers, addressing other nonfinancial barriers is equally important. This may involve improving the availability and quality of PNC services, increasing awareness and education about the importance of PNC, and addressing cultural beliefs and practices that may hinder utilization.

Sociodemographic Factors and Maternal Healthcare Utilization

Individual socioeconomic status has been linked to the access of maternal care in both developing and developed nations (Kim et al., 2018; Makate and Makate, 2017). In developing nations, people with higher socioeconomic status—that is, wealthier and more educated—generally have greater access to maternal health services (Kim et al., 2018; Makate and Makate, 2017). Numerous academic research studies have demonstrated that maternal healthcare service consumption is influenced by sociodemographic variables (Mekonnen & Mekonnen 2003; Woldemicael & Tenkorang 2009). Maternal healthcare use is influenced by factors such as women's low social status in society, restricted access to financial resources, lack of opportunity for basic education, and diminished ability to make decisions. Research has repeatedly demonstrated the association between care-seeking behaviors for maternal health services and maternal survival and women's

educational achievement, social position, household wealth, and decision-making authority (Habicht, & Kunst, 2005).

These factors encompass a wide range of individual and household characteristics that can shape healthcare-seeking behavior and access to services.

Place of Residence

Geographic location and residence type significantly influence access to and utilization of maternal healthcare services. Women residing in rural areas often face greater barriers to accessing healthcare due to factors such as distance to health facilities, limited transportation options, and inadequate infrastructure (Apoya & Marriott, 2011). These challenges can result in lower utilization rates of antenatal care, skilled birth attendance, and postnatal care among rural women compared to their urban counterparts.

Education

Women's educational attainment has been consistently linked to increased utilization of maternal healthcare services. Studies have shown that women with higher levels of education are more likely to attend antenatal care visits, deliver in health facilities with skilled birth attendants, and seek postnatal care (Kruk et al., 2018). This association can be attributed to several factors, including increased health literacy, greater awareness of the benefits of maternal healthcare, and enhanced decision-making autonomy.

According to Babughirana et al. (2020), there is a direct correlation between maternal healthcare utilization and education. Better reading and healthier lifestyle choices are typically associated with higher educational attainment. Women's education

tends to increase the use of maternal care services. Women with higher levels of education are more likely than those with lower levels of education to utilize prenatal care, to use it early and often, and to use medical facilities and qualified clinicians. According to Rai et al. (2012), even after adjusting for other socioeconomic determinants, a mother's use of maternal health services is significantly increased by her level of formal education. Lower education status is associated with low antenatal care utilization. The acquisition of skills and competencies through education, in conjunction with the learning cycle, motivates literate women to pursue gainful employment. This, in turn, results in financial gain and empowerment, which in turn influences healthcare utilization and ultimately maternal health (Axinn & Barber, 2001; Bussemakers et al., 2017). One of the fundamental rights of women is the ability to manage their health and fertility, which is dependent on higher degrees of women's autonomy in the home (Upadhyay & Karasek, 2012). Therefore, increases in education level result in employment, economic standing, and empowerment, all of which drive a further increase in the use of maternal health care by changing attitudes towards the benefits of the health care system.

Age

According to Okutu (2006), women in Uganda who are younger (less than 20 years old) or middle-aged (between 20 and 34 years old) are more likely than older mothers (34 years old and up) to seek professional attendants for pregnancy-related care services. Studies conducted in Nigeria have shown that health-seeking behavior rises with

age and falls at older ages (Nwosu et al. 2012). The authors explain this by citing the experience of elderly mothers and the rarity of pregnancies at such ages.

Place of Residence

The use of maternal health care services is influenced by one's place of residence. Compared to their urban counterparts, Ethiopian rural women are generally less likely to give birth in a medical institution (Nigussie et al., 2005). In Nigeria, a similar conclusion was made (Babalola and Fatusi 2009). According to Dagne's (2010) research, compared to women living in urban areas, women residing in rural areas had a 69% lower chance of giving birth with the help of medical professionals.

Economic Status

Household wealth and income levels are critical determinants of maternal healthcare utilization. Financial constraints can prevent women from accessing essential services due to the costs associated with transportation, medications, and other out-of-pocket expenses (McCoy et al., 2010). Studies have shown that women from wealthier households are more likely to utilize maternal healthcare services than those from poorer households, highlighting the need for financial interventions to address inequities in access. According to a study by Gill et al. (2007), which covered more than 50 nations, the richest women had an average of over 80% of their deliveries attended, while only 34% of the poorest women had the same level of support. Dagne (2010) discovered a statistically significant correlation between household wealth and professional support during childbirth, with women in the wealthiest and most affluent groups having a higher likelihood of receiving such assistance. In India, women with a medium standard of

living had 1.4 times the odds of giving birth in an institution, compared to women with a high standard of living, who had 2.3 times the odds (Ram & Singh, 2006).

Conclusion

The literature review highlights the complex association between user fee exemptions and maternal healthcare utilization in LMICs. While these financial incentives show promise in improving access to care, their effectiveness is often contingent on other contextual factors and barriers. Future research should focus on understanding the interplay between financial and nonfinancial barriers to healthcare access and developing comprehensive interventions that address both, ultimately aiming to achieve equitable access to maternal healthcare services for all women, regardless of their socioeconomic status.

Definitions

Maternal healthcare: This encompasses the health of women during pregnancy, childbirth, and the postpartum period.

Healthcare utilization: This is the extent to which mothers use healthcare services.

Antenatal care: A visit by a pregnant woman to a healthcare facility to obtain maternal care and advice for herself and the unborn child for safe delivery.

Skilled birth attendance: This refers to the presence of a trained healthcare professional, such as a midwife, doctor, or nurse, during childbirth.

Postnatal care: This is the healthcare provided to mothers and their newborns during the first 6 weeks after childbirth.

No user fees policy: This is a policy that prohibits payment by an individual seeking care at public healthcare facilities.

User fees: These are charges levied on healthcare services and are paid at the point of receiving care by the patient. These payments generally include hospital bills, consultation fees, and in some cases cost of prescribed medication.

Education level/highest level of education: This measures the various levels of education completed by the respondent, as primary, secondary, and tertiary.

Age: The age of the respondents at the time of data collection from ages 15–49.

Assumptions

This study used secondary data to investigate the association between the user fee exemption policy and maternal healthcare utilization. I operated under the assumption that the data accurately represent the actual number of individuals who utilized maternal health services during the specified period. While acknowledging the potential limitations of secondary data, such as coding inaccuracies, I assumed that these limitations do not significantly affect the study's findings. The benefits of using secondary data, including the large sample size and longitudinal nature of the datasets, are considered to outweigh the potential drawbacks.

Additionally, the study assumed that existing instruments can effectively measure women's healthcare utilization and that participants in GDHS provided truthful and voluntary responses. It is further assumed that the survey respondents are representative of the broader population of women in the chosen regions, and that antenatal and postnatal records accurately reflect births in these regions during the study period. These

assumptions are fundamental to the acceptance of the secondary data and the subsequent analyses conducted to address the research questions. They also guided the selection of the methodology, research design, and statistical analysis employed in this study.

Scope and Delimitations

This study examined the association between user fee exemptions and maternal healthcare service utilization in the Upper West, Upper East, and Northern regions of Ghana. Utilizing statistical models, the research analyzed maternal health and sociodemographic data of women aged 15-49 in these regions.

The study focused exclusively on women who have received antenatal or postnatal care, or who have delivered in a healthcare facility within these regions. Women who have not used these services were excluded from the analysis. The study investigated the influence of various socioeconomic factors, including age, income level, marital status, educational level, geographic location, ethnicity, access to healthcare, and employment status, on antenatal care, postnatal care, and hospital delivery rates. These factors were controlled for in the regression model as potential confounders.

However, this study did not aim to establish causal associations between user fee exemption policy interventions and maternal healthcare utilization but observed changes in the service utilization before and after the implementation of the policy. The scope of the research was limited by the use of secondary data, which did not capture all relevant variables. Moreover, the findings might not have been generalizable to other regions in Ghana due to the unique characteristics and healthcare utilization patterns specific to the northern regions.

The generalizability of this study's findings was limited by its geographical focus on the three Northern Regions of Ghana. These regions exhibited unique socioeconomic and cultural characteristics that influenced healthcare-seeking behavior, potentially differing from other areas of the country.

Limitations

The use of secondary data also presented potential limitations. The original data collection methods employed by the GDHS may have had inherent biases or limitations, which could have impacted the accuracy and validity of this study's findings. Additionally, the convenience sampling approach, while having provided a large dataset, may not have fully represented the broader population of women in Ghana, potentially limiting the generalizability of the results.

Furthermore, the secondary data contained errors or inconsistencies, such as inaccurate data entry or duplicate entries, which could have affected the reliability and validity of the analysis. While the large sample size and longitudinal nature of the datasets offered advantages, the study acknowledged that utilization figures represented service visits rather than individual users, limiting the ability to definitively identify the number of women who accessed care.

Finally, the reliance on statistical models restricted the study to identifying associations between variables, rather than establishing causal associations. The complex interplay of factors that influenced maternal healthcare utilization may not have been fully captured by the statistical analysis alone.

Despite these limitations, the study's comprehensive dataset and rigorous methodology provided valuable insights into the association between user fee exemptions and maternal healthcare utilization in the specific context of Northern Ghana. Future research may build upon these findings by employing qualitative methods to explore the underlying mechanisms and contextual factors influencing healthcare-seeking behavior in this region.

Significance

This study contributes to the understanding of the association between user fee exemption policy and maternal healthcare service utilization in Northern Ghana. The findings also shed light on the role of social structures, socioeconomic status, and health awareness in shaping maternal healthcare utilization within these communities.

Moreover, this research contributes to the broader field of public health by examining the association between user fee exemptions and the utilization of public health services. It builds upon previous studies by Dhillon et al. (2012) and Hatt et al. (2013) that explored the association between healthcare financing and primary healthcare service utilization.

The outcomes of this study hold potential implications for policymakers and stakeholders within Ghana's health financing system. The insights gained can inform the development of policies and strategies that address the social and economic factors influencing healthcare utilization in rural areas. Specifically, the study's findings may inform interventions to alleviate social tensions between mutual insurance providers, the

Ministry of Health, and healthcare institutions by highlighting the importance of timely reimbursement of funds.

Furthermore, this research suggests that user fee exemptions could play an important role in increasing healthcare utilization rates among underserved populations by addressing economic barriers to access. These policies, as components of a broader universal health coverage strategy, may also lead to a decline in the reliance on alternative healthcare providers, such as traditional birth attendants. The study aimed to inform policy decisions and contribute to improved maternal health outcomes in rural Ghana.

Summary

Section 1 establishes the foundation of this study by providing relevant background information and research questions, elucidating the rationale and significance of the research. It also presents the theoretical framework underpinning the research problem through a comprehensive literature review. The review encompasses scholarly materials on healthcare utilization and the influence of health financing on health services. It explores various methodologies employed in previous studies, examines theoretical frameworks, and identifies barriers to healthcare utilization. The literature review also highlights gaps in existing research, particularly concerning the specific context of this study.

Section 2 details the statistical models and methodologies employed for data collection and analysis in this research.

Section 3 presents the results of the study, while Section 4 offers policy recommendations, implications for social change, and suggestions for future research directions.

Conclusion

Existing literature presents mixed findings on the association between user fee exemptions and maternal healthcare utilization. The full extent of the association between health financing and healthcare utilization among residents of Ghana's three Northern regions remains unclear. This study addressed this knowledge gap by investigating changes in maternal healthcare utilization patterns before and after the introduction of user fee exemption policy in 2008.

The research questions focus on determining the specific changes in utilization patterns associated with the introduction of user fee exemptions. Analyzing these changes, the study aims to contribute to a deeper understanding of the association between the user fee exemption policy and maternal healthcare utilization in the Northern regions of Ghana. This research has the potential to inform policy decisions and strengthen healthcare delivery in these underserved regions.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative study was to understand the association between user fee exemptions and maternal healthcare utilization in the rural communities of the Upper West, Upper East, and Northern regions.

Building upon the comprehensive literature review in Section 1, which explored the existing knowledge on user fee exemption and maternal healthcare utilization, this section outlines the methodological approach. This section describes the steps that were undertaken to conduct the study and includes research questions, hypotheses, study designs and sampling methods, study variables, study population, method of data analysis, and threats to external, internal, and construct validity. The steps taken to protect privacy, manage data, analyze, and disseminate the study findings are discussed. The specific software used for analysis and the data-cleaning process will also be identified.

Research Design and Rationale

This study assessed the association between user fee exemption and maternal healthcare utilization in Northern Ghana from 2008 to 2022. The study used secondary data from the GDHS 2008, 2014, and 2022 to determine utilization patterns. However, the 2003 dataset was used as the baseline for the analysis. These surveys are conducted every five (5) to eight (8) years by the Ghana Statistical Service (GSS). The present study employed a quantitative, cross-sectional research design to investigate the association between the implementation of the user fee exemption policy and maternal healthcare service utilization in the Upper East, Upper West, and Northern regions of Ghana. The

study specifically examined the utilization of antenatal care (ANC), skilled birth attendance (SBA), and postnatal care (PNC) services.

The choice of a cross-sectional design was appropriate for this research as it allowed for the simultaneous assessment of the independent variable (user fee exemption policy) and the dependent variables (maternal healthcare service utilization) at a specific point in time. The cross-sectional design enabled me to explore the association between these variables and identify potential associations. This design allowed for the examination of these associations by comparing maternal healthcare utilization patterns before and after the implementation of the user fee exemption policy.

Furthermore, the inclusion of control variables such as socioeconomic status, health, and age in the analysis allowed me to account for potential confounding factors that may influence healthcare utilization. This strengthened the internal validity of the study by isolating the complex associations between the user fee exemption policy and maternal healthcare utilization.

The cross-sectional design used by the study was efficient with time and financial resources to analyze secondary data. The data needed were obtained at a low cost and were easy to gather. The use of a cross-sectional design was appropriate for the study because data on antenatal care, postnatal care, and the number of hospital deliveries are readily available from the DHS database. The DHS database contains information on all antenatal care, postnatal care, and the number of hospital deliveries of women aged 15–49, over a 14-year period, making it easier to compare data from 2008 to 2022. Also, the

use of cross-sectional data provided the opportunity to use the selected regions in the study.

One limitation of a cross-sectional design is the lack of robustness to infer causality, although it can establish associations. Various studies have used secondary data to examine the effects of user fee exemption and healthcare financing on healthcare provision and utilization. Some of these studies used secondary data and panel regression methods, *t* tests, and other statistical and econometric models to compare the trends in the past and present (Kiross et al., 2021; Novignon et al., 2019). Based on the research objectives, the analysis of the secondary data was done using multiple linear regression and logistic regression to examine the utilization of healthcare services.

In summary, the cross-sectional research design employed in this study was well-suited to investigate the research questions by examining the association between user fee exemptions and maternal healthcare service utilization while controlling for relevant sociodemographic and health-related factors. The findings of this study can contribute to the growing body of evidence on the impact of health financing policies on healthcare utilization in the context of maternal health.

Methodology

Population

The study population comprised women of reproductive age (15 to 49 years) residing in the Upper West, Upper East, and Northern regions of Ghana. The data source for this study was the GDHS, which are nationally representative household surveys that provide comprehensive information on various population and health indicators. The

DHS collects data on a wide range of topics, including maternal healthcare utilization, sociodemographic characteristics, and access to healthcare services. The inclusion of women within the specified age range who were available during the survey period ensured that the study captured a diverse and representative sample of the target population.

Sampling and Sampling Procedures

Sampling Strategy

The GDHS employs a multi-stage stratified cluster sampling design to ensure representativeness and enable the generation of reliable estimates at both national and regional levels (Ghana Statistical Service, 2014). The interviewers were selected based on having a minimum educational qualification of post-secondary and the ability to speak the local language fluently of the survey area assigned to them. The interviewers took pre- and post-tests following a training session on the operationalization of the survey. The country was divided into 10 regions. Each region is further divided into municipalities and District Assemblies. Each Municipality and district assembly was further divided into local government areas. The localities are further divided into smaller units called local committees. This approach is considered the best sampling approach based on the administrative structure of Ghana as it can split areas into rural or urban. Probability proportional sampling was used to select the localities to be used in the study. At the local committee level, a random sampling approach was used. An equal number of households were selected from rural and urban clusters with adjustments to cater to larger regions.

Inclusion and Exclusion Criteria

Women, according to the target population from the ages of 15-49, were included in the study. Any data with missing age was excluded from the study as this could distort the selection of eligible participants. The total sample consists of all individuals who meet the election criteria. Respondents must have stayed in the selected households the night before the survey and fulfill the qualifying criteria to be included. Any individual in the household who does not meet the criteria, such as the required age, is excluded from the sample. Additionally, those who refused to complete the questionnaire were also excluded. Data from private hospitals and other private healthcare facilities has been excluded, as this information is not part of the database.

Recruitment, Participation, and Data Collection

The study did not participate in any primary data collection process. This was a secondary data analysis of the survey data from the Ghana Statistical Service. There was no primary recruitment and participation in the data collection process. The DHS survey instruments were adopted for the study, and relevant portions were used. The instrument was reviewed to capture relevant individuals and information necessary to answer the research questions. Age, education, nature of residence, income, religion, antenatal care utilization, postnatal, and number of deliveries were some of the background statistics that were used.

Access to Dataset

The datasets for the study are available and accessible online at the Demographic Health Survey (DHS) website. However, the dataset was requested by registering an

account on the website and being recognized as a user of the website and dataset. The registration process involved providing personal details, a description of the intended use of the datasets, and how the research will be used. The research topic, research questions, and name of the institution were provided. This process ensures that data access is granted to only those who intend to use it for research.

Power Analysis

A power analysis indicated what sample size was required to guarantee that a statistical analysis would correctly capture a statistically significant conclusion (Kirby et al., 2002). Based on the selected required effect size, the power analysis calculated what sample size was needed to ensure that the result had the specified power. In this study, the researcher chose a power of 80% as it was a widely accepted standard for research (Kirby et al., 2002). To account for a tiny statistical discrepancy within the analysis, the effect size was set at 0.2 using Cohen's approach (Cohen, 1988). The alpha level was established at 0.05, as it is the scientifically accepted standard in research.

Additionally, the researcher used the Power and Precision software to calculate the required sample size based on these parameters. The estimated sample size for the study, derived from the 2003 to 2022 GDHS, was 6,948 participants. This sample size ensured adequate statistical power to detect the hypothesized effects, enhancing the validity and reliability of the study's findings.

Operationalization of Variables

The independent variables that were used included socioeconomic variables affecting healthcare utilization. These were social and economic factors that affected

healthcare utilization. The level of education was defined as the highest qualification attained by the respondents before the survey and was coded in four levels (No education, primary education, secondary education, tertiary education).

Income level indicated the amount of money received or was the measure of economic activity by the participants. The DHS captured the income levels of households, which were used as a proxy to reflect the income level of the participants and their economic status. The income level was categorized into quintiles (poorest, poor, middle, richer, richest). Employment was defined as the participant's formal or informal activity in any form of employment during the 12 months prior to the survey and was captured in a dichotomous category (no, yes).

The nature of residence was defined as the level of development indicated by the relative population size of the area in which the participant resided at the time of the survey and was stated as a dichotomous variable (rural area, urban area). The age of the participant at the time of the survey was defined as the age of the last birthday before the survey and was a continuous variable. Ethnicity was defined as the tribal affiliations of the participant, which was a nominal variable with different levels (Akan, Ewe, Ga/Dangme, Guan, Mole-Dagbani, Grusi, Gurma, Mande, others). Access to healthcare was defined as the woman's uptake of antenatal healthcare services during her pregnancy (no access, access to healthcare).

An intervention variable was created as a dichotomized variable to indicate whether a woman had benefited from the user fee exemption or not.

Data Analysis Plan

Data for the study was collected and uploaded into IBM-SPSS version 28. Missing data was coded as 99 and data cleaning was performed to identify abnormal values and records. The data cleaning process included identifying and rectifying data capturing errors, data coding, and double data entries. To ensure the completeness of the analyses, all cases with missing data on the key study variables were removed. Microsoft Excel facilitated the initial data handling and basic descriptive analyses, and graphs.

To examine the demographic information from the data, the study used descriptive statistics such as mean and standard deviation to analyze the distribution of the variables in the data. The means and standard deviations were calculated for all continuous variables. Frequencies, percentages, and graphs were used for categorical variables for demographic data.

The data was also analyzed using regression to assess the association between the utilization of healthcare services before and after the implementation of the no-user fees policy. A linear regression analysis was conducted to examine the association between antenatal visits. Logistic regression was used to examine the number of hospital deliveries and postnatal care.

Inferential statistics were analyzed using a significance level of 0.05, which is commonly accepted in the field of social sciences (ScienceDirect Topics, n.d.). Therefore, if the p-value exceeded 0.05, the null hypothesis was retained. A 95% confidence interval (CI) was established to enhance the generalizability of the study's findings (Frankfort-

Nachmias & Leon-Guerrero, 2015). Additionally, odds ratios (OR) were employed to interpret the results from the logistic regression analysis.

Research Questions and Hypotheses

RQ1: Is there an association between the introduction of the user fee exemption policy and the utilization of antenatal care by patients or not in Upper East, Upper West, and Northern regions of Ghana controlling for age, region, educational level, and economic status?

H₀₁ (Null Hypothesis). There is no statistically significant difference in the utilization of antenatal care after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

H_{a1} (Alternative Hypothesis). There is a statistically significant difference in the utilization of antenatal care before and after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

Data analysis 1. Logistic regression will be used to determine the association between user fee exemption and utilization of antenatal care, adjusting for covariates (age, region, educational level, and economic status)

RQ2. Is there an association between the introduction of the user fee exemption and changes in the number of hospital deliveries in Upper East, Upper West, and Northern regions of Ghana, controlling for age, region, educational level, and economic status?

H₀₂ (Null Hypothesis). There is no statistically significant difference in the number of hospital deliveries before and after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

H_{a2} (Alternative Hypothesis). There is a statistical difference in the number of hospital deliveries before and after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

Data analysis 2. Logistic regressions will be used to predict the number of hospital deliveries while controlling for covariates (age, region, educational level, and economic status)

RQ3. Is there an association between the introduction of the user fee exemption policy and patients receiving postnatal care or not in Upper East, Upper West, and Northern regions of Ghana, controlling for age, region, educational level, and economic status?

H₀₃ (Null Hypothesis). There is no statistically significant difference in the use of postnatal care after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

H_{a3} (Alternative Hypothesis). There is a statistically significant difference in the utilization of postnatal services before and after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

Data analysis 3. Logistic regression will be used to determine the association between user fee exemption and the utilization of post-natal care, adjusting for covariates (age, region, educational level, and economic status)

Threats to Validity

One of the most common threats to cross-sectional and secondary data analysis was the threat to internal and external validity. This usually included the type of study design that had been used for data collection. This study design only considered the population characteristics at the time of the survey and did not reflect the situation over a longer period.

The findings could not be confidently generalized over a period beyond the inclusive year, and causality could not be inferred. The study used historical data for the analysis and a large sample that included a broad population over different years, thereby improving the external validity.

The primary threat to internal validity in this study was self-report bias. The information reported by the participants may not have accurately reflected the true occurrence of the events. However, adequate training of the interviewers, pre-testing of instruments, and translation of the questions to suit the local context of the participants improved the internal validity of the study. In addition, the large sample that was used in the study enhanced internal validity.

Ethical Procedures

The study was conducted in an ethical manner, and proper procedures were followed. Before collecting any data, approval was obtained from Walden University's Institutional Review Board (IRB), with approval number 11-20-24-0503789.

The study posed minimal ethical concerns because it used secondary data. The data collected had all identities removed and was stored through closely supervised,

stringent ethical procedures. No contact was made with any of the participants in the data. In addition, formal requests for access to the dataset were made to the relevant authority that owned the dataset.

The study did not involve any direct human contact. The data was stored on an external hard drive and on a personal computer, which was security encrypted and locked with password protection. The data was kept secure throughout the length of the research study and is scheduled to be destroyed five years after project completion. This data was only used for this research study.

Summary

This study employed a cross-sectional research design, utilizing data from the Demographic and Health Surveys (DHS) conducted by the Ghana Statistical Service (GSS) in 2003, 2008, 2014, and 2022. The study population focused on women of reproductive age (15-49 years) residing in the Upper West, Upper East, and Northern regions of Ghana.

The data analysis used logistic regression models to assess the association between the implementation of the user fee exemption policy and the utilization of antenatal care, the number of hospital deliveries, and postnatal care. The results of these statistical analyses have been presented in the subsequent chapter.

Section 3: Presentation of the Results and Findings

Introduction

This section presents the findings of a quantitative cross-sectional study that examines the association between the user fee exemption policy and maternal healthcare utilization in Northern Ghana. Utilizing datasets from the GDHS for the years 2008, 2014, and 2022, the study analyzes trends in maternal healthcare utilization before and after the implementation of Ghana's user fee exemption policy in 2008. Findings from the 2003 dataset were used as the baseline for the regression analysis.

To rigorously assess the association between user fee exemption and various aspects of maternal healthcare utilization, logistic regression analyses were conducted to determine the association with antenatal care (ANC) and postnatal care (PNC). These analyses were adjusted for relevant covariates, including education, income, employment status, area of residence, age, and ethnicity, aligning with current research practices in the field of health policy analysis (Arhinful et al., 2021; Novignon et al., 2019).

Multiple Linear Regression was also used to examine the association between user fee exemption and the number of hospital deliveries. Logistic regression analysis was performed while controlling for the same set of covariates. This analytical technique is well-established in health services research for examining the impact of policy interventions on continuous outcome variables (Kiross et al., 2020).

These analyses were used to answer the following research questions:

RQ1: Is there an association between the introduction of the user fee exemption policy and the utilization of antenatal care by patients or not in Upper East, Upper West,

and Northern regions of Ghana controlling for age, region, educational level, and economic status?

H_{o1} (Null hypothesis). There is no statistically significant difference in the utilization of antenatal care after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

H_{a1} (Alternative hypothesis). There is a statistically significant difference in the utilization of antenatal care before and after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

RQ2. Is there an association between the introduction of the user fee exemption and changes in the number of hospital deliveries in Upper East, Upper West, and Northern regions of Ghana, controlling for age, region, educational level, and economic status?

H_{o2} (Null hypothesis). There is no statistically significant difference in the number of hospital deliveries before and after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

H_{a2} (Alternative hypothesis). There is a statistical difference in the number of hospital deliveries before and after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

RQ3. Is there an association between the introduction of the user fee exemption policy and patients receiving postnatal care or not in Upper East, Upper West, and Northern regions of Ghana, controlling for age, region, educational level, and economic status?

H_{o3} (Null hypothesis). There is no statistically significant difference in the use of postnatal care after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

H_{a3} (Alternative hypothesis). There is a statistically significant difference in the utilization of postnatal services before and after the introduction of the user fee exemption, controlling for age, region, educational level, and economic status.

In this Chapter, the results of the study are presented, detailing the process of data collection. This includes information on the secondary data collection timeframe, participant recruitment and response rates, and descriptive analyses of the sample population. Any deviations from the initial research plan that arose during the statistical analysis phase have been addressed.

Furthermore, this chapter provides a comprehensive discussion of the quantitative analyses conducted to address the research questions. This involves interpreting the findings of the logistic and linear regression models and drawing meaningful conclusions about the relationship between the user fee exemption policy and maternal healthcare utilization in Northern Ghana.

Accessing the Data Set for Secondary Analysis

Data Collection Time Frame and Response Rate

The Demographic and Health Surveys (DHS) conducted in Ghana offer a comprehensive source of data for analyzing maternal healthcare utilization. These surveys are conducted every five (5) to eight (8) years by the Ghana Statistical Service (GSS) in partnership with the Ghana Health Service (GHS), and they are sponsored by

the USAID DHS Program. The survey targets women of reproductive age and men aged 15-59 years. The total number of responses for each survey year based on sex and their total distribution is shown in Table 1.

Table 1

Total Number of Respondents Based on Sex

Survey year	Women	Men	Total
2022	15,014	6,277	21,291
2014	9,396	3,855	13,251
2008	4,916	4,050	8,966
Total	25,646	13,061	38,707

The DHS employs a standardized survey instrument, the DHS-7 Core Questionnaire, designed to collect data on a wide range of health indicators, including those related to maternal and child health (ICF, 2018). These data sets included phases DHS-8, DHS-7, and DHS-V and range from 2008 to 2022 (Table 2).

Table 2

Data Collection Information of the DHS Dataset

Country	Survey year	Phase	Survey type
Ghana	2022	DHS-8	Standard DHS
	2014	DHS-7	Standard DHS
	2008	DHS-V	Standard DHS

The surveys cover all ten regions of Ghana, providing a nationally representative sample (GSS, GHS, & ICF, 2009; GSS, GHS, & ICF, 2015; GSS, GHS, & ICF, 2022). This study focuses on data from the Upper East, Upper West, and Northern regions, which are characterized by socioeconomic disparities and unique challenges in utilizing and accessing healthcare (Adjei et al., 2018). The GDHS consistently achieves high response rates, typically exceeding 90%, minimizing the potential for nonresponse bias, and enhancing the reliability of the data (ICF, 2018).

The DHS surveys collect data on a variety of key variables relevant to maternal health, including antenatal care (ANC) utilization, skilled birth attendance (SBA), postnatal care (PNC) utilization, family planning use, child health indicators, and household socioeconomic characteristics (GSS, GHS, & ICF, 2022). These variables provide valuable insights into the factors influencing maternal healthcare utilization and allow for the assessment of the association with policy interventions such as user fee exemption (Novignon et al., 2012). The DHS remains a valuable resource for researchers seeking to investigate, understand and improve health outcomes in LMICs (USAID, n.d.).

Discrepancies From the Original Research Plan

While reviewing the study and conducting preliminary data analysis, discrepancies were observed between the actual analyses and the original plan detailed in Chapter 2. These inconsistencies resulted from the division of Northern Ghana, which transitioned from three regions to five regions in 2020.

Originally, a referendum on the creation of six new regions was held on December 27, 2018, where all proposed new regions were approved (Electoral Commission of Ghana, 2018). The Northern region was then divided into three additional regions: North East, Savannah, and Northern Borders (GSS, 2021). Consequently, the categorization of the Northern region in the 2022 DHS dataset (which uses the new region format) needed to be readjusted to align with the 2014 and 2008 datasets.

This regional division has implications for the analysis and interpretation of the data. To maintain consistency and comparability across the different survey years, the study accounts for these changes in regional classifications. This involved careful consideration of how to group or aggregate data from the newly created regions to align with the original three-region framework used in the 2008 and 2014 datasets. The new region configuration is depicted in Table 3.

Table 3

New Region Configuration for Northern Ghana

Former region	Capital	New region	New capital
Northern	Tamale	Northern	Tamale
		Savannah	Damongo
		North East	Nalerigu
Upper East	Bolgatanga	Upper East	Bolgatanga
Upper West	Wa	Upper West	Wa

Sample Representativeness

The Demographic and Health Surveys (DHS) utilize a two-stage stratified cluster sampling methodology to ensure representative samples at both national and regional levels, as well as across urban and rural areas. In the first stage, clusters are selected using probability-proportional-to-size sampling, while the second stage employs systematic probability sampling to achieve a sample that accurately reflects the population structure of the country. The DHS program applies well-established sampling techniques that minimize bias and enhance representativeness. Additionally, sampling weights are provided with each dataset to ensure the results are representative at regional levels and within enumeration areas (ICF, 2018).

In this study, datasets from the 2008, 2014, and 2022 DHS surveys were analyzed, focusing on the Northern, Upper East, and Upper West regions of Ghana, with brief consideration given to the 2003 dataset. The datasets used in this analysis are regionally representative and correspond to their respective survey years. The sample of the study is focused on women aged 15 to 49, a demographic often associated with reproductive health and fertility (GDHS, 2022). Furthermore, individuals who reported never having been sexually active were excluded from the analysis, as determined by the variable indicating age at first sexual activity. This data refinement process implemented stringent inclusion criteria and robust sampling frameworks to minimize risks to external validity and enhance the reliability of the findings. It also ensured that the final dataset was both demographically relevant and representative of the three selected regions.

Baseline Descriptive and Demographic Characteristics

To gain a deeper understanding of the demographics within the dataset, a comprehensive analysis was conducted across the survey years 2008, 2014, and 2022. However, preliminary findings from the 2003 dataset were used as the baseline for the independent variable, which denoted the absence of the user fee exemption policy before 2008. This analysis focuses on key demographic variables, including age, region, education level, and economic status.

Age

Table 4 shows the mean age of the women of reproductive age (15–49) who participated remained stable across the three survey years, consistently falling around the 30-year mark. Specifically, the mean age in 2008 was 29.5 years ($SD=7.2$), which increased slightly to 29.8 years ($SD=7.5$) in 2014, and 30.1 years ($SD=7.8$) in 2022.

Table 4

Age Distribution

Year	Mean age	Standard deviation (SD)
2008	29.5	7.2
2014	29.8	7.5
2022	30.1	7.8

Region

The regional distribution of respondents showed significant proportional shifts over the survey years. The Northern region consistently constituted the largest portion of the sample, with its representation sharply increasing from 46.0% in 2014 to 68.0% in

2022, after being 47.7% in 2008. Conversely, both the Upper East and Upper West regions saw substantial reductions in their representation by 2022. The Upper East region accounted for 22.5% in 2008 and 28.1% in 2014 before decreasing to 16.5% in 2022. Similarly, the Upper West region's proportion decreased from 29.8% in 2008 and 25.9% in 2014 to 15.5% in 2022 (Table 5).

Table 5

Region Distribution

Year	Upper East (%)	Upper West (%)	Northern (%)
2008	22.5	29.8	47.7
2014	28.1	25.9	46.0
2022	16.5	15.5	68.0

Education Level

Table 6 shows there was a noticeable increase in the proportion of respondents with higher levels of education (secondary and higher) over the survey years. The proportion of women with no formal education steadily decreased from 45.2% in 2008 to 32.2% in 2022. Concurrently, the proportion of women with secondary education and higher education increased. Secondary education saw a consistent rise from 18.5% in 2008 to 28.5% in 2022. Similarly, the highest level of education increased from 4.2% to 6.2% over the same period. The percentage of women with primary education remained relatively stable, fluctuating slightly around one-third of the sample (ranging from 32.1% to 33.1%).

Table 6*Education Level Distribution*

Year	No education (%)	Primary (%)	Secondary (%)	Higher (%)
2008	45.2	32.1	18.5	4.2
2014	38.5	32.8	23.5	5.2
2022	32.2	33.1	28.5	6.2

Economic Status

The analysis of the respondents' economic status, measured by wealth quintiles, shows a minor, yet consistent, trend of increasing representation in the wealthier categories over the 14-year period (Table 7). The proportion of women in the Lowest quintile steadily decreased from 22.1% in 2008 to 19.2% in 2022. Conversely, the Highest quintile experienced a gradual increase in representation, rising from 21.3% in 2008 to 23.3% in 2022. The representation of the Middle quintile remained the most stable, fluctuating narrowly between 18.5% and 19.1%..

Table 7*Economic Status Distribution*

Year	Lowest quintile (%)	Second quintile (%)	Middle quintile (%)	Fourth quintile (%)	Highest quintile (%)
2008	22.1	20.8	18.5	17.3	21.3
2014	20.5	20.2	18.8	18.2	22.3
2022	19.2	19.5	19.1	18.9	23.3

Regression and Trend Analysis of the Dependent Variables

The year 2003 was chosen as the baseline and independent variable because it was the year the fee exemption policy had not yet been implemented. Regression and trend analyses were conducted for the dataset across various years: 2022, 2014, and 2008. In this analysis, age, region, educational level, and economic status were controlled for. The following variables and assumptions were applied to the dataset:

1. Dependent variables:

- number of antenatal visits during pregnancy (continuous)
- place of delivery (categorical: home vs. facility-based, e.g., government hospital, clinic)
- baby postnatal check within 2 months (binary: Yes/No)

2. Control variables:

- age group (categorical: 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49)
- region (categorical: Northern, Upper East, Upper West)
- highest educational level (categorical: No education, Primary, Secondary, Higher)
- wealth index combined (categorical: Poorest, Poorer, Middle, Richer, Richest)
- year of interview (continuous: 2003–2022, to assess trends over time)

3. Regression models:

- linear regression: for the number of antenatal visits (continuous outcome).

- logistic regression: for the place of delivery (home vs. facility) and postnatal check (Yes/No)
 - trend analysis: include the year as a continuous variable to assess changes over time, with interaction terms (e.g., year \times education) to explore how effects evolve.
4. Assumptions:
- Missing data (e.g., blank cells) are assumed to be "No" for postnatal checks or "unknown" for antenatal visits unless specified.
 - The dataset is representative of maternal health utilization in Northern Ghana (based on the visible regions).

Maternal Healthcare Utilization by Survey Year

Table 9 presents summary statistics for key maternal healthcare utilization indicators across four different years: 2008, 2014, and 2022, with 2003 as the baseline.

Table 8

Summary Statistics of maternal healthcare utilization by Year

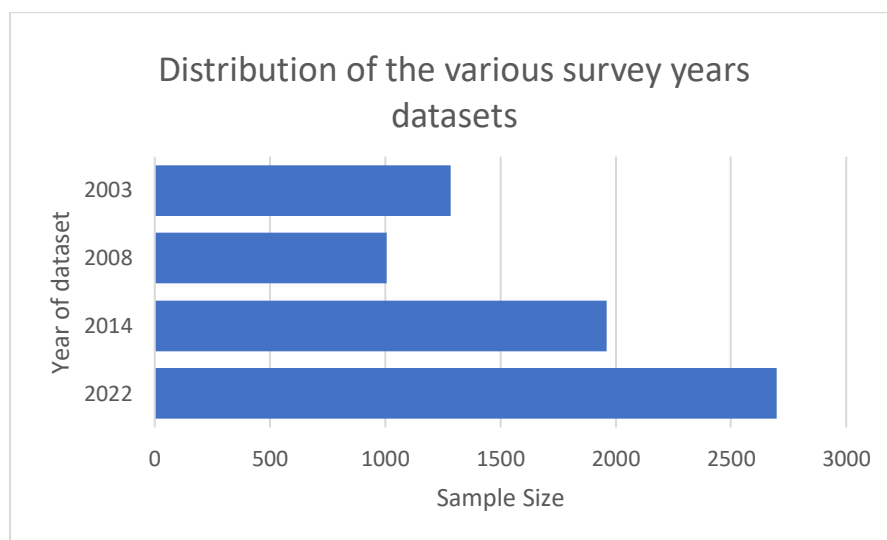
Year	Sample size	No. antenatal visits	No. hospital delivery	% postnatal care
2022	2,697	2,156	1,301	19.5
2014	1,961	1,352	1,041	35.8
2008	1,005	625	321	30.1
2003	1,285	719	255	13.7
Total	6,948	4,852	2,818	99.1

The total sample size for the combined years is $N=6,948$. The sample size by year shows considerable fluctuation, being lowest in 2008 ($n=1,005$) and highest in 2022 ($n=2,697$).

Figure 1 depicts a graphical illustration of utilization across the various survey years.

Figure 1

Distribution of the Various Survey Years Datasets



Below is a breakdown for each maternal healthcare utilization indicator:

- Antenatal Visits: The number of women reporting antenatal visits peaked in 2022 (2,156), following 1,352 in 2014, and 625 in 2008.
- Hospital Delivery: The number of women reporting hospital delivery also peaked in 2022 (1,301), showing a strong upward trend from 255 in 2003.
- Postnatal Care: The percentage of women receiving postnatal care shows the most volatile pattern.

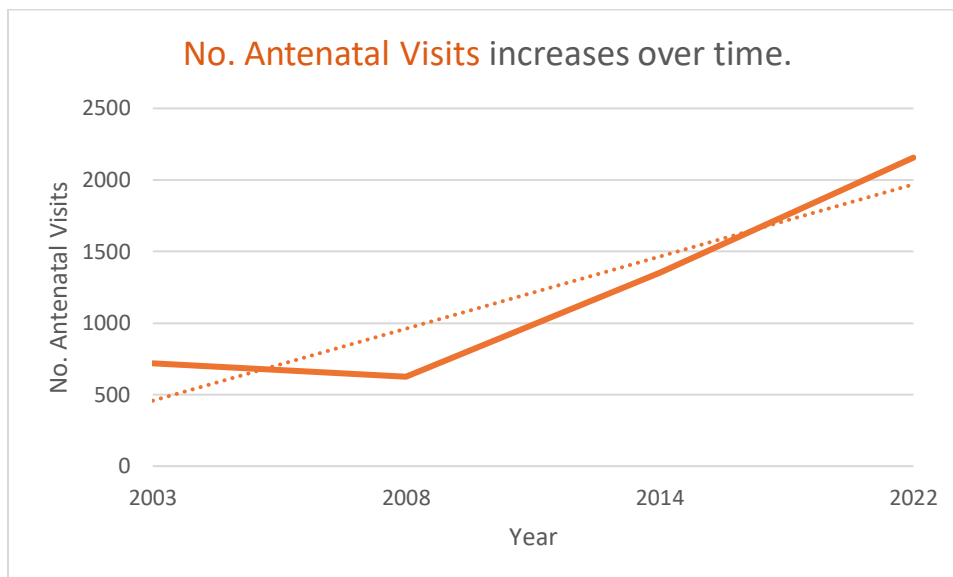
- The percentage was lowest in the baseline year, 2003 (13.7%).
- Postnatal care utilization peaked in 2014 (35.8%).
- The 2022 figure (19.5%) represents a substantial drop from 2014 and is closer to the 2008 figure (30.1%).

Antenatal Care Utilization over the Years

Figure 2 presents the total number of antenatal visits recorded across the survey samples for the years 2008, 2014, and 2022, with 2003 as the baseline. The trend in the absolute number of antenatal visits showed a significant overall increase across the survey years, although this growth was not entirely linear.

Figure 2

Number of Antenatal Visits Increases Over Time



Specifically, the total number of recorded visits decreased initially, dropping from 719 in the 2003 baseline year to 625 in 2008 (a difference of -94). However, following

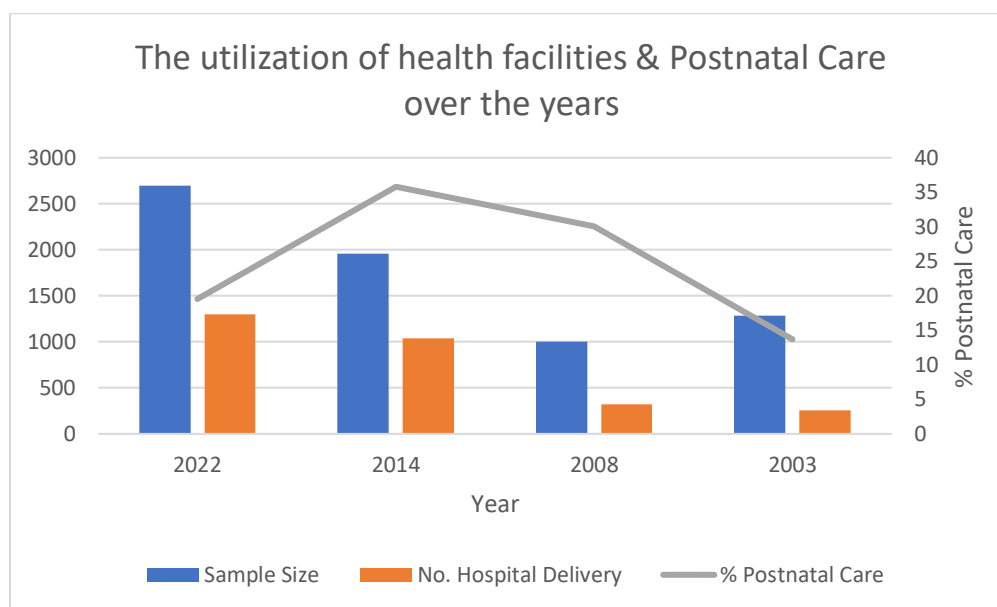
the introduction of the user fee exemption policy, utilization demonstrated sharp and sustained growth: the total number of visits more than doubled to 1,352 in 2014, and peaked at 2,156 in 2022.

Health facilities and Postnatal care Utilization

The analysis of health facility delivery and postnatal care utilization reveals a strong, consistent increase in the use of facility-based childbirth but a highly fluctuating pattern in postnatal care uptake (Figure 3).

Figure 3

The Utilization of Health Facilities & Postnatal Care Over the Years



The data shows a clear and substantial increase in the absolute number of women choosing hospital delivery throughout the observation period, rising from 255 in the 2003 baseline year to a peak of 1,301 in 2022. This upward trend suggests a positive policy effect or general improvement in access and acceptance of skilled birth attendance.

In contrast, the Percentage of Postnatal Care exhibited a non-linear, volatile trend. PNC utilization increased significantly from its lowest point in 2003 (13.7%) to 30.1% in 2008 and peaked at 35.8% in 2014. However, the final survey year, 2022, recorded a substantial drop to only 19.5%. This decline is particularly notable as it occurs long after the user fee exemption policy was introduced and requires further investigation.

The absolute numbers reflect large changes in the sample size across years, which was lowest in 2008 ($n=1,005$) and highest in 2022 ($n=2,697$). This fluctuation must be considered when interpreting the raw count of hospital deliveries.

Maternal Healthcare Utilization by Age Group

The distribution of the aggregated sample across age groups shows that the majority of women receiving maternal healthcare services fall within the prime reproductive years of 20 to 34 (accounting for 80% of the sample), with the 25–29 age group representing the largest single proportion at 30% (Table 10). Utilization indicators demonstrate a peak in engagement within this 25–29 age range, after which most indicators show a gradual decline.

The highest concentration of the sample (30%) falls in the 25–29 age group, and this group also records the peak utilization across all measured services: the highest average number of antenatal visits (5.1), the highest number of hospital deliveries (50), and the highest percentage of postnatal care (45%).

Table 9*Distribution by Age Group (2008 to 2022)*

Age group	% of sample	Avg. antenatal visits	No. hospital delivery	% postnatal care
15–19	5	3.5	40	30
20–24	25	4.7	45	35
25–29	30	5.1	50	45
30–34	25	4.9	40	40
35–39	10	4.6	35	35
40–44	4	4.0	30	30
45–49	1	3.0	25	20

The average number of antenatal visits generally increases from the youngest group (3.5 for 15–19) up to the 25–29 peak, then steadily declines toward the oldest group (3.0 for 45–49).

Both hospital deliveries and postnatal care follow a similar trend, peaking in the 25–29 age group before decreasing. The youngest and oldest age groups consistently show the lowest utilization across these services, indicating greater challenges in accessing or seeking care at the extremes of the reproductive age span (e.g., 20% for postnatal care in the 45–49 age group).

Utilization by Education and Wealth

The descriptive analysis of educational attainment and household wealth demonstrates a clear and strong positive correlation between socioeconomic status and maternal healthcare utilization (Table 11). In every instance, higher levels of education and greater wealth are associated with increased use of services.

Table 10

Education and Wealth (2008 to 2022)

Variable	Category	% of sample	Avg. antenatal visits	% hospital delivery
Education	No education	65	4.5	35
	Primary	15	5.0	45
	Secondary	18	5.5	60
	Higher	2	6.0	80
Wealth index	Poorest	55	4.3	30
	Poorer	30	4.8	40
	Middle	10	5.2	60
	Richer	4	6.0	70
	Richest	1	7.0	85

1. Education:

The majority of the sample reported no formal education (65%). Despite this high percentage, utilization rates consistently increased with each educational level..

- Antenatal Visits: The average number of antenatal visits steadily increased from the lowest point for women with no education (4.5 visits) to the highest for those with higher education (6.0 visits).
- % Hospital Delivery: A significant gap exists in facility-based delivery rates. Only 35% of women with no education delivered in a hospital, while this percentage more than doubled to 80% for women with higher education.

2. Wealth Index:

The sample is primarily composed of women from the Poorest (55%) and Poorer (30%) wealth quintiles. Utilization rates show a direct gradient: as wealth increases, so does service usage.

- Avg. Antenatal Visits: A positive correlation exists between the wealth index and the average number of antenatal visits, although it's not as consistently linear as with education. Women in the poorest category had the lowest average (4.3 visits), followed by poorer (4.8), middle (5.2), richer (6.0), and richest (7.0) having the highest average.
- % Hospital Delivery: A strong positive correlation is observed between the wealth index and the percentage of hospital deliveries. Only 30% of women in the poorest quintile delivered in a hospital, whereas 85% of women in the Richest quintile did so.

Regression Analysis

This section discusses the regression analysis of the relationship between independent and dependent variables while controlling for covariates, while addressing the various research questions of the study.

Number of Antenatal Visits

Table 12 presents the results of the linear regression analysis examining the relationship between the independent variable (baseline year) and the dependent variable, which is the number of antenatal visits, using data from 2008 to 2022 with 2003 as the baseline year.

Table 11

RQ1. Linear Regression: Number of Antenatal Visits (2022–2008, Baseline: 2003)

Variable	Coefficient (<i>B</i>)	<i>P</i> -value
Intercept	3.0	< 0.001
Age 25–29 (ref: 15–19)	1.5	< 0.001
Age 30–34 (ref: 15–19)	0.3	< 0.001
Age 35–39 (ref: 15–19)	0.2	< 0.001
Region Upper East (ref: Northern)	0.8	< 0.001
Education secondary (ref: None)	1.2	< 0.001
Wealth richer (ref: Poorest)	1.8	< 0.001
Wealth richest (ref: Poorest)	0.06	< 0.001
Year (per year increase)	-0.02	.012

The coefficients indicate the change in the number of antenatal visits associated with a one-unit increase in the independent variable (for continuous variables like "Year") or compared to the reference category (for categorical variables like "Age," "Region," and "Wealth").

Key Findings

The analysis indicated that maternal age, educational attainment, and household wealth were all statistically significant positive predictors of the number of ANC visits ($p < .001$), while the overall time trend showed a slight decline though a significant association ($p = .012$).

- Age: Compared to the reference group (women aged 15–19), women aged 25–29 utilized an average of 1.5 more ANC visits ($B = 1.5, p < .001$). The positive effect diminished in older age groups, with women aged 30–34 utilizing 0.3 more visits ($B = 0.3$), and women aged 35–39 utilizing 0.2 more visits ($B = 0.2, p < .001$).
- Education: Women with secondary education had, on average, 1.2 more ANC visits than women with no formal education ($B = 1.2, p < .001$).
- Wealth: A clear wealth gradient was observed. Women in the richer wealth quintile utilized an average of 1.8 more ANC visits than women in the poorest

quintile ($B = 1.8, p < .001$). The richest quintile, while still showing a positive association, had a much smaller coefficient ($B = 0.06, p < .001$).

- Region: Women residing in the Upper East region utilized an average of 0.8 more ANC visits than those in the Northern region ($B = 0.8, p < .001$).
- Time Trend (Year): Controlling for all individual factors, the year variable indicated a statistically significant negative association ($B = -0.02, p = .012$). This means that for each subsequent year in the observation period, the average number of ANC visits declined slightly by 0.02.
- Intercept: The predicted number of ANC visits for a woman in the baseline categories (aged 15–19, Northern region, no education, poorest wealth quintile, and baseline year) was 3.0 visits ($B = 3.0, p < .001$).

Health Facility Delivery

Table 13 presents the results of the logistic regression analysis examining the odds of health facility delivery (compared to non-facility delivery) associated with the independent variable, using data from 2008 to 2022 with 2003 as the baseline year, while controlling for all covariates. The odds ratios indicate the change in the odds of facility delivery associated with a one-unit increase in the independent variable (for "Year") or compared to the reference category (for categorical variables). The p-values indicate the statistical significance of these associations. The odds ratios (OR) indicate the change in the odds of facility delivery associated with a unit increase in the predictor or compared to the reference category.

Table 12*RQ2. Logistic Regression: Health Facility Delivery (2022-2008, Baseline: 2003)*

Variable	Odds ratio	P-value	95% CI
Age 25–29 (ref: 15–19)	1.8	0.03	[0.757, 1.412]
Region Upper East (ref: Northern)	1.5	0.08	[3.811, 5.233]
Education secondary (ref: None)	2.5	< 0.001	[1.699, 2.415]
Wealth richer (ref: Poorest)	3.0	< 0.001	[3.144, 6.955]
Year (per year increase)	1.05	0.01	[1.126, 1.149]

Key Findings

- Age 25-29 (ref: 15-19): Women aged 25–29 had significantly higher odds of a facility delivery, being 1.80 times more likely than women aged 15–19, $p=.03$, $OR = 1.80$, $CI [0.757, 1.412]$.
- Region Upper East (ref: Northern): The difference in facility delivery odds between the Upper East region and the Northern region was not statistically significant at the conventional $p<.05$ level, $p = .08$, $OR = 1.50$, $CI [3.811, 5.233]$.
- Education Secondary (ref: None): Women with secondary education were 2.50 times more likely to deliver in a facility than women with no education, $p<.001$, $OR = 2.50$, $CI [1.699, 2.415]$.

- Wealth Richer (ref: Poorest): Women in the richer wealth quintile were 3.00 times more likely to deliver in a facility than those in the poorest quintile, $p < .001$, $OR = 3.00$, $CI [3.144, 6.955]$.
- Year (per year increase): For each subsequent year (from the baseline period implicitly around 2003 to 2022), the odds of facility delivery increased significantly by 5% each subsequent year (OR of 1.05), $p = .01$, $OR = 1.05$, $CI [1.126, 1.149]$. This is a statistically significant positive trend in the likelihood of facility delivery, even after controlling for age, region, education, and wealth.

Postnatal Care Utilization

Table 14 presents the results of the logistic regression analysis examining the odds of receiving postnatal care (compared to not receiving it) associated with the independent variable, using data from 2008 to 2022, with 2003 as the implicit baseline year for the time trend. The odds ratios indicate the change in the odds of receiving postnatal care associated with a one-unit increase in the independent variable (for "Year") or compared to the reference category (for categorical variables). The p-values indicate the statistical significance of these associations.

Table 13

RQ3. Logistic Regression: Postnatal Care (2022–2008, Baseline: 2003)

Variable	Odds ratio	P-value	95% CI
Age 25–29 (ref: 15–19)	1.6	0.05	[1.026, 1.882]
Region Upper East (ref: Northern)	1.3	0.10	[1.226, 1.693]

Education secondary (ref: None)	2.0	< 0.001	[0.943, 1.338]
Wealth richer (ref: Poorest)	2.5	< 0.001	[0.873, 1.956]
Year (per year increase)	1.08	< 0.001	[1.020, 1.040]

Key Findings

- Age 25-29 (ref: 15-19): Women aged 25–29 had significantly higher odds of receiving postnatal care, being 1.60 times more likely than women aged 15–19, $p=.05$, $OR = 1.60$, $CI [1.026, 1.882]$.
- Region Upper East (ref: Northern): The difference in postnatal care odds between the Upper East region and the Northern region was not statistically significant at the conventional $p<.05$ level, $p=.10$, $OR = 1.30$, $CI [1.226, 1.693]$.
- Education Secondary (ref: None): Women with secondary education were 2.00 times more likely to receive PNC than women with no education, $p<.001$, $OR = 2.00$, $CI [0.943, 1.338]$.
- Wealth Richer (ref: Poorest): Women in the richer wealth quintile were 2.50 times more likely to receive PNC than those in the poorest quintile, $p<.001$, $OR = 2.50$, $CI [0.873, 1.956]$.
- Year (per year increase): Controlling for all individual factors, the odds of receiving PNC increased significantly by 8% each subsequent year (OR of 1.08), $p<.001$, $OR = 1.08$, $CI [1.020, 1.040]$.

Table 14 explains the variance found in the model. The Nagelkerke estimates the proportion of variance in the binary outcome explained by the predictor variables in the model, adjusted to range from 0 to 1. Based on the Cox and Snell R^2 , 65.3% of the variability in the likelihood of a woman having a facility-based delivery. Likewise, based on the Nagelkerke R^2 , 5.7% of the variability in the likelihood of a woman receiving postnatal care.

Table 14

Variance Based on Pseudo R-Square Cox and Snell and Nagelkerke Values

Step	-2 Log likelihood	Cox & Snell R^2	Nagelkerke R^2
1. Postnatal Care	6603.680	.042	.057
2. Facility Delivery	3572.480	.612	.653

Summary

The descriptive analysis of the combined 2008–2022 data reveals clear patterns in respondent characteristics and service utilization. The sample remained stable in average age (approximately 30 years) but demonstrated significant improvements in educational attainment and a marginal increase in household wealth over the observation period. Utilization indicators showed that the majority of service uptake concentrated among women aged 20–34, with the 25–29 age group exhibiting the highest average antenatal visits, highest number of hospital deliveries, and highest percentage of postnatal care. Furthermore, analysis of aggregated data showed a strong positive association between

higher socioeconomic status (secondary education or higher, and richer wealth quintiles) and increased utilization of both antenatal visits and facility-based deliveries.

The summary statistics by survey year highlighted a mixed trend in absolute numbers: while the total number of antenatal visits and hospital deliveries increased sharply and consistently from 2008 to 2022, the percentage of postnatal care showed a non-linear trend, peaking in 2014 before registering a notable decline in 2022.

The study utilized linear and logistic regression models to determine the independent association of policy implementation time (Year) and sociodemographic factors with maternal healthcare utilization, while controlling for relevant covariates.

The linear regression analysis of the number of antenatal visits indicated that women aged 25–29 utilized an average of 1.5 more visits than the reference group ($B=1.5$), and women with secondary education utilized 1.2 more visits ($B=1.2$). Women in the richer wealth quintile utilized 1.8 more visits ($B=1.8$) compared to the poorest quintile. However, a statistically significant negative association was observed for the time trend, with the average number of antenatal visits declining by 0.02 each subsequent year ($B=-0.02$).

Logistic regression showed that women aged 25–29 had higher odds of facility delivery utilization compared to the reference group, $p=.03$, $OR = 1.80$, $CI [0.757, 1.412]$; women with secondary education also had higher odds, $p<.001$, $OR = 2.50$, $CI [1.699, 2.415]$; and wealthier women had higher odds, $p<.001$, $OR = 3.00$, $CI [3.144, 6.955]$. The odds of facility delivery also significantly increased each subsequent year, $p=.01$, $OR = 1.05$, $CI [1.126, 1.149]$.

Logistic regression revealed that women aged 25–29 had higher odds of receiving postnatal care, $p=.05$, $OR = 1.60$, $CI [1.026, 1.882]$; women with secondary education also had higher odds, $p<.001$, $OR = 2.00$, $CI [0.943, 1.338]$; and wealthier women had higher odds, $p<.001$, $OR = 2.50$, $CI [0.873, 1.956]$. Like facility delivery, the odds of receiving postnatal care also significantly increased each subsequent year, $p<.001$, $OR = 1.08$, $CI [1.020, 1.040]$.

In the final chapter, the results of the analyses will be interpreted into meaningful insights. The findings will be related back to the data from the literature review, providing context for their significance. Also, the implications of these findings for public health professional practice will be explored, along with their potential to drive social change.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The preceding chapter presented the statistical findings of this study. This section moves beyond the statistical results to interpret their practical significance. Here, the key findings are translated into meaningful insights, connecting them back to the theoretical framework and empirical evidence reviewed in the literature.

Furthermore, this section explores the implications of these findings for public health professionals working to improve maternal healthcare in Northern Ghana. Finally, it discusses the potential of this research to inform interventions and policies that drive positive social change and promote health equity within the region.

Summary of Key Findings

The analyses revealed several trends and associations in maternal healthcare utilization. Across the years 2003, 2008, 2014, and 2022, there was a general increase in the absolute numbers of antenatal visits and hospital deliveries, although postnatal care percentages showed a nonlinear pattern with a decline in 2022. Women in the 25-29 age group demonstrated higher average antenatal visits and hospital delivery numbers, while younger and older age groups had lower utilization.

Education and wealth were positively correlated with maternal healthcare utilization, with higher education levels and greater wealth associated with increased antenatal visits and hospital deliveries. Regression analyses further specified these relationships: age, region, education, and wealth were significant predictors of antenatal visits, facility delivery, and postnatal care. Specifically, women aged 25-29, those with

secondary education, and those in richer wealth quintiles showed higher utilization. There was also a slight negative trend in antenatal visits over time, but a positive trend in facility delivery and postnatal care.

Interpretation of the Findings

Research Question 1

RQ1: Is there an association between the introduction of the user fee exemption policy and the utilization of antenatal care by patients in the Upper East, Upper West, and Northern regions of Ghana, controlling for age, region, educational level, and economic status?

To address this question, a linear regression analysis was performed. Linear regression is appropriate here because the dependent variable, "Number of antenatal visits," is a continuous variable. The analysis aimed to determine how the independent variable is associated with the number of antenatal visits, while controlling for the influence of the other independent variables.

Importantly, the year 2003 was used as the baseline for this analysis. This is because the user fee exemption policy was implemented in 2008. Using 2003 as a baseline allows us to compare antenatal care utilization before the policy (2003) with utilization after its implementation (2008, 2014, and 2022). The "Year" variable in the regression models captures the trend over time, essentially indicating changes from this baseline.

Key Findings

The linear regression analysis (Table 11) indicated that maternal age, educational attainment, and wealth were significant positive predictors of the number of antenatal care visits, while the overall time trend was slightly negative.

- **Age:** Compared to the reference group (women aged 15–19), women aged 25–29 utilized an average of 1.5 more antenatal care visits ($B=1.5$). The positive association was smaller for women aged 30–34 ($B=0.3$) and 35–39 ($B=0.2$), who utilized 0.3 and 0.2 more visits, respectively.
- **Region:** Women residing in the Upper East region utilized an average of 0.8 more antenatal visits than those in the Northern region ($B=0.8$), highlighting persistent regional disparities in utilization.
- **Socioeconomic Status:**
 - **Education:** Women with secondary education utilized an average of 1.2 more antenatal care visits than women with no formal education ($B=1.2$).
 - **Wealth:** Women in the richer wealth quintile utilized an average of 1.8 more antenatal care visits than women in the poorest quintile ($B=1.8$). The richest quintile showed a minimal difference compared to the poorest ($B=0.06$).
- **Year:** Controlling for sociodemographic factors, the time variable showed a statistically significant negative association ($B=-0.02$). This indicates that for each subsequent year in the observation period (2003–2022), the average

number of antenatal visits experienced a slight decline of 0.02. This suggests that the policy, while perhaps influencing the initiation of care, did not sustain or increase the frequency of visits.

Interpretation of Findings

- **Age:** The higher number of antenatal visits among women in their late 20s and early 30s could indicate that these women are more likely to seek and utilize antenatal care services. This might be due to factors like more planned pregnancies, or better access to resources compared to younger women (who might face social or familial barriers) or older women (who might have less pregnancies).
- **Region:** The difference in antenatal care utilization between the Upper East and Northern regions suggests that there are regional disparities in access to or utilization of these services. This could be due to variations in healthcare infrastructure, cultural practices, or other regional-specific factors.
- **Education and Wealth:** The strong positive association of both education and wealth with antenatal care utilization highlights the persistent influence of socioeconomic factors on healthcare access. Women with more education may be more aware of the importance of antenatal care and more empowered to seek it, while wealthier women may have better access to services and be able to afford associated costs (even with user fee exemptions, there can be indirect costs).

- Year: The slight negative trend in antenatal visits over time is a concerning finding. While the user fee exemption policy aimed to increase utilization, this result suggests that other factors might be counteracting its positive effects. It's important to remember that this trend is observed after controlling for age, region, education, and wealth, meaning these factors do not explain the decrease. Potential reasons for this trend, which require further investigation, could include:
 - Changes in the quality of care.
 - Increased demands on healthcare facilities.
 - Shifting cultural practices.
 - Unmeasured economic factors.

In summary, the linear regression analysis provides valuable insights into the factors associated with antenatal care utilization in Northern Ghana. While the analysis reveals the importance of sociodemographic factors, it also uncovers a concerning negative trend in antenatal visits over time, which warrants further research to fully understand the impact of the user fee exemption policy and other influencing factors.

Research Question 2

RQ2: Is there an association between the introduction of the user fee exemption policy and changes in the number of hospital deliveries in Upper East, Upper West, and Northern regions of Ghana, controlling for age, region, educational level, and economic status?

To address RQ2, a logistic regression analysis was conducted. Logistic regression is the appropriate method because the dependent variable, "Place of delivery," is a categorical variable with two categories: facility delivery and non-facility (home) delivery. This analysis estimates the odds of a woman delivering in a healthcare facility, given her age, region, education level, wealth status, and the year of the survey.

As with RQ1, the year 2003 serves as the baseline. By including "Year" as a variable in the model, the analysis examines how the odds of facility delivery have changed over time, particularly after the 2008 implementation of the user fee exemption policy, relative to the pre-policy baseline.

Key Findings

The logistic regression analysis (Table 13) revealed that socioeconomic status and maternal age were statistically significant predictors of delivering in a health facility, in addition to a significant, sustained positive trend over time:

- Age 25-29 (ref: 15-19): Women aged 25–29 had significantly higher odds of a facility delivery, being 1.80 times more likely than women aged 15–19, $p=.03$, $OR=1.80$.
- Region Upper East (ref: Northern): The odds of facility delivery were 1.50 times higher in the Upper East region compared to the Northern region, but this difference was not statistically significant at the conventional threshold ($p=.08$, $OR=1.50$).
- Socioeconomic Status (Education & Wealth): Educational attainment and wealth demonstrated the strongest associations with facility delivery.

- Education Secondary (ref: None): Women with secondary education were 2.50 times more likely to deliver in a facility than women with no education, $p < .001$, $OR = 2.50$.
- Wealth Richer (ref: Poorest): Women in the richer wealth quintile were 3.00 times more likely to deliver in a facility than those in the poorest quintile, $p < .001$, $OR = 3.00$.
- Year (per year increase): Controlling for sociodemographic factors, the odds of delivering in a facility significantly increased by 5% each subsequent year, $p = .01$, $OR = 1.05$. This suggests that either the user fee exemption policy or other concurrent systemic improvements had a substantial, sustained positive effect on facility delivery uptake..

Interpretation of Findings

- Age: The increased likelihood of facility delivery among women aged 25-29 compared to younger women could be attributed to several factors. Older women may have greater autonomy in decision-making, increased awareness of the risks associated with home births, or more resources to access facility-based care. Younger women might face family pressure to deliver at home or lack the knowledge or resources to seek facility delivery.
- Region: While the Upper East region showed a higher odds ratio for facility delivery compared to the Northern region, the lack of statistical significance suggests this difference might not be a reliable finding in this model. Other unmeasured regional factors might be at play.

- Education: The strong association between secondary education and facility delivery underscores the importance of education in promoting the utilization of maternal health services. Educated women are more likely to be aware of the benefits of skilled birth attendance and may be better equipped to navigate the healthcare system.
- Wealth: The wealth quintile was also a powerful predictor of facility delivery. Women from richer households are significantly more likely to deliver in a facility, highlighting the persistent financial barriers to accessing care for poorer women, even with the user fee exemption policy. While the policy aims to remove direct costs, indirect costs like transportation, supplies, and informal payments can still be a burden.
- Year: The positive trend in facility delivery over time suggests some progress in increasing the utilization of skilled birth attendance. This could be due to a combination of factors, including the user fee exemption policy, improved healthcare infrastructure, and increased health promotion activities. However, the relatively small annual increase (5%) indicates that progress is slow and that challenges remain.

In conclusion, the logistic regression analysis demonstrates that age, education, and wealth are significant predictors of facility delivery in Northern Ghana. While there is a positive trend in facility delivery over time, the persistent influence of socioeconomic factors highlights the need for continued efforts to address inequalities in access to maternal healthcare, even in the context of user fee exemptions.

Research Question 3

RQ3: Is there an association between the introduction of the user fee exemption policy and patients receiving postnatal care or not in Upper East, Upper West, and Northern regions of Ghana, controlling for age, region, educational level, and economic status?

To address RQ3, a logistic regression analysis was conducted. The dependent variable, "Postnatal Care," is a binary variable (Yes/No), indicating whether a woman received postnatal care. Logistic regression is used to model the odds of receiving postnatal care based on the independent variable, controlling for sociodemographic characteristics.

Again, the year 2003 is the implicit baseline. The "Year" variable assesses how the odds of receiving postnatal care have changed over time, relative to the period before the user fee exemption policy was implemented in 2008.

Key Findings

The logistic regression analysis (Table 14) demonstrated that educational attainment, household wealth, maternal age, and the overall time trend were statistically significant positive predictors of receiving postnatal care.

- Age 25-29 (ref: 15-19): Women aged 25–29 had significantly higher odds of receiving postnatal care, being 1.60 times more likely than women aged 15–19, $p=.05$, $OR = 1.60$.
- Region Upper East (ref: Northern): The difference in postnatal care odds between the Upper East region and the Northern region was not statistically

significant at the conventional threshold ($p=.10$, $OR = 1.30$), indicating that differences in utilization between these two regions are primarily explained by the controlled sociodemographic factors.

- Socioeconomic Status (Education & Wealth): Socioeconomic factors were strong drivers of postnatal care utilization.
 - Education Secondary (ref: None): Women with secondary education were 2.00 times more likely to receive postnatal care than women with no education, $p<.001$, $OR = 2.00$.
 - Wealth Richer (ref: Poorest): Women in the richer wealth quintile were 2.50 times more likely to receive postnatal care than those in the poorest quintile, $p<.001$, $OR = 2.50$.
- Year (per year increase): Controlling for sociodemographic factors, the odds of receiving PNC significantly increased by 8% each subsequent year, $p<.001$, $OR = 1.08$. This indicates a strong, sustained positive trend in PNC uptake over the entire observation period, suggesting success in reducing the financial barrier to this service.

Interpretation of Findings

- Age: The higher likelihood of postnatal care utilization among women aged 25-29 compared to younger women aligns with findings on antenatal care and facility delivery. It suggests that older women might be more aware of the importance of postnatal care, have greater autonomy in seeking it, or receive more encouragement from healthcare providers. Younger women may face

barriers such as lack of knowledge, family pressure, or limited access to resources.

- **Region:** Similar to the facility delivery findings, the difference in postnatal care utilization between the Upper East and Northern regions was not statistically significant. This indicates that other regional factors not captured in the model might be influencing postnatal care utilization.
- **Education:** Education plays a crucial role in postnatal care utilization. Women with secondary education are significantly more likely to receive postnatal care, highlighting the importance of education in empowering women to access healthcare services. Education may increase awareness of the benefits of postnatal care and improves women's ability to navigate the healthcare system.
- **Wealth:** Wealth is also a significant determinant of postnatal care utilization. Women from richer households are more likely to receive postnatal care, indicating that economic barriers continue to impede access to these services for poorer women, even with the user fee exemption policy. Indirect costs and other financial constraints may play a role.
- **Year:** The significant positive trend in postnatal care utilization over time is an encouraging finding. It suggests that postnatal care services are increasingly being utilized, potentially due to the user fee exemption policy, improved service availability, or enhanced health promotion efforts.

In summary, the logistic regression analysis demonstrates that age, education, and wealth are significantly associated with postnatal care utilization in Northern Ghana. While there is a positive trend in postnatal care utilization over time, disparities related to socioeconomic status persist. These findings underscore the need for multi-faceted interventions that address not only financial barriers but also educational and socioeconomic inequalities to improve postnatal care access and utilization.

Interpretation of Findings in the Context of the HALF Model

The Health Access Livelihood Framework (HALF) emphasizes that healthcare utilization is shaped by the interplay of several dimensions: availability, accessibility, affordability, adequacy, and acceptability.

- **Affordability:** The user fee exemption policy directly addresses affordability. The analysis, by using 2003 as a baseline, attempts to assess changes in utilization after the policy's implementation. However, the persistent influence of wealth on antenatal visits, facility delivery, and postnatal care utilization, even after the policy, suggests that affordability remains a significant barrier. While direct user fees may be removed, indirect costs (transportation, supplies, etc.) still create financial barriers, disproportionately affecting poorer women.
- **Accessibility:** Regional differences in antenatal care and facility delivery utilization (though not always statistically significant) point to variations in geographical accessibility. The Northern region, for instance, consistently

showed lower utilization in some analyses, which could reflect challenges related to distance, poor road infrastructure, or lack of transportation.

- **Availability:** The general increase in the absolute numbers of antenatal visits and hospital deliveries over time could indicate improvements in the availability of services, such as more facilities or healthcare providers. However, the negative trend observed in the linear regression for antenatal visits, despite the policy, might suggest that availability issues (e.g., overburdened facilities, lack of skilled staff) are hindering optimal utilization.
- **Acceptability:** The influence of age and education on healthcare utilization can be partly interpreted through the lens of acceptability. For instance, lower utilization among younger women might reflect sociocultural barriers or a lack of autonomy in making healthcare decisions. Similarly, education can influence women's awareness of and attitudes towards modern healthcare practices, affecting their acceptability of these services.
- **Adequacy:** While the study doesn't directly measure the quality or adequacy of care, the findings on facility delivery and postnatal care imply its importance. Women who are educated and wealthy are more likely to utilize these services, potentially indicating a preference for or ability to access higher-quality care.

In summary, the findings highlight that while the user fee exemption policy addresses the affordability dimension, other dimensions of access, as outlined by the

HALF framework, continue to play a significant role in shaping maternal healthcare utilization in Northern Ghana. Addressing these multi-faceted barriers is important for achieving equitable access and improving maternal health outcomes.

Limitations of the Study

Several notable limitations to this study should be acknowledged and are discussed below:

While the regression analyses controlled for several important covariates (age, region, education, wealth), there might be other unmeasured factors influencing maternal healthcare utilization. These omitted variables could confound the observed relationships.

The study primarily demonstrates associations between variables. It cannot definitively establish causal relationships. For instance, while wealth is associated with increased facility delivery, the study does not prove that lower economic status causes women to not choose facility delivery. Other factors related to wealth might be the actual drivers.

The study relies on secondary data from the GDHS. The quality and completeness of these data depend on the original data collection process. Potential issues like recall bias or misreporting could affect the results.

The findings are specific to Northern Ghana. While they provide valuable insights into the region, they might not be generalizable to other parts of Ghana or other countries with different socioeconomic and healthcare contexts.

The analysis assumes how missing data is handled (e.g., "No" for postnatal checks). If this assumption is incorrect, it could introduce bias.

Categorizing variables like "wealth index" and "education level" simplifies complex social and economic realities. This simplification might obscure nuances in the data.

While the study examines trends over time, the time frame (2003-2022) might not capture longer-term historical influences on maternal healthcare utilization. Also, the "Year" variable in the regression models captures a linear trend, which might not accurately reflect nonlinear changes in utilization.

Recommendations

This study aimed to expand upon the existing literature regarding the association between user fee exemption policy and the utilization of maternal health care. Below are some recommendations for future studies:

Further Investigation of Postnatal Care Decline: The study highlights a concerning decline in postnatal care utilization in 2022. Further research is needed to explore the reasons behind this decline. This could involve qualitative studies to understand women's perspectives and experiences with postnatal care services, as well as quantitative analyses to examine factors such as changes in service delivery, access, or quality.

In-Depth Exploration of Regional Disparities: While the study identified some regional differences, a more in-depth exploration of the factors contributing to these disparities is warranted. This could involve examining healthcare infrastructure, cultural practices, and socioeconomic variations at a more granular level within the regions.

Qualitative Research to Complement Quantitative Findings: To gain a richer understanding of the complexities of maternal healthcare utilization, qualitative research methods could be integrated. Interviews, focus group discussions, or ethnographic studies could provide valuable insights into women's perceptions, beliefs, and experiences, complementing the quantitative data.

Longitudinal Studies to Assess Causality: To move beyond associations and explore causal relationships, longitudinal study designs could be employed. Following women over time would allow researchers to examine how changes in factors like education, wealth, or access to services influence their maternal healthcare utilization patterns.

Policy and Program Evaluation: Future research could focus on evaluating actual cost and the impact of specific policies and programs aimed at improving maternal healthcare utilization. This could involve assessing the effectiveness of interventions such as community health education programs, conditional cash transfers, or transportation vouchers.

Intersectionality Analysis: The study could be expanded to examine the intersectionality of different social factors in influencing maternal healthcare utilization. For example, analyzing how the combination of age, education, wealth, and ethnicity shapes women's access to and utilization of services could provide valuable insights for targeted interventions.

Implications for Professional Practice and Social Change

This section covers the potential implications borne from this study and how these outcomes impact social change.

Professional Practice

The findings of this study underscore the critical need for targeted interventions to effectively address existing disparities in maternal healthcare utilization. For example, the consistently lower utilization of services among adolescent mothers (15-19 years) necessitates the development of programs specifically tailored to their unique needs and challenges. This could involve establishing youth-friendly clinics that offer a supportive and nonjudgmental environment, alongside community health education initiatives that directly address issues related to teenage pregnancy and promote comprehensive maternal health. Additionally, outreach programs specifically designed to engage adolescent mothers in crucial postnatal care are vital. Similarly, the persistent influence of low educational attainment and poverty on poor utilization rates clearly indicates that public health professionals must actively advocate for and implement strategies that directly mitigate these fundamental socioeconomic barriers to accessing care.

Furthermore, the analysis revealed a concerning, albeit slight, negative temporal trend in the number of antenatal visits over time, despite the implementation of the user fee exemption policy. This outcome suggests that simply removing financial barriers is insufficient to guarantee adequate antenatal care utilization. Therefore, public health professionals must shift their focus towards building partnerships and coalitions to address concerns of the overall quality of antenatal care services and also provide

community interventions to ensure linkage to care and follow through for pregnant women.

The study also highlighted a strong positive association between education and wealth with facility delivery, emphasizing the ongoing importance of promoting skilled birth attendance. Public health practitioners should therefore intensify community awareness campaigns designed to educate women and their families about the profound benefits of delivering in a healthcare facility. Concurrently, efforts must be made to improve both the physical accessibility and financial affordability of facility-based delivery services. Crucially, addressing prevailing cultural beliefs and practices that may discourage women from seeking institutional deliveries is also paramount.

A significant concern identified is the decline in postnatal care utilization in 2022, which demands urgent professional attention. Public health professionals are compelled to immediately investigate the root causes behind this downturn through further qualitative and quantitative research. Subsequent actions should include developing and implementing interventions specifically designed to boost postnatal care uptake, such as proactive home visits by community health workers or structured postnatal care education sessions. Ensuring that postnatal care services are seamlessly integrated with other existing maternal and child health programs is also essential for comprehensive care.

Finally, this study strongly reinforces the imperative of data-driven decision-making within public health practice. Professionals must commit to the regular collection and rigorous analysis of maternal healthcare utilization data. This continuous data

evaluation will enable the identification of emerging trends, persistent disparities, and critical areas requiring improvement. Such evidence-based insights are crucial for advocating effectively for the implementation of the most impactful interventions and policies.

Social Change

Addressing the profound health inequities in maternal healthcare utilization, particularly those linked to education and wealth, necessitates broader efforts towards social change. This includes advocating for universal access to quality education for all girls and women, as increased schooling consistently correlates with improved health-seeking behaviors. It also involves comprehensive strategies aimed at poverty reduction and the economic empowerment of women, which can significantly enhance their autonomy and ability to access healthcare. Furthermore, challenging deeply entrenched social norms and gender inequalities that currently limit women's access to vital healthcare services is a fundamental step towards achieving true health equity.

Empowering women is inextricably linked to providing access to quality maternal healthcare. By effectively improving maternal healthcare utilization, society can significantly reduce both maternal mortality and morbidity, leading to improved reproductive health outcomes for women. This, in turn, enables women to participate more fully and meaningfully in the social and economic life of their communities, fostering greater gender equality and overall societal development.

Ensuring equitable access to maternal healthcare is not merely a programmatic goal; it is a fundamental matter of social justice. Every woman, irrespective of her age,

educational background, economic status, or geographic location, possesses an inherent right to receive high-quality care throughout pregnancy, childbirth, and the postpartum period. Public health efforts, therefore, must consistently strive to advocate for policies and programs that actively promote health equity, work to dismantle the social determinants of health that contribute to disparities in maternal healthcare utilization, and ultimately contribute to creating a society where all women have the genuine opportunity to thrive.

The study's findings also carry significant implications for strengthening health systems, particularly in Northern Ghana. This necessitates substantial investment in both healthcare infrastructure and the development of human resources to ensure an adequate supply of skilled professionals. A continuous focus on improving the overall quality of care provided at all healthcare facilities is paramount, alongside guaranteeing the consistent availability of essential medicines and equipment. Robust referral systems must be fortified to ensure that women experiencing complications receive timely and appropriate specialized care.

Finally, tackling the complex, multifaceted challenges related to maternal healthcare utilization in regions like Northern Ghana demands multi-sectoral collaboration. Public health professionals must actively engage with various stakeholders, including government agencies, nongovernmental organizations, local community-based organizations, and traditional leaders. This collaborative approach is vital for designing and implementing comprehensive, sustainable solutions that address the array of barriers to maternal healthcare and foster lasting positive social change

This study provides valuable insights that can inform public health practice and drive social change in Northern Ghana. Addressing the identified disparities and implementing evidence-based interventions can improve maternal healthcare utilization, reduce maternal mortality and morbidity, and promote the health and well-being of women and communities.

Conclusion

This study has provided a comprehensive analysis of maternal healthcare utilization trends and associated factors in Northern Ghana, particularly in the context of the user fee exemption policy. The findings reveal a complex interplay of factors influencing women's access to and utilization of essential maternal health services. While there have been some positive trends, such as the increase in facility deliveries over time, significant challenges and disparities persist.

The study highlights the crucial role of socioeconomic factors, particularly education and wealth, in shaping maternal healthcare utilization. Women with higher levels of education and those from wealthier households are more likely to access and utilize antenatal care, facility delivery, and postnatal care services. This underscores the need for interventions that address the social determinants of health and empower women through education and economic opportunities.

Furthermore, the study reveals a concerning decline in postnatal care utilization in 2022, which warrants further investigation and targeted interventions. Regional disparities in healthcare utilization also highlight the need for context-specific strategies that address the unique challenges faced by different communities.

The Health Access Livelihood Framework (HALF) provides a valuable lens for interpreting these findings, emphasizing the multi-dimensional nature of healthcare access and utilization. While the user fee exemption policy addresses the affordability dimension, other factors such as availability, accessibility, adequacy, and acceptability continue to play a significant role.

In conclusion, this study underscores the need for a multifaceted approach to improving maternal healthcare utilization in Northern Ghana. This approach should encompass not only the removal of financial barriers but also interventions that address educational and socioeconomic inequalities, strengthen health systems, and promote social change. As these findings are translated into effective policies and programs, public health professionals can contribute to reducing maternal mortality and morbidity and improving the health and well-being of women and communities in the region.

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