

Healthcare Access and Cost among Pregnant Women: Evidence from Nigerian Demographic and Health Survey Data

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Abstract

This study utilized data from the most recent Nigerian Demographic and Health Survey data (2018) to examine healthcare access and cost among pregnant women in Nigeria. Employing binary logistic regression, this study was aimed to assess the socioeconomic and demographic factors that influence healthcare access and cost among pregnant women in Nigeria. Stata 17 was used to run the regression. The findings of this research showed that the socio-economic factors: employment status, health insurance coverage and wealth index significantly impacted on healthcare access and healthcare costs. On the other hand, the demographic factors: age, education level, religion, ethnicity, place of residence and region also significantly impacted on healthcare access and costs. Age was an exception as it didn't have a significant impact on access to healthcare. In line with the objectives, policies such as investments in community health clinics and maternity care centres in lacking areas, regulations that require healthcare providers and facilities to disclose pricing information for maternity-related services, limits on out-of-pocket costs for maternity-related services, support of prenatal education programs that provide information about pregnancy, childbirth, and postpartum care were recommended.

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Introduction

“Health is wealth”, as the popular saying goes. The ability of a person and a nation as a whole depends highly on the well-being and health status of all parties involved. The way you grow and progress in life in no small way depends on the level of health that you live in, work in and transact in. Leveraging this knowledge of the importance of health as a stabilizing phenomenon in no small measure contributes either deliberately or by chance to the health sector’s output. A healthy economy is equally as represented in its citizens and their health status, their ability to take care of themselves and their ability and willingness to make use of the health infrastructures and facilities in the country.

The World Health Organisation (WHO) emphasizes the importance of primary healthcare as the foundation of a strong and comprehensive healthcare system. They advocate for a primary healthcare approach that focuses on essential health services, health promotion, disease prevention, and community participation. The WHO supports the strengthening of primary healthcare systems to ensure universal health coverage and improve health outcomes. The essence is to make all women should receive adequate maternal health care before, during, and after their pregnancies to guarantee newborn and every member of that family’s good health.

During its early history, Nigeria relied on traditional medicine as its primary healthcare system. This encompassed practices like herbalism, divine healing, midwifery, spiritual healing, bone-setting, mental health therapy, and surgical interventions. Despite over 150 years Western-medical method being introduced in the country, traditional and medical restorative practices continue to coexist within Nigeria’s intricate healthcare system. The inception of modern medical services in Nigeria can be traced back to the European expeditions of the early to mid-nineteenth century. The inaugural healthcare facility in the country, a dispensary, was inaugurated in 1880 by the Church Missionary Society in Obosi. This was followed by additional facilities in Onitsha and Ibadan in 1886. The very first hospital in Nigeria, however, was the Sacred Heart Hospital in Abeokuta, constructed by the Roman Catholic Mission in 1885.

In Nigeria, the growth and expansion of medical services were closely tied to the process of industrialization. The majority of medical doctors operated as civil servants, although those employed by missionary hospitals often integrated evangelism with healing practices. Within the realm of civil service doctors, a Chief Medical Officer was designated, assuming the role of the primary executor of healthcare policies across Nigeria. Together with their junior colleagues, they constituted the core of the Ministry of Health in Lagos. The intricate nature of centralized health service administration at this juncture mirrors the intricate political evolution of the entire region. From 1952 to 1954, the authority over medical services shifted to the regional governments, along with control over various other services. Consequently, each of

the three regions (eastern, western, and northern) established their respective Ministries of Health, alongside the Federal Ministry of Health. Even though the federal government primarily managed the health budget for the states, the state governments possessed the autonomy to allocate the healthcare budget according to their own judgment.

In terms of access to health care services, it is estimated that in 1960, only about 10-15% of the Nigerian population was covered by any form of modern health care services, which is a very poor number. Also, services were focused more in the urban areas at the expense of the rural areas. As a result, more than 50% of the urban population had access to health care, while less than 5% of the rural population had comparable access. It was even more shocking considering the fact that about 90% of the population was rural in 1960. The situation has not really changed much today, except that there has been an increase in urban migration, further tasking the existing urban facilities, making them ineffective and inadequate. Also, today there are more quacks parading as doctors all over the country with impunity.

These factors have resulted in adverse effects on the overall well-being of the average Nigerian population, particularly impacting pregnant women and contributing to perinatal mortality. The perinatal mortality rate in sub-Saharan Africa, excluding South Africa, is commonly estimated to range from 100 to 110 per 1000 births. Nigeria follows a similar pattern.

For instance, at Nigeria's University of Benin Teaching Hospital, Omene and colleagues reported a perinatal mortality rate of 89 in 1974, which declined to 33 in 1980 due to the implementation of a robust neonatology program. However, by 1986, the rate rebounded to 57. Although data for 1990 is unreliable, it's estimated to be near the 1974 level. The substantial reduction in the rate by two-thirds between 1974 and 1980 corresponded with the establishment of a proactive neonatology program at the Teaching Hospital, resulting in a significant reduction in deaths within the first week of life. Presently, the same hospital is witnessing a perinatal mortality rate as high as 110 to 120 per 1000 births. In Nigeria, infant mortality rate which is the death of an infant before the first birthday had its figure in 1960 at 190; in 1978 it was 157. However, the situation has improved somewhat over the last 3 decades. According to UNICEF's report on the "State of the World's Children" in 2010, Infant Mortality in 1990 was 120 while in 2008, it was 96, and in 2021, the figure stands at 70.6 (WDI). No reason was given for this decline, but credit must go to Health Care Institutions and health care providers.

As per the 2017 report by the World Health Organization (WHO), over 295,000 women lost their lives globally due to preventable pregnancy or childbirth complications, averaging around 810 maternal deaths each day. The majority of these maternal fatalities (94%) happened in low- to middle-income countries (LMICs), with a particular focus on sub-Saharan Africa, where around two-thirds (66%) of all worldwide

maternal deaths were documented. Even though there was a reduction of over 38% in maternal mortality worldwide, decreasing from 342 to 211 deaths per 100,000 live births between 2000 and 2017, the maternal mortality ratio remains significantly elevated. Furthermore, during the period of 2000 to 2017, the maternal mortality ratio in sub-Saharan Africa remained at 542 maternal deaths per 100,000 live births, surpassing the global ratio of 216 deaths per 100,000 live births. In order to mitigate and lower these maternal fatalities, a variety of interventions have been created. Among them is the incorporation of Sustainable Development Goals (SDGs) by the UN, with one of SDG-3's objectives being to decrease global maternal deaths to fewer than 70 deaths per 100,000 live births by the year 2030. Additionally, in the year 2021, five fresh objectives were introduced to aid nations in getting back on course towards diminishing maternal mortality and monitoring advancement in line with the SDGs. Among these targets, the initial three necessitate a 90% attendance rate for ANC4+ visits, 90% attendance by skilled health personnel during births, and 80% accessibility of prenatal care (PNC) for women who have given birth. In spite of these efforts, global progress towards achieving the SDG-3 goal of reducing maternal deaths remains sluggish, with inadequate utilization of maternal health care services persisting as a pressing concern in low- and middle-income countries (LMICs). This is attributed to disparities in accessing quality health services, a scarcity of skilled health personnel, and the substantial gap between socioeconomic classes, all of which have amplified challenges within healthcare systems.

Our healthcare system faces numerous challenges, including inadequate infrastructure, a shortage of healthcare professionals, and limited resources. Access to quality healthcare services is particularly difficult for pregnant women residing in rural and remote areas, where healthcare facilities are scarce. The urban-rural divide exacerbates the inequalities in healthcare access, with urban areas having better-equipped facilities compared to rural regions. Also, the cost of healthcare services is a significant barrier for pregnant women in Nigeria. Many pregnant women, especially those from low-income households, struggle to afford prenatal care, delivery services, and postnatal care. The financial burden includes direct costs, such as medical fees, transportation expenses, and medication, as well as indirect costs, such as loss of income due to time spent seeking care. Socio-cultural factors also play a vital role in determining healthcare-seeking behaviours among pregnant women in Nigeria. Deeply rooted cultural practices, traditional beliefs, and societal norms influence decisions related to maternal healthcare. For example, some women may prefer traditional birth attendants or home births due to cultural beliefs and a lack of awareness regarding the importance of skilled healthcare providers during childbirth. The Nigerian government has made efforts to improve maternal healthcare through various policies and programs, such as the National Health Insurance Scheme (NHIS) and the Midwives Service Scheme. However, the

implementation and effectiveness of these initiatives remain uneven across different regions, and barriers persist in translating policies into tangible improvements in healthcare access and cost for pregnant women. Most researches that have been done in this area have focused on the factors which influenced health care usage among pregnant women and barriers to healthcare utilization by pregnant women. Little work has examined geographical, demographical and socioeconomic factors affecting maternal healthcare access and costs among pregnant women in Nigeria over time. It seems that this lens is lacking, yet necessary for any meaningful debate on healthcare cost and healthcare access. To fill this gap, this study puts into consideration some socioeconomic and demographic characteristics that may affect the access to healthcare and cost of healthcare. This study's findings will contribute to the existing literature on maternal health in Nigeria and provide evidence for evidence-based policy recommendations. By addressing the socio-economic and demographic characteristics and how they affect access to healthcare and costs faced by pregnant women, the study aims to contribute to the reduction of maternal and infant mortality rates, improve overall health outcomes, and promote gender equity in healthcare provision.

Literature Review

The literature review of this study is divided into two: theoretical and empirical literature.

Theoretical Literature

This study is anchored on the Andersen's Behavioural Model of Health Care Utilization Initially developed in the late 1960s by Ronald M. Andersen (a professor of health services) as a theoretical model, the Andersen's Behavioural Model of Health Care Utilization has been used to explore individual and contextual characteristics that may facilitate or impede health services utilization in a much broader orientation than most other models (Bradley, Curry, & Devers, 2007). In most general terms, the model aims to identify the factors that may trigger the necessity of using health assistance.

The model relies on the assumption that the use of a wide range of health care services (including both in-patient and home care) is conditioned by the major factors:

- Predisposition aspects (e.g. gender, ethnicity, age, beliefs about treatment, health habits, etc.);
- Enabling factors (access to health care, the general state of health in the community, the attitude of family members to treatment and their support, etc.);
- Needs (encompassing both real needs for medical assistance and perceived ones) (Babitsch, Gohl, & Lengerke, 2012).

This framework was further developed and several alterations were introduced. In its most recent form, the model covers the whole process of treatment starting from the patient's previous experience in health care

and ending with long-term outcomes as the ultimate goal of any medical intervention. A feedback loop has been integrated into the latest version of the model. It deals with the ways the experience may affect the patient's previous needs as well as his/her views of health care. It allows identifying the direction of the changes produced in the patient's characteristics and his/her immediate environment. The Anderson's Behavioral Model will be subjected to other improvements, which are going to include genetic factors that can influence treatment methods and assist in predicting its outcomes (Andersen, Rice, & Kominski, 2011).

Empirical Literature

The cost- access nexus has generated debates over the years, and many research studies have, therefore, been conducted in the area, both abroad and domestically. This section of the literature review seeks to examine such studies, with particular emphasis on foreign and domestic studies.

Fetene and Haile (2023), delved into the challenges surrounding healthcare access among women of reproductive age in emerging regions of Ethiopia, utilizing data from the 2016 Ethiopia Demographic and Health Survey. Employing multilevel mixed-effect binary logistic regression analysis, they identified the contributing factors to these accessibility issues. A notable portion of women in these emerging regions face hurdles when trying to access healthcare, especially among those who are unmarried, economically disadvantaged (poor or middle wealth status), uneducated, not employed, and living in rural areas. Their recommendations include the implementation of governmental strategies aimed at enhancing women's education, household economic status, and employment opportunities. These measures are envisioned to mitigate the barriers that impede healthcare access for women residing in Ethiopia's emerging regions.

Alamneh, Teshale, Yeshaw, Alem, Ayalew, Liyew, Tessema, Tesema & Worku (2022), utilized the latest Demographic and Health Survey (DHS) data spanning 2010 to 2020, to investigate the prevalence of socioeconomic disparities in healthcare access barriers across 33 sub-Saharan African countries. Their analysis indicated that factors such as wealth index and place of residency played a significant role in creating pro-poor socioeconomic inequalities in healthcare access barriers. In light of their findings, the researchers emphasized the importance of directing efforts toward initiatives that enhance both wealth status and educational attainment among the population. Additionally, they recommended expanding mass media coverage to address the challenges faced by economically disadvantaged individuals in accessing healthcare services.

Yehualashet, Seboka, Tesfa, Mamo & Seid (2022), utilized a secondary analysis of the 2019 Ethiopian Mini Demographic and Health Survey (EMDHS), the researchers aimed to discern factors linked to achieving optimal antenatal care (ANC) visits for pregnant women in Ethiopia. They established a

multilevel logistic regression model to uncover the elements associated with meeting the criteria for optimal ANC attendance. Notably, factors such as women's educational attainment, wealth status, and place of residence demonstrated significant correlations with achieving these optimal ANC visits. As a result, the researchers suggested that implementing health promotion programs specifically aimed at uneducated mothers is crucial to heighten awareness about the importance of undergoing a minimum of four antenatal care service visits.

Bain, Aboagye, Dowou, Kongnyuy, Memiah & Amu (2022), utilized data from recent demographic and health surveys in 28 sub-Saharan African countries, and employed a multilevel logistic regression analysis to explore both the prevalence and factors influencing maternal healthcare utilization among young women within these nations. Notably, young women situated in the wealthiest wealth quintile exhibited higher likelihoods of utilizing antenatal care, skilled birth attendants, and postnatal care, in contrast to their counterparts in the poorest wealth quintile. Conversely, young women who acknowledged facing barriers to healthcare utilization demonstrated decreased likelihoods of engaging with maternal healthcare services. They put forth recommendations for interventions, including the implementation of free delivery services and enhancements in facility accessibility, among other strategies proven effective in certain countries. These proposals are directed at nations with lower maternal healthcare utilization rates, aiming to enhance overall maternal health outcomes.

Sserwanja, Mukunya, Musaba, Kawuki & Kitutu (2021), utilized data from the Uganda Demographic and Health Survey 2016, which aimed to identify the determinants linked to the utilization of health facilities during childbirth in the country. Employing multivariable logistic regression, they sought to uncover the factors associated with this particular healthcare choice. The analysis indicated a high prevalence of health facility utilization during childbirth. Notably, this choice was correlated with factors such as younger age, higher levels of education, increased wealth index, urban residency, tribe, religion, and proximity to nearby health facilities. In light of these findings, they recommended that initiatives aiming to promote health facility childbirths in Uganda should specifically target women with lower levels of education, those with limited financial resources, and older age groups.

Nisingizwe, Tuyisenge, Hategeka & Karim (2020), leveraged data from the 2014–15 Rwanda Demographic and Health Survey (RDHS), as they aimed to explore the connection between perceived obstacles to healthcare access and insufficient antenatal care (ANC) visits among women of reproductive age in Rwanda. The findings indicated that 64% of women who perceived encountering barriers to healthcare faced inadequate ANC visits. Through multivariable analysis, it was evident that women perceiving such barriers were more likely to experience inadequate ANC visits. In light of these results,

the researchers recommended the implementation of interventions specifically designed to enhance healthcare access in Rwanda. Such measures are anticipated to lead to an increase in the uptake of antenatal care services.

D. Zhou, Z. Zhou, Yang, Ji, Ghose & Tang (2020), evaluated the advancements made in maternal healthcare service utilization since 2000. By analysing two sets of the Cambodian Demographic and Health Surveys (DHS) data (DHS 2000 and DHS 2014), the researchers employed both descriptive and multivariate regression analyses. The investigation unveiled noteworthy discrepancies across demographic, socioeconomic, and geographic dimensions in the usage of antenatal care (ANC), health facility delivery, and postnatal care services. These current findings offer valuable insights into the sociodemographic factors linked to maternal health service utilization in Cambodia. This information can significantly contribute to the development of evidence-based health policies and the creation of effective intervention programs.

Tanou & Kamiya (2019), evaluated the influence of geographical proximity to health facilities on maternal healthcare utilization in Burkina Faso using the Burkina Faso Demographic and Health Survey (DHS) 2010 dataset. Employing multivariate logistic regressions, they aimed to quantify the impact of distance on the utilization of maternal healthcare. The findings unveiled a significant relationship: as the distance to the nearest health centre increased, the likelihood of women receiving adequate maternal healthcare services decreased. The estimates indicated that a one-kilometre increase in distance to the closest health centre corresponded to reduced odds of a woman receiving four or more antenatal care visits and reduced odds of delivering her baby under the care of a skilled birth attendant. Based on these results, the researchers advocated for the enhancement of geographical access to health facilities. This strategic improvement is envisioned to elevate the utilization of appropriate healthcare services during both pregnancy and childbirth.

El-Khatib, Odusina, Ghose & Yaya (2020), conducted an analysis using combined data from Nigeria Demographic and Health Surveys for the years 2008, 2013, and 2018 to explore the trends in antenatal care (ANC) utilization, identify factors contributing to inadequate ANC usage, and assess the links with specific socio-demographic factors. The analysis employed multivariable logistic regression. The study identified significant associations between insufficient and delayed ANC attendance and factors such as residency type, geographical region, education level, household size, contraceptive use, distance to healthcare, media exposure, and total number of children. The study's recommendations include investing in initiatives to enhance women's socio-economic status and addressing urban-rural disparities in healthcare access within Nigeria.

Okoli, Hajizadeh, Rahman & Khanam (2020), employed data from four rounds of Nigeria's Demographic Health Surveys (DHS) conducted in 2003, 2008, 2013, and 2018. The aim was to assess disparities in maternal healthcare utilization based on geography and socioeconomic status in Nigeria from 2003 to 2017. The findings revealed that maternal healthcare usage is less frequent among women with lower socioeconomic backgrounds, limited education, residents of rural areas, and those located in the North West and North East geopolitical zones. The study suggested the implementation of strategies aimed at improving maternal healthcare service uptake within these specific groups.

Ozumba, Onyeneho, Chalupowski, Subramanian (2019), conducted a cross-sectional survey involving 1,600 women who had given birth in the six months preceding the study. The participants were selected from both urban and rural areas across four local government regions within Enugu State, Nigeria. The survey, carried out using a structured questionnaire, aimed to investigate disparities in accessing maternal health services in the region. Findings highlighted existing inequalities in accessing adequate healthcare services when required. These disparities in quality healthcare access among different population segments pose a barrier to achieving universal health coverage in Enugu State. They suggested that concerted efforts to establish a coordinated healthcare delivery system is needed to ensure equitable access to health services, leaving no one behind.

Adedokun & Uthman (2019), utilized data from the 2013 Nigeria Demographic and Health Survey (DHS) to explore the factors associated with not utilizing healthcare services for childbirth in Nigeria, a country where less than 40% of births occur in healthcare facilities. Employing multilevel multivariable logistic regression models, the study analysed the predictors of non-utilization of healthcare services for delivery across individual, community, and state levels. The study found that various factors increased the odds of not using healthcare services during childbirth. These factors included lack of education, poverty, age between 25 and 34 years, unmarried status, absence of antenatal clinic attendance, transportation difficulties to healthcare facilities, and residing in socioeconomically disadvantaged communities and states. The study recommended that interventions targeting this issue should be comprehensive, considering each level of influence.

Akinyemi, Afolabi and Awolude (2016), conducted an inquiry into the trends and influencing factors behind the discontinuation of the maternity care continuum (antenatal, delivery, and postnatal care) in Nigeria. Analysing data from the 2013 Nigeria Demographic and Health Survey (DHS), they examined information from 20,467 women who had given birth within five years of data collection. Descriptive statistics were used to outline background characteristics and dropout patterns. Factors contributing to dropout between antenatal care and delivery included financial constraints, distance to healthcare facilities,

lack of formal education, belonging to a lower wealth quintile, and residing in rural areas. They recommended implementing intervention programs that emphasize the advantages of consistent maternal healthcare across communities, particularly targeting women in rural regions and lower socioeconomic strata.

Okafor, Sekoni, Ezeiru, Ugboaja and Inem (2014), focused their research on the healthcare preferences of rural women during pregnancy and childbirth in the Southwestern region of Nigeria. This study comprised three focus group discussions where women of reproductive age from a rural Local Government Area in Lagos State participated, sharing their insights through semi-structured interviews. The findings underscored the considerable impact of traditional beliefs on the decision-making process for accessing maternal healthcare services. The choice of the actual delivery location was influenced by personal and household factors, primarily financial resources. They suggested enhancing financial accessibility to conventional healthcare services as a means to improve maternal healthcare access.

Method

The theoretical foundation for this study is the Andersen's Behavioural Model of Health Care Utilization. This model is of the view that three primary circumstances or variables affect a person's decision to utilize or not use a health care service. These three types of factors are care-related factors, enabling factors, and predisposing factors. Predisposing factors are an individual's health beliefs, social structure, and demographics that influence whether or not they choose to use a health care service. The resources or means that a person has at their disposal to seek medical attention are enabling factors. The availability of income, the level of the community, and the presence and placement of healthcare services are all measured at the household level. The term "need for care factors" describes how a person views his or her own overall health and functional state, as well as their knowledge of the symptoms of illness, pain, and health-related anxieties.

In line with this theory, this study adopts the binary logistic regression model to examine whether socio-economic and demographic factors limit or hinder pregnant women's access to prenatal care and maternal services in Nigeria using secondary data from the 2018 Nigeria Demographic and Health Survey (NDHS). The logistic regression analysis is a regression technique that is used to investigate the relationship between binary or ordinal response variable and a set of independent predictor variables that can either be continuous or categorical.

Table 1: Variable Names and Definitions

Source: Author’s computation

Variable Names	Definition
haccess	getting medical help for self: distance to health facility
hcost	getting medical help for self: getting money needed for treatment
emp	Employment Status
age	Age of respondent
edu	Education level (No education, primary, secondary, higher)
rel	Religion
eth	Ethnicity
resd	Place of residence
rgn	Region
ins	Health Insurance coverage
wealth	Wealth Index

The logit form may be written as:

$$\begin{aligned}
 \text{logit} &= \log \left[\frac{p1}{1 - p1} \right] \\
 &= \beta_0 + \beta_1 \text{emp} + \beta_2 \text{age} + \beta_3 \text{edu} + \beta_4 \text{rel} + \beta_5 \text{eth} + \beta_6 \text{resd} + \beta_7 \text{rgn} \\
 &\quad + \beta_8 \text{ins} \\
 &\quad + \beta_9 \text{wealth} \dots \dots \dots (1)
 \end{aligned}$$

Itemizing the variables, we show the functional forms of the models in the equations 2 and 3 below:

$$\begin{aligned}
 &haccess \\
 &= F(\text{emp, age, edu, rel, eth, resd, rgn, ins, wealth}) \dots \dots \dots (2)
 \end{aligned}$$

$$\begin{aligned}
 &hcost \\
 &= F(\text{emp, age, edu, rel, eth, resd, rgn, ins, wealth}) \dots \dots \dots (3)
 \end{aligned}$$

Data Source

The study used secondary data from the most recent (6th) Nigeria Demographic and Health Survey (NDHS). The collection of data took place from August 14, 2018, to December 29, 2018. All variables used in this study were obtained from the NDHS. The outcome variables in this study are getting medical help for self: distance to health facility (where not being a big problem is coded as 0 and being a big problem is coded as 1) as a proxy for healthcare access and getting medical help for self: getting money needed for treatment (where not being a big problem is coded as 0 and being a big problem is coded as 1) as a proxy for healthcare costs. The independent variable used were age, education status, religion, ethnicity, residence (urban or rural), region (North Central, North East, North West, South East, South

West and South South), health insurance (No and Yes), currently employed (No and Yes), and wealth index (poorest, poorer, middle, richer and richest).

Results and Interpretations

Table 2: Logistic Regression for Healthcare Access (with haccess as the dependent variable)

Variables	Coefficient	Std. err.	z	P> z
emp	.0550901	.0150008	3.67	0.000
age	-.0004119	.0008188	-0.50	0.615
edu	-.0627568	.0090319	-6.95	0.000
rel	-.0055142	.0014267	-3.86	0.000
eth	.0027979	.0001675	16.70	0.000
resd	.3450203	.0166531	20.72	0.000
rgn	.0199139	.0050311	3.96	0.000
insu	-.83237	.0667342	-12.47	0.000
wealth	-.3998477	.006725	-59.46	0.000
_cons	-.5090853	.0490833	-10.37	0.000

Source: Author's computation

Employment Status (emp): The value of the coefficient of emp is .0550901, which means that the log odds increased by .055 for a change in employment status. The regression result shows that employment status (emp) has a positive relationship with healthcare access. This means that if one is employed, it increases the likelihood of access to healthcare not being a big problem. Some jobs or employers provide their workers with health insurance benefits which provides them with consistent access to healthcare coverage thereby reducing the risk of interruptions in medical care.

Education Level (edu): The value of the coefficient of edu is -.0627568, which means that the log odds decreased by .062 for each increase in education level. The regression result shows that education level (edu) has an inverse relationship with healthcare access. This means that having higher educational level decreases the likelihood of access to healthcare not being a big problem. Higher education levels can sometimes lead to decreased access to healthcare for pregnant women due to various factors. For instance, highly educated women might have demanding careers that make it difficult for them to take time off for prenatal appointments or to rest during pregnancy.

Religion (rel): The value of the coefficient of rel is -.0055142, which means that the log odds decreased by .0055 for belonging to one religious group or the other. The regression result shows that religion (rel) has an inverse relationship with healthcare access. This means that belonging to one religious group or the other decreases the likelihood of access to healthcare not being a big problem. Some religious beliefs might

discourage or prohibit certain medical interventions, including prenatal care or childbirth interventions. This could lead pregnant women to avoid seeking necessary medical attention, potentially putting their health and the health of their unborn child at risk. In certain religious communities also, there's a reliance on faith healing or prayer as an alternative to conventional medical care. This could lead pregnant women to avoid prenatal care, potentially leading to undiagnosed complications.

Ethnicity (eth): The value of the coefficient of eth is .0027979, which means that the log odds increased by .0027 for belonging to one ethnic group or the other. The regression result shows that ethnicity (eth) has a positive relationship with healthcare access. This means that belonging to one ethnic group or the other increases the likelihood of access to healthcare not being a big problem. Healthcare providers who are aware of and sensitive to the cultural norms and practices of different ethnic groups can offer more effective and respectful care. This can encourage pregnant women to seek medical attention without fear of judgment or misunderstanding. Some ethnic communities might also have specific health promotion programs that focus on maternal and child health, encouraging pregnant women to seek regular check-ups and prenatal care.

Place of Residence (resd): The value of the coefficient of resd is .3450203, which means that the log odds increased by .345 for each change in place of residence, from rural to urban. The regression result shows that place of residence (resd) has a positive relationship with healthcare access. This means that a change in place of residence increases the likelihood of access to healthcare not being a big problem. Urban areas typically have better healthcare infrastructure, including hospitals and specialized clinics, which can provide comprehensive prenatal and obstetric care. Pregnant women in rural areas might face challenges in accessing quality care due to geographical limitations. Living close to healthcare facilities, especially maternity clinics or hospitals, as well as having easy access to public transportation increases the likelihood that pregnant women will seek prenatal care and medical assistance when needed. Reduced travel time makes accessing care more convenient.

Region (rgn): The value of the coefficient of rgn is .0199139, which means that the log odds increased by .019 for each change in region. The regression result shows that region (reg) has a positive relationship with healthcare access. This means that regional change increases the likelihood of access to healthcare not being a big problem. Investing in the development of healthcare facilities, including maternity clinics and hospitals, in several regions can provide pregnant women with closer and more convenient options for prenatal care and childbirth services. Also, offering subsidized or free maternal healthcare services in

regions with financial constraints can remove economic barriers that might hinder pregnant women from seeking medical care.

Health Insurance Coverage (insu): The value of the coefficient of insu is $-.83237$, which means that the log odds decreased $.832$ for each increase in health insurance coverage. The regression result shows that health insurance coverage (insu) has an inverse relationship with healthcare access. This means that being covered by health insurance decreases the likelihood of access to healthcare not being a big problem. Health insurance coverage, although intended to provide financial support for healthcare needs, can sometimes inadvertently decrease access to healthcare for pregnant women. Some health insurance plans might have limitations on coverage for prenatal care, childbirth, and related services. Pregnant women might be deterred from seeking necessary care if they anticipate high out-of-pocket costs. Also, insurance plans with high deductibles and copayments can create financial barriers, making pregnant women hesitant to seek medical attention, especially if they are facing tight budgets.

Wealth Index (wealth): The value of the coefficient of wealth is $-.3998477$, which means that the log odds decreased by $.399$ for an increase in wealth status. The regression result shows that ethnicity (eth) has an inverse relationship with healthcare access. This means that being in a higher wealth status decreases the likelihood of access to healthcare not being a big problem. Being in a higher wealth status can paradoxically lead to decreased access to healthcare for pregnant women. Women with higher socioeconomic status might assume that they are at lower risk for pregnancy complications and delay seeking medical care, believing they don't require frequent prenatal visits. Wealthier women might have demanding careers and busy schedules, which can limit their availability for prenatal appointments and other healthcare needs. Women from higher wealth status might prefer private healthcare providers and facilities, which can sometimes lead to a lack of coordination with public health initiatives and limited access to certain specialized services. Women with higher wealth might have the means to travel for healthcare services, which could lead to delays in accessing care or reliance on distant providers.

Table 3: Logistic Regression for Healthcare Cost (with hcost as the dependent variable)

Variables	Coefficient	Std. err.	z	P> z
emp	.1044409	.0138609	7.53	0.000
age	.0041745	.0007524	5.55	0.000
edu	-.0750488	.0078288	-9.59	0.000
rel	-.01542	.0014129	-10.91	0.000
eth	.0026957	.0001558	17.30	0.000

resd	.0636778	.0143082	4.45	0.000
rgn	-.0182447	.0043442	-4.20	0.000
insu	-1.370329	.0541901	-25.29	0.000
wealth	-.3194573	.0059472	-53.72	0.000
_cons	.6795085	.0436052	15.58	0.000

Source: Author's computation

Employment Status (emp): The value of the coefficient of emp is .1044409, which means that the log odds increased by .104 for a change in employment status. The regression result shows that employment status (emp) has a positive relationship with healthcare cost. This means that if one is employed, it increases the likelihood of healthcare cost not being a big problem. Being employed often translates to having a higher income, which can make it easier for pregnant women to manage healthcare costs, even without comprehensive insurance coverage. Some employers offer maternity leave benefits, allowing pregnant women to take time off work without losing their income. This reduces the financial stress associated with medical appointments and postpartum recovery.

Age of Respondent (age): The value of the coefficient of age is .0041745, which means that the log odds increased by .004 for each increase in age. The regression result shows that age of respondent (age) has a positive relationship with healthcare cost. This means that an increase in age increases the likelihood of healthcare cost not being a big problem. An increase in age can sometimes lead to a greater likelihood of healthcare costs not being a significant problem for pregnant women. Older pregnant women might be more likely to have stable jobs and access to employer-sponsored health insurance plans, which can provide comprehensive coverage for prenatal care and childbirth expenses. With age, individuals might have accumulated more savings, providing a financial cushion that can help cover unexpected healthcare expenses during pregnancy.

Education Level (edu): The value of the coefficient of edu is -.0750488, which means that the log odds decreased by .075 for each increase in education level. The regression result shows that education level (edu) has an inverse relationship with healthcare cost. This means that having higher educational level decreases the likelihood of healthcare cost not being a big problem. While higher education level generally correlates with better financial stability, there are situations in which it could lead to healthcare costs becoming a significant problem for pregnant women. Pursuing higher education might lead to delays in starting a career, resulting in lower income or temporary unemployment when pregnancy occurs. This financial strain can make healthcare costs more burdensome. Some highly educated individuals might switch careers or jobs, leading to periods without stable health insurance coverage and making them susceptible to high out-of-pocket healthcare expenses.

Religion (rel): The value of the coefficient of rel is $-.01542$, which means that the log odds decreased by $.015$ for belonging to one religious group or the other. The regression result shows that religion (rel) has an inverse relationship with healthcare cost. This means that belonging to one religious group or the other decreases the likelihood of healthcare cost not being a big problem. Certain religious beliefs might discourage or prohibit specific medical interventions, including prenatal care or childbirth interventions. Pregnant women who adhere strictly to these beliefs might avoid seeking necessary medical attention, leading to potential complications and higher costs when issues arise. Religious practices such as fasting, dietary restrictions, or observance of certain rituals might impact maternal health during pregnancy, potentially leading to complications that also increase healthcare costs.

Ethnicity (eth): The value of the coefficient of eth is $.0026957$, which means that the log odds increased by $.002$ for belonging to one ethnic group or the other. The regression result shows that ethnicity (eth) has a positive relationship with healthcare cost. This means that belonging to one ethnic group or the other increases the likelihood of healthcare cost not being a big problem. Certain ethnic groups may have established healthcare programs or community initiatives that provide assistance, education, and resources for pregnant women, reducing the financial burden of healthcare expenses. In some close-knit ethnic communities, extended families might also collectively contribute to covering healthcare costs, easing the financial burden for pregnant women.

Place of Residence (resd): The value of the coefficient of resd is $.0636778$, which means that the log odds increased by $.063$ for each change in place of residence, from rural to urban. The regression result shows that place of residence (resd) has a positive relationship with healthcare cost. This means that a change in place of residence increases the likelihood of healthcare cost not being a big problem. Many urban areas may have robust public health programs that offer subsidized or free healthcare services for low-income individuals, including prenatal and maternity care. Urban areas often have efficient public transportation systems, reducing transportation costs and making it easier for pregnant women to travel to healthcare facilities.

Region (rgn): The value of the coefficient of reg is $-.0182447$, which means that the log odds decreased by $.018$ for each change in region. The regression result shows that region (reg) has an inverse relationship with healthcare cost. This means that regional change decreases the likelihood of healthcare cost not being a big problem. In some areas, the cost of health insurance plans might be high relative to the income levels of residents, making it challenging for pregnant women to afford coverage. Regions with limited or inadequate healthcare facilities might require pregnant women to travel long distances to access necessary medical services, leading to increased transportation costs and inconvenience.

Health Insurance Coverage (insu): The value of the coefficient of insu is -1.370329, which means that the log odds decreased by 1.37 for each increase in health insurance coverage. The regression result shows that health insurance coverage (insu) has an inverse relationship with healthcare cost. This means that being covered by health insurance decreases the likelihood of healthcare cost not being a big problem. Having health insurance coverage generally aims to alleviate healthcare cost concerns, but in some situations, it can still contribute to healthcare costs becoming a significant problem for pregnant women. Pregnancy can bring unforeseen complications. If a health insurance plan does not cover these complications comprehensively, pregnant women might face higher-than-expected costs. Even with health insurance, there might be certain pregnancy-related services or treatments that are not covered. Pregnant women might need to pay for these services out of pocket, adding to their healthcare costs.

Wealth Index (wealth): The value of the coefficient of wealth is -.3194573, which means that the log odds decreased by .319 for an increase in wealth status. The regression result shows that ethnicity (eth) has an inverse relationship with healthcare cost. This means that being in a higher wealth status decreases the likelihood of healthcare cost not being a big problem. Wealthier individuals might opt for high-end healthcare facilities and specialized services, which can lead to higher costs compared to standard care options. Some women with higher wealth might choose elective medical interventions, tests, or procedures that might not be medically necessary, leading to higher overall healthcare costs. Also, they may be more affected by unexpected healthcare expenses, as they might not have budgeted for certain medical needs and might not have insurance coverage for every situation.

Conclusion and Recommendations

Having used data from the 2018 Nigerian Demographic and Health Survey (NDHS) data, it was found out that some socio-economic and demographic factors influence access to healthcare by pregnant women as well as the cost of healthcare. This study used the logistic regression model as well as the maximum likelihood estimation technique to ascertain how likely it is for these factors to influence access and cost of healthcare. In line with the objectives of the study, feasible and realistic policies were recommended to address the issues of access and cost of healthcare. The objectives of this study were divided into four parts. Firstly, to assess the socio-economic factors that hinder pregnant women's access to prenatal care and maternal services in Nigeria. Secondly, to assess the demographic factors that limit pregnant women's access to prenatal care and maternal services in Nigeria. Thirdly, to find out if there are socio-economic factors that affect cost of utilizing healthcare services by pregnant women in Nigeria. Lastly, to find out if there are demographic factors that make healthcare costly.

In line with the first and third objectives which deal with the socio-economic factors, employment status, health insurance coverage and wealth index significantly impacted on healthcare access and healthcare costs. With respect to objectives two and four, which deal with the demographic factors, it was revealed that age, education level, religion, ethnicity, place of residence and region also significantly impacted on healthcare access and costs. Age was an exception as it has insignificant impact on access to healthcare. Based on the findings of the study, the policy recommendations focused on areas that help improve access to healthcare and reduce cost of healthcare, which are given below:

- The government should enact policies that mandate comprehensive health insurance coverage for prenatal care, childbirth, and postpartum services, ensuring that pregnant women have access to essential medical services without financial barriers.
- There should be an expansion in Medicaid eligibility to cover pregnant women with low incomes, providing them with comprehensive healthcare coverage throughout pregnancy and postpartum without the burden of high costs.
- There should be development and support of prenatal education programs that provide information about pregnancy, childbirth, and postpartum care, empowering pregnant women to make informed decisions about their health.
- Better and meaningful investments should be made in community health clinics and maternity care centres in lacking areas to provide accessible and affordable healthcare services for pregnant women.
- The government should also implement training programs for healthcare providers to ensure culturally competent care for pregnant women from diverse backgrounds, addressing language barriers and respecting cultural beliefs.
- There should also be an introduction of incentives for healthcare providers who offer affordable and high-quality maternity care, encouraging cost-effective practices.
- The government should implement regulations that require healthcare providers and facilities to disclose pricing information for maternity-related services, allowing pregnant women to make informed decisions.
- The federal government can also encourage states to implement their own initiatives to improve maternal healthcare access and affordability based on the unique needs of their populations.
- Limits on out-of-pocket costs for maternity-related services can also be enforced, ensuring that pregnant women are protected from excessive expenses that could lead to financial strain.
- Regulations that protect pregnant women from discrimination in healthcare settings should be put

in place to ensure transparent pricing and billing practices.

COMPETING INTERESTS

The authors have no competing interests to declare.

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