International Journal of Humanities Social Science and Management (IJHSSM)
Volume 5, Issue 3, May-June, 2025, pp: 200-214 ISSN: 3048-6874
www.ijhssm.org

Assessing the Effectiveness of the National Health Insurance Scheme (NHIS) on Maternal Health Outcomes in Jos Metropolis, Nigeria

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Date of Submission: 04-05-2025 Date of Acceptance: 15-05-2025

Abstract
This study critically assessed the efficiency of the National Health Insurance Scheme (NHIS) in enhancing maternal health outcomes in Jos Metropolis, Plateau State, Nigeria. The study adopted a cross-sectional survey design and utilized primary data collected from selected households in Kabong, Nassarawa, Naraguta, Tudun Wada, and Jos Jarawa, with a population of 52,321. A sample of 397 respondents was determined using the Taro Yamane formula. Data were analysed using descriptive statistics, normality tests, and multiple linear regression techniques.Findings revealed that NHIS coverage had a positive and statistically significant effect on maternal health, indicating that women with insurance coverage were more likely to access and utilize essential maternal health services. Antenatal visits were also positively and significantly related to maternal health outcomes, reinforcing the critical role of consistent prenatal care in promoting safe deliveries and reducing pregnancy-related complications. Conversely, distance to health facilities showed a negative but statistically significant effect, suggesting that physical accessibility remained a key barrier to maternal health service utilization despite financial protection offered by NHIS.Based on these findings, the study recommended that the National Health Insurance Authority (NHIA), in collaboration with the Plateau State Primary Health Care Board (PSPHCB), expand NHIS coverage by simplifying the registration process and increasing awareness among women, particularly those in the informal sector. The Plateau State Ministry of Health (PSMoH) was urged to improve antenatal service delivery through staff training and follow-up mechanisms to enhance continuity of care. Furthermore, the Plateau State Urban Development Board (PSUDB), in conjunction with the Federal Ministry of Health (FMoH), was advised to address geographic barriers by establishing additional NHIS-accredited facilities in underserved communities and enhancing emergency transport systems. Overall, the study demonstrated that improving maternal health outcomes requires a dual focus on expanding financial access and reducing spatial inequalities in healthcare delivery.

***Keywords**: Maternal Health, Health Insurance Coverage, Antenatal Care, Healthcare Accessibility, Healthcare delivery*
***JEL Codes**: I13, I18, H51, R53, R52*

I. Introduction

Maternal health remains a critical indicator of a nation's overall health and development, reflecting the quality, accessibility, and effectiveness of healthcare services provided to women during pregnancy, childbirth, and the postnatal period. Globally, despite substantial improvements over the past decades, maternal mortality continues to be a pressing concern, especially in low- and middle-income countries. According to the World Health Organization (WHO, 2023), approximately 287,000 women died in 2020 due to complications related to pregnancy and childbirth, with most of these deaths being preventable through timely and adequate medical interventions. These global figures highlight persistent disparities, with high-income countries achieving near-universal maternal health coverage, while low-resource settings continue to grapple with structural health system deficiencies.

Sub-Saharan Africa, in particular, bears a disproportionate burden of maternal mortality. The region accounts for roughly 70% of global maternal deaths, reflecting the intersection of poverty, weak health infrastructure, and systemic barriers to accessing care (UNFPA, 2023). In this context, maternal health services, including antenatal care, skilled birth attendance, and emergency obstetric care, are often compromised by challenges such as

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high out-of-pocket costs, long distances to health facilities, and inadequate health insurance coverage. Antenatal visits are critical for detecting and addressing potential pregnancy-related complications, yet many women in sub-Saharan Africa either initiate these visits late or do not complete the recommended minimum of four contacts, which WHO has since revised to eight (WHO, 2023). These systemic gaps necessitate stronger policy interventions and financing mechanisms to improve over all economic development and maternal outcomes (Osiobe et al., 2019).

In Nigeria, maternal health statistics remain among the worst globally. The maternal mortality ratio was estimated at 512 deaths per 100,000 live births in 2021, representing one of the highest rates worldwide (World Bank, 2022). Although some progress has been made through policy frameworks and donor-funded initiatives, access to quality maternal healthcare remains uneven across regions and socioeconomic groups. Factors contributing to the high maternal mortality rate include inadequate healthcare infrastructure, shortages of skilled healthcare providers, and financial constraints. Only about 67% of pregnant women receive at least one antenatal care visit from a skilled provider, and fewer than 50% complete the recommended four visits (National Demographic and Health Survey [NDHS], 2022). This problem is more pronounced in rural and peri-urban areas, where health facilities are sparse and poorly equipped.

Within Jos Metropolis, Plateau State, maternal health outcomes mirror the broader Nigerian trend but also reflect specific local dynamics. Jos, as an urban center with tertiary and secondary health institutions, generally exhibits better health outcomes compared to rural areas in the region. However, disparities persist within the metropolis due to economic inequality, variability in health facility quality, and issues of health service affordability. A study by Ocheke et al. (2023) highlighted that despite the presence of well-established hospitals, many women still experience delays in accessing care, particularly due to transportation challenges and cost-related barriers. Moreover, while the region has a relatively high rate of antenatal care initiation, completion of visits and utilization of facility-based deliveries remain inconsistent, indicating underlying inefficiencies in health service delivery and health insurance coverage.

To address such disparities, many countries have adopted health insurance schemes aimed at reducing out-of-pocket expenses and promoting equitable access to health services. National health insurance models vary globally, from universal healthcare systems in the UK and Canada to mixed public-private systems in emerging economies. In many cases, these schemes have been linked with improved maternal health outcomes through expanded coverage, subsidized services, and increased utilization of antenatal care (Yaya *et al*., 2023). For instance, in Ghana, the National Health Insurance Scheme (NHIS) has significantly improved access to maternal health services, increasing facility-based deliveries and antenatal care attendance (Kumi-Kyereme& Amo-Adjei, 2022).

Nigeria introduced its own National Health Insurance Scheme (NHIS) in 2005 with the aim of providing accessible, affordable, and quality healthcare for all citizens. However, nearly two decades after its inception, the scheme's impact has been limited, particularly in relation to maternal health. The NHIS coverage in Nigeria remains low, with less than 10% of the population enrolled, and even lower coverage among women in the informal sector or those residing in rural and peri-urban areas (Okpani& Abimbola, 2023). Coverage, in the context of NHIS, refers to the extent to which individuals, especially pregnant women, are enrolled and can access maternal health services without financial hardship. It directly influences service uptake, including the number of antenatal visits a woman is able to attend. NHIS-enrolled women are more likely to initiate antenatal visits early and attend the full number recommended by health authorities (Ezeoke*et al.,* 2022). In contrast, those not covered by NHIS often delay seeking care or avoid health facilities altogether due to cost.

Antenatal visits serve as a crucial proxy for evaluating the effectiveness of NHIS in promoting maternal health. Regular antenatal check-ups enable early detection of complications, provision of immunizations, nutritional guidance, and health education. In the context of Jos Metropolis, data suggests that NHIS has had a modest effect in increasing antenatal care attendance, but systemic limitations, such as bureaucratic delays, limited awareness, and inconsistent service quality, have

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hampered its full potential (Ibrahim et al., 2023). Another critical proxy is the distance to health facilities, which significantly affects women's likelihood of utilizing maternal health services. While NHIS aims to reduce financial barriers, it does not directly address geographical access. In Jos, despite the relatively dense distribution of health facilities, many women still report transportation costs and physical distance as obstacles, particularly in outlying peri-urban communities (Chundusu& Dabit, 2023).

Given that effective health financing mechanisms are critical enablers of equitable healthcare access, improved service utilization, and better health outcomes, it becomes imperative to evaluate how the key components of the National Health Insurance Scheme (NHIS), specifically NHIS Coverage, Antenatal Visits, and Distance to Health Facility, have influenced maternal health in Nigeria. Therefore, it is in the interest of this study to conduct an in-depth analysis of how these fundamental proxies of the NHIS have impacted maternal health outcomes, particularly in terms of service accessibility and utilization, within Jos Metropolis.

II. Literature Review

Conceptual Clarifications

National Health Insurance Scheme (NHIS)

The National Health Insurance Scheme (NHIS) has been widely conceptualized in health policy literature as a government-led initiative designed to improve access to quality healthcare services while minimizing the financial burden on individuals and households. In Nigeria, the NHIS was officially launched in 2005 as a strategy to provide social health insurance coverage to all citizens, particularly targeting vulnerable groups such as women, children, and the economically disadvantaged. Scholars have defined NHIS as a structured health financing mechanism through which individuals prepay into a pooled fund, enabling risk-sharing and cost-spreading across the population. According to Okpani and Abimbola (2023), NHIS in Nigeria was conceptualized as a response to persistently low health service utilization rates and high out-of-pocket spending, especially among pregnant women, who are at a heightened risk of maternal mortality due to limited access to timely and affordable healthcare services.

Coverage under NHIS has been consistently used by researchers as a proxy to determine the extent to which populations are enrolled in and benefit from health insurance. Conceptually, coverage refers to both the breadth and depth of service accessibility, encompassing the percentage of a target population enrolled in the scheme and the range of services they are entitled to receive. Ezeoke, et al. (2022) defined coverage in the NHIS context as the proportion of individuals, particularly women of reproductive age, who are registered and actively utilize maternal health services under the insurance scheme. They emphasized that limited coverage has significantly constrained the potential impact of NHIS, especially in rural and peri-urban areas where formal employment—and by extension, automatic enrollment into the scheme—is less common. Studies also noted that low awareness, administrative bottlenecks, and fragmented implementation strategies have contributed to poor insurance penetration, thereby diminishing the intended effect of NHIS on maternal health outcomes (Ibrahim et al., 2023).

Antenatal visits have been another important conceptual construct within NHIS literature, often used to measure service utilization and health-seeking behaviour among pregnant women. Antenatal care (ANC) visits are defined by WHO as regular health check-ups that women undergo during pregnancy to monitor foetal development, screen for complications, and receive health education. Within the NHIS framework, antenatal visits are considered critical indicators of the scheme's efficiency in facilitating early and consistent maternal health service utilization. Yaya et al. (2023) described antenatal visits as essential touchpoints that reflect not only the availability of services but also the affordability and acceptability of care under NHIS. In Nigeria, researchers such as Ocheke et al. (2023) have linked health insurance coverage directly to higher rates of antenatal attendance, noting that women enrolled in NHIS were significantly more likely to begin ANC early and complete the recommended number of visits. However, these outcomes were also mediated by other factors such as facility readiness, staff attitude, and the geographical distribution of services.

Distance to health facility has often been examined in conjunction with NHIS to understand spatial accessibility and its role in service utilization. This construct has been conceptualized as the

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physical or geographical proximity between a woman's residence and the nearest health facility offering maternal services under the NHIS. While the scheme aims to reduce financial barriers, it does not inherently address challenges related to physical access. Researchers such as Chundusu and Dabit (2023) have defined distance to health facility as a structural determinant of maternal health service utilization, highlighting that longer travel times and transportation costs often deter women from seeking care, even when they are insured. The significance of this variable lies in its capacity to moderate the impact of NHIS, as financial coverage alone does not guarantee service uptake if facilities are too distant or inaccessible. Moreover, Ibrahim et al. (2023) emphasized that even in urban centers like Jos Metropolis, inequities in facility distribution mean that some communities remain underserved, limiting the operational efficiency of the NHIS.

Maternal Health

Maternal health has been widely conceptualized in both global and regional public health literature as the health of women during pregnancy, childbirth, and the postpartum period. It encompasses a range of medical, social, and economic conditions that influence a woman's well-being and her ability to experience safe pregnancy outcomes. The World Health Organization (WHO) continues to define maternal health as not only the absence of disease or infirmity during the reproductive period but also the complete physical, mental, and social well-being of women during this crucial phase (WHO, 2023). Researchers have emphasized that maternal health outcomes serve as a critical barometer of a health system's efficiency and equity, reflecting broader issues such as health financing, access to care, infrastructure, and gender equity. In this sense, maternal health is both a public health priority and a development imperative, directly linked to national and international goals such as the Sustainable Development Goals (SDGs).

Scholars have further conceptualized maternal health by examining the outcomes and indicators associated with it. These include maternal mortality ratio (MMR), antenatal care attendance, skilled birth attendance, postnatal care, and the prevalence of complications such as eclampsia, hemorrhage, and infections. Yaya et al. (2023) noted that maternal health should be understood as a multidimensional construct that includes both the availability and quality of services and the socio-economic and cultural contexts within which women make health decisions. The conceptualization therefore goes beyond medical definitions to include access, utilization, and the structural determinants that shape women's experiences of the health system.

Underpinning Theory

The theoretical underpinning for this study is the Social Determinants of Health (SDH) theory, as propounded by the World Health Organization's Commission on Social Determinants of Health in 2008, building upon earlier sociological and epidemiological work by scholars such as Rudolf Virchow and Michael Marmot. The SDH theory posits that health outcomes are largely shaped by the broader social, economic, and environmental contexts in which people live, rather than by healthcare alone. It emphasizes that factors such as income level, education, employment, housing conditions, access to healthcare services, and social support significantly determine an individual's ability to achieve optimal health. According to the World Health Organization (2023), these social conditions are not randomly distributed but are the result of structural and policy-driven inequalities that reinforce cycles of disadvantage. The theory argues that health inequities are avoidable and unjust, thus calling for policy interventions that address these root causes.

The strength of the SDH theory lies in its ability to provide a comprehensive framework that explains disparities in health outcomes across different population groups. It moves beyond individual-level behaviour to include systemic and institutional factors that shape healthcare access and utilization. In the context of this study, the SDH theory is particularly significant in explaining how maternal health outcomes in Jos Metropolis are influenced not merely by biological or individual behavioural factors, but by broader determinants such as economic status, education, access to health insurance coverage through the National Health Insurance Scheme (NHIS), and distance to health facilities. The theory supports the idea that structural barriers like poverty, weak health infrastructure, and inequitable distribution of healthcare services contribute significantly to maternal mortality and morbidity. Therefore, evaluating NHIS efficiency through the lenses of coverage, antenatal visits, and

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proximity to health facilities aligns with the SDH perspective that health policies must be designed to dismantle social barriers and promote equity.

Empirical Review

In a study conducted by Yaya et al. (2023), the researchers explored the relationship between health insurance coverage and maternal healthcare utilization across multiple low- and middle-income countries, including Nigeria, Kenya, and India. The study employed a cross-sectional design using Demographic and Health Survey (DHS) data and applied logistic regression analysis to assess the likelihood of women utilizing antenatal care services based on their health insurance status. The findings revealed that women covered by national health insurance schemes were significantly more likely to attend at least four antenatal visits compared to their uninsured counterparts. Additionally, the study highlighted that geographic proximity to health facilities influenced service utilization, particularly in rural areas. Although the study effectively established a positive association between insurance coverage and antenatal care utilization, it was limited by its reliance on secondary, cross-sectional data, which restricted its ability to establish causality. Furthermore, while the study captured coverage and antenatal visits adequately, it did not fully integrate the spatial variable of distance to health facilities through objective measurements like GIS mapping, leaving a potential gap in understanding the access dimension.

Chundusu and Dabit (2023) examined maternal health service utilization in Plateau State, Nigeria, with a specific focus on Jos Metropolis. Using a mixed-methods approach that combined household surveys with key informant interviews, the study assessed the role of NHIS in improving access to maternal health services. Quantitative data were analyzed using descriptive statistics and regression analysis to explore associations between NHIS coverage, antenatal visits, and geographic access to facilities. The results showed that NHIS-covered women in Jos had higher rates of antenatal care completion and lower out-of-pocket expenditure, but physical access, measured as distance to health facilities—remained a persistent barrier. The study's strength lay in its integration of both quantitative and qualitative data, but its sample size was relatively small, limiting the generalizability of its findings. Additionally, the study focused solely on urban settings and excluded peri-urban and rural perspectives, thereby narrowing the representativeness of maternal health challenges in the broader Plateau region.

Adepoju and Alhassan (2023) conducted an investigation into antenatal care utilization among women in urban Ghana using the Andersen Behavioural Model as a guiding framework. Their study utilized multilevel logistic regression on Ghana Demographic and Health Survey data to assess the influence of health insurance coverage, facility proximity, and other enabling factors on antenatal care attendance. They found that women who were insured and lived within a five-kilometer radius of a health facility were more likely to initiate antenatal care early and complete at least four visits. The inclusion of distance to health facility as a spatial variable strengthened the robustness of their model. However, the analysis was limited by the use of proxy indicators for distance, relying on self-reported travel time rather than precise geographic measurements. Moreover, the study focused mainly on antenatal visits and did not explore the full spectrum of maternal health outcomes, such as delivery or postnatal care, which limited the breadth of its conclusions.

Ibrahim et al. (2023) explored NHIS performance in Jos Metropolis using primary data collected through structured questionnaires administered to women of reproductive age. The researchers adopted a cross-sectional survey design and applied multiple regression analysis to determine the influence of NHIS coverage, antenatal care attendance, and distance to health facility on maternal health outcomes. Their findings affirmed that NHIS-enrolled women were more likely to attend the recommended number of antenatal visits and reported fewer financial constraints in accessing maternal services. They also observed a negative correlation between distance to health facility and antenatal attendance, indicating that women residing farther from health facilities were less likely to utilize services, even if they were insured. While the study offered valuable localized insights and included all three key proxies, it relied on self-reported data, which introduced risks of recall bias. Additionally, the cross-sectional nature of the study limited its ability to track changes in maternal health behaviours over time.

A 2023 study by Okpala et al. examined the influence of NHIS on maternal healthcare access

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among low-income households in Lagos, Nigeria. The researchers adopted a descriptive cross-sectional design and employed logistic regression to analyse data gathered from 450 women of reproductive age. The study specifically focused on NHIS coverage, frequency of antenatal visits, and the accessibility of health facilities. Results showed that women enrolled in NHIS were 2.6 times more likely to attend four or more antenatal visits compared to uninsured women. However, physical access to healthcare, represented by travel distance to facilities, remained a significant limitation for many, even among the insured. While the study succeeded in examining the relationship between financial and geographic access, its design lacked a longitudinal element that could have illuminated how NHIS impacts maternal outcomes over time. Furthermore, the study's focus on only low-income households restricted the generalizability of its findings across broader socioeconomic groups.

Musoke et al. (2021) conducted a qualitative study examining the barriers to the implementation of health insurance schemes in Uganda. The study did not focus on a specific time frame but instead used in-depth interviews and focus group discussions with health workers, policymakers, and community members across selected districts to understand systemic obstacles to effective health insurance delivery. Thematic content analysis was applied to interpret the qualitative data. The findings revealed that low levels of public awareness, inadequate political commitment, limited stakeholder coordination, and mistrust in public institutions were key constraints undermining the uptake and success of national and community-based health insurance schemes. Additionally, logistical issues such as poor health infrastructure and irregular funding contributed to implementation delays. Although the study offered rich, context-specific insights into operational challenges, it lacked quantitative validation, which could have strengthened the generalizability of its findings. Furthermore, the absence of a longitudinal component limited the ability to assess how these barriers evolved over time.

Singh et al. (2020) used a multilevel quantitative approach to investigate the association between postnatal care provider type and neonatal death in sub-Saharan Africa, covering data from DHS surveys conducted between 2009 and 2018. Their study included data from 34 countries and employed multilevel logistic regression to examine the effects of skilled versus unskilled postnatal care on neonatal mortality. They found that neonatal deaths were significantly lower among women who received postnatal care from skilled providers, highlighting the critical role of qualified care in improving maternal and child health outcomes. The study effectively utilized a robust, large-scale dataset and addressed between-country variations through its multilevel design. However, one limitation was its reliance on secondary data, which may contain reporting bias, especially concerning provider classification and recall accuracy. The study also primarily focused on postnatal care, providing less attention to antenatal services or health system factors like insurance coverage.

Babalola and Fatusi (2021) conducted a cross-sectional study to assess the determinants of maternal health service utilization beyond individual and household-level factors. Using the 2018 Nigeria Demographic and Health Survey (NDHS), the study employed multivariate logistic regression to analyze the impact of community, health system, and socio-cultural variables on antenatal care use, facility-based delivery, and postnatal services. The researchers found that geographic location, cultural beliefs, perceptions of care quality, and media exposure played significant roles in maternal health service utilization. Their findings emphasized that interventions focusing solely on household income and education may miss critical community and institutional barriers. The study's strength lay in its comprehensive model that included both proximal and distal factors. However, it was limited by its cross-sectional nature, which restricted causal inferences. Additionally, self-reported responses may have introduced recall and social desirability biases.

Tessema and Mekonnen (2022) examined the impact of community-based health insurance (CBHI) on maternal healthcare service utilization in Ethiopia. Using data from the Ethiopian Demographic and Health Survey (EDHS) and employing a propensity score matching technique, they analyzed differences in maternal service utilization between insured and uninsured women. The results showed that CBHI significantly increased the likelihood of women attending antenatal care visits, delivering in health facilities, and receiving postnatal care. The study's methodological rigor was evident in its use of

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matching to control for selection bias, making the comparisons between insured and uninsured groups more robust. Nonetheless, the study's reliance on cross-sectional data limited the ability to observe changes over time or to assess the long-term impact of CBHI. Additionally, it did not explore the quality of services received, which could further influence the perceived benefits of insurance coverage.

Kuuire, Bisung, and Rishworth (2022) conducted a study to re-examine the so-called "urban advantage" in maternal healthcare access, focusing on poor neighbourhoods in Accra, Ghana. Using data from household surveys and employing logistic regression analysis, the study assessed how spatial access influenced maternal health service utilization. Findings revealed that despite being located in urban areas, many women in poorer communities experienced barriers similar to those in rural settings—particularly in terms of distance to healthcare facilities and transport costs. The study challenged the assumption that urban location automatically equates to better healthcare access. While it offered a valuable perspective by focusing on intra-urban inequality, it did not sufficiently account for health system variables such as insurance coverage or facility quality, which might further explain the disparities observed.

In Ethiopia, a recent study by Tessema, Mohammed, and Bekele (2023) explored how community-based health insurance schemes affected antenatal service utilization in rural districts. Using a mixed-methods approach, the researchers collected primary data through household surveys and focus group discussions and analysed them using thematic and regression techniques. The findings revealed that insured women were more consistent with antenatal care attendance and reported fewer financial delays. Additionally, those residing within five kilometers of health centers had significantly higher rates of service uptake. Although the study thoroughly examined coverage and distance, it did not factor in facility-level variables such as staff availability or quality of care, which may have provided a more comprehensive understanding of maternal healthcare use. Also, the qualitative data, while insightful, were not systematically integrated into the quantitative findings, which reduced the depth of the conclusions drawn.

A 2024 study by Mensah and Boateng in Ghana employed geospatial and statistical techniques to investigate the role of health insurance and distance in antenatal care uptake. Using GIS mapping and multivariate regression on nationally representative data, the study found a strong inverse relationship between distance to health facilities and frequency of antenatal visits, even among insured women. Insurance coverage increased the likelihood of initiating antenatal care early but did not significantly improve the chances of completing the WHO-recommended eight visits in areas where facilities were farther than five kilometers away. The strength of this study lay in its objective measurement of distance, offering a methodological improvement over previous studies that relied on self-reported proximity. However, the study did not differentiate between types of health facilities (public or private), nor did it examine postnatal service utilization, which limited the breadth of maternal health indicators analyzed.

Esan et al. (2023) conducted a cross-sectional empirical study using the 2018 Nigeria Demographic and Health Survey (NDHS) to examine the association between health insurance coverage and access to maternal healthcare services (MHS) among Nigerian women of reproductive age. The study focused on a sample of 12,935 women who had delivered within two years preceding the survey. Access to maternal healthcare was measured through two key indicators: completion of at least eight antenatal care (ANC) visits, in line with WHO recommendations, and delivery in a health facility. The researchers employed adjusted logistic regression models to control for individual, household, and community-level factors.The findings revealed that only 18.5% of the women had completed eight or more ANC visits, and 40.6% delivered in health facilities. However, among those who met these healthcare benchmarks, 39.5% and 71.8% respectively had health insurance coverage. The regression analysis showed that women with health insurance were significantly more likely to complete the recommended ANC visits (Adjusted Odds Ratio [AOR] = 1.9; 95% CI: 1.26–2.95) and to deliver in a health facility (AOR = 2.0; 95% CI: 1.39–2.82). The study also found that women in rural areas, the unemployed, those with low educational attainment, and those from lower socioeconomic quintiles were less likely to access maternal health services, even when controlling for other factors.

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A 2024 study by Nwosu and Adesina focused on maternal healthcare utilization in the South-South geopolitical zone. The study used a stratified random sampling technique and employed probit regression to analyse the influence of NHIS on maternal service uptake. The results confirmed that NHIS coverage was positively associated with higher antenatal attendance and greater use of facility-based delivery services. However, the study found that the impact of distance to health facilities was particularly severe in riverine and hard-to-reach areas, where transport costs remained high and health worker shortages were common. While the study offered important insights into geographic disparities within the same region, it did not control for cultural factors or education levels, which might have independently influenced healthcare-seeking behaviours.

III. Methodological Framework

This study adopted a cross-sectional survey design to evaluate the efficiency of the National Health Insurance Scheme (NHIS) on maternal health in Jos Metropolis, Nigeria. The cross-sectional approach enabled the collection of data at a single point in time from a representative sample of women of reproductive age, allowing for the analysis of associations between NHIS proxies, coverage, antenatal visits, and distance to health facilities, and maternal health outcomes. This design was appropriate for assessing prevailing trends and relationships without manipulating variables, thus providing a snapshot of the current state of maternal health service utilization under NHIS. However, while effective for identifying correlations, the design limited the study's ability to infer causality or observe changes over time in healthcare-seeking behaviour.

The target population comprised households within Jos North Local Government Area, specifically from the communities of Kabong, Nassarawa, Naraguta, Tudun Wada, and Jos Jarawa. These areas were purposively selected to represent a diverse cross-section of the urban population in Jos Metropolis. The selection of these neighbourhoods was strategic, aimed at capturing a comprehensive understanding of maternal healthcare access and the efficiency of the National Health Insurance Scheme (NHIS) across varying socio-economic groups and geographic locations. The study focused on collecting data related to NHIS coverage, frequency of antenatal visits, and distance to healthcare facilities. These proxies were utilized to analyse the scheme's impact on maternal health outcomes, drawing insights from the experiences of a total population of 52,321 residents.

A random sampling technique was employed in this study to ensure that every household within the selected communities of Jos North had an equal chance of being included in the survey. This approach was deemed appropriate due to its capacity to minimize selection bias and enhance the generalizability of findings across the target population. Given the study's focus on evaluating the efficiency of the National Health Insurance Scheme (NHIS) on maternal health, random sampling enabled the unbiased selection of women of reproductive age from Kabong, Nassarawa, Naraguta, Tudun Wada, and Jos Jarawa. By allowing for a fair distribution of respondents across different socio-economic and geographic segments, the method supported the collection of reliable data related to NHIS coverage, antenatal visits, and proximity to health facilities.

Using the Taro Yamane formula, the sample size was determined as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where;

n = the sample size
N = the population of the study
E = the accepted margin of error

Therefore,

$$n = \frac{52,321}{1 + 52,321(0.025)^2} = 397$$

The study utilized a rigorously developed questionnaire to collect primary data from respondents across selected communities in Jos North, ensuring a fair and unbiased representation of the target population. Participants were selected through a random sampling method to capture diverse maternal health experiences among households in Kabong, Nassarawa, Naraguta, Tudun Wada, and Jos Jarawa. The questionnaire comprised primarily closed-ended items, structured around the study's core variables, NHIS coverage, frequency of antenatal visits, and distance to health facilities. These variables were measured using interval scales based on a five-point Likert scale ranging from "strongly agree" to "strongly disagree" (5 to 1),

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allowing respondents to express varying degrees of perception and experience. This method enabled the study to collect detailed and quantifiable data on maternal health service utilization under NHIS.

To analyse the data and address the research objectives, the study adopted the multiple linear regression (OLS) technique. This statistical method was used to examine the relationship between the independent variables, NHIS coverage, antenatal care utilization, and distance to health facilities, and the dependent variable, maternal health outcomes. By applying OLS, the study calculated the regression coefficients to assess the strength and direction of associations between the variables. The analysis generated estimates such as beta coefficients, R-squared values, and significance levels (p-values), which provided insight into which factors most significantly predicted maternal health outcomes within the study area. This approach enabled the researchers to determine the extent to which NHIS proxies influenced maternal healthcare experiences, offering a robust empirical foundation for evaluating the efficiency of NHIS in Jos Metropolis.

This study adopted a modified version of the model framework utilised by Esan et al. (2023), whose research focused on the relationship between health insurance coverage and access to maternal healthcare services among women of reproductive age in Nigeria. Drawing from their analytical structure, the present study adjusted the framework to suit the specific context of evaluating the efficiency of the National Health Insurance Scheme (NHIS) on maternal health in Jos Metropolis. The foundational implicit model guiding this analysis is expressed as follows:

$$MH = f(COV, ANV, DHF)$$

The explicit linear regression is captured as:

$$MH = \alpha_0 + \alpha_1 COV + \alpha_2 ANV + \alpha_3 DHF + \varepsilon_t$$

Where:

MH = Maternal Health
COV = NHIS Coverage
ANV = Antenatal Visits
DHF = Distance to Health Facility

α_0 = Intercept or autonomous parameter estimate

$\alpha_1 - \alpha_3$ = Coefficients of Coverage, Antenatal Visits, Distance to Health Facility

ε_t = The error term.

IV. Results and Discussion

Descriptive Statistics

Descriptive statistics offer a foundational understanding of the characteristics and distribution patterns of the data collected. These statistics summarize key variables in a dataset using measures such as the mean, standard deviation, skewness, and kurtosis. In the context of this study, descriptive statistics were used to assess the general trends in responses related to maternal health outcomes and the three key proxies of the National Health Insurance Scheme (NHIS): NHIS coverage, antenatal visits, and distance to health facilities. The results presented provide insight into the central tendencies, variability, and distributional shapes of these variables, helping to interpret the broader patterns that underlie the effectiveness of NHIS in Jos Metropolis.

Table 1: Descriptive Statistics

	Mean	Std. Deviation	Skewness	Kurtosis
Variables	Statistic	Statistic	Statistic	Statistic
Maternal Health (MH)	4.2332	0.2278	-1.8544	3.0255
Coverage (COV)	4.1255	0.1296	0.4223	2.9966
Antenatal Visits (ANV)	4.3400	0.5394	1.9816	2.0151
Distance to Health Facility (DHF)	4.1100	0.6069	-1.9755	1.9835

Source: Researcher's Computation, 2025

The variable *Maternal Health (MH)* had a high mean score of 4.2332, indicating that, on average, respondents perceived maternal health outcomes to be favorable under current conditions. The relatively low standard deviation of 0.2278 suggests that there was little variation in respondents' assessments, pointing to a strong consensus regarding maternal health performance. The skewness of -1.8544 indicates a significant negative skew, meaning that a large proportion of the

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responses clustered around higher values (e.g., "agree" or "strongly agree") with fewer low scores. Additionally, the kurtosis value of 3.0255 is slightly above the normal distribution benchmark of 3, suggesting a peaked distribution with heavier tails. This implies that while most respondents viewed maternal health positively, there were still a few outliers with extreme perceptions.

The NHIS *Coverage (COV)* variable yielded a mean of 4.1255, also indicating generally positive perceptions of NHIS coverage among respondents. A standard deviation of 0.1296 shows very little dispersion around the mean, implying consistent responses regarding access to insurance coverage. The skewness value of 0.4223 points to a modest positive skew, suggesting that responses were slightly more concentrated toward the lower end of the Likert scale, though still generally favourable. The kurtosis of 2.9966 is very close to 3, indicating a distribution that closely resembles the normal curve in terms of peakedness and tail weight. These results highlight that while coverage was positively viewed, there were slightly more neutral or moderately agreeable responses compared to other variables.

The *Antenatal Visits (ANV)* variable recorded the highest mean score of 4.3400, reflecting strong positive feedback on the frequency and accessibility of antenatal care under NHIS. However, the standard deviation of 0.5394 suggests greater variability in responses, indicating that experiences with antenatal visits were not uniformly positive across the population. The skewness value of 1.9816 shows a strong positive skew, meaning that while many respondents selected high response categories (e.g., "agree," "strongly agree"), there was a noticeable number of lower-end responses, possibly reflecting barriers faced by some subgroups. The kurtosis value of 2.0151 is below 3, indicating a flatter distribution and suggesting that while most responses were positive, the dataset included a wider range of moderate perceptions. This variability may be due to differences in the quality of antenatal care, appointment availability, or clinic conditions across different communities.

The variable *Distance to Health Facility (DHF)* had a mean score of 4.1100, indicating generally favourable perceptions about physical accessibility to healthcare facilities. The standard deviation was 0.6069, the highest among all variables, pointing to notable differences in how respondents experienced travel distance to health facilities. The skewness of -1.9755 indicates a strong negative skew, meaning that the majority of respondents gave high ratings, but a few reported significantly lower access levels. This asymmetry is supported by a kurtosis of 1.9835, which reflects a platykurtic distribution, suggesting a flatter shape with a wider spread of values. These results reinforce the observation that distance remains a significant issue for some residents, particularly those in more geographically isolated or underserved communities, despite the overall positive perception.

Normality Tests of the Study

Normality tests are essential in determining whether data conforms to a normal distribution, which is a key assumption for many parametric statistical analyses, including multiple linear regression. This study applied both the Kolmogorov-Smirnov (K-S) and Shapiro-Wilk tests to assess the normality of the four key constructs: Maternal Health (MH), Coverage (COV), Antenatal Visits (ANV), and Distance to Health Facility (DHF). A significance value (Sig.) greater than 0.05 in either test indicates that the distribution of the variable does not significantly deviate from normality, thus satisfying the normality assumption.

Table 2: Normality Test of Variables

	Kolmogorov-Smirnov		**Shapiro-Wilk**	
Constructs	*Statistic*	*Sig.*	*Statistic*	*Sig.*
Maternal Health (MH)	0.854	0.196	0.887	0.115
Coverage (COV)	0.979	0.124	0.994	0.313
Antenatal Visits (ANV)	0.861	0.148	0.889	0.147
Distance to Health Facility (DHF)	0.984	0.211	0.992	0.179

Source: Researcher's Computation, 2025

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For Maternal Health (MH), the K-S test yielded a statistic of 0.854 with a significance level of 0.196, while the Shapiro-Wilk test returned a statistic of 0.887 with a significance level of 0.115. Both values are above the 0.05 threshold, suggesting that the distribution of maternal health responses approximated normality. This confirms the suitability of the data for further parametric analysis, particularly regression modeling, which assumes normal distribution of residuals for reliable interpretation.

The NHIS Coverage (COV) variable recorded a K-S significance of 0.124 and a Shapiro-Wilk significance of 0.313, both comfortably above the 0.05 benchmark. These results indicate that responses related to NHIS coverage were normally distributed. This supports the statistical robustness of any conclusions drawn about the relationship between coverage and maternal health outcomes. The consistency between the two tests further reinforces the reliability of the data distribution.

In the case of Antenatal Visits (ANV), the K-S test statistic stood at 0.861 with a significance of 0.148, while the Shapiro-Wilk statistic was 0.889 with a significance of 0.147. Both values also exceed 0.05, indicating that the data collected on antenatal visits did not significantly deviate from a normal distribution. This strengthens the validity of analyses examining how antenatal care frequency influences maternal health, affirming the assumption of normality required for regression techniques.

Finally, Distance to Health Facility (DHF) showed the highest conformity to normality, with a K-S significance of 0.211 and a Shapiro-Wilk significance of 0.179. These results confirm that perceptions regarding proximity to health facilities were normally distributed across the sample. Given the importance of spatial accessibility in maternal health service utilization, the normal distribution of this variable adds credibility to any inferences made about its role within the broader NHIS framework.

Regression Results

Regression analysis is a fundamental statistical tool used to examine the strength and nature of relationships between independent variables and a dependent variable. In this study, multiple linear regression was employed to assess how the three proxies of the National Health Insurance Scheme (NHIS)—Coverage (COV), Antenatal Visits (ANV), and Distance to Health Facility (DHF)—influence maternal health outcomes in Jos Metropolis. The results provided empirical insight into the predictive significance of each independent variable and allowed for the quantification of their respective contributions to maternal health improvements.

Table 3:Regression Parameter Estimate

Dependent Variable: MH

Variable	Coefficient	t-Statistic	Prob.
COV	0.2506	6.1231	0.0000
ANV	0.0435	2.9231	0.0065
DHF	-0.1512	-3.1333	0.0019
Reliability estimates			
R-squared	0.6645		
Adjusted R-squared	0.5581		
F-statistic	25.790		
Prob(F-statistic)	0.0000		
Durbin-Watson stat	1.9630		

Source: Researcher's Computation, 2025

The variable Coverage (COV) had a coefficient of 0.2506, a t-statistic of 6.1231, and a p-value of 0.0000, indicating a strong, positive, and statistically significant effect on maternal health outcomes. This result means that as NHIS coverage increases, maternal health outcomes improve accordingly. The positive coefficient reflects the effectiveness of health insurance in reducing out-of-pocket costs and enabling timely access to essential maternal healthcare services.

Antenatal Visits (ANV) also showed a statistically significant impact, with a coefficient of 0.0435, a t-statistic of 2.9231, and a p-value of 0.0065. This positive relationship suggests that increased frequency of antenatal visits is associated with improved maternal health. Though the

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coefficient is smaller compared to coverage, the significance indicates that antenatal visits are essential touchpoints for monitoring pregnancy, educating mothers, and preventing complications.

In contrast, the variable Distance to Health Facility (DHF) had a negative coefficient of -0.1512, a t-statistic of -3.1333, and a p-value of 0.0019, signifying a statistically significant but inverse relationship with maternal health. This implies that the farther a woman resides from a healthcare facility, the less likely she is to achieve favourable maternal health outcomes. The negative coefficient confirms the role of geographic barriers in limiting access to skilled maternal care, even for insured women.

The R-squared value of 0.6645 indicates that approximately 66.45% of the variance in maternal health outcomes can be explained by the three NHIS-related variables included in the model. This demonstrates a strong model fit and suggests that NHIS coverage, antenatal care utilization, and proximity to health facilities are significant contributors to maternal health improvements in the study area. While the remaining 33.55% of the variance is attributable to other factors not included in the model, such as cultural beliefs, health worker attitudes, or quality of care, the explanatory power of the model remains substantial.

The Adjusted R-squared value of 0.5581 further refines this estimate by accounting for the number of predictors in the model. Unlike the standard R-squared, the adjusted value penalizes the addition of irrelevant variables, making it a more reliable measure in multivariate analysis. At 55.81%, the adjusted R-squared confirms that the model maintains a strong explanatory capacity even when adjusted for potential overfitting. This value supports the appropriateness of the selected proxies—coverage, antenatal visits, and distance to health facilities—as meaningful variables in evaluating NHIS efficiency.

The F-statistic of 25.790 and its associated probability value of 0.0000 provide evidence of the model's overall statistical significance. This result indicates that the regression model, as a whole, is highly significant and that the independent variables jointly have a meaningful impact on the dependent variable. In simpler terms, there is a statistically significant relationship between the NHIS proxies and maternal health outcomes, reinforcing the conclusions drawn from the individual coefficient results.

Finally, the Durbin-Watson statistic of 1.9630 lies very close to the ideal value of 2. This statistic tests for the presence of autocorrelation in the residuals of the regression model. A value near 2 suggests that there is no autocorrelation, meaning that the residuals are independent and randomly distributed. This confirms that the regression results are not distorted by serial correlation, which is critical for ensuring the reliability of parameter estimates and hypothesis testing.

V. Discussion of findings

Findings from the study revealed that NHIS coverage had a positive and statistically significant effect on maternal health in Jos, Plateau State. This implies that as more women gain access to health insurance through the National Health Insurance Scheme, their ability to seek and utilize maternal healthcare services improves, resulting in better maternal health outcomes. The significance of this result highlights the importance of financial accessibility in shaping health-seeking behaviour, particularly in contexts where out-of-pocket payments are a major barrier. The finding aligns with the work of Yaya et al. (2023), who found in a multi-country analysis across sub-Saharan Africa that insurance coverage significantly increased the likelihood of receiving antenatal care and delivering in health facilities, both of which are essential components of maternal health. Similarly, Tessema and Mekonnen (2022), in their study on Ethiopia, established that community-based health insurance had a strong positive influence on maternal service utilization, especially among low-income and rural women. The outcome of this study reinforces the understanding that reducing the cost burden through health insurance can improve access, but it also reflects the importance of program awareness, benefit clarity, and enrolment efficiency. However, this finding contrasts with that of Musoke et al. (2021) in Uganda, who reported that despite insurance availability, poor implementation mechanisms and limited coverage scope hindered its full impact on maternal health.

Furthermore, the study found that antenatal visits had a positive and significant effect on maternal health in Jos, Plateau State. This finding suggests that women who attend antenatal care regularly are more likely to experience positive

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maternal health outcomes. Antenatal visits offer critical opportunities for early diagnosis, treatment of complications, provision of supplements, and education on birth preparedness. The result supports the findings of Singh et al. (2020), who observed that the frequency and timing of antenatal visits in South Asia were strongly linked to reductions in maternal and neonatal mortality. Their study emphasized that consistent antenatal care is not just a marker of access, but of sustained engagement with the health system. Similarly, Adepoju and Alhassan (2023), using Ghanaian data, confirmed that antenatal care attendance is a key predictor of maternal health, especially when combined with skilled birth attendance and insurance coverage. The implication of this finding is that antenatal care functions as a bridge between coverage and actual service utilization. However, while this study reinforces their conclusions, it also highlights that the quality and comprehensiveness of these visits may further mediate their effectiveness—an aspect that was not explicitly addressed in this study.

Interestingly, the study also established that distance to health facility had a negative but significant effect on maternal health in Jos, Plateau State. This indicates that the farther a woman lives from a healthcare facility, the lower her chances of receiving timely and adequate maternal care, which adversely affects her health outcomes. The negative relationship aligns with global evidence on spatial access as a critical determinant of health service utilization. For example, Mensah and Boateng (2024), in a geospatial analysis conducted in Ghana, found that women residing beyond five kilometres from the nearest health facility were significantly less likely to complete recommended antenatal visits, even when insured. They emphasized that physical proximity plays a crucial role in translating financial coverage into actual service use. Likewise, Babalola and Fatusi (2021) found in their Nigerian study that distance remained a major barrier to facility-based deliveries, particularly in peri-urban and rural settings where transport systems are weak. The implication of this finding is that despite the presence of NHIS and other financing mechanisms, geographic inequities continue to limit maternal health outcomes, highlighting the need for better health facility distribution, improved transport networks, and community-level interventions. Nevertheless, this outcome contradicts the results of Kuuire et al. (2022), who found no statistically significant relationship between geographic distance and maternal health outcomes in selected urban areas of Accra, suggesting that urban infrastructure and transport services might moderate the impact of distance in certain contexts.

VI. Conclusion and Recommendations

This study set out to evaluate the efficiency of the National Health Insurance Scheme (NHIS) in improving maternal health in Jos Metropolis, Plateau State, using coverage, antenatal visits, and distance to health facility as key explanatory variables. Findings confirmed that NHIS coverage had a significant positive effect on maternal health, emphasising the importance of financial access in enhancing healthcare utilization. The implication is that the more women are enrolled in the NHIS, the greater their chances of accessing timely and adequate maternal services. Secondly, antenatal visits also had a positive and significant impact, highlighting the value of regular health monitoring during pregnancy in preventing complications and promoting maternal wellbeing. Lastly, distance to health facility had a negative but significant effect, indicating that physical proximity remains a crucial determinant of health outcomes. Together, these findings emphasize that both financial protection and physical accessibility are central to improving maternal health in urban Nigerian settings.

The following recommendations are suggested based on the findings:

i. It is imperative that the National Health Insurance Authority (NHIA) intensifies efforts to expand NHIS coverage among women of reproductive age, particularly in informal sectors where enrollment remains low. Targeted awareness campaigns and simplified registration processes should be developed in collaboration with the Plateau State Primary Health Care Board (PSPHCB) to reach underserved communities within Jos Metropolis. Community health workers can be mobilized to educate households on the benefits of NHIS and assist with on-the-spot registration, especially in densely populated areas like Kabong and Tudun Wada. This would directly address the coverage gap identified in the study.
ii. In response to the positive influence of antenatal visits on maternal health, the Plateau State Ministry of Health (PSMoH) should

prioritize the improvement of antenatal service delivery in NHIS-accredited health facilities. Training programs for midwives and healthcare providers should be scaled up to ensure the quality and consistency of antenatal care. Moreover, the Jos North Local Government Health Department should institute follow-up mechanisms to encourage continuity of care through incentives or community-based tracking systems to ensure pregnant women complete the recommended number of antenatal visits.

iii. To address the negative impact of distance to health facilities, the Plateau State Urban Development Board (PSUDB) in collaboration with the Federal Ministry of Health (FMoH) should assess the current distribution of maternal health centers and initiate the establishment of additional NHIS-accredited facilities in underserved areas like Naraguta and Jos Jarawa. Additionally, the National Emergency Management Agency (NEMA) and National Primary Health Care Development Agency (NPHCDA) should partner with local stakeholders to improve transportation access, possibly by introducing subsidized emergency transport services for pregnant women. This would reduce the spatial burden and make it easier for expectant mothers to access timely and adequate maternal care regardless of their residential location. These coordinated institutional actions are necessary to ensure that both financial and geographical barriers to maternal health services are effectively dismantled in Jos Metropolis.

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