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# COVID-19 PANDEMIC AND MATERNAL HEALTH SERVICES IN PLATEAU STATE, NIGERIA

**Ogoh Alubo[1], Anande Vitalis Hunduh[2] & Emmanuel Ameh Otache[3]***

[1,2,3]Department of Sociology, University of Jos, Jos, Nigeria

*amehemmanuelot@gmail.com

**ABSTRACT:** Nigeria's high maternal mortality rate remains a pressing public health issue. Although multiple interventions have been implemented, improvements have been modest. The emergence of COVID-19 further disrupted the healthcare system, redirecting resources and impacting essential services, including maternal care. This study investigated the impact of the COVID-19 pandemic on maternal health service delivery across primary, secondary, and tertiary care levels in Plateau State, Nigeria. It also assessed patient flow patterns during the pandemic compared to the pre-COVID period. The study was guided by Andersen's Behavioural Model of Health Services Use (1968). A cross-sectional survey design and mixed-methods approach were employed. Using multistage sampling, 296 service users and 75 service providers were selected from health facilities across the three levels of care to participate in the study. Data were collected through structured questionnaires. Maternal services largely remained available during the pandemic. However, there was a notable decline in service utilisation due to movement restrictions, fear of infection, and facility-imposed limits on patient numbers. Temporary closures of some health centres were reported following confirmed COVID-19 cases. Although patient flow has since improved, many now face financial barriers to accessing care. While service availability was maintained during the pandemic, access was significantly constrained. With the resumption of routine healthcare, cost has become a primary barrier to maternal service utilisation. Addressing these financial constraints is crucial for improving maternal health outcomes in the post-pandemic period. The authors recommended emergency health system strengthening, socioeconomic support for vulnerable groups and capacity building for health workers:

**Keywords:** Maternal Health Services, COVID-19, Pandemic, Healthcare Providers, Pre-COVID-19 Period

## INTRODUCTION

The outbreak of COVID-19, first reported in Wuhan, China, in December 2019, rapidly evolved into a global health crisis. Declared a pandemic by the World Health Organisation (WHO) in March 2020, COVID-19 placed extraordinary strain on healthcare systems worldwide. Among the most affected areas was maternal healthcare, particularly in low-resource settings where health services were already fragile. Globally, the pandemic intensified existing barriers to accessing maternal health services, contributing to an increase in maternal deaths. According to the WHO (2023), approximately 287,000 women died during and following pregnancy and childbirth in 2020. A significant number of these deaths were associated with service disruptions caused by the pandemic. In low- and middle-income countries (LMICs), the burden was especially severe, with

notable declines in antenatal care attendance, institutional deliveries, and postnatal visits. A systematic review reported reductions of over 30% in maternal service utilisation during lockdown periods, attributed to movement restrictions, fear of infection, and strained health systems (Ahmed et al., 2024). Sub-Saharan Africa, already home to 66% of global maternal deaths, was particularly vulnerable. During the pandemic, many countries in the region experienced service disruptions due to travel bans, facility closures, and redirection of resources toward COVID-19 containment. These setbacks negatively affected access to skilled birth attendance, emergency obstetric care, and the supply of maternal health commodities (Okereke et al., 2023).

In Nigeria, the first confirmed case of COVID-19 was reported in February 2020. By March 2022, over 270,000 cases and more than 3,000 deaths had been recorded (NCDC, 2023). However, testing remained low in relation to the country's population of over 200 million, with only about five million tests conducted. Vaccination coverage was also limited, with roughly ten million people receiving at least one dose, including boosters (Alubo & Alubo, 2020). Nigeria's COVID-19 response involved standard public health measures such as mask-wearing, physical distancing, and hand hygiene. While these protocols were enforced in the early phase of the pandemic, adherence declined from 2022 onward. The relaxation of public health measures, coupled with persistent public gatherings, marked a shift away from earlier containment strategies. Treatment for COVID-19 was primarily provided in public hospitals and temporary isolation centres, mostly located in urban areas and concentrated within secondary and tertiary health facilities (Alubo, 2021). While economic and commercial disruptions attracted significant attention, the broader impact of the pandemic on healthcare—especially maternal services—received comparatively little focus.

This neglect is particularly concerning given Nigeria's already poor maternal health indicators. With an estimated 58,000 maternal deaths annually and a maternal mortality ratio of 576 per 100,000 live births (UNICEF, 2022), maternal healthcare in Nigeria was struggling even before the pandemic. COVID-19 exacerbated this situation by limiting service access, reallocating healthcare personnel, and overburdening health infrastructure. This study, therefore, investigates how maternal healthcare services were affected during the COVID-19 pandemic across the three levels of healthcare—primary, secondary, and tertiary—in Plateau State, Nigeria. It explores changes in service availability, patient flow, and patterns of access during the pandemic compared to the pre-pandemic period.

## LITERATURE REVIEW

The literature on maternal health service utilisation in Nigeria is extensive, yet fragmented, especially in light of the disruptions introduced by the COVID-19 pandemic. This review synthesises existing research around three central themes: economic access, quality of services, and the impact of the pandemic on maternal healthcare delivery. Drawing from both foundational studies and recent empirical evidence, the review critically examines areas of consensus and divergence while identifying persisting gaps in the literature.

**Economic Access and Financial Barriers**

Economic factors consistently emerge as major determinants of maternal health-care utilisation. Pre-pandemic studies such as Ajayi & Akpan (2020) and Yaya et al. (2018) reinforce the effectiveness of targeted interventions—such as the Abiye Programme and vouchers/conditional cash transfers—in increasing ANC attendance, skilled deliveries, and postnatal care. These programs demonstrate that removing financial barriers can substantially improve maternal outcomes. Adedokun et al. (2023) used NDHS data to show that wealth quintile, education, and insurance access are strong predictors of adequate care utilisation. Rural women remained disadvantaged, suggesting economic structures underpin access disparities. Also, Esan et al. (2023), analysing 2018 NDHS, found that women with insurance were nearly twice as likely to complete 8+ ANC visits and deliver in a facility, pointing to insurance as a vital facilitator.

On the other hand, Oluwole et al. (2025) examined care patterns in Lagos: while awareness and uptake were high, many women booked late in pregnancy and fewer utilised postnatal care beyond immunisations. Household income and spouse employment predicted both ANC uptake and facility delivery. Similarly, Mordecai et al. (2025), in a scoping review of NDHS 2018 vs 2023 data, found persistent multidimensional poverty—63% of households—and only modest improvements in skilled birth attendance (43%→52%), highlighting that economic deprivation remains a central barrier. Together, these studies echo earlier findings, emphasising economic access. However, pre-COVID frameworks often do not evaluate how such systems withstand shocks like pandemics. Ahmad et al. (2024) suggest that many incentive programmes were halted amid supply chain disruptions, raising questions about their resilience. Thus, a gap remains in how economic interventions function during and after public-health crises.

**Quality of Services and System Challenges**

Quality perceptions have a profound impact on maternal service usage. Structural issues (staffing, infrastructure), process factors (service delivery, referral systems), and outcome dimensions (maternal satisfaction and trust) interconnect to determine utilisation. Okonofua et al. (2018) and Oladapo et al. (2015) spotlighted facility delays, transport constraints, and inadequate referrals as significant causes of poor maternal outcomes. Hanefeld et al. (2017) advocated using multidimensional frameworks (structure, process, outcomes) to evaluate care quality, though empirical applications were rare in Nigerian settings. Ntoimo et al. (2019) and Ope (2020) underscored the influence of provider attitudes, mistrust, and drug shortages, particularly in rural centres, in discouraging facility use. Srivastava et al. (2015) linked maternal satisfaction to cleanliness, privacy, shorter wait times, and staff behaviour.

Recent WHO (2024) reports from the Maternal & Perinatal Database and Dignity (MPD-4-QED) programme, covering 54 tertiary hospitals, revealed that lack of labour companions and failure to use checklists greatly elevated maternal and perinatal mortality, underscoring the importance of 'process quality'. Iliyasu et al. (2023) conducted focus group interviews in rural Kano, reporting home deliveries triggered by fear of infection, poor provider availability, and perceived negative experiences at clinics. Oluwole et al. (2025) noted late ANC booking and underutilization of postnatal visits were linked to perceived low service quality—many women viewed available

facilities as poorly equipped or under-staffed. Mordecai et al. (2025) recorded persistent rural–urban disparities in access and quality, even as skilled birth attendance improved modestly. Infrastructure and regional inequities remain pressing concerns.

All these studies align that quality of care is central to maternal health utilisation, with structural deficiencies, human resource constraints, and mistrust as recurring impediments. Some of the empirical focus on system-level process tools (e.g., WHO's database tracking), while field studies emphasise interpersonal and facility-level dynamics, hinting at the multi-layered nature of quality. There is limited evidence capturing how quality dimensions changed during COVID-19 due to facility repurposing, staff shortages, and restrictive policy implementations. This study aims to examine the trajectory of quality during the pandemic comprehensively.

**Impact of the COVID-19 Pandemic on Maternal Health Services**

The pandemic introduced a multifaceted threat: lockdowns, infection fears, resource reallocation, and infrastructure adaptations all affected maternal service access, quality, and trust. Nigeria's maternal health burden was already severe: in 2020, the maternal mortality ratio was ~556/100,000 live births, with exit criteria focused on poverty, infrastructure, and cultural barriers (neglected by a neo-feminism lens). Ahmed et al. (2024) reported service utilisation declines (≥30%) across LMICs due to movement restrictions, economic hardship, and fears of infection. Adedokun et al. (2023) speculated that rural and low-wealth women were especially affected. Okereke et al. (2023) documented facility closures, repurposing for COVID care, and staff redeployment, leading to delayed or refused care. Iliyasu et al. (2023) highlighted that clinics lost midwives to COVID duty stations, resulting in home births out of fear, increasing risk.

Similarly, Stein et al. (2023) surveyed 315 pregnant women across three states during late 2020 and found significant utilisation drops linked to lockdowns and service unavailability. Over 50% of women reported missed ANC appointments. Focus groups cited fear of infection and poor or inconsistent service availability as major reasons. This mixed-methods study provides rich evidence of patient-level experiences, including fears, stigma, and structural constraints in accessing ANC visits, with moderate recovery noted by late 2021. Iliyasu et al. (2023) in FGD-based descriptions from rural Kano expose home deliveries and declining trust due to perceived 'infection risk' at clinics. Mordecai et al. (2025) show modest improvements in skilled birth attendance by 2023, but permanent system changes may have left large segments (≈50%) still unserved. Esan et al. (2023) associate insurance coverage with improved follow-up even amid lockdowns, pointing to insurance as a buffer against pandemic shocks.

All these studies agreed that COVID-19 disrupted maternal care in attendance, trust, and availability, especially during 2020–2021. However, some report full return to baseline by 2022–2023 (Mordecai et al.) while others (Stein et al., Iliyasu et al.) emphasise lasting distrust, structural dislocations, and economic hardship delaying recovery. Insurance coverage emerges as protective in some studies. While available data primarily capture cross-sectional snapshots, there is a limited tiered analysis (primary vs. secondary vs. tertiary), lacking an assessment of recovery, and systemic comparisons across levels. Economic access, quality, and pandemic disruptions are deeply interwoven. Insurance, cash transfers, and free care improve access—but only when quality

and trust are adequate. The COVID crisis intensified existing systemic weaknesses, particularly for rural and low-income populations. Methodologies vary from large quantitative surveys (NDHS data), cost-effectiveness modelling, facility-based quality audits, to rural qualitative FGDs. Disparate timeframes—some evidence points to impact mitigation by 2023, while others highlight persistent vulnerability—need reconciliation.

Evidence is siloed around single themes or levels of care; there's no comprehensive, comparative framework across tiers. Limited longitudinal, pandemic-aware analysis: how interventions, trust, and utilisation co-evolved during and after the crisis remains underexplored. Tier-specific disruptions (e.g., which level was most repurposed) need elucidation. To address these gaps, this study investigates the economic, structural, and psychological factors affecting maternal service utilisation across primary, secondary, and tertiary facilities in Plateau State, both during and after the COVID-19 pandemic. There is also the tracking of patient flow, service availability, and quality indicators from pre-pandemic to post-pandemic periods. Differential Effects of Insurance, Financial Assistance, and Pandemic Exposure at Each Care Level. While there is broad agreement across studies on their importance, existing literature is fragmented and often static. Only by analysing these factors comparatively across healthcare tiers during a dynamic crisis like COVID-19 can we generate actionable insights. This study fills that void, providing evidence to strengthen resilience and inform policies for maternal health in Nigeria's evolving public health landscape.

**Theoretical Framework**

The Behavioural Model of Health Services Use was first developed by Ronald M. Andersen in 1968. It was initially designed to understand why families use health services, with a focus on access and equity in health service utilisation. The model has undergone several revisions, with significant contributions made in 1973, 1995, and 2001 to adapt it to changing healthcare systems and research needs. The model is based on the premise that healthcare utilisation is influenced by both individual and systemic factors, grouped into three major categories: predisposing factors, enabling factors, need factors, and external environment factors (added in later versions).

The predisposing factors are characteristics of individuals that exist prior to their illness and influence their use of healthcare, including age, gender, education, beliefs, values, and attitudes, cultural, and religious influences. The enabling factors are logistical and structural conditions that facilitate or hinder access to care. The family income, health insurance, transportation, and availability of healthcare services. The need factors, on the other hand, are the perceived need (an individual's own perception of health or illness) and the evaluated need (a clinician's assessment of a health condition). While the external environment was added in later versions, including health system characteristics, policies, and broader societal factors, such as a pandemic, as witnessed in COVID-19.

The strength of the theory is primarily in its comprehensive nature. It considers multiple layers of influence on healthcare behaviour (individual, family, societal, and systemic). The model is also flexible and adaptable. It can be applied to various populations and health issues—including pandemics, maternal health, and marginalized, including pandemics, maternal health, and marginalised groups. It is policy-relevant and very useful for identifying access barriers and

informing improvements in healthcare policy and service delivery. Recent research (Ameh & Umar, 2021) has adopted the model to study barriers to accessing maternal healthcare in Northern Nigeria during the COVID-19 pandemic. On the other hand, critics argue the model assumes a mostly linear path to service use, while real-world behaviour is more dynamic and iterative. Some scholars argue that it underrepresents the role of culture and context, especially in non-Western settings. While the model predicts service use, it does not fully explain the quality of care or health outcomes. In this study, Andersen's Behavioural Model is used to explore how the COVID-19 pandemic affected women's access to maternal care, including disruptions to antenatal and delivery services due to lockdowns, economic hardship, and fear of infection.

## METHODS

This study was conducted in Plateau State, located in the North Central region of Nigeria. With a population of approximately 4.2 million, the state comprises 17 Local Government Areas (LGAs), encompassing both urban and rural communities (National Bureau of Statistics, 2022). Despite hosting over 700 Primary Health Centres (PHCs) and referral institutions such as Jos University Teaching Hospital (JUTH), the state faces significant maternal health challenges, including a maternal mortality ratio of 512 per 100,000 live births (NDHS, 2018). These challenges—driven by a lack of skilled health workers, under-resourced facilities, insecurity, and high out-of-pocket expenses—were likely compounded during the COVID-19 pandemic, necessitating an investigation into how maternal service access and continuity were affected.

The study employed a cross-sectional survey design, allowing data to be collected from a wide population within a relatively short time frame (4–6 weeks). A total sample size of 296 participants (pregnant women and mothers of children aged 0–5 years) was determined based on Cochran's formula for sample size estimation for large populations, adjusted for resource limitations and accessibility. The formula assumes a 5% margin of error, a 95% confidence level, and an estimated maternal health service utilisation rate of 50% (to maximise variability). Cochran's formula is commonly used to calculate sample sizes for large populations when the target variable is categorical. The formula is denoted as:

$$n = \frac{Z^2 pq}{e^2}$$

Where:

- Z = 1.96 (95% confidence level)
- p = estimated proportion of the population with the attribute (0.5 is used for maximum variability)
- q = 1 - p = 0.5
- e = margin of error (5% or 0.05)

$$n = \frac{(1.96^2) \times 0.5 \times 0.5}{(0.5^2)} = 384$$

The sample size produced by applying the formula is 384. However, given resource constraints, time, and pandemic-related limitations, the researchers decided to reduce the sample size to a more pragmatic and manageable size of 296, which still ensures a confidence level of approximately 90–93% and acceptable precision for exploratory, cross-sectional research. This adjusted sample size was proportionately distributed across the selected LGAs and facilities to maintain representativeness. Also, 75 healthcare providers were sampled to provide institutional perspectives.

A multi-stage sampling strategy was employed to ensure representativeness across the state's three senatorial zones. In the first stage, two LGAs were randomly selected from each of the three senatorial zones using the fishbowl (simple random sampling) technique. The names of all the LGAs in each zone were written on pieces of paper, placed in a bowl, and two were randomly selected from each zone. An additional LGA (Jos North) was purposively included from the Northern Zone due to the presence of tertiary health facilities, bringing the total number of sampled LGAs to seven. The second stage focused on facility Selection. Within each selected LGA, three functional PHCs and one secondary-level (general hospital) were purposively selected, based on functionality, geographical spread, and availability of maternal health services. In Jos North, one tertiary facility (Plateau Specialist Hospital) was included to assess pandemic effects at the highest level of care. This produced a total of 25 health facilities. In the last stage, the study participants were selected. Within each facility, convenience sampling was used to select participants (service users) who met the inclusion criteria: pregnant women or mothers with children under 5 years old. Convenience sampling was chosen due to practical constraints, including varying patient flow and the sensitive nature of health discussions during the pandemic. For each facility, three maternal healthcare providers (e.g., nurses, midwives, or doctors) were purposively selected to participate, based on their availability and involvement in maternal service delivery. The selected LGAs, facilities, and number of participants are listed in Table 1.

**Table 1: Selected LGAs, Health Care Facilities and Respondents Sampled**

| Senatorial Zones | LGAs | Facilities | No. of Respondents |
|---|---|---|---|
| North | Barkin Ladi | GH, B/Ladi | 15 |
| | | PHC, Heipang | 12 |
| | | PHC, Marit | 10 |
| | | PHC, Foron | 11 |
| | Jos North | Plateau Specialist Hospital | 23 |
| | Jos South | General Hospital, Dadin Kowa | 10 |
| | | PHC, Bukuru Central | 18 |
| | | PHC, Chugwi | 10 |
| | | PHC, State Lowcost | 10 |

| | | | |
|---|---|---|---|
| Central | Mangu | GH, Mangu | 10 |
| | | PHC, Mangu Halle | 06 |
| | | PHC, Panyam | 09 |
| | | PHC, Mangun | 06 |
| | Pankshin | Cottage Hospital | 10 |
| | | PHC, Wokkos | 11 |
| | | PHC, Chip | 16 |
| | | PHC, Langkang | 11 |
| South | Lang. South | Hospital, Mabudi | 10 |
| | | PHC, Fajul | 12 |
| | | PHC, Gamakai | 13 |
| | | PHC, Magama | 13 |
| | Shemdam | GH. Shendam | 18 |
| | | PHC, Yelwa | 10 |
| | | PHC, Kalong | 10 |
| PHC, | | Longvel | 10 |
| Total | 6 | 25 | 296 |

Out of the 296 respondents, 121 (40.9%) were from the Northern zone, 79 (26.7%) from the Central zone, and 96 (32.4%) from the Southern zone. Each of the six LGAs (excluding Jos North) contributed 48 respondents, while Jos North contributed 23 due to the smaller number of eligible attendees during the data collection period. Additionally, 75 healthcare providers were surveyed across the 25 facilities.

While the sampling strategy ensured geographic spread, several limitations are acknowledged. Convenience sampling may introduce selection bias, as participants were selected based on availability and willingness, potentially excluding those who are less frequent in facility visits due to financial, logistical, or health reasons. The exclusion of private health facilities could limit the generalisability of findings to all maternal health service users in Plateau State. Non-response bias may have occurred, particularly among healthcare providers or patients who were unwilling to participate due to fatigue, distrust, or pandemic-related concerns. Also, facility-based sampling inherently excludes women who may have completely avoided health facilities during the pandemic, potentially underestimating the true extent of service disruption.

Despite these limitations, the combination of randomisation at the LGA level and purposive facility selection ensured a reasonably representative and pragmatic approach for assessing maternal service trends during a public health emergency. To enhance the reliability and validity of the study findings, precautionary steps were taken to minimise the impact of the identified methodological limitations and potential biases. While convenience sampling was used to select participants within facilities, this was mitigated by ensuring that multiple facilities across urban and rural areas were included from all three senatorial zones. Uniform participant quotas were maintained per LGA (except Jos North) to achieve geographical representativeness. Also, Inclusion criteria were consistently applied across all sites to ensure comparability of respondents.

To collect data from the selected respondents, two instruments—questionnaires for facility users and service providers — were designed by the researchers in line with the objectives. 3 research teams—one for each senatorial zone—were constituted. A co-researcher with two research assistants heads each team. The assistants received a two-week training on the instruments used for data collection. The respondents were administered a questionnaire by research assistants to collect data. The quantitative data were checked for completeness and consistency. Then they were coded and entered into the computer using Statistical Package for the Social Sciences (SPSS version 26). Presentation was done through tables using simple percentages, while differences and assumed impacts were tested using the Chi-square.

## RESULTS

The findings of this study are presented to illustrate the effects of the COVID-19 pandemic on maternal health services in Plateau State, Nigeria. The results are organised into three main segments. First, the sociodemographic characteristics of respondents (service providers and users) are presented to provide context for interpreting subsequent findings. The analysis focuses on the impact of the COVID-19 pandemic on maternal health service delivery. Also, comparative data on the nature and volume of patient flow across health facilities are presented for the pre-pandemic and pandemic periods, highlighting variations in service utilisation patterns over time. The tables and figures that follow provide a visual and statistical summary of these dynamics, supporting a nuanced understanding of how the pandemic influenced maternal healthcare access and delivery across the state.

### Socio-demographic and Economic features

The socio-demographic and economic data from 296 respondents (service users) highlight important population characteristics relevant to health-seeking behaviour before and during the pandemic. According to Table 2, the majority of respondents (58.5%) fall within the 18–29 age bracket, indicating that COVID-19 disruptions heavily impacted this age group. The mean age of 27.4 years falls within the core reproductive age, a group most dependent on maternal health services. During COVID-19, service access for this group was hindered by lockdowns, transportation barriers, and fear of infection, resulting in decreased antenatal visits and facility-based deliveries.

A significant number (30.7%) were married or had their first child before age 17, while 46.3% did so after 18 years. This implies that early marriage remains prevalent, with an average age at marriage/first birth of 18.4 years. The COVID-19 pandemic likely disrupted reproductive health education and access to adolescent reproductive services. For girls marrying or giving birth at younger ages, pandemic restrictions increased the risks of complications due to a lack of skilled care and a delay in emergency response. The marital status shows that the majority (50.2%) were married, while 42.3% were either divorced, separated, or widowed. These latter groups may lack spousal or economic support and would have faced greater challenges during the pandemic due to service disruptions and financial hardship. 59% of those who are married were in polygamous unions. In such families, resource competition during COVID-19 lockdowns may have led to prioritisation of care for certain wives, affecting maternal care access for others.

Also, 59.9% came from extended families. While extended families often provide support, they can also be a source of traditional influence that deters formal maternal care. During the pandemic, reliance on informal care may have increased due to the closure of clinics. High parity was common, with 67 respondents having eight or more children. Multiparous women may have deprioritised maternal services during the pandemic, relying on past experiences instead of skilled birth attendance, raising the risk of complications. The mean parity is approximately 6.5 children per woman, which is quite high. This reinforces the need for accessible family planning, reproductive health education, and maternal care services—especially during health crises like COVID-19, when service availability is often disrupted.

**Table 2: Socio-Demographic/Economic Characteristics of the Respondents (Users)**

| Demographic Features | F | % | Economic Features | F | % |
|---|---|---|---|---|---|
| **Age Group** | | | **Educational Level** | | |
| ≤ 17 yrs | 28 | 9.5 | No Formal Education | 23 | 7.8 |
| 18-23 yrs | 84 | 28.4 | Primary | 59 | 19.9 |
| 24-29 yrs | 89 | 30.1 | Secondary | 169 | 57.1 |
| 30-35 yrs | 41 | 13.9 | Tertiary | 30 | 10.0 |
| 36-40 yrs | 27 | 9.1 | Others | 15 | 5.2 |
| 41 & above | 27 | 9.1 | **Occupation** | | |
| **Age at Marriage/1st Birth** | | | Farming | 165 | 55.6 |
| Less than 17 yrs | 91 | 30.7 | Artisan | 44 | 15.0 |
| 18+ yrs | 137 | 46.3 | Civil service | 28 | 9.5 |
| Do not know | 68 | 23.0 | Petty trading | 21 | 7.0 |
| **Marital Status** | | | None | 29 | 9.9 |
| Married | 149 | 50.2 | Others | 9 | 3.0 |
| Divorced | 63 | 21.2 | **Estimated Monthly Income** | | |
| Separated | 62 | 21.1 | Below ₦70,000 | 215 | 72.7 |
| Single | 22 | 7.5 | ₦71,000–₦90,000 | 40 | 13.4 |
| **Type of Marriage** | | | ₦91,000–₦110,000 | 15 | 5.1 |
| Monogamy | 121 | 41.0 | ₦111,000–₦200,000 | 3 | 4.5 |
| Polygamy | 175 | 59.0 | ₦201,000–₦300,000 | 8 | 2.7 |
| **Type of Family** | | | ₦301,000 and above | 5 | 1.6 |
| Nuclear | 119 | 40.2 | | | |
| Extended | 177 | 59.9 | | | |
| **Parity** | | | | | |
| Less than 3 | 96 | 32.3 | | | |
| 4–7 | 83 | 28.0 | | | |
| 8–11 | 67 | 22.7 | | | |
| 12+ | 50 | 17.0 | | | |

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common, with 67 respondents having eight or more children. Multiparous women may have deprioritised maternal services during the pandemic, relying on past experiences instead of skilled birth attendance, raising the risk of complications. The mean parity is approximately 6.5 children per woman, which is quite high. This reinforces the need for accessible family planning, reproductive health education, and maternal care services—especially during health crises like COVID-19, when service availability is often disrupted.

The majority of the respondents (57.1%) had attained secondary education, followed by 19.9% with primary education, and only 10.0% had tertiary education. A small fraction (7.8%) had no formal education, while 5.2% fell into the "others" category. Limited health literacy among a large portion of users may have hindered proper understanding of pandemic-related health messages, prevention strategies, and service changes. Those with lower education levels may have been less likely to seek facility-based care due to fear, misinformation, or inability to interpret COVID-19 guidelines. The relatively small proportion with tertiary education (10.0%) suggests a need for targeted communication strategies in local languages or simplified formats.

Over half of the respondents (55.6%) identified as farmers, followed by artisans (15.0%), civil servants (9.5%), and petty traders (7.0%). Another 9.9% were unemployed, and 3.0% belonged to other unspecified categories. The high number of informal sector workers implies limited access to employment benefits such as maternity leave or health insurance, all of which are crucial during health emergencies. COVID-19 restrictions likely disrupted agricultural and market activities, reducing household income and deterring people from visiting health facilities. Civil servants (9.5%) may have had better access to formal healthcare, but still constituted a minority. The economically vulnerable and unemployed group may have avoided or delayed care due to cost or fear of infection.

A striking 72.7% of respondents reported a monthly income below ₦70,000, while only 1.6% earned ₦301,000 and above. Poverty is a critical barrier to maternal healthcare utilisation, especially in times of crisis. With most respondents in the lowest income bracket, out-of-pocket expenses for transport, drugs, or emergency services would have been unaffordable during the pandemic. Financial hardship may have led to increased reliance on traditional birth attendants (TBAs) or home deliveries, risking maternal and neonatal outcomes. Economic distress during lockdowns may have compounded existing inequalities, further reducing access to antenatal care (ANC), skilled birth attendance, or postnatal services. The socio-demographic profile of maternal health service users reveals a population that is educationally and economically disadvantaged, and predominantly engaged in informal labour. These factors likely exacerbated barriers to accessing maternal health services during the COVID-19 pandemic.

Table 3 shows the socio-demographic and economic attributes of respondents who are service providers. The sex distribution indicates that the majority (70.1%) of the respondents are female, while 22 (29.9%) are male. This implies that women constitute a significant majority in the workforce of primary health care settings compared to their male counterparts. About 93.5% of the study participants are between the ages of 18 and 49 years. This reflects a high proportion of the cohort within the working age group. The majority (57.1%) of the study participants have a bachelor's degree. 19.9% have a diploma, 10.0% have postgraduate degrees, while 7.8% and 5.2%

have certificates and other qualifications, respectively. The professional distribution shows that most (64.9%) of the study participants are CHEWs. There are a handful (35.1%) of other professionals, including nurses, midwives, and doctors, in that order.

**Table 3: Socio-Demographic/Economic Characteristics of the Respondents (Service Providers)**

| Variables | N | % |
|---|---|---|
| Gender | | |
| Male | 22 | 29.9 |
| Female | 53 | 70.1 |
| Age Group | | |
| Below 20 years | 4 | 5.2 |
| 20–29 years | 20 | 27.3 |
| 30–39 years | 29 | 38.1 |
| 40–49 years | 17 | 22.9 |
| 50–59 years | 4 | 4.8 |
| 60 years and above | 1 | 1.7 |
| Educational Level | | |
| Certificate | 6 | 7.8 |
| Diploma | 15 | 19.9 |
| Bachelor's Degree | 43 | 57.1 |
| Post-Graduate | 8 | 10.0 |
| Others | 4 | 5.2 |
| Profession | | |
| Doctor | 3 | 3.5 |
| Nurse | 7 | 9.5 |
| Midwife | 5 | 6.9 |
| CHEW | 49 | 64.9 |
| Others | 8 | 10.0 |
| Length of Service | | |
| 1–4 years | 8 | 10.0 |
| 5–9 years | 10 | 13.4 |
| 10–14 years | 15 | 20.3 |
| 15 years and above | 42 | 56.3 |
| EMI | | |
| Below ₦70,000 | 2 | 2.6 |
| ₦71,000–₦90,000 | 8 | 10.4 |
| ₦91,000–₦110,000 | 33 | 44.1 |
| ₦111,000–₦200,000 | 17 | 22.5 |
| ₦201,000–₦300,000 | 10 | 12.7 |
| ₦301,000 and above | 4 | 5.6 |

56.3% say they have spent 15 years or more on their job. 20.3% of the participants have spent between 10 and 14 years in service, 13.4% have spent between 5 and 9 years in service, while

10.0% have spent between 1 and 4 years in service. Also, more than half (about 57.1%) estimated their monthly income to be between N70,000.00 and N110,000.00. 22.5% indicate monthly income estimate of N111,000.00-- N 200,000.00 while about 18.3% estimated their monthly income to be N201,000.00 and above. These characteristics underscore that maternal health service delivery during the COVID-19 pandemic in Plateau State was shaped by a predominantly female, moderately young, and mid-level cadre workforce that is experienced but economically vulnerable.

**Ways the COVID-19 pandemic has affected maternal health services**

This section presents empirical findings on the impact of the COVID-19 pandemic on maternal health service delivery in Plateau State, Nigeria. The data analysed focuses on several critical dimensions of maternal care, comparing respondents' experiences before and during the pandemic. These include the level of access to antenatal care (ANC) services, perceptions of the quality of ANC, feelings of safety at health facilities, access to skilled delivery services, postnatal care, and emergency maternal care. Additionally, the section explores barriers to accessing maternal health services during the pandemic, including mobility restrictions, fear of infection, economic hardship, and facility-based limitations. The analysis provides a holistic view of the pandemic's disruptive effects on both the availability and utilisation of essential maternal healthcare services.

**Table 4: Level of Access to Antenatal Care (ANC) Services Before and During COVID-19**

| Access Level | Before F (%) | During F (%) |
|---|---|---|
| No Access | - (-) | 25 (8.4) |
| Limited (1–2) | 30 (10.1) | 203 (68.6) |
| Full (3+) | 266 (89.9) | 68 (23.0) |
| Total | 296(100.0) | 296(100.0) |

$X^2 = 266.62$; $P \leq 0.0001$; df=3

There was a significant decline in full ANC access during the COVID-19 pandemic, falling from 89.9% to 23%. Limited or no access increased sharply to 77%, suggesting a significant service disruption. This aligns with movement restrictions, facility shutdowns, and fear of infection. The chi-square statistic of 266.62 is very large, indicating a substantial deviation between expected and observed frequencies. The associated p-value $\leq 0.0001$ implies that this result is highly statistically significant, meaning the changes in ANC access levels before and during COVID-19 are unlikely to be due to chance. These results confirm that COVID-19 had a profound negative impact on access to antenatal care services. The significant shift from full access to limited or no access suggests potential risks for maternal and foetal health, as inadequate ANC is associated with poor pregnancy outcomes.

**Table 5: Perception of Quality of ANC Services during COVID-19 by Respondents**

| Perception | Frequency | Percentage |
|---|---|---|
| Much better | 21 | 7.1 |
| Slightly better | 44 | 14.9 |
| Same | 98 | 33.1 |
| Slightly worse | 82 | 27.7 |
| Much worse | 51 | 17.2 |
| **Total** | **296** | **100.0** |

Nearly 45% reported worse quality ANC compared to before COVID-19. Only 22% felt any improvement. This perception reflects challenges like reduced staffing, shortened consultations, or poor patient-provider interaction.

**Table 6: Responses on Access to other Maternal Health Services Before and During COVID-19**

| | Responses | | | | |
|---|---|---|---|---|---|
| | Before | | During | | |
| Maternal Health Service | Yes F(%) | No F(%) | Yes F(%) | No F(%) | Total F(%) |
| Skilled Delivery Services | 281(94.9) | 15(5.1) | 57(19.3) | 239(80.7) | 296(100.0) |
| Postnatal Care Services | 281(94.9) | 15(5.1) | 72(24.3) | 224(75.7) | 296(100.0) |

$X^2$= 342.91; P≤ 0.0001; df=2

A drastic decline in skilled deliveries (80.7%) highlights how severely maternal health systems were impacted. This has implications for maternal and neonatal outcomes due to a lack of professional support. Postnatal care, vital for both mother and newborn, was largely unavailable (75.7%) during the pandemic. Neglect at this stage can increase maternal and neonatal morbidity and mortality. The study hypothesised that access to skilled delivery services and postnatal care services before and during the COVID-19 pandemic would remain the same. According to the results in Table 7, a significant difference is apparent between the level of access to other maternal health services before and during the COVID-19 pandemic. To test these observed differences, the Chi-square test was applied to the data. The results reveal that the observed differences are significant at the 0.0001 level, with a Chi-square value of 342.91. This implies that access to skilled delivery services and postnatal care services before and during COVID-19 is not the same.

**Table 7: Barriers to Accessing Maternal Health Services**

| Barrier | Frequency | Percentage |
|---|---|---|
| Lockdowns/restrictions | 201 | 67.9 |
| Fear of infection | 174 | 58.8 |
| No transportation | 143 | 48.3 |
| Increased costs | 119 | 40.2 |
| Health worker shortage | 98 | 33.1 |
| Facility closures | 84 | 28.4 |

Lockdowns/restrictions (67.9%) had the highest reported frequency, indicating that government-imposed movement limitations significantly hindered women's ability to access maternal health services during the pandemic. Fear of infection (58.8%) was the second most common concern, reflecting heightened anxiety about exposure to COVID-19 in health facilities. These two barriers—rooted in the public health response to the pandemic and individual health fears—highlight both structural and psychological impediments. The lack of transportation (48.3%) further underscores how logistical issues, likely exacerbated by lockdowns and curfews, disrupted access to facilities. Increased costs (40.2%) indicate the economic strain many households experienced, including higher prices for transportation, medications, or out-of-pocket service fees.

The health worker shortage (33.1%) and facility closures (28.4%) reflect disruptions within the healthcare system itself, resulting from staff reassignments, infections among healthcare workers, or policy decisions to limit service availability and curb the spread of the virus. Many of these barriers are interconnected. For example, lockdowns contributed to transportation issues and facility closures, while health worker shortages might lead to longer wait times and reduced quality of care, intensifying fear of infection and discouraging utilisation. The data reveal a multifaceted disruption in access to maternal health services during the COVID-19 pandemic. The prevalence of lockdowns and restrictions, as well as the fear of infection, serves as a barrier, highlighting the profound impact of public health measures and individual perceptions on health-seeking behaviour. This data suggests that both external/system-level factors (e.g., lockdowns, transportation, facility operations) and internal/personal-level concerns (e.g., fear of infection, affordability) jointly influenced maternal health access. The fact that almost 7 in 10 women identified mobility restrictions and nearly 6 in 10 reported infection fears underscores the urgent need for resilient, adaptable health systems that ensure maternal service continuity during health crises.

**Nature of patient flow in the pre-COVID-19 period and currently.**

In this section, the analysis of patient flow dynamics in maternal health service delivery is presented, comparing before and during the COVID-19 era. Data on key indicators, including average weekly number of clients, patient flow patterns, and average waiting time, are presented. It also examines the extent of the reduction in maternal health services experienced during the pandemic, whether maternal service utilisation has returned to pre-pandemic levels, and the changes in maternal health referrals during the COVID-19 crisis. Understanding these variables is crucial for assessing the impact of the pandemic on service efficiency, client satisfaction, and access to quality maternal healthcare. The analysis provides insight into disruptions caused by COVID-19, including delays, reduced service uptake, and strained referral systems, while also highlighting progress (if any) toward the restoration of routine maternal health services in Plateau State, Nigeria.

In Table 8, the total number of clients visiting the facility every week decreased substantially during the pandemic. Before the COVID-19 pandemic, the most common client volumes were 31–50 clients (40%) and 10–30 clients (24%). During the COVID-19 pandemic, 28% of respondents reported seeing fewer than 10 clients per week, and only 18.7% indicated they were seeing 31–50 clients. The largest group of respondents (40%) reported seeing 10–30 clients. This reduction reflects a clear decline in access to maternal health services due to factors like lockdowns, fear of infection, and limited mobility, showing a significant decrease in client volume.

**Table 8: Average Weekly Number of Maternal Health Clients Before and During COVID-19**

| | **Before COVID-19** | | **During COVID-19** | |
|---|---|---|---|---|
| Weekly Client Volume | F | % | F | % |
| Fewer than 10 | 6 | 8.0 | 28 | 37.3 |
| 10–30 | 18 | 24.0 | 30 | 40.0 |
| 31–50 | 30 | 40.0 | 14 | 18.7 |
| Over 50 | 21 | 28.0 | 3 | 4.0 |
| Total | 75 | 100.0 | 75 | 100.0 |

This decline in patients' flow was reaffirmed by research participants in in-depth interviews. A health care provider held that "...during the initial outbreak of Covid, attendance at antenatal clinic got low (declined) by the day; from an average of 60 to 20 clients per month" (Senior CHEW, Township Primary Health Care Centre, Pankshin). This was the same situation in most health facilities, including those in Shedam, Langtang South, as well as in Barkin Ladi and Jos South LGAs. At the Primary Health Centre in Mangu, a healthcare provider indicated that.

During the COVID-19 pandemic, we had only 5 to 15 women coming for antenatal care. However, as you saw when you visited, today is our antenatal day, and we had up to 40 women who came for antenatal care; so we can say that patient flow is increasing. COVID-19 only caused a drop in client flow during the early stage of the outbreak of the pandemic. In recent months, we have seen a significant increase in patient numbers, sometimes exceeding those of the pre-COVID period.

**Table 9: Description of Patient Flow Patterns Before and During COVID-19**

| | Before COVID-19 | | During COVID-19 | |
|---|---|---|---|---|
| **Flow Description** | **F** | **%** | **F** | **%** |
| Smooth and timely | 42 | 56.0 | – | – |
| Moderate delays | 19 | 25.3 | – | – |
| Often congested | 9 | 12.0 | – | – |
| Very slow/chaotic | 5 | 6.7 | – | – |
| Improved | – | – | 5 | 6.7 |
| About the same | – | – | 13 | 17.3 |
| Slower or more delayed | – | – | 32 | 42.7 |
| Severely disrupted | – | – | 25 | 33.3 |

$X^2 = 59.42$; $P \leq 0.05$; df=3

Before the pandemic, 56% of facilities reported that patient flow was smooth and timely. However, after the onset of COVID-19, 42.7% of respondents reported that patient flow had become slower or more delayed, and 33.3% stated that it had been severely disrupted. Only 6.7% felt that the flow had improved or remained the same. These findings indicate a significant decline in patient movement efficiency from registration to consultation, primarily attributed to crowded facilities, social distancing measures, and staff shortages during the pandemic.

The study hypothesised that there is no significant difference in patient flow between the pre-COVID-19 period and the COVID-19 period. To test this assumption, the data on patient flow patterns before and during COVID-19 were cross-tabulated using the Chi-Square test.

According to the table's results, there appear to be some observed differences in patient flow between the pre-COVID-19 period and the COVID-19 period. To test this observed difference, the Chi-square test was applied to the data in the table. The result reveals that the observed difference is significant at the 0.05 level, with a Chi-square value of 59.42. This implies that there is a statistically significant difference in patient flow patterns between before and during the COVID-19 pandemic. This supports the earlier descriptive findings that patient flow was more disrupted and delayed during the pandemic, indicating a negative impact of COVID-19 on maternal health service delivery processes in Plateau State.

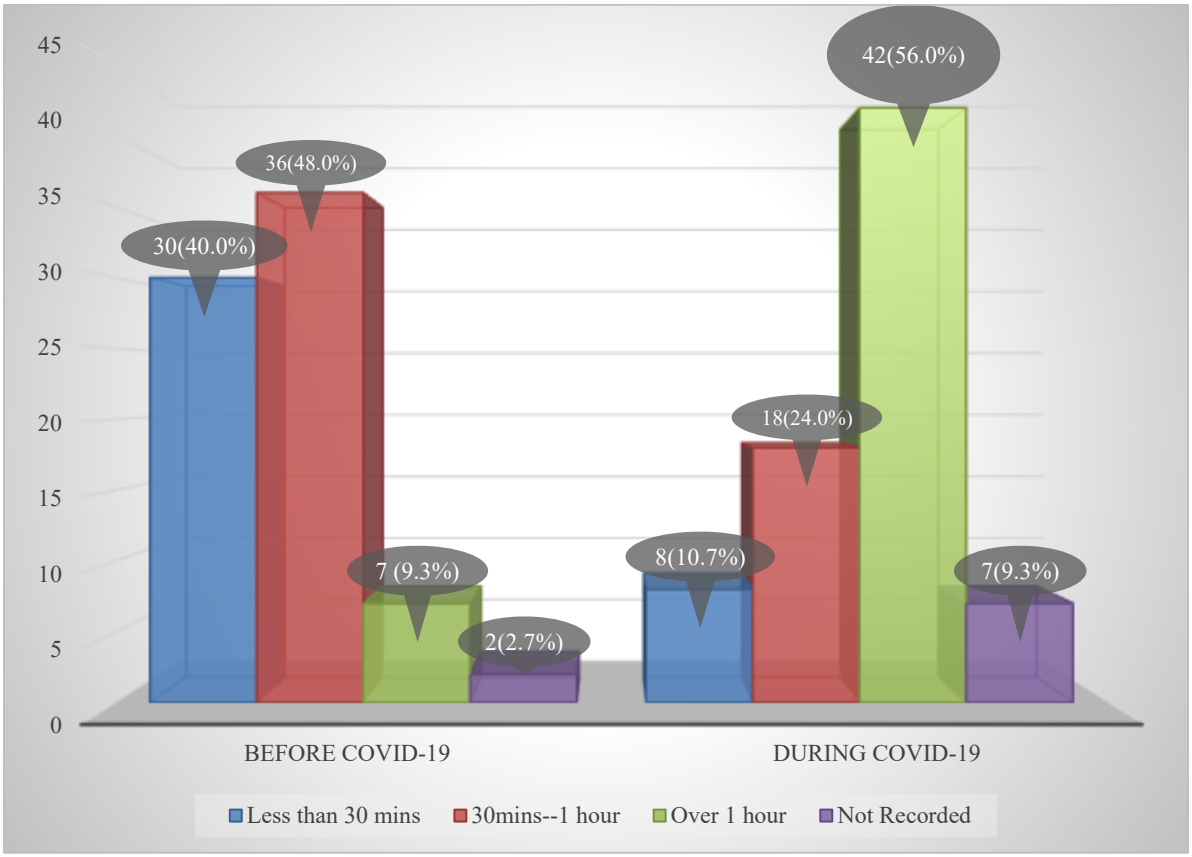


**Fig. 1 Average Waiting Time Before and During COVID-19**

Waiting times also saw a marked increase: 40% of respondents indicated that before COVID-19, their clients waited less than 30 minutes for services. However, during the COVID-19 pandemic, this figure drastically fell to 10.7%. The proportion of clients waiting over 1 hour surged from 9.3% pre-pandemic to a substantial 56% during the pandemic, indicating severe delays in service delivery. This increase in waiting time can be attributed to the overburdened healthcare system, disruptions in staffing, and reduced facility capacity resulting from safety protocols.

**Table 10: Reduction in Maternal Health Services During COVID-19**

| Service Type | Frequency | Percentage |
|---|---|---|
| Antenatal care | 60 | 80.0 |
| Delivery care | 42 | 56.0 |
| Postnatal care | 50 | 66.7 |
| Family planning | 55 | 73.3 |
| **Emergency obstetric care** | **38** | **50.7** |

Several key services experienced substantial reductions in client visits during the pandemic. Antenatal care (80%), family planning (73.3%), and postnatal care (66.7%) were the most affected, with more than half of the respondents reporting reduced client visits. These reductions were likely due to restrictions on movement, fear of visiting health facilities, and limited transport during the pandemic. Many individuals may have prioritised emergency care or avoided seeking non-urgent care due to COVID-related fears.

**Table 11: Return to Pre-Pandemic Levels of Maternal Service Utilisation**

| Response | Frequency | Percentage |
|---|---|---|
| Yes | 8 | 10.7 |
| Partially | 25 | 33.3 |
| No | 37 | 49.3 |
| Not sure | 5 | 6.7 |
| **Total** | **75** | **100.0** |

Only 10.7% of facilities reported that service utilisation had returned to pre-pandemic levels, while 49.3% stated there had been no return to normal. This suggests that while some facilities are partially recovering, the overall impact of COVID-19 on service delivery is still being felt, with low levels of recovery and persistent barriers preventing a return to normal service use.

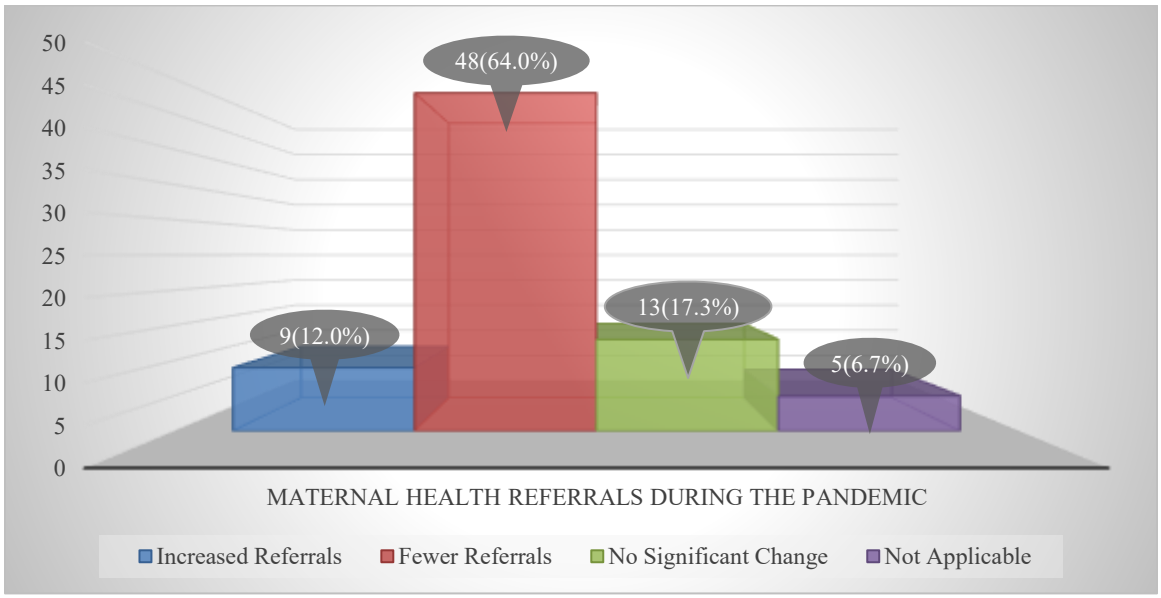


Fig. 2 Change in Maternal Health Referrals During the Pandemic

According to Figure 2, 64% of facility staff reported a decrease in referrals, while only 12% stated that their facilities experienced an increase in referrals. A drop in referrals could be indicative of reduced inter-facility cooperation or patients bypassing lower-level facilities due to the perception that higher-level facilities might offer more comprehensive care in times of crisis.

## DISCUSSION OF FINDINGS

The findings of this study reveal the profound disruptions caused by the COVID-19 pandemic on maternal health service access and utilisation across all levels of healthcare in Plateau State, Nigeria. The most notable change was a statistically significant decline in antenatal care (ANC) attendance, where full access dropped from 89.9% pre-pandemic to 23% during the pandemic ($\chi^2 = 266.62$, $p \leq 0.0001$). This trend mirrors global reports of service disruption, including those from the World Health Organisation (WHO, 2020) and Roberton et al. (2020), which cite a sharp decline in essential maternal health service uptake due to both demand- and supply-side shocks.

Among the primary factors cited for the decline were movement restrictions (67.9%), fear of infection at healthcare facilities (58.8%), and transportation difficulties (48.3%). These findings reflect a breakdown in the enabling environment for care, in line with Andersen's Behavioural Model of Health Services Use, which categorises access to care as a function of predisposing, enabling, and need-related factors (Andersen, 1995). In this study, enabling factors—such as transportation availability, healthcare facility accessibility, and financial resources—were severely compromised during the pandemic, making it difficult for even highly motivated individuals to seek care.

The disruption was felt across the three levels of care. Skilled birth attendance declined dramatically from 94.9% to 19.3%, while postnatal care utilisation dropped to 24.3%. These findings are alarming, as skilled delivery and postnatal care are critical in preventing maternal and neonatal deaths (Campbell & Graham, 2006; WHO, 2023). In the absence of formal care, many women reverted to using traditional birth attendants (TBAs), further underscoring the erosion of trust and accessibility in the formal health system during the pandemic. This shift suggests that in emergencies, predisposing factors such as cultural beliefs and trust in traditional practices may override formal health-seeking behaviour, especially when the enabling environment fails.

Additionally, the socioeconomic profile of the respondents compounded the barriers to access. A significant majority (72.7%) earned less than ₦70,000 monthly, and 86.4% had only secondary education or less, indicating deep-rooted inequities in health access. These conditions likely exacerbated the influence of predisposing factors such as low educational attainment and limited autonomy in health decision-making. This finding is consistent with studies by Onwujekwe et al. (2021) and Adedokun et al. (2023), which emphasise how socioeconomic disadvantage can amplify health vulnerabilities during crises. The high rates of polygamous unions (59%) and extended family living arrangements (59.9%) may also reflect sociocultural dynamics where women's health needs are sometimes deprioritised in favour of broader household concerns.

From the supply side, the health system exhibited notable weaknesses. The workforce was overwhelmingly female (90.1%), with most being Community Health Extension Workers (42.6%), earning less than ₦110,000 monthly (52.5%). These workers were on the frontlines without adequate protection, hazard pay, or psychological support. These systemic issues echo findings from Hanefeld et al. (2017) and WHO (2020), which argue that the quality of care deteriorated globally during the pandemic due to workforce shortages, lack of protective equipment, and repurposing of health infrastructure. Within Andersen's model, these reflect failures in the external

environmental factors—including system-level preparedness and resilience—which are crucial for facilitating effective utilisation of care.

Interestingly, the study also found evidence of a gradual rebound in service utilisation post-lockdown, especially in urban and tertiary facilities. Though not statistically analysed in depth here, this trend may be attributed to a combination of public health messaging, adaptation by health workers, and community resilience. Such rebounds have been noted in other settings as well (Bouzid et al., 2023; Oluwole et al., 2024), suggesting that resilience mechanisms, such as community health worker interventions, informal information networks, and facility-level innovations (e.g., appointment scheduling to reduce crowding), may have played a role. This finding highlights the dynamic interplay between enabling and predisposing factors. While barriers initially suppressed demand, ongoing needs, accumulated health concerns, and adaptations in health delivery eventually encouraged return visits.

Furthermore, it is plausible that perceived need (a component of Andersen's model) increased as pregnancies progressed, overriding fears associated with infection. Pregnant women who missed ANC early in the pandemic may have returned later for delivery services or immunisations for their newborns. This pattern supports the need to distinguish between different types of maternal health service utilisation—preventive vs. emergency care—as they may respond differently to external stressors.

However, the recovery was not uniform. Rural areas and PHCs continued to report lower patient inflows, reflecting persistent structural inequities. These findings reinforce the conclusions of Okonofua et al. (2018) and Ntoimo et al. (2019), who identified rural women as particularly disadvantaged due to distance, weak infrastructure, and distrust of the health system. In the context of the pandemic, these pre-existing vulnerabilities were likely magnified, and the lack of tailored outreach or mobile care services further marginalised already marginalised groups.

The study's findings have several implications. First, they demonstrate that pandemics exacerbate existing inequalities in maternal health service access. Second, they highlight the importance of integrating community-level resilience mechanisms into formal health systems, including strengthening community health workers, decentralising care delivery, and supporting informal caregiver networks. Third, the results confirm the relevance of Andersen's model in analysing service utilisation under crisis conditions, especially the interplay of structural barriers and individual-level determinants. Unexpectedly, despite limited resources, some facilities demonstrated adaptive capacity, continuing to offer services within pandemic constraints. This suggests that institutional flexibility, leadership, and community trust may serve as buffers in future health emergencies. Further investigation is needed into what specific practices enabled some PHCs or hospitals to maintain or restore service access more quickly than others.

## Conclusion

This study reveals a significant decline in access to maternal health services during the COVID-19 pandemic in Plateau State, driven by structural, economic, and psychological barriers. Service users—mostly young, poor, and minimally educated—faced reduced access to antenatal, skilled

delivery, and postnatal care due to lockdowns, fear of infection, and systemic weaknesses in the health system. On the supply side, frontline health workers, predominantly female Community Health Extension Workers (CHEWs), operated under challenging conditions with limited protection, remuneration, or institutional support. These findings underscore the pressing need for targeted interventions to enhance resilience in maternal healthcare delivery during public health emergencies and ensure the continuity of essential services for vulnerable populations.

Despite the robustness of the study, several limitations should be acknowledged. The use of facility-based convenience sampling may have excluded women who completely avoided formal health services during the pandemic, thereby underrepresenting the most affected groups and introducing sampling bias. Moreover, the reliance on retrospective self-reports from both service users and providers raises concerns about recall bias, especially regarding service use before and during different phases of the pandemic. These factors could affect the precision and generalisability of the results. Future studies should consider community-based or longitudinal designs to capture broader, time-sensitive patterns of maternal health service utilisation. Additionally, qualitative research focusing on lived experiences, decision-making processes, and perceptions of risk could offer more nuanced insights into the barriers and motivators affecting maternal health behaviour in times of crisis.

In conclusion, the findings underscore the critical need for strategic preparedness and prioritisation of maternal health within broader public health and emergency response frameworks. Policymakers must treat maternal healthcare as an essential service, not just in name, but also in terms of funding, infrastructure, and frontline protection. With careful planning, inclusive policies, and proactive investment in maternal health systems, Nigeria can not only recover from the COVID-19 shock but also strengthen its capacity to safeguard women and children during future health emergencies. Failure to act decisively now risks eroding decades of progress in maternal health and widening already existing health disparities.

**Recommendations**

i. Emergency Health System Strengthening: The state should develop pandemic-resilient maternal health systems, including mobile antenatal care units, telemedicine platforms, and community-based delivery models to ensure continued access during crises.
ii. Socioeconomic Support for Vulnerable Groups: Introduce conditional cash transfers, free maternal health insurance, and transportation vouchers for pregnant women—especially those in low-income, polygamous, or rural households—to reduce economic barriers during emergencies.
iii. Capacity Building for Health Workers: Provide psychosocial support, pandemic-specific clinical training, and adequate hazard allowances to frontline maternal health workers to boost morale, safety, and service continuity in emergency settings.

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