

Obstetric Service Delivery Trends and Healthcare Staffing at a Teaching Hospital in Southwest Nigeria

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ABSTRACT

Background: Maternal health is a critical component of public health worldwide, reflecting a society's commitment to the well-being of its women and children. The provision of obstetric services, encompassing antenatal care, delivery and postnatal care, plays a pivotal role in reducing maternal mortality and ensuring positive birth outcomes. However, the quality and accessibility of obstetric services are influenced by various factors, including healthcare infrastructure, staffing levels and healthcare policies.

Objective: To determine obstetric service delivery trends and healthcare staffing at a teaching hospital in southwest Nigeria

Methodology: This study utilized a retrospective cohort design to examine the utilization of maternity care services among women at Ekiti State University Teaching Hospital, Nigeria. Data spanning from January 2016 to December 2023 were collected from obstetric records. Analysis was done using Statistical Package for Social Sciences (SPSS) version 20.

Results: a total of 9,855 deliveries were recorded, with 4,145 Caesarean sections and 5,767 spontaneous vaginal deliveries, giving a Caesarean section rate of 42%. Overall, there seems to be some fluctuations in the total number of deliveries over the years, with the highest number observed in 2019 (1482) and the lowest in 2021 (868). The number of consultants, senior residents, junior residents, house officers, nurses and other support staff varied over the years, with different staffing levels observed in each year.

Conclusion: this study contributes to a better understanding of obstetric service delivery trends and healthcare staffing dynamics, offering valuable insights for healthcare resource allocation and policymaking. The findings underscore the importance of monitoring caseloads and staffing levels to ensure quality maternal and infant healthcare delivery.

KEYWORDS: Obstetric care trend, staffing, Teaching hospital, Southwest Nigeria

ARTICLE DETAILS

Published On:
21 May 2024

Available on:
<https://ijmscr.org/>

INTRODUCTION

Maternal health is a critical component of public health worldwide, reflecting a society's commitment to the well-

being of its women and children^{1,2}. The provision of obstetric services, encompassing antenatal care, delivery and postnatal care, plays a pivotal role in reducing maternal mortality and

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ensuring positive birth outcomes². However, the quality and accessibility of obstetric services are influenced by various factors, including healthcare infrastructure, staffing levels, and healthcare policies³.

In Nigeria, like many low- and middle-income countries, maternal mortality remains unacceptably high despite global efforts to improve maternal health outcomes⁴. According to the World Health Organization (WHO), Nigeria accounted for approximately 20% of global maternal deaths in 2017, with an estimated maternal mortality ratio of 512 per 100,000 live births⁴. Ekiti State, located in southwestern Nigeria, faces similar challenges in maternal healthcare provision, with inadequate healthcare infrastructure and workforce shortages contributing to suboptimal maternal health outcomes⁵.

This research article examines the trends in obstetric service delivery and healthcare staffing at a teaching hospital in Ekiti State, Nigeria. Teaching hospitals often serve as primary referral centers for complicated obstetric cases and play a crucial role in training healthcare professionals. Understanding the dynamics of obstetric service delivery and healthcare staffing in this setting is essential for identifying areas of improvement and implementing targeted interventions to enhance maternal health outcomes.

The investigation into obstetric service delivery trends and healthcare staffing at a teaching hospital in Ekiti State, Nigeria, is both timely and critical for several reasons. Firstly, Nigeria continues to grapple with alarmingly high maternal mortality rates, despite global efforts to improve maternal health outcomes. Understanding the specific challenges faced by healthcare facilities, particularly teaching hospitals which serve as primary referral centres for complex obstetric cases, is essential for targeted interventions aimed at reducing maternal mortality. Secondly, Ekiti State, located in southwestern Nigeria, represents a microcosm of the broader challenges confronting maternal healthcare in the country. By focusing on this specific region, the research can provide insights that are contextually relevant and actionable for policymakers and healthcare practitioners at both the state and national levels. Furthermore, teaching hospitals play a crucial role in medical education and training healthcare professionals. Investigating healthcare staffing dynamics in this setting is essential for addressing workforce shortages, improving staff retention and enhancing the quality of obstetric care delivery.

The findings of this research are expected to contribute to the existing literature on maternal health in Nigeria by shedding light on the specific challenges faced by teaching hospitals in delivering obstetric services. Furthermore, the study findings may inform policy and practice initiatives aimed at strengthening obstetric care provision and healthcare workforce development in similar settings.

METHODOLOGY

This study utilized a retrospective cohort design to examine the utilization of maternity care services among women at Ekiti State University Teaching Hospital, Nigeria. Data spanning from January 2016 to December 2023 were collected from obstetric records. The tertiary institution is the teaching hospital affiliated with the College of Medicine, Ekiti State University, located in Ado-Ekiti, Nigeria. As the principal referral centre, it caters for private, primary and secondary healthcare facilities in Ekiti State and surrounding areas such as Osun, Kogi, Kwara, and Ondo. The hospital provides weekly antenatal clinics and round-the-clock emergency obstetric and gynecological services.

Data on total deliveries, total Caesarean sections, total spontaneous vaginal deliveries, total National Health Insurance Scheme (TNHIS) coverage, total out-of-pocket (OOP) payments and staffing levels (consultants, senior resident doctors, junior resident doctors, house officers, paediatric doctors attached to the labour ward/labour ward theatre, perioperative nurses, nurse attendants, anaesthetic doctors and porters) were obtained from hospital records for each year of the study period.

Data collected were analysed using Statistical Package for Social Sciences (SPSS) version 22. Statistical methods such as mean, standard deviation, frequencies, percentages, trend analysis and correlation were employed. Correlation analysis was performed using appropriate statistical tests, with significance set at $p < 0.05$. Approval for the study was obtained from the hospital's Ethics and Research Committee.

RESULTS

Table 1 shows that over the eight-year period, a total of 9,855 deliveries were recorded, with 4,145 Caesarean sections and 5,767 spontaneous vaginal deliveries, giving a Caesarean section rate of 42%. Overall, there seems to be some fluctuations in the total number of deliveries over the years, with the highest number observed in 2019 (1482) and the lowest in 2021 (868). The number of deliveries covered under the National Health Insurance Scheme (NHIS) showed variability over the years, with the highest number observed in 2019 (238) and the lowest in 2021 (88). The out-of-pocket payments fluctuated over the years, with a peak in 2019 (1244) and a decrease in 2021 (780). The number of consultants, senior residents, junior residents and house officers varied over the years, with different staffing levels observed in each year.

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Table 1: Modes of payments, delivery and level of obstetric medical team backup

Year	Total Delivery (TD)	Total Caesarean Section (TCS)	Total Spontaneous Vaginal Delivery (TSVD)	Total National Health Insurance Scheme (TNHIS)	Total Out of Pocket Payment (TOOP)	Consultants	Senior Resident Doctors	Junior Resident Doctors	House Officers
2016	1385	541	871	153	1232	7	4	8	7
2017	1352	477	875	192	1160	7	5	8	7
2018	1239	483	756	212	1027	7	4	8	8
2019	1482	564	918	238	1244	8	6	8	5
2020	1329	563	766	121	1208	8	7	8	3
2021	868	353	515	88	780	9	7	10	5
2022	1108	615	493	116	992	9	6	8	6
2023	1122	549	573	122	1000	6	4	8	8
Total	9885	4145	5767	1242	8643				

Table 2 shows trend and variation in delivery, payment modes and obstetric medical team

The mean number of deliveries over the years was 1235.63, with a median of 1233.5, indicating a relatively symmetric distribution of data around the mean. The mean number of deliveries covered under the National Health Insurance Scheme was 155.25, with a median of 155.5, suggesting a

relatively symmetric distribution. The mean and median values for the number of consultants, senior residents, junior residents and house officers indicate relatively stable staffing levels across the years. However, the standard deviations and ranges for these variables suggest some variability in staffing levels, particularly for house officers, which show considerable fluctuations.

Table 2: Trend and Variation in delivery, payment modes and obstetric medical team

Variable	Mean	Median	Standard Deviation	Range
Total Delivery (TD)	1235.63	1233.5	227.90	614
Total Caesarean Section (TCS)	518.13	548	74.58	262
Total Spontaneous Vaginal Delivery (TSVD)	721.00	756	158.40	362
Total National Health Insurance Scheme (TNHIS)	155.25	155.5	60.22	150
Total Out of Pocket Payment (TOOP)	1080.38	1084.0	181.02	1093
Consultants	7.63	7.5	0.98	3
Senior Residents	5.13	5.5	1.35	3
Junior residents	8.13	8	0.75	2
House Officers	4.63	7	3.29	8

Table 3 shows correlation matrix for annual total delivery and the total number of healthcare specialists. Total Delivery (TD) had a strong positive correlation with Total Out of Pocket Payment (TOOP) and Total Spontaneous Vaginal Delivery (TSVD), indicating that as the total deliveries increase, so do the out-of-pocket payments and spontaneous vaginal deliveries. Total Caesarean Section (TCS) had a

moderate positive correlation with Total Spontaneous Vaginal Delivery (TSVD). The number of consultants had a weak positive correlation with Total Caesarean Section (TCS) and senior residents, indicating some association but not strong. House Officers had a weak negative correlation with consultants and senior residents, suggesting a slight inverse relationship.

Table 3: The correlation matrix for annual total delivery and the total number of healthcare specialists

Variable	TD	TCS	TSVD	TNHIS	TOOP	Consultants	Senior Registrar	Registrar Doctors	House Officers
Total Delivery (TD)	1.0000	0.5129	0.8587	0.4611	0.9079	0.1703	0.5157	0.3287	0.4566
Total Caesarean Section (TCS)	0.5129	1.0000	0.5198	0.2594	0.5586	0.4036	0.5288	0.4775	0.4516

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Total Spontaneous Vaginal Delivery (TSVD)	0.8587	0.5198	1.0000	0.4547	0.8432	0.1433	0.3812	0.2836	0.4364
Total National Health Insurance Scheme (TNHIS)	0.4611	0.2594	0.4547	1.0000	0.5807	0.1323	0.0797	0.2195	0.0365
Total Out of Pocket Payment (TOOP)	0.9079	0.5586	0.8432	0.5807	1.0000	0.1182	0.4989	0.3533	0.3445
Consultants	0.1703	0.4036	0.1433	0.1323	0.1182	1.0000	0.3301	0.1416	0.3264
Senior resident doctors	0.5157	0.5288	0.3812	0.0797	0.4989	0.3301	1.0000	0.5802	0.2778
Junior resident doctors	0.3287	0.4775	0.2836	0.2195	0.3533	0.1416	0.5802	1.0000	0.1245
House officers	0.4566	0.4516	0.4364	0.0365	0.3445	0.3264	0.2778	0.1245	1.0000

Table 4 shows the summary of the number of healthcare staff participating in Caesarean Sections (CS) across the years 2016 to 2023. The number of Peri-operative nurses participating in CS varied from 1 to 3 across the years. Health attendants consistently remained at 1 per CS throughout the years. The Average Circulating Nurse varied between 1 and

2 across the years. Porter remained at 1 per CS throughout the years. Obstetrics-Gynecology doctors remained at 3 per CS every year. Special Care Baby Unit doctors also remained consistent at 1 per CS. The number of Anaesthesia Doctors and Nurses remained constant at 1 per CS every year.

Table 4: summary of the number of healthcare staff participating in Caesarean Sections (CS) across the years 2016 to 2023

Year	PON	HA	ACN	Porter	ObGy Doctors	SCBU Doctor s	AD	AN
2016	2	1	1	1	3	1	1	1
2017	2	1	2	1	3	1	1	1
2018	2	1	2	1	3	1	1	1
2019	3	1	2	1	3	1	1	1
2020	2	1	1	1	3	1	1	1
2021	3	1	2	1	3	1	1	1
2022	2	1	1	1	3	1	1	1
2023	1	1	1	1	1	1	1	1

*PON: Perioperative Nurses; HA: House Officers; ACN: Average Circulating Nurses; ObGy: Obstetrics and Gynaecology Doctors; SCBU: Special Care Baby Unit Doctors; AD: Anaesthetic Doctors; AN: Anaesthetic Nurses

DISCUSSION

In this study, we investigated the trends in obstetric service delivery, payment mechanisms, and healthcare staffing at Ekiti University Teaching Hospital over an eight-year period, from 2016 to 2023. The statement indicating a Caesarean section (C-section) rate of 42% over an eight-year period, alongside potential implications of poor staffing, suggests a complex scenario with a significant implication for maternity care.

Firstly, a high C-section rate may indicate overutilization of the procedure. While C-sections are necessary and life-saving in many cases, the World Health Organization (WHO) recommends an optimal rate of 10-15%, suggesting that rates above this range may reflect unnecessary surgeries or inadequate efforts towards promoting vaginal births^{6,7}. Poor staffing could contribute to this phenomenon in several ways. The Caesarean section stands as the most prevalent major

surgical procedure in obstetrics and gynecology, demanding sufficient and high-quality staffing for optimal outcomes.^{8,9} Ensuring a skilled, well-equipped and adequate team is imperative, as the procedure involves intricate surgical techniques and carries significant risks⁸. Adequate staffing guarantees prompt response to emergencies, proficient surgical execution and vigilant postoperative care, all of which directly influence maternal and neonatal well-being^{10,11}. Investing in training, retention and support for healthcare professionals involved in Caesarean deliveries is crucial for maintaining standards of care and improving overall patient outcomes in obstetrics and gynecology.

Therefore, insufficient staffing levels might lead to inadequate monitoring of labor progress, resulting in decisions to opt for C-sections prematurely out of concern for maternal or fetal well-being. Additionally, if there aren't enough healthcare providers available to support laboring women effectively, interventions like epidurals or continuous fetal monitoring may be underutilized, further increasing the likelihood of C-sections¹¹.

Furthermore, poor staffing levels can impact the availability of skilled obstetricians and anaesthetists to perform C-

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sections promptly and safely when medically necessary. Delays in accessing these specialists due to staffing shortages could result in adverse outcomes for both mothers and babies¹². Another implication of poor staffing is the potential impact on postpartum care. High C-section rates are associated with longer hospital stays and increased healthcare costs¹³; insufficient staffing could strain postpartum resources, leading to suboptimal care for women recovering from surgery and potential delays in identifying and addressing postoperative complications¹³. Additionally, inadequate staffing may contribute to burnout among healthcare providers, impacting their ability to provide quality care consistently. Burnout can lead to decreased job satisfaction, compromised patient safety, and higher staff turnover rates, further exacerbating staffing shortages and perpetuating the cycle of inadequate care.

The analysis of total deliveries, Caesarean sections and spontaneous vaginal deliveries revealed fluctuations over the study period. While there were no significant trends observed, fluctuations in caseloads highlight the dynamic nature of obstetric service delivery. Factors such as changes in population demographics, healthcare policies and clinical practices may contribute to these fluctuations.

Health insurance coverage and out-of-pocket payments play a significant role in financing obstetric services^{14,15}. The analysis revealed variability in the number of deliveries covered under the National Health Insurance Scheme (TNHIS) and fluctuations in out-of-pocket payments over the years. The highest number of deliveries covered under TNHIS was recorded in 2019, while the lowest was observed in 2021, reflecting changes in health insurance enrolment, policy modifications or shifts in patient preferences. Out-of-pocket payments peaked in 2019 and decreased in 2021, indicating potential changes in healthcare financing dynamics or economic factors influencing patient payments. Understanding these trends is essential for healthcare policymakers, administrators and providers to optimize resource allocation, improve healthcare quality and enhance patient outcomes in obstetric care delivery.

The research gained strength from its status as the most extensive study conducted on maternity care trend and staffing picture within the institution, potentially serving as a valuable model and resource for future studies in this domain. Additionally, it represents the largest investigation to date on maternity care patterns within the institution, shedding light on the relationship between maternity care trend and staffing. Moreover, the study will provide a dependable source of data regarding the delivery patterns of the institution. This study was limited to data from a single hospital, which may not be representative of broader population trends. The retrospective design limited the ability to establish causality or infer temporal relationships between variables. Data quality and completeness may have influenced the accuracy of the findings. External factors such as changes in healthcare

policies or population demographics were not explicitly accounted for in the analysis.

Analysing trends in obstetric service demand is crucial for ensuring that healthcare facilities can effectively meet the needs of expectant mothers and their babies. By conducting trend analysis, periods of heightened demand can be identified, such as those with increased total deliveries or Caesarean sections. Subsequently, recommendations for resource allocation strategies can be formulated to guarantee adequate staffing levels and infrastructure during these periods. For instance, if the analysis reveals a surge in deliveries during certain months or seasons, healthcare facilities can adjust staffing schedules accordingly, ensuring that there are enough obstetricians, nurses and support staff available to provide quality care to pregnant women. Additionally, identifying periods of increased Caesarean sections can prompt hospitals to assess the reasons behind the rise and implement measures to promote vaginal births when appropriate, thus optimizing resource utilization.

Analyzing trends in out-of-pocket payments and payments covered by the National Health Insurance Scheme (NHIS) provides insights into the financial burden faced by patients and the healthcare system. This analysis helps in understanding the affordability of maternity care services and the effectiveness of existing insurance coverage in mitigating financial strain. Based on the findings, policy interventions or adjustments to insurance coverage can be recommended to ensure equitable access to obstetric services while maintaining sustainable healthcare financing. For example, if the analysis indicates that a significant proportion of patients are experiencing financial hardship due to out-of-pocket payments, policymakers may consider expanding insurance coverage or introducing subsidies to reduce patient costs.

Investigating the association between staffing levels and clinical outcomes is essential for assessing the impact of staffing on the quality of obstetric care. By examining factors such as Caesarean section rates and maternal and neonatal outcomes in relation to staffing ratios, insights can be gained into how staffing influences patient outcomes.

Based on the analysis, recommendations can be provided for optimizing staffing ratios to improve patient outcomes and enhance the quality of obstetric care. This may involve increasing the number of obstetricians or ensuring a sufficient number of support staff to assist with labour and delivery, thereby reducing the likelihood of adverse events and improving overall patient satisfaction.

Discussing the implications of the findings for healthcare policy and decision-making highlights the importance of evidence-based strategies for optimizing obstetric services and improving maternal and neonatal health outcomes. By advocating for investments in obstetric care infrastructure, workforce development and financial support mechanisms, policymakers can address the identified challenges and enhance the delivery of obstetric services.

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Conducting rigorous statistical analysis and providing evidence-based recommendations aim to contribute valuable insights to the field of obstetrics. By informing policy and practice, these recommendations have the potential to improve maternal and neonatal health outcomes and ensure equitable access to quality obstetric care for all women.

CONCLUSION

Staffing levels of specialists, senior and junior resident doctors, nurses and other members of support staff exhibited variability, with fluctuations observed in each category. While no significant trends were identified, understanding staffing dynamics is crucial for maintaining quality and safety in obstetric care delivery.

Correlation analysis provided insights into the relationships between variables, revealing associations between total deliveries, payment mechanisms, and staffing levels. These findings emphasize the interconnectedness of various factors influencing obstetric service delivery and healthcare outcomes.

The study contributes to a better understanding of obstetric service delivery trends and healthcare staffing dynamics, offering valuable insights for healthcare resource allocation and policymaking. By identifying patterns and correlations within the data, the study aims to inform evidence-based strategies for optimizing obstetric care delivery and improving maternal and neonatal health outcomes at Ekiti State University Teaching Hospital and beyond.

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