

Comparative analysis of maternal and child healthcare services for quality care in selected secondary health institutions, Lagos metropolis, Nigeria

Bamigbade PE¹, Sowunmi CO¹[ID](#), Ope-Babadele OO¹[ID](#), Olabisi EO²

¹Department of Maternal and Child Health Nursing, School of Nursing, Babcock University, Ilishan-Remo, Nigeria

²West African Institute for Applied Health Research, University of Ibadan, Ibadan, Nigeria

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Abstract

Objective: This study compared the quality of maternal and child healthcare services in selected upgraded and non-upgraded secondary health institutions in the Lagos metropolis.

Methods: A comparative cross-sectional design was used across four secondary health facilities (two upgraded, two non-upgraded). Data were collected from existing maternal and neonatal health records over three months from August to October 2024. A proportional stratified random sampling technique was used to select 165 patient records. Data were collected using a validated, reliable ($r=1.0$) structured checklist based on the Donabedian model. Data were analysed using descriptive and inferential statistics (independent t-test) at a 0.05 significance level.

Results: Upgraded facilities demonstrated a significantly better mean score for physical infrastructure (3.77 ± 0.56) compared to non-upgraded facilities (3.31 ± 0.95), with a mean difference of 0.458 ($p=0.005$). No significant differences were found in personnel skills/welfare ($p=0.914$) or the process of care delivery ($p=0.152$). However, outcome measures were more favourable in upgraded facilities, which had lower rates of near-miss cases (20.0% vs. 30.5%) and lower maternal (3.3% vs. 3.8%) and neonatal mortality.

Conclusion: Upgraded facilities were associated with superior physical infrastructure and better maternal and neonatal outcomes, despite similar processes of care. Findings suggest that strategic investments in health facility upgrades, alongside targeted improvements in resource allocation and digital infrastructure, are crucial to enhancing service delivery and reducing mortality.

Key Words: Maternal healthcare services, Child healthcare services, Quality of Care, Lagos Metropolis, Nigeria

Plain English Summary

This study compared the quality of healthcare services for mothers and children in different hospitals in Lagos, Nigeria. We looked at hospitals that had been upgraded and those that hadn't.

We found that upgraded hospitals had slightly better facilities and staff, leading to a measurable impact on the quality of care delivered to patients. However, there were gaps in infection control and digital systems. The study suggests that all hospitals need more resources, better digital systems, and more staff to provide high-quality care to mothers and children.

Correspondence:

Ope-Babadele Oluwatosin O

Department of Maternal and Child Health Nursing, School of Nursing

Babcock University, Ilishan-Remo

Nigeria.

+2347030800247, ope-babadeleo@babcock.edu.ng oluwatomisinope2016@gmail.com

Introduction

Maternal and child health (MCH) services are vital components of healthcare systems worldwide, directly influencing the health and survival of mothers and children. Maternal health services are a set of services related to maternity care (1). These services include antenatal care services, delivery care services and postnatal care services. On the other hand, child healthcare services include all forms of medical assistance such as childhood immunisation, health and nutrition education, breastfeeding education, oral rehydration therapy, growth monitoring, child illness and treatment, to a baby right after birth, up to the age of five (2).

Nigeria has made some progress on some health indicators, but challenges still exist with its maternal and child mortality, which remains one of the highest globally. In Nigeria, maternal and child health indicators remain troubling despite efforts to improve healthcare services. According to the World Health Organisation (WHO), Nigeria's MMR of 1,047 per 100,000 live births accounts for more than a quarter (28.5%) of all estimated global maternal deaths in 2020 (3). In 2017, it accounted for 67,000 (23.0%) of global maternal deaths, while 872,676 under-5 deaths occurred the same year (4). The deaths of newborn babies in Nigeria represent a whopping 25% of the total number of under-five deaths (2).

In the past 5 years, Lagos State, in its bid to curb maternal and infant mortality, renovated and upgraded five (5) secondary health facilities out of the twenty-seven (27) secondary health facilities offering maternal and child health services in the state. The state's investments in upgrading several facilities aim to improve service delivery and health outcomes for mothers and children (5). The upgraded healthcare facilities are expected to offer superior services due to better infrastructure, advanced medical technologies, and trained personnel. These upgraded centres, commonly known as "Maternal and Child Centres" (MCC) are located at Eti-Osa, Alimosho, Epe, Badagry and Ikorodu. Lagos State set a six-year target to achieve universal health coverage, and the government is working assiduously towards achieving the goal and making affordable healthcare accessible for all residents by 2025.

Upgraded facilities typically offer better infrastructure, trained personnel, and modern equipment, resulting in higher-quality care. This is because upgraded healthcare facilities often receive significant investment in infrastructure, technology, and training, while non-upgraded facilities may struggle with inadequate resources

(6, 7). Conversely, non-upgraded facilities often lack these essential resources, leading to suboptimal care and poor health outcomes. This disparity can lead to differences in the quality of care provided to patients, which in turn can impact maternal and child health outcomes (8).

However, there is limited research that directly assesses the quality indices of the upgraded MCC facilities compared to the non-upgraded facilities, especially within the Lagos metropolis. This study will therefore aim to utilise the Donabedian model to assess and compare the quality of maternal and child health services in selected secondary upgraded and non-upgraded health institutions in the Lagos metropolis.

Materials and Methods

Study Design and Setting

A comparative cross-sectional study was conducted across four secondary health institutions in the Lagos Metropolis offering maternal and child health services: two upgraded (MCC Alimosho, MCC Eti-Osa) and two non-upgraded (Lagos Island Maternity and Ifako Ijaiye General Hospital).

Sampling and Sampling Technique

Multi-sampling techniques were used in the study. Purposive sampling was used to select the institutions; the non-upgraded facilities were based on service volume, while the upgraded facilities were selected because they are the only upgraded secondary health institutions offering maternal and child health services located within the Lagos metropolis. Leslie Kish was used in calculating the sample size of 165 patients' records.

$$n = \frac{Z^2 pq}{d^2} \text{ (Kish \& Leslie, 1965).}$$

Where n = minimum sample size expected
Z = standard normal deviation (1.96 corresponding to 95% confidence interval)

p = prevalence of MCH services utilisation (11%) (1).

d = precision (0.05)

q = 1-p

Solution

$$n = \frac{Z^2 p(1-p)}{d^2}$$

$$n = \frac{1.96^2 \times 0.11 \times 0.89}{0.05 \times 0.05}$$

$$n = \frac{0.37609}{0.0025}$$

$$n = 150$$

The attrition rate is set at 10%,

$$n = \frac{10}{100} \times 150$$

$$= 15$$

Hence, 10% of 150 is 15. Therefore, the total sample size is 165 patient records.

A proportional stratified random sampling technique was used to select 165 medical patient records from the four selected secondary facilities,

conducted between August and October 2024. Finally, a simple random sampling technique was used in selecting 33, 37, 36 and 69 patients' records from the four hospitals, respectively (Table 1).

Table 1: Sample Population

Facility	Facility Type	Population	Proportional Sample
Maternal and Child Centre Alimosho	Upgraded	360	33
Maternal and Child Centre Eti-Osa	Upgraded	300	27
Ifako – Ijaiye General Hospital	Non-upgraded	390	36
Lagos Island Maternity	Non-Upgraded	750	69
Total		1800	165

Study Instrument

Data were collected using an adapted checklist developed from the WHO’s Quality of Care framework for maternal and newborn health and the Pathfinder International standards, structured according to the Donabedian quality of care model. The checklist was designed to collect data regarding the structure (Personnel and Physical facilities), process and outcome of maternal health services.

The scale was divided into four sections: socio-demographic survey which contained 7 items that elicited responses on demographic variables of the Maternal and Child Health Centres (MCC), structure survey contained 37 items assessing the physical structure and personnel available in the facility graded as '2' - Availability of skilled personnel/policy and implementation of policy, '1' – Personnel/policy available but not implemented, '0' - Personnel/policy is not available at all.

The process survey contained 28 items exploring the services rendered within the Maternal and Child Health Centres (MCC) graded as '3' – Routine/Always, '2' – Sometimes, '1' – Rarely, '0' – Never and lastly the outcome survey contained 21 items that was used in accessing and extracting data from existing records within the Maternal and Child Health Centres (MCC).

Data Analysis

The data obtained was sought for errors and completeness. The analysis was done using the

International Business Machine Statistical Package for Social Sciences version 27. Data was analysed using both descriptive and inferential statistics, including Pearson correlation to summarise the characteristics and to examine differences between variables influencing the quality of care in the upgraded and non-upgraded maternal health services, independent sample t-test to compare mean scores for structure and process variables between upgraded and non-upgraded facilities. Results were presented in frequency, percentage, tables and mean SD.

Results

Table 2 presents the characteristics of four selected general healthcare facilities in different Local Government Areas (LGAs) within the Lagos metropolis. Among these, Eti Osa and Alimosho are upgraded secondary facilities established in 2019, while Lagos Island Maternity (established in 1960) and Ifako-Ijaiye (established in 2010) are non-upgraded secondary facilities. The head of MCH services across all facilities was a female healthcare professional with RN/RM qualifications. Most held B.Sc./BNSC degrees, except for the Lagos Island representative, who had an MSc. Their years of practice ranged from 24 to 30 years, with Alimosho having the most experienced practitioner at 30 years, followed by Lagos Island at 29 years, Ifako-Ijaiye at 25 years, and Eti Osa at 24 years.

Table 2: Facilities Characteristics of Upgraded and Non-Upgraded Secondary Health Institutions in the Lagos Metropolis

Facility Type Facility	Upgraded Secondary Facility		Non-upgraded Secondary Facility	
	MCC Eti Osa	MCC Alimosho	Lagos Island Maternity	Ifako Ijaye GH
Location	Eti Osa LGA	Alimosho LGA	Lagos Island LGA	Ifako Ijaye LGA
Year Established	2019	2019	1960	2010

Gender of the Head of MCH Services	Female	Female	Female	Female
Professional Qualification	RN/RM	RN/RM	RN/RM	RN/RM
Educational Qualification	B.Sc./BNSC	B.Sc./BNSC	MSc	B.Sc./BNSC
Years of Practice	24	30	29	25

Table 3 presents the analysis of nursing personnel distribution across the four facilities. Lagos Island had 50% of Deputy Director of Nursing Service (DDNS) positions and 43.5% of Assistant Director (ADNS) roles, while Ifako-Ijaiye had 0% DDNS and 4.3% ADNS. Lagos Island had 35.5% Chief Nursing Officers, whereas Alimosho had 40.5% Assistant Chief Nursing Officers. Principal Nursing

Officers in Lagos Island were 31.9% while Alimosho had 35.7% Senior Nursing Officers, 38.5% Nursing Officers, and 34.9% Registered Nurses/Midwives. Based on specialisation, Lagos Island had 39.2% paediatric nurses, while Alimosho and Lagos Island had 36.4% perioperative nurses, respectively.

Table 3: Personnel Distribution of Maternal and Child Healthcare Services in Selected Upgraded and Non-Upgraded Secondary Health Institutions in the Lagos Metropolis

Facility Type	Upgraded Secondary Facility		Non-upgraded Secondary Facility	
	MCC Eti Osa	MCC Alimosho	Lagos Island Maternity	Ifako Ijaiye GH
Deputy Director of Nursing Service (DDNS)	1(16.7)	2(33.3)	3(50.0)	0(0.0)
Assistant Director of Nursing Service (ADNS)	4(17.4)	8(34.8)	10(43.5)	1(4.3)
Chief Nursing Officers (CNO)	17(27.4)	12(19.4)	22(35.5)	11(17.7)
Assistant Chief Nursing Officers (ACNO)	6(16.2)	15(40.5)	10(27.0)	6(16.2)
Principal Nursing Officers (PNO)	10(21.3)	12(25.5)	15(31.9)	10(21.3)
Senior Nursing Officers (SNO)	19(27.1)	25(35.7)	17(24.3)	9(12.9)
Nursing Officers	24(22.0)	42(38.5)	28(25.7)	15(13.8)
Registered Nurse/Midwife	61(23.6)	90(34.9)	67(26.0)	40(15.5)
Paediatric Nurses	15(29.4)	8(15.7)	20(39.2)	8(15.7)
Perioperative Nurses	5(15.2)	12(36.4)	12(36.4)	4(12.1)
Accident & Emergency Nurses	0(0.0)	6(50.0)	6(50.0)	0(0.0)

Table 4 presents the analysis of the availability and implementation of basic emergency obstetric care services across all four facilities. Findings indicate that most services, including basic and comprehensive emergency obstetric care, administration of parenteral antibiotics, uterotonics, anticonvulsants, manual placenta removal, retained product removal, assisted vaginal delivery, neonatal resuscitation, caesarean delivery, blood transfusion, and prompt salary payment, were scored '2' across all institutions, indicating consistent availability and

implementation. Essential Newborn Care (ENC) scored '0' in Eti-Osa, while Alimosho and both non-upgraded facilities scored '2'. Eti-Osa and Ifako-Ijaiye scored '1' in manual vacuum extraction, while Alimosho and Lagos Island scored '2'. Eti-Osa and Ifako-Ijaiye scored 1 in the use of anti-shock garments, while Alimosho and Lagos Island scored 2. Based on total scores and weighted averages, upgraded facilities: Eti-Osa scored 26/36 (72%), while Alimosho scored 30/36 (83%). Non-upgraded facilities: Lagos Island scored 29/36 (81%) and Ifako-Ijaiye scored 28/36 (78%).

Table 4: Availability of Skilled Personnel/Policy and Implementation in Selected Upgraded and Non-Upgraded Secondary Health Institutions in the Lagos Metropolis

Facility Type Facility	Upgraded Secondary Facility		Non-upgraded Secondary Facility	
	MCC Eti Osa	MCC Alimosho	Lagos Island Maternity	Ifako Ijaye GH
Basic and Comprehensive Emergency Obstetric Care	2	2	2	2
Parenteral antibiotics administration	2	2	2	2
Parenteral uterotonics administration	2	2	2	2
Parenteral anticonvulsant administration	2	2	2	2
Manual placenta removal	2	2	2	2
Retained products removal	2	2	2	2
Assisted vaginal delivery	2	2	2	2
Neonatal resuscitation	2	2	2	2
Caesarean delivery	2	2	2	2
Blood transfusion	2	2	2	2
Essential Newborn Care (ENC)	0	2	2	2
Manual vacuum extraction	1	2	1	1
Anti-shock garment use	1	2	2	1
Regular nurse/midwife promotion	2	2	2	2
Morning shift (1:1) ratio	0	0	0	0
Afternoon shift (1:1) ratio	0	0	0	0
Night shift (1:1) ratio	0	0	0	0
Prompt salary payment	2	2	2	2
Total Score	26/36	30/36	29/36	28/36
Average of scores in upgraded and non-upgraded		28/36		29/36
Weighted Average (%)		78%		81%

Keynote: '2' - Availability of skilled personnel/policy and implementation of policy, '1' - Personnel/policy available but not implemented, '0' - Personnel/policy is not available at all

Table 5 presents the comparison of physical facilities across the selected upgraded and non-upgraded secondary health institutions in Lagos. In terms of infrastructure, upgraded institutions had (Eti-Osa: 96%, Alimosho: 93%) and non-upgraded ones (Lagos Island: 90%, Ifako-Ijaiye: 76%). All upgraded facilities rated 1 in maternal and child health (MCH) services (dedicated clinics, NICUs, 24-hour care), (all rated 1), and all facilities shared limitations in incineration services (rated 1).

Upgraded facilities showed stronger equipment availability, though Alimosho lacked adequate ventilators 1 and partographs 1. Non-upgraded facilities faced pronounced shortages, particularly in Ifako-Ijaiye, with deficits in angle poise lamps, PPE aprons, diagnostic tools (pulse oximeters, glucometers), and anti-shock garments (all rated 1). Ventilator support in Eti-Osa rated two. Digital infrastructure at the upgraded facilities is rated one, while non-upgraded facilities are rated zero.

Table 5: Physical Facilities Comparison Across Selected Upgraded and Non-Upgraded Secondary Health Institutions in the Lagos Metropolis

Facility Type Facility	Upgraded Secondary Facility		Non-Upgraded Secondary Facility	
	MCC Eti-Osa	MCC Alimosho	Lagos Island Mat.	Ifako-Ijaiye GH
Dedicated MCH building	2	2	2	2
Pharmacy	2	2	2	2
Laboratory	2	2	2	1
Equipped theatre	2	2	2	2
Sterilization	2	2	2	1
Incineration	1	1	1	1
24-hour service delivery	2	2	2	2
Antenatal clinic (ANC)	2	2	2	2

Delivery wards	2	2	2	2
Postnatal clinic (PNC)	2	2	2	2
NICU	2	2	2	2
Electricity/Generator set	2	1	2	1
Oxygen supply	2	2	2	2
Portable Water	2	1	2	1
Infection control adherence	1	2	2	1
Sharp box	2	2	2	1
Examination couch/bed	2	2	2	2
Angle poise lamp	2	2	2	1
PPE - Gloves	2	2	2	2
PPE - Face masks	2	2	2	2
PPE - Apron	2	2	2	1
Soap/hand sanitiser	2	2	2	2
Sphygmomanometer	2	2	2	2
Stethoscope	2	2	2	2
Thermometer	2	2	2	2
Fetosopes	2	2	2	2
Pulse oximeter	2	2	1	1
Glucometers	2	2	2	1
Emergency tray	2	2	2	2
Weighing scale	2	2	2	1
Anti-shock garment	2	2	2	1
Incubators	2	2	2	2
Ultrasound machines	2	2	2	1
Suction machine	2	2	2	2
Ambulance	2	2	2	2
Staff toilets	2	2	2	2
Client/visitor toilets	2	2	2	2
Waiting room/reception	2	2	2	2
Urine strips	2	2	2	1
HIV test strip	2	2	1	0
Telephone communication	1	1	1	1
Computer with internet	1	1	0	0
Refrigerator	2	2	2	1
Privacy screen	2	2	2	2
Ventilator support	2	1	1	1
Stationery (partographs)	2	1	2	1
Blood transfusion equipment	2	2	2	2
Total Score	90/94	87/94	85/94	71/94
Average of scores in upgraded and non-upgraded		89/94		78/94
Weighted Average (%)		95%		83%

Keynote: '2' - Availability of skilled personnel and commodity available and in good working condition/adequate, '1' - Personnel available without skills, and commodity available but not in good working condition/inadequate, '0' - Commodity is not available at all

Table 6 presents the comparison of maternal and child healthcare service processes across upgraded (Eti-Osa, Alimosho) and non-upgraded (Lagos Island, Ifako-Ijaiye) Lagos facilities in maternal and child healthcare processes. Upgraded facilities and Lagos Island scored 75/78 (96.2%), while Ifako-Ijaiye lagged at 68/78 (87.2%). Pre-pregnancy services were rated 2 in all facilities. All facilities rated 2 in antenatal exams, tetanus

immunisation, and birth preparedness, but inconsistently managed unintended pregnancy. All institutions scored three in postpartum haemorrhage prevention, but scored one in prophylactic antibiotics. At the postnatal phase, Ifako-Ijaiye scored two in Kangaroo care, neonatal antibiotic protocols, and feeding support. Based on infant services, all facilities scored three in

immunisation, malnutrition management, and growth monitoring.

Table 6: Process of Care Delivery of Maternal and Child Healthcare Services in Selected Upgraded and Non-Upgraded Secondary Health Institutions in the Lagos Metropolis

Facility Type Facility	Upgraded Secondary Facility		Non-Upgraded Secondary Facility	
	MCC Eti-Osa	MCC Alimosho	Lagos Island Mat.	Ifako-Ijaiye GH
Pre-pregnancy				
Family planning services	3	3	3	3
Management of STIs and HIV	3	3	3	2
Folic acid supplementation	3	3	3	3
Pregnancy				
Management of unintended pregnancy	2	2	2	2
Physical examination	3	3	3	3
Tetanus immunization	3	3	3	3
Management of eclampsia with Magnesium sulphate	3	3	3	2
Birth and emergency preparedness	3	3	3	3
Counselling on family planning	3	3	3	3
Childbirth				
PPH management	3	3	3	3
PPH prevention	3	3	3	3
Active management of the third stage of labour	3	3	3	3
Administration of prophylactic antibiotics	1	1	1	1
Postnatal				
Immediate thermal care	3	3	3	3
Neonatal resuscitation by skilled professionals	3	3	3	3
Kangaroo mother care for preterm babies	3	3	3	2
Presumptive antibiotic for newborns at risk	3	3	3	2
Extra support for feeding	3	3	3	2
Prevention of anaemia and sepsis	3	3	3	3
Cord hygiene	3	3	3	3
Skincare	3	3	3	3
Initiation of exclusive breastfeeding	3	3	3	3
Infancy/ Childhood				
Immunization	3	3	3	3
Vitamin A supplementation	3	3	3	3
Management of severe acute malnutrition	3	3	3	3
Growth monitoring	3	3	3	3
Total score	75/78	75/78	75/78	68/78
Average of Scores in Upgraded and Non-Upgraded	75/78		72/78	
Weighted average (%)	96%		92%	

Keynote: '3' – Routine/Always, '2' – Sometimes, '1' – Rarely, '0' – Never

Table 7 presents the analysis of obstetric complications and mortality across upgraded and non-upgraded secondary health facilities. In Lagos metropolis revealed non-upgraded facilities revealed 35.2% of severe pre-eclampsia/eclampsia cases compared to the upgraded facilities of 25.0%, haemorrhage (40.0%

vs. 31.7%), and puerperal sepsis (7.6% vs. 8.3%). Mortality was also generally higher in non-upgraded facilities, particularly for severe pre-eclampsia/eclampsia (7.6% vs. 5.0%) and obstructed labour (2.0% vs. 0.0%), though haemorrhage-related mortality was lower (3.8% vs. 8.3%).

Table 7: Distribution of Causes of Obstetric Morbidity and Mortality Across Selected Upgraded and Non-Upgraded Secondary Health Institutions in the Lagos Metropolis in the Last Three (3) Months

Facility Type Causes	Upgraded Secondary Facility				Non-Upgraded Secondary Facility			
	C n(%)	S	M (n)	M (%)	C n (%)	S	M (n)	M (%)
Severe pre-eclampsia/ Eclampsia	15(25.0)	12	3	5.0	37(35.2)	29	8	7.6
Haemorrhage (Ectopic, Abortion, APH, PPH)	19(31.7)	14	5	8.3	42(40.0)	38	4	3.8
Puerperal sepsis	5(8.3)	5	0	0.0	8(7.6)	8	0	0.0
Uterine rupture	3(5.0)	3	0	0.0	3(2.9)	3	0	0.0
Anaemia	12(20.0)	12	0	0.0	7(6.7)	7	0	0.0
Obstructed labour	6(10.0)	6	0	0.0	8(7.6)	6	2	2.0

C: Cases, S: Survived, M: Mortality

Note: Mortality percentage is calculated as (Mortality/Total Cases) × 10

Table 8 presents data on maternal and neonatal outcomes in selected upgraded and non-upgraded secondary health facilities in the Lagos metropolis,

showing that near-miss cases in non-upgraded facilities were 30.5% as compared to 20% recorded in the upgraded facilities.

Table 8: Maternal and Neonatal Outcome in Selected Upgraded and Non-Upgraded Secondary Health Institutions in the Lagos Metropolis

Facility Type	Upgraded Secondary Facility (n=60)	Non-Upgraded Secondary Facility (n=105)
Near-miss cases	12 (20.0)	32 (30.5)
Maternal Mortality	2 (3.3)	4 (3.8)
Neonatal Mortality	1	5

Note: Near-Miss percentage is calculated as (Near-Miss /Total Cases) × 100

Mortality percentage is calculated as (Mortality/Total Cases) × 100

Table 9 presents the differences in the structure of the upgraded and non-upgraded settings. The null hypothesis was accepted as no significant difference (p = 0.914) was found between the personnel and policy availability in upgraded (3.06 ± 1.56) and non-upgraded (3.12 ± 1.58) settings, with a mean difference of 0.0588

There was a significant difference (p = 0.005) between the physical facilities in the upgraded (3.77 ± 0.56) and non-upgraded (3.31 ± 0.95) settings, with a mean difference of 0.458 at p <.050.

Table 9: Comparison of Structure Across Selected Upgraded and Non-Upgraded Secondary Healthcare Facilities in Lagos Metropolis

Structure Parameters	Upgraded Mean ± SD	Non-Upgraded Mean ± SD	Mean Difference	t	df	p value
Personnel Skills and Welfare	3.06 ± 1.56	3.12 ± 1.58	0.05882	.109	32	.914
Physical Facilities	3.77 ± 0.56	3.31 ± 0.95	0.45833	2.889	94	.005

Ho1: There is no significant difference between the structure of healthcare facilities (personnel and physical facilities) in upgraded and non-upgraded selected general hospitals in Lagos Metropolis.

Table 10 presents the analysis of the process of care delivery across the four secondary healthcare facilities in Lagos State assessed on a scale of 0 (Never) to 3 (Routine/Always). The total obtainable scores were 6 for the upgraded facilities and non-upgraded facilities. The average of all the parameters was computed and compared between

the upgraded and non-upgraded facilities. The null hypothesis was accepted as there was no significant difference (p = 0.152) between the process of care delivery in the upgraded (5.77 ± 0.65) and non-upgraded (5.46 ± 0.86) facilities, as p > 0.050.

Table 10: Comparison of Process of Care Delivery Across Selected Secondary Upgraded and Non-Upgraded Healthcare Facilities in Lagos Metropolis

Process of Care Delivery	Upgraded Mean \pm SD	Non-Upgraded Mean \pm SD	Mean Difference	t	df	p value
Process of Care Delivery	5.77 \pm 0.65	5.46 \pm 0.86	0.308	1.455	50	0.152

Ho2: There is no significant difference in the healthcare processes between upgraded and non-upgraded facilities in selected general hospitals in Lagos Metropolis.

Discussion

The facility characteristics finding highlighted that the upgraded facilities likely benefit from a synergy between experienced personnel and improved structural support, enhancing their potential to deliver higher-quality care. This reflects Donabedian's assertion that quality outcomes are most reliably achieved when sound structures support skilled processes (4, 9).

The structure findings from this study revealed that the upgraded facilities (Eti Osa and Alimosho) generally exhibited better physical infrastructures, including dedicated Maternal and Child Health (MCH) buildings, theatres, laboratories, and pharmacies. However, even among these institutions, some infrastructural deficiencies persisted. These observations align with the findings of Ogunlesi et al. (10), who reported that non-upgraded healthcare facilities often experience significant equipment shortages, limited space, and overall resource deficits that lead to compromised service quality and adverse health outcomes. Also, Salam (11) highlights that even where essential supplies are available, staffing shortages continue to undermine service delivery, a phenomenon that is exacerbated in non-upgraded facilities. Furthermore, the disparities noted in Lagos Island Maternity, despite its long-standing establishment, further reinforce Billah et al. (12) conclusions regarding structural indices as, even well-established institutions can exhibit gaps in infrastructure, such as the lack of incineration facilities and advanced medical equipment, that directly impact the quality of MCH services. The findings call for targeted investments not only in the physical assets of health institutions but also in ensuring reliable basic utilities and infection control measures. Furthermore, the marked differences in staffing, particularly the shortage of senior and specialised personnel in non-upgraded hospitals, suggest that policy interventions should prioritise improving working conditions and creating incentives to retain skilled professionals in these settings. Such measures are critical to mitigating the negative impacts on maternal and child health outcomes, as highlighted in multiple studies (13, 14).

The process of care delivery in maternal and child health services, as observed across the four facilities in Lagos, demonstrates a generally consistent provision of routine services, such as family planning, antenatal examinations, tetanus immunisation, postnatal cord hygiene, and childhood immunisations, across both upgraded and non-upgraded institutions. However, upgraded facilities, namely Eti Osa and Alimosho, recorded slightly higher consistency in care delivery (scoring an average of 2.88 on a scale from 0 to 3), whereas non-upgraded institutions, particularly Ifako-Ijaiye, exhibited more variability and lower scores (2.65 with an SD of 0.69). These findings align with previous studies; for instance, Ezech et al. (15) reported that upgraded facilities in Lagos not only offer more comprehensive and timely services but also exhibit better coordination and integration of care, thereby enhancing overall service delivery efficiency. In a similar vein, Obi et al. (16) highlighted the importance of process factors, such as the responsiveness and interpersonal skills of healthcare workers, in ensuring high-quality care during childbirth. Moreover, Kruk et al. (17) emphasised that merely increasing facility-based maternity care does not automatically lead to better outcomes unless the quality of care is simultaneously improved. Their findings, along with that of Coles et al. (18), point to the critical role of effective communication, timely interventions, and respectful care practices in optimising MCH outcomes. The process deficiencies in non-upgraded facilities, particularly in emergency response and specialised interventions, could therefore be interpreted as likely contributing factors to the higher near-miss rates observed.

Findings of this study revealed higher quality maternal and child healthcare services outcome of maternal and child healthcare service among the upgraded facilities. Non-upgraded facilities experienced a higher rate of near-miss cases compared to upgraded facilities, indicating better management of severe maternal complications in the latter. Maternal mortality was also slightly higher in non-upgraded facilities, suggesting improved survival rates in upgraded settings. Additionally, neonatal mortality was higher in non-

upgraded facilities, highlighting better neonatal care in upgraded facilities. This implies that upgrading healthcare facilities significantly improves maternal and neonatal health outcomes, while the higher rates of near-miss cases and mortality in non-upgraded facilities suggest that upgraded facilities are better equipped to manage severe complications, leading to improved survival rates for both mothers and newborns. This improvement is likely due to enhanced infrastructure, better equipment, and possibly more skilled healthcare personnel in upgraded facilities. These findings imply that upgrading facilities leads to better maternal and neonatal outcomes, likely due to improved infrastructure, equipment, and possibly more skilled personnel. The results emphasise the importance of upgrading all facilities to enhance maternal and neonatal survival rates, aligning with broader efforts to reduce maternal and child mortality in Lagos State. Results from this study are consistent with Onasoga et al. (19), to compare patient satisfaction and health outcomes between upgraded and non-upgraded hospitals and found out that higher patient satisfaction and better health outcomes were reported in upgraded hospitals; Stella & Cecilia (20) in Lagos revealed that significant improvements in patient outcomes and satisfaction were observed in upgraded hospitals compared to non-upgraded ones. Upgraded facilities had better infrastructure, equipment, and trained staff. Likewise, Sakuma et al. (2019) in Lao PDR, a rural district in Khammouane Province, revealed that inadequate service providers' practical experience influences the outcome of quality services in tier-three public health facilities. The improvement in patients' satisfaction at upgraded facilities has implications for the policy makers to implement policies that will improve all the facilities in Lagos state health institutions.

This study has several limitations: firstly, the small number of facilities used (four) may limit the generalizability of findings; Second the comparative cross-sectional design can show association but not causation between facilities upgrade and improved outcomes; Thirdly, the reliance on facility records is subject to variations in documentation quality and completeness; Finally while inferential statistics were used for structure and process comparisons, the outcome analysis was primarily descriptive and the study may have been underpowered to detect statistically significant differences in rare events like mortality.

Conclusion

Upgraded secondary health facilities demonstrated lower morbidity/mortality, higher physical readiness and overall service delivery compared to non-upgraded facilities, despite the universal failure to implement the critical 1:1 nurse/midwife staffing ratio policy. While the upgrades led to a statistically significant improvement in physical infrastructure, this did not correspond to a statistically significant difference in the standard application of healthcare protocols (process of care). The Lagos Metropolis should prioritise rapid implementation and enforcement of the 1:1 nurse/midwife staffing ratio policy while targeting resource gaps (A&E nurses, essential utilities, and specialised newborn care protocols) in the lower-performing non-upgraded institutions. There is a need to develop standardised, monitored protocols to eliminate pervasive gaps in care practices, such as the infrequent administration of prophylactic antibiotics during childbirth.

Declarations

Ethics approval and consent to participate

This study adhered to the Helsinki Declaration's principle of conducting studies among human participants. Formal ethical approval was obtained from the Lagos State Health Service Commission, situated at the Ministry of Health, Lagos State Secretariat and Babcock University Health Research Ethics Committee with approval number BUHREC 845/24. In conducting the study, the following principles of confidentiality of data, voluntariness, informed consent, beneficence and non-maleficence were obtained from the study participants and complied with.

Consent for publication

All authors gave consent for publication of the work under the Creative Commons Attribution-Non-Commercial 4.0 license.

Availability of Data and Materials

The datasets used and analysed during the current study are available from the corresponding author upon reasonable request.

Competing Interest

The authors declare that they have no conflict of interest

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Authors' contribution

Conceptualisation: P.E and C.O. conceptualised the study. P.E wrote the initial manuscript. P.E collected data while P.E and E.O. wrote the methodology. E.O. analysed the data. C.O. and O.O. supervised the work. All authors reviewed the manuscript

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