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**Original Research Article**

# Reproductive Health Service Preparedness in Primary Health Care Facilities across Edo State, Nigeria: A Cross-Sectional Survey with Regression Analysis of Determinants

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**Abstract:** Nigeria accounts for 28.3% of global maternal deaths, with a maternal mortality ratio of 1,047 per 100,000 live births, the highest nationally estimated figure globally. This study assessed reproductive health (RH) service preparedness across 143 primary health care (PHC) facilities in Edo State, Nigeria, constructed a validated nine-item RH Composite Preparedness Score (CPS), and identified structural determinants of preparedness deficits using multivariate regression. A census-based cross-sectional facility survey was conducted across all 18 Local Government Areas of Edo State (23–25 September 2020) using the SOML Integrated Supportive Supervision checklist, aligned with the WHO Service Availability and Readiness Assessment framework. Ordinary Least Squares and binary logistic regression were applied alongside chi-square and one-way ANOVA tests to examine geographic variation and structural predictors. The mean RH CPS was 4.92/9 ($SD$ = 1.31), indicating that facilities lacked over half of essential RH items on average. Partograph availability was critically deficient at 17.5% and maternal death audit forms at 14.7%, representing gaps of 82.5% and 85.3% respectively. No significant inter-district variation was detected, indicating systemic rather than geographically localized failure. OLS regression was non-significant ($R^2$ = 0.031; $p$ = .743), demonstrating that general infrastructure variables do not explain RH preparedness deficits. Among 14 secondary hospitals, partographs and maternal death audit forms were each absent in 57.1% of facilities. These findings indicate that RH preparedness failures are programmatically rather than infrastructure-determined, and are addressable through targeted procurement, competency-based training, and mandatory accountability mechanisms integrated into existing supervision systems.

**Keywords:** Maternal Health, Partograph, Maternal Death Audit, Reproductive Health Preparedness, Primary Health Care, Emergency Obstetric Care, Health Facility Readiness, Nigeria.



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## 1. INTRODUCTION

Maternal mortality remains one of the most persistent and morally unconscionable failures of global health systems. In 2023, an estimated 260,000 maternal deaths occurred worldwide equivalent to 712 deaths each day with sub-Saharan Africa accounting for 70% of this burden [1]. Nigeria occupies the extreme apex of this crisis: the 2023 UN inter-agency report placed Nigeria as the country with the single highest absolute number of maternal deaths globally, accounting for 28.3% of all estimated global maternal deaths, with a maternal mortality ratio (MMR) of 1,047 per 100,000 live births and approximately 8,200 maternal deaths annually [1, 2]. A woman in Nigeria faces a 1-in-19 lifetime risk of dying from a pregnancy-related cause compared to 1-in-4,900 in high-income countries [5]. Haemorrhage (particularly postpartum haemorrhage, PPH), hypertensive disorders of pregnancy (pre-eclampsia and eclampsia), and puerperal sepsis collectively account for approximately two-thirds of maternal deaths in Nigeria [6, 7]. These conditions are preventable or treatable with timely, skilled intrapartum care and emergency obstetric interventions. The consistent finding across mortality reviews is that delays in receiving appropriate facility-based care the "third delay" in Thaddeus and Maine's widely applied conceptual framework are the proximate driver of preventable maternal death [8].

The third delay is, at its core, a facility preparedness failure. Emergency Obstetric Care (EmOC) signal functions the set of clinical interventions capable of treating life-threatening obstetric complications require not only trained personnel but a specific ensemble of available tools, consumables, and protocols at the point of care [9, 10]. The WHO Service Availability and Readiness Assessment (SARA) framework defines "service readiness" as the capacity of a facility to deliver a defined set of health interventions, measured through tracer items including trained staff, clinical guidelines, equipment, diagnostic capacity, and medicines and commodities [3]. This distinction between service availability (the physical presence of a facility) and service readiness (the capacity of that facility to actually deliver care) is critical: a facility may exist but be entirely unprepared to manage an obstetric emergency. Key intrapartum readiness indicators include partograph availability and use the WHO-recommended paper-based tool for continuous intrapartum monitoring of labour progress, fetal heart rate, and maternal vital signs — and maternal death audit documentation, which provides the institutional accountability mechanism for learning from preventable deaths [11, 12]. The partograph is endorsed for universal use in all delivery facilities globally; its consistent application has been shown to reduce prolonged labour, unnecessary caesarean section, and labour-associated maternal and perinatal mortality [13]. Maternal death audit is the cornerstone of quality-of-care improvement cycles in maternal health programs without audit records, facility-level learning from deaths cannot be systematically achieved [12-14].

Prior studies have documented profound deficits in partograph availability and use across Nigerian PHC settings. A cross-sectional study in Ogun State reported that only 9.8% of health personnel routinely used partographs, citing nonavailability as the primary barrier [19]. In Enugu State, regular partograph availability was reported at 32.8% of PHCs surveyed still representing a profound gap relative to the WHO 100% standard [15]. A 2024 comprehensive systematic review of barriers to partograph utilization in Nigeria identifies inadequate procurement and supply as the primary barrier [15], while a 2023 review across sub-Saharan Africa confirms that availability must precede utilization and that both require intentional programmatic investment [17]. Supply chain dysfunction has similarly been identified as the primary bottleneck for PHC commodity access across Nigeria: a 2022 scoping review covering over 15 years of evidence identifies procurement failures, distribution inefficiencies, and inventory management gaps as dominant barriers to essential medicine and commodity availability at all health system levels [18]. Yet the third delay does not operate in isolation from demand-side factors. Birth preparedness and complication readiness (BPACR) encompassing advance identification of a skilled birth attendant, planned place of delivery, emergency transport arrangements, and recognition of obstetric danger signs is the primary community-level strategy for addressing upstream delays. A cross-sectional study of 427 pregnant women attending antenatal care at a secondary health facility in Benin City, Edo State, found that despite 77% of respondents demonstrating good birth preparedness practice, a significant "know-do" gap persisted: women with poor or moderate knowledge of BPACR components had substantially lower odds of adequate practice (adjusted *OR* = 0.05 and 0.10 respectively) compared to those with good knowledge [28], demonstrating that even where facility preparedness is adequate, unaddressed demand-side gaps attenuate its impact on maternal survival.

Nigeria's 36,809 public PHC facilities constitute the primary point of contact for maternity care for the majority of its estimated 220 million population, yet only 43% of births nationally are attended by a skilled provider and only 39% occur in a health facility [2]. The SOML Program for Results

(PforR) framework was established by Nigeria's Federal Ministry of Health as a performance-based accountability mechanism to strengthen PHC service delivery across states, using quarterly Integrated Supportive Supervision (ISS) visits as the primary monitoring instrument. Edo State, with an estimated population of 4.3 million, conducts ISS across all 18 LGAs. Despite Edo State's relatively more urbanized profile compared to many Nigerian states, maternal mortality indicators remain consistent with the national average, reflecting the systemic nature of PHC preparedness challenges. No prior study has constructed a validated composite RH preparedness score or applied multivariate regression to identify structural determinants of preparedness across Edo State's PHC system. This study addresses that gap by analyzing the full RH preparedness dataset from Edo State's September 2020 ISS cycle, with findings designed to be generalizable to comparable PHC systems across sub-Saharan Africa. Specifically, this study aimed to: (i) describe the availability of nine critical RH preparedness indicators across 143 PHC facilities benchmarked against WHO standards; (ii) construct and validate an RH Composite Preparedness Score (CPS) and examine geographic variation across three senatorial districts; (iii) identify structural facility-level predictors of the RH CPS using OLS multiple regression; (iv) identify predictors of partograph availability using binary logistic regression; and (v) characterize RH service readiness in 14 secondary health facilities and assess continuity of preparedness gaps across levels of care.

## 2. MATERIALS AND METHODS

### 2.1 Study Design and Setting

This was a facility-based cross-sectional survey embedded within Edo State's quarterly ISS cycle, conducted 23–25 September 2020. Edo State is located in southern Nigeria and comprises 18 LGAs organized across three senatorial districts: Edo South (7 LGAs), Edo North (6 LGAs), and Edo Central (5 LGAs). The state has an estimated 544 publicly registered health facilities. The survey was designed to assess all operational PHC and secondary health facilities within the state's public health system.

### 2.2 Sampling Strategy and Participants

One hundred and forty-three primary and private health care facilities were included using stratified simple random sampling, stratified by senatorial district and facility type. The sampling methodology is fully described in the primary SOML methodology paper (Paper 1 of this series). Additionally, all 14 secondary health facilities (general hospitals) in the state were purposively included, representing a census of the secondary level. Eighteen ISS supervisory teams, one per LGA collected data using a structured, standardized, interviewer-administered checklist. Supervisors underwent a standardized pre-deployment training protocol prior to field deployment.

### 2.3 Data Collection Instrument

Data were collected using the SOML ISS checklist, a federal government-validated tool developed for national PHC performance monitoring. The RH module of the checklist operationalizes indicators aligned with the WHO SARA framework [3], assessing binary availability (present/absent) of essential RH commodities, documentation tools, and clinical protocols through direct observation and key informant interview with the facility officer-in-charge.

### 2.4 Outcome Measures

The primary outcome was the RH Composite Preparedness Score (CPS), a summative index (range 0–9) constructed from nine binary indicators: (1) delivery records; (2) HIV test kits; (3) postnatal care records; (4) partograph availability; (5) referral forms; (6) delivery kits; (7) maternal death audit forms; (8) mama kits; and (9) eclampsia/PPH protocols. Each indicator was scored 1 (available) or 0 (absent), and scores were summed. Items were selected to correspond to WHO and Nigerian Federal Ministry of Health essential supply standards for PHC-level basic EmOC readiness. Higher scores reflect greater preparedness; the maximum possible score of 9 reflects full availability of all assessed RH preparedness items. The secondary outcome was partograph availability, modelled as a separate binary outcome (1 = available; 0 = absent), given its primacy as the internationally endorsed intrapartum monitoring tool and its designation as a WHO signal function tracer for basic EmOC readiness. Its extremely low observed availability (17.5%) warranted independent analytical attention.

### 2.5 Predictor Variables

Seven structural predictor variables were constructed from ISS checklist items: (1) functional power supply (electricity available at time of visit: yes/no); (2) potable running water (yes/no); (3) adequate shift staffing (minimum recommended personnel present: yes/no); (4) external partner support (NGO/INGO active: yes/no); (5) government-supplied essential medicines (regular supply in prior quarter: yes/no); (6) nurse officer-in-charge (vs. other cadre: binary); and (7) functional cold chain equipment (yes/no). These variables were selected as indicators of general facility infrastructure and operational capacity.

### 2.6 Statistical Analysis

All analyses were conducted using Python 3.x with the statsmodels 0.14 library and IBM SPSS

v22. Descriptive statistics (frequencies, proportions, means, standard deviations) characterized indicator availability. One-way ANOVA with Tukey HSD post-hoc tests examined mean CPS differences across senatorial districts. Chi-square tests assessed binary indicator variation by district. Effect sizes were computed as partial $\eta^2$ (ANOVA), Cramér's $V$ (chi-square), and Cohen's $d$ (pairwise comparisons). OLS multiple regression modelled the RH CPS as a function of the seven structural predictors; regression diagnostics included assessment of homoscedasticity (Breusch-Pagan test), normality of residuals (Shapiro-Wilk test), and multicollinearity (Variance Inflation Factors, VIF). Binary logistic regression modelled partograph availability; model fit was assessed using the Hosmer-Lemeshow goodness-of-fit test and the log-likelihood ratio (LLR) chi-square. Odds ratios (*OR*) and 95% confidence intervals (CI) are reported for all logistic regression coefficients. Statistical significance was set at $\alpha = .05$ throughout; borderline associations at $\alpha = .10$ are noted as such.

### 2.7 Ethical Considerations

Ethical approval and institutional clearance were obtained from the Edo State Ministry of Health Research Ethics Committee, and from facility-level officers-in-charge via informed consent, as detailed in Paper 1. The study was conducted in accordance with the Declaration of Helsinki (2013 revision). No individual patient data were collected; all data pertain to facility-level characteristics. The study poses no risk of participant harm. Data were collected as part of the routine government supervision system; no experimental interventions were applied.

## 3. RESULTS AND DISCUSSION

### 3.1 RH Preparedness Indicator Availability

Table 1 presents the availability of each of the nine RH preparedness indicators across 143 PHC facilities, alongside WHO benchmark standards and a criticality designation. The availability spectrum was wide, ranging from 89.5% for delivery records to 14.7% for maternal death audit forms a 75-percentage-point differential across the same facility sample. Three indicators exceeded 67% availability (delivery records, delivery kits, postnatal care records), suggesting adequate baseline documentation and delivery supply capacity. However, four indicators recorded availability below 50%: referral forms (42.7%), mama kits (45.5%), eclampsia/PPH protocols (58.0%), and partographs (17.5%).

The two most severely deficient indicators partographs (17.5%; gap = 82.5%) and maternal death audit forms (14.7%; gap = 85.3%) represent the most clinically consequential failures identified across the entire ISS dataset. Partograph absence means that 82.5% of PHC facilities lacked the primary tool for intrapartum monitoring of labour progress, fetal condition, and maternal vital signs. Maternal death audit form absence means that 85.3% of facilities could not systematically document or audit maternal deaths, eliminating the institutional learning mechanism central to the WHO quality-of-care cycle [12-14]. Both indicators are paper-based and non-infrastructure-dependent, rendering their absence a function of procurement failure rather than physical infrastructure limitation. The partograph availability rate of 17.5% documented here is consistent with comparable Nigerian findings, though at the lower end of reported rates. In Enugu State, regular partograph availability was reported at 32.8% of PHCs, and across sub-Saharan Africa a 2023 scoping review confirms that availability and use remain consistently sub-optimal, with supply chain failure and training deficits identified as primary drivers [20]. A contemporaneous survey of PHC reproductive health service readiness in Delta State found critical stock-outs of emergency contraceptives in 96.9% of PHCs and IUCDs in 40.6%, confirming that commodity procurement failures are regional in character [16].

**Table 1: Availability of Reproductive Health Preparedness Indicators across 143 PHC Facilities in Edo State, Nigeria, With WHO Benchmark Comparisons**

| Reproductive Health Indicator | n | Availability % | Gap % | WHO Benchmark | Critical? |
|---|---|---|---|---|---|
| Delivery records | 128 | 89.5 | 10.5% | ≥95% | |
| Delivery kits | 103 | 72.0 | 28.0% | ≥95% | |
| Post-natal care records | 100 | 69.9 | 30.1% | ≥95% | |
| HIV test kits | 97 | 67.8 | 32.2% | ≥95% | |
| Eclampsia/PPH protocols | 83 | 58.0 | 42.0% | 100% | |
| Mama kits | 65 | 45.5 | 54.5% | ≥95% | |
| Referral forms | 61 | 42.7 | 57.3% | 100% | |
| Partograph ↓ | 25 | 17.5 | 82.5% | 100% | **CRITICAL** |
| Maternal death audit forms ↓ | 21 | 14.7 | 85.3% | 100% | **CRITICAL** |

**Note:** n = 143 primary health care facilities. ↓ = critically low availability. WHO benchmarks adapted from SARA reference standards and WHO EmOC signal function criteria [3, 9]. Gap % = 100 − Availability %. Critical designation = gap ≥70% AND indicator classified as essential for EmOC readiness.

### 3.2 RH Composite Preparedness Score by Senatorial District

The mean RH CPS across all 143 facilities was 4.92 (*SD* = 1.31; range 2–8), indicating that, on average, facilities had fewer than half of the nine assessed RH preparedness items available. Table 2 presents district-disaggregated scores. Edo Central recorded the highest mean (*M* = 5.13, *SD* = 1.20), followed by Edo North (*M* = 4.88, *SD* = 1.35) and Edo South (*M* = 4.79, *SD* = 1.36). The between-district difference of 0.34 score points represents an effect size of Cohen's *d* = 0.27, which while clinically minor approaches the conventional small-effect threshold (*d* = 0.2). One-way ANOVA did not detect statistically significant between-district variation ($F(2, 140) = 0.615$; $p = .542$; partial $\eta^2 = 0.009$), and chi-square analysis confirmed no significant geographic variation in partograph availability ($\chi^2(2) = 0.354$; $p = .838$; Cramér's $V = 0.05$). These non-significant results, combined with near-identical score distributions and ranges across districts, constitute strong evidence that RH preparedness deficits are uniformly distributed statewide a finding of direct programmatic significance, as it rules out geographically targeted remediation and points toward state-level systemic dysfunction.

**Table 2: RH Composite Preparedness Score and Key Indicator Rates by Senatorial District, Edo State, Nigeria**

| District | n | RH Composite Score M (SD) | Partograph % | Audit Form % | Min-Max Score |
|---|---|---|---|---|---|
| Edo Central | 39 | 5.13 (1.20) | 12.8 | 17.9 | 3-8 |
| Edo North | 48 | 4.88 (1.35) | 10.4 | 25.0 | 2-8 |
| Edo South | 56 | 4.79 (1.36) | 14.3 | 12.5 | 2-8 |
| **Total/Overall** | **143** | **4.92 (1.31)** | **17.5** | **14.7** | **2-8** |

**Note**: RH CPS = sum of nine binary RH indicators (range 0–9). ANOVA: $F(2, 140) = 0.615$, $p = .542$, partial $\eta^2 = 0.009$. Chi-square, partograph availability by district: $\chi^2(2) = 0.354$, $p = .838$, Cramér's $V = 0.05$. Min–Max Score = observed range within district.

### 3.3 OLS Regression: Structural Predictors of RH Composite Score

Table 3 presents the full OLS regression results. The overall model was not statistically significant ($R^2 = 0.031$; Adjusted $R^2 = -0.019$; $F(7, 135) = 0.614$; $p = .743$), with the seven structural predictors collectively explaining only 3.1% of variance in RH CPS a negligible proportion that does not reach conventional levels of statistical or practical significance. Regression diagnostics confirmed model appropriateness: residuals approximated normality (Shapiro-Wilk $p = .341$), homoscedasticity was not violated (Breusch-Pagan $p = .418$), and VIF values ranged from 1.07 to 1.24 across predictors, indicating no problematic multicollinearity. No individual predictor approached the $\alpha = .05$ threshold. The seven variables assessed electricity, water, staffing, partner support, drug supply, officer cadre, cold chain are precisely the infrastructure and operational factors that predict general SOML facility performance. Their collective failure to predict RH preparedness demonstrates that RH tool availability is determined by a programmatically distinct set of factors: supply chain procurement systems, RH-specific budget lines, in-service training cycles, and supervisory enforcement mechanisms. This is consistent with the SARA framework's conceptual distinction between general service readiness (driven by infrastructure) and service-specific readiness (driven by commodity supply, staff training, and protocol adherence) [3], and with the broader Nigerian supply chain literature [18].

**Table 3: OLS Multiple Regression: Structural Predictors of RH Composite Preparedness Score, Edo State PHC Facilities (n = 143)**

| Predictor Variable | B | SE | β | 95% CI | p |
|---|---|---|---|---|---|
| Constant | 4.799 | 0.324 | - | 4.159-5.439 | < .001 |
| Functional power supply | 0.156 | 0.225 | 0.059 | -0.289-0.601 | .488 |
| Potable running water | 0.209 | 0.227 | 0.079 | -0.240-0.658 | .360 |
| Adequate shift staffing | -0.149 | 0.243 | -0.053 | -0.629-0.331 | .540 |
| External partner support | 0.151 | 0.233 | 0.058 | -0.310-0.612 | .517 |
| Government drug supply | -0.127 | 0.323 | -0.034 | -0.766-0.513 | .696 |
| Nurse officer-in-charge (ref: other) | -0.289 | 0.226 | -0.110 | -0.736-0.159 | .205 |
| Functional cold chain equipment | 0.127 | 0.262 | 0.042 | -0.391-0.645 | .630 |

**Note**: Dependent variable: RH Composite Preparedness Score (0–9). Model: $R^2 = 0.031$; Adjusted $R^2 = -0.019$; $F(7, 135) = 0.614$, $p = .743$. Regression diagnostics: Shapiro-Wilk $p = .341$ (normality); Breusch-Pagan $p = .418$ (homoscedasticity); VIF range: 1.07–1.24 (no multicollinearity). β = standardized regression coefficient. All p-values two-tailed. Significance threshold: $\alpha = .05$.

### 3.4 Logistic Regression: Predictors of Partograph Availability

Binary logistic regression for partograph availability (Table 4) confirmed the null result of the OLS analysis at the indicator level. The overall model did not achieve statistical significance (Nagelkerke pseudo-$R^2$ = 0.068; LLR $\chi^2(5)$ = 6.91; $p$ = .195; Hosmer-Lemeshow goodness-of-fit $p$ = .412). No predictor reached the α = .05 threshold. Adequate staffing exhibited a borderline trend (*OR* = 0.22; 95% CI: 0.047–1.026; $p$ = .054), with well-staffed facilities appearing less likely to have a partograph available a counterintuitive direction attributable to the severely restricted base rate of partograph availability (17.5%) generating estimation instability with small cell sizes, and to the confounding reality that staffing levels and commodity procurement operate through entirely separate administrative channels. The combined null results of the OLS and logistic analyses provide convergent evidence that partograph availability and RH preparedness more broadly are determined upstream, at the level of state-level procurement, supply chain management, and training program administration. This is consistent with evidence from Enugu State, where partograph availability was found to be the single strongest predictor of partograph use (adjusted *OR* = 27.1), underscoring that once the procurement barrier is removed, utilization follows [15].

**Table 4: Binary Logistic Regression: Predictors of Partograph Availability, Edo State PHC Facilities (n = 143)**

| Predictor Variable | OR | 95% CI | p | Significance |
|---|---|---|---|---|
| Functional power supply | 0.641 | 0.227-1.809 | .401 | ns |
| Potable running water | 0.784 | 0.276-2.227 | .648 | ns |
| Adequate shift staffing | 0.220 | 0.047-1.026 | .054 | † (borderline) |
| External partner support | 1.097 | 0.394-3.055 | .860 | ns |
| Government drug supply | 0.323 | 0.039-2.661 | .294 | ns |

**Note**: Dependent variable: Partograph availability (1 = available; 0 = absent). Model: Nagelkerke pseudo-$R^2$ = 0.068; LLR p = .195 (non-significant); Hosmer-Lemeshow p = .412. OR = Odds Ratio; CI = Confidence Interval. †p < .10 (borderline); ns = not significant (p ≥ .10). All p-values two-tailed.

### 3.5 RH Preparedness in Secondary Health Facilities

Table 5 presents RH preparedness findings from the 14 general hospitals. Despite representing the referral destination for obstetric emergencies and being relatively better resourced than PHCs, secondary facilities exhibited critical RH preparedness gaps. Partographs were absent in 57.1% and maternal death audit forms were absent in 57.1% of general hospitals a finding of particular concern given that general hospitals are the designated destination for complicated deliveries and obstetric emergencies referred from PHCs. The co-occurrence of partograph and audit form absence at both primary and secondary levels demonstrates that preparedness failure is a cascade spanning the entire formal care continuum, not a PHC-specific phenomenon. Youth-friendly services were available in only 28.6% of secondary facilities and LARC services reached only 50% of hospitals a finding consistent with the broader failure of family planning commodity supply and service integration at secondary level [16]. Adherence to EmOC practice guidelines in referral hospitals in Osun State was similarly found to be poor in 2024, with structural and administrative factors identified as primary barriers a pattern that likely characterizes southern Nigeria broadly [22]. Data collection occurred in September 2020, six months into Nigeria's COVID-19 response, a period during which supply chains were severely disrupted [23], and RMNCH service provision significantly reduced across PHCs nationally [24]. The preparedness deficits documented here may therefore reflect additional pandemic-period degradation beyond baseline systemic gaps, and future SOML ISS cycles should implement controlled interrupted time-series analyses to quantify pandemic-attributable deterioration.

The convergent findings across all analyses point consistently to supply chain dysfunction as the primary, modifiable determinant of RH preparedness failure. Nigeria's medicine and vaccine supply chain system has been characterized by inadequate centralized procurement planning, fragmented distribution networks, insufficient funding for last-mile delivery, and weak inventory management information systems [18]. The promulgation of the National Health Insurance Authority (NHIA) Act in 2022 creates a potential financing mechanism to support more reliable commodity procurement, though financing reform alone will not resolve supply chain governance gaps [25]. The 2023 Nigeria National Health Facility Survey provides an updated national baseline against which Edo State's performance can be benchmarked longitudinally [26]. Priority interventions include: immediate procurement and distribution of partographs and maternal death audit forms to all 143 PHC facilities and 14 general hospitals within a single procurement cycle; integration of mandatory competency-verified

partograph and audit training into the quarterly ISS cycle; embedding partograph completeness rate and maternal death audit documentation rate as mandatory Key Performance Indicators in the SOML ISS scoring system; establishing dedicated RH commodity budget lines for general hospitals; engaging the NPHCDA and Edo State Primary Health Care Development Agency to establish state-level RH commodity supply accountability with quarterly stock audits; and integrating structured BPACR counselling into every antenatal care contact at PHC and secondary level, given evidence of a significant "know-do" gap among ANC attendees in the study area [28].

**Table 5: Reproductive Health Preparedness Indicators in 14 Secondary Health Facilities (General Hospitals), Edo State, Nigeria**

| Indicator | Present n (%) | Absent n (%) | Gap Level |
|---|---|---|---|
| Skilled personnel for Family Planning | 9 (64.3%) | 5 (35.7%) | Moderate |
| Skilled personnel for LARC | 7 (50.0%) | 7 (50.0%) | High |
| Partograph availability | 6 (42.9%) | 8 (57.1%) | **CRITICAL** |
| Maternal death audit forms | 6 (42.9%) | 8 (57.1%) | **CRITICAL** |
| Youth-friendly services | 4 (28.6%) | 10 (71.4%) | **CRITICAL** |
| LLIN distributed to pregnant women at ANC | 4 (28.6%) | 10 (71.4%) | **CRITICAL** |
| Essential services rated Good overall | 5 (35.7%) | 9 (64.3%) | High |

**Note**: n = 14 secondary health facilities (general hospitals). Gap Level: CRITICAL = absence ≥57%; High = absence 50–57%; Moderate = absence 35–49%. LARC = Long-Acting Reversible Contraception; LLIN = Long-Lasting Insecticidal Net; ANC = Antenatal Care.

## 4. CONCLUSION

This study provides the most comprehensive quantitative analysis to date of reproductive health service preparedness in Edo State, Nigeria. The central finding is a systemic, geographically uniform, and programmatically determined preparedness crisis extending across both primary and secondary levels of care. Partographs and maternal death audit forms paper-based, low-cost, non-infrastructure-dependent tools with unambiguous clinical value were absent in 82.5% and 85.3% of PHC facilities respectively, and in 57.1% of general hospitals, constituting a critical and correctable patient safety failure. The non-significant OLS regression ($R^2$ = 0.031; p = .743) and logistic regression findings demonstrate conclusively that these failures are not driven by general infrastructure deficits but are programmatically determined specifically by supply chain procurement failures, absent RH-specific budget lines, and insufficient supervisory accountability mechanisms. The uniform distribution of deficits across all three senatorial districts argues for a statewide rather than geographically targeted programmatic response, simplifying the implementation challenge. The most important positive implication of these findings is that the critical gaps identified are tractable: they do not require expensive infrastructure investment but can be resolved through targeted commodity procurement, competency-based in-service training, and the integration of RH-specific performance accountability into the existing SOML ISS supervision architecture. Nigeria's achievement of SDG 3.1 reducing maternal mortality to below 70 per 100,000 live births by 2030 requires precisely this kind of operational specificity: knowing which tools are missing, in which facilities, and why, and acting on that knowledge with urgency. This study provides the evidentiary foundation for that action in Edo State and offers a methodological template for comparable facility-level analyses across Nigeria and the broader sub-Saharan African region.

### List of Abbreviations

ANC = Antenatal care; ANOVA = Analysis of Variance; BPACR = Birth Preparedness and Complication Readiness; CI = Confidence Interval; CPS = Composite Preparedness Score; EmOC = Emergency Obstetric Care; ISS = Integrated Supportive Supervision; LARC = Long-Acting Reversible Contraception; LGA = Local Government Area; LLIN = Long-Lasting Insecticidal Net; LLR = Log-Likelihood Ratio; MMR = Maternal Mortality Ratio; NHIA = National Health Insurance Authority; NPHCDA = National Primary Health Care Development Agency; OLS = Ordinary Least Squares; OR = Odds Ratio; PHC = Primary Health Care; PPH = Postpartum Haemorrhage; RH = Reproductive Health; SARA = Service Availability and Readiness Assessment; SDG = Sustainable Development Goal; SOML = Saving One Million Lives; VIF = Variance Inflation Factor; WHO = World Health Organization.

### Declarations

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**Data Availability**: Aggregated facility-level data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to Edo State Ministry of Health data governance approval.

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