Risk Factor Determinants for Bemonc Services Uptake at Basic Health Care Provision Fund (BHCPF) Ward Focal HCFS in Kogi State

Adah Patrick Eneojo (MPH)[1], Dr Emmanuel Bola Jonah K (MBBS, MPH)[2], Dr Onoja-Alexander Mary Ojonema (MBBS, MPH, FWACP)[3], Dr Hadiya Ismail (MBBS, MPH)[4], Dr Onimisi Abdullahi (MBBS, MPH, FWACP)[5], Theophilus Olorunmaiye (MPH)[6], Odaudu Deborah Anewn (MPH)[7], Aminu Yusuf (MPH)[8]

[1]DHPRS, Kogi State Primary Health Care Development Agency (KSPHCDA)

[2]BHCPF Focal Person, Kogi State Primary Health Care Development Agency (KSPHCDA)

[3]Reader/Consultant, Community Medicine, College of Health Sciences, Federal University of Lokoja (FUL)

[4]MCH Coordinator, Kogi State Primary Health Care Development Agency (KSPHCDA)

[5]DCHSS, Kogi State Primary Health Care Development Agency (KSPHCDA)

[6]PM, IMPACT-World Bank funded Project, Kogi State Primary Health Care Development Agency (KSPHCDA)

[7]DDCI, Kogi State Primary Health Care Development Agency (KSPHCDA)

[8]ZDE, Kogi State Primary Health Care Development Agency (KSPHCDA)

ABSTRACT

This descriptive cross-sectional (non-exposure assigning), survey on Basic Health Care Provision Fund (BHCPF) Basic Emergency Obstetric and Newborn Care (BEmONC) Quality of Care (QoC) in Kogi State of Nigeria was implemented as evidence base for informed decision making towards action on and leverage for the strengthening of the essential public health functions during a five-month period between April to August, 2024. The epidemiologic applied approach provided the data in a process that identified, characterized and quantified proximate socio-ecological risk factors that are determinants (moderators and mediators) of the uptake of BEmONC services measured by Antenatal care, (ANC), Delivery, Postnatal care (PNC) indicators at n=206 Primary Health Care centres (PHCs) and outcome indicators not mutually exclusive of the optimized Maternal, Newborn and Child Health Week (oMNCHW) which was implemented between 29th of July and the 2nd of August, 2024.

The datasets were obtained from on-line real-time responses from eligible population on the pre-tested checklist processed through an open data kit applying unique artificial intelligence and geo-location. The research was based on a sample size for the cross-sectional multi-stage sampling survey derived through applying the Cochran method to arrive at the n=206 eligible derived sample size. The eligibility criteria for the ward focal BHCPF PHC was the accreditation from received in 2020 form National Primary Health Care Development Agency (NPHCDA) and National Health Insurance Agency (NHIA) Gateways towards supply-side provision of equitable, qualitative and standardized BEmONC services or complementary referral to Comprehensive Emergency Obstetric and Newborn Care (CEmONC).

The Nigerian 2014 National Health Act and the 2016 National Health Policy effort of the Federal Ministry of Health and Social Welfare (FMoHSW) and relevant multidisciplinary stakeholders has precipitated into

improved defragmentation in the scale-up of Basic Minimum Package of Health Services (BMPHS) in an enhanced capacity to enroll clients on the demand side, that vulnerable and hard-to-reach population can access where and when they need them; within financial risk protection so that no one is left behind. Only 86.85% (or n=206) of the checklist via an open data kit (ODK) link was captured by eligible population on average.

There are eight indicators categorized under four Health Care Facility (HCF) Quality of Care (QoC) productivity/efficiency thematic areas of focus and three skilled birth attendant (SBA) indicators categorized under performance management. The means of all eleven indicators were analyzed through a Pearson bi-variate correlation towards establishing the decision-making mediators and moderators relative to BEmONC QoC risk factors that determine uptake by vulnerable and hard-to-reach population at ward focal BHCPF HCF (n=206) as encapsulated in the health security and emergency preparedness strategy of the Health Sector Strategic Blueprint (HSSB) 2025 of the Federal Ministry of Health and Social Welfare (FMoHSW) through sector wide approach (SWAp) .

Microsoft Excel and SPSS 25 were used to analyze the data obtained during the five-month survey for decisions-making regarding the prioritization of action on improvement of the QoC associative of the risk factors that determine BEmONC services uptake by eligible population. The parametric bivariate Pearson correlation (95% CI) was used to derive the following decisions regarding optimization.

Firstly, the signal function relevant to the number of pregnant women who gave birth in the HCF who received prophylactic uteronic (oxytocin) after birth (n=206) was correlated with and positively associative of four key performance indicators which are inclusive of number of babies breastfed within one hour of birth (n=206), the Skilled Birth Attendant (SBA) assisted normal delivery (n=79), the number of children 0-59 months who were administered with Vitamin A (n=206), and the DPT immunization drop-out rate observed from April to August, 2024 where p (0.52, 0.71, 0.10, 0.82) and r (0.875, 0.845, 0.80, 0.13) values respectively, indicating statistically significant relative strength of association except the very weak relationship in the DPT immunization drop-out rate, however, there is an observed p(0.12, 0.15, 0.20, 0.87) level of risk that determine PNC services uptake by under-served population except for the 87% uptake of immunization by under-five population.

Secondly, the risks that determine the BEmONC signal functions linked to livebirths at ward focal BHCPF HCF were observed to be laboratory tests, ANC services and uptake of immunization by neonate or infant 0-59 months where p (0.33, 0.13, 0.47) and r (-0.54, -0.76, -0.42) respectively.

The tracking of the QoC in the signal function through a test of association in the key performance indicators for BEmONC services uptake at (n=239) ward focal BHCPF HCF in Kogi State provided the observations from the correlation of the risk factors that determine the defragmentation of BEmONC services for taking proactive measure to strengthen the optimization of the uptake of basic minimum package of health services (BMPHS) by vulnerable and hard-to-reach population, so that no one is left behind by 2030 in line with the SDGs 3.8 goal for attaining Universal Health Coverage (UCH) in Kogi State and globally.

INTRODUCTION

Background Information

The descriptive cross-sectional survey was conducted during a five-month period (April to August, 2024) for a Quality of Care (QoC) monthly data capture process on an open data kit, to observe the means (n=206) of Basic Emergency Obstetric and Newborn Care (BEmONC) QoC key performance indicators from the ward focal Basic Health Care Provision Fund (BHCPF) health care facility (HCF).

The categories of the thematic areas of foci encapsulates the health facility productivity/efficiency service quality, maternal health, postnatal and newborn and childhood health tracking to optimize systematization

through epidemiologic approach in essential public health functions at ward level BHCPF HCF to improve health security and emergency preparedness policy and strategic implementation risk factor amelioration in line with SDG 3.1 targets connected to the attainment of universal health coverage by 2030 [29].

The process provided the data from the observation from the field for the identification, characterization and quantification of relevant proximate risk factors that determine the uptake of BEmONC services at Antenatal Care (ANC), Postnatal Care (PNC) and during the optimized Maternal Newborn and Child Health Week (oMNCHW). The test of association analysis was conducted on a predictor and ten outcome variables to provide leverage for decision-making and knowledge management process towards improved optimization and integration of services for uptake by vulnerable and hard-to-reach population at the Basic Health Care Provision Fund (BHCPF) ward focal sites (n=206) surveyed during the cross-sectional study.

Justification

The analysis of the associative linkages between the means of one (1) BEmONC predictor and other ten (10) outcome variables (seven (7) QoC (n=206) and three (3) performance management (n=79) indicators from the descriptive cross-sectional survey was conducted and provided evidence for inference towards action required by management on the risk factor amelioration, reduction, elimination and knowledge management associative of BEmONC services that are determinants of the public health interventions outputs and outcomes from a population of 239 ward level BHCPF health care facility productivity/efficiency, service quality, maternal health, postnatal and newborn and childhood thematic area focus associative of uptake by neonate, under-five year olds, pregnant and breastfeeding women.

The inferences from the associative coefficients applying a Pearson bivariate correlation of the risk factors of BEmONC services uptake by vulnerable and hard-to-reach population are guidance and leverage for systems strengthening measures that management require to take action through informed-decisions towards ensuring improved Quality of Care (QoC) in the BEmONC services delivery strategic approach in the scale-up of the Basic Minimum Package of Health Services (BMPHS).

Objectives of the Study

The study has following specific objectives: -

1. To identify risk factors that are determinants of the quality of BEmONC services uptake by neonate, under-five year olds, pregnant and breast-feeding women as part of vulnerable and hard-to-reach population
2. To utilize Pearson bivariate correlation to quantify and characterize the probability of risk factor association of a predictor variable; the administration of prophylactic parenteral oxytocin at delivery to women of reproductive age population n=206, with seven (7) QoC and three (3) performance management indicators n=79 surveyed through epidemiological approach.

Research Questions

1. What are optimal policy measures regarding the systematization of risk factors that determine the uptake of routine BEmONC services by vulnerable and hard-to-reach population at ward level BHCPF sites?
2. How can the optimization of a signal function such as the administration of oxytocin at delivery to women of reproductive age improve integration in routine services?
3. What are the implications of the proximate and distal risk factors that are mediators and moderators of the improvement of the QoC linked to tracking towards the optimization of systematization through epidemiological approach in essential public health functions to improve health security and emergency preparedness policy and strategic implementation risk factor amelioration in BHCPF n=206 continuum cross-examined?

Research Hypothesis

BHCPF sites in Kogi State have no positive or negative correlation coefficient between the mean prophylactic

administration of oxytocin at delivery to women of reproductive age as the predictor variable and outcome variables defined as the mean performance of a set of seven (7) Quality of Care (QoC n=206) and three (3) Skilled Birth Attendant (SBA n=79) associative indicators.

H_0: r=0 (the correlation coefficient is equal to zero in the population)

H_1: r≠0 (the correlation coefficient is not equal to zero in the population)

We reject null hypothesis if Sig<0.05.

Definition of Key Terms

General

Basic Emergency Obstetric and Newborn Care (BEmONC) facilitates the performance of a set of seven key obstetric services or "signal function" focused on the reduction of maternal and newborn mortality and also the provision of neonatal emergency interventions such as treating neonatal sepsis or infection and oxygen support.

Basic Health Care Provision Fund (BHCPF) is a three-pronged approach to the financing of the strengthening of health systems and services at basic obstetric care or primary health care level backed-up by the 2014 National Health Act (NHA). The BHCPF is derived from 1% of the consolidated revenue fund to promote Universal Health Coverage through the NPHCDA, NHIS and CDC Gateways.

Health Security and Emergency Preparedness refers to a systematic approach to identifying, assessing and mitigating health risks associated with potential emergencies and disasters so that no one is left behind.

Oxytocin binds to receptors within the myometrium to facilitate frequent and prolonged uterine contractions within minutes. Oxytocin occurs naturally and was first made parenteral uteronic in 1953. The neuropeptide oxytocin acts as a hormone and a neuromodulator.

Post Partum Haemorrhage (PPH) according to WHO 2018 is blood loss of 500mL or more from the genital tract within twenty-four (24) hours or birth.

Primary Health Care (PHC) is a system and a whole society approach that is the first point of contact for health care focused on equitable improvement of the health status and well-being of the population as early as possible along the continuum of care through health promotion, disease prevention and treatment, rehabilitative and palliative prongs (WHO 2024). The PHC transformational role is a logical and crucial focus in primary care development.

Primary care, is a model of care that supports first contact, assessible, continuous, comprehensive and coordinated person-focused care. It is the building block of and the appropriate location of public health interventions, particularly when established with a clear responsibility of empanelment or registration, for the population [17].

Quality of Care (QoC) is an evidence-based measure of coefficient of the desired outcomes for clients and populations that is important for the achievement of universal health coverage. The six domains of healthcare quality are safety, effectiveness, client-centered, timeliness, efficiency and equitability.

Signal function is a component of BEmONC that includes the Administration of parenteral antibiotics, Administration of parenteral anti-convulsant, Administration of parenteral uteronic, removal of retained products (Manual Vacuum Aspiration), Assisted virginal delivery, Manual removal of placenta and Resuscitation of newborn

Universal Health Coverage (UHC) refers to availability and scalability of qualitative health services that they need, when and where they need them, without financial hardship.

LITERATURE REVIEW

Routine BEmONC Services Uptake Risk Factors Epidemiology

An estimated loss of approximately 145 women and 2,300 children occurs in Nigeria daily due to pregnancy and childbirth related causes [1,4,13,18]. 15% of expected births worldwide world-wide, will result in life threatening complications during pregnancy, delivery, or the postpartum period and 80% of Maternal mortality are due to severe bleeding, infections, high blood pressure during pregnancy (pre-eclampsia and eclampsia) and unsafe abortion causative of major complications that occur during, following pregnancy and child birth [2, 13, 36].

Maternal mortality is preventable or avoidable with relevant public health approaches designed to prevent and manage complications that exist. All pregnant women require access to antenatal care, skilled care during child birth and care and support in the following weeks after child birth. The crude death rate per 100,000 population for women aged 20-24 years was highest above 20% in 2018 [14, 15, 20, 24]. The absence of skilled human resources is a relevant proximate factor. Distal risk factors that causative of maternal mortality includes poverty, distance from the HCF, lack of information, inadequate hours of BEmONC services and adverse cultural practices which has led to the death of 3 million babies with 2.6 million still born babies annually [13, 14].

Globally, the maternal mortality ratio of 216/100,000 live births is explained by pregnancy and child birth complications resulting in 630 maternal deaths per day around the world which is comparable to a higher Nigerian maternal mortality ratio of 512/100,000 live births or 67,000 women, represent 23% of all global deaths as at 2018 [1, 24, 25] . In 2015 about 303,000 women died globally during pregnancy and child birth. 99% of the dead were from low-and-middle-income countries particularly, Africa, South-East Asia and South Asia despite the 75% SDG target for the reduction of maternal mortality between 1990 – 2025 [9 , 14, 24, 29]

The proportion of births attended to by skilled birth attendants improved from 62% between 2000 to 2015 to 81% between 2013 to 2018 [2, 14, 20, 27, 28] however Africa, Eastern Mediterranean and South East Asia had the lowest proportion [28]. In Kogi State by 2023 only 54.9% % of women took iron supplementation during pregnancy while 61.1% were delivered by a skilled provider [2, 9]. The global maternal mortality ratio (MMR) fell by 34 per cent – from 339 deaths to 223 deaths per 100,000 live births translating into an average annual rate of reduction of 2.1 per cent [9,10, 21, 14, 24]. While substantive, this is about one third of the 6.4 per cent annual rate needed to achieve the Sustainable Development Goal (SDG) of 70 maternal deaths per 100,000 live births by 2030 [14, 15, 20, 29]. An estimated 28.5% of global maternal deaths occur in Nigeria, as a top contributor to maternal and child mortality [4, 15]. The North East zone of Nigeria, in particular, experiences some of the country's worst maternal and newborn health outcomes due to ongoing conflicts, lack of access to healthcare services and weak health security and emergency preparedness strategy.

The Nigerian infant, child and under-five mortality rates per 1,000 decreased by 9.9%, 9.5% and 31.6% respectively between 2008 and 2018 [1]. In the 10-year period preceding 2024 the infant, child and under-five mortality rates for Kogi State were 59, 21 and 78 per 1,000 respectively [2]. In Kogi State 16.8% of infants between 12-23 months were fully vaccinated with basic antigen compared to 54.2% zero-dose or no vaccination and 7.5% fully vaccinated according to national schedule [2]. Nigerian children 12-23 months fully vaccinated with basic antigen increased from 29% in 1990 to 39% in 2023, while the zero-dose or non-vaccinated decreased from 36% in 1990 to 31% in 2023 [1, 2]. The nutritional status of Nigerian under-five with sub-optimal growth has not greatly improved since between 2018 and 2023 the indices worsened by 3%, 1% and 5% for stunting, wasting and under-weight respectively [1, 2].

Measures Towards Amelioration of Risk Factor Determinants of Routine BEmONC Services at Ward Focal BHCPF HCF In Kogi State

Enhanced access to health services by vulnerable and hard-to-reach population, better health outcomes, and

a decrease in hospitalization and emergency department visit characterize primary care. The Basic Health Care Provision Fund (BHCPF) improves supply-side service delivery at ward level through the essential public health functions support and also the demand for Basic Minimum Package of Health Services at no cost by enrollees, vulnerable and hard-to-reach population in Kogi State a bid to achieve the Universal Health Coverage (UHC). Basic Emergency Obstetric and Newborn Care (BEmONC) introduced by WHO, UNICEF, and UNFPA in 1997 is an arrangement for the delivery of evidence-based clinical services, as a critical component of any program aiming at reducing infant and maternal mortality [8,14, 30].

Risk factors that determine BEmONC services uptake include human, health system and socio-ecological. Human risk factors include low health-seeking behavior, lack of preference for preventive care, myths and misconceptions, weak uptake of immunizations. Health system risk factors include low use of partograph, intra-sectoral professional rivalry, urban skew of orthodox services, poor emergency obstetric and preventive services, lack of medical and clinical equipment. Socio-ecological factors include gender related discrimination and stigmatization, harmful cultural practices, poor municipal infrastructure and transportation systems, high out-of-pocket expenditure on health care and poverty [25]. The building of the capacity of Skilled Birth Attendants (SBA) on BEmONC by the Basic Health Care Provision Fund (BHCPF) in Kogi State in July of 2024 was an essential process among several intervening variables required to facilitate the prevention and treatment of postpartum hemorrhage and pre-eclampsia/eclampsia and management of birth asphyxia, within the broader context of quality health services.

In this research the coefficients of association in the relationship between a basic (parenteral administration of prophylactic oxytocin to women of reproductive age during delivery) as a predictor variable and other signal functions inclusive of intervening and causative linkages as outcome variables were cross-examined to identify the degree of risks that determine uptake by vulnerable and hard-to-reach population as indicators of the extent of the quality of basic care service at ward level BHCPF sites in Kogi State.

The BHCPF strategic approach in Kogi State through defragmentation includes the engagement of Skilled Birth Attendants (SBAs) at ward focal PHC centers as a component of the essential public health function and specifically the Reproductive, Maternal, Child, Adolescent, Elderly Health plus Nutrition (RMNCAEH+N) strategy is designed to reduce maternal and newborn mortality. The building of capacity midwives and other SBA on requisite life-saving skills and competencies to improve BEmONC services provides community-focused and facility-based health services, enabling timely prevention of and intervention for complications to save the lives of mothers and neonates as part of universal access that requires that all pregnant women and newborns with complications have rapid access to well-functioning facilities that include a broad range of service delivery types and settings [6]. Core indices for the provision of BEmONC care in the facility are inclusive of several thematic areas such as laboratory tests availability which should comprised of hemoglobin/hematocrit, blood group, urine analysis, venereal disease research laboratory (VDRL), and HIV test for PMTCT available in the facility at the time of the data collection; medical and clinical equipment such as oxygen concentrator, sphygmomanometer, vacuum extractor, suction machine, radiant heater, and Ambu-bag mask; drugs and consumables comprising of intravenous (IV) uterotonics, IV fluids, Nifedipine, Hydralazine, IV antibiotics, IV MgSO4 and calcium gluconate; ambulance service in the facility 24 hours a day, maternity waiting area/homes in or around the facility, a designated referral focal person to coordinate in- and out-referrals 24 hours a day in the facility, clean facility compound, cleaning done after birth, availability of disinfectant solutions, disinfectant solution prepared and used correctly, availability of a container for sharps' disposal, providers practice hand washing, quality mechanism in place for sterilization, staff use personal protective barriers, availability of a light source for vaginal procedure, enough physical space, good illumination and ventilation, and easily washable delivery floor [12].

Signal functions are a set of seven key obstetric services identified as critical to basic emergency obstetric and newborn care (BEmONC) that include; administration of parenteral antibiotics; administration of parenteral anticonvulsants; administration of parenteral uterotonics; removal of retained products (manual vacuum aspiration); assisted vaginal delivery; manual removal of the placenta; and resuscitation of the newborn [8,9,16]. The health facility strengthening supported by the World Bank funded project: Immunization Plus Malaria Progress by Accelerating Coverage and Transforming services (IMPACT), legal framework, global leadership, strong government ownership and coordination are distal factors not studied in this paper but are essential

antecedents to scale-up of high impact evidence-based maternal and newborn interventions in Kogi State. The Human Recourses for Health (HRH) density in Nigeria of 2.52 per 1000 population is competitive compared to WHO benchmark of 2.43 however, Kogi State in 2022 had 0.66 HRH density [21].

Post Partum Haemorrhage (PPH), is the leading cause of maternal deaths in most low-income countries thus, improving access to safe and effective interventions to prevent PPH through efforts to prevent and reduce morbidity and mortality selectively by the slow intravenous administration of 10 IU oxytocin as recommended in preference to intramuscular administration can help to address the profound inequities in maternal and perinatal health globally with alternatives such as the use of carbetocin or a combination with misoprostol. [9, 10, 11, 16, 22]

To achieve this, skilled health personnel, health managers, policy-makers and other stakeholders need up-to-date and evidence-informed recommendations to guide clinical policies and practices linked to the critical World Health Organization (WHO) strategic priorities (particularly universal health coverage) for achieving the targets of the third Sustainable Development Goal (SDG) 3.1 [4, 10, 11, 24 29]

Indirect mortality often represents aggravated underlying medical conditions, but not caused by, the pregnancy, including complications from connective-tissue disease or cardiac conditions, in which the underlying pathology is independent of the pregnancy, but has likely been exacerbated by pathophysiologic changes of pregnancy e.g Cancers, Inherited disorders etc. Direct causes of maternal mortality are mostly commonly post-partum hemorrhage, hypertensive disorders, Sepsis, Obstructed labour and Unsafe abortion events etc [3, 36]

Opportunities for the reduction of maternal neonatal and infant mortality includes Maternal, Perinatal and Child Death Surveillance Response (MPCDSR) policy development strategic implementation and, Modified Basic Midwife Service Scheme intervention, Community Midwife Service Scheme intervention, National Health Insurance Scheme Saving One Million Lives Initiative (P4R), Advocacy Community and Social Mobilization, Task Shifting/Sharing policy adoption or adaptation to enhance HRH re-distribution, Malaria elimination program–Malaria in Pregnancy, Integration (District Health Information System/IDSR), Electronic Data collection using DHIS2, Global Facilities Funds (GFF) [19, 20, 24].

METHODOLOGY

Study Design

The non-exposure assigning or descriptive cross-sectional study observed and tested the association between one (1) predictor variable and ten (10) outcome variables applying Pearson bivariate correlation to derive moderator and mediator coefficients. The survey was based on multi-stage random sampling from a population of PHCs (n=239). However, only 86.85% of data on the Monthly Report Form (MRF) (or the pre-tested QoC checklist) was captured between April and August, 2024 on the link https://ee.kobotoolbox.org/x/OhaTIO3v and https://ee.kobotoolbox.org/x/mURrceLx for Officer-in-Charge (OIC) and Skilled Birth Attendant (SBA) in a ward focal NPHCDA and NHIA accredited HCF as criteria [26]. The captured data were on indicators selected from health care facility productivity/efficiency, service quality, maternal health, postnatal, newborn and childhood thematic area foci associated of uptake by neonate, under-five year olds, pregnant and breastfeeding women.

Study Area

The study was conducted in 239 ward focal health care facilities (HCFs) from the 21 Local Government Areas (LGAs) of Kogi State and a 0.66/1000 ratio for human resources for health density at basic obstetric care or PHC in line with the 2022 population projection of 5,290,126 by the Nigerian, National Bureau of Statistics (NBS) in 2017 [21]. In Kogi State 63.24% of the population live in rural areas and the demographic subsets of the State are inclusive of 211,605 and 1,058,025 children who are zero to one year and zero to five years respectively and 264,506 pregnant population characterized into 4%, 20% and 22% of the population respectively. Kogi State is located in the North Central geopolitical zone of Nigeria, and was created on the 27th of August, 1991. It has a and mass of 29,833 square kilometers and is located on 7∘30'N and 6∘42'E. The divisions in the state are Igala, Ebira, Kabba, Kogi and Yoruba.

Method of Data Collection

The semi-structured checklist was administered on-line through an open data kit where the checklists on the links: https://ee.kobotoolbox.org/x/OhaTIO3v and https://ee.kobotoolbox.org/x/mURrceLx were pre-tested during two weeks culminating on the 15th of in March in 2024 prior to data capture between April to August, 2024 by Officers-in-Charge (OICs) and Skilled Birth Attendant (SBA) congruently at the designated BHCPF 239 ward focal HCFs during April to August, 2024 (n=239). This was a real-time online process conducted to eliminate confounding factors in the quantification of the performance of selected indicators for characterization: eight (8) QoC (n=239) and three (3) SBA (n=79) performance management indicators [26].

Data Collection Procedure

The checklist was administered at the ward focal PHCs during the survey encapsulating data capture on the Basic Emergency Obstetric and Newborn Care (BEmONC) Quality of Care (QoC) Monthly Reporting Form (MRF) at 239 designated BHCPF PHCs which was conducted after information was disseminated to the Officer-in-Charge (OIC) and Skilled Birth Attendant (SBA) on the process prior to the recording of demographic and categorized responses on the https://ee.kobotoolbox.org/x/OhaTIO3v and https://ee.kobotoolbox.org/x/mURrce Lx during a 30-60 minutes period during April to August, 2024 period during a fifteen-day period monthly and however to ensure zero homoskedasticity and alignment with the assumptions underlying the Pearson correlation the analyzed sample size of n=206 submissions were mutually exclusive of the 13.15% non-participation and or untimely submissions from the respondents population of OIC n=239 and SBA n=79).

Study Instrument

The semi-structured checklist (see appendix "A") encapsulates selected one (1) predictor variable and ten (10) outcome variables which was used to capture the data from 239 HCFs each with unique ID assigned and returned within the eligibility criteria of being an Officer-in-Charge (OIC) and Skilled Birth Attendant (SBA) in a National Primary Health Care Development Agency (NPHCDA) and National Health Insurance Agency (NHIA) accredited BHCPF ward focal PHC. The checklist was designed to obtain data on BHCPF indicators earlier identified in 3.1 (See appendix "A"). The study instrument was revised on-line between the 1st to the 15th of March 2024 with late submission extended by five days as a pre-testing period to remove confounding factors via the ODK link (See 3.1) at 239 PHCs at ward level in Kogi State [26]. The pretesting was successfully conducted allowing for an improved design of the checklist prior to the data capture at the HCFs which commenced from April to August 2024 with derived identified and quantified QoC and performance management indicators coefficients relevant to BEmONC systems strengthening.

Sampling Technique

The semi-structured checklist was administered through a multi-stage random sampling technique on the links: https://ee.kobotoolbox.org/x/OhaTIO3v and https://ee.kobotoolbox.org/x/mURrceLx by the Officer-in-Charge (OIC) and Skilled Birth Attendant (SBA) after receiving information on the process prior to the self-administration of the recording of demographic and categorized responses on BEmONC QoC and performance management indicators in an NPHCDA and NHIA accredited PHC as criteria with a population and sample size of n=239 ward focal BHCPF PHCs across the 21 LGAs in Kogi.

The Cochran sampling technique in **Equation 1** was used to obtain yield (n_o) from a population that is representative of n=239 PHCs in a population of N=1,010 PHCs in Kogi State with focal Officers-in-Charge (OICs) and engaged Skilled Birth Attendants (SBA) as follows:

$$n_o = Z^2pq/e^2$$

Where: -

n_o = Sample Size

Z^2 = The abscissa of the normal curve that cuts off an area alpha a at the tails (1-α = Confidence Interval)

p = Probable desired population with attribute present in the population)

q = 1-p

Thus, from Equation 1, n_o = (1.96) ^{2} (0.78) (0.22)/0.05² n_o = 263 (Only 239 eligible NHIA and NPHCDA accredited PHCs exist)

Data Analysis

The 11 categorized datasets (One (1) predictor and ten (10) outcome variables) derived from the multi-stage BEmONC QoC survey, (n=206) where means of identified indicators or variables were collated on Microsoft Excel, followed by analysis of categorized indicators on SPSS 25 with a presentation of the correlations on a parametric table (See Table 4.2). The hypothesis was tested with Pearson bi-variate correlation on SPSS 25 for the selected 11 categorized indicators at a CI of 0.05 and a 0.01 level of significance.

DATA PRESENTATION

Results

Table 4.1 Health Care Facility Productivity/Efficiency

4.11: Laboratory Tests Done Per 1000 Opd Client

(Total No Of Lab Tests Done Per Month*1000/No. Opd Cases Per Month) (N=206)

Period	Variable	Mean (ū)
APRIL	14,832	72
MAY	17,098	83
JUNE	19,364	94
JULY	17,098	83
AUGUST	19,776	96

4.111: Total No. Of Anc Conducted During the Reporting Month (N=206)

Period	Variable	Mean (ū)
APRIL	12,712	61.71
MAY	10,059	48.83
JUNE	20,993	101.91
JULY	11,895	57.74
AUGUST	20,405	99.06

4.112: Total Number of Out Referrals from The Phc During Thereporting Month (N=206)

Period	Variable	Mean (ū)
APRIL	206	61.71

MAY	1,764	48.83
JUNE	649	101.91
JULY	660	57.74
AUGUST	729	99.06

4.113: Total Number of Out Referrals from The Phc During the Reporting Month (N=206)

Period	Variable	Mean (ū)
APRIL	206	1.00
MAY	1,764	8.56
JUNE	649	3.15
JULY	660	3.21
AUGUST	729	3.54

4.114: Drop-Out Rate of Dpt Immunization (N=206)

(No. Of Infant Recieving Dpt 1 Less No. Of Infant Recieving Dpt 3*100/No.Of Infant Receiving Dpt 1)

Period	Variable	Mean (ū)
APRIL	1,751	8.50
MAY	166	0.81
JUNE	209	1.01
JULY	461	2.24
AUGUST	287	1.39

Table 4.121 SERVICE DELIVERY

4.1211: SCORE FROM LATEST QUALITY ASSURANCE VISIT(n=206)

(HIGHEST SORE: 100%)

Period	Variable	Mean (ū)
APRIL	15,715	76.29
MAY	15,612	75.78
JUNE	15,908	77.22
JULY	16,715	81.14
AUGUST	16,082	78.07

Table 4.131 MATERNAL HEALTH

4.1311: Number Of Pregnant Women Who Gave Birth in The Hcf Who Received Prophylactic Uteronic (Oxytocin) Immediately After   Birth (N=206)

Period	Variable	Mean (ū)
APRIL	1,972	9.57
MAY	2,024	9.83
JUNE	1,574	7.64
JULY	2,602	12.63
AUGUST	1,660	8.06

Table 4.141 POST-NATAL NEWBORN HEALTH

4.1411: Number Of Babies Breastfed Within One Hour Of Birth During The Month (N=206)

Period	Variable	Mean (ū)
APRIL	1,972	9.57
MAY	2,024	9.83
JUNE	1,574	7.64
JULY	2,602	12.63
AUGUST	1,660	8.06

4.1412: Number Of Children 6-59 Months Who Were Administered with Vitamin A During The Month (N=206)

Period	Variable	Mean (ū)
APRIL	5,562	27
MAY	5,562	27
JUNE	4,326	21
JULY	127,308	618
AUGUST	35,638	173

Table 4.151: Sba Performance Management 4.1511: Number of Pregnant Women Assisted with Normal Delivery

BY SBA (n=79)

Period	Variable	Mean (ū)
APRIL	301	3.81
MAY	313	3.96

JUNE	296	3.75
JULY	318	4.03
AUGUST	293	3.71

4.1512: Number Of Nursing Mothers Provided with Initiation and Sustenance Of Breastfeeding By Sba (N=79)

Period	Variable	Mean (ū)
APRIL	319	4.03
MAY	319	4.04
JUNE	310	3.93
JULY	337	4.26
AUGUST	329	4.17

4.1513: Number Of Newborne Provided Uptake of Immunization Services; Bcg, Penta 1, Penta 3, Measles, (All Antigen) According to National

SCHEDULE BY SBA (N=79)

Period	Variable	Mean (ū)
APRIL	353	4.47
MAY	344	4.35
JUNE	336	4.25
JULY	336	4.25
AUGUST	395	5.00

DISCUSSION

The mediators of the signal function relevant to the number of pregnant women who gave birth in the HCF who received prophylactic uteronic (oxytocin) after birth (n=206) from the Person bivariate correlation were four positively associative key performance indicators, which are inclusive of the number of babies breastfed within one hour of birth (n=206), the Skilled Birth Attendant (SBA) assisted normal delivery (n=79), the number of children 0-59 months who were administered with Vitamin A (n=206). The DPT immunization drop-out rate observed during the period under study where p (0.52, 0.71, 0.10, 0.82) and r (0.875, 0.845, 0.80, 0.13) values respectively. This indicates a statistically significant relative strength of association for all outcome variables except the very weak relationship in the DPT immunization drop-out rate. There was an observed p (0.12, 0.15, 0.20, 0.87) level of risk that determine PNC services uptake by under-served population except for the 87% level uptake of routine immunization by under-five population.

The moderators were the risks factors determinants identified as linkages to livebirths at ward focal BHCPF HCF that were observed to be laboratory tests, ANC services and uptake of immunization by neonate or infant 0-59 months where p (0.33, 0.13, 0.47) and   r (-0.54, -0.76, -0.42) respectively.

Table 4.2 CORRELATION COEFFICIENTS (n=206)

		1	2	3	4	5	6	7	8	9	10	11
1. LABORATORY TESTS DONE PER 1000 OPD CLIENT (TOTAL NO OF LAB TESTS DONE PER MONTH*1000/NO. OPD CASES PER MONTH) (n=206)	Pearson Correlation	1.000	.797	.190	-.804	.164	-0.548	-.257	-.029	-.494	.045	.363
	Sig. (2-tailed)		.106	.759	.101	.792	.339	.677	.963	.398	.943	.548
	N	5	5	5	5	5	5	5	5	5	5	5
2. TOTAL NO. OF ANC CONDUCTED DURING THE REPORTING MONTH (n=206)	Pearson Correlation	.797	1.000	-.362	-.296	.028	-0.760	-.495	-.237	-.902*	-.159	.441
	Sig. (2-tailed)	.106		.550	.628	.965	.135	.397	.701	.036	.798	.457
	N	5	5	5	5	5	5	5	5	5	5	5
3. TOTAL NUMBER OF OUT REFERRALS FROM THE PHC DURING THE REPORTING MONTH (n=206)	Pearson Correlation	.190	-.362	1.000	-.649	-.300	0.0382	-.022	-.163	.533	-.119	-.119
	Sig. (2-tailed)	.759	.550		.236	.624	.951	.972	.794	.355	.849	.849
	N	5	5	5	5	5	5	5	5	5	5	5
4. DROP-OUT RATE OF DPT IMMUNIZATION (NO. OF INFANT RECIEVING DPT 1 LESS NO. OF INFANT RECIEVING DPT 3*100/NO. OF INFANT RECEIVING DPT 1) (n=206)	Pearson Correlation	-.804	-.296	-.649	1.000	-.217	0.137	-.001	-.159	-.100	-.128	-.005
	Sig. (2-tailed)	.101	.628	.236		.726	.825	.999	.798	.873	.838	.993
	N	5	5	5	5	5	5	5	5	5	5	5

5. SCORE FROM LATEST QUALITY ASSURANCE VISIT (HIGHEST SORE: 100%) (n=206)	Pearson Correlation	.164	.028	-.300	-.217	1.000	0.624	.780	.963**	.244	.836	-.078
	Sig. (2-tailed)	.792	.965	.624	.726		.260	.120	.009	.692	.078	.901
	N	5	5	5	5	5	5	5	5	5	5	5
6. NUMBER OF PREGNANT WOMEN WHO GAVE BIRTH IN THE HCF WHO RECEIVED PROPHYLACTIC UTERONIC (OXYTOCIN) IMMEDIATELY AFTER BIRTH DURING THE MONTH (n=206)	Pearson Correlation	-.548	-.761	.038	.138	.624	1	.875	.803	.845	.642	-.426
	Sig. (2-tailed)	.339	.135	.951	.825	.260		.052	.102	.071	.243	.475
	N	5	5	5	5	5	5	5	5	5	5	5
7. NUMBER OF BABIES BREASTFED WITHIN ONE HOUR OF BIRTH DURING THE MONTH (n=206)	Pearson Correlation	-.257	-.495	-.022	-.001	.780	0.874	1.000	.905*	.634	.929*	.025
	Sig. (2-tailed)	.677	.397	.972	.999	.120	.052		.035	.251	.023	.968
	N	5	5	5	5	5	5	5	5	5	5	5

		1	2	3	4	5	6	7	8	9	10	11
8. NUMBER OF CHILDREN 6-59 MONTHS WHO WERE ADMINISTERED WITH VITAMIN A DURING THE MONTH (n=206)	Pearson Correlation	-.029	-.237	-.163	-.159	.963**	0.802	.905*	1.000	.481	.880*	-.148
	Sig. (2-tailed)	.963	.701	.794	.798	.009	.102	.035		.412	.049	.813
	N	5	5	5	5	5	5	5	5	5	5	5

9. NUMBER OF PREGNANT WOMEN WITH NORMAL DELIVERY PROVIDED WITH ASSISTANCE BY SBA (n=79)	Pearson Correlation	-.494	-.902*	.533	-.100	.244	0.845	.634	.481	1.000	.341	-.509
	Sig. (2-tailed)	.398	.036	.355	.873	.692	.071	.251	.412		.574	.381
	N	5	5	5	5	5	5	5	5	5	5	5
10. NUMBER OF BREAST-FEEDING MOTHERS PROVIDED INITIATION AND SUSTENANCE OF BREASTFEEDING BY SBA	Pearson Correlation	.045	-.159	-.119	-.128	.836	0.641	.929*	.880*	.341	1.000	.313
	Sig. (2-tailed)	.943	.798	.849	.838	.078	.243	.023	.049	.574		.608
	N	5	5	5	5	5	5	5	5	5	5	5
11. NUMBER OF NEWBORNE PROVIDED UPTAKE OF IMMUNIZATION SERVICES; BCG, PENTA 1, PENTA 3, MEASLES, (ALL ANTIGEN) ACCORDING TO NATIONAL SCHEDULE BY SBA (N=79)	Pearson Correlation	.363	.441	-.119	-.005	-.078	-0.42	.025	-.148	-.509	.313	1.000
	Sig. (2-tailed)	.548	.457	.849	.993	.901	.475	.968	.813	.381	.608	
	N	5	5	5	5	5	5	5	5	5	5	5

CONCLUSION

The tracking of the signal function Quality of Care (QoC) through the test of association between the key performance indicators for BEmONC services uptake at (n=239) ward focal BHCPF HCF in Kogi State provided the observations from the Pearson bivariate correlation coefficients. The analysis of sample means presented the associative risk factors that determine the defragmentation of BEmONC services in terms of moderators and mediators.

A relevant leverage applied in this study was the epidemiological approach towards the precipitation of appropriate proactive management action and measures towards the strengthening of optimization of BEmONC services uptake by vulnerable and hard-to-reach population, so that no one is left behind by 2030 in line with the SDGs 3.8 goal for attaining Universal Health Coverage (UCH) in Kogi State.

It has become relevant for action to be taken by management towards the mitigation of system defragmentation gaps or risk factors that determine the quality of care in the PHC approach within the context of socioecological implications (proximate and distal). The study findings emphasize the linkages to the absence of or weaknesses in the political will for improved fiscal release (statutory and budgetary) to revitalize the essential public health functions of ward focal BHCPF sites, legal framework, policy and or full implementation of the Primary Health Care Under One Roof (PHCUOR) aimed at providing a sustainable and enabling environment to revitalization of PHCs in alignment with the Sector Wide Approach (SWAp) guidance to reach the one health approach. The absence of enacted core legal framework or policy (adoption or adaptation of the State Health Act, Health Policy, Human Resources for Health (HRH) Policy and redistribution of HRH strategy linked to a Task Shifting and Task Sharing policy) has consequently led to the persistence of weaknesses in the strengthening of PHC systems, which require timely action.

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APPENDIX 'A' – QUESTIONNAIRE

(Selected BEmONC Service Delivery Continuum QoC Indicators)

	Kogi State Primary Health Care Development Agency (Ksphcda) Basic Health Care Provision Fund (Bhcpf)	
Quality Of Care (Qoc) Monthly Reporting Form (MRF)/Checklist		
State: Kogi		**n=239 PHCs**
S/No	**Key Performance Indicator**	**RESPONSE**
A	**Health Care Facility Productivity/Efficiency**	
1.	LABORATORY TESTS DONE PER 1000 OPD CLIENT (TOTAL NO OF LAB TESTS DONE PER MONTH*1000/NO. OPD CASES PER MONTH) (N=239)	
2.	TOTAL NO. OF ANC CONDUCTED DURING THE REPORTING MONTH (N=239)	
3.	TOTAL NUMBER OF OUT REFERRALS FROM THE PHC DURING THE REPORTING MONTH (N=239)	
4.	DROP-OUT RATE OF DPT IMMUNIZATION (NO. OF INFANT RECIEVING DPT 1 LESS NO. OF INFANT RECIEVING DPT 3*100/NO. OF INFANT RECEIVING DPT 1) (N=239)	
B	**Service Quality**	
5.	SCORE FROM LATEST QUALITY ASSURANCE VISIT (HIGHEST SORE: 100%) (N=239)	
C	**Maternal Health**	
6.	NUMBER OF PREGNANT WOMEN WHO GAVE BIRTH IN THE HCF WHO RECEIVED PROPHYLACTIC UTERONIC (OXYTOCIN) IMMEDIATELY AFTER BIRTH DURING THE MONTH (N=239)	
D	**Post-Natal Newborn Health**	
7.	NUMBER OF BABIES BREASTFED WITHIN ONE HOUR OF BIRTH DURING THE MONTH (N=239)	
8.	NUMBER OF CHILDREN 6-59 MONTHS WHO WERE ADMINISTERED WITH VITAMIN A DURING THE MONTH (N=239)	
E	**Sba Performance Management**	
9.	NUMBER OF PREGNANT WOMEN WITH NORMAL DELIVERY PROVIDED WITH ASSISTANCE BY SBA (N=79)	
10.	NUMBER OF BREAST-FEEDING MOTHERS PROVIDED INITIATION AND SUSTENANCE OF BREASTFEEDING BY SBA	
11.	NUMBER OF THE UPTAKE IMMUNIZATION BY NEWBORNE BCG, PENTA 1, PENTA 3, MEASLES, (ALL ANTIGEN) SERVICES TO NEW BORNES ACCORDING TO NATIONAL SCHEDULE BY SBA (N=79)	