

Research Article

# Availability of Health Services and Preparedness for Basic Emergency Obstetric and Newborn Care in Togo

Wankpaouyare Gmakouba<sup>1, 3, \*</sup> , Komi Ameko Azianu<sup>2</sup> , Labaguibe Gangak<sup>3</sup> ,  
Gountante Kombate<sup>5, 6</sup> , Mazabalo Bini<sup>3</sup> , Salaraga Bantakpa<sup>4</sup> 

<sup>1</sup>Department of Public Health, Bircham International University, Madrid, Spain

<sup>2</sup>Interdisciplinary Research Laboratory in Social and Health Sciences, University Joseph Ki-Zerbo, Ouagadougou, Burkina Faso

<sup>3</sup>Research and Planning Department, Ministry of Health and Public Hygiene, Lomé, Togo

<sup>4</sup>Universal Health Coverage Programme, Ministry of Universal Access to Health Care, Lomé, Togo

<sup>5</sup>University Medical Centre Utrecht, Utrecht University, Utrecht, Netherlands

<sup>6</sup>Department of Public Health, Institute of Tropical Medicine, Antwerp, Belgium

## Abstract

**Introduction:** Togo, like many low-income countries, faces critical challenges in reducing maternal mortality, including limited access to care, inconsistent service quality, and regional disparities in healthcare availability. Improving the accessibility and readiness of health facilities is essential to reduce maternal and neonatal deaths by ensuring timely and adequate care. This study aims to assess the preparedness and availability of services necessary to deliver Basic Emergency Obstetric and Neonatal Care (BEmONC), focusing on the seven essential functions defined by WHO. Using data from the 2021 Harmonized Health Facility Assessment (HHFA) a national cross-sectional survey the study evaluates service availability and readiness across healthcare facilities. Availability was measured based on the presence of the seven BEmONC signal functions, while preparedness was assessed using a composite index that includes three key criteria: trained staff, essential diagnostic equipment, and access to necessary medications. This methodological framework offers a comprehensive evaluation of the capacity of healthcare facilities to manage obstetric and neonatal emergencies in a resource-limited setting, providing critical insights for strengthening maternal and neonatal healthcare systems. **Results:** An analysis of 200 healthcare facilities in Togo revealed that 76 (38%) of these facilities offer BEmONC services. Hospitals demonstrate superior availability of the seven essential functions and exhibit a higher average preparedness score in comparison to medical-social centres and dispensaries ( $p < 0.05$ ). The study identified that higher preparedness is associated with the geographical location of facilities, the regular undertaking of maternal and neonatal death reviews, and the evaluation of patient feedback. However, disparities persist, particularly in the availability of certain essential interventions, such as manual removal of retained products of conception and neonatal resuscitation. The paucity of ongoing staff training has also been identified as a barrier to the enhancement of services. **Conclusion:** This study highlights significant disparities in the availability and preparedness of healthcare facilities in Togo to provide BEmONC services. To address this, it is crucial for the Ministry of Health to strengthen quality assurance and implement systematic maternal and neonatal death audits in healthcare centers. An equitable distribution of clinical guidelines, essential medications, equipment, and continuous training is also necessary to improve access to and the quality of BEmONC services. These measures will strengthen facility preparedness and ensure the provision of quality emergency obstetric and neonatal care, especially in resource-limited areas.

\*Corresponding author: makoubafredi@gmail.com (Wankpaouyare Gmakouba)

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## Keywords

BEmONC, Availability of Healthcare Services, Preparedness of Healthcare Facilities, Maternal and Neonatal Mortality, Access to Healthcare, Togo

## 1. Introduction

In a global context marked by mounting challenges to sustainable development and access to fundamental services, enhancing basic emergency obstetric and newborn care (BEmONC) is a key priority for numerous developing countries. Togo, like many African countries, is working to strengthen its health system with the aim of reducing maternal and neonatal mortality in line with the United Nations Sustainable Development Goals (SDGs).

This article analyzes the state of BEmONC in Togo, highlighting the progress made, persistent challenges, and prospects for improvement. Utilizing an evidence-based approach and field studies, the study assesses crucial elements of the supply and quality of care, along with the policies in place to enhance the management of obstetric and newborn emergencies.

The study provides a comprehensive assessment of the BEmONC system, offering guidance for strategic decisions and targeted interventions. These decisions and interventions are designed to strengthen the capacity of health structures and ensure equitable access to essential services. This analysis will help identify priority levers for sustainable improvement of maternal and newborn health in Togo.

## 2. Context and Rationale

Despite considerable global progress in reducing maternal and neonatal mortality over the past two decades [1], approximately 800 women and 7,700 newborns continue to die daily due to pregnancy, childbirth and postpartum complications [2]. A disproportionate number of these deaths occur in low-income countries, with 85% of the global mortality burden being concentrated in these regions [3]. Togo, a nation classified as a low-income country, is grappling with a substantial maternal and neonatal mortality burden, despite the expansion of prenatal care coverage and an increase in deliveries attended by skilled personnel.

In 2020, the World Health Organization (WHO) reported that, akin to other low-income countries, Togo grapples with substantial impediments to reducing maternal mortality, primarily characterised by constrained access to healthcare, suboptimal service quality, and pervasive regional disparities in healthcare access [4]. Despite a modest decline in the maternal mortality ratio, progress falls short of the Sustainable Development Goals (SDGs) targets set for maternal and ne-

onatal health. In 2021, the maternal mortality ratio was estimated by UN agencies at 399 deaths per 100,000 live births, a figure well above the global average [5]. This finding underscores the substantial gap that still needs to be addressed to achieve Sustainable Development Goal (SDG) target 3.1, which aims to reduce maternal mortality to less than 70 deaths per 100,000 live births by the year 2030 [6]. The neonatal mortality rate in 2021 was 23 deaths per 1,000 live births. Although this figure represented an improvement in comparison with preceding years, it remained substantially higher than the global target of 12 deaths per 1,000 live births [7].

Togo has made significant progress in reducing maternal and neonatal mortality. In 2022, 76% of deliveries were assisted by qualified personnel, compared to 72% in 2021, and by 2023, this rate had increased to 81%. Nevertheless, challenges persist in ensuring universal coverage and the provision of quality care for all pregnant women.

Togo has demonstrated a commitment to reducing maternal and neonatal mortality as part of its national health policy for 2030 and its National Health Development Plan (PNDS) for the years 2023-2027. These two strategic documents are intended to achieve ambitious maternal and neonatal health goals. The strategy entails the enhancement of access to quality obstetric care, the augmentation of prenatal care coverage, and the fortification of healthcare infrastructure capacity. The country also focuses on training and deploying qualified medical personnel, particularly in rural and isolated areas, to ensure safe pregnancy monitoring and childbirth.

The PNDS 2023-2027 aims to reduce neonatal mortality to less than 10 deaths per 1,000 live births by 2027 [8]. In order to achieve this, the plan includes several interventions, such as the improvement of neonatal services, the expansion of vaccination services, and the combating of neonatal infections. The strategy also incorporates a primary healthcare strengthening initiative, with a particular focus on regions experiencing high vulnerability. The overarching objective of these initiatives is twofold: firstly, to mitigate geographical and socio-economic disparities in access to healthcare, particularly among marginalised populations; and secondly, to foster community participation in health promotion and pregnancy management.

Despite these efforts, challenges persist in achieving the sustainable development goals by 2030. The WHO has recommended the availability of BEmONC services in every healthcare facility as a key strategy to reduce maternal and

neonatal deaths [9, 10]. The emergency obstetric and neonatal care package is an integrated strategy that aims to equip healthcare facilities to address the leading causes of direct obstetric emergencies, which are responsible for the majority of maternal and neonatal deaths. However, in Togo, the majority of healthcare facilities still lack all the essential BEmONC functions. A national survey conducted in 2015 found that only 13% of health posts, 28% of medical centres, and 62% of hospitals were able to perform the seven essential functions [11]. These figures are well below the targets set by the WHO, which aim for all hospitals and at least 70% of health centres and clinics to provide BEmONC services [10].

Improving the availability and readiness of healthcare facilities to provide these services is crucial for reducing the burden of maternal and neonatal deaths. Although progress has been made, the lack of preparedness in facilities to deliver these services remains a major concern. It is essential to understand the factors associated with this low level of preparedness to strengthen the maternal and neonatal health system. A national study using a representative sample could provide crucial information on the extent of healthcare facilities' availability and readiness to offer these services and help guide policies and investments in this area.

### 3. Literature Review

The BEmONC plays a key role in reducing maternal and neonatal mortality, particularly in low- or middle-income countries that still experience high birth rates. These services provide urgent and specialized care for pregnant women and newborns facing complications such as hemorrhage, infections, pre-eclampsia, or complicated deliveries [12]. Their implementation in basic healthcare facilities, such as health posts and medical-social centers, enables a rapid response to obstetric and neonatal emergencies. The widespread use of BEmONC is crucial for reducing maternal and neonatal mortality in rural areas, where resources are often limited. According to Campbell and Graham [13], the implementation of BEmONC in these areas has significantly reduced maternal and child deaths.

The added value of BEmONC lies in its ability to provide urgent care where infrastructure and qualified personnel are often insufficient. BEmONC allows for prompt and adequate management of obstetric and neonatal complications, which can save lives and improve long-term health outcomes [2]. For example, the implementation of these services has contributed to a 20-30% reduction in maternal mortality in certain regions, according to the World Bank [14]. Additionally, BEmONC aligns with the Sustainable Development Goals, particularly SDG 3, which aims to reduce maternal and neonatal mortality by ensuring essential health coverage [12].

However, the implementation of BEmONC presents some challenges, particularly due to the lack of infrastructure and qualified personnel, especially in developing countries. Nevertheless, innovative strategies, such as integrating services

into primary healthcare, have facilitated their deployment at a lower cost [14]. Togo, for example, has made significant progress in improving access to these services, strengthening local capacities, and integrating them into its national public health strategies [15]. In conclusion, although challenges remain, BEmONC represents an essential and effective strategy for addressing obstetric and neonatal emergencies, saving lives, and improving health outcomes in developing countries.

## 4. Methodology

### 4.1. Study Type and Sampling

The study uses data collected in 2021 as part of the HHFA survey conducted in healthcare facilities in Togo. The survey was conducted by the Ministry of Health and Public Hygiene with technical and financial support from the WHO. It is a cross-sectional survey with a nationally representative sample, and the sampling population was derived from the national database of healthcare facilities.

### 4.2. Objective and Study Framework

The HHFA survey is a methodological tool developed by the WHO aimed at harmonizing and standardizing the assessment of healthcare service quality, healthcare infrastructure, and the performance of the national health system. This survey provides comprehensive information on the country's capacity to provide adequate healthcare services to the population, including in areas of maternal, neonatal, and child health, primary healthcare, and emergency services.

### 4.3. Sampling Method

The HHFA survey used stratified random sampling and drew a representative sample of 200 facilities from the national list of 1,297 healthcare facilities. The selection criteria considered the type of facility, the managing authority, and the regions of the country. Adjustments were made to define the optimal sample size by facility type, in accordance with WHO recommendations [16], which suggest that for small countries (like Togo), a sample size of 150 to 250 facilities is appropriate when the country has 50 to 100 hospitals, 1,000 to 2,000 healthcare facilities, and 10 to 80 health districts.

### 4.4. Tools and Data Collection

Data were collected using standardized questionnaires and analytical tools developed by the WHO in collaboration with various partners. These tools allow for the collection of reliable information on the availability of healthcare services and the capacity of facilities to meet established quality standards [17].

## 4.5. Data Collection Methods

The data collection method used in the survey involved the direct administration of questionnaires to assess the availability and operational capacity of services, including certain basic health interventions. Data were collected in November 2021 by teams of surveyors and supervisors, under the direct supervision of the implementation technical team and the national consultant team. Data entry was conducted electronically using the KoboCollect software. To ensure the accuracy of the information, data control and validation procedures were implemented to minimize errors. Data processing involved careful verification of inconsistencies and errors, followed by corrections made, especially regarding elements such as facility identity, facility number, name, address, facility type, and managing authority.

## 4.6. Variables of the Study

Based on the research questions, this study identified two outcome variables: «availability of services» and «service preparedness».

These variables were measured using the WHO tool for assessing the availability and preparedness of services in healthcare facilities.

Thus, «availability of services» in this study is defined as «the physical presence of services related to the provision of healthcare services». It was measured by evaluating the completion of the following seven essential functions performed by healthcare providers at least once during their work in the facility: i) parenteral administration of antibiotics, ii) parenteral administration of oxytocics, iii) parenteral administration of anticonvulsants, iv) assisted vaginal delivery, v) manual removal of the placenta, vi) manual removal of retained products of conception, vii) neonatal resuscitation.

«Service preparedness» was defined as the state of readiness or the capacity of a facility to provide BEmONC. It was measured based on the availability and functionality of support elements, organized into three main areas:

*Staff training:* This domain includes two indicators: the presence of guidelines and the presence of at least one staff member who has undergone formal or structured training (continuous training) on the services offered in the 24 months prior to the evaluation.

*Diagnostic equipment:* This domain includes 11 indicators, namely the presence of: emergency transport, sterilization equipment, examination light, delivery kit, suction device, manual vacuum extractor, D&C kit, neonatal bag and mask, delivery bed, partograph, and gloves.

*Basic medicine and essential products:* This domain includes 11 indicators, including essential medicines for delivery and neonatal care, such as: injectable antibiotics, injectable uterotonics, injectable magnesium sulfate, injectable diazepam, intravenous fluids, skin disinfectant, antibiotic eye ointment, 4% chlorhexidine, injectable gentamicin, injectable ceftriaxone, and amoxicillin suspension.

The service preparedness for BEmONC was then created in the form of a composite score by adding the presence of each indicator, with equal weight given to each domain and each indicator within the domains. The expected total score was 100%, with each domain representing 33.3% ( $100\%/3$ ) of the total score. The proportion of each indicator within the domain was equal to 33.3% divided by the number of indicators in that domain. The BEmONC service preparedness score for each facility was then calculated by summing the proportions. Since the preparedness score is a relative measure, facilities that scored 50% or higher were considered prepared to provide BEmONC services, compared to those scoring below 50% for the BEmONC preparedness score. This 50% threshold was also used in previous studies [18].

The outcome variables were examined in relation to potential explanatory variables selected as key variables that could influence the availability or preparedness of healthcare facilities to provide BEmONC services. These variables were as follows:

1. The location of the facility was coded as «0» for urban settings and «1» for rural settings.
2. The type of facility was coded as «0» for a dispensary, «1» for a health center, and «2» for a hospital.
3. The management authority was coded as «0» for a public facility and «1» for a private facility.
4. The 24-hour service schedule was coded as «1» for facilities that had a 24-hour service schedule or an on-call staff roster, otherwise the facility was coded as «0».
5. The review of maternal or neonatal deaths was coded as «1» for facilities that conducted regular reviews of maternal or neonatal deaths, otherwise the facility was coded as «0».
6. The examination of customer opinions was coded as «1» for facilities that had a system for determining and reviewing customer opinions, otherwise the facility was coded as «0».
7. The number of employees and the number of beds per facility remained as distinct quantitative variables.

## 4.7. Statistical Analysis

The data were analyzed using SPSS V.21 in two steps. First, a descriptive analysis of all variables was conducted using proportions, and the results were presented in tables and graphs. Then, bivariate and multivariate regression models were performed to assess the association between the outcome variable (service preparedness) and explanatory variables. Since the objective was to adjust a final model predicting the association, an objective method based on criteria was used to include or exclude variables in the multiple regression models. A p-value of less than 0.05 was considered indicative of a statistically significant association.

## 5. Results

### 5.1. General Characteristics of the Studied Facilities

The [table 1](#) below presents a summary of the general characteristics of the healthcare facilities included in the survey. Of the 200 facilities surveyed, 192 (96%) reported providing delivery services and neonatal care.

Regarding their geographical distribution, 67% of these facilities were located in rural areas, while 79% were in the public sector. However, only 10% of them conducted regular reviews of maternal and neonatal deaths occurring within their facility.

Additionally, human resources appeared limited, with a median staff of only two personnel per facility.

**Table 1.** Distribution of respondent facilities based on basic characteristics.

Variable	n	(%)
Installation location		
Rural	134	(67)
Urban	66	(33)
Type of facility		
Dispensary	102	(51)
Medical-social center (MSC)	65	(32.5)
Hospital	33	(16.5)
Managing authority		
Public	158	(79)
Private	42	(21)
Assisted vaginal delivery		
Yes	192	(96)
No	08	(04)
24-hour service schedule		
Yes	177	(88.5)
No	23	(11.5)
Review of maternal/neonatal deaths		
Yes	20	(10)

Variable	n	(%)
No	180	(90)
Number of employees per facility		
Median	02	(37.5)
Number of delivery beds per facility		
Average	1.42	(69.5)

### 5.2. Availability of Signal Functions for Bemone Based on the Type, Management Authority, and Location of Healthcare Facilities

The [table 2](#) presents the distribution of the availability of seven signal functions for BEmONC based on the type of facility, management authority, and location of the healthcare structure.

In general, the availability of these seven signal functions, namely the parenteral administration of antibiotics, parenteral administration of oxytocics, parenteral administration of anticonvulsants, assisted vaginal delivery, manual removal of the placenta, manual removal of retained products of conception, and neonatal resuscitation, was significantly higher in hospitals compared to health centers and dispensaries ( $p<0.05$ ).

Although public facilities consistently reported higher availability of these functions compared to private facilities, the parenteral administration of antibiotics, parenteral administration of anticonvulsants, manual removal of the placenta, and neonatal resuscitation showed a statistically significant difference favoring the private sector ( $p<0.05$ ).

Regarding location, manual removal of the placenta, manual removal of retained products of conception, and neonatal resuscitation showed a statistically significant difference favoring urban settings ( $p<0.05$ ).

Regardless of the type of facility, location, or management authority, the majority of facilities reported high availability of parenteral administration of oxytocin (96%), assisted vaginal delivery (96%), and neonatal resuscitation (20%). In contrast, 43% of the facilities reported providing manual removal of retained products of conception, while 98.5% ensured the parenteral administration of antibiotics, and 94.5% reported manual removal of the placenta. Additionally, all healthcare facilities ensured the parenteral administration of anticonvulsants.

**Table 2.** Distribution of the seven signal functions for BEmONC, by facility type and management authority.

Variable	Type of facility			Managing authority		Installation location		Total
	Dispen- sary n (%)	MSC n (%)	Hospital n (%)	Public n (%)	Private n (%)	Rural n (%)	Urban n (%)	n (%)
Administration of parenteral antibiotics	99 (50.3)	65 (33)	33 (16.8)	156 (79.2)*	41 (20.8) *	134 (68)	63 (32)	197 (98.5)
Parenteral administration of oxytocin	98 (51)	61 (31.8)	33 (17.2)	156 (81.3)*	36 (18.8)	133(69.3)	59 (30.7)	192 (96)*
Parenteral administration of anticonvulsants	102 (51)	65 (32.5)	33 (16.5)	158 (79)*	42 (21) *	134 (67)	66 (33)	200(100)
Assisted vaginal delivery	98 (51)	61 (31.8)	33 (17.2)	156 (81.3)*	36 (18.8)	133 (69.3)	59 (30.7)	192 (96)
Manual removal of placenta	98 (51.9)	58 (30.9)	33 (17.5)	156 (82.5)*	33 (17.5)	131(69.3)	58(30.7)*	189(94.5)*
Manual extraction of the product of conception	0 (0)	54 (62.8)	32 (37.2)	74(86)*	12 (14) *	35 (40.7)	51(59.3)*	86 (43)
Neonatal resuscitation	0 (0)	8 (20)	32 (80)	32 (80)*	8 (20) *	8 (20)	32 (80)*	40 (20)
Number of facilities offering services	102 (51)	65 (32.5)	33 (16.5)	158 (79)*	42 (21)	134 (67)	66 (33)	200

\*P<0,05. The availability of seven functions was based on whether the procedure had been performed at least once in the last 03 months.

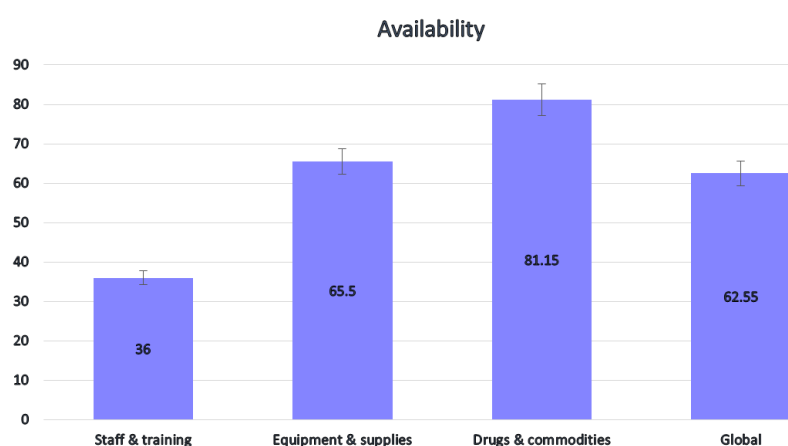
### 5.3. Facility Preparedness Score for Providing BEmONC Services

#### 5.3.1. Score of the Three Domains of Preparedness for Providing BEmONC Services

The Figure 1 below illustrates the preparedness score of healthcare facilities in the three specific domains, as well as the overall preparedness index for providing BEmONC services. Among these domains, only the one related to human resources and staff training had an average preparedness score lower than 50%, in accordance with the indicators defined by

the WHO guidance.

The overall preparedness score is 62.55, reflecting the general level of preparedness and providing an overall indication of performance. The standard deviation of 20.73 indicates a notable spread of scores around the average, indicating significant variability among health facilities. This variability suggests that some facilities have significantly higher or lower levels of preparedness than the average. It may reflect differences in access to resources, training, or other key factors related to preparedness. Such heterogeneity underscores the need to examine more closely the underlying causes of these differences. It also highlights areas where targeted interventions or improvement efforts may be particularly warranted.

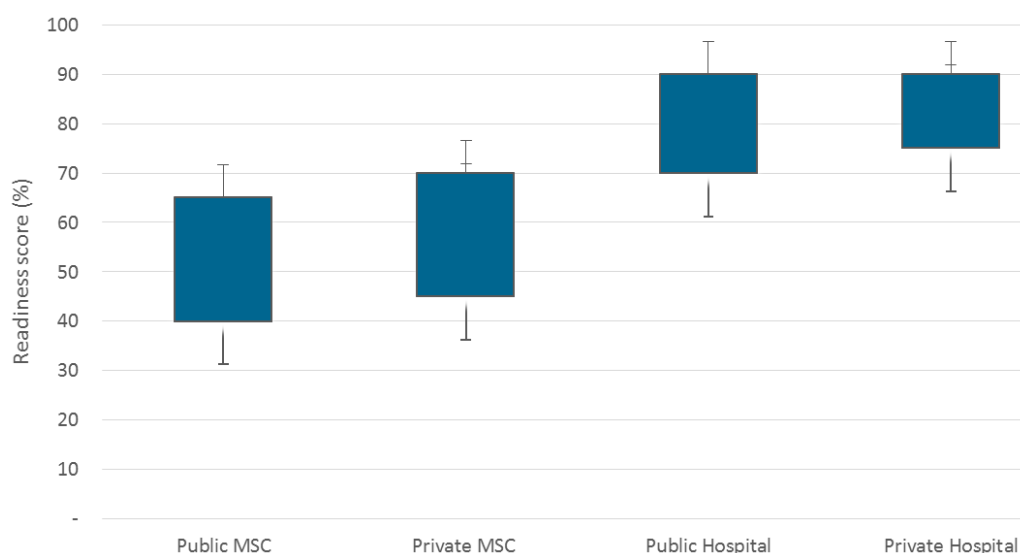


**Figure 1.** Percentage score of the three domains of preparedness for providing BEmONC services.

### 5.3.2. Overall Preparedness Score for Providing BEmONC

Additionally, the box plot highlights the variability in preparedness scores across different types of healthcare facilities. Public MSC show greater dispersion, indicating marked heterogeneity in their level of preparedness. In contrast, private

hospitals show more consistent scores, indicating a relatively uniform level of preparedness. Overall, private facilities tend to be better prepared than public facilities. Moreover, hospitals, whether public or private, generally appear to be better prepared than MSC as shown in Figure 2 below.



**Figure 2.** Overall preparedness score for providing BEmONC, by facility type and management authority.

## 5.4. Availability of Essential Resources for Delivery and Neonatal Care Services

### 5.4.1. Human Resources and Staff Training

Among the facilities included in the study, only 77 (38.5%) reported having at least one staff member who had received additional training in delivery and neonatal care. Furthermore, 67 (33.5%) of the facilities indicated that they had implemented the recommended guidelines for delivery and neonatal care.

### 5.4.2 Essential Equipment and Supplies

Overall, 189 (94.5%) facilities had at least one delivery bed. Additionally, 199 (99.5%) had sterile gloves, 192 (96%) had delivery kits, but only 38 (19%) were equipped with neonatal resuscitation bags and masks.

Regarding medical equipment, 86.5% of the facilities had sterilization equipment, while 78% had an examination light. However, specific equipment such as the vacuum suction device or the dilation and curettage kit was available in only 19% of the facilities, and the manual vacuum extractor in 17.5% of the cases. Less than a quarter of the facilities (19.5%) reported having an aspiration device.

### 5.4.3. Diagnostic Tools

154 (77%) facilities performed HIV screening. However, syphilis screening was only conducted in 98 (49%) of the facilities. Urinary tests for albuminuria and glucosuria were widely performed (189 facilities, or 94.5%), while Rh factor testing was only conducted in 89 (44.5%) facilities.

### 5.4.4. Availability of Basic Medicines and Products

Regarding essential obstetric medicines, injectable uterotonics were available in 96% of the facilities, skin disinfectants in 99.5%, and injectable diazepam in 98% of the cases. Furthermore, intravenous fluids and injectable antibiotics were accessible in 96% and 98% of the facilities, respectively. However, injectable magnesium sulfate, essential for the and eclampsia, was available in only 48% of the facilities. Regarding neonatal care medicines, 96% of the facilities reported having amoxicillin suspension, while 86% had injectable ceftriaxone. However, injectable gentamicin was available in only 85% of the facilities. Antibiotic eye ointment was widely accessible (97.5%), but 4% chlorhexidine, used for umbilical cord care, was only available in 48% of the facilities.

Finally, the availability of antiretrovirals (ARVs), both for the mother and for the newborn, was reported in 173 facilities (86.5%) (Table 3).

**Table 3.** Indicators of preparedness for providing BEmONC, service delivery evaluation.

Indicators	n (%)
Staff and training	
Availability of guidelines	77 (38.5)
Availability of trained personnel	67 (33.5)
Materials and supplies	
Emergency transport	45 (22.5)
Sterilization equipment	173 (86.5)
Examination lamp	154 (78)
Suction device	39 (19.5)
Manual vacuum	35 (17.5)
Vacuum suction or D&C kit	38 (19)
Neonatal bag and mask	38 (19)
Delivery bed	189 (94.5)
Partograph	173 (78)
Gloves	199 (99.5)
Tensiometer	200 (100)
Delivery kit	192 (96)
Stethoscope	183 (91.5)
Pinard stethoscope	192 (96)
Diagnostic support materials and equipment	
HIV screening tests	154 (77)
Syphilis screening tests	98 (49)
Albuminuria & glycosuria tests	189 (94.5)
Anemia screening (Rh & Grouping)	89 (44.5)
Drugs and commodities	
Essential medicines for delivery	
Injectable antibiotic	196 (98)
Uterotonics for injection	192 (96)
Injectable magnesium sulfate	96 (48)
Diazepam for injection	196 (98)
Liquides intraveineux	192 (96)
Skin disinfectant	199 (99.5)
ARV drugs for the mother	173 (86.5)
Essential drugs for newborns	
Antibiotic eye ointment	195 (97.5)
4% Chlorhexidine	96 (48)
Gentamicin for injection	170 (85)
Ceftriaxone injection	172 (86)

Indicators	n (%)
Amoxicillin suspension	192 (96)
ARV drugs for newborns	173 (86.5)

## 5.5. Analysis of Factors Associated with Facility Preparedness to Provide BEmONC Services

The table 4 below presents the adjusted multiple regression models for factors associated with preparedness to provide BEmONC services.

In the analysis, all explanatory variables showed a significant association with preparedness for BEmONC services ( $p < 0.05$ ). As a result, they were included in multiple regression models, selected based on objective criteria to assess their influence on the willingness of facilities to provide these services.

The results of the multiple regression analysis indicate that the type of facility, its location, 24-hour service availability, and maternal/neonatal death reviews influence the preparedness of facilities to provide BEmONC.

According to the type of facility, hospitals are 7.34 times more likely to be prepared to provide BEmONC services compared to dispensaries. Based on the location of the facility, urban facilities are about 2 times more likely to be prepared to offer BEmONC compared to rural facilities. Additionally, compared to facilities that do not offer 24-hour services, those with a 24-hour service schedule are about 12 times more likely to be prepared to provide BEmONC services. Facilities that conduct regular reviews of maternal and neonatal deaths are 4.5 times more likely to be prepared to offer BEmONC compared to those that do not.

The health facilities that review the clients feedback are 11.33 times more likely to be prepared to offer BEmONC services compared to those that do not.

The adjusted logistic regression model has a Nagelkerke pseudo- $R^2$  of 0.061. This indicates that only 6.1% of the observed variability in the ability of facilities to provide BEmONC services can be attributed to these variables.

This suggests that only 6.1% of the observed variability in the ability of facilities to provide BEmONC services can be attributed to these variables. Although some variables showed statistically significant associations with readiness, such as high odds ratios for hospitals or 24-hour services, their overall predictive and explanatory power remains limited.

**Table 4.** Results of adjusted multiple regression models for factors associated with preparedness to provide BEmONC, service delivery evaluation.

Variable	Adjusted coef	ES
Installation location (ref: rural)		

Variable	Adjusted coef	ES
Urban	1.78*	0.57
Type of facility (ref: dispensary)		
Medical-social center (MSC)	6.13	2.88
Hospital	7.34*	3.31
Managing authority (ref: public)		
Privée	3.20	0.93
24-hour service schedule (ref: no)		
Yes	11.73*	4.73
Review of maternal/neonatal deaths (ref: no)		
Yes	4.49*	2.20
Examining the opinions of clients (ref: no)		
Yes	11.33*	3.30
Number of employees per facility (continuous variable)	1.02	0.12
Number of delivery beds per facility (continuous variable)	2.01	0.45

\*p<0,05

Adjusted coefficient: each variable in the model has been adjusted by all the variables.

## 6. Discussion

### 6.1. Strengths and Limitations of the Study

This study relies on nationally representative data from Togo, a country with limited resources, to assess the availability and preparedness of healthcare facilities to provide BEmONC. Conducted in 2021, the survey included 200 healthcare facilities, selected based on the type of facility and management authority (public or private), and weighted to ensure national representativeness. The goal was to evaluate the availability of services and the operational capacity of healthcare infrastructures in 2021 to effectively meet emergency obstetric and neonatal care needs.

#### 6.1.1. Strengths of the Study

One of the main strengths of this research lies in the representativeness of the national sample, providing a detailed overview of the status of BEmONC services in Togo in a resource-limited context. These data are crucial for understanding the situation of healthcare facilities in a country where maternal and child mortality remains high. Additionally, the study employed complex sampling procedures, with

adjustments for cluster effects and non-response, ensuring greater robustness of the results [19].

This study makes a significant contribution to understanding the challenges related to the availability and preparedness of healthcare facilities for providing BEmONC in Togo. It highlights the strengths and weaknesses of the healthcare system while emphasizing the need for further monitoring to better evaluate the impact of implemented policies. Future research adopting a longitudinal approach and integrating qualitative analyses would refine these findings and effectively guide strategies to improve maternal and neonatal care.

#### 6.1.2. Limitations of the Study

However, this study has several limitations that should be noted.

The first limitation concerns the masking of regional disparities. Although the study offers an overview of the country's healthcare system, the methodology used may obscure certain regional inequalities, particularly based on regions, municipalities, and health districts. Previous research has shown that access to care varies significantly depending on available infrastructure and geographical context [20].

The second limitation is related to reporting and evaluation bias. The data collected rely on the self-reports of healthcare facilities, which exposes them to response biases. The score is based solely on self-reported data from facilities, which may overestimate their true level of preparedness in the absence of validation mechanisms such as direct observation or independent audits. Some facilities may overestimate their preparedness level or, conversely, minimize their difficulties due to institutional or administrative considerations [2]. Moreover, the focus on the availability of resources (personnel, equipment, medications) does not directly assess the quality of care, its actual accessibility, or its real impact on patient management [21].

The use of a 50% threshold and equal weighting across domains in the calculation of the composite score lacks sound empirical or clinical justification. This approach may mask critical gaps, particularly in important interventions such as neonatal resuscitation or the availability of magnesium sulfate. While these methodological choices may promote simplicity and reproducibility, they reduce the score's sensitivity to clinical severity and the specific context of care delivery.

Another limitation is the absence of temporal follow-up and the omission of contextual factors. The study relies on a cross-sectional analysis of the situation in 2021, without longitudinal follow-up. This limitation restricts the ability to identify trends or changes over time. Furthermore, certain contextual factors influencing the availability and quality of care, such as economic, health, or security crises, were not considered, even though these factors can have a lasting impact on healthcare systems in resource-limited countries like Togo [22, 23].

Moreover, interpreting observed associations, such as the presumed effects of antenatal screening or the availability of

24/7 services, as causal relationships may be misleading if potential confounders are not adequately accounted for.

Larger facilities, particularly hospitals, are more likely to provide continuous, functional services and generally have higher levels of overall preparedness. These facilities typically provide 24-hour coverage and are often integrated with specialized services, supported by a centralized intake system. This organizational model allows for the management of a wide range of cases, many of which may not be directly related to obstetric or neonatal emergencies, but may involve other acute or chronic conditions. As a result, this configuration may skew the interpretation of BEmONC readiness by overestimating the actual capacity of these facilities to respond to maternal and newborn health needs [24].

Facilities with strong management systems or highly qualified staff are generally more likely to implement audits of maternal and newborn deaths and to provide higher quality care. The effects observed in the statistical analyses may therefore be due to underlying organizational characteristics, such as the availability of specialized expertise (emergency physicians, obstetricians, gynecologists, surgeons, or neonatologists) that are typically only found in hospital settings. In addition, committed leadership and an institutional culture focused on continuous quality improvement may simultaneously promote patient feedback mechanisms and enhance service readiness—even in facilities that do not formally offer BEmONC services. Consequently, the observed associations between specific management practices and service preparedness may reflect a broader organizational climate that is conducive to high-quality care, rather than indicating a direct causal effect of these practices themselves [24, 25].

Finally, the absence of a direct link between service availability and health outcomes constitutes a limitation. Although the study provides essential information on the availability of BEmONC services, it does not establish a direct link between this availability and maternal and neonatal health outcomes. To better understand the impact of available infrastructure, it is crucial to incorporate morbidity and mortality indicators into the analysis [26].

### 6.1.3. Limitations of the Statistical Model

While certain variables, such as the type of facility and the availability of 24-hour services, are strongly associated with facility preparedness to provide BEmONC services, their overall explanatory power remains limited. The Nagelkerke pseudo  $R^2$ , estimated at 0.061, underscores the intricacy of the phenomenon under investigation. This suggests that important determinants of facility preparedness fall outside the scope of the current model [10, 27]. To enhance our understanding, it is crucial to adopt a more comprehensive approach that integrates structural, financial, and organizational dimensions. Key considerations should include the health workforce profile, governance structures, population density, quality of supervision, national health norms and standards, the foundational objectives of each health facility, the size and

characteristics of the population served, and the facility's organizational culture of continuous quality improvement [24, 25].

The absence of interaction terms represents a limitation of the model. The potential moderating effects of contextual factors, such as population density, governance, and organizational culture, were not examined, despite their potential to reveal important dynamics. For example, the impact of maternal and neonatal death audits may vary depending on the type of facility, and the effect of 24-hour service availability may differ based on the geographical location of the facility especially in a context where healthcare demand is closely tied to demographic and territorial characteristics [13]. Accounting for these interactions would allow for a better understanding of the specific configurations influencing BEmONC preparedness.

In addition to explanatory linear models, a complementary approach using typological or cluster analyses should be considered. Classifying facilities on the basis of structural characteristics, level of equipment, staff profiles, internal organization, and involvement in quality improvement processes would help to identify different facility profiles [21]. Such segmentation would be useful for designing targeted and differentiated interventions for example, rural facilities with limited resources could receive more intensive support than well equipped urban hospitals.

In summary, while the current model has highlighted key priority areas for action, its limited explanatory power calls for a broader, more robust and multidimensional analytical approach. Incorporating sensitivity analyses, classification models, and qualitative data would provide a more nuanced understanding of the realities on the ground and better inform public health policies aimed at improving maternal and newborn care [9].

## 6.2. Inadequate Preparedness of Healthcare Facilities to Provide BEmONC

The results of this study indicate that healthcare facilities in Togo are inadequately prepared to provide BEmONC. The insufficiency of qualified human resources and the lack of materials and equipment are major limiting factors, compromising the ability of these facilities to deliver quality care. These structural and organizational gaps hinder the establishment of effective services for childbirth, maternal, and neonatal health, thus limiting universal access to healthcare [13, 28].

In many low-income countries, previous studies have highlighted similar findings, emphasizing the impact of shortages of qualified personnel and material resources on the quality of obstetric care [26]. In Togo, this situation requires strategic interventions aimed at strengthening the capacity of healthcare facilities, particularly through staff training, infrastructure improvement, and the allocation of sufficient financial resources [16].

These results underscore the urgency of reforming emergency obstetric care in Togo and other low-income countries. Targeted measures, supported by effective public policies and sustained investments, are necessary to ensure equitable access to quality obstetric care and thus reduce maternal and neonatal morbidity and mortality [29, 30].

### 6.3. Disparities and Challenges in the Availability of BEmONC in Healthcare Facilities

The availability of the seven essential functions of BEmONC is a crucial lever in reducing maternal and neonatal mortality. This study identifies significant disparities in access to these functions based on the type of facility, the managing authority, and the geographical location of the healthcare infrastructure.

Although public facilities generally show a higher availability of the seven signal functions compared to private structures, only four functions parenteral administration of antibiotics, parenteral administration of anticonvulsants, manual removal of the placenta, and neonatal resuscitation are reported significantly more frequently in private establishments than in public ones. Additionally, hospitals demonstrate better availability of signal functions compared to lower-level establishments. These results are consistent with findings from a study conducted in Haiti [29], likely due to similar methodological approaches, relying on a nationally representative sample collected as part of the Demographic and Health Surveys (DHS).

Furthermore, our analysis shows that the availability of parenteral anticonvulsant administration, particularly magnesium sulfate, remains a major challenge hindering the effective provision of BEmONC services in Togo, particularly in public and lower-level facilities. This insufficiency, also observed in other low-resource contexts, has severe implications for the prevention and treatment of pre-eclampsia and eclampsia, the top three causes of maternal morbidity and mortality [2, 5, 31].

Moreover, the low availability of other essential interventions, such as manual removal of retained products of conception and neonatal resuscitation, highlights that despite increased coverage of prenatal care, hospital deliveries, and postnatal care, these advancements remain insufficient to significantly reduce maternal and infant mortality. Strengthening the availability and operability of BEmONC services is therefore a priority to enhance the effectiveness of maternal and perinatal health policies in Togo.

### 6.4. Disparities in the Availability of Medications and Healthcare Facility Readiness

The results showed that the availability of medications and essential products is considered very satisfactory. However,

this evaluation is based solely on the perceptions of respondents, without objective verification through logistics management tools for medications. Furthermore, this apparent availability hides significant disparities, particularly depending on the location of the healthcare facilities [4].

The preparedness of healthcare facilities is a crucial indicator of their commitment to ensuring the cumulative availability of the necessary resources for the provision of care. A detailed analysis reveals significant differences in preparedness for BEmONC services depending on the type of facility. Hospitals have a higher preparedness score compared to medical centers and dispensaries [32].

The suboptimal preparedness observed in lower-level facilities may result from a lack of clarity in the allocation formula for financial resources intended for these structures. This budgetary opacity contributes to deficiencies and inequalities in the distribution of medical supplies [33]. Therefore, it is imperative to strengthen the capacities of lower-level facilities, which are predominantly located in rural areas, in order to address the rising maternal and neonatal mortality rates. This observation supports the findings of a previous study conducted in Kenya, which highlighted the correlation between the availability of infrastructure and improvements in maternal and child health indicators [33].

### 6.5. Examination of Maternal and Neonatal Deaths: An Essential Tool for Improving BEmONC

Each maternal or neonatal death is a critical event that warrants in-depth analysis. The systematic review of these deaths is widely recognized as a fundamental tool for identifying failures in care delivery and improving the quality of obstetric and neonatal services [34]. Our results indicate that healthcare facilities (hospitals) that regularly conduct these reviews are significantly more likely to be better prepared to provide BEmONC than those that do not perform such analyses.

These facilities use the information derived from death reviews to optimize resource availability and enhance the quality of obstetric care [35]. Although the implementation of maternal death reviews has been established as a national policy aimed at improving the quality of BEmONC services [11], our findings show that the majority of healthcare facilities do not regularly conduct these evaluations. This gap represents a missed opportunity to learn from adverse events and make structural and functional improvements to obstetric and neonatal care [36].

The absence of systematic maternal and neonatal death reviews prevents the early identification of contributory factors and the targeted implementation of necessary corrective actions to improve care. Therefore, it is essential to strengthen the effective implementation of this policy by equipping healthcare facilities with the necessary technical and human resources to conduct these analyses in a rigorous and sys-

tematic manner. Increased commitment from health authorities and healthcare professionals is needed to ensure the effective integration of death reviews into strategies for improving maternal and neonatal care.

## 6.6. Client Opinions Review in Health Facilities: A Key Factor for Improving BEmONC

Evaluating the clients opinions is a crucial lever for assessing the availability and preparedness of healthcare facilities to provide specific services. Indeed, involving users in evaluating the quality of care not only measures their satisfaction but also gathers critical feedback that can guide necessary improvements [21]. The results of this study reveal that healthcare facilities that systematically incorporate patient opinions are significantly better prepared to provide BEmONC services compared to those that do not consider such feedback.

This finding can be explained by the fact that patient feedback not only expresses their level of satisfaction but also provides valuable insights into the strengths and weaknesses of the services offered [37]. Analyzing comments helps identify gaps in the organization of care, optimize resource allocation, and enhance the quality of medical services, thereby contributing to better availability and effectiveness of BEmONC services [38].

However, our analysis indicates that the collection and regular review of patient feedback remain underutilized in healthcare facilities, especially in the field of maternal and neonatal care. The absence of a structured feedback mechanism represents a missed opportunity to strengthen the alignment between the care provided and the users' expectations. Therefore, it is essential to promote the institutionalization of this approach by integrating satisfaction surveys and participatory mechanisms into continuous improvement strategies for obstetric and neonatal care.

## 6.7. Continuous Training and Healthcare Facility Preparedness for BEmONC Services

Continuous training is an essential tool for strengthening the competencies of healthcare providers, allowing them to acquire updated knowledge and improve the quality of care provided to mothers and newborns [9, 10]. However, the results of this study reveal an alarming proportion of healthcare facilities that do not have at least one qualified staff member to manage childbirth and neonatal care. This human resource deficit, combined with the persistent shortage of healthcare professionals reported in previous studies [28], significantly undermines the ability of facilities to provide BEmONC services in Togo.

Despite the government's efforts to address the shortage of healthcare personnel and other structural challenges within the health system, the budgets allocated to the sector con-

sistently fall short of the Abuja target of 15% of public spending [22]. This budget shortfall may explain the low level of preparedness of healthcare facilities to offer BEmONC services and, consequently, the still high maternal and neonatal mortality rates in the country.

## 7. Recommendations for Improving BEmONC in Healthcare Facilities in Togo

In summary, this study highlights significant disparities in the availability of the seven essential BEmONC functions and the willingness of healthcare facilities in Togo to provide BEmONC services. These disparities are compounded by gaps in the availability of essential elements such as continuous staff training, updated clinical guidelines, and other critical resources for providing these services.

To improve the quality of BEmONC services, government authorities can take targeted actions such as implementing quality assurance activities, establishing continuous care improvement mechanisms, and conducting regular maternal and neonatal death audits. To strengthen healthcare facilities' preparedness to provide these vital services, health system leaders should adopt strategies to ensure an equitable distribution of clinical guidelines, essential medicines, necessary equipment, and refresher training for staff.

Finally, further research is needed to assess the impact of public policies regarding BEmONC and ensure greater support for healthcare facilities. These studies would also help better understand the effectiveness of interventions implemented to address challenges related to BEmONC services in Togo [16, 26, 29].

## 8. Conclusion

The results of this study highlight the major challenges faced by healthcare facilities in Togo regarding the preparedness and availability of BEmONC. While progress has been made in some areas, the implementation of BEmONC remains insufficient due to multiple factors, including the shortage of qualified personnel, inadequate equipment, and gaps in the ongoing training of healthcare providers. These obstacles not only undermine the effectiveness of services but also limit access to essential care necessary to reduce maternal and neonatal mortality.

It is important to note that the situation in Togo is not unique, as similar studies conducted in other low-income countries have highlighted comparable issues. Therefore, strategic interventions are crucial to strengthen healthcare infrastructure, improve staff training, and ensure an equitable distribution of essential resources. In this regard, targeted public policies, supported by appropriate funding and structural reforms, are essential levers to ensure universal access to quality obstetric and neonatal care.

Furthermore, the systematic implementation of regular maternal and neonatal death audits, coupled with the improvement of feedback mechanisms, is a key measure to optimize BEmONC services and prevent avoidable loss of life. While some progress has been made, there is still considerable work to be done for BEmONC services to become truly accessible and effective, thus contributing to the reduction of maternal and neonatal mortality and the overall improvement of maternal and child health.

To ensure optimal preparedness of healthcare facilities, further research is needed to assess the implementation of existing policies and identify the levers that will ensure their success. This ongoing work is essential to meet the growing need for emergency obstetric and neonatal care, especially in resource-limited contexts.

## Abbreviations

ARV	Antiretroviral
BEmONC	Basic Emergency Obstetric and Newborn Care
DHS	Demographic and Health Survey
HHFA	Harmonized Health Facility Assessment
HIV	Human Immunodeficiency Virus
MSC	Medical-Social Center
PNDS	Plan National de Développement Sanitaire
SDG	Sustainable Development Goals
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization

## Authors Contributions

**Wankpaouyare Gmakouba:** Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

**Komi Ameko Azianu:** Conceptualization, Data curation, Formal Analysis, Methodology, Validation, Writing – review & editing

**Labaguibe Gangak:** Formal Analysis, Writing – review & editing

**Gountante Kombate:** Formal Analysis, Writing – review & editing

**Mazabalo Bini:** Formal Analysis, Methodology, Writing – review & editing

**Salaraga Bantakpa:** Formal Analysis, Writing – review & editing

Wankpaouyare Gmakouba and Komi Ameko Azianu ensured the design, the validity of the study, and the analysis of the data and the proofreading of the project. All authors were responsible for reviewing and editing the manuscript. All authors confirm they had full access to all data of the study and accept responsibility for the content of the manuscript.

They also accept responsibility for the decision to submit it for publication.

## Data Sharing

For our study, we used public data from the HHFA 2021 survey, available on request from the Ministry of Health and Public Hygiene of Togo.

## Conflicts of Interest

The authors declare no conflicts of interest.

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