

RESEARCH ARTICLE

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Availability of basic emergency care services in conflict-affected and resource-limited settings: A facility-based assessment of secondary health facilities in Borno state, Nigeria

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Abstract

Objective: Basic Emergency Care (BEC) services are critical for reducing preventable morbidity and mortality. However, there has been no prior empirical assessment that specifically evaluated BEC capacity in secondary facilities in Borno State. This study assesses the availability of BEC services in secondary healthcare facilities amid ongoing insurgencies.

Methods: A facility-based cross-sectional descriptive assessment was conducted in 20 secondary health facilities across Borno State using a multi-stage sampling technique. A validated researcher-constructed checklist assessed infrastructure, guidelines/protocols, medications/supplies, diagnostic services, consulting services, ancillary services, and human resources. Data were collected via Google Forms, verified through direct observations, and analysed using descriptive statistics in IBM SPSS version 27.

Results: Critical gaps were identified in human resources, with 55% of facilities having low nurse staffing and 65% low doctor staffing per shift. Only 15% of facilities provided 24-hour coverage. Diagnostic services were limited, with basic imaging available in only 20% of facilities. Ancillary services were fully available in only 28% of the hospitals assessed. However, consulting services (90.5%), medications (74%), and infrastructure (75%) were fully or partially available.

Conclusion: Persistent shortages in human resources, diagnostics, and ancillary services hinder effective BEC delivery in Borno State. Intentional and innovative investments in workforce recruitment and retention, diagnostic equipment, and ancillary support, alongside technology-driven solutions, are needed to strengthen emergency care in this conflict-affected region.

Keywords: Emergency Medical Services; Resource-Limited Settings; Health Facilities; Basic Emergency Care; Nigeria

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Plain English Summary

Basic emergency care is the first and timely treatment people get when they are very sick or injured, which usually saves lives. In Borno State, Nigeria, many hospitals have been destroyed or damaged by the conflict caused by the Boko haram, which affects getting this type of care in secondary health facilities. We assessed the capacity of 20 secondary-level hospitals in Borno state to provide basic emergency care services. We found that most hospitals did not have enough health workers. Very few had doctors and nurses available all day and night. Only a small number could treat patients around the clock. Basic tests and scans like X-rays were missing in most places, and important support services such as cleaners, security, and patient transport were also limited. On the positive side, most hospitals had doctors for different types of care, many had essential medicines, and about three-quarters had basic facilities like beds, water, and electricity. In summary, hospitals in Borno are trying to provide emergency care, but the shortage of staff, tests, and support services remains a challenge. More support and investment are needed to improve basic emergency care to save lives.

Background

Globally, healthcare systems rely heavily on emergency care to reduce preventable deaths and disability (1). Emergency care services are responsible for the prompt assessment, stabilisation, and treatment of patients in critical conditions, including trauma, severe infections, and cardiovascular incidents. These swift and effective interventions significantly reduce morbidity and mortality, particularly in low-resource environments where access to advanced medical care is limited (2, 3).

The importance of emergency care has become even more evident in the context of global health emergencies, including pandemics, natural disasters, and armed conflicts (4). However, access to effective basic emergency care remains a significant challenge worldwide, especially in low- and middle-income countries (LMICs), where health systems are often under-resourced (5). Research indicates that many healthcare facilities in low- and middle-income countries (LMICs) lack the necessary infrastructure to deliver essential emergency services (6). In conflict-affected regions, these challenges are further compounded by violence and insecurity. Armed conflict often destroys health infrastructure, increases casualties, and causes a substantial decline in the capacity of health systems to respond effectively (7, 8).

This is the reality in Borno State, in northeastern Nigeria, where the armed opposition group Boko Haram has severely disrupted the healthcare system. Approximately 40% of health facilities have been destroyed, and of the remaining 60%, only 33% are fully operational. Additionally, around 48 healthcare workers have been killed, and more than 250 have been injured (9). A rapid assessment conducted in 2016 revealed that the capacity of health facilities in Borno State to meet minimum care standards was significantly compromised. These facilities struggled to meet the growing

demand for emergency medical services, including care for bomb blasts and gunshot victims (10). Other reported issues included acute shortages of essential supplies and equipment, poor infrastructure, limited laboratory capacity, and inadequate medical referral systems. Moreover, 19% of facilities were inaccessible, and 15% lacked scheduled clinical staff (10). Further assessment in 2019, as reported in the Health Resources and Services Availability Monitoring System (HeRAMS), revealed that only 75% of the secondary hospitals were fully functional, 14% were non-functional, and 6% were severely damaged. Insecurity, workforce shortages, and a lack of medical supplies were the primary challenges. Although 79% had capacity for primary injury care and essential laboratory services, only 66% offered trauma and surgical care, 21% had a blood bank, 85% had referral capacity, and just 35% had access to ambulance services (11). There was a further decline in the 2023 HeRAMS assessment, as fully functioning secondary facilities decreased from 75% to 65%, while the number of non-functioning facilities increased from 14% to 25% (12). This could be attributed to the resurgence of attacks on communities and health facilities within the state. This HeRAMS assessment was a comprehensive evaluation that focused on the entire hospital's capabilities, rather than just the availability of basic emergency care services, particularly in the emergency unit. Moreover, in assessing the human resources, the HeRAMS only assessed the number of staff in the hospitals without specifying it for the emergency unit, nor accounting for the number of healthcare workers assigned to the emergency unit, nor the 24-hour coverage of the emergency unit. Moreover, to the author's best knowledge, despite the ongoing protracted insurgency in the state for the past 15 years, there has been a lack of comprehensive assessments of the basic emergency care capacity in secondary health

facilities, specifically in the emergency units. Furthermore, anecdotal evidence suggests that many secondary hospitals continue to operate with limited capacity to provide basic emergency care services. Therefore, this study aimed to fill such a gap by conducting a comprehensive evaluation of the availability of basic emergency care services in secondary health facilities in Borno State. It focuses on the availability of infrastructure, guidelines/protocols, medication and supplies, diagnostic services, consulting, ancillary services, and human resources (including the number of personnel per shift and 24-hour coverage of the emergency unit by trained professionals) within the emergency unit. With a dearth of secondary healthcare facilities to provide BEC in the emergency unit, this study provides new insights into the current state of emergency care services in secondary hospitals. This will inform policymakers, health authorities, and humanitarian actors on current needs and guide resource allocation, facility upgrades, and workforce planning to strengthen the health system.

Materials and Methods

Study design

A facility-based cross-sectional descriptive design was employed to evaluate the availability of basic emergency care resources across 20 selected secondary health facilities in Borno state. Data was collected to provide a comprehensive snapshot of the assessed hospitals.

Study Area and Setting

The study was conducted in Borno state, located in northeastern Nigeria, which is one of the largest states in the country, bordered by the Republic of Chad to the north and Cameroon to the east. The population is predominantly composed of various ethnic groups, including the Kanuri, Babur, and Shuwa Arabs (13). The state comprises twenty-seven (27) Local Government Areas, grouped into

three Senatorial Districts: 8 LGAs in Borno Central, 9 LGAs in the southern Senatorial District, and 10 LGAs in the northern Senatorial District (13). This study was conducted in secondary healthcare facilities in Borno State. There are 60 secondary healthcare facilities in Borno State, comprising 40 public and 20 private facilities (Borno State Ministry of Health and Human Services, 2024). According to the 2023 HeRAMS report, only 41 of the secondary health facilities in Borno State were fully functioning (12). The healthcare system in Borno State has faced significant challenges, particularly in recent years, due to the impact of insurgency and conflict. The ongoing violence, primarily attributed to the activities of extremist groups, has resulted in widespread displacement of populations, destruction of healthcare facilities, and disruption of essential services. Many healthcare workers have fled the region, exacerbating the already strained health system and limiting access to emergency care services for the affected populations (14).

Sample and Sampling Technique

1. A multi-stage sampling technique was adopted for the study. The hospitals were selected using a three-stage multistage sampling technique.

Cluster Sampling: In the first stage, Borno State was divided into 3 clusters corresponding to the 3 senatorial districts (North, Central, and South).

2. Random Selection: In the second stage, 5 local governments were selected from each cluster using a simple random sampling by balloting. The list is presented in Table 1.

3. Random Sampling: In the third stage, a random sampling technique was used to select one secondary facility from each of the selected LGAs, ensuring accessibility in terms of security (15). To create balance between private and public hospitals, 5 private hospitals were randomly selected to make 20 health facilities.

Table 1: List of Selected Secondary Health Facilities in Borno State by Senatorial District and Ownership.

Senatorial district	LGAs selected	Public Hospital	Private hospital
Northern senatorial district	Mobbar	General Hospital Damasak	Alpine Hospital
	Nganzai	General Hospital Gajiram	Kanem Hospital
	Monguno	General Hospital Monguno	Foundation Hospital
	Magumeri	General Hospital Magumeri	Nakowa Clinic
Southern senatorial district	Biu	Biu General Hospital	
	Askira Uba	General Hospital Askira	
	Chibok	General Hospital Chibok	
	Gwoza	General Hospital Gwoza	
Central senatorial district	Ngala	General Hospital Ngala	

Maiduguri Metropolitan City
Bama

State Specialist Hospital
General Hospital Bama

Source: Field Survey, 2025

Study Instrument

Data were collected using a researcher-developed, structured assessment checklist designed to assess the availability of BEC services in secondary health facilities. The assessment tool was examined by 3 experts in the field to ensure its face and content validity. The Content Validity Index (CVI) was calculated at 0.92, indicating excellent content validity. The assessment tool was further pretested in 3 secondary health facilities to assess its clarity, completeness, and consistency. After the pilot study, items were modified accordingly. The assessment tool was structured to evaluate seven key domains of BEC:

Infrastructure

Including the presence of intensive care units (ICUs), operating theatres, triage and resuscitation areas, waiting areas, electricity, clean running water, communication systems, ambulances, and systems for stocking and dispensing medications.

Guidelines and Protocols

Covering systematic triage protocols, clinical management protocols, condition-specific protocols, admission and discharge protocols, patient transfer protocols, communication protocols, safety and infection prevention and control (IPC) protocols, and surveillance systems linked to public health reporting.

Medications and Supplies

Assessing the availability of emergency medications, airway management equipment, automated external defibrillators (AEDs), intravenous fluids and infusion pumps, oxygen cylinders or concentrators, nebulisers, suction machines, personal protective equipment (PPE), and trauma care tools.

Diagnostic Services

Including laboratory-based testing, point-of-care testing, and diagnostic imaging services such as ultrasound and X-ray.

Consulting Services

Including the availability of surgical, obstetric and gynaecological, orthopaedic, anaesthesia, and psychiatric services within the emergency unit.

Ancillary Services

Assessing the availability of support services such as patient transport personnel (wheelchairs or gurneys), security personnel assigned to the emergency unit, social work services, and cleaning or sanitation support.

Human Resources

Assessing the number and type of trained staff (nurses, doctors, and other healthcare workers such as Community Health Extension Workers [CHEWs]) physically present in the emergency unit per shift, as well as the level of coverage provided across different hours of the day. Each item from infrastructure to ancillary services on the checklist was scored as "Not Available" (0), "Partially Available" (1), or "Always Available" (2).

For staffing levels, categorisation was based on predefined thresholds: Nurses and other healthcare workers (HCWs): Low (0-2), Moderate (3-5), High (6-10) per shift. Doctors: Low (0-1), Moderate (2-3), High (4-10) per shift.

Coverage hours were similarly categorised as limited (<12 hours/day), full coverage with gaps (12–23 hours/day), or continuous coverage (24 hours/day).

Data collection procedure

The checklist was digitised using Google Forms to allow for streamlined, real-time data entry and management. Before data collection, a two-day training session was conducted for research assistants with clinical backgrounds (e.g., nurses and health officers). The training covered the study objectives, ethical considerations, proper interpretation of checklist items, and standardised procedures for engaging facility staff to minimise observer and reporting bias.

Data collection was conducted from April 4, 2025, to April 23, 2025. At each facility, the head of the hospital or the officer in charge of the emergency unit collaborated with the research assistants to complete the checklist. Direct observations were performed to verify responses wherever possible, especially for infrastructure, equipment, and medication availability. Ambiguous responses were clarified immediately during the visit.

During the facility visits, observer bias was minimised by training data collectors to use the validated assessment tool and by verifying findings through direct observation and cross-checking with available records. To reduce social desirability bias,

participants were assured of confidentiality and informed that the assessment was solely for research and service improvement purposes. Data collectors also prioritised direct observation of equipment and services over self-reported information from staff.

Data submissions were automatically synchronised via Google Forms into a secure, password-protected spreadsheet accessible only to the core research team. Daily reviews of the entries were conducted by the principal investigator to ensure data accuracy and completeness, with any inconsistencies verified through follow-up phone calls with the facility focal persons.

Data analysis

Data collected through Google Forms was exported into Microsoft Excel. It was further cleaned, transformed, and then imported into IBM SPSS Statistics version 27 for analysis. Descriptive statistics, including frequencies and percentages,

were used to summarise the availability of BEC services across domains such as infrastructure, medications and supplies, guidelines/protocols, diagnostics, consulting, ancillary services, and human resources. Results were presented in tables and figures.

Results

A total of 20 secondary health facilities were assessed for the availability of basic emergency care services across various domains in Borno State, Nigeria. The results are presented in tables in frequency and percentages. Table 2 shows that the facilities were distributed across Central Borno (40%), Northern Borno (35%), and Southern Borno (25%). The majority were public (75%), with the remainder private (25%). The majority were from MMC (30%), followed by Hawul LGA (10%), while the remaining LGA each contributed 5% of the sample.

Table 2: Demography of Hospitals. n=20

Characteristic	F (%)
Ownership	
Public	15 (75.0)
Private	5 (25.0)
Senatorial District	
Central Borno	8 (40.0)
Northern Borno	7 (35.0)
Southern Borno	5 (25.0)
Local Government	
Askira Uba	1(5.0)
Biu	1(5.0)
Chibok	1(5.0)
Gubio	1(5.0)
Gwoza	1(5.0)
Hawul	2(10.0)
Jere	1(5.0)
Kwaya kusar	1(5.0)
Magumeri	1(5.0)
MMC	6(30.0)
Mobbar	1(5.0)
Monguno	1(5.0)
Ngala	1(5.0)
Nganzai	1(5.0)

Source: Field Survey 2025.

Table 3 presents critical gaps in emergency unit infrastructure across the assessed secondary health facilities. Most facilities lacked a functional intensive care unit, as it was available only in 10%, partially available in 25%, and not available in 65%. Additionally, half did not have an electronic or paper-based emergency unit chart (50%). Isolation

rooms were either partially available or absent in 70% of the facilities, and a dedicated communication line was similarly deficient, being partially available (45%) or absent in 40% of the facilities. Electricity was consistently available in 45% of the facilities, partially available in another 45%, and completely unavailable in 10% of the

facilities assessed. Conversely, some essential infrastructures were relatively more available, including patient beds (55%), a designated waiting

area (70%), clean running water (70%), and ambulances for patient transport (55%).

Table 3: Availability of Key Infrastructure Components in Emergency Units, n=20

Item	Always Available F (%)	Partially Available F (%)	Not Available F (%)
Bed space dedicated to emergency cases	11 (55.0)	7 (35.0)	2 (10.0)
Functioning unit (ICU) for continuous monitoring and mechanical ventilation	2 (10.0)	5 (25.0)	13 (65.0)
Functioning operating theatre 24/7	10 (50.0)	4 (20.0)	6 (30.0)
Designated triage area	12 (60.0)	6 (30.0)	2 (10.0)
Designated resuscitation area	9 (45.0)	8 (40.0)	3 (15.0)
Designated waiting area	14 (70.0)	5 (25.0)	1 (5.0)
Constant Electricity supply	9 (45.0)	9 (45.0)	2 (10.0)
Electronic/paper-based emergency unit chart	4 (20.0)	6 (30.0)	10 (50.0)
Clean running water	14 (70.0)	5 (25.0)	1 (5.0)
Isolation room for infectious diseases	6 (30.0)	7 (35.0)	7 (35.0)
Dedicated mechanism (radio/telephone) for communicating with other facilities	3 (15.0)	9 (45.0)	8 (40.0)
Available Ambulance for patient transport to other facilities	11 (55.0)	1 (5.0)	8 (40.0)
System for stocking, managing, and dispensing medication in the emergency unit	9 (45.0)	9 (45.0)	2 (10.0)

Source: Field Survey, 2025

Availability of guidelines and protocols is presented in Table 4. Systematic surveillance guidelines were always available in 55% of facilities, while admission/discharge protocols were always available in 50%. Triage protocols were always

available in 40%, with partial availability in 35%. Clinical management and communication protocols showed lower full availability (30% each). Partial availability predominated in safety protocols (50%).

Table 4: Availability of Guidelines and Protocols in Emergency Units (n=20)

Item	Always Available F (%)	Partially Available F (%)	Not Available F (%)
Protocol for systematic triage that ensures patients are seen in order of priority	8 (40.0)	7 (35.0)	5 (25.0)
Clinical management protocol	6 (30.0)	9 (45.0)	5 (25.0)
Condition-specific management protocol	7 (35.0)	7 (35.0)	6 (30.0)
Admission/discharge protocol	10 (50.0)	4 (20.0)	6 (30.0)
Patient transfer protocol	9 (45.0)	6 (30.0)	5 (25.0)
Clear protocol for communicating with other facilities	6 (30.0)	7 (35.0)	7 (35.0)
Safety protocol, e.g., infection prevention & control protocol	6 (30.0)	10 (50.0)	4 (20.0)
Systematic surveillance guidelines with links to public health officials for case definition and reporting	11 (55.0)	5 (25.0)	4 (20.0)

Source: Field Survey, 2025

Table 5 indicates that electronic cardiac monitoring machines (65%) and automated external defibrillators (AEDs) (65%) were unavailable in most hospitals. In contrast, essential equipment such as a stock of emergency medications (55%),

oxygen cylinders or concentrators (65%), and suction machines were consistently available in most facilities (60%). However, nebulisers were either partially available or completely absent in 60% of the hospitals.

Table 5: Availability of Medications and Supplies in Emergency Units (n=20)

Item	Always Available n (%)	Partially Available n (%)	Not Available n (%)
Electronic cardiac monitoring machine	2 (10.0)	5 (25.0)	13 (65.0)
Stock of emergency medication	11 (55.0)	8 (40.0)	1 (5.0)
Essential airway management equipment	8 (40.0)	9 (45.0)	3 (15.0)
Functioning Automated external defibrillators (AED)	2 (10.0)	5 (25.0)	13 (65.0)
Intravenous fluids and infusion pumps	10 (50.0)	8 (40.0)	2 (10.0)
Oxygen cylinder/Oxygen concentrator	13 (65.0)	4 (20.0)	3 (15.0)
Nebulizer	8 (40.0)	3 (15.0)	9 (45.0)
Suction machine	12 (60.0)	6 (30.0)	2 (10.0)
Sufficient personal and protective equipment	10 (50.0)	9 (45.0)	1 (5.0)
Basic trauma equipment	6 (30.0)	9 (45.0)	5 (25.0)

Source: Field Survey, 2025

Table 6 shows that Laboratory-based testing was always available in only 35% of facilities, partially available in 45%, and entirely unavailable in 20%. Similarly, point-of-care testing was always available in 35% of the facilities, partially available

in 30%, and unavailable in another 35%. Diagnostic imaging services were the least accessible, with only 20% of facilities reporting consistent availability, 50% indicating partial availability, and 30% having no access at all.

Table 6: Availability of Diagnostic Services in Emergency Units (n=20)

Item	Always Available n (%)	Partially Available n (%)	Not Available n (%)
Laboratory-based testing	7 (35.0)	9 (45.0)	4 (20.0)
Point of care testing	7 (35.0)	6 (30.0)	7 (35.0)
Diagnostic Imaging	4 (20.0)	10 (50.0)	6 (30.0)

Source: Field Survey, 2025

Table 7 shows that surgical services were available in 55% of the facilities but absent in 25%. Medical services were consistently available in 85% of the facilities, partially available in 15% and none of the hospitals lacked medical services. Obstetric and

gynaecological services were present in 70% of the facilities and absent in 10%, while pediatric services were always available in 65%, partially available in 30% and absent in only 5% of the facilities.

Table 7: Availability of Consulting Services in Emergency Units (n=20)

Item	Always Available n (%)	Partially Available n (%)	Not Available n (%)
Surgical services	11 (55.0)	4 (20.0)	5 (25.0)
Medical services	17 (85.0)	3 (15.0)	0 (0.0)
Obstetrics & Gynaecology Services	14 (70.0)	4 (20.0)	2 (10.0)
Paediatric Services	13 (65.0)	6 (30.0)	1 (5.0)

Source: 2025

Table 8 shows that ancillary services were somewhat inconsistent in terms of availability across the hospitals assessed. Cleaners were the category that was most available, with 45% availability, partially available at 40%, and not available at 15%. This was followed by patient

transport services, which were always available in 35%, partially available in 45% and not available in 20% of the hospitals. However, social work services and porters were always available at only 15% each, with security personnel at 30%.

Table 8: Availability of Ancillary Services in Emergency Units (n=20)

Item	Always Available n (%)	Partially Available n (%)	Not Available n (%)
Patient transport services (personnel with wheelchairs and/or gurneys)	7 (35.0)	9 (45.0)	4 (20.0)
Security personnel attached to the emergency unit	6 (30.0)	4 (20.0)	10 (50.0)
Social work services	3 (15.0)	8 (40.0)	9 (45.0)
Porters attached to the emergency unit	3 (15.0)	7 (35.0)	10 (50.0)
Cleaners attached to the emergency unit	9 (45.0)	8 (40.0)	3 (15.0)

Source: Field Survey, 2025

Table 9 shows that more than half of the facilities (55%) had a low number of trained nurses per shift, while 35% reported moderate staffing levels, and only 10% had a high number of trained nurses. Similarly, the number of trained doctors per shift was low in 65% of the facilities and moderate in the

remaining 35%, with no facility meeting a high staffing threshold. Among other healthcare providers, such as Community health workers or Community health officers, staffing levels were low in 55% of facilities, moderate in 25%, and high in only 20%.

Table 9: Number of Trained Staff Per Shift in Emergency Units (n=20)

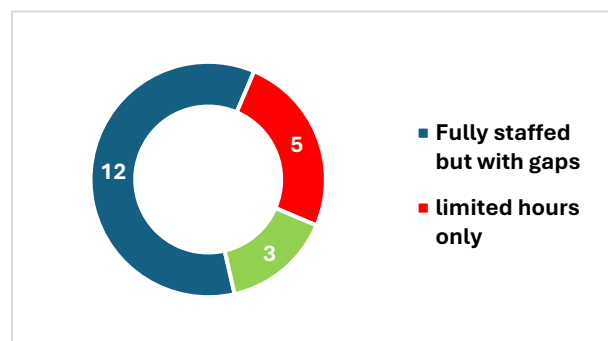
Staff Type	Low n (%)	Moderate n (%)	High n (%)
Nurses	11 (55.0)	7 (35.0)	2 (10.0)
Doctors	13 (65.0)	7 (35.0)	0 (0.0)
Other Healthcare Workers ¹	11 (55.0)	5 (25.0)	4 (20.0)

Source: Field Survey, 2025

Note: Staffing levels were categorised as follows: Nurses and other healthcare workers (HCWs), Low (0-2), Moderate (3-5), High (6-10) per shift; Doctors, Low (0-1), Moderate (2-3), High (4-10) per shift. ¹HCWs = Healthcare workers such as Community Health Extension Workers (CHEWs), community health officers, or emergency support staff

Figure 1 below illustrates that while 60% of the hospitals provided full staffing coverage (12 to 23 hours per day), these facilities still experienced notable gaps in coverage. Additionally, 25% of the

hospitals were staffed for only limited hours (<12 hours per day), and just 15% maintained continuous 24-hour coverage in their emergency units.

**Figure 1: Hospital Staffing 24hrs**

Source: Field Survey, 2025

Figure 2 illustrates the overall average level of Basic Emergency Care (BEC) service availability across secondary health facilities in Borno State. Critical gaps were observed in human resources, ancillary services, and diagnostic capacities, which were largely only partially available or, in some

facilities, entirely unavailable. In contrast, core services such as consulting, availability of medications and medical supplies, adherence to guidelines and protocols, and key infrastructural components were consistently available in the majority of facilities.

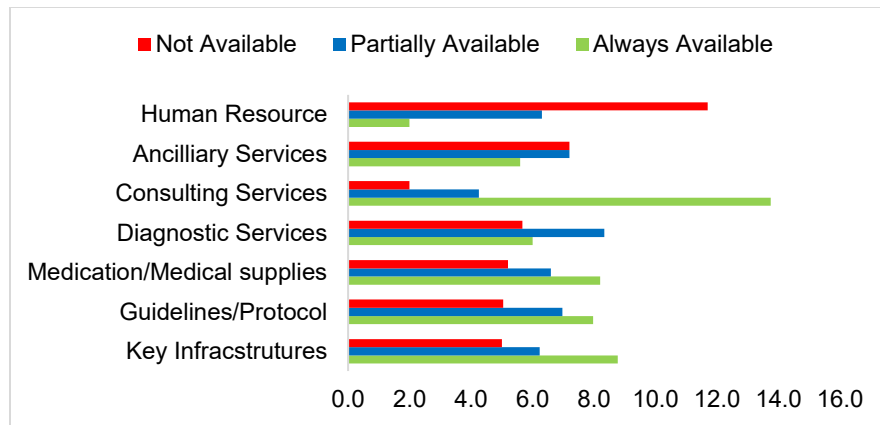


Figure 2: Overall Availability of BEC Services across all the assessed domains. n=20
Source: Field Survey, 2025

Discussion

This study assessed the availability of Basic Emergency Care (BEC) services, including infrastructure, guidelines and protocols, medications and supplies, diagnostic services, consulting, ancillary services, and human resources within the emergency units of secondary health facilities in Borno State. The findings revealed critical gaps in human resources, ancillary services, and diagnostic capacities, which were largely only partially available or, in some facilities, entirely unavailable. In contrast, consulting services, essential medications and supplies, adherence to guidelines and protocols, and key infrastructures were consistently available in most facilities.

The most prominent gap was in human resources. Staffing levels among nurses, doctors, and other healthcare workers (CHEWs) were critically low per shift in the emergency unit. Most of the facilities assessed had fewer than two nurses or CHEWs per shift and fewer than one doctor per shift, indicating a significant shortfall in personnel needed for effective emergency care delivery (15). This aligns with previous studies reporting an estimated ratio of one healthcare worker per 1,000 population in Borno, which is far below the WHO Sustainable Development Goal (SDG) threshold of 4.45 per 1,000 (11, 16). This shortage is largely driven by the ongoing insurgency, which has forced many healthcare workers to flee and discouraged others from accepting postings due to the risk of abduction, attacks, or death (14).

The coverage of 24-hour emergency services in the emergency unit was also limited, with only 15% of facilities operating round-the-clock. This gap is likely linked to the shortage of healthcare personnel and the security situation, as many insurgent

attacks occur during nighttime hours. This calls for strategic reforms to attract and retain skilled health workers. These include the provision of secure housing with security devices and the constant update of the security situation in the area, as well as safe transportation, such as helicopter support or a military escort for high-risk areas to prevent attacks on the road during movement. Moreover, competitive remuneration, life insurance policies, and risk-based incentives comparable to or exceeding those offered by international NGOs could also help attract and retain healthcare workers within the region.

Another critical gap was the limited overall availability of basic diagnostic services, such as laboratory-based testing, point-of-care testing, and basic diagnostic Imaging, which were either partially available or completely unavailable in most facilities. This contrasts sharply with the 2019 HeRAMS assessment, which reported that basic laboratory services were consistently available in 84% of hospitals, compared to the 35% found in this study. Additionally, the current study found that basic imaging services were available in only 20% of secondary health facilities, representing a decline from 32% in the previous 2019 report on secondary health facilities (11). This decline significantly affects the timely and accurate diagnosis of emergency conditions, increasing the risk of delayed interventions, misdiagnoses, and poorer patient outcomes in emergency settings. Investments in modern diagnostic equipment, as well as improved medical supply chain systems that leverage technology such as drones and Artificial Intelligence (AI), are urgently required to bridge this gap.

In addition to human resource and diagnostic gaps, the study revealed a lack of key ancillary services,

including dedicated security personnel, social work support, and porters in most assessed hospitals. While cleaning and basic transport services, such as wheelchairs, were relatively more available, they remained insufficient to meet operational needs. The importance of ancillary services cannot be overstated. The presence of security personnel, for instance, is critical to safeguarding both patients and healthcare workers, a key component of quality and safe healthcare delivery (17). The absence of these services not only disrupts workflow and service delivery but also compromises infection prevention and control (IPC) practices, thereby affecting the overall quality of care. Targeted investments are urgently needed to strengthen ancillary services, integrate social workers and porters into emergency teams, and enhance security support, particularly in conflict-affected areas.

Despite these critical shortages, the study identified strengths in four domains: consulting services, medications and medical supplies, guidelines and protocols, and infrastructure. Most facilities consistently maintained adequate bed spaces, operating theatres, triage areas, resuscitation rooms, waiting areas, clean running water, electricity supply, communication mechanisms, ambulances, and medication management systems. These findings align with the 2019 HeRAMS report, which documented similar availability in approximately 86% of hospitals, reflecting government efforts in strengthening emergency care capacity (11). However, notable gaps remain in the availability of intensive care units (10%) and isolation rooms (30%) of the assessed hospitals. The availability of ICU has declined from 20% in the 2019 HeRAMS assessment, while isolation room availability showed a marginal increase from 26% to 30%. These trends highlight the need for upgrading critical care infrastructure to improve the management of severe and highly infectious conditions.

The guidelines/protocols domain revealed mixed findings. While protocols for triage, condition-specific management, admissions and discharges, patient transfers, and surveillance were consistently available, clinical management, communication, and IPC protocols were present in only 30% of facilities. This represents a significant decline in IPC guideline availability, from 84% reported in 2019 to the current level (30%) (11). This decline poses a significant threat to quality and safety standards, particularly in emergency settings that are prone to overcrowding and high patient turnover. To address this, the government

should establish strong IPC implementation teams, including hospital representatives and community stakeholders, and invest in IPC infrastructure such as handwashing stations and a consistent supply of personal protective equipment.

The medications and supplies domain showed encouraging results as emergency medications, airway management equipment, infusion pumps, supplemental oxygen, suction machines, PPEs, and trauma care tools were always available in most hospitals. However, critical emergency equipment such as electronic cardiac monitoring machines, AEDs, and nebulisers was largely absent, limiting the capacity to manage cardiac events and respiratory emergencies effectively.

Finally, consulting services, including surgical, medical, obstetric/gynaecological, and paediatric care, were available in most hospitals, aligning with findings from previous 2019 HeRAMS assessments that reported surgical services in approximately 70% of secondary health facilities (11). Notably, the delivery of these services cannot be adequate without adequate manpower and basic diagnostic services. These strengths provide a foundation for strengthening BEC delivery but also highlight the urgent need to integrate these services with improved human resource capacity and diagnostic support.

While the study assessed the presence and functionality of diagnostic equipment, it did not evaluate utilisation rates, turnaround times, or diagnostic accuracy, which could provide a more comprehensive understanding of service capacity. Furthermore, the study focused on the availability of resources rather than patient outcomes such as morbidity, mortality, or satisfaction, which are essential for a holistic evaluation of emergency care performance. Therefore, it is recommended that future studies focus on more detailed aspects of the domains, such as the current stage, turnaround times, and accuracy of equipment, as well as the standards of facilities and quality of services. More so, further studies should focus on patient outcomes like cure rate and mortality rate from emergency units. Other studies could focus on patient satisfaction with services rendered in the emergency unit.

Conclusion

This study highlights critical gaps in the provision of Basic Emergency Care services across secondary health facilities in Borno State, particularly in human resources, diagnostic capacity, and ancillary support services. Persistent shortages of trained personnel, especially doctors and nurses, combined with limited diagnostic tools

and inadequate ancillary support, significantly hinder the provision of timely, effective, and quality emergency care. While strengths were observed in the availability of essential medications, infrastructure, and consulting services, these are insufficient to guarantee quality care in a conflict-affected, resource-constrained setting. Addressing these gaps requires targeted investments in workforce recruitment and retention, including ensuring staff safety and providing additional incentives. This also involves infrastructure upgrades, improvements to diagnostic and ancillary services, and leveraging technology such as telemedicine for specialist support, digital health platforms for real-time data management, and mobile diagnostic solutions to enhance service delivery and coordination. Strengthened policies, innovative funding models, and partnerships are essential to build a more resilient, technology-enabled emergency care system capable of meeting both routine and crisis-driven health needs.

List of Abbreviations

BEC: Basic Emergency Care
SPSS: Statistical Package for the Social Sciences
LMICs: Low and Middle-Income Countries
HeRAMS: Health Resources and Services Availability Monitoring System
LGAs: Local Government Areas
CVI: Content Validity Index
ICUs: Intensive Care Units
IPC: Infection Prevention and Control
AEDs: Automated External Defibrillators
PPE: Personal Protective Equipment
CHEWs: Community Health Extension Workers
HCWs: Healthcare Workers
SDG: Sustainable Development Goal
AI: Artificial Intelligence

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Borno State Health Research Ethics Committee (Approval No: 036/2025). In addition, administrative permission was secured from the management of all participating secondary hospitals before the commencement of data collection.

Consent for publication

Consent for publication was obtained from the Borno State Ministry of Health Research Ethics Committee, which approved the dissemination of findings arising from this study.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to institutional restrictions from the Borno State Ministry of Health, but are available from the corresponding author on reasonable request and with permission from the Ministry.

Competing Interest

The authors declare that they have no financial or non-financial competing interests to disclose.

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Author contributions

AAZ and HJJ: Conceptualisation, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualisation, Writing – original draft, Writing – review and editing.

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IA: Conceptualisation, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review and editing.

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