



Review article

Out of hospital emergency care in Nigeria: A narrative review

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ABSTRACT

Introduction: Out of Hospital Emergency Care (OHEC) in Nigeria, the most populous country with the highest GDP in Africa, is considered inadequate. A better understanding of the current state of OHEC is essential to address the country's unique challenges and offer potential solutions.

Objectives: This paper sought to identify gaps, barriers, and facilitators in implementing an OHEC model in Nigeria and provide recommendations for improvement.

Methods: We searched MEDLINE (PubMed), Embase (OVID), CINAHL (EBSCO), and Google Scholar, using combinations of “emergency medical care” (‘FRC,’ ‘PHC,’ and ‘EMS’) OR prehospital care OR emergency training’ AND ‘Nigeria.’ We included papers that described OHEC in Nigeria and were published in English. Of the initial 73 papers, those that met our inclusion criteria and those obtained after examination of reference lists comprised the 20 papers that contributed to our final review. Two authors independently reviewed all the papers, extracted data relevant to our objectives and performed a content analysis. All authors reviewed, discussed, and refined the proposed recommendations.

Key recommendations: For OHEC to meet the needs of Nigerians and achieve international standards, the following challenges need to be addressed: harmful cultural practices, inadequate training of citizens in the provision of first aid or of professionals that provide prehospital care, lack of proper infrastructure, poor communication, absent policy, and poor funding. Based on the available literature, this paper proposes key recommendations to improve OHEC with the hope of improving the standards of living. The federal government should provide general oversight, but this will require political will on the part of the country's leadership and the provision of adequate funding.

Introduction

The lack of an organized and functional emergency care system in Nigeria, the most populous African country, is of great concern. Despite having the highest gross domestic product (GDP) in Africa [1], it has a high rate of Road Traffic Accidents (RTAs) [2] and other emergencies. A focused review of the current state of out of hospital emergency care (OHEC) in Nigeria could guide the planning decisions of clinicians, educators, and administrators. In general, terminologies such as prehospital care (PHC), emergency medical services (EMS), and out of hospital emergency care (OHEC) have significant overlaps and have been used interchangeably. Notably, Emergency Medical Rescue Service (EMRS) is uncommon but has been used in the Nigerian context, when prehospi-

tal emergency care is provided by agencies like the Federal Road Safety Corp (FRSC), National Emergency Management Agency (NEMA), Fire Services and Federal Civil Service Defense Corps, and response teams from specific hospitals such as Maitama hospital, Abuja [3]. The African Federation of Emergency Medicine (AFEM) has proposed the adoption of OHEC to represent “the full spectrum of emergency care that occurs outside the healthcare facilities” [4]. This term includes First Responder Care (tier one), EMS, and prehospital services (tier two). In 2013, AFEM also published recommendations to provide structure and direction for developing OHEC systems [4].

The current population of Nigeria is estimated as 206,139,589 [5]. Although ranked as the country with the highest gross domestic product (GDP) of 514 billion US dollars in Africa [1], the country

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is saddled with a high burden of death with an annual mortality rate of 20.6 deaths per 100,000 people due to RTAs, (in 2012) and double the rate of RTAs in the USA or UK [2]. The injury and death rates were estimated as 4120 per 100,000 population and 160 per 100,000 population, respectively, in 2016 [6]. Although Ghana and Nigeria were two of the 16 west African countries with confirmed EMS systems [7], a National Ambulance System was established in Ghana in 2004 [8], but Nigeria still lags [2,9,10]. This significant deficiency has resulted in the establishment of EMS systems by jurisdictional state governments and private corporations. Some states including Lagos, Oyo, Delta, and the Federal Capital Territory, have implemented their own EMS with varying standards and oversight. The Lagos State Emergency Medical Services (LASEMS), established in 1998, was the first recorded state-owned EMS. LASEMS comprised two trauma centers with their corresponding ambulance services. The two were later separated in 2001, with the prehospital component becoming the Lagos State Ambulance Service (LASAMBUS) [11,12]. After an initial failed attempt between 2003 and 2009, Delta State made another attempt at prehospital care of RTA victims through a collaborative effort between a local trauma center, the Nigeria Red Cross, the Police, the Army, and Road safety patrol teams, in 2017 [13]. While the Federal Road Safety Commission (FRSC) in Nigeria was established to regulate, enforce and coordinate all road traffic and safety management activities, they are also expected to provide care for RTA victims [14]. To perform this role, officers need proper training and adequate equipment, which are often lacking [15]. The Nigeria National Emergency Management Agency (NEMA) is another national organization established in 1999 primarily to manage disasters but may be called on to assist with road traffic accidents [16]. Table 1 shows a list of identified OHEC providers.

A systematic review of literature on barriers to OHEC in low- and low-middle-income countries by Kironji et al. included two papers focused on Nigeria [17]. Moreover, the currently available literature on OHEC in Nigeria focuses mainly on RTAs and trauma. The high burden of RTA and resulting high mortality, partly due to deficient or poorly organized prehospital care, and the need to explore the prehospital care of other emergency conditions require further examination.

Objective

This paper reviewed the current peer-reviewed literature focused on OHEC in Nigeria to identify gaps, barriers, and facilitators in implementing an OHEC model and provide recommendations for improvement.

Methods

We searched MEDLINE (PubMed), Embase (OVID), CINAHL (EBSCO) and Google Scholar to identify relevant articles in July 2021. Our search was updated in October 2022. We searched for the concepts of emergency medical care ('FRC,' 'PHC,' and 'EMS') OR prehospital care OR emergency training' AND 'Nigeria,' using controlled vocabulary and natural language terms. This search used the Boolean database operators 'OR' for related/similar terms and 'AND' to combine different concepts to combine these keywords. The titles and abstracts of the resulting articles were independently screened by two authors (EI and TO) to identify articles published in English and focused on OHEC in Nigeria. The same authors then conducted a full-text review of the included papers and also scrutinized their reference lists to identify additional articles for inclusion. While most recommendations were from the reviewed literature, a few were based on our knowledge and experience.

Results

Our search returned 73 articles. Twenty articles met the inclusion criteria. Most of the literature on OHEC in Nigeria was published recently with six papers published in 2021, 12 between 2011 and 2020, and two in the preceding decade. Almost half of the articles originated

from Lagos and Ibadan, two major cities in South Western Nigeria, while four did not refer to any specific location and the rest were from various regions in the country. The articles used a variety of methodologies (eleven qualitative, two quantitative, two mixed-methods, and five review) and focused on different types of OHEC (eight general, nine trauma, two pediatrics, and one obstetrical). The information obtained from the literature search was presented and discussed under six themes adapted from Adeloye's conceptual framework [2] and Kironji's systematic review [17]: culture/community, citizen/personnel training, infrastructure, communication/coordination, equipment/transport, policy, and funding. Features of the included articles are summarized in Table 1.

Discussion

Culture/Community

Cultural practices and belief systems can impact OHEC. For example, many well-meaning citizens seek care from alternative healthcare practitioners instead of the emergency care system. Some of these practices, such as the provision of care from untrained family members and bystanders who do not recognize an emergency, may delay care. Others, such as applying direct fire and flame to the feet of a convulsing child to rid them of the evil spirits that caused the seizure, are harmful [18]. Other challenges inhibit the provision of care by bystanders. The use of police and military first responders is common, but many victims and lay first responders often do not want to be involved with these organizations [18]. Further, high-handedness and unprofessional behavior among law enforcement personnel when attending to accident victims are commonly reported as a barrier [3]. Poor legal protection for Good Samaritans has led to reports of civilians not providing care. For example, civilians fear that they will be accused of responsibility for causing the accident or death of an injured victim if they transport them to hospitals [13,19] or accused of sexual assault for performing CPR on cardiac arrest patients [18]. Lastly, transport of patients to care is inhibited due a lack of compliance with general norms of OHEC transport. For example, the inappropriate use of sirens desensitizes the public, making them more likely to ignore ambulance sirens and delaying transport to the hospital [11]. In some cases, ambulances are often not granted the right-of-way when traveling, further delaying their arrival to and from emergencies [12,18,20].

Recommendations:

- 1) Provide focused health education and information to the general public
 - a) Promote the recognition of medical emergencies, the provision of first aid, and the transportation of patients to the hospitals [12]
 - b) Communicate the importance of respecting the right of way for ambulances conveying patients with lights and/or sirens [12,20]
- 2) Enact and promote Good Samaritan law so that bystanders feel protected when providing first aid [13,18,19]
 - a) Improve driver education and enhance enforcement of traffic laws [12]

Citizen/Personnel training

The training of OHEC providers varies across the country and among agencies, resulting in an inconsistent approach to patient care [18]. Less than 3% of patients transported by LASAMBUS received prehospital care by staff trained in Basic Life Support (BLS) [11]. Despite being staffed by nurses and paramedics, only one in five FRSC and NEMA staff, on average, have active certification in Advanced Cardiovascular Life Support (ACLS). [3] While doctors were better trained, only one in three had active ACLS and ATLS training [3]. Some FRSC officers who responded to emergencies only provided transport because they were not trained as first responders [3,15]. The Delta State EMS initiative involved anesthetist led teams comprised of nurses and technicians who

Table 1
Summary of articles.

First Author	Year	Location/study setting	Design	Focus	Theme
Adeloye (2)	2012	Not specified	Review	Trauma Prehospital trauma care practices	Citizen/Personnel training Communication Policy Training
Mac (3)	2019	Abuja	Mixed-Method	General The burden of medical emergencies and needs assessment of emergency medical rescue services	
Adeyemi-Doro (9)	1999	Not specified	Review	Trauma Rudimentary state of prehospital emergency service and call for urgent attention	Citizen/Personnel training Policy
Solagberu (10)	2009	Ilorin	Quantitative -Prospective	General Possible interventions in the existing mode of prehospital transport	Citizen/Personnel Training
Ibrahim (11)	2017	Lagos	Quantitative -retrospective	Trauma The burden of road traffic injury (RTI) in Lagos, Nigeria and the effectiveness of prehospital care	Citizen / Personnel Training
Adewole (12)	2012	Lagos	Quantitative -retrospective	General Audit of a state ambulance service	Culture/Community Policy Equipment/transport Citizen and personnel training
Jasper (13)	2019	Benin and Warri	Review (Program Description)	Trauma A review of prehospital care of RTA victims in the Niger Delta	Equipment Transport Policy/funding Citizen and personnel training
BPT (15)	2021	Ibadan	Quantitative Cross-sectional	Trauma Knowledge, attitude and practice of prehospital trauma care among Federal Road Safety Commission officials.	Equipment/transport training
Usoro (18)	2021	Lagos	Qualitative	General Public perceptions of Nigeria's emergency care system and strategies to improve emergency care delivery	Culture/Community Citizen and personnel training Equipment/transport Infrastructure Communication/coordination Culture/Community
Iloh (19)	2013	Umuahia	Quantitative -retrospective	Trauma Gunshot injuries in the ED of a Nigerian tertiary hospital in a State without formal prehospital emergency medical service	
Venkatraman (20)	2021	Lagos	Quantitative- retrospective	Trauma The burden of RTAs, call outcomes, response time, and causes for delay of ambulance service	Culture/Community
Olufadeji(21)	2021	Lagos	Mixed-methods	General Participants' knowledge acquisition after implementing the Basic Emergency Course	Citizen / Personnel training
Sangowawa(23)	2012	Ibadan	Quantitative Quasi-experimental	Trauma Building capacity of drivers in Nigeria to provide first aid to road crash victims	Citizen / Personnel training
Ahidjo (26)	2011	Abuja and Lagos	Quantitative -Prospective	Trauma The challenges of prehospital transport of people with spinal cord injury and its contribution to mortality in Nigeria.	Citizen / Personnel training Equipment/Transport Policy
Olumide (27)	2015	Ibadan	Quantitative -Quasi-experimental	General The effect of first aid education on first aid knowledge and skills of commercial drivers in South West Nigeria	Citizen / Personnel training
Abdulraheem (28)	2016	Ibadan	Quantitative prospective and descriptive cross-sectional	Pediatric/Neonatal Modes of transport, pre- and intratransport care of neonates referred to the University College Hospital (UCH), Ibadan, Nigeria	Communication/Coordination
Nwauwa (29)	2017	Not specified	Review	General Current state and expectations for improving care and response	Equipment/transport Policy
Oguntunde (30)	2018	Jigawa and Kaduna	Qualitative	Obstetrics Perceptions of stakeholders and beneficiaries of emergency transport schemes (ETS) in two states in northern Nigeria, comparing two models of ETS	Equipment/transport
Abiodun (31)	2021	Benin	Quantitative Cross-Sectional	Pediatrics The quality of prehospital care and influence of parental socioeconomic status on the presence of shock in children seen at the emergency unit	Funding
Onotai (33)	2012	Not specified	Review	General Nigerian health care funding system and how it compares to that of South Africa, Europe and America	Funding

were all BLS-certified [13]. Some team members also had ACLS certifications but none of the physicians were ATLS trained [13]. The Basic Emergency Care (BEC) course developed by WHO is an important training tool, as there was a demonstrable improvement in the emergency care knowledge of participants in the pilot course [21]. Training lay responders in first aid is possible and necessary to fill the gap in places with poor OHEC [9]. Commercial drivers are prime targets for this type of training as first responders, especially after RTAs [22–25]. In Nigeria, relatives and bystanders form the largest group transporting patients to healthcare facilities [10,26]. While road safety training for drivers in Ibadan led to increased knowledge, the demonstrated decline in knowledge four months after training highlights the need for continuous and periodic training [23,27].

Recommendations:

- 1) Train and empower lay people, primarily commercial drivers, and uniformed personnel (police, military, Firefighters, and FRSC) to provide first aid [11,15,18,23,27]
 - a) Institute policies requiring commercial drivers to undergo first aid training [23,27]
 - b) Stipulate periodic first aid retraining for commercial drivers to ensure that they maintain the acquired knowledge and skills [23,27]
- 2) Administer Basic Emergency Care courses and appropriate life support courses for the employees of organizations involved in prehospital care [21]
- 3) Establish paramedic training programs [13]
- 4) Leverage the skills and resources of nongovernmental organizations such as the Red Cross and St John Ambulance to provide first-aid training [13]

Infrastructure

The high mortality from trauma in Nigeria is the result of failures in various aspects of the regional trauma system. OHEC is frequently delayed by hazardous road conditions, including potholes and traffic congestion, and result in worsening outcomes, especially in major cities [18]. The FRSC and NEMA have “Bay posts” (ambulance stations) along some major roads in Nigeria, especially in Abuja [3], with the expectation that the nearest of such posts responds to incidents within its proximity. LASAMBUS uses a similar model, with 25 posts in Lagos state equipped to respond [20]. However, these posts are not sustained over time and are frequently used for commerce by food sellers. Often, EMS will employ staffed motorcycles to pave the way in obstructed/congested roads for ambulances to get to these locations during emergencies.

Recommendations:

- 1) Improve road conditions to reduce road traffic accidents [18]
- 2) Improve road infrastructure to access healthcare facilities, especially in more rural areas [18]
- 3) Support workforce planning by funding collaborative national training programs for OHEC providers that can be delivered regionally

Communication/Coordination

The lack of a universal number for emergency services has also been identified as a significant cause of delay in receiving emergency care [18]. Increased EMS response times are associated with higher mortality rates. Many victims and their families are unaware that EMS exists, and most members of the public in Nigeria do not know which emergency numbers to call. Multiple numbers, including 112, 122, and 199, have been identified as universal access numbers in Nigeria; however, the most recognizable number (122) is deemed unreliable [18]. Attempts have been made to improve the coordination of different EMS and emergency access numbers, including the introduction of an emergency communication network and call center in Lagos. Relatedly, poor

OHEC documentation and communication with receiving hospitals, especially regarding the clinical stability of babies, has resulted in health-care centers being unprepared for their arrival [28].

Recommendations:

Adopt a single, memorable toll-free number (e.g. 123) as the emergency number across Nigeria that is accessible by cell phone [18]

- 1) Increase awareness of the emergency number by integrating it into all levels of public education and promoting it through a public awareness advertising campaign
- 2) Establish clear communication lines between referral facilities, EMS, and receiving facilities [28]
- 3) Develop local and national referral systems

Equipment and transport

Patient transfer from a prehospital location to the appropriate hospital is not regulated in Nigeria. This deficiency has prevented the coordination of an integrated service. The same vehicles used to transport coffins are sometimes switched to carry the sick with no medical expertise from the drivers. As a result, many patients arrive at health care facilities via non-OHEC providers including other types of commercial transportation, self-transportation, or walk-in by foot. While ambulances were reported as the most commonly mentioned mode of transporting patients in 71% of papers in a systematic review [17], a Nigerian study showed that ambulances conveyed a meager 5.4% of patients with spinal cord injuries [26]. These limitations have led private and public health-associated organizations to develop ambulance services with variable equipment standards, and rural communities to mobilize community members to provide alternative forms of transport [29,30]. Air ambulance services, including fixed- and rotary-wing, are expensive to maintain and their service availability is influenced by weather conditions. At present, these forms of transport are exclusive to the rich. Transportation response times to and from the scene of an incident are affected by road users not granting the right of way on heavily congested and poorly maintained roads [12,18]. The availability and design of OHEC vehicles and equipment is organization-dependent. Ambulances used by FRSC and NEMA are mainly intensive care unit (ICU) buses equipped to provide BLS and ACLS. NEMA has specialized ICU vehicles, helicopters, and boats for emergency bay post units near the Niger river [3]. Unfortunately, many FRSC ICU ambulances and helicopters are not functional. Similarly, Delta State EMS uses a variety of transport modalities depending on the situation and location, including ICU ambulances, vans with open backs, tricycles, and boats [13].

Recommendations:

- 1) Strategically place ambulances throughout regions and cities to optimize the time required to reach victims regardless of their location [12,18]
- 2) Boost the federal budget for replacing or optimizing current vehicles and equipment to a functional standard
- 3) Recognize the importance of expensive platforms such as air ambulances, and make them available, when possible, but not at the expense of more affordable modalities [13].
- 4) Encourage innovative, tailored approaches to prehospital transport [12,13,28,29]
 - a) Subsidize/incentivize commercial transport owners and communities to provide affordable transport
 - b) Adapt two- or three-wheeled vehicles for patient transport
 - c) Develop marine rescue capabilities for maritime accidents
 - d) Consider the development of specialized OHEC systems for the transport of neonatal and obstetrical patients [28,30]

Policy and funding

Many of the barriers described in this manuscript could be prevented or mitigated by instituting proper policies backed by adequate funding.

As financial challenges are encountered at multiple administrative levels, funding for OHEC will be required from different sources. For example, funding for the Delta state program described by Jasper et al. was from various stakeholders [13]. While the patients and their family members paid bills and the hospital funded personnel training, the transportation of accident victims to the hospital was free. The program also demonstrated a strong partnership between private and government agencies [13]. Another concern is excessive delays in transferring patients to a higher level of care due to financial constraints. [31] Given the bad road conditions, heavy traffic, especially in bigger cities, and remote location of some patients, the use of helicopter emergency medical services (HEMS) is limited by its delivery through private companies at prohibitive cost. The Nigerian National Health Insurance Scheme (NHIS) [32] was established in 1999 to achieve financial access to quality healthcare for all Nigerians. However, the scheme's usefulness is limited by the fact that several community members are unemployed and are therefore unable to benefit, thereby dashing the hopes of providing universal coverage for healthcare, including OHEC [33]. High poverty levels throughout the country preclude the institution of private health insurance.

As emergency medical care develops in Nigeria, EM is increasingly being recognized as a specialty and prehospital care as a subspecialty [34]. The establishment of the relevant legislature and policies to this effect requires cooperation between the government and the leadership of the Postgraduate Medical Colleges that would support the development of the OHEC system [35]. In recognition of the high morbidity and mortality due to poor OHEC, the federal government has made provision to the national budget to establish a regular source of funding for EMS operations in the country [29], and the Nigerian Senate passed legislation to establish a national EMS Agency in 2021.

Recommendations

- 1) Policymakers should acknowledge that the poor state of OHEC in the country requires immediate attention, involving organization at national, state, and local government levels, with an overall increase in health care funding.
- 2) Restructure and strengthen the National Health Insurance Scheme to make it accessible for the whole population, regardless of the citizen's financial status [31].
- 3) Consider Public Private Partnership (PPP) funding models [13].
- 4) Set and maintain national standards for quality assurance activities within the OHEC system that cover record keeping and documentation, response times, and ongoing quality improvement efforts [13].

Limitations

This study has limitations including a literature gap from regions outside the major cities of Ibadan and Lagos. The development of a national OHEC agency requires further research to identify unique barriers that may not be present in these relatively higher resource areas. Also, there is limited information about the clinical practice of OHEC practitioners in Nigeria. Lastly, many of the recommendations identified from the literature are vague. Further research will be needed to refine and strengthen these recommendations and assess their feasibility.

Conclusion

Although there is a preponderance of descriptions of the challenges of OHEC in Nigeria, most of the literature focuses on trauma and calls for further research in OHEC care of medical, obstetrics, pediatric and other emergencies. Most papers were published in the last decade, suggesting a renewed focus on OHEC in the country. The lack of studies on prehospital care related to SARS COVID-19 provides opportunities to examine the impact of the pandemic on OHEC in Nigeria and other African countries. With the advent of a national EMS agency in Nigeria,

policymakers should seek to implement a national OHEC model of care. This model must include improving access to prehospital care and transportation and improving infrastructure that impacts transport times to and from emergency scenes. Our literature-informed recommendations are relevant for OHEC organizations and government administrators and would significantly improve OHEC in Nigeria. The authors support the adoption of OHEC as the umbrella term representing emergency care provided until arrival at the destination healthcare facility.

Authors' contribution

The authors contributed as follow to the conception or design of the work, the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it for important intellectual content: TO contributed 35%; EI 25%; NE 15%; OO 10%; OA 10%; and OS 5%. All authors approved the version to be published and agreed to be accountable for all aspects of the work.

Declaration of Competing Interest

The authors declare no conflicts of interest.

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Dissemination of results

Although this is a review paper, some our findings were unofficially shared with some members of the Nigerian Prehospital Interest Group during AfCEM 2022. It is hoped that some of the recommendations from this article will help guide the future of OHEC in Nigeria.

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