



ORIGINAL ARTICLE

Level of emergency and disaster preparedness of public hospitals in Northwest Ethiopia: A cross-sectional study

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ABSTRACT

Background: From time to time, the magnitude and type of health emergencies and disasters are increasing. Hospital emergency and disaster preparedness, on the other hand, is still in its early stages in many low- and middle-income countries. In Ethiopia, research on hospital disaster preparedness is severely limited. As a result, the purpose of this study was to determine the level of hospital emergency and disaster preparedness at public hospitals in the east Gojjam zone of Northwest Ethiopia.

Methods: A census method was used to include ten hospitals in the East Gojjam zone in a cross-sectional descriptive study. An adopted World Health Organization observation checklist was used to assess disaster and emergency preparedness. Each question was assigned a score out of three points, with one indicating low readiness and three indicating the highest level of preparation. Finally, the level of preparedness was classified as “low” if the average percentage score ranged from 33.3% to 66.6 %, and as “high” if the percentage score ranged from 66.7 % to 100 %. The results were then presented in the form of texts, tables, and percentages.

Results: The evaluated hospitals’ overall level of emergency and disaster preparedness falls into the low category, with an average calculated preparedness score of 54.75 %. The domain with the lowest preparedness is logistics and finance (43.33 %), while the domain with the highest preparedness is patient care and support services (60 %).

Conclusion: According to the findings of this study, the level of emergency and disaster preparedness in the hospitals studied is low. It is therefore recommended that the ministry of health, regional health bureaus, and hospital administrators collaborate to develop an appropriate intervention strategy to address this issue.

Introduction

Disaster is defined by the World Health Organization (WHO) as “a sudden ecological phenomenon of sufficient magnitude to require external assistance” [1]. A more specific definition acknowledged by the specialty of emergency medicine is when the quantity of patients presenting within a given time exceeds the capacity of the emergency centre to offer care without assistance [1,2].

People all over the world are dealing with a wide variety of disasters related to health emergencies. Infectious disease outbreaks, natural disasters, conflicts, unsafe food and water, chemical and radiation incidents, building collapses, transportation incidents, a lack of water and power, air pollution, antimicrobial resistance, the effects of climate change, and other sources of risk are among them [3]. These emergencies and disasters frequently have serious consequences for people’s health, including the loss of many lives and significant disruptions in

community functioning. Every new threat highlights the difficulties in managing health risks and the consequences of emergencies and disasters. Emergency risk management measures involving health and other sectors can prevent or reduce deaths, injuries, diseases, disabilities, psychosocial problems, and other health impacts [4].

Measures done to prepare for and mitigate the effects of disasters are referred to as disaster preparedness. That is, to anticipate and, when feasible, avert catastrophes, limit disasters’ impact on vulnerable people, and respond to and effectively cope with disasters’ effects. It necessitates contributions from a wide range of sectors, including training and logistics, as well as health care, recovery, livelihood, and institutional development. In disaster medicine, four critical phases must be addressed properly at all times. Preparation, mitigation, response, and recovery are the four categories [5,6].

Population growth and climate change have exacerbated the impact of disasters in both human and economic terms. Natural and technological disasters affect approximately 190 million people worldwide each

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year, resulting in over 77 000 deaths [7]. Conflict affects an additional 172 million people [3]. Between 2012 and 2017, WHO documented over 1200 outbreaks in 168 countries, including those caused by new or re-emerging infectious diseases. World Health Organization tracked 352 infectious disease events in 2018, including Middle East respiratory syndrome coronavirus (MERS-CoV) and Ebola virus disease (EVD) [8].

Weather-related disasters claimed an estimated 606,000 lives and left 4.1 billion people injured, homeless, or in need of emergency assistance between 1995 and 2015 [7]. Every year, an estimated 1.25 million people are killed and up to 50 million are injured in road crashes, with a high number of mass casualty incidents. More than 90% of road traffic fatalities occur in low and middle-income countries. According to a World Bank report from 2010, Sub-Saharan Africa has experienced over 1000 disasters in the last four decades, with 300 disasters occurring in the last five years alone. Droughts, floods, cyclones, earthquakes, and volcanoes have affected over 330 million people since then [9,10]. Natural and man-made disasters, as well as public health emergencies, are common in Ethiopia as a result of drought, flood, communicable disease epidemics, and conflicts [11]. The coronavirus pandemic is now on top of other disasters affecting the entire world, particularly Ethiopia. As a result, hospitals must prepare for the worst and be ready to deal with it on a large scale [12].

Health systems rely on a variety of public and nongovernmental health facilities to collaborate in order to serve the community, which is especially crucial during times of emergency. To maintain the continuity of health services, hospitals, primary health care centers, laboratories, pharmacies, and blood banks collaborate with non-health sectors such as electricity and water supply, as well as transportation [13]. More importantly, hospitals play a key role in providing necessary medical care to communities throughout all types of disasters [14].

However, studies have shown that hospital disaster preparedness is still in its early stages in Tanzania, Namibia, and many other African countries [15–17]. Personnel shortages, weakened health systems, mis-handling of scarce resources, and political instability are among the challenges facing disaster management in Africa. Furthermore, medical economic constraints, apathy in risk perception among hospital administrators, planning assumptions that expect orderly and usual occurrences, cost versus benefit of early preparedness, and business and legal risks were identified as potential barriers to disaster preparedness among hospitals [1819]. In Ethiopia, particularly in the study area, studies on hospital disaster preparedness are very sparse. The purpose of this study was to determine the level of hospital emergency and disaster preparedness at public hospitals in the east Gojjam zone of Northwest Ethiopia.

Methods

A facility-based cross-sectional survey was conducted in public hospitals in the East Gojjam Zone of Northwest Ethiopia from March to June 2021. The zone covers roughly 14,004.47 km² and has a population of 2,351,855 people. This population is served by one referral hospital and nine primary hospitals. According to Ethiopian National Disaster Risk Management Commission (NDRMC) assessments, there are flooding and landslides prone areas in the zone. Furthermore, the area is being overrun by internally displaced persons as a result of the ongoing conflict in Northern and Western Ethiopia. Current dangers include locust invasion and the potential health consequences of starvation, as well as the COVID-19 pandemic. There is also a high number of road traffic accidents. These circumstances may exceed the hospitals in the East Gojjam Zone's capacity to provide healthcare [20–22].

In the study region, there are 10 hospitals that are completely operational. One of the hospitals mentioned is a comprehensive specialized hospital, while the other nine are general primary hospitals. By census method, all ten hospitals in the east Gojjam zone were included in the study. The level of hospital emergency and disaster preparedness was the dependent variable for this study.

The World Health Organization's hospital safety index evaluation checklists were adopted to assess the hospitals' readiness. The checklist is made up of four parts that are used to measure overall hospital safety. However, just the checklist from module four (emergency and disaster management) was employed for this study. There are seven evaluation domains in total in the adopted checklist, with a total of 40 questions on the checklist [23]. One parameter was the coordination of emergency and disaster management activities, which was used to assess how well the selected hospitals had incorporated coordinated emergency and disaster activities into their ordinary healthcare delivery system. The hospitals' level of preparedness for possible emergencies and disasters was assessed using emergency and disaster response and recovery planning. The checklist also included sections on human resources, logistics, and finance, as well as the communication and information management system. The other parameter used is to assess the status of hospitals in terms of emergency patient care and support services, which was comprised of eight questions in the checklist. Similarly, the evaluation checklist addresses patient evacuation procedures, decontamination, and security concerns. The checklist was rigorously completed with the cooperation of four key informants in each hospital, namely chief executive officers (CEO), medical directors, liaison officers, and emergency centre department coordinators.

After checking for completeness and unclear responses, the data was coded and entered into Epi Data version 4.2. Statistical Package for the Social Sciences (SPSS) version 25 was used to transfer and analyze the data. The data from 40 questions completed for all hospitals was analyzed, and an average score percentage obtained by the hospitals was calculated. Each question was assigned a score out of three points, with one indicating low readiness and three indicating the highest level of preparation. Finally, the level of preparedness was classified as "low" if the average percentage score ranged from 33.3 % to 66.6 %, and as "high" if the percentage score ranged from 66.7 % to 100%. The results were then presented in the form of texts, tables, and percentages.

Results

To begin, a checklist comprising seven categories was used to assess the level of hospital emergency and disaster preparedness. There are 40 checklist questions with a 1–3 Likert scale under each category. The following is a description of each of the seven categories.

Coordination of emergency and disaster management activities

The efficacy of hospitals in handling emergencies and disasters is based on the establishment and continual evaluation of emergency and disaster response and recovery systems. In terms of the existence of integrated coordination of emergency and disaster management activities in hospitals, most hospitals have a hospital emergency and disaster committee, but it is ineffective. Most hospitals have a diagrammatic representation of the hospital incident management system, but no personnel were allocated to each management role in the hospital incident management system. Almost all hospitals lacked an emergency operations center (EOC).

Emergency and disaster response and recovery

Another goal of this study was to evaluate hospital emergency and disaster response and recovery plans. Most hospitals have an emergency and disaster response plan, but there are no hazard-specific sub-plans. There was no practice of the plans using various drills to evaluate and correct the plan as needed.

Communication and information management

During an emergency or disaster, information is a valuable resource. Appropriate management and communication of this information serve

as the foundation for emergency health intervention planning, decision making, and evaluation. Furthermore, information is critical for providing immediate and effective assistance to those affected by emergencies or disasters. Good public and media communication have a significant advantage in mobilizing resources required for emergency health intervention during a disaster or mass causality. According to the study's findings, there is no specific system for communicating with the public and media during an emergency, and there is also no external stakeholder directory for communication.

Human resources

In and out of hospitals, human resources are critical in the care of victims of disasters or health emergencies. A trained task force, both clinical and non-clinical, must be ready at all times to intervene in an emergency. Staff contact lists are available, according to the findings of this study, although they are not updated regularly to review staff rotation to different units. Personnel is also given tasks and duties, despite the reality that there is no system in place to assess their performance.

Logistics and finance

Another area of preparedness was logistics and finance, which is a major challenge for almost all hospitals. Among the critical logistics and finance categories required for emergency management are financial resources, food service, and transportation mechanisms. According to the study's findings, there is a mechanism for transporting victims during an emergency with basic level ambulances, but it is lacking in trained emergency medical technicians and basic life support supplies such as oxygen. There is also no memorandum of understanding in place with local suppliers to provide the logistics required during emergencies.

Patient care and support services

Surge capacity is a fundamental component of emergency and disaster management in hospitals, ensuring the continuity of essential patient care services during an emergency. In most hospitals, there is a plan in place to ensure the continuity of essential clinical support, as well as a potential triage area and referral system for emergencies. However, there is no plan in place to provide psychosocial support to victims of an emergency. [Table 1](#)

Evacuation, decontamination and security

During an emergency or disaster, safety and infection prevention are major concerns. There is a plan in this study for providing personal protective equipment during an emergency, but there is no plan for ensuring security or evacuating victims when an emergency occurs ([Table 1](#)).

In general, the evaluated hospitals' overall level of emergency and disaster preparedness falls into the low category, with an average calculated preparedness score of 54.75 %. The domain with the lowest preparedness is logistics and finance (43.33 %), while the domain with the highest preparedness is patient care and support services (60 %) ([Table 2](#).)

Discussion

Emergencies and disasters are unavoidable as long as humans interact with their surroundings and live in a changing world. Although the specific type of emergency and disaster, as well as the timing of the event, cannot be predicted, early preparation to deal with it when it occurs is expected to be one of the routine activities of various institutions. Health care institutions, particularly hospitals, are among those required to be directly involved in the management of health emergencies and disasters. As a result, hospitals must plan ahead of time for the

management of emergencies and disasters. It is also critical that they practice and evaluate their preparation regularly [24–26].

The study's findings revealed that hospitals' preparedness for the management of health emergencies and disasters is low, with an overall preparedness score of 54.75 %. This finding is consistent with a similar study conducted in western Ethiopia, Tunisia, Jeddah, and Italy, but it is lower than that of an Indonesian study [27–31]. The variation may be due to geographical differences, which may interfere with institutions' perceptions of disaster risk according to the nature of the disaster in that specific location [32,33]. Despite the increasing frequency of emergencies and disasters, this finding is unsatisfactory and should serve as a warning to stakeholders in the region [34].

The establishment and continuous evaluation of an emergency and disaster response and recovery system is the foundation for hospitals' effectiveness in dealing with emergencies and disasters [35–37]. In this study, only emergency and disaster committees exist in most hospitals but have no effective functioning, and hospital incident management systems are displayed with diagrammatic representation in most hospitals but no personnel is assigned to each management position in the hospital incident management system. This finding coincides with a similar study conducted in western Ethiopia, Tunisia, and Indonesia [27,29,35]. There is no exercise of the plans through different drills to evaluate and correct the plan accordingly even though there exists a plan for emergency and disaster response in most of the hospitals. Furthermore, hazard-specific sub-plans did not exist. The findings are congruent with those of a similar study conducted in western Ethiopia [27]. However, it differs from previous research and a World Health Organization standard [1638].

The aforementioned shortcomings may be due to some hospitals viewing hospital incident management systems just as a method to manage emergency occurrences that may arise on occasion. A flexible, scalable, and adaptable system, on the other hand, lends itself to managing non-emergency situations or events [39,40]. This finding could provide a substantial push for hospitals to establish hospital incident management systems with a well-functioning command-and-control system, which is essential for effective hospital emergency as well as non-emergency incident or events management operations. Furthermore, it would encourage hospitals to hold events to display and evaluate the effectiveness of their emergency management procedures.

In and out of hospitals, human resources are critical in the care of victims of disasters or health emergencies [41]. In this study, individuals are assigned jobs for emergency or disaster response and recovery despite the lack of a system to assess their effectiveness. This contradicts findings from other similar studies [42,43]. This would imply that the plan's effectiveness requires frequent examination of allotted personnel's motivation, dedication, and functionality, as well as appropriate readjustment. Furthermore, each appointed worker must receive training and orientation regarding their tasks.

According to the findings in this study, the logistics and finance domains had the lowest level of preparation in this study, which was similar to the findings in western Ethiopia and Indonesia [27,31]. This could be due to the fact that health care services in general, and emergency mass causality management in particular, are resource expensive, posing an additional burden for resource-constrained countries like Ethiopia [44]. This would suggest that agreements with local suppliers and vendors for emergencies and disasters, transportation during an emergency, food and drinking water during an emergency, and financial resources for emergencies and disasters must be planned well in advance [45].

The mobilization of national and international resources, as well as post-action analysis, assessment, and learning, are all influenced by information [46]. Despite this, the study's findings revealed that communication and information management readiness is insufficient. This finding is consistent with the findings of other studies [15,27,28] however, in contrast to an Italian study [30]. The discrepancy would be due to socioeconomic inequalities, which could impact hospital standards in low-income countries but not other high-income countries such as

Table 1
Description of emergency and disaster preparedness of hospitals in East Gojjam Zone, Northwest Ethiopia, 2021

| Variables (Score Range = 1-3) | Mean ± SD |
|--|-----------|
| Coordination of emergency and disaster management activities (N=10) | |
| Hospital emergency/disaster committee | 2.2±0.63 |
| Committee member responsibilities and training | 1.6±0.97 |
| Designated emergency and disaster management coordinator | 1.7±0.48 |
| Preparedness program for strengthening emergency and disaster response and recovery | 1.3±0.48 |
| Hospital incident management system | 2.2±0.63 |
| Emergency Operations Centre (EOC) | 1.1±0.32 |
| Coordination mechanisms and cooperative arrangements with local emergency/disaster management agencies | 1.3±0.48 |
| Coordination mechanisms and cooperative arrangements with the health-care network | 2.0±0.00 |
| Hospital emergency and disaster response and recovery(N=10) | |
| Hospital emergency or disaster response plan | 2.3±0.48 |
| Hospital hazard-specific subplans | 1.3±0.48 |
| Procedures to activate and deactivate plans | 1.4±0.52 |
| Hospital emergency and disaster response plan exercises, evaluation and corrective actions | 1.3±0.48 |
| Hospital recovery plan | 1.7±0.48 |
| Communication and information management(N=10) | |
| Emergency internal and external communication | 1.6±0.97 |
| External stakeholder directory | 1.0±0.00 |
| Procedures for communicating with the public and media | 1.6±0.52 |
| Management of patient information | 2.0±0.00 |
| Human resources(N=10) | |
| Staff contact list | 1.9±0.32 |
| Staff availability | 1.6±0.97 |
| Mobilization and recruitment of personnel during an emergency or disaster | 1.7±0.95 |
| Duties assigned to personnel for emergency or disaster response and recovery | 2.2±0.63 |
| Well-being of hospital personnel during an emergency or disaster | 1.3±0.48 |
| Logistics and finance(N=10) | |
| Agreements with local suppliers and vendors for emergencies and disasters | 1.1±0.32 |
| Transportation during an emergency | 2.0±0.00 |
| Food and drinking-water during an emergency | 1.1±0.32 |
| Financial resources for emergencies and disasters | 1.0±0.00 |
| Patient care and support services(N=10) | |
| Continuity of emergency and critical care services | 1.6±0.97 |
| Continuity of essential clinical support services | 2.3±0.48 |
| Expansion of usable space for mass casualty incidents | 1.6±0.97 |
| Triage for major emergencies and disasters | 2.2±0.63 |
| Triage tags and other logistical supplies for mass casualty incidents | 1.3±0.48 |
| System for referral, transfer and reception of patients | 2.3±0.48 |
| Infection surveillance, prevention and control procedures | 2.0±0.00 |
| Psychosocial services | 1.0±0.00 |
| Post-mortem procedures in a mass fatality incident | 1.9±0.32 |
| Evacuation, decontamination and security(N=10) | |
| Evacuation plan | 1.4±0.52 |
| Decontamination for chemical and radiological hazards | 1.9±0.32 |
| Personal protection equipment and isolation for infectious diseases and epidemics | 2.3±0.48 |
| Emergency security procedures | 1.3±0.48 |
| Computer system network security | 1.1±0.32 |

Table 2
Level of emergency and disaster management preparedness of Hospital in East Gojjam Zone, Northwest Ethiopia, 2021

| Parameters | Number of questions | Score ranges | Mean ± SD | Percent | Preparedness Level |
|--|---------------------|-----------------|-------------------|---------------|--------------------|
| Coordination of emergency and disaster management activities | 8 | 8-24 | 13.4±2.50 | 55.83% | Low |
| Hospital emergency and disaster response and recovery | 5 | 5-15 | 8.0±1.41 | 53.33% | Low |
| Communication and information management | 4 | 4-12 | 6.2±0.63 | 51.66% | Low |
| Human resources | 5 | 5-15 | 8.7±2.98 | 58.00% | Low |
| Logistics and finance | 4 | 4-12 | 5.2±0.63 | 43.33% | Low |
| Patient care and support services | 9 | 9-27 | 16.2±4.05 | 60.00% | Low |
| Evacuation, decontamination and security | 5 | 5-15 | 8.0±1.41 | 53.33% | Low |
| Total | 40 | 40 – 120 | 65.7±12.63 | 54.75% | Low |

Italy. This implies that hospitals must create a well-functioning communication and information management system for emergency or disaster management.

The study's findings showed that patient care and support services such as critical clinical support continuity, as well as a potential triage area and referral system for emergencies, exist, but there is no strategy in place to give psychosocial support to emergency victims. This finding is consistent with Ethiopian and Tanzanian research and runs against standards that call for the integration of psychosocial support

services into the care of emergency victims [27,47,[48]. As a result, integrating the service is projected to be a significant future effort for hospitals.

This study's findings indicate that evacuation, decontamination, and security plans are inadequate, which is consistent with other similar studies [16,27] nonetheless, in contradiction to World Health Organization recommendations [3]. This implies that hospitals should devise methods to ensure the security procedures needed for emergency and disaster management.

Strength and limitation of the study

This study was one of the few in Ethiopia, and particularly in the study area, that attempted to assess disaster preparedness using a standardized World Health Organization checklist. On the other hand, this study did not conduct a qualitative investigation of the barriers associated with a low level of disaster preparedness. Because this study was conducted in a specific region, the findings cannot be generalized to other hospitals.

Conclusion

According to the findings of this study, the level of emergency and disaster preparedness in the hospitals studied is low. It is therefore recommended that the ministry of health, regional health bureaus, and hospital administrators collaborate to develop an appropriate intervention strategy to address this issue.

Dissemination of results

Results from this study were shared with staff members at the data collection site through an informal presentation.

Authors' contributions

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 critically for important intellectual content: TA contributed 50%; SF and Workneh BS contributed 25% each. 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 that they have no competing interests

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