Disaster medical assistant team establishment and the disaster response experience of Ethiopia

Woldesenbet Waganew[*1], Akilili Azazh[2]

Abstract

Background: Disasters, especially natural disasters, are inevitable and occur globally, which affect communities. Therefore, countries are recommended to have a system for disaster management. The Minister of health-Ethiopia established a disaster medical assistance team as part of disaster countermeasures. The present study describes the establishment, operation, and challenges of the team (1,2,3,4).

Objective: The aims of this analysis are to review the disaster medical assistant team establishment and disaster response experiences in Ethiopia.

Methods: A desk review and analysis of secondary data for the disaster medical assistant team establishment and disaster response experiences in Ethiopia.

Result: In August 2018, the ministry of Health-Ethiopia took the first step-in health system development history by establishing and having a successful achievement in the medical disaster response system. Some of the achievements are basic training, which had been cascaded to 678 multi-disciplinary professionals, through the deployment of the team to mass gathering events, and different disaster responses. The team was involved in conflict-based causality responses in Metekel Benishangul Gumz region in 2018, 2019 Ethiopian plane crash, COVID 19 response, and Tigray region mass causality response following incident since October 2020. Since the birth of the team, DMAT faced structural, security, lack of adequate necessary resources challenges. Due to pushing factors in the course of time, the active national team number decreased by 48.57% currently.

Conclusions: The ministry of Health encouraged an appreciable step in the establishment, as well as through disaster responses in early phases, however, its success was not maintained and the status of DMAT indicated that it may become obsolete unless corrective interventions are implemented. [*Ethiop. J. Health Dev.* 2021: 35(SI-4):00-00]

Keywords: Disaster, Health, response

Introduction

Disaster is a sudden ecological phenomenon which has the potential for injury creating effects with sufficient magnitude, which requires external assistance. Disaster harm includes injury, diseases, malnutrition, and psycho-social stress. Recent catastrophes include tsunamis, in the Indian Ocean in 2004, and massive hurricanes in the southern United States. Disaster occurs suddenly and overwhelms the health system by exceeding the available resource. As a result, the health system should work on disaster prevention, risk reduction, mitigation, preparedness, and response. This in turn requires an organized, structured system, trained human resources as well as medical logistic (2,3).

Even though there is no nation which is immune to disaster, it is more likely to happen in low-income nations more frequently, and their effect may be more pronounced. The growing incidence of disasters is highly correlated to increasing vulnerability of households and communities in low-income countries. The low socioeconomic level by itself exacerbates the impact of a disaster and makes the recovery process difficult. Recent evidence shows that the future frequency of disasters will increase due to global warming, increasing population density and terrorist activities (3, 4, 5, 6).

Millions of Ethiopians have been affected by drought and flood in the last decade. The number of people who suffered from drought peaked at 14 million in 2003. The floods of 2006 were the most disastrous affecting about 1.7 million people. Furthermore, drought, risk of other disasters like flood, conflict, landslides, disease outbreak, crop pests and forest and bush fires as well as the frequency, scale, and intensity of such disasters have been increasing due to various factors. (4)

The first formal governmental disaster management institution in Ethiopia was the Relief and Rehabilitation Commission (RRC), which was established in the wake of the 1973/74 famine with a mandate of relief supplies to drought victims (4).

In 2018 the Ministry of Health (MOH) launched the establishment of the disaster medical assistant team (DMAT), with the aim of an effective, sufficient, timely response for medical-related disasters (4).

As there are limited published articles worldwide and these are lacking in Ethiopia, reviewing the first organized medical disaster response team's establishment, experience, and challenges in Ethiopia will be beneficial for future reference. Hence this research aimed to analyze, the Ethiopian-DMAT establishment, experience, and challenges.

Methodology

Materials & Methods

Study area and period:

The desk review of DMAT documents from a national disaster designated hospital and coordinator for national emergency response was made. The review was conducted from October 20,2020-Feburary 15, 2021.

Study design

A retrospective DMAT record review was carried out using a structured checklist to assess the establishment and governance, human resource mobilization and

[1]* St. Paul Hospital millennium medical college
[2] Addis Ababa University

training, budget allocation & usage, DMAT operation, engagement of stakeholders, partnership and status and challenges of the team.

Sample size and sampling procedure

All available complete and informative data regarding DMAT (memorandum of understanding, quarter and annual reports, plans, guidelines, standard operation procedures, rosters, and meeting minutes) were reviewed and included.

Data collection tool and procedure

Data extraction form was prepared based on the objective of the study during review of similar literatures. We did a narrative review to extract concepts.

Data Management and analysis

Data was checked for completeness, consistency, missing values, and the data was cleaned, analyzed manually and narrated in five thematic areas.

Ethical consideration

Permission has been granted from Ethiopian Ministry of Health (MOH) as well as Saint Paul Hospital millennium medical college (SPHMMC).

Results

For reporting purposes, the findings have been categorized into five thematic areas. these thematic areas include firstly, DMAT establishment and governance which narrates how the team has been established, administered, and managed, the second section is a brief discussion about the human resource mobilization and capacity building, the third one discusses the details about team budgeting and how the team was operating in different deployed disaster situations, including the lessons learned. The fourth section elaborates about the internal and external stake holders involved in the establishment, deployment administration, and overall DMAT performance. Lastly, the fifth thematic area narrates the current team status and the challenges faced.

Establishment and governances of the disaster medical assistant team

Due to the influence of natural and man-made disasters in Ethiopia the MOH took the initiative to establish a disaster medical assistant team (DMAT) primarily targeting medical responses.

Following the initiative an agreement had been made between the Ethiopian MOH and SPHMMC for DMAT coordination, training, logistics and equipment, and drug management on August 31, 2018. MOH was responsible for the overall implementation of the program. Whereas SPHMMC was a party to the agreement who undertook the implementation and reporting of the program activities according to the provided agreement.

Since August 31st, 2018, DMAT was under MOH, and the budget was directly allocated, and it carried out various responsibilities within a period of one year. Later when permanent structure was developed there was an attempt to put it under the Ethiopian public health institute (EPHI).

The team activation or deployment was made by emergency and critical care directorates or by other higher officials of MOH. During an active disaster response, SPHMMC delegates incident management for overall response and was also responsible for logistic supply, as well as the report.

The plan of DMAT was based on hypothetical and past trends, there is no evidence indicating any hazard vulnerability analysis.

Human resources and Training

After the official launching of DMAT establishment, emergency, and critical directorate under MOH took a leading role in the development of the training manual in collaboration with Ethiopian public health institute, and SPHMMC. This manual was designed for DMAT members and stakeholders for effective disaster preparedness and response. It aimed to assist in training DMAT and stakeholders at different levels to enable them to prepare disaster management plans, respond and assist with recovery in both hospital and field disasters. It also provided guidance on effective communication, coordination, collaboration, and cooperation in performing roles and responsibilities in times of disaster to build community resilience and ensure that impacts are minimized by an efficient and effective disaster response.

MOH as well as the regional health bureau enrolled a multi-disciplinary of professionals from health facilities based on volunteerism. In regular situations these teams are the staff of health facilities and provide care, whenever there is disaster situation, team members were mobilized to provide care for victims of a disaster.

SPHMMC as per given mandate cascaded the first round of training to both national as well as regional DMAT (figure 1) in 2018/19. Training has been given to all regions and city administrations by the senior trainer who trained 678 DMAT members in 2018.

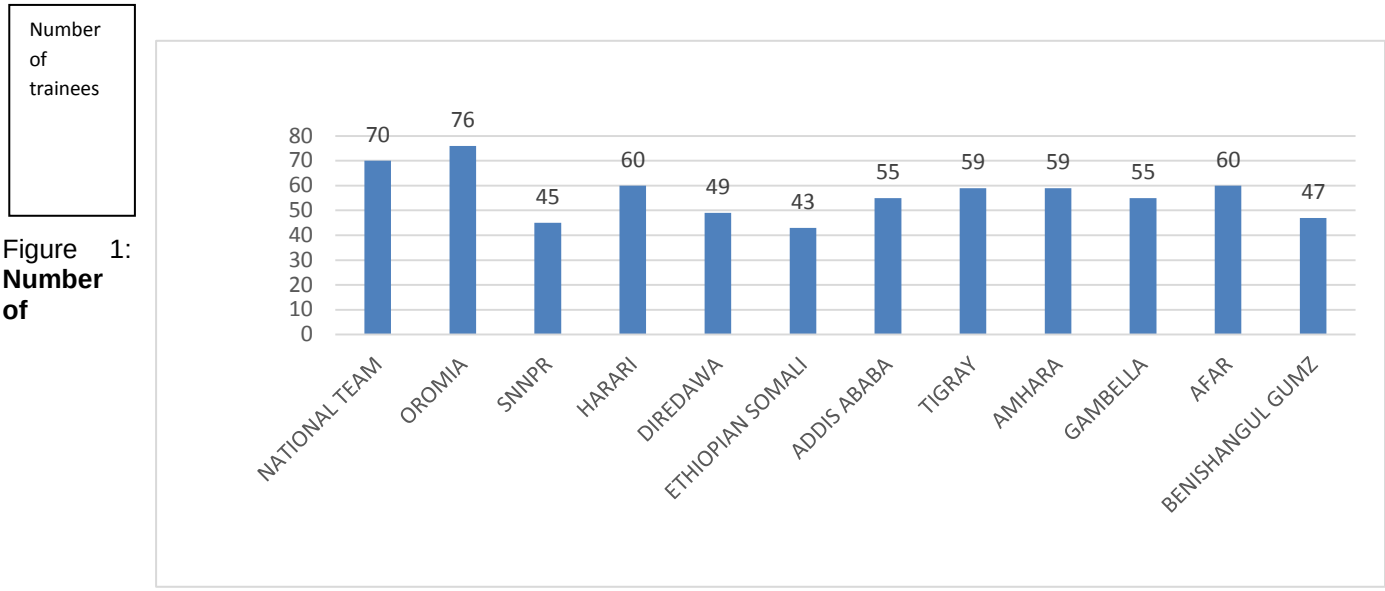

Figure 1: **Number of professionals provided disaster medical assistant training at nine regions, two city administrations, and national level in 2018.**

Budget and operations

DMAT Budget

The national level leading role, budgeting, and deployment was the responsibility of MOH, including regional respective activities being handled by the regional health bureau. Record review indicated that the national DMAT funding was made only for a year, from August 2018 to August 2019. As per our review the three-year spent budget was 21,000,700.00 Ethiopian birr (ETB).

National DMAT had four major deployments in the year (August 31, 2018-August 31, 2019) of which two were manmade disasters and the other two were mass gathering events, which demanded medical care. By deploying 108 multi-disciplinary professionals, the team provided medical care to 468 patients in the same year.

DMAT operation

Mass gathering medical care: Irreecha festivity and Qulubi religious gatherings are a few events with thousands of populations being gathered. Since the establishment of DMAT in Ethiopia, it became the trend to see such gatherings being provided with medical care in the field. Since 2018, the national DMAT in collaboration with the regional team were providing mass gathering medical care. In the first year, the team provided medical care for 272 patients in the Irreecha festivity and to 126 patients during the Qulubi mass gathering.

Disaster medical response experiences

Plane crash response: Ethiopian Airlines Flight 302 crashed on March 10, 2019, which was one of the catastrophic disasters the airline and the country has never encountered so far and placed the world in unfathomable concerns.

The team was deployed via its incident commander from the Federal Ministry of Health, after four hours of the plane crash. The incident commander thereby took the leadership and mobilized within the first two and half hours and arrived at the causality area after 4 hours of the activation because of difficulty for land transportation, and scarcity of air transportation. Unfortunately, the report indicated that there were no survivors out of 157 travelers of the plane crash, the team supported the forensic examining team and dead body handling. It was reported as one of the incidents that resulted in post incident stress that demanded post crisis debriefing which was undertaken a week later.

Benishangul Gumz Conflict based casualty response: In late April 2018, there was a conflict incident in Benishangul Gumuz region, Dangur district Metekel zone,620 km from the capital Addis Ababa. Since there was no road access for regional DMAT due to a blockage, because of the conflict area, in addition to limited capacity, the regional health bureau requested medical assistance from MOH. MOH initiated national DMAT to be deployed to the area. After having the ground situation details, the incident manager mobilized a team of 17 professionals within 24 hours. The deployed team consists of two emergency and critical care physicians, two general surgeons, one neurosurgeon, one anesthetist, 8 clinical nurses, two scrub nurses, and one general practitioner. Because of security challenges, lack of air transport to the area directly, it took 96 hours to arrive at the disaster designated hospital (Pawe general hospital). Ethiopian MOH in collaboration with the defense minister escorted the team, using the national defense force from Western command due to the tight security situation. After arrival at the destination, the team was sub-divided into the different service areas, due to the

minimal number of staff which remained in the Hospital, the DMAT team was obliged to provide care to previously admitted as well as new causalities in Hospital. The team remained for one week and provided medical care for 251 patients who were victims of this causality including 7 major surgeries, 7 minor surgeries, 60 different medical procedures, and remaining medical care. In addition to clinical care, the team extended the support for 5000 internally displaces population where health education, on environmental and personal education was given in addition to medical screening for acute medical care. Due to the relative security improvement, the team from regional DMAT arrived and the activities had been taken over. The team completed causality response debriefing for regional health bureau, MOH, as well, as Western defense force command.

COVID 19 response: Since early January 2020, through the request of MOH, the team was involved in the COVID 19 isolation, quarantine and treatment center, the team contributed especially in the preparation of Eka Kotobe general Hospital, by providing training, drill, and rehearsal exercises for almost one month before the first COVID 19 case was confirmed on March 13/2020, repurposing and structuring the facility so the hospital can achieve the minimum requirements for infection prevention and control. Some of the team had experience on Ebola treatment that may provide the team with confidence in terms of pandemic control. Even though there was intense training, the Hospital team were skeptical to handle the first case. The DMAT members were on-site to assist in handling the first case and subsequent other additional cases, which enabled the Hospital team to develop the confidence to provide care to the COVD - 19 patients.

Nine of the team members stayed for about eight months in the hospital, primarily assisting in critical care. In addition, the team was also involved in the national clinical advisory team, which provides a high-level advisory role for MOH.

Tigray mass causality incident response: The Team also had a significant contribution in planning for causality responses as well as a health system recovery plan in the Tigray region following the mass causality incidents since October 2020.

Though the conflict was categorized based on the political view, the report indicated that the team served both sides of the victims without bias. Due to the ongoing conflicts the data was dynamic and difficult to include in this article.

Stakeholder engagement and partnership: DMAT collaboratively worked for preparedness, risk reduction, mitigation, response, and recovery, primarily with regional health bureau, regional DMATs, Ethiopian public health institute, associations, and different levels of law enforcement bodies however no collaboration was made with international institutions or organization.

Current status and Challenges

Despite the dedication and commitment of MOH on the establishment and allocation of the necessary budget in the first year, the team had no source of the budget in subsequent years, however, MOH was still deploying the team to different emergency situations. The challenge was not limited to lack of budget but also lack of an organized warehouse for logistics, lack of international experience sharing and collaboration platforms. Currently, there are only 27 clinical nurses and 7 physicians actively responding and participating in the team at the national DMAT (48.57% of all trained national DMAT). Lack of motivation for deployment by the DMAT team especially after August 2019, one in five requests agreed for deployment. A review of the report indicated that there was no subsequent training given to the team.

Discussion

The world was affected by manmade and natural disasters including pandemics, hurricanes, population violence and war. It is assumed that the burden of disaster increases in the future because of climate changes, increased population density and terrorist attacks. In Ethiopia natural and manmade disasters, which are' frequently occurring, triggered the government to search for organized and timely response mechanisms. Cognizant of these facts Ethiopian MOH had organized DMAT in the past 3 years and the team undertook several national duties and responsibilities (4, 7).

In the beginning DMAT was under the MOH and the budget was directly allocated, and it carried out various responsibilities within the period of a year. Later there was an attempt to put it under EPHI to create better coordination and harmonization but the process failed. Many experts suggested that since, DMAT is a medical assistance which is more oriented on clinical care and hence it should be under MOH or should be an independent authority. In Japan Great Harishin and Awaji in 1995 and other subsequent disasters was a reason behind the establishment of DMAT (7).

There is structural similarity between previous Ethiopian and Japanese as well as the USA DMAT, the Ethiopian DMAT had no backing law in addition to a lack of mainstreaming (7,8,9, 10).

Upon our review we identified that, Ethiopian DMAT has no owner institution, this could be one of the major factors behind the current weakened status. Research indicated that in most nations DMAT, is institutionalized and has headquartered like in Japan and in the USA (8, 9, 10).

The Ethiopian DMAT team have provided the first-round of basic training for national and regional DMAT members although it was not followed by advanced and refreshed training. This helped to introduce basic concepts of medical disaster response to the team members and address certain competences important in emergency care which supposedly were unaddressed in previous sessions.

But in other nations DMAT training is more institutionalized and standardized and given uninterruptedly. This has helped to ensure sustainability and to develop it as a profession (9,10,11,12, 13).

In the USA, Australia, and Turkey they provide refresher courses and follow up with their members constantly. They can access most of their members when the need arises. (10) But in the Ethiopian context there is only a 51.43% of active team member decrement in the last 3 years due to multiple factors.

Even though activation to team deployment is within the time frame of national guidelines, which is 12-24 hours, there have been significant time wastage from mobilization to response due to many factors like transport and security during the response. The Japan, USA, Turkey DMAT guideline targets activation to deployment time to be within 48 hours (7, 8, 9, 10).

The hazard vulnerability will provide significant knowledge of the main characteristics of the nature of hazards (areas affected, time-frequency, duration, the population affected, effects, root causes and early warning signs) which will allow preparation of an appropriate response to avoid loos of life, injury or other health impacts, property damage, loos of livelihoods and services, social and economic disruption, or environmental damage (4,5,6,11,13). The Ethiopian DMAT plan is not based on hazard vulnerability analysis.

Ethiopian-DMAT team have been engaged in various activities including manmade violence in different parts of the country, rescue of a plane crash and pandemic management.

There was a significant engagement of national multi-sectorial stakes from different organization, even though international stakes are lacking.

Despite initial dedication of Ethiopian MOH, the status of the team shows that maintenance of the teams' performance and existence is challenged mainly due to the lack of owning institutions, lack of continuous capacity building, budgetary support, and high rates of member withdrawal.

Study limitation; being a cross sectional study, lack of related literature on low and middle-income countries for comparison and lack of adequate data on regional DMAT.

Conclusion

Ethiopia embarked on a historical measure in 2018 by establishing DMAT, which was influenced by the frequent occurrence of natural and manmade disasters. The team in the same year performed relatively excellent remarks on disaster response as well as providing mass gathering medical care. However, they were unable to maintain these achievements in subsequent years. The status of DMAT indicated that it is close to becoming obsolete unless corrective interventions are undertaken.

Recommendation

We recommend the revitalization of DMAT both at national as well as regional levels, taking health systems under consideration.

Advanced training and continuous subsequent refreshing training should be provided following the revitalization of the team.

Logistic challenges such as air transport should be considered so to deliver a timely response to emergencies.

The MOH and respective stake should work on mainstreaming the budget as well as other necessary resources being available for the team.

There must be a clear guideline that provides clear ownership and an applicable structure that solves the current challenges of the team.

MOH should institutionalize the DMAT and its training services to ensure sustainability of the program.

Abbreviations

COVID 19	Coronavirus Disease
DMAT	disaster medical assistant team
EPHI	Ethiopian public health institute
ETB	Ethiopian birr
MOH	Ministry of Health
RRC	Relief and Rehabilitation Commission
SNNPR	Southern Nation Nationalities and Peoples' region
SPHMMC	Saint Paul Hospital millennium medical college
USA	United States of America

References

1. Mehdi Beyramijam , Hamid Reza Khankeh , Mehrdad Farrokhi , Abbas Ebadi , Gholamreza Masoumi , and Mohsen Aminizadeh. Disaster Preparedness among Emergency Medical Service Providers: A Systematic Review Protocol. *Emergency Medicine International* 2020; 2020(10): .
2. Carl H. Schultz and Kristi L. Koenig. *ROSEN'S EMERGENCY MEDICINE: CONCEPTS AND CLINICAL PRACTICE, 7TH EDITION* , 7th ed. http://www.elsevier.com/: ELSEVIER; 2009.
3. Robert G. Hendrickson B. Zane Horowitz. *Tintinalli's Emergency Medicine A Comprehensive Study Guide*, 8th ed.

https://www.tintinalliem.com/: Mc GRAW hILL EDUCATION ; 2015.

4. Ministry of Health Ethiopia. *National Disaster Health preparedness and Response Guideline*, 1st ed. http://repository.iifphc.org/bitstream/handle/123456789/685/3%20National%20Disaster%20Health%20Preparedness%20and%20Response%20Guideline.pdf?sequence=1&isAllowed=y,MOH,2017: MOH ; 2017.
5. WHO. *A Strategic Framework for Emergencv Preparedness*, 2nd ed. https://www.who.int/ihr/publications/9789241511827/en/: who; 2017.
6. David Todd and Hazel Todd. *Natural Disaster Response Lessons from Evaluations of the World Bank and Others.* world bank : Evaluation brief ; no date.
7. Hisayoshi Kondo, M,Yuichi Koido; Kazuma Morino; Masato Homma; Yasuhiro Otomo;3 Yasuhiro Yamamoto;4 Hiroshi Henmi1. Establishing Disaster Medical Assistance Teams in Japan. *Prehospital and disaster medicine: the official journal of the National Association of EMS Physicians and the World Association for Emergency and Disaster Medicine in association with the Acute Care Foundation* December 2009; 24(6):
8. Sharon E. Mace , MD, FACEP, FAAP,Jaszmine T. Jones &Andrew I. Bern , MD, FACEP. An Analysis of Disaster Medical Assistance Team (DMAT) Deployments in the United States. *prehospital emergency care* 02 Jul 2009; 11(1):
9. Peter Aitken, Peter Leggat, Hazel Harley, Richard Speare & Muriel Leclercq. Human resources issues and Australian Disaster Medical Assistance Teams: results of a national survey of team members. *Emerging Health Threats* 25 Jan 2017; 5(0):
10. Ibrahim ARZIMAN. Field Organization and Disaster Medical Assistance Teams. *Turkish Journal of Emergency Medicine* October ,2015 ; 15(1): .
11. Steven Moore, Edward Blasser. A New Look at Disaster Medical Assistance Teams. *Military Medicine* October 1991; 156(10): .
12. van Berlaer, Gerlanta,b,d; Staes, Tomd,g; Danschutter, Dirkb,d; Ackermans. Disaster preparedness and response improvement: comparison of the 2010 Haiti earthquake-related diagnoses with baseline medical data. *European Journal of Emergency Medicine* October,2017; 24(5): .
13. J.cho,H.Ahm, H.Yang.J.Kim,W.P.ark, S.Hyum. A Disaster Medical Assistance Team (DMAT) Experience after Yeon-Pyeong Island Artillery Bombardment Incident. *The Journal Of Emergency Medicine* November 01,2012; 43(5): .