

indicator to the central government and the response of government also food aid from air to victim. These means that risk assessment, warning and dissemination and response were too weak.

The evolutions of Ethiopia EWS are discussed as follows. The first disaster management institution was called Relief and Rehabilitation Commission (RRC) established in 1974. RRC purpose was to provide relief assistance and response to the affected society. RRC had National Early Warning System department to predict the impending disasters but ineffective due to lack of coordinated disaster prevention, preparedness and response effort between local government and ministers (Mulugeta, 2010).

Then the RRC merged with the Settlement and Awash Valley Development Authorities, supported by Emergency Food Security Reserve to prevent famine. However, it was unable to prevent 1984/85 famine in Ethiopia due to lack of professional and coordination among different sectors (Atinkut, 2014).

In 1993 Ethiopia enacted the National Policy on Disaster Prevention and Management to preventing disasters by reducing their root causes, building the capacity necessary to reduce the impact of disasters and making check whether the required assistance to victims of disasters reached on time or not. This policy also established Disaster Prevention and Preparedness Commission (DPPC); National Disaster Prevention & Preparedness Committee as a Secretariat to DPPC to implement DRM policies and decisions; Early Warning and Emergency Response Directorate (EWARD) and Early Warning Working Group (EWWG in 1995. However, DPPC had weak information dissemination, coordination and response to warning (Mulugeta, 2010).

The DPPC had changed into Disaster Prevention and Preparedness Agency (DPPA) of Ethiopia. DPPA had DPPA, early warning system and Food Security Coordination Bureau (FSCB). The Early Warning Department and its working group have been conducting regular monitoring of exposure by using various signs of climate, crop, livestock and market situations. It invited representatives from international humanitarian organizations, international development agencies, national and international journalists to detect the state of the country in the affected areas.

In 2007 DPPC has transformed into Disaster Risk Management and Food Security Sector (DRMFSS) under Ministry of Agriculture and Rural Development. It was composed of Early Warning and Response Directorate (EWRD); and Food Security Coordination Directorate. The EWRD was supported by the Early Warning Working Group with members from line ministries, UN agencies and NGOs that have various assessment mechanisms and methodologies. It also involves all stakeholders, local communities, Federal and Regional governments, NGOs and donors.




In 2013 Ethiopia ratified disaster risk management policy, which recognized the necessity of a multi-hazard approach in relation to an integrated multi-sector approach grounded in a deep understanding of specific disaster risks and its link to sustainable development efforts and vulnerability; emphasis on prevention, mitigation, preparedness and post-disaster modalities and capacities; decentralization of resources and structures. It also clearly determines DRM responsibilities supported by the capacity for legal enforcement and a high degree of accountability; provides the direction for the kind of DRM system Ethiopia is envisioning to have in the future; relying on organizational structures with appropriate and harmonized roles and responsibilities at federal, regional and Woreda levels and ensuring horizontal and vertical coordination among decision making bodies and effective DRM systems and processes. It aims to enhance Ethiopia's capacity to withstand the impact of natural hazards at the national, local, community and household level and to significantly reduce the damages associated with disasters by 2023.

In 2015 DRMFSS change in to NDRMC, which is autonomous and independent Commission accountable to the Minister of Peace by council of minister's regulation No. 363/2015. It is responsible for coordinating disaster response, risk management, preventive measures and recovery programs in the country.

These evolutions of early warning system in Ethiopia law and institution indicated that EWS is decentralized, bottom-up approach, from traditional reactive ex-post emergency response and relief work to pro-active ex-ante preparedness and disaster risk reduction. It also conceptually old disaster management characterized by one agency show, top-down relief planning, centralized, donor-driven intervention, unclear responsibilities and authorities, limited preparedness modalities, focus on general affected population, free food handout, relief, saving lives, late intervention, neglect of livelihood, focal point at various levels undefined, imposition of projects/programs, & reactive response to disaster symptoms. Whereas, the modern disaster risk management concept characterized by multi-agency effort, bottom-up relief planning, decentralized, recipient-driven response, clear delegation of authorities and responsibilities, comprehensive preparedness modalities targeting

food assistance to the most needy creation of employment relief or development, saving lives and creation of community assets, preparedness for early response, protection of crops and preservation of livestock, focal points and center of co-ordination defined, full community participation with gender consideration, & conscious and proactive planning targeting to address root cause of disaster, & use of relief efforts to assist development efforts and use of development programs to eliminate root cause of food insecurity (Asmamaw & Simeneh, 2014) (Table 2).

Table 2. Early warning system structure of Ethiopia.

| |
|---|
| 1. Federal DPPC Chair PM or delegated individual Sec /Commissioner of CDPP; EWS committee Chair Commissioner of CDPP & Sec/ Head of Federal EW unit  |
| 2. Regional DPPC Chair President of Regional Council Sec /Head of BDPP NDPPC; EW committee Chair /Bureau Head of BDPP Sec/Head of Regional EW unit  |
| 3. Zonal DPPC Chair - Head of Zonal Council Sec /Head of DDP; EW committee Chair - Dept. Head of DDPP Sec /Head of Zonal EW unit  |
| 4. Woreda DPPC Chair Woreda Council President Sec/Head of Agriculture Office ZDPPC |

Success story of Ethiopia EWS

The most successful story of Ethiopian EWS is prevention a repeated occurrence of the famines that struck Ethiopia in the 1970s and 1980s. Its information has induced government, donor, UN and NGO humanitarian responses on an adequate scale to prevent the mass migration of vulnerable populations to famine camps. The Ethiopian EWS was successful in predicting potentially risks of the 1984/85, 1992, 1994/95, 1999/2000, and 2002/2003. In 1990 the EWS information urged the government to put a food reserve of 205,000 tons to provide food, in times of emergency, approximately for 4.2 million drought vulnerable populations about for four months, which was used for a worst famine that was expected to occur in 1999, 2000& 2003 (Atinkut, 2014). The Ethiopian disaster risk management policy recognized a “bottom-up” approach, which is a very good decentralized structure extending from region to kebele level (Atinkut, 2014).

Challenges story of Ethiopia EWS

Early warning is a tool to disaster risk reduction. The common challenges of EWS are the following (Carlos & Bogard, 2006; UNDRR and UNESCO-IOC, 2019).

The first is different hazards require different early warning systems; some hazards are difficult to predict. For example, the forecast of catastrophic eruptions or tsunamis in any part of the world is still facing major difficulties due to the lack of adequate measuring techniques to capture the true magnitude and timing; Weak linkage between the technical capacity and the public’s capacity to respond effectively to the warning, lack of understanding by the public and community organizations of their risk and vulnerabilities. Moreover, different hazards are handled differently like weather-related hazards through the national meteorological and hydrological services of the WMO system but no other disasters.

Ethiopian EWS has the pilot program for Livestock Early Warning System (LEWS), the Welfare Monitoring Unit (WMU) and other services provided by the Ministries of Health and Agriculture, and the National Metrological Services Agency (NMSA) also conducted EWS. However, no capacity for meta-analysis and no coordinating framework that brings together the different streams of information into a multi-sectoral early warning system. For instance, the NMA has about 1,000 hydro-meteorological stations of various classes located throughout the country. However, information at the local level is seen as unreliable, and not captured in a way that would allow the community itself to use the data for early warning and forecasting, and for planning of crop-livestock systems (Sue et al., 2003; Asmamaw & Simeneh, 2014).

Specifically Amhara region EWS challenges’ are weak coordination among different actors in the EW system, lack of appropriate allocation of resources for effective sharing of information and knowledge transfer for each EW sector, lack of planned and targeted training, persistent belief which dictates that some zones are self-sufficient and not risk-prone Zones, replication of reports, lack of technology based early warning information

flow, Weak information flow, the existence of nominal and inactive early warning committees and Lack of feedback from the region to the zone and from the Zone to the Woreda and the kebele levels(Gedif et al., 2016).

Additionally, the data collected at the woreda level, is processed at the federal level, and the results are transmitted to the government and relief agencies, rather than to the woreda officials and the vulnerable community; shortage of early warning data: in terms of its quality and quantity, the system has been facing a shortage of accurate and on time data; shortage of skilled human power which makes the function of EWS difficult; focus was mobilizing external food aid to the country for emergency needs rather than the implementation of EW principles; lack of stations: stations, to collect and organize data, are not enough and most of the stations are located next to the main roads or in towns; the government do not publicizing warning information about impending disasters; Its focus on rural areas& no attention for urban area(Atinkut, 2014).

Failure stories of Ethiopia EWS

Ethiopia has more than three decades EWS system but it has the following failure stories.

Drought

Ethiopia have experienced three most terrible drought induced famines in 1957/58, 1964/65 and 1973/74. The 1957/58, & 1964/65 silent famines were centered in North Wollo because the government attempt to hide the famine to the international community but exposed by international media. These famines took the lives of over 250,000 people. The 1984/85 famine period claimed a million people. However, the dergue government was busy with its preparation to celebrate the 10th anniversary of its seizure of power (Atinkut, 2014). This humanitarian assistance program violates the reputation of Ethiopia, which make the symbol of famine(International Federation of Red Cross and Red Crescent Societies, 2013) (Sue et al. 2003). Moreover, The Food and Agriculture Organization (FAO) revealed that by December 2021, the impact of the drought had extended to at least 11 administrative zones across three regions, namely Somali (six zones), Oromia (four zones) and Southern Nations, Nationalities, and Peoples SNNP (one zone) regions (OCHA, 2022) (**Table 3**).

Table 3. People dying in regions of drought.

| Region | Number |
|---------------|---|
| Oromia | 95,000 dying livestock |
| Somali | 67,000 dying livestock |
| SNNPR | 10, 000 dying livestock |
| Three regions | 2 million livestock at risk of dying 4 million people livelihoods affected |

Flood early warning system

In Ethiopian is prone area for flood due to a national topography of mountainous highlands and lowland plains, with natural drainage systems formed by the principal river basins. The National Meteorological Agency (NMA), the Flood Taskforce led by DRMFSS and comprised of representation from NMA, sectoral line ministries, UN agencies, NGOs and donors, under the Disaster Risk Management Working Group (DRMTWG) have responsibility for early warning (IFRC Reports, 2020). For instances; in 2020 the National Disaster Risk Management Commission (NDRMC) reports indicated in the following **Table 4**.

Table 4. Flood affected and displaced people by Regions from June to September 2020.

| Region | Flood Affected | Flood Displaced |
|----------|----------------|-----------------|
| Afar | 162,921 | 128,242 |
| Amhara | 144,490 | 6,010 |
| Gambella | 31,865 | 18,819 |
| Oromia | 447,565 | 46,028 |
| Somali | 140,892 | 37,650 |
| SNNPR | 90,121 | 56,114 |
| Total | 1,017,854 | 292,863 |

Sources: (IFRC Reports, 2020)

This table shows close to 1,017,854 people have been affected and 292,863 people are displaced, killed 3,714 livestock, destroyed crops, and damaged homes and public infrastructure. Among regions in terms of the most flood affected people was Oromia & in term of the most displaced was Afar. In Dire Dawa city in 2006 flash floods claimed about 250 people died, 240 reportedly disappeared and 10,000 were displaced due to lack of effective early warning system (Dejene & Amsalu, n.d.). This data indicated that flood early warning system is not effective to prevent disaster.

Desert Warm Locust EWS

Desert locust is one of the dangerous trans-boundary pests based on the wind direction that cause severe threat to the livelihoods of farmers and pastoralist communities of Ethiopia. For instances, June 2019 and February 2020 total about 121,495.6 hectares of land groups & grass in Afar region, Somali region, Dire Dawa City Administration council, Southern Tigray, Eastern Amhara, South eastern Oromia and southern districts of SNNP region were infested by desert locust between. The government mobilized the local community and use chemicals, aircraft hire, awareness raising and training and deployment of human resources. However, Ethiopia did not have drones suitable for locust and other pests' survey and information collection, modern AU8000 motorized long lances capacity sprayers, & field vehicle (<https://reliefweb.int/report/ethiopia/desert-locust-current-uptake-2019-2021-11-aug-2021>)

Fire Risk Management

Ethiopia has not firefighting organization and legal framework. There are no trained and equipped personnel, budget for firefighting and the prevention is mainly through the mobilization of the farming communities. The Forestry and Wildlife Technology and Regulatory Team within the ministry of agriculture at the federal level and bureau of agriculture at the regional levels are responsible for forest fire. The Addis Ababa city administration and regional government cities have fire fighter department. However, Ethiopia has not effect fire early warning, no reliable statistical data on occurrence of fires, areas burned and losses are not available, no communication system to transmit the information to the responsible office, which is usually reported by telephone if it is at all available (Million, 2001).

Historical evidence indicates that fire is the means of war, conflict & food production. Ethiopia is still having not fire early warning system. Examples of fire incident in Ethiopia were Addis Ababa Police Commission on Tuesday announced that there had been 110 fire accidents in the city in the span of six months on February 2, 2021. Twenty-four of the accidents were on businesses. About five people have been killed and property worth 157 million birr was damaged, said the commission. It is due to Improper use of power lines and poor installation of electric lines, improper storage of flammable items and explosion of stoves that work with gas and oil are among causes listed in the police report. Additionally, Forest fires broke out in 2000 were Bale, Borana, Jimma, Ilubabor, East Wellega, East and West Hararghe and Arsi Zones of Oromia Region; Benishangul Gumuz and Gambella Region and SNNPR zones, Amhara region Semain mountain national park.

Conflict Early Warning System

In 2018, a Ministry of Peace (MoP) was established to resolve intergovernmental conflict between federal & regional governments, or among regional governments. To discharge these responsibilities the peace minister has conflict prevention & resolution directorate general, which sub classified into culture of peace building directorate & early warning directorate. The early warning system also has structure from minster of peace, regional, zonal, woreda, & Kebel peace & security department and also kebel level filed workers (**Figure 1**).

Inter-ethnic conflict

In Ethiopia ethnic based attach has been increasing since the adoption of the FDRE constitutions. In 2018, almost 2.9 million new conflict displacements were recorded from mostly Gedeo, West Guji and East and West Wollegas. Violence also forced people from their homes in the Afar, Amhara, Benishangul Gumuz and Southern Nations, Nationalities and People's (SNNP) regions, pushing the number of new displacements to nearly 1.7 million in the country as a whole, a 61 per cent increase on the figure for 2019 (Adeto, 2019; Dugo & Eisen, 2018a; Dugo & Eisen, 2018b; Dugo & Eisen, 2017; Birru, 2018; Mengistu, 2015; Yeneabat, 2020; Wogene et al., 2016).



Figure 1. Conflict Early warning system in Ethiopia.

TPLF aggression

The conflict between the federal government and TPLF the ruling party of Tigray has been escalating since 2018. In September 2020 Tigray region established its own election board & held elections in against the postponed of national election due to the Covid-19 pandemic. The federal government launched a military offensive in early November in response to an attack of the northern command base of national army. This war has been conducting more than nine months’, which claimed many life, property destruction, internal displaced person (Ylönen , 2021; Ayenew, 2021; Desalegn, 2019; Legesse , 2021).

CONCLUSION

Ethiopia is the most disaster-prone country due to it is geographical position and diversity. Ethiopia early warning system in 1970s was famine disaster focus, no effective early warning system, and the providing reliefs to the victims. The existing Ethiopian early warning system is organized in directorate level at federal level, multi sectorial, multi hazard, proactive, and the disaster risk management commission accountable to the prime minster. The early warning system is decentralized from federal, regional, woreda level and it is bottom (community) to top approach.

The failure stores of Ethiopian EWS were violating honor of Ethiopia, no conflict, traffic accident, & fire early warning system, lack of qualified personal, budget, technology & coordination. The challenges of Ethiopia early warning system are lack of expertise, coordination, no community participation and not multi- hazard EWS.

Therefore, government of Ethiopia should implement the multi sectorial & multi hazard national disaster risk management policy and strategies, mainstreaming multi hazard early warning system in every government minster. The government should adopt community based early warning system.

LIMITATION OF THE STUDY

This this study is desk review, it lacks triangulation and detail analysis. Therefore, other researcher should conduct further study on Ethiopia Early warning system through mixed research approach.

REFERENCES

1. Adeto, Y. A. (2019). Preventing violent extremism in the Horn: The case of ethnic extremism in Ethiopia (Issue July).
2. Ashenafi Dejene & Yetayal Amsalu. (n.d.). Strengthening Community-based Early Warning Systems through a multi-sectoral platform.
3. Asmamaw, T. J. S. (2014). Conceptual Understanding of Disaster Risk Management, Disaster Risk Management and Sustainable Development Department, Bahir Dar University (Issue December).
4. Atinkut, B. (2014). The Historical Development of Early Warning Practice in Ethiopia Since 1970s. *Global Advanced Research Journal of Social Science*, 3(August), 44-51.
5. Cowan, Y., Brien, E. O., & Rakotomalala-rakotondrandria, N. (2009). Community-based Early Warning Systems: Key Practices for DRR Implementers.
6. Gedif, B., Wondmagegn, W., Ayalew, T., & Gelaw, L. (2016). Analysis of the existing early warning systems: The case of Amhara national regional state. *International Journal of Advanced Scientific Research International*, 1(9), 24-28.
7. IFRC Reports, W. D. (2020). Emergency Plan of Action (EPoA) Ethiopia flood. In International Federation of Red Cross & Crescent (Issue June).
8. International Federation of Red Cross and Red Crescent Societies. (2013). Ethiopia: Country Case Study Report About the IFRC Disaster Law Programme (Issue April). <http://www.ifrc.org/dl>
9. Juan Carlos & Janos Bogard. (2006). Early Warning Systems in the context of Disaster Risk Management.
10. Million. (2001). Fire Management Requirements in Ethiopia-The need for international support.
11. Sue Lautze, Yacob Aklilu, Angela Raven-Roberts, Helen Young, Girma Kebede, J. L. (2003). Risk And Vulnerability in Ethiopia: Learning from The Past, Responding to The Present, Preparing for The Future. A Report for The U.S. Agency For International Development.
12. Sufri, S., Dwirahmadi, F., Phung, D., & Rutherford, S. (2020). A systematic review of Community Engagement (CE) in Disaster Early Warning Systems (EWSs). *Progress in Disaster Science*, 5, 100058. <https://doi.org/10.1016/j.pdisas.2019.100058>
13. UNDRR and UNESCO-IOC. (2019). Limitations and Challenges of Early Warning Systems: A Case Study of the 2018 Palu-Donggala Tsunami. United Nations Office for Disaster Risk Reduction (UNDRR), Regional Office for Asia and the Pacific, and the Intergovernmental Oceanographic Commission of (Issue SEPTEMBER 2018).
14. United Nations Development Programme. (2018). Five approaches to build functional early warning system.