Environmental Health: Creating Resilient Communities Through Disaster Risk Reduction and Climate Change Mitigation and Adaptation

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Abstract

The paper was introduced by looking at environmental health as a pivotal part of public health. Terms were defined, they included environment, environmental health, resilience, resilient communities, disaster, disaster risk reduction, climate, climate change, climate change mitigation and climate change adaptation. Also, the factors responsible for causation of disasters and climate change were discussed. The consequences of human activities on the environment including cyclones, hurricanes, floods, tsunami, earthquake, drought, heat wave and health/biological/epidemiological disasters were talked about. Furthermore, the way forward to avert and mitigate disasters and climate change was identified. Principally, trees planting and renewable energy use was strongly advocated for. Initiatives for disaster risk reduction and climate change mitigation and adaptation - the 3rd United Nations World Conference on Disaster Risk Reduction at Sendai, the Paris Agreement on Climate Change and the Addis Ababa Action Agenda were mentioned**.** The various ways of creating resilient communities through disaster risk reduction and climate change mitigation and adaptation were mentioned. The protection of disaster victims in emergencies, roles of the government and others in disasters risk reduction and the duties of the Environmental Health Professionals in achieving the 2030 Goals for Sustainable Development were discussed. Conclusion and recommendations were clearly stated.

Key words: Adaptation, Environment Health, Climate change, Disaster risk, Resilient communities

Introduction

On 26th September, 2011, the WEHD was launched by the International Federation of Environmental Health (IFEH) Council at its meeting in Indonesia. The launching was to assess and control environmental factors that can potentially affect health, and it is targeted at preventing diseases and creating health-supportive environments. Environmental Health is one of the largest and core field in public health. It is concerned with the control of the factors in man's physical environment that impact negatively on his overall well-being. Climate change and disasters take place in man's physical environment. Joint and holistic approaches are needed in creating a safe and habitable environment before, during and after disasters. Climate Change and disaster risks are fundamental threats to sustainable development, and the living and health conditions for all humans on the globe and the reduction of poverty. Building resilient and sustainable communities means addressing both climate change and disaster risks, and integrating these risks, as well as potential opportunities, into planning and budgeting for development. The needed response to avoid disasters is Disaster Risk Reduction initiatives and planning which include climate change mitigation and adaptation and for future policy action to promote successful coordination to create resilient communities.

Consequences of Human Activities on the Environment

It is projected that the number of people exposed to disasters now would double by the year 2030 (Wilander, 2021). According to Onojeharho (2020), the under mentioned are some of the disasters that ravage the world today;

Cyclones: In meteorology, a cyclone is a large-scale air mass that rotates around a strong Centre of low atmospheric pressure. In other words, cyclones are characterized by inward spiraling winds that rotate about a zone of low pressure. It is a tropical wind that has a speed that exceeds 119 km (74 miles) per hour. They are formed over the South Pacific and Indian Ocean.

Hurricanes: They are tropical winds formed over the North Atlantic Ocean and Northeast Pacific. They have a speed of about 119 km (74) miles per hour.

Floods: Flood is excess water in a place where it never existed. Monsoon rains, snow melt, tidal waves and collapsed dams are some of the things that trigger floods which affect millions of people each year. The devastation is often widespread, from loss of lives, properties and infrastructure to food insecurity and diseases. Floodwaters also pose threats to food safety and public health. Presently, Maiduguri in Borno state is facing its most devastating flood since 1994 due to overflow of Alau Dam caused by excessive rainfall (Udi, 2024).

Tsunami: A tsunami is a harbour wave that takes place in the ocean, lakes and it ranges from a few inches and goes as high as 100 feet. Tsunamis are giant waves caused by earthquakes or volcanic eruptions under the sea.

Earthquake: It is an unexpected and rapid shaking of the earth due to the breakage and shifting of the underneath layers of the earth. Some earthquakes are weak and small in size such that they cannot be felt, while others are big and violent enough to toss people around and destroy whole cities.

Drought: Drought means a long period of time in an area when rain or any other form of precipitation does not occur. It cripples food production, depletes pastures, disrupts markets and in the extreme, causes widespread human and animal deaths. In Sudan (Horn of Africa) in 2011 and Sahel regions in 2012, droughts caused much devastation.

Heat wave: A heat wave could be described as a period of unusually hot weather lasting two or more days accompanied by high humidity.

Health/biological/epidemiological disasters: They could be described as the occurrence of significant and unusual cases of infectious' communicable diseases. An example is the Corona virus disease 2019 (COVID-19) pandemic; a global infectious disease outbreak caused by severe acute respiratory syndrome SARS-CoV-2 in 2019 (WHO, 2024).

Factors responsible for causation of Disasters and Climate Change

Energy is at the bedrock of climate change and its concomitant effects. Most of the greenhouse gases which blanket the earth and trap the sun's high temperature produced via energy by burning fossil fuels in the generation of power and heat. Burning of fossil fuels, such as coal, oil and gas result to the release of various greenhouse gases, especially carbon dioxide, methane, ozone and the chlorofluorocarbons (CFCs) (United Nations Climate Action, 2024). Meanwhile, these gases are resultant effects of human activities like production of goods and services in industries, transportation, power supply, domestic cooking, bush burning, deforestation and many more (Jackson, 2024).

The way forward to avert and mitigate Disasters and Climate Change

1. Planting of trees: One principal way of halting disasters and climate change is planting of trees. Planting of trees planting is one of the most important steps humanity can take to ensure a healthy and sustainable environment for inhabitants of the world. Trees produce oxygen needed to maintain body metabolism and absorb carbon dioxide. Planting of treed has many

advantages including absorption of carbon dioxide, nitrogen oxides, sulphur dioxide and other obnoxious gases responsible for global warming and climate change (Master Yard Life, 2024).

2. Renewable energy: Another major solution to disaster reduction and climate change is renewable energy. It is key to a safer, cleaner, and sustainable world where humanity can stay with little or no problems. Renewable energy sources are the sun, wind, water, waste, bioenergy (biogas) and heat from the earth. They are supplied by nature and emit little or no greenhouse gases or pollutants into the atmosphere (United Nations Climate Action, 2024). Renewable energy is essential for the following reasons (United Nations Climate Action, 2024);

It is ubiquitous: Renewable energy sources are everywhere and are all around us. About 80% (6 billion people) of the globe are dependent on fossil fuels. However, it is estimated that about 90% of the world's electricity can and should come from renewable energy by 2050.

Renewable energy is cheaper than other sources of power supply: A close look at global statistics indicate that renewable energy is the cheapest source of energy in most parts of the world today. The cost of electricity from solar power fell by 85 percent between 2010 and 2020. Similarly, costs of onshore and offshore wind energy fell by 56 percent and 48 percent respectively. One of its major advantages is that it is good for low and middle-income countries all over the world.

Renewable energy is healthier: According to the WHO (2022), about 99 percent of people in the world breathe air that exceeds air quality limits and threatens their health, and more than 13 million deaths around the world each year are due to avoidable environmental causes, including air pollution. The unhealthy levels of fine particulate matters and nitrogen dioxide originate mainly from the burning of fossil fuels.

Renewable energy creates jobs: Whatever amount that is invested in renewable energy generates three times more jobs than in the fossil fuel industry. It is projected that the transition towards zero emissions of fossil fuel will lead to an overall increase in the energy sector jobs, while about 5 million jobs in fossil fuel production might be lost by 2030.

Renewable energy is more economical: In the year 2022, globally, more than $7 trillion was spent on subsidizing the fossil fuel industry. The subsidies included tax breaks, health and environmental damages that were not accounted for in view of the cost of fossil fuels. Comparatively, more than $4.5 trillion is needed annually to be invested in renewable energy until 2030. It includes investments in technology and fundamental infrastructure.

Creating Resilient Communities through Disaster Risk Reduction

Clark-Ginsberg (2015) stated that the ways in which resilient communities could be created include the following;

1. Risk analysis: It is the qualitative or quantitative approach to determine the nature and extent of disaster risk. Disaster risk assessments include; the identification of hazards; a review of the technical characteristics of hazards such as their location, intensity, frequency and probability; the analysis of exposure and vulnerability, including the physical, social, health, environmental and economic dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities with respect to likely risk scenarios (UNDRR, 2024).

2. Coordination: It refers to a number of activities embarked upon by governmental and non-governmental organizations, civil society groups and others in managing disasters. In coordination, both human and non-human resources are properly managed to achieve desired goals.

3. Reducing scale, intensity or frequency of hazards: According to the International Union for Conservation of Nature and Natural Resources [IUCN] (2024), climate change is increasing the frequency, intensity and magnitude of hazards, impacting vulnerability of human communities and changing exposure patterns. Environmental degradation contributes to growing disaster risk Nature-based solutions can help communities prepare for, cope with, and recover from disasters.

4. Reducing vulnerability: Vulnerability reduction is key in emergencies and disasters management. Vulnerability means being exposed to risk in the environment.
5. Addressing drivers of inequality: Drivers of inequality are the factors that predispose a group of people to certain hazards than other people. They are poor education, poverty, gender, age, poor social status and sicknesses. These inequalities should be addressed so that the most vulnerable will have a sense of belonging. The people should be empowered so that they can live well.
6. Improving coping and recovering capacity: One of the most important assets that is available during relief stage in emergencies are the survivors of disasters. There is need to involve them in rebuilding a better community. It is worthy to note that the first support comes from the people who survived disasters. Attempts to undermine their potentials might spell doom for the affected people.
7. Improving response capacity: After a major disaster, the need for search, rescue and first aid cannot be over looked. The management of mass casualties can be divided into search and rescue, first aid, triage and stabilization of victims, hospital treatment and redistribution of patients to other hospitals if necessary.
8. Building governance institutions: Good governance institutions should be built for disasters and emergencies. This should involve the governments, traditional institutions, corporate bodies and professional associations. The strategies should be comprehensive in that a pattern of safety is established for the people.
9. Innovation, learning and exit strategies: This implies that new things are to be brought into limelight. New ways of approaching situation should be introduced for the prevention, control and mitigation of natural and manmade disasters in the community. Introduction of new strategies is not enough. There is need for teaching the community people how to adopt them for their wellbeing. Remediation is also important for a people to recover from disasters.

Creating Resilient Communities through Climate Change Mitigation and Adaptation

According to Hallegatte, Rentschler and Rozenberg (2020), the following are the ways to build resilient communities through climate change;
1. Build resilient foundations with rapid and inclusive development: Poverty and the lack of access to basic services including infrastructure, financial services, health care and social protection are strong predictors of vulnerability to climate change. To put it in another way, the poorer communities are the ones climate change will affect more.
2. Help people and firms to do their part: It is critical to boost the adaptive capacity of households and firms. Many households and firms already have incentives to adapt, but they need help in overcoming obstacles, ranging from a lack of information and financing, to behavioural biases and imperfect markets.
3. Revise land use plans and protect critical infrastructure: In addition to direct support to households and businesses, governments must also play a role in protecting public investments, assets and services. Urban and land use plans are also important responsibilities of the public sector, and they influence massive private investments in housing and productive assets, so it is vital these adapt to evolving long-term climate risks to avoid locking people into high-risk areas.
4. Help people and firms recover faster and better: Risks and impacts cannot be reduced to zero. Governments must develop strategies to ensure that when disasters do occur, people and firms can cope without devastating long-term consequences, and can recover quickly. Preparations such as early warning and emergency management systems reduce physical damage and economic losses.
5. Manage impacts at the macro level: With many impacts in many sectors, from floods affecting housing prices to changes in ecosystems affecting agriculture productivity, climate

change will affect the macroeconomic situation and tax revenues. Some impacts on major sectors (especially exports) can affect a country's trade balance and capital flows. The combination of these factors may result in new risks for macroeconomic stability, public finances and debt sustainability, and the broader financial sector.

6. Prioritize according to needs, implement across sectors and monitor progress: Governments must not only prioritize actions to make them compatible with available resources and capacity; they must also establish a robust institutional and legal framework, and a consistent system for monitoring progress.

Other ways of creating resilient communities through climate change mitigation and adaptation according to Amarnath, Mweemba, Manishimwe and Koppen (2023) are;

7. Build green infrastructure: This involves planting trees and vegetation, creating green spaces and promoting natural drainage systems to reduce the risk of flooding and improve air quality. Green infrastructure also offers benefits such as shade, cooling, and habitat for wildlife.

8. Promote sustainable climate-smart agriculture: This includes using sustainable farming practices, such as crop and nutritional diversification, conservation tillage and water management to reduce the impacts of drought, flooding and other climate-related challenges on food production.

9. Develop early warning systems: This involves creating and implementing systems to detect and respond to weather and climate-related hazards such as floods, storms and heat waves. Early warning systems can help communities prepare and respond to disasters more effectively.

10. Provide climate-smart energy solutions: Promoting the use of renewable energy sources, such as solar and wind power, and fostering energy-efficient practices can reduce greenhouse emissions and reduce energy costs.

11. Create community-based disaster risk reduction plans: This involves engaging with community members and local organizations to develop plans for responding to and recovering from disasters such as floods, storms and wildfires. These plans can help reduce the risk of loss of life and property damage during disasters.

12. Improving community-based water tenure for enhanced and sustainable resilience: This involves the provision of a reliable water source during the dry season and protection against floods and storms. This improves health and well-being, reduces food insecurity and promotes economic development. The use of ground water being the planet's largest water reservoir can be effective in this.

Initiatives for Disaster Risk Reduction and Climate Change Mitigation and Adaptation

The Sendai conference of 2015:

The 3rd United Nations World Conference on Disaster Risk Reduction was held in the city of Sendai, Japan, on March 18th, 2015. The conference created a blueprint for global disaster risk reduction. Among other things, the framework for Disaster Risk Reduction 2015-2030 clearly states four priorities for implementation to prevent new and minimize existing disaster risks; (i) Comprehending disaster risk; (ii) Strengthening disaster risk governance to manage disaster risk; (iii) Committing funds in disaster reduction for resilience and; (iv) Improving disaster preparedness for efficient and robust response, and to "Build Back Better" in recovery, rehabilitation and reconstruction (UNDRR, 2015).

Paris Agreement on Climate Change, 2015:

Another international agreement is the Paris Agreement on Climate Change. Held in Paris, France, on 12th December, 2015, it came into force on 4th November, 2016. Its major objectives are to reduce the discharge of gases that cause global warming, enhancing adaptive capacity, to create resilience and reduce vulnerability to climate change. Also, it is intended to limit global temperature rise to 2ºC (United Nations Climate Change [UNCC], 2016).

Addis Ababa Action Agenda in 2015:

Also worthy of mentioning is the Addis Ababa Action Agenda **in** 2015, where countries accepted action plans by governments, governmental organization, non-governmental organizations, international agencies, businesses and civil society groups to generate more fund for social, environmental and economic issues in meeting with the Sustainable Development Goals **(**United Nations Organization, 2023).

Protection of Disaster Victims in Emergencies

The protection of disaster victims in emergencies is vital in disasters' management. This is because all management procedures and methods are targeted at alleviating the miseries of disasters victims; which is the main objective of disaster management. However, this part focuses on personal protections and safety tips in specific emergencies and disasters (Famuyiwa, 2014). The general protective measures in emergencies are as follows;

When in emergency, do not use phone except to call for help. This is to make the telephone line free for the organizations to respond.

Listen to the message broadcast by media houses to be informed of recent developments.

Carry out official instructions by the radio (media houses).

Keep a family emergency kit ready which should contain blankets, little food items, little clothing, little water, little utensils, radio etc. (Famuyiwa, 2014).

Roles of the Government and Others in Disasters Risk Reduction

Adefisoye (2015) said that the functions of the National Emergency Management Agency (NEMA) are as follows;

1. Evaluating the risk of the country or particular part(s) to disaster(s)
2. Adopting standards and regulations
3. Organizing communication, information and warning systems
4. Ensuring coordination and response mechanism
5. Adopting measures to ensure that financial and other resources are available for increased readiness and can be mobilized in disaster situations
6. Developing public educative programmes
7. Coordinating information sessions with the mass media
8. Organizing disaster simulation exercises that test response mechanism
9. Searching, rescuing and providing first aid for disaster victims
10. Providing relief materials and fund for disaster victims.

What should the Environmental Health Officers do?

The world is at a crossroads. Climate change resulting to disasters and other daunting environmental and health challenges is undermining the ability to achieve the 2030 Agenda for Sustainable Development, including the Sendai Framework for Disaster Risk Reduction. The Environmental Health Professionals are expected to intensify efforts in their scope of work. According to Scarlett (2024), such areas should include but not limited to;

1. Air Pollution control
2. Water Pollution control
3. Land pollution control
4. Waste water management
5. Drinking water supply
6. Water-borne diseases prevention and control

7. Vector borne disease prevention and control
8. Infectious disease outbreaks prevention and control
9. Inspection of food to ensure safety and security
10. Proper disposal of the dead
11. Vector borne disease control
12. Provision of emergency shelters
13. Ports and border control
14. Hazardous waste control
15. Taking part in design of emergency and disaster risk reduction planning
16. Health educating the public about health risks and how to avoid risks
17. Housing inspection. With these, achieving the 2030 Goals for Sustainable Development might be possible in the face of changing climatic conditions.

Conclusion

At the inaugural proclamation of the WEHD in 2011, the IFEH stated key areas in which environmental health professionals especially the Environmental Health Officers can provide core services. The areas in which they provide core services according to Joshua, et al, (2023) include sanitary inspection of premises, food safety, sanitation, the protection of water quality for drinking and recreation, the protection of indoor and outdoor air quality, communicable diseases control, vector management, emergency management and disaster preparedness. The Environmental Health Officers require investigative, analytical, communicative and educational skills, among others to function effectively. Therefore, a healthy environment is important for the well-being of mankind.

Recommendations

Disaster management should be the concern of every individual. This should be so because; it can be the turn of a group of persons at any particular time. The following may be important to every individual in the control of disasters in the society:

1. The members of the community should be conversant with the various disasters which they are prone to and be able to devise measures of preventing or reducing their effects.
2. The government at all levels should monitor the activities of the people to ensure that their activities do not pose threats to the environment.
3. Prompt assistance to disaster victims should be observed by the government and other stakeholders.
4. Assistance meant for disaster victims should not be diverted to other areas.
5. There should be means of immediate transfer of disaster cases to the appropriate health institutions as stated by the authority.
6. Professional bodies like Environmental Health Officers Association of Nigeria (EHOAN) and others should be actively involved in disasters' management and mitigation.
7. There should be public education.

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