Public Health Emergency and Disaster Management: Indian Perspective

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Abstract

The COVID-19 pandemic in the past was accompanied by an abrupt increase in cases, and since health emergencies and disasters are unexpected, preparation is crucial. With a stretched-thin staff and a rise in signals, events, resource requests, deliveries, and deployments, maintaining supervision and keeping track of public health initiatives will become increasingly difficult within an over-stretched and limited workforce context. This pandemic has taught many lessons. Perhaps one of the most pervasive weaknesses was the constant challenge of coordination. Both the response and the preparedness pillars in many countries had highly intelligent leaders and dedicated responders with extraordinary skill sets, however, the coordination within and between the pillars kept breaking down. Three factors may have contributed to this. Firstly, expertise at all levels may be lacking the tools, training, and experienced staff to rapidly implement the strategic guidance. Secondly, leaders of the response at all levels similarly lacking the tools, training and work force to be able to shift their staffs from a slow, deliberative, consensus management ("peacetime footing") to a rapid, higher risk, delegated functioning ("war footing"). Finally, the principles of public health emergency and disaster management (including Incident Response Systems or Incident Management System and EOC emergency operations) were not disseminated, understood, embraced or practised by a sufficiently large group of individuals to enable the response to function in a coordinated fashion under emergency conditions. The Government of India (GoI) is making all essential preparations to be well-equipped to handle any sudden increase in cases. We need to strengthen the capabilities in terms of "Public Health Emergency and Disaster

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Management" in order to handle present and new risks to public health as well as the requirement for effective resource and information management in addition to the use of subject matter expertise.

Keywords: *Public Health Emergency and Disaster management; COVID-19 pandemic; capacity building; community engagement; Government of India*

1. Introduction

Severe Acute Respiratory Syndrome Coronavirus (SARS-1), H1N1 (Swine Flu), Nipah, Zika, Ebola, Avian Influenza, Dengue, Japanese Encephalitis, Acute Encephalitis Syndrome (AES), Crimean Congo Hemorrhagic Fever (CCHF), Plague, and recent pandemic of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), among other emerging infections, have caused public health emergencies. There have reportedly been more natural and chemical disasters in the nation during the past several decades, including cyclones, floods, earthquakes, tsunamis, cloud bursts, and the Bhopal tragedy.

The factors responsible for such an increase have been observed to be due to more close interaction between human and animal populations, emergence of newer pathogens, increased travel and trade (domestic and international), climate change, lifestyle changes, dietary habits, water storage practices etc. The aspiration and need for public health preparedness and response during large conglomerations like Kumbh Melas etc. has also been realized. As a consequence of migration, transitioning into shelters/camps, social unrest, financial loss, lifestyle changes, damage to healthcare facilities, infrastructure, environment, and adjustments to the larger political and socioeconomic backdrop, these can lead to direct effect on one's physical and mental health.

There are similarities across disasters despite the fact that each one differs from the others in that it impacts areas with various degrees of susceptibility as well as particular social, health, and economic aspects. The management of health humanitarian aid and resource usage can be improved by taking into account certain common variables (PAHO 2000).

- There is a connection between a disaster's types and its impact on health. This is especially true of the direct injury-causing impact. For instance, floods and

tidal waves cause relatively few injuries that require medical attention, whereas earthquakes frequently have large casualties.

- Some consequences pose a possible risk to health rather than an unavoidable one. For instance, although epidemics typically do not originate from natural catastrophes, population shifts and other environmental changes may raise the likelihood of disease transmission.
- Following a tragedy, not all health risks actual and potential occur at once. Instead, within a disaster-affected area, they often occur at various periods and have varying degrees of relevance. The hazards of increased disease transmission take longer to develop and are highest where there is overcrowding, and standards of cleanliness have dropped. As a result, casualties mostly occur at the time and location of impact and require prompt medical care.
- Food, housing, and basic medical care requirements brought on by disasters are typically not fully met. Even those who have been forced to flee frequently manage to preserve some essentials. Additionally, individuals typically bounce back fast from their initial shock and spontaneously take part in search and rescue operations, the transportation of injured persons, and other private relief efforts.
- Complex emergencies such as conflicts and civil unrest produce a unique mix of operational challenges and public health issues.

2. Impact of Public Health Emergency and Disaster on the Economy

These public health emergencies and disasters result in significant financial losses and have a negative influence on the Gross Domestic Product (GDP), which in turn affects economic activity across several sectors.

The COVID-19 pandemic has had a major negative impact on all communities and individuals, as well as the global economy. The spread of the virus has benefited from the underlying interconnectedness and frailties of globalisation, moving quickly across borders and along the main arteries of the global economy. As a result, a global health crisis has turned into a global economic shock that has hit the most vulnerable people the hardest. The coronavirus epidemic, which sprang from the natural environment and is crippling our communities and economy, shows the interconnectedness implied by the Sustainable Development Goals, but it is impeding global attempts to fulfil them.

Across India, there is an estimated average yearly economic loss of $9.8 billion, of

which more than $7 billion is attributable to floods, which are a frequent occurrence in the majority of the nation's states (GAR 2015). Lack of awareness about risks and access to risk information, both of which are necessary to take any action aimed at reducing risk, is one of the main causes of the rising economic loss resulting from catastrophes. Additionally, novel risks are continuously accumulating as a result of growing exposure to dangers brought on by risk-insensitive planning practices, environmental degradation, population increase, and poverty. The hazards brought on by climate change are giving India's current catastrophe risk profile a whole new dimension (NIDM-IUINDRR 2022).

Despite the uncertainties surrounding the effects of climate change, average climatic conditions and variability have changed, and extreme climate events have become more frequent in recent years, worsening economic loss and damage. India's expanding economy also leads to significant investment in new industries, infrastructure, and other revenue-generating sectors and enterprises. Rarely do these investment decisions consider risk exposure, which increases the risk that economic assets will be exposed to numerous types of natural and man-made risks (NIDM-IUINDRR 2022).

3. Public Health Emergency and Disaster Management

India's response to natural disasters and public health emergencies has substantially improved over time and is now recognized on a worldwide level by the government, non-governmental organisations (NGOs), and civil society. Satellite photography, remote sensing, mobile-phone mobility data, real-time monitoring, genetic sequencing, artificial intelligence (AI), machine learning, online training, and other contemporary technologies are enhancing prediction and readiness as well. Mobile platform and social media such as aarogya setu, facebook, tweeter have played a significant role during pandemic and disasters.

The government of India has been undertaking several initiatives to prioritize efforts towards enhancing Public Health Emergency and Disaster Management. This is demonstrated by the Union Budget 2021–2022 announcement to strengthen the National Center for Disease Control (NCDC), its five regional branches, twenty metropolitan health surveillance units, and fifteen health emergency operation centres (HEOCs) for preparedness and response to disease epidemics and pandemics under the "PM Atma Nirbhar Swasth Bharat Yojna." has now renamed PM – Ayushman Bharat Health Infrastructure Mission (PM-ABHIM). The Strategic Health Operation Centre

(SHOC) of the NCDC in Delhi, the Integrated Disease Surveillance Programme (IDSP), and the Emergency Medical Relief (EMR) Division of the Directorate General of Health Services serve as the hub for coordinating the response to public health emergencies. Similar structures exist in the States and Municipal Corporations. The program's actions are geared toward strengthening the capacity of healthcare institutions and systems at all levels of care primary, secondary, and tertiary as well as getting health systems ready to successfully handle current and upcoming pandemics and disasters. By creating a network of surveillance laboratories at block, district, regional, and national levels in metropolitan areas and strengthening health units at the Points of Entry, the PMASBY aims to create an IT-enabled disease surveillance system for efficiently identifying, looking into, preventing, and combating public health emergencies and disease outbreaks. Increased funding is also planned for research on COVID-19 and other infectious diseases, as well as biomedical research to produce data for short- and medium-term responses to pandemics similar to COVID-19 and to build core capabilities for implementing the One Health Approach to prevent, detect, and address infectious disease outbreaks in both humans and animals. The National Health Policy (NHP), published in 2017, calls for a time-bound increase in public health spending from the current 1.15 percent of GDP to 2.5 percent by 2025 (PIB-GoI, 2021).

In the current COVID-19 pandemic, the provisions of the Epidemic Diseases Act of 1897, National Disaster Management Act (NDMA), 2005, and International Health Regulations (IHR), 2005, have also assumed a prominent role. The National Health Mission (NHM) infrastructure and the funding's availability have improved the system's readiness to respond by enabling flexibility and need-based decisions at the District and Sub-District levels. However, in light of rising demand and necessity, expectations for such a system have increased over time.

Building local capacities, beginning with the poor, to significantly reduce the loss of lives, livelihoods, and assets in various forms including economic, physical, social, cultural, and environmental while enhancing India's capacity to cope with disasters at all levels is the current government's vision for making India disaster resilient across all sectors. Under the guidance of the Hon'ble Prime Minister and Chairman of NDMA, Shri Narendra Modi, the first National Disaster Management Plan (NDMP) was created in a brief six-month period and launched in June 2016. Including disaster risk reduction, mitigation, readiness, response, recovery, and rehabilitation, the

NDMP offers a framework for all phases of the disaster management cycle. The Sendai framework has been greatly aided by India's zero casualty strategy to managing extreme weather disasters, which has also helped to reduce the number of people who die in such incidents.

India is one of the most disaster-prone countries in the world. The country is vulnerable to a wide range of natural disasters because of its geo-climatic and socio-economic conditions, including floods, earthquakes, tsunamis, landslides, cyclones, droughts, thunderstorms, lightning strikes, glacial lake outburst floods (GLOFs), heat waves, biological and public health emergencies, fires (including forest fires), etc. In order to reduce the danger of catastrophe in India, a national strategy for disaster management is crucial. A national plan for disaster management for the entire nation is mandated by Section 11 of the Disaster Management (DM) Act 2005 (NDMA 2022). In this regard, a NDMP (was formulated).

3.1 Community engagement

The community is the first responder of any kind of disaster and public health emergency. Therefore, the active participation and involvement of the community is important in every phase of Disaster starting from planning to rehabilitation. Community plays a crucial role in any disaster management and health emergency because:

- Having a local understanding of the hazards guarantees that the community's genuine requirements are met.
- Local activities reduce risks by minimising exposure to local dangers at the source.
- A well-prepared, active and well-organized community can reduce risks and mitigate the impact of emergencies.
- Many lives can be saved in the first hours after an emergency before external help arrives.

A few illustrations of the positive outcome of community involvement in health emergencies are mentioned below.

3.1.1 Dharavi Slum Mumbai

Because of the overcrowding, lack of knowledge, and lack of adoption of COVID-19 appropriate behaviours, there was concern that the problem of COVID-19 infection in migrant workers, the "Dharavi Slum" of Mumbai, and the slums of Pune would worsen exponentially. However, once the community was involved to adopt the COVID-

19-appropriate behaviour, hygienic practices, early reporting, isolation, and early admission of at-risk patients in health facilities, infection could be contained quickly.

3.1.2 Fani (2019) and Amphan (2020)

Similar events occurred during numerous natural disasters, such as the cyclones Fani (2019) and Amphan (2020) in Odisha, when early warning to the community and their readiness to leave high-risk regions prevented accidents, trauma, and fatalities.

3.1.3 Tsunami-Ready villages in Odisha

In Odisha, India has become the first nation in the Indian Ocean to host communities that are prepared for a tsunami. The UNESCO-Intergovernmental Oceanographic Commission (IOC) has awarded the two villages, Noliasahi in the Jagatsinghpur district and Venkatraipur in the Ganjam district, certificates of appreciation and recognition. Indian villages have never received such distinction from UNESCO.

3.1.4 Early warning signals of the plague, avian flu, malaria/dengue etc

The importance of spotting early warning signs of the plague, avian flu, malaria, and dengue, as well as preventing the effects of public health emergencies, is demonstrated by the community's prompt reporting of rat falls, abnormal behaviour and bird deaths, high fever rates, and fever-related deaths.

All of these initiatives would require skilled health professionals to sensitise the population. It has also been demonstrated that raising awareness of these issues among middle-level managers is a good strategy to improve the effectiveness of the response system. In addition to the leadership role of District/ State and National Level Officials and the involvement of Civil Society in the early detection and response to public health emergencies, it has been observed that frontline workers and middle-level managers play a particularly significant role in the management of health emergencies.

3.1.5 Studies on need for community engagement

There have been scientific studies conducted to support the significance, necessity, and involvement of community health professionals in catastrophe circumstances. Illustrations are as under:

I. The George Institute for Global Health in India was commissioned by the National Health Systems Resource Centre (NHSRC) to conduct a study in order to assess the

evidence and determine the potential role, enablers, and barriers for Community Health Workers (CHWs) during COVID-19 prevention and control. The study found that contact tracking, community awareness, participation, and sensitization (including for overcoming stigma) were the most frequent supplementary actions during pandemics. All facets of contact tracing were reportedly handled by CHWs, which had an impact on everyday service delivery. CHWs have frequently experienced stigmatisation or social exclusion during pandemics.

The study came to the conclusion that CHWs are crucial to pandemics. The provision of Personal Protective Equipment (PPE), housing allowance, equal training opportunities, transportation allowance, improving salaries (paid on time and for a broad range of services), and awards in high-profile public events was suggested as contributing to better recruitment and retention. It is important to ensure role clarity, training, supportive supervision, as well as their work satisfaction, health, and well-being (Bhaumik et al., 2020).

II. In August 2020, a descriptive cross-sectional survey was done among health professionals from Rajasthan's District Hospitals (DHs) and Community Health Centers (CHCs) who had participated in a training session on hospital disaster preparation. The goal of the study was to comprehend the standardised indicators of public hospital readiness and resilience during health emergencies, including pandemics as the most recent COVID-19 pandemic. Rajasthan's District Hospitals (DHs) and Community Health Centers (CHCs) appear to be only somewhat resilient and prepared. Only 37.9% of healthcare personnel received the required training and instruction on disasters like the current COVID-19, which is critical for those in the profession. The significance of the additional public health emergency training programme was stressed by more than 93% of the health authorities.

The study found that despite the availability of an emergency medication supply, the isolation room lacked the necessary amenities and equipment to stabilise a critical patient. Staff members may mark and perform in the triage area as needed. The operational state of DHs and CHCs indicated that the level of emergency preparation was variable from hospital to hospital and from CHC to CHC, falling between low and medium. As a result, it was advised to review and improve emergency preparation strategies, which need to address mitigation, readiness, response, and recovery (Sharma and Sharma 2020).

4. Strengthen Public Health Emergency and Disaster Management capacity

4.1 Essential Elements of PHEDM

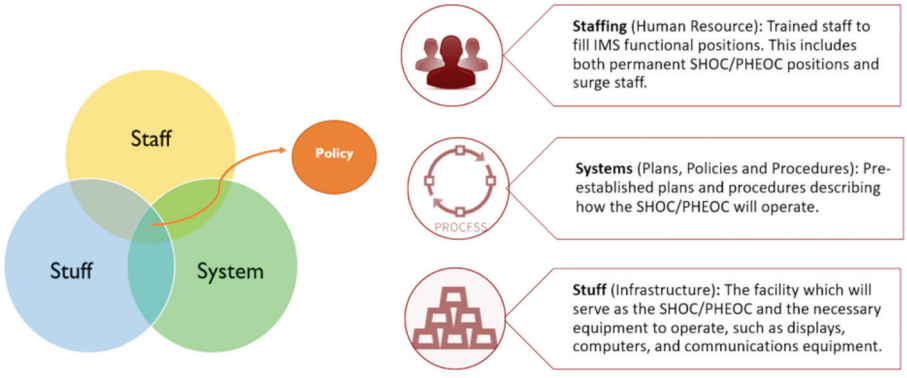

Figure 1: Essential Elements of PHEDM.

For carrying out any initiatives towards strengthening Public Health Emergency and Disaster Management capacity, following elements of PHEDM needs to be consider:

I. Staffing (Human Resource): Trained staff at all Incident Management System (IMS) functional positions. This includes both permanent Strategic Health Operations Centre (SHOC)/ Public Health Emergency Operations Centre (PHEOC) positions and surge staff.

II. Systems (Plans, Policies and Procedures): Pre-established plans, procedures and protocols describing how the SHOC/PHEOC will operate.

III. Stuff (Infrastructure): The facility which will serve as the SHOC/PHEOC and the necessary equipment to operate, such as displays, computers, and communications equipment etc.

For achieving all the objectives of Staff, System and Stuff commitment and willingness from the policy level is paramount.

The national ability to prevent, identify, and respond to public health emergencies and new infectious illnesses has to be strengthened in light of the aforementioned

findings. In this approach, it is suggested to boost emergency management capability on two different levels: a. institutional capacity building; and b. community capacity building.

4.2 Institutional Capacity Building: It is suggested that the following three-tier framework be used for educating professionals and employees:

I. **First Tier- Community Level**: Front line Healthcare Workers, Accredited Social Health Activist (ASHA), Anganwadi Worker (ANM), Multi-purpose Health Worker (MPHW), Volunteers from Disaster Management (Aapda Mitra), Civil Defense etc.

II. **Second Tier - First Referral Unity/ Points of Care**: Medical doctors, nursing staff, pharmacists, and technicians (develop their capacities: to respond to health aspects of disasters, to develop contingency plan, to report to district level and state level, to strengthen surveillance, surge, coordination, management, and preparedness, to work with multi layered multi sectoral response etc.)

III. **Third Tier - Tactical Level:** Front line Healthcare Workers, Accredited Social Health Activist (ASHA), Anganwadi Worker (ANM), Multi-purpose Health Worker (MPHW), Volunteers from Disaster Management (Aapda Mitra), Civil Defense etc.

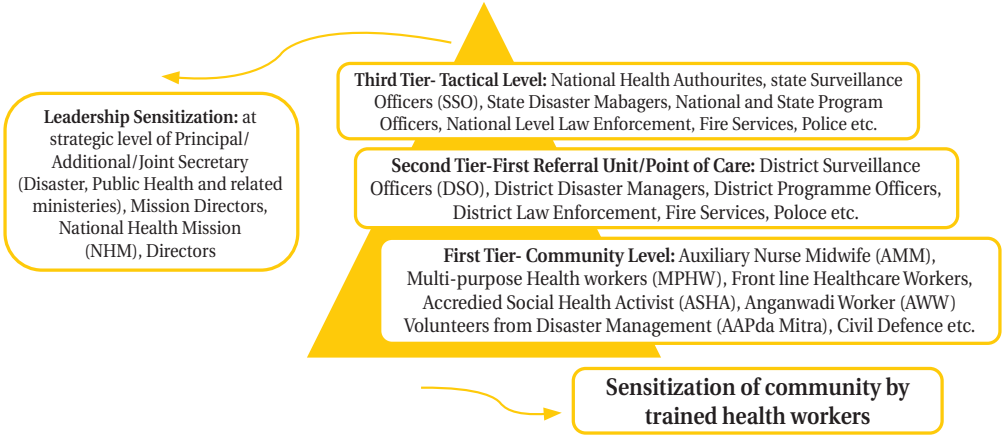

Figure 2: A three-tiered institutional PHEM capacity-building model

4.2 Community Capacity Building: Preparing Individuals and communities to work together to improve preparedness and respond to disasters and emergencies and to

help build capacity and plan for the unexpected. To build a culture of preparedness it's important to work with the whole community, including central, state, district and local governments; Panchayati Raj Institutions; non-governmental partners from all sectors; self-help groups; faith-based organizations; youth children, daycares.

The main objective of this plan is capacity building of the community with Health Focus and develop their infrastructure, capacity building, community disaster preparedness planning integrating with health and pandemic parameters, table tops simulation exercises, system, plans, procedures and SOPs. Develop systemic challenges and systems approach (Community gathers their own resources) and develop a Community Emergency Response Team (CERT) responding to emergencies.

4.3 Leadership sensitization

In order to strengthen the above 3-tier institutional capacity building, it is also necessary to **sensitize leadership** at the strategic level of Principal/Additional/Joint Secretary (Public Health), Mission Directors, National Health Mission (NHM); Directors; for the Incident Management System (IMS) with globally accepted principles for working with multi-layered/multi-sectoral response more effectively would be required.

Conclusion

There is a need to strengthen national and regional capacities to effectively prevent, prepare for, detect and respond to disaster and public health threats and emergencies. Any nation's progress depends critically on the population's and community's health. Every nation has a duty to protect its citizens' health, welfare, and well-being. It also has a duty to maintain the health system's self-sufficiency and resilience, which are essential for lowering health risks and vulnerabilities and delivering efficient response and recovery in times of emergencies and disasters. Enhancing the capabilities in terms of "Public Health Emergency and Disaster Management" would help us handle present and upcoming dangers to the public's health as well as the requirement for effective resource use and management.

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