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# A Critical Study On Management Of Health And Disaster Risk In India

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**Abstract:** Rapid urbanisation has been occurring in India. Health, well-being and infrastructure capacity are all in a state of flux. This study provides an overview of India's health capacity to manage disaster risks from the perspective of a rapidly urbanising nation. It examines India's demographic, epidemiological, and developmental shifts, as well as the ramifications for healthcare policy. Health outcomes can be improved or harmed during catastrophes and other periods when relevant experiences and current healthcare provisioning are studied.

**Keywords:** Disaster Resilience, Disaster risk reduction, Public health, Developmental risk, Hospital safety.

**Introduction:**

The state of a country's health is an essential measure of its progress. The country's level of development can gauge a disaster's effect on health. Having a well-equipped health care system is essential to a successful reaction and long-term healing. This information is highly relevant for India, a disaster-prone country with a limited supply of resources and a large density of people. Both the health infrastructure and the health outcomes are affected by these elements.

First and foremost, disasters in India have had costly economic effects on the country's health system [1]. The Indian Ocean Tsunami (2004) caused $30 million in damage to health facilities, which necessitated extensive repair efforts. When a 281-bed public hospital collapsed in the 2001 Bhuj earthquake, one hundred seventy-two people were killed. Also recognised is that a region's economy suffers when health care systems collapse at a large scale. The government is responsible for the majority of the costs associated with the deterioration of the healthcare system and the resulting decline in health. Because of this, health infrastructure must be designed so that it can adapt effectively to natural disasters.

Second, it's critical to assess developmental risk factors that impact overall health and well-being before having a conversation about health infrastructure [2].

India's development trajectory has taken a dramatic turn over the last hundred years. Over the past 35 years, India's GDP has grown by an average of 6.3 per cent every year, doubling every 11 years. On the one hand, a country's economic prosperity raises people's standard of living, their access to education, and their ability to pay for medical care. Still, the rapid expansion also raises the danger of natural disasters to people's health. India, for example, expects to add 300 million new urban dwellers by the year 2050 as a result of widespread migration from rural areas to cities. As a result of accommodating this influx of people, there will be increased risk from uncontrolled growth, poor planning, ecological pollution, inefficient sewage and waste disposal systems, a high incidence of infectious diseases, and pollution [3]. Environmental degradation and pollution will result. These dangers harm the environment as a whole, which hurts people's health. Considerate development that minimises risk and increases regional resiliency should be pursued.

**In India, the disease load is as follows:**

- **The burden of tradition:**

Even though India has one-sixth of the world's population, it bears a hefty 21% of the illness burden (WHO, 2012). India's health concerns have historically been linked to the country's low income, widespread illiteracy, and inadequate access to public health care. A wide range of illnesses, including tuberculosis, cholera and dengue fevers, HIV/AIDS and sexually transmitted diseases, were found. This, coupled with child health, hunger, infant mortality, maternal mortality, and gender equity issues, is constant. Substantial efforts to combat infectious diseases and malnutrition have yielded positive results since the early 1990s. As a result, the provision of curative healthcare & institutional delivery has risen to the top of the list of health priorities. India's health outcomes are improving, but there is a long way to go before India catches up with the worldwide average.

- **Air pollution:**

In 2015, air pollution overtook dietary hazards and malnutrition in children and mothers as the leading cause of death and disability in India. Fourteen Indian towns were listed among the world's 20 most polluted by particulate matter concentrations by the World Health Organization (WHO). As a result of air pollution, India overtook China as the leading cause of mortality in 2013.

- **Sanitation:**

Poor sanitation and open defecation are widespread issues. 73 million workdays are lost in India each year due to water-borne infections impacting roughly 40 million individuals. An initiative to assist Sustainable Development Goal No. 06, "Ensure availability and sustainable

access to water and sanitation for all," called the "Swachh Bharat Abhiyan" (Clean India Mission) was launched in 2014. Toilets will be built by 2020 as part of the initiative to enhance environmental cleanliness and eliminate open defecation. The mission was funded with USD 1.3 billion in 2016 from the Union Budget. However, in government parlance, sanitation & cleanliness are the more significant issues in changing behaviour. The media has a critical role in fostering a sense of ownership and involvement among citizens.

- **Urbanization:**

The Smart Cities Mission is a flagship programme of the Indian government that aims to revitalise and refit the country's cities. The plan calls for creating 100 new cities in India to serve as role models for how the country's future urbanisation should proceed. 3 Core infrastructure must be provided, and quality of life must be improved by readily available services, including health care. 76% of the projected smart cities are located in areas with medium to high risk of flooding, earthquakes, or windstorms; the remaining 22% are in areas with low to moderate risk. A chance to mainstream catastrophe risk resilience and reduce the generation of new risks exists with every new development in these cities. As an "open to the interpretation of city authorities" scheme, catastrophe resilience is not a significant development objective.

- **Construction of new roads and bridges:**

Responsibility for providing infrastructural services such as health care services, water, sanitation, and sewage disposal is delegated to several levels of government in India (municipal, panchayat). 4 Within their "legally notified boundaries," local administrations have the authority to provide services. There are "census towns" springing up throughout India as people move from the countryside to the cities. Even though they meet the legal definitions, these locations have not been officially recognised as such by the state. As a result, these are not subject to municipal bylaws or decisions made by the local government [4]. As of 2011, census towns made up about half of India's new urban centres. According to a report on " Regulating Infrastructure Development for India, " poor planning and regulation of services can be attributed to the lack of comprehensive power devolution, according to a report on "Regulating Infrastructure Development for India." This directly impacts environmental quality, health, and catastrophe preparedness.

**The health & hazard landscape in India:**

More than half of India's land area is at risk from many high-intensity hazards. Between 1970 and 2015, India was hit by 614 disasters, including floods, earthquakes, heatwaves, droughts, landslides, and storms, resulting in the lives of over 198,000 people, displacing over 2 billion people, and causing USD 93 billion in damage. While natural catastrophe deaths in India have continuously been among the highest, economic losses to infrastructures are increasing at an alarming rate (Table 1). In the last decade, India's health care system has been exposed

for what it is. A 125-year-old hospital in Kerala, which served 350,000 people, was destroyed by floods in 2018. 7 An 18-patient death toll was identical to that of the 2015 Chennai floods, which occurred when the city of Mumbai experienced its annual urban flooding. The 2001 Gujarat earthquake, which claimed the lives of 172 people, resulted in the collapse of a 281-bed civil hospital, serving as a terrible illustration of the devastating effects of disaster on healthcare facilities. As a result of this catastrophe, earthquake-resistant structures now use base separation technology. Indian Seismic Code IS 1893: 2002 for Guidelines for Earthquake Resistant Design was later updated to include this. 1.6 million public health institutions in India are located in moderate to high-risk zones for earthquakes, according to an assessment of their seismic susceptibility.

| Year | Type | Name | Deaths | Affected | Damages (USD '000) |
|---|---|---|---|---|---|
| 1971 | Storm | E: Odisha, Andhra Pradesh | 9658 | 6900000 | 30000 |
| 1972 | Drought | N,W: Rajasthan, Himachal and Uttar Pradesh | n.a. | 200000000 | 100000 |
| 1977 | Tropical cyclone | S: Andhra Pradesh cyclone | 14204 | 14469800 | 498535 |
| 1978 | Flood | E: West Bengal floods | 3800 | 32000000 | 165000 |
| 1987 | Drought | North, West and Eastern India | 300 | 300000000 | not available |
| 1993 | Earthquake | W: Latur earthquake | 9748 | 30000 | 280000 |
| 1999 | Tropical cyclone | E: Super Cyclone | 9843 | 12628312 | 2500000 |
| 2001 | Earthquake | W: Gujarat earthquake | 20005 | 6321812 | 2623000 |
| 2002 | Drought | All India | n.a. | 300000000 | 910722 |
| 2004 | Earthquake | S: Indian Ocean Tsunami | 16389 | 654512 | 1022800 |
| 2013 | Riverine Flood | North India floods | 6054 | 504473 | 1100000 |
| 2013 | Tropical cyclone | E: Cyclone Phailin | 47 | 13230000 | 633471 |

Table 1: Major disasters have occurred in India.

**Role of Government:**

- **Health care in the public sector**

Public health, sanitation, hospitals, and dispensaries fall under the state's authority in India's Constitution. Medical education, family welfare, and quality control all fall within the authority of both the Center and the State. Federal systems like India divide decision-making power between the federal government and the states (provinces). The Ministry of Health and Family Welfare (MoHFW) handles policies and programmes pertaining to health care.

On the degree of treatment and the population it serves, the three-tiered health service delivery system is based

1. Sub-Centres (SCs) and Primary Health Centers (PHCs) for rural and tribal regions are primary healthcare facilities.
2. District hospitals (DH) and Community Health Centers (CHC) located at the block level are examples of secondary healthcare
3. This is the third and last level of healthcare: medical research facilities.

Public health includes catastrophe preparedness, response, health promotion, and disease prevention. Since its independence from Britain in 1947, India has integrated medical and public health services. In 1955 and 1987, a Model Public Health Act was drafted to encourage the development of a public health ecosystem focused on prevention (monitoring, inspecting, regulating). However, it failed to gain traction with state governments. Leprosy, TB, malaria, and high mother and child mortality rates were all targeted by specialised health programmes. There was less emphasis on preventative public health initiatives due to the concentration on medical services.

Social, economic, and environmental factors all play a role in health. However, essential sectors, including public health, the environment, water resources, and sanitation, were separated in governance. Vaccination, mortality, and disease surveillance are more quantifiable programmes supported by international donor agencies [5]. As a result, there is more motivation to develop targeted programmes with clear outcomes that can be monitored more quickly than more comprehensive mitigation and preventative programmes that require longer time horizons.

Since its inception in 2013, India's National Health Mission (NHM) has worked to enhance its healthcare systems and the quality of care provided to the general public. Health-related issues such as water, sanitation, education, and nutrition are all addressed by NHM, which creates unique financing streams for each of these facets of health. India's National Health Mission (NHM) publishes the Indian Public Health Standards (IPHS) to ensure uniformity in healthcare infrastructure design and upgrading [6]. All facilities must be built to withstand flooding, earthquakes, and other natural disasters following the National Building Code's principles (Table 2). We are looking to multilateral development organisations for help to improve service delivery, capacity building, cost assessment, and accountability. When it comes to strengthening India's healthcare system, both the Asian Development Bank and the World Bank have offered assistance.

| Health Institution | Avg. population to be served | Beds | Avg. population being served | | | | |
|---|---|---|---|---|---|---|---|
| | | | Odisha | Assam | UP | Bihar | Punjab |
| District Hospital | 35,000 to 30,000,000 | 101-500 | 1,446,461 | 1,246,771 | 1,513,730 | 2,731,701 | 1,458,118 |
| Sub-divisional Hospital | 500,000 600,000 | 31-100 | 1,613,360 | 2,833,570 | 19,981,234 | 3,460,155 | 791,550 |
| Community Health Center | 80,000 1,20,000 | 30 | 116,520 | 145,651 | 217,187 | 1,526,539 | 184,695 |
| Primary Health Center | 20,000 30,000 | 6 | 74,112 | 83,118 | 190,116 | 156,332 | 64,881 |
| Sub-centers | 3000 to 5000 | 2 | 28,096 | 36,370 | 76,999 | 56,786 | 9,388 |

Table 2: India's public healthcare facilities and the people they serve are arranged according to their priority.

**Disaster Management:**

The Catastrophe Management Act 2005 is India's approach to natural disaster management. India's disaster management policy before to the early 2000s focused on relief and rescue efforts. Healthcare facilities' role in disaster mitigation was not explicitly stated. The Ministry of Home Affairs (MHA) established the National Disaster Management Authority (NDMA) in 2005 to deal with disaster-related economic, environmental, and developmental challenges [7]. India was one of the first countries to develop a National Disaster Management Plan after signing the Sendai Framework on Disaster Risk Reduction (2005). As a result of its creation, the nation's disaster risk and service disruptions have been significantly reduced. The newly constituted National Disaster Management Authority (NDMA) released several standards on specific risks in the years after 2005. In addition, these include rules for minimum standards of relief and the handling of natural catastrophes like as floods, typhoons, droughts, and landslides. In any of these catastrophes, there was a section on medical readiness and mass killing management in the instructions. In addition, the NDMA released comprehensive psychosocial health guidelines. The NDMA issued guidelines for hospital safety in 2016.

- **Hospital Safety Standards:**

The DM Act mandates that state governments plan, mitigate, respond, and recover from disasters through the development of State Disaster Management Plans (SDMPs). Medical emergency preparedness & mass casualty management are included in these strategies. The State should follow the National Authority's standards when providing healthcare and other

services. Every hospital is required by law to have an emergency plan, which must be checked and practised regularly. To cope with the injuries, illnesses, and diseases that a particular hazard may cause, the NDMA's hazard-specific management recommendations specify the proper medical readiness and healthcare delivery system. It also assigns tasks to state, district, and state health departments and private hospitals and urban municipal authorities to facilitate multidisciplinary collaboration [8]. Lifeline structures in high-risk locations should receive seismic reinforcement and retrofit as part of the NDMA earthquake guidelines. Hospitals and medical facilities, tertiary care institutions, and all hospitals that have been classified as significant hospitals must follow these guidelines.

The India Disaster Resource Network (IDRN) database mandates updating. Urban flooding guidelines indicate that the corporate sector should be included in implementing relief efforts. People affected by natural disasters are entitled to "basic levels of relief," which include rehabilitation, shelter, nutrition, health, water sanitation, and vulnerable groups, according to the National Disaster Management Agency (NDMA). National Disaster Mitigation Authority (NDMA) issued guidelines for hospital safety in 2016 to integrate disaster preparedness and response efforts into the health sector. The publication assembles a comprehensive set of recommendations from a wide range of sources, including the National Building Code, Directorate of Indian Standards, Clinical Establishment Act and Indian Public Health Standards. It enlisted the help of subject matter experts to improve upon these principles and to develop implementation frameworks. Hospitals and disasters are covered in great detail in this book.

1. To raise public awareness about hospital safety,
2. Preparedness of the hospital for a disaster
3. Hospital buildings' design and safety
4. preventing a fire
5. Accreditation and authorization

There is a "National Action Framework for Hospital Safety" laid out in this report, which considers what we've learned from the previous components. It identifies five critical areas for action, identifies gaps, recommends actions, estimates a schedule, and assigns work to the appropriate agencies. Building codes are supposed to be adhered to, but in actuality, there is a lack of preparation and preparedness and a wide range of quality medical facilities. Any law does not cover the regulation and standardisation of hospital disaster response plans. As a result, hospitals don't have catastrophe preparedness procedures in place. According to a survey, only 26% of trauma care hospitals had a well-documented disaster management plan. Primary health care institutions in a flood-prone area were found to lack essential response utilities such as power backup, standard operating procedures, and equipment during an on-site survey. Keeping tabs on these facets of hospital administration is the job of the states and the administrative units that fall under their jurisdiction.

- **Public health considerations in disaster preparedness plans:**

As mandated by the Disaster Mitigation Act (DM Act), each state is expected to develop a State Disaster Management Plan (SDMP). The SDMP is expected to address the state's vulnerabilities, disaster prevention and mitigation measures, capacity building, and the delegation of responsibilities to departments concerned in the case of a disaster. Health care facilities are categorised as critical or life-saving. Disaster management is covered in detail in the SDMP (preparedness, mitigation, response). There was a lack of proportionality between the level of information in a State Disaster Management Plan and the number of health facilities at danger in the state. In addition, the planes were outdated. Only eight states had updated their plans by 2016, despite the requirement in the legislation that they do so annually. Unlike creating SOPs to prevent disasters, most plans devote most of their sections to responding to one when it occurs (Table 3).

| Department | Responsibility |
|---|---|
| Health and Family Welfare | Healthcare infrastructure, response, contingency plans, preparedness and mitigation, vulnerability assessments, mass casualty plan, ambulance network, hospital networking, first aid, training and capacity building |
| Public Health Engineering Department | Drinking water supply & sanitation, extreme events, ground water resources |
| Revenue and Disaster Management | Buildings & lifeline infrastructure operations and construction compliance with Indian construction codes, training and capacity building |
| Urban Development and Urban Local Bodies | Development of built stock and provision of services such as drainage, sewage, drinking water, etc |

Table 3: Ministry of Health and Disaster Preparedness

Without a well-thought-out response strategy, time and resources will be stretched too thinly to effectively use in an emergency. The "response" phase of a disaster is the primary focus of SDMPs. Additional measures for response and rehabilitation are outlined in the relevant agencies' Standard Operating Procedures (SOPs). Non-structural and functional health resilience indicators are under-represented in global frameworks. These are the conclusions of a study of 22 Indian states' disaster management plans: Seventy-five per cent of the documents reference structural indicators. For example, in Himachal Pradesh, over half of the state's medical facilities must adhere to the Bureau of Indian Standards' standards (BIS). Punjab advises that construction in seismic zones 3, 4, and 5 be monitored by a quality auditor organisation (medium to very high earthquake risk). Because of the Bhuj earthquake and the subsequent collapse of the civil hospital, the Indian Seismic Code for Earthquake Resilient Design of Structures underwent its most recent amendment. Because of this,

structural indicators are now included in most SDMPs, and facilities are required to do so by law and more specific requirements.

Among all documents, non-structural indicators are the ones that get the least attention. Less than half of the WHO Safe Hospitals indicator set indicators are even mentioned. Action points are not included in checklists for responding to medical emergencies, including medical equipment and furniture safety and backup supplies. Non-structural utilities are the focus of plans developed by Indian independent authorities. The NDMA's Hospital Safety recommendations go into more detail on this. It has yet to be adopted by state plans because it is a relatively new document.

Regarding non-structural components of safety, the SDMPs do not relate to any additional universal criteria that hospitals may follow. More than 75% of the documents mention functional indicators. A medical emergency preparedness plan, a mass casualty management strategy, and emergency readiness checklists are all recommended by all states. Having a comprehensive inventory of all healthcare facilities and support services on hand is a must to keep hospitals running smoothly in times of crisis. Most documents do not include any information about local health care facilities. The populations of Assam and Odisha are listed. A dedicated high-tension power connection has also been provided to the district headquarters hospitals in Odisha to ensure ongoing contact with the state's health control centre. Meghalaya is the only state to include psycho-social assistance and mental health functional metrics in all documents. At least a third of those who survived the super-cyclone in Odisha had incapacitating mental health issues. The National Catastrophe Medical Association (NDMA) has identified this issue as "a continuum of interventions in disaster settings" and established PSSMHS in Disasters recommendations (2009). Other metrics, such as mobile hospitals, media management, district-level data, and Standard Operating Procedures, are well-considered. The India Disaster Resource Network is mentioned in 16 of the 22 states (IDRN). Medical personnel and medical equipment are included in a database that may be accessed online in the event of a disaster. State Disaster Resource Networks have been developed in Gujarat and Assam (SDRN).

**Disaster risk reduction in India includes the following components:**

- **Management of resources:**

Human resources and equipment may be in low supply or unavailable during and after a disaster. The Government of India and the United Nations Development Program (Disaster Management) collaborated to develop the India Disaster Resource Network to maintain a centralised inventory of disaster response resources (IDRN). Data about district resources accessible at the line department level is systematically collected and compiled using IDRN, a web-based inventory (local administrative unit). One can use the website's nationwide query system to determine if there are medical supplies, qualified health personnel, and

other necessities in their area. Data can be uploaded and accessed by government officials, including emergency responders, relief managers, district collectors/magistrates, and others, through the National Institute of Disaster Management (NIDM) portal [9]. The IDRN covers more than 75% of districts in India at this time. The Confederation of Indian Industry (CII) and the Builders Association of India (BAI) can publish resource details to the database through a module on the web, making it possible for the private sector to contribute equipment. State inventories that are interoperable with the national interface are pioneered by a few states using this online format. As a result of the State Disaster Resource Network in Gujarat, 97% of the state's villages have access to resources. The quality and completeness of the data, on the other hand, are constantly being improved.

- **Epidemiological tracking of diseases and outbreaks:**

Indian disease control is hampered by weak surveillance systems, low vaccination rates, and filthy conditions in public restrooms. Seasonal outbreaks of vector-borne diseases, water-borne infections, and endemic diseases are commonplace in the region WHO set up an on-site surveillance system with 620 reporting points after the Bhuj earthquake (2001). An integrated disease surveillance programme (IDSP) was established in 2004 by the Ministry of Health & Social Welfare with the support of the World Bank to detect and monitor illness outbreaks. In 1997, the National Surveillance Program for Communicable Diseases (NSPCD) was established to monitor the spread of communicable diseases in the United States.

Identification, diagnosis, and surveillance of infectious and non-infectious disorders are central to IDSP's mission. Rapid Response Teams (RRT) will be trained and deployed in the event of an epidemic as part of a strategy that includes integrating current surveillance systems, improving public health laboratory capabilities, and preparing and deploying RRTs. A one-page monitoring instrument was designed to monitor ten critical health issues among the displaced people following the 2004 Indian Ocean Tsunami. It is decentralised, where data is collected at the local administrative units and then sent to the national level. It's done three times a week, in weekly intervals (suspected, presumptive, laboratory-confirmed). The National Center for Disease Control (NCDC) & Indian Space Research Organization (Isro) collaborated to create a satellite-based learning and interaction network called Education Satellite (EduSat) (ISRO). All communication terminals at state and federal levels are connected to this network and government medical schools around the country.

- **Sanitation and mobile medical units:**

Epidemic control is an essential part of disaster management. Clean water, sanitation (in-situ or ex-situ), and proper hygiene are necessary. The National Disaster Management Agency (NDMA) has issued "Guidelines on Minimum Standards of Relief" to address the essential service requirements for relief and rehabilitation camps, including temporary shelter, food, water, sanitation, medical coverage, and the needs of vulnerable groups

(NDMA, n.d.). New guidelines have been issued by the Ministry of Health & Social Welfare that specify the service, quality, control, and financing mechanisms required for a fleet of mobile medical units. Standard operating procedure (SOP) for drinking water delivery and sanitation services during natural hazard events was issued by the Ministry of Rural Development in 2011. Building Leaching Pits for Rural Communities and Installing Septic Tanks are two examples of standard disaster sanitation equipment that the Bureau of Indian Standards instructions for building.

**Conclusion:**

Many projects have shown that India can deliver and fight for public health care efficiently, despite its enormous population. However, it has been challenging to maintain service quality for long periods. The wide range of institutions has provided both an opportunity for local innovation and a problem for establishing frameworks at the national level. Continual research into the effectiveness of national health programmes and their effects on health infrastructure, health outcomes, and emergency services is required. This would allow for more significant social and environmental goals that enhance systems coping capability in the case of a crisis. In the preceding overview, we have seen some key issues in India's catastrophe risk management and health care. Building health system resilience to disasters is a subset of improving overall health. This is a massive task when a country is still attempting to overcome systemic flaws and obtain baseline health metrics. Building resilient health systems that can respond to disasters will require persistent efforts and investments in the medical world, health infrastructure innovation, and society.

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