

Health Consequences of the Massive Floods: Immediate and Long Term

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INTRODUCTION

Kerala is a narrow strip of land about 500 kms long extending from Kaliyikkavila in the south to Manjeswaram in the north extending from the Western Ghats to the Arabian Sea about 150 kms broad. It has varied topographical features from the mountainous terrain to the hilly and flat plains. The state receives heavy rainfall approximately 200 cms yearly spread across two monsoons the South West beginning May end to September and the North Eastern from October to mid-December is drained by 44 rivers that take the water rapidly to the sea. Numerous dams harness these waters for generation of electricity, irrigation, flood control and water supply. Since time immemorial this state had protection from major natural disasters like floods, earthquakes and cyclones and manmade disasters like war and major communal flare-ups.

This August we had a massive rainfall of approximately 80 cms in a couple of days. This year the season had started well in mid-May and most of the dams were already near full. The resultant situation produced the most massive flooding in the history of Kerala. The nearest parallel was in 1924 when a massive flooding in the Periyar river basin caused massive destruction.

Despite the media attention given to catastrophic disasters such as those resulting from tsunamis and earthquakes, floods responsible for the most common disasters due to natural and/or technological hazards—they account for 40–50% of all disasters and disaster-related deaths worldwide.¹⁻³ According to the EM-DAT database, floods (excluding tsunamis) accounted for 38.7% of all incidents, 6.2% of the deaths, and 43.0% of the population affected by all disasters caused by natural hazards in the world during the period of 2000–2009.⁴ The speed of onset of the flood is the main factor determining the number of flood-related deaths.

However, floods often are long-term events that may last days, weeks, or longer.⁵

Floods are defined as “the condition that occurs when water overflows the natural or artificial confines of a stream, river, or other body of water, or accumulates by drainage over low-lying areas”.⁶ Floods are caused by rainfall, melting snow or ice, or by structural failure of water containing structures, including subterranean structures. The nature and extent of the flood is determined by the physical location and topography, and by the built environment. Floods impact the human community either directly through contact with the water or indirectly through the damage the water does to the natural and human-built environment. Even relatively small, localized floods may have a significant impact on people’s physical and mental health.⁷ One study found a four-fold increase in illnesses among people whose homes had been flooded compared with those whose homes were not flooded.⁸ Not only is the incidence of floods increasing, but rapid urbanization is resulting in the exposure of more people to floods. In addition, it is projected that global warming will have an impact on the frequency of floods worldwide.⁹

In an excellent article Wu W et al¹⁰ has tried to identify the health impacts of disasters and the underlying causes of health impacts associated with floods. A conceptual framework could be developed that may assist with the development of a rational and comprehensive approach to prevention, mitigation, and management of the disaster.

Reasons for flooding

The nature and consequences of floods vary according to the cause of the flood and the nature of the natural and human environment. Floods may be caused by a range of factors or combinations of those factors.

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Different types of floods have different impacts on the human community, and therefore, different health effects.

1. Increased precipitation could be due to rainfall, melting snow or hail.
2. Rising levels of fresh water or sea water
3. Release of stored water
4. Failure of natural drainage

The following factors affect the nature of impact in addition to the nature and severity of flooding. They include:

1. Flood type
2. Geography of the affected area
3. Demography of the affected population
4. Community infrastructure
5. Disaster management system

Health consequences of floods

The health consequences of floods may be categorized broadly as direct or indirect. Direct consequences are those resulting from direct exposure to the water and the flooded environment, and include drowning, injuries from debris, chemical contamination, and hypothermia. Indirect consequences are those associated with risks associated with the damage done by the water to the natural and built environment and include infectious diseases, malnutrition, poverty-related diseases, and diseases associated with displaced populations.¹¹ The health consequences of flooding may be described in terms of time as immediate, medium-term, and long-term. There is no clear definition of these terms; indeed, in many respects, these periods overlap. However, this classification is useful to aid with planning and the development of management strategies. For the purposes of this study, immediate is considered as the period when the flood is present, medium is the immediate recovery phase (days to weeks), and long-term is the reconstruction phase (months to years) after the flood.

Immediate Health Effects

These could be categorised as:

- a. Drowning
- b. Physical injuries
- c. Electrical injuries
- d. Burns and explosions
- e. Hypothermia
- f. Disruption of health services delivery

Secondary Health Effects

- a. Water contamination
- b. Chemical contamination
- c. Carbon monoxide poisoning
- d. Communicable diseases
- e. Respiratory illness
- f. Animal displacement

Longer Term Health Consequences

- a. Disability
- b. Mental health problems
- c. Social disruption and related health issues

DISCUSSION

The health consequences of floods depend upon the vulnerability of the environment and the local population. Improved disaster management, including mitigation and preparation has contributed to a reduction in flood-related deaths. Fewer people die from drowning, the majority of which are due to the misuse of motor vehicles or engaging in risky behavior such as swimming in flooded drains. The provision of clean food and water as well as the safe disposal of waste has reduced the incidence of communicable disease outbreaks following floods. Improved risk management of chemicals and other contaminants also has reduced the risks associated with disruption during major floods. Long-term mental health problems have been identified more clearly as a problem and responses must be more coordinated. Ultimately, it is the responsibility of the disaster management system to continue to upgrade the recovery phase and part of this is the long-term coordination of the mental health aspects. The solution is organizational and community-specific, but often not well managed.

The destruction of health service infrastructure can be avoided by improved design, location, and construction to appropriate standards. Both domestic and international collaboration may contribute to a rapid replacement of damaged health infrastructure in both the short and longer-term.

Health impact of floods

Adverse health outcomes accompany floods due to a variety of reasons. The causes of Health Risks after natural disaster are as follows:¹²

- a. Structural damage and debris – falling structural elements, exposed cables and electrical wires,

downed power lines and ruptured gas lines, broken glass and splintered woodwork can cause serious injuries, electric shocks, and even carbon monoxide poisoning;

- b. Floodwater and stagnant water – Floodwater is often contaminated with sewage and chemicals and contains various harmful toxins. If it has come in contact with any household items and materials, it will have contaminated them as well, so touching or using them before they have been thoroughly disinfected may result in skin infections, stomach problems, and conjunctivitis. If there is stagnant water in or near the home, it may contain bacteria that can cause gastrointestinal problems and various infections if it comes in contact with open wounds or mucous membranes;
- c. Mold – When the right conditions are present (ample organic food and abundant moisture), mold growth can begin within 48 hours. It will spread very fast in the humid environment caused by natural disasters like floods and hurricanes and will quickly affect large parts of the home. The harmful microorganisms will not only cause considerable structural damage, but will also have a negative impact on the health of the occupants – mold can trigger a variety of allergy symptoms and other serious health issues, such as headaches, dizziness, respiratory problems, sinus infections, eye irritations, rashes, etc. It can even aggravate conditions like asthma or chronic obstructive pulmonary disease;
- d. Environmental toxins – Lead and asbestos are present in various construction materials that were widely used before the 1970s (when these substances were discovered to be harmful to the health). They are considered to be safe when undisturbed, but hurricanes, earthquakes, and other natural disasters can cause considerable damage to floors, walls, insulations, siding, shingling and other structural elements that contain asbestos and/or lead. As a result, lead dust and asbestos fibers may be released in the air. If inhaled or ingested, these microscopic toxins can cause respiratory problems and long-lasting health issues.

There is a higher risk of epidemic outbreaks after natural disasters. Communicable diseases spread more quickly and more easily after natural disasters. The reasons for the spread of Communicable Diseases are as follows (see **table 1**)

The relationship between the flood and the health consequences often is indirect, and management of the health consequences often are focused on the inter-

Table 1. Reasons for spread of Communicable diseases

1	The shortage of fresh food, typical for post-disaster periods, results in malnutrition that weakens the immune systems of the people in the affected area
2	The limited access to safe water and lack of proper sanitation pose a risk of infections and gastrointestinal problems (diarrhea, hepatitis, and various other bacterial diseases can be transmitted by direct contact with contaminated water);
3	The crowded living conditions and poor hygiene levels in emergency camps facilitate the transmission of infectious diseases;
4	The structural damage done to the hospitals and health facilities in the region and the loss of medical equipment and medicines prevent adequate health care.

mediary elements. A conceptual map may assist health planners and emergency managers to ensure a comprehensive and rational approach in planning for and responding to the health consequences of floods. Floods vary greatly in their character and their impact, as does the vulnerability of the populations they affect. Areas at greatest risk are low-lying, near water, and located downstream from a dam. The health impacts of floods depend upon various factors, including the characteristics of the flood hazard, patterns of exposure, and underlying vulnerability of the population. The health impacts of a particular flood event are context specific, and are very different between developed and developing countries. The current review may be biased towards developed countries as the US and Western countries have published more than have other countries. Variations in population, density, resources, and building codes between developed and developing countries will alter the health impact. Disruptions to food supply are more likely in developing countries while motor vehicle-related injuries are more predominant in developed countries.

Social cohesion as a unifying force

The role of the society in mitigating the disaster is huge. When the various sections of the population rise as one and offer unsolicited help in rescue efforts, providing the basic infrastructure, provide clean food and drinking water, offer temporary shelter, emergency medical evacuation and medical services, provide dress materials, blankets and replace the lost medicines, help in cleaning the damaged houses, help in repairing lost livelihoods the social support helps to reduce the burden on the affected population. The long term concerns to reduce the incidence of communicable diseases and tackle the mental health problems are to be met with planning and effective delivery of services. Several new heroes emerged during the biggest natural disaster of the state. This happened in Kerala when several sections of the society like youngsters and fishermen rose as one to participate in the flood rescue operations either physically or in helping locate the

marooned or endangered people. The greatest appreciation of this is the fact that all this help was spontaneous and unsolicited.

The bigger challenge remains to reconstruct the health infrastructure of the state to a bigger and more modern platform capable of tackling such natural disasters with fast reaction, effective services and with minimal morbidity and mortality.

END NOTE

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