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ആരോഗ്യ കേരളം
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Department of Health and Family Welfare

SHSRC-KERALA

Generic Disaster Management Framework for the Health Sector of Kerala



PREVENTION & MITIGATION

PREPAREDNESS

RESPONSE

RECOVERY & REHABILITATION






State Health Systems Resource Centre - Kerala

OCTOBER 2025

STATE HEALTH SYSTEMS RESOURCE CENTRE – KERALA
GENERIC DISASTER MANAGEMENT FRAMEWORK FOR THE HEALTH SECTOR
2025

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Generic Disaster Management Framework for the Health Sector

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Grounded in the national Disaster Management Act, 2005, the framework sets out a comprehensive, phase-wise approach to disaster management for the health sector, covering: Prevention & Mitigation, Preparedness, Response, and Recovery. It outlines the roles and responsibilities of health administrators, frontline workers, local bodies, and disaster management authorities, and provides detailed protocols for public health measures, mental health and psychosocial support, relief camp standards, surveillance and early warning, dead body management, and the integration of AYUSH systems.

The framework draws on Kerala's disaster profile, including the 2018 and 2019 floods, Cyclone Ockhi (2017), the Kavalappara and Puthumala landslides (2019), the Pettimudi landslide (2020), and the Wayanad landslides (2024), to illustrate the health sector's recurring vulnerabilities and response requirements.

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ABBREVIATIONS

Abbreviation	Full Form
AYUSH	Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy
ASHA	Accredited Social Health Activist
CBOs	Community-Based Organisations
CBS	Community-Based Surveillance
CHC	Community Health Centre
CLW	Community Level Workers
DDMA	District Disaster Management Authority
DMHP	District Mental Health Programme
DMO	District Health Office
ICDS	Integrated Child Development Services
ICU	Intensive Care Unit

IEC	Information, Education and Communication
IYCF	Infant and Young Child Feeding
JPHN	Junior Public Health Nurse
KHRWS	Kerala Health Research and Welfare Society
LSGD	Local Self-Governments
MO	Medical Officer
MoU	Memorandums of Understanding
NGO	Non-Governmental Organisation
NHM	National Health Mission
NRC	Nutritional Rehabilitation Centres
PCR	Polymerase Chain Reaction
PHC	Primary Health Centre
PFA	Psychological First Aid
PLWHA	People Living with HIV/AIDS

PPE	Personal Protective Equipment
QRMT	Quick Response Medical Team
RDT	Rapid Diagnostic Test
SC/ST	Scheduled Castes / Scheduled Tribes
SOP	Standard Operating Procedure
SNO	State Nodal Officer
WASH	Water, Sanitation and Hygiene

CHAPTER 1: INTRODUCTION

1.1 Definition and Scope of Disasters

A disaster is a sudden, calamitous event bringing great damage, loss, destruction, and devastation to life and property. Damage caused by disaster is immeasurable and varies with the geographical location, climate and type of earth surface. According to WHO , a disaster means any occurrence that causes damage , ecological disruption , loss of human life or deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or area. On the basis of source of origin, disasters are mainly of two types: natural and man-made disasters.

1.2 Global and National Disaster Context

Even though substantial scientific and material progress has been made at various levels, the loss of lives and property due to disasters has not decreased. In 1989, the United Nations General Assembly declared 1990-2000 as the International Decade for Natural Disaster Reduction with the objective to reduce loss of lives and property and restrict socio-economic damage through international action, especially in developing countries. (1) India has been traditionally vulnerable to natural disasters on account of its unique geo-climatic conditions. Floods, droughts, cyclones, earthquakes and landslides have been recurrent phenomena. About 60% of the landmass is prone to earthquakes of various intensities; over 40 million hectares are prone to floods; about 8% of the total area is prone to cyclones and 68% of the area is susceptible to drought. Over the past couple of years, the Government of India has brought about a paradigm shift in the approach to disaster management. On 23rd December 2005 , the Government of India passed the Disaster Management Act, which lays down institutional and coordination mechanisms for effective disaster management at the national, state, district and local levels. As authorized by this act, the Government of India created a multi-tiered institutional system consisting of the National Disaster Management Authority (NDMA), headed by the Prime Minister; State Disaster Management Authorities (SDMAs), headed by the respective Chief Ministers; and

District Disaster Management Authorities (DDMA), headed by the District Collectors and co-chaired by Chairpersons of the local bodies.

1.3 Kerala's Disaster Vulnerability and Governance

Kerala faces unique disaster risks due to its geographical location and climate. The state's vulnerability to both natural and human-made disasters is influenced by factors such as its long coastline, high population density, and frequent heavy rainfall. Floods and landslides during the monsoon season are recurrent challenges, often exacerbated by deforestation and urbanization. In addition, Kerala's susceptibility to tropical cyclones and rising sea levels due to climate change add to its disaster risk profile. On account of this, Kerala established India's first State Disaster Management Authority, the Kerala State Disaster Management Authority (KSDMA). DDMA has been constituted in all the districts of Kerala as per the Disaster Management Act 2005. (1) As per the Kerala State Disaster Management Plan, the state is vulnerable to 40 hazards of natural origin along with other human-induced hazards. Among them, 17 are natural hazards and 23 are man-made (Table 1). (2)

Table 1.1. List of hazards in Kerala*

SL No	Category	Type
1		Flood (Riverine, Urban and Flash Floods)
2		Landslides (includes debris flows, rockfall, rock avalanches, rock slides, land slips and mud slips)
3		Drought
4		Coastal hazards (High Waves, Storm surges, Kallakkadal, Tsunami, Salt Water Intrusion, Coastal erosion)
5		Wind (Cyclone, gustnadoes, Gusty winds)

6	**Natural Hazards**	Lightning
7		Earthquakes
8		Human epidemics
9		Plant disease epidemics and pest attacks on crops
10		Avian epidemics
11		Animal epidemics
12		Pest attack of human habitations
13		Forest fire
14		Meteor/asteroid impacts
15		Soil piping
16		Heat wave / Humid warm stroke
17		Natural background radiation
1	**Anthropogenic Hazards**	Stampedes
2		Firecracker accidents
3		Petro-chemical transportation accidents
4		Industrial accidents
5		Dam break
6		Dam spillway operation-related floods & accidents
7		Oil spill
8		Road accidents involving civilian transport vehicles
9		Human-induced forest fire

10		Human-animal conflicts
11		Fire accidents in buildings and marketplaces
12		Boat capsizing
13		Accidental drowning
14		Building collapse
15		Hooch accidents
16		Air accidents
17		Rail accidents
18		Terrorism, riots and naxalite attacks
19		Nuclear and radiological accidents
20		Space debris impacts
21		Biological accidents
22		Occupational and recreational area-related hazards
23		Accidents in Armed Forces premises
24		Disasters outside State's administrative boundaries, affecting Keralites

*(*Source: Kerala state disaster management plan 2016)*

1.4 Kerala's Disaster Profile: Major Events and Impacts

Kerala, with its unique geography and dense population, has faced numerous natural and man-made disasters over the years. Notable events include the Great Flood of 1999, the Attappadi landslide, the 2004 Indian Ocean tsunami, the 2016 Puttingal Temple fire, Cyclone Ockhi (2017), the catastrophic Kerala floods of 2018 and 2019, the Kavalappara and Puthumala landslides (2019), the Pettimudi landslide (2020), and recurrent Wayanad landslides. Among these, the Kerala floods (2018) and the

subsequent landslides stand out as the most devastating in recent history, highlighting the state's vulnerability to climate extremes and the urgent need for robust disaster management strategies. Among them, major disasters in recent years are ,

- Cyclone Ockhi (2017) was one of the most devastating cyclones to affect the southern Indian coast in recent decades. Officially, the death toll from Ockhi in Kerala is officially reported as 143 with 52 confirmed dead and 91 "missing." (4) The Centre Government reported that 39 people had died and 167 were missing after the cyclone hit parts of Kerala and Tamil Nadu. Cyclone Ockhi was an unusual cyclone; it emerged quickly and travelled rapidly towards the Kerala coast. (3)
- The Kerala floods (2018) were one of the worst natural disasters in the state's history; in 2018 the state experienced its highest level of monsoon rainfall. The rainfall, 164 percent above the usual levels, affected all 13 districts and resulted in serious flooding and landslides, which caused severe damage across the state and resulted in over 400 fatalities and the displacement of millions. (4)
- The Kavalappara Landslide (2019) was triggered by intense and continuous rainfall, which was 66 percent higher than the average for that time frame, indicating a departure from typical weather patterns, which resulted in 69 casualties. 39 completely damaged houses along with roads, utilities and other infrastructure damages, were recorded during the landslide. (5)
- The Pettimudi Landslide & Floods (2020) were triggered by heavy rainfall resulting in a landslide that killed over 80 people. Among the people affected in the district were tea plantation workers. (6)
- The Wayanad landslides (2024) were a devastating consequence of intense rainfall, primarily affecting the villages of Punjirimattom, Mundakkai, Chooralmala and Vellarimala in the Meppadi panchayat of Vythiri taluk, Wayanad district, Kerala. The hillsides collapsed due to the massive downpour, leading to catastrophic landslides that swept away entire villages and caused flash floods. The landslides, which started near the origin of the Iruvanjippuzha river, resulted in at least 373 deaths, over 200 injuries, and 218 people reported missing. (7)

1.5 Health Impacts of disasters

Disasters impose a significant health burden on affected populations and strain the capacity of local health systems to deliver essential healthcare services. The health impacts of disasters can be categorized into four key dimensions: (1) direct effects on population health, including injuries, trauma, and fatalities; (2) direct damage to healthcare infrastructure, disrupting medical services and supply chains; (3) indirect consequences on public health, such as disease outbreaks, malnutrition, and mental health disorders due to displacement and poor living conditions; and (4) indirect strain on healthcare systems, exacerbating pre-existing vulnerabilities and diverting resources from routine care. (8) Addressing these multidimensional challenges requires integrated disaster preparedness and resilient health systems to mitigate both immediate and long-term health crises.

1.5.1 *Direct impact on the health of the population*

Disasters exert profound direct health consequences on affected populations through multiple pathways. The most immediate effects manifest as trauma-related injuries, with morbidity and mortality patterns varying significantly based on disaster type—ranging from crush injuries in earthquakes to drowning in floods. Secondary health crises often emerge through the disruption of disease control systems, leading to outbreaks of communicable diseases, including cholera, typhoid (water-borne), and malaria or dengue (vector-borne). Vulnerable populations face compounded risks as disasters interrupt continuous care for chronic conditions like diabetes, renal disease, and respiratory illnesses, potentially turning manageable conditions into life-threatening situations. Perhaps most insidiously, disasters trigger both acute and chronic mental health consequences: immediate psychological impacts such as shock, fear, confusion and acute stress reactions frequently evolve into long-term conditions including PTSD, clinical depression, anxiety disorders, complicated grief, and social dysfunction.

1.5.2 *Direct impact on health care system*

Disasters can severely disrupt healthcare infrastructure and services, exacerbating the challenges faced by affected populations. Hospitals, clinics, and healthcare centers

may sustain physical damage, rendering them partially or completely non-functional. Critical medical equipment, pharmaceutical supplies, and power sources can be destroyed, while essential health records may be lost, complicating patient care and follow-up. Healthcare workers themselves may become disaster victims, further straining the system's capacity. These disruptions create a cascading effect—overwhelmed facilities struggle to manage sudden surges in trauma cases while maintaining routine medical services. The resulting gaps in healthcare delivery not only hinder emergency response but also prolong recovery, leaving communities vulnerable to secondary health crises.

1.5.3 *Indirect impact on population*

When Primary Health Care facilities are damaged or non-functional, critical services such as immunization programs, prenatal and antenatal care, and chronic disease management (e.g., hypertension, diabetes) are disrupted. This leads to increased risks of vaccine-preventable diseases, pregnancy complications, and uncontrolled chronic conditions, worsening long-term health outcomes.

In addition, disasters often cause loss of income, displacement, and destruction of livelihoods, forcing affected individuals to prioritize survival over healthcare. Reduced financial access to medicines, nutritious food, and medical consultations further aggravates health disparities. Social instability, including family separation and increased domestic violence compounds psychological distress, leading to prolonged mental health issues.

1.5.4 *Indirect impact on health care system*

Disasters strain healthcare systems by diverting resources from routine services to emergency response. Disruptions in vaccination drives, maternal health programs, and treatment for chronic illnesses can lead to resurgences of preventable diseases (e.g., measles, diphtheria) and increased hospitalizations due to unmanaged conditions.

Overburdened health workers, infrastructure damage, and supply chain breakdowns further weaken the system's ability to deliver continuous care. This creates a vicious

cycle: as preventable illnesses rise, healthcare demand surges, stretching already limited resources and deepening health inequities.

1.6 Foundational principles

The formulation of this generic disaster management framework for the health sector of Kerala is grounded in the Disaster Management Act, 2005 (DM Act, 2005), which provides the legal foundation for a comprehensive, multi-stakeholder approach to disaster risk reduction in the state. The DM Act, 2005 establishes an integrated system involving governmental agencies, non-governmental organizations, private sector entities, and individuals, ensuring collaborative efforts across all levels. Disaster management, as defined by the Act, encompasses a continuous and systematic process that includes planning, organizing, coordinating, and implementing measures to prevent or mitigate disaster risks, reduce severity and consequences, build capacity, ensure preparedness, enable prompt response, assess impacts, and facilitate evacuation, rescue, relief, rehabilitation, and reconstruction. This framework ensures that health and psychosocial well-being are embedded within Kerala's broader disaster management strategy, aligning prevention, preparedness, response, recovery, and resilience-building efforts across the state. By institutionalizing these principles, the framework addresses both immediate health impacts and long-term recovery needs. fostering a coordinated and effective approach to safeguarding public health during disasters while strengthening the overall resilience of Kerala's health system.

CHAPTER 2: DISASTER MANAGEMENT

2.1 Concept and Scope of Disaster Management

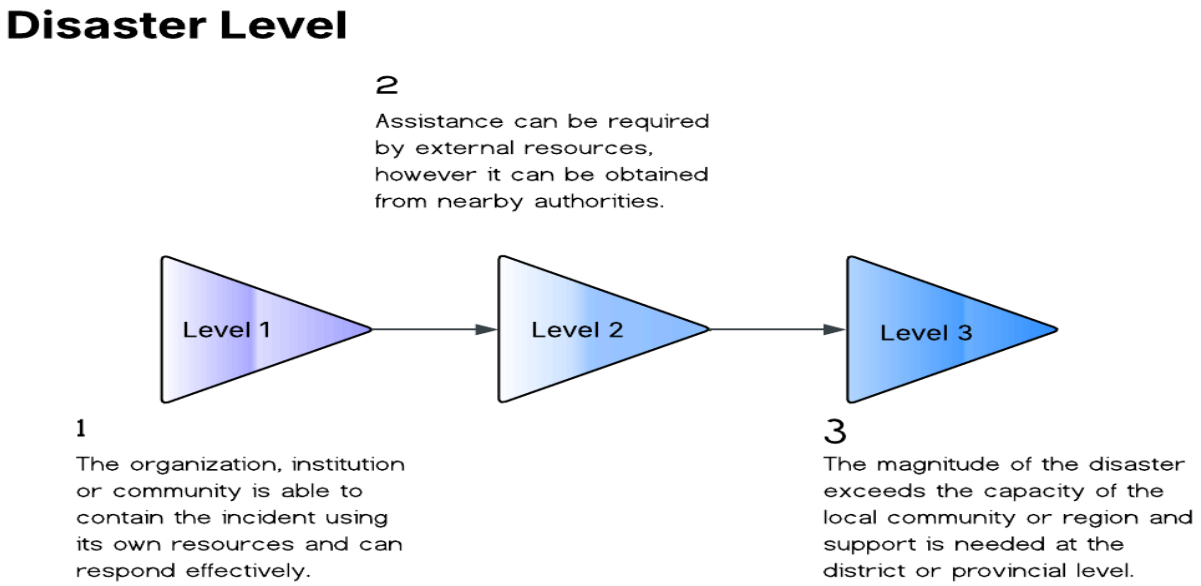
Disaster management involves the organized efforts to mitigate, prepare for, respond to, and recover from disasters. In other terms, it is the coordination and integration of all activities necessary to build, sustain and improve the capability to prepare for, protect against, respond to and recover from threatening or actual natural or human-induced disasters. It is a multi-jurisdictional, multi-sectoral, multi-disciplinary and multi-resource initiative.

2.2 Levels of Disaster Classification

Based on containment, disaster can be categorized under 3 levels:

1. Level 1 (Localized Disaster): The organization, institution or community is able to contain the incident using its own resources and can respond effectively.
2. Level 2 (Moderate Disaster): Assistance may be required from external resources, but can be obtained from nearby authorities.
3. Level 3 (Major Disaster): The magnitude exceeds local/regional capacity, requiring district or provincial/national level support.

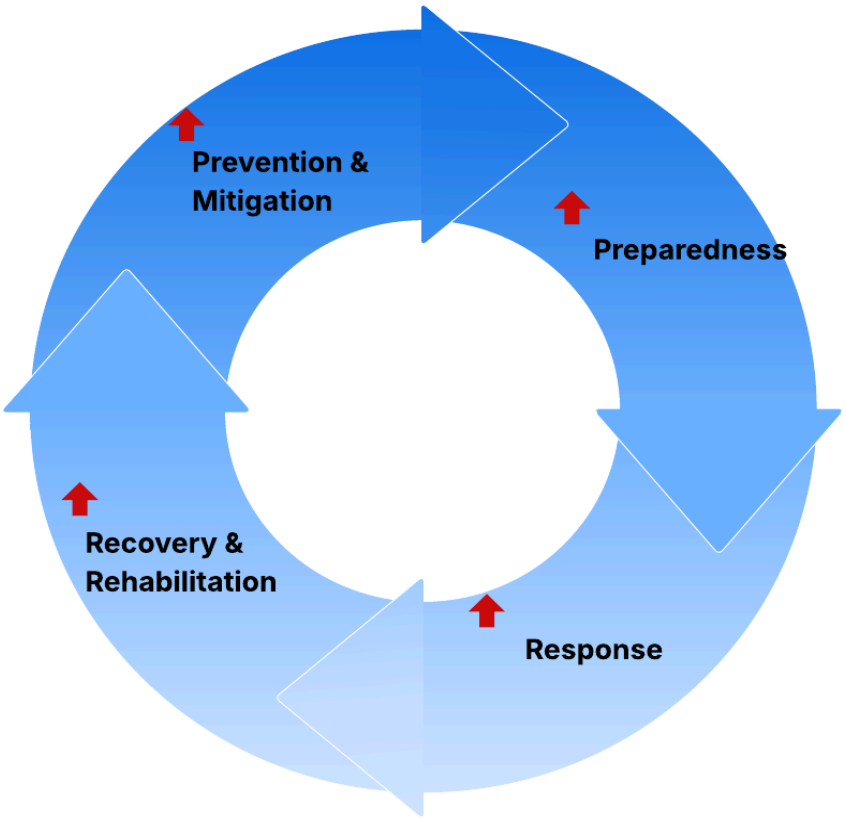
Figure 2.1. Classification of Disaster Response Levels



2.3 Disaster Management Cycle

The disaster management cycle represents a continuous, iterative process that integrates four key components. Prevention and mitigation form the foundational stage, employing both structural measures (e.g., flood barriers, earthquake-resistant construction) and non-structural approaches (e.g., land-use regulations, public education) to minimize risks. Preparedness activities build institutional and community capacity through simulation exercises, resource allocation planning, and public awareness campaigns. When disasters occur, the response phase mobilizes coordinated efforts for emergency relief, including search and rescue operations, temporary shelter provision, and medical triage. The cycle culminates in recovery and rehabilitation, where long-term strategies are implemented to restore socioeconomic stability, rebuild critical infrastructure, and incorporate lessons learned into future planning, thereby completing the cycle and strengthening subsequent preparedness efforts.

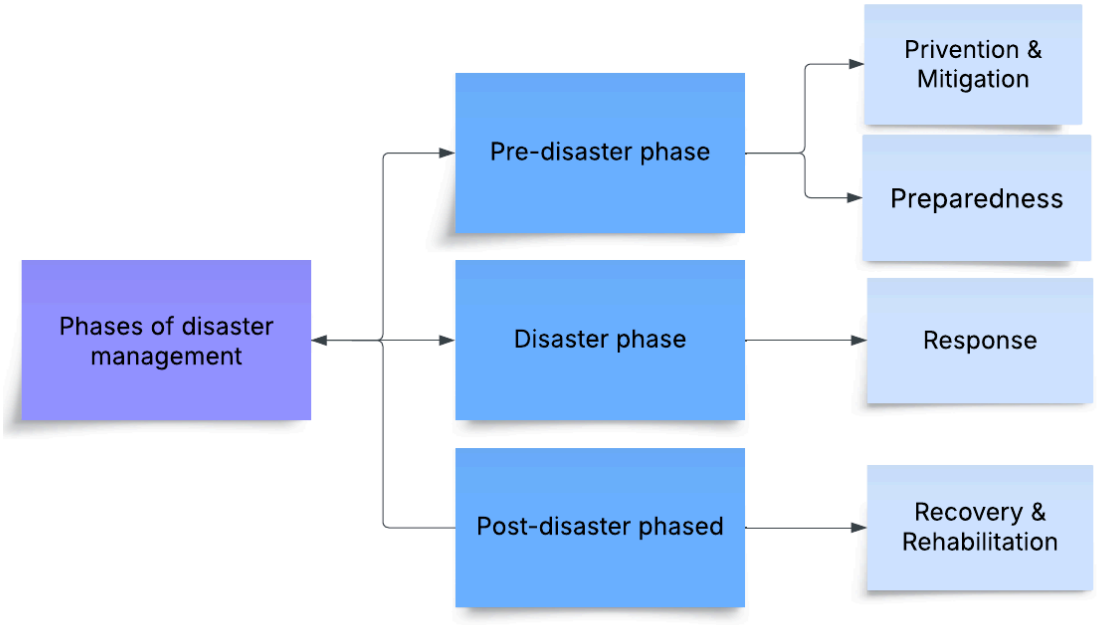
Figure 2.2. Disaster Management Cycle



2.4 Disaster Management Phases

Disaster management operates through three critical temporal phases that guide intervention strategies. The pre-disaster phase encompasses proactive measures, including prevention and mitigation activities such as hazard mapping, infrastructure reinforcement, and policy development to reduce potential impacts. Concurrently, preparedness initiatives establish early warning systems, conduct training programs, and stockpile essential resources to enhance response readiness. During the active disaster phase, immediate response mechanisms are activated, focusing on life-saving interventions like emergency medical services, evacuation procedures, and damage containment. The post-disaster phase transitions to recovery and rehabilitation, addressing both physical reconstruction of damaged infrastructure and psychosocial support for affected communities, ensuring comprehensive restoration and improved future resilience.

Figure 2.3. Phases and Activities in Disaster Management



CHAPTER 3: PREVENTION AND MITIGATION

Prevention means stopping the hazard or event from happening. In other terms, actions taken to avoid the occurrence of a disaster completely. Mitigation reduces the severity of its impact if it happens. In landslides, both are proactive strategies used to reduce the likelihood and impact of landslides.

3.1 Health Facility Preparedness

Health facilities constitute the fundamental infrastructure for disaster management, serving as critical first responders during emergencies. The preparedness of primary, secondary, and tertiary health facilities during prevention and mitigation phases directly correlates with life-saving effectiveness during disasters. Implementation requires an integrated strategy encompassing: (1) health awareness initiatives including training programs for staff and community leaders; (2) structural safety measures such as facility audits and retrofitting of vulnerable structures; and (3) comprehensive resource planning to ensure adequate staffing, equipment, and emergency transportation. These coordinated efforts enhance facility capacity, resilience, and operational readiness to minimize mortality, maintain essential services, and safeguard vulnerable populations during crises.

3.1.1 Health Awareness and Capacity Building

Health awareness and capacity development represent foundational elements of institutional disaster preparedness. As primary emergency response nodes, health facilities require (1) comprehensive training on disaster response protocols for all staff; (2) regular simulation exercises conducted in partnership with Kerala Police (IRB), Disaster Management authorities, and Fire and Safety departments; and (3) continuous enhancement of technical and managerial competencies. These measures transform health facilities into resilient emergency response centers capable of coordinated action during disasters, while reducing institutional vulnerabilities through improved staff preparedness and inter-agency collaboration (9).

Table 3.1 : Capacity building/training provided for hospital staffs in prevention and mitigation phase(10)

Category/Role	Prevention & Mitigation Responsibilities	Capacity Building / Training Needs
RMO (Resident Medical Officer)	Ensure disaster plan is updated; identify structural/operational risks; plan workforce mobilization systems.	Training in risk assessment, disaster plan updating, coordination of preventive strategies.
Nursing Superintendent	Monitor nursing staff readiness; ensure wards have safe layouts and backup systems; anticipate surge needs.	Training in hazard identification in wards, safe evacuation planning, risk communication.
PRO (Public Relations Officer)	Develop IEC materials for awareness; establish communication networks with external agencies; orient volunteers before emergencies.	Training in public risk communication, media preparedness, volunteer training in prevention.
Hospital Administrator / Superintendent	Enforce safety audits; ensure mock drills are scheduled; establish structural/functional safety protocols.	Training in hospital safety standards (fire, electrical, building codes), multi-sectoral coordination.
Security Officers	Conduct regular checks on fire exits, access routes, and crowd control mechanisms.	Training in fire safety, evacuation route management, hazard

		identification (electrical, chemical).
Reception Staff/ASHA	Maintain updated patient/visitor registers; educate visitors on safety codes (e.g., evacuation routes).	Training in information management, risk communication with patients/relatives.
Triage Officer (RMO/ Superintendent)	Anticipate high-risk situations; pre-identify triage zones and ensure readiness.	Training in simulation-based triage drills, risk prioritization.
Specialist Doctors	Keep updated on emergency protocols; support preventive health audits (ICU, OT, etc.).	Training in periodic risk assessments, preventive clinical protocols.
Nursing Staffs	Ensure emergency kits, first aid, and ward safety measures are in place.	Training in first aid readiness, infection prevention, fire and hazard awareness.
Nursing Assistants	Maintain readiness of beds, linens, and supplies; report hazards in wards.	Training in hazard spotting, safe patient-handling practices.
Housekeeping Staff	Ensure hygiene, safe waste disposal, and unobstructed evacuation paths.	Training in biomedical waste management, sanitation during emergencies.
Ward Attenders	Keep wheelchairs/stretchers ready; ensure movement routes are clear.	Training in safe evacuation drills, mobility support in risk reduction.

Clinical Epidemiologist	Conduct regular disease surveillance; monitor sanitation and water safety.	Training in early warning surveillance, outbreak risk assessment.
Dietary Department	Maintain safe food storage; ensure uninterrupted supply chains.	Training in food safety standards, contingency planning for nutrition.
Counselling Centre	Build resilience of staff and patients through awareness on stress coping before disasters.	Training in psychosocial preparedness, psychological first aid.
Ambulance Team	Ensure ambulances are functional and drivers trained; maintain backup plans.	Training in preventive vehicle maintenance, safe transport protocols.
Mortuary Staff	Ensure mortuary safety (electricity, storage); maintain identification systems in advance.	Training in respectful handling protocols, infection prevention.
Laboratory Staff	Keep labs safe from chemical/biological hazards; maintain emergency testing protocols.	Training in biosafety, chemical hazard mitigation.
Blood Bank Staff	Maintain stock readiness; establish donor networks in advance.	Training in donor mobilization, preventive blood safety measures.
Pharmacy Staff	Maintain buffer stocks; establish supplier agreements.	Training in supply chain risk management, essential medicine stockpiling.
ICU Nursing In-Charge	Anticipate surge risks; maintain emergency discharge protocols.	Training in ICU risk mitigation, ventilator allocation planning.

Radiology Team	Ensure imaging equipment safety; maintain power backup.	Training in equipment safety, prioritization protocols.
Operation Theatre Team	Verify safety of OT equipment; ensure sterile supplies and backups.	Training in OT fire safety, sterile supply management.
Physiotherapy Department	Maintain assistive devices and educate patients on fall prevention.	Training in preventive rehabilitation, safe mobility practices.

3.1.2 *Structural Safety*

The proposed framework recommends conducting safety audits of all health facilities in the State to identify structurally vulnerable buildings. All new health facility constructions should incorporate disaster-resilient design standards from the planning stage. Identified weak structures should undergo prioritized retrofitting interventions. For health sector buildings located in flood-prone areas, appropriate mitigation measures including structural strengthening or relocation should be implemented based on technical assessments. Concurrently, hospital staff should receive regular orientation about damage-resistant sections within their facilities to ensure optimal space utilization during emergency situations.

3.1.3 *Human Resources and Equipment*

The proposal emphasizes comprehensive workforce planning that assesses current staffing levels across all medical specialties and support roles to identify critical personnel gaps. These gaps should be addressed through strategic recruitment, private sector partnerships, and volunteer integration programs. Parallel assessment of emergency medical equipment and transportation resources should inform procurement strategies encompassing direct purchases, rental agreements, and requisition protocols from private sources when necessary. Particular attention should be given to maintaining appropriate doctor-specialist-support staff ratios to ensure effective epidemic response capabilities across all health facilities.

3.2 Community Health Education

Community health education is vital in strengthening disaster preparedness and resilience. Awareness programs should inform communities about landslide causes, early warning signs, and safe land-use practices, enabling timely reporting of risks and early evacuation. Safe routes and assembly points must be established and communicated through local health workers, schools, and mass media. Training for volunteers and health staff should cover first aid, CPR, trauma care, and the use of emergency supplies. Public education must also promote safe water, sanitation, vaccination, and early recognition of disease symptoms to prevent outbreaks. Psychological preparedness through counseling and awareness programs is equally important to address fear, stress, and panic during high-risk seasons. By combining health, hygiene, mental health support, and life-saving skills, community health education builds resilience and empowers individuals and families to act effectively before, during, and after disasters.(11).

3.3 Public Health Measures during prevention and Mitigation

In the prevention and mitigation phase, public health measures are important in the case of disaster-related health risks, encompassing not only water, sanitation, and hygiene (WASH) interventions but also integrated approaches to communicable diseases, non-communicable diseases (NCDs), reproductive health, and chronic illness management. Overcrowding, unsafe water, and poor sanitation during disasters heighten the risk of outbreaks such as diarrhoeal diseases, malaria, dengue, leptospirosis, and influenza, which necessitates preventive strategies including vaccination campaigns, vector control measures, isolation facilities, and rapid surveillance through frontline health workers to ensure early detection and timely treatment. Equally important is the continuity of care for NCDs such as hypertension, diabetes, cardiovascular disease, asthma, and cancer, which requires buffer stocks of essential medicines, maintenance of patient health registers, and regular counseling and screening to minimize complications. Reproductive and maternal health also demands priority, with relief camps ensuring antenatal and postnatal care, safe childbirth facilities, nutritional supplementation, contraceptive availability, and breastfeeding support in line with Minimum Initial Service Package (MISP) protocols.

Chronic and long-term illnesses including tuberculosis, HIV/AIDS, renal disease, and mental health disorders require uninterrupted therapy, regular follow-up, referral linkages, telemedicine services, and psychosocial support systems to avoid treatment disruptions. By integrating these dimensions—WASH, communicable disease control, NCD management, reproductive health, and chronic disease care—into the prevention and mitigation phase, public health measures become comprehensive, inclusive, and resilient, safeguarding both immediate survival and long-term well-being of disaster-affected populations.

3.3.1 *Disease Surveillance and Response*

Equally important is the expansion of disease surveillance networks at local, district, and state levels. Health workers and community leaders should be trained to detect and report early signs of outbreaks. A well-coordinated surveillance system facilitates intersectoral response by linking hospitals, laboratories, and community structures in monitoring and controlling disease spread. To conduct this effectively, it is essential to train Medical Officers (MO), nurses, ASHA workers, and volunteers to recognize early warning signs of epidemic-prone diseases and respond promptly through appropriate reporting and referral systems.

3.4 Environmental Risk Reduction

Environmental risk reduction involves implementing sustainable measures to minimize the occurrence and impact of landslides. A key preventive strategy is restricting construction in high-risk zones, which reduces potential casualties, property damage, and ecological harm. Risk-prone areas should be identified and classified using advanced tools such as GIS mapping, satellite imagery, and field surveys. Concurrently, awareness initiatives should educate communities, landowners, and developers about the dangers of unstable terrain, promoting safer land-use practices and voluntary relocation from vulnerable locations.

To enhance early detection, sensor-based monitoring systems should be installed in high-risk areas. These sensors track critical indicators like ground movement, soil moisture levels, and rainfall patterns, enabling timely alerts through early warning systems (EWS). Proper slope drainage is equally essential, as water accumulation

destabilizes soil structure and increases landslide susceptibility. A combination of surface drainage solutions (e.g., open channels, gutters) and subsurface systems (e.g., horizontal drains, deep wells), along with slope grading and vegetation management, should be implemented to mitigate risks.

Deforestation control is another critical component. Measures should include afforestation and reforestation programs, strict surveillance to prevent illegal logging, and community-led forest conservation efforts. Public education campaigns should highlight the direct relationship between deforestation and landslide risks, fostering local stewardship of natural resources. Together, these strategies create a holistic approach to environmental risk reduction, aligning with sustainable development goals.

Table 3.2. Measures of prevention & mitigation in disaster management

Prevention & Mitigation		
Domain	**Actors**	**Responsibilities**
Health Facility Safety	PHC/CHC staff, local hospital administration, Panchayat/Municipality health committees	Conduct basic safety audits, identify damage-proof areas, ensure backup utilities, maintain emergency medicines, carry out evacuation drills
	District Health Office(DMO/DPM), Public work department(PWD) engineers, Health, Irrigation &Transport, District officers of KSEB	Conduct technical structural safety inspections, assist in retrofitting or relocating vulnerable facilities, inspect access roads to health facilities, coordinate with private hospitals for resource sharing

	State Health Department (DHS), KSDMA, NDMA, MoHFW	Set and enforce disaster-safe building codes, approve funding for structural retrofitting, and integrate hospital safety into state/national disaster management plans
Community Health Education	Junior Public Health Nurse, Accredited Social Health Activist(ASHA), Anganwadi Workers, local NGOs	Conduct awareness on landslide signs, safe evacuation routes, first aid, CPR, trauma care, hygiene and sanitation, vaccination schedules; organise community drills and pre-disaster counselling in high-risk seasons
	Taluk-level trained health educators, district Information, Education and Communication (IEC) units, school health coordinators	Provide standardized training materials, supervise awareness campaigns, conduct inter-school and community competitions on disaster safety
	State IEC Bureau, State Health Promotion Unit, MoHFW IEC Division, Institute of Land and Disaster Management (ILDM) and the Kerala State Disaster Management Authority (KSDMA)	Develop and run mass media campaigns, create standardized disaster health education material, integrate disaster risk reduction into school curriculum

Public Health & Disease Prevention	PHC staff/ trained AHSAs and JPHN, LSGD sanitation workers, community volunteers	Monitor drinking water quality, promote hygiene practices, manage solid and liquid waste, ensure vaccination of vulnerable groups, report unusual disease symptoms
	District Surveillance Unit (IDSP), District Epidemiologist	Strengthen outbreak detection, provide rapid diagnostic kits, coordinate with health facilities for timely reporting and response
	State IDSP cell, State Public Health Laboratory, National Centre for Disease Control (NCDC)	Maintain central disease database, issue early warnings, coordinate statewide outbreak investigation, supply essential medicines and vaccines from reserve stock
Environmental Risk Reduction	LSGD, community volunteers	Prevent illegal logging, plant native vegetation for slope stability, maintain surface drains, report cracks or ground movement, avoid construction in high-risk areas
	District Forest Department, District Disaster Management Authority, PWD	Implement slope stabilization works, install and maintain early warning sensors, enforce district-level land-use restrictions, manage

		drainage systems in landslide-prone slopes
	State Forest Department, Ministry of Environment, KSDMA	Fund and oversee afforestation projects, approve large-scale slope stabilization plans, enact state policies on deforestation control, support relocation from high-risk zones

CHAPTER 4: PREPAREDNESS

This protective process includes measures that enable governments, communities, and individuals to rapidly respond to disaster situations to cope with them effectively and reduce their potential impact on the people, property, and infrastructure. This includes the formulation of viable emergency plans, the development of warning systems, the maintenance of inventories, and the training of personnel. It may also include search and rescue measures as well as evacuation plans for areas that may be at risk from a recurring disaster (3).

4.1 Planning & Coordination

Effective disaster management relies on a clear framework for planning, coordination, and oversight across all levels of governance. This systematic approach ensures unified action among various stakeholders while maintaining accountability and operational efficiency throughout all phases of disaster management – from prevention and preparedness to response and recovery. The framework establishes standardized protocols for inter-agency collaboration, resource allocation, and decision-making processes that are critical for effective disaster risk reduction.

4.1.1 *Kerala State Disaster Management Authority (KSDMA)*

As the apex body for disaster management in Kerala, KSDMA plays a pivotal role in leading and coordinating prevention, mitigation, and preparedness efforts statewide. The authority serves as the central coordinating mechanism, aligning departmental, district, and sectoral plans into a comprehensive, unified strategy. KSDMA's mandate includes serving as the nodal agency for prevention and mitigation initiatives while providing technical guidance and policy direction for all disaster risk reduction activities. The authority actively monitors preparedness measures across sectors, ensures the integration of local-level plans with state strategies, and facilitates capacity-building initiatives. Through its oversight functions, KSDMA maintains operational readiness by establishing clear lines of communication, standardizing response protocols, and optimizing resource deployment across all administrative levels.

4.1.2 *State Departments*

State-level departments are critical stakeholders in disaster risk reduction, ensuring that prevention, mitigation, and preparedness measures are systematically integrated into routine governance and sectoral service delivery. Each department is responsible for developing comprehensive Departmental Disaster Management Plans (DDMPs), which must include (1) disaster prevention, mitigation, and preparedness programmes tailored to their operational scope; (2) hazard-specific contingency plans addressing sectoral vulnerabilities; and (3) capacity-building initiatives to enhance institutional and staff readiness. To streamline coordination, departments should establish dedicated Disaster Management Cells at state and district levels, appoint Nodal Officers for Disaster Management, and maintain functional control rooms for real-time decision-making. Additionally, standardised Standard Operating Procedures (SOPs) must be developed for key operational areas such as evacuation protocols, emergency procurement, and resource deployment to ensure swift and structured responses during crises.

4.1.3 *District Collector / District Disaster Management Authority (DDMA)*

At the district level, the DDMA, under the leadership of the District Collector, serves as the nodal body for orchestrating disaster management efforts across departments, local governments, and community networks. Its mandate encompasses (1) coordinating all district-level prevention, mitigation, and preparedness activities; (2) ensuring District Disaster Management Plans are regularly updated, tested, and operational; and (3) spearheading training programmes, awareness campaigns, and capacity-building initiatives for officials and vulnerable communities.

4.1.4 *Local Authorities (Panchayats, Municipalities, Corporations)*

Local authorities serve as the frontline governance units in disaster management, responsible for implementing preparedness and mitigation measures at the community level. As the direct interface between citizens and higher-level authorities, they ensure local needs, vulnerabilities, and resources are incorporated into disaster planning and

response. Their key functions include (1) close coordination with the District Disaster Management Authority (DDMA) and relevant departments; (2) enforcement of hazard zonation maps, building codes, and safety specifications; and (3) organization of community-based disaster preparedness activities. By leveraging their grassroots presence, local authorities play a pivotal role in translating state policies into actionable local measures while ensuring community participation in risk reduction (12).

4.1.5 *NGOs & Community Groups*

Non Governmental Organizations(NGOs) and community groups are vital partners in disaster risk reduction, bridging the gap between formal disaster management structures and local communities. Their grassroots connectivity enables them to: (1) identify and assess local vulnerabilities through participatory risk assessments; (2) implement community-based disaster risk management (CBDRM) initiatives; (3) conduct training and awareness programs at the grassroots level; and (4) collaborate with local authorities to develop context-specific mitigation mechanisms.

4.1.6 *Corporate Sector*

The corporate sector makes significant contributions to disaster risk reduction through responsible business practices and active engagement in preparedness efforts. Key responsibilities include (1) participation in awareness campaigns, training programs, and preparedness activities; (2) compliance with disaster management regulations and safety standards; (3) development of comprehensive on-site and off-site disaster management plans; (4) adoption of environmentally sustainable industrial processes; and (5) support for local community preparedness initiatives through Corporate Social Responsibility (CSR) programs.

4.2 Risk Mapping & Facility Vulnerability Assessment

A comprehensive risk mapping and vulnerability assessment of health facilities is critical for ensuring healthcare service continuity during disasters. This systematic process examines health infrastructure and surrounding areas to evaluate their exposure to hazards, structural resilience, operational capacity, and ability to serve

vulnerable populations. The assessment combines multiple approaches: geospatial mapping identifies facility-specific risks from floods, landslides or other regional hazards; structural evaluations analyze building integrity and critical system vulnerabilities; and service continuity assessments examine backup power, water supply, and emergency protocols.

For health facilities in Kerala's disaster-prone regions, this integrated analysis supports evidence-based preparedness planning by identifying priority facilities requiring retrofitting or relocation, optimizing resource allocation, and developing tailored emergency response protocols. The assessment also considers population needs, evaluating patient demographics, accessibility challenges during disasters, and alternative care arrangements for displaced communities. Findings directly inform the state's Health Facility Preparedness Plans and are regularly updated to reflect changing environmental risks or healthcare demands.

4.2.1 *Identification and Assessment of Hazard-Prone Health Facilities*

A comprehensive approach to identifying and assessing health facilities in hazard-prone areas is essential for disaster preparedness. The process begins with mapping all healthcare facilities to determine their vulnerability to specific hazards such as floods, cyclones, landslides, and earthquakes. This geospatial analysis provides the foundation for prioritizing preparedness actions and resource allocation.

Structural safety assessments must be conducted for critical health infrastructure, including PHCs, CHCs, laboratories, and medical warehouses. These evaluations determine the capacity of buildings to withstand anticipated hazards while protecting vital medical equipment and supplies. The assessments should follow standardized protocols to ensure consistency across facilities and identify structures requiring immediate reinforcement or relocation.

4.2.1.1 *Functional Capacity Evaluation*

The ability of health facilities to maintain operations during disasters is a key determinant of health system resilience. A systematic review of infrastructure, essential resources, and emergency readiness helps identify strengths and gaps in

service continuity. Particular attention must be given to maintaining adequate stocks of essential medicines, vaccines, and emergency medical kits, with regular monitoring of expiration dates and supply chain robustness. Facilities should maintain updated lists of emergency suppliers to enable rapid restocking during crises.

4.2.1.2 *Critical Systems and Accessibility*

Ensuring resilient utility systems is paramount, including backup power solutions, alternative water supplies, and fail-safe waste disposal mechanisms. Clinical staff must verify water quality and sanitation standards in emergency treatment areas. Facilities should develop clear protocols for sustaining essential services during prolonged emergencies, with nursing supervisors maintaining updated inventories of available equipment and medications.

Accessibility assessments must evaluate transportation routes, alternative access points, and ambulance services to guarantee patient access during disasters. This includes ensuring 24/7 availability of ambulances, including mobile Intensive Care Unit (ICU) units, with adequate numbers of trained drivers and emergency medical technicians.

4.2.1.3 *Risk Mitigation and Planning*

The assessment process should identify specific retrofit requirements for high-risk facilities, prioritizing structural reinforcements or relocation for those below safety standards. Health teams must maintain updated registries of vulnerable populations within each facility's service area, including the elderly, children, persons with disabilities, and immunocompromised individuals, to guide targeted emergency responses.

District health authorities should map and document alternative healthcare facilities, including public, private, and charitable institutions capable of providing temporary services when primary facilities are compromised. This contingency planning must consider road accessibility, surge capacity, and service capabilities of alternate sites.

All assessment data should be consolidated into a comprehensive Facility Vulnerability Database, integrated into District Disaster Management Plans (DDMPs). This living database must include:

1. Structural and functional safety ratings
2. Hazard exposure levels
3. Resource inventories
4. Retrofitting requirements
5. Emergency contact networks
6. Backup utility arrangements
7. Evacuation protocols

Regular updates to the database ensure alignment with evolving risks and operational needs, creating a dynamic tool for evidence-based decision-making in health facility preparedness and disaster response plan (13).

4.2.1.4 *Implementation Framework*

The assessment process requires:

1. Multi-disciplinary teams combining engineering, medical, and disaster management expertise

2. Standardized evaluation tools adapted to Kerala's specific hazards

3. Regular reassessment cycles accounting for environmental and demographic changes

4. Clear accountability structures for implementing mitigation measures

5. Integration with statewide emergency response systems

4.3 Pre-Disaster Planning – Hospital Preparedness Measures

Hospitals serve as critical response hubs during disasters and must maintain comprehensive preparedness to manage sudden patient surges while continuing essential services. Effective pre-disaster planning ensures health facilities remain operational during emergencies by establishing clear protocols, command structures,

and resource mobilization systems. This involves developing institutional frameworks that address infrastructure resilience, staff readiness, and coordination mechanisms to handle increased caseloads and complex medical needs during crises.

4.3.1 *Institutional Arrangements*

A robust institutional framework forms the foundation of hospital disaster preparedness. Each facility must establish a Hospital Disaster Management Committee (HDMC) chaired by the Medical Superintendent/Medical Officer In Charge to oversee planning, training, and evaluation of preparedness measures. The committee coordinates regular mock drills and reviews emergency protocols to maintain operational readiness.

Hospitals should implement an Incident Command System (ICS) to standardize emergency response under a centralized command structure. This system clarifies decision-making hierarchies and ensures seamless coordination across departments during crises. Complementary to this, all staff must receive role-specific job cards detailing their responsibilities, with regular training to ensure competency in emergency procedures.

Comprehensive activation protocols must outline step-by-step procedures for initiating emergency operations, including:

1. Triggers for escalating response levels
2. Mechanisms for rapid staff mobilization
3. Inventory management of critical supplies
4. Coordination with external response agencies

4.3.2 *Capacity Readiness*

Hospitals must develop comprehensive capacity readiness measures to maintain operational efficiency and ensure patient safety during disasters. A critical component involves pre-identifying surge capacity areas within the facility, including conference halls, recovery rooms, and other spaces that can be rapidly converted into patient care zones. Clear protocols must be established for expanding bed capacity, including the mobilization of additional cots, mattresses, and essential medical supplies to

accommodate sudden patient surges. These plans should outline roles, resource allocation, and activation procedures to enable swift scaling of services.

Security arrangements constitute another vital element of hospital preparedness. Facilities must implement robust crowd control measures to manage patient influx, prevent unauthorized access, and protect staff, patients, and critical infrastructure. Security personnel should receive specialized training in emergency protocols, including evacuation procedures and coordination with local law enforcement for additional support during large-scale crises. Contingency plans must account for potential disruptions, ensuring that medical operations remain uninterrupted even in high-stress scenarios.

Effective public information and media management is equally essential to prevent misinformation and maintain public trust. Hospitals should designate trained spokespersons to provide timely, accurate updates to the media and affected communities. A standardized communication protocol must be developed, outlining key messaging, frequency of updates, and channels for disseminating information. This system should integrate with broader district and state emergency communication networks to ensure consistency and reliability during crises.

4.3.3 *Logistics Planning*

Comprehensive logistics planning is essential to ensure hospitals can respond effectively during disasters by establishing robust systems for communication, resource management, and personnel coordination. Hospitals must maintain updated contact lists of key stakeholders, including state and district health officials, private medical facilities, transportation hubs, NGOs, and emergency services. Geographic Information System (GIS) mapping of healthcare institutions should be developed to optimize coordination and resource allocation during crises. Structured communication protocols must link state health authorities with district and hospital administrations, ensuring seamless information flow between response tiers.

- A dedicated disaster store should be established in emergency departments, containing reserved stocks of medical supplies, surgical equipment, and linen, accessible only upon official disaster declaration. Buffer stocks must be

maintained to sustain operations for at least 72 hours until external replenishment arrives. Transportation networks require meticulous planning, including real-time ambulance registries, verified driver contacts, and pre-identified alternative routes for patient transfers.

- Human resource preparedness involves creating rotational duty charts for clinical and nursing staff, with emergency rosters that include redeployable personnel from non-critical units. Ancillary services such as diagnostics, blood banks, and support staff must have clearly defined activation protocols. Financial preparedness requires pre-approved emergency funds and streamlined procurement procedures to prevent bureaucratic delays during crises.
- At the district level, a centralized resource inventory should catalog bed capacity, medical equipment availability, specialty services, and mortuary provisions across public and private healthcare facilities. This integrated database must be shared with command centers to enable dynamic resource allocation. Regular updates, system testing, and cross-verification with neighbouring districts will maintain the plan's effectiveness, ensuring hospitals can overcome supply chain disruptions and staff shortages while maintaining continuous patient care during emergencies.

4.3.4 *Preparedness Measures for Health Services*

Effective disaster preparedness for health services requires a multi-pronged approach encompassing disease surveillance, workforce training, and strategic resource management. Strengthening disease surveillance systems is paramount for early outbreak detection and rapid containment in post-disaster scenarios, particularly given the heightened risk of communicable diseases. Healthcare personnel must receive comprehensive training in emergency medical care, mass casualty management, and infection prevention protocols to ensure both patient safety and provider protection during crises. This training curriculum should incorporate mental health first aid components to address the psychological trauma frequently experienced by disaster-affected populations.

- Strategic pre-positioning of critical medical resources forms the foundation for rapid health response. This includes maintaining adequate stocks of life-saving

medications, emergency medical kits, and specialized nutrition rehabilitation supplies like ready-to-use therapeutic food (RUTF) and micronutrient powders for vulnerable groups. Vaccine security requires particular attention, with maintained inventories supported by reliable cold chain systems to preserve potency. Personal protective equipment (PPE) reserves must be sufficient to protect healthcare workers throughout extended emergency periods.

- Specialized preparedness measures address hazard-specific health risks through targeted interventions: For chemical disasters, district and taluk hospitals must maintain appropriate antidote stocks for industrial chemicals, with designated poison control centers providing expert consultation. Biological hazard preparedness requires adequate anti-rabies vaccines and snake anti-venoms at taluk-level facilities, complemented by trained outbreak investigation teams. Nutrition emergencies demand pre-positioned therapeutic foods and clear protocols for inpatient malnutrition management at designated facilities.

4.4 Capacity Building as a Core Preparedness Strategy

A robust capacity-building programme forms the cornerstone of disaster-ready health systems, equipping healthcare teams with specialised skills for effective emergency response. The Health Department implements a tiered training framework that addresses critical competency gaps across all levels of the healthcare workforce. For clinical staff, this includes advanced trauma life support, mass casualty triage, and emergency obstetric care tailored to disaster scenarios. Public health teams receive targeted instruction in outbreak investigation, waterborne disease prevention, and rapid health assessments for displaced populations. Crucially, all personnel undergo infection control training and psychological first aid certification to address both physical health risks and mental trauma in crisis situations. The programme employs innovative learning methodologies, including tabletop simulations of multi-hazard scenarios and full-scale drills that test coordination between hospitals, laboratories, and emergency services. Particular emphasis is placed on training trainers – developing cadres of master facilitators who can cascade skills to peripheral health centres. These capacity-building initiatives synchronise with Kerala's disaster calendar, with pre-monsoon refresher courses and post-disaster debriefings that convert field experiences into improved training content. The result is a healthy

workforce capable of maintaining clinical standards during crises while adapting to the unique challenges posed by floods, landslides, and disease outbreaks that frequently follow disasters. Regular competency evaluations ensure skills retention, creating a sustainable cycle of learning, application, and continuous improvement in emergency health response capabilities.

Table 4.1 : List of training and capacity building

Cadre / Group	**Training / Skills**
Medical Officers & CMOs	Emergency triage, mass casualty management, disease outbreak response
Staff Nurses & JPHNs	First aid, infection prevention & control, maternal and child health in emergencies, Emergency Infant and Young Child Feeding(IYCF), severe acute malnutrition(SAM) management
ASHA Workers	Community health surveillance, basic first aid, epidemic control, referral pathways
Ambulance & Paramedic Staff	Trauma care, patient transport under adverse conditions
Anganwadi Workers (AWWs)	Nutrition screening, supplementary feeding, IYCF in emergencies
ICDS Supervisors	Coordination of nutrition services, RUTF distribution, post-disaster restocking
Community Nutrition Volunteers	Food safety, emergency meal preparation, micronutrient supplementation
DMHP Staff	Psychological First Aid (PFA), crisis counselling, PTSD screening
Psychosocial Teams / School Counsellors	Child trauma management, crisis counselling, PTSD screening, referral protocols, psychoeducation for parents

NGO & CBO Volunteers	Basic psychosocial support, safe space management in relief camps
Ward-level Emergency Response Teams (ERTs)	Integrated training in first aid, shelter management, evacuation, epidemic control
Annual Drills Conducted	Landslide & flood response, epidemic control, hospital evacuation

4.5 Community Health Preparedness

Community health preparedness is essential for building local resilience and ensuring effective responses to health risks during disasters. The Local Self-Government Department (LSGD) plays a pivotal role in coordinating these efforts by working closely with communities to strengthen their capacity for disaster response and recovery. Key initiatives include hazard-specific awareness campaigns, such as educating residents about waterborne diseases during floods or heatstroke prevention during heatwaves, ensuring that communities understand the health risks associated with different disasters (Detailed version in chapter 7).

4.6 Surveillance and Early Warning Systems

An effective surveillance and early warning system is critical for detecting and responding to health emergencies during disasters. The process begins with rapid resource assessment, including reviewing medical stockpiles (medicines, vaccines, PPE), verifying fuel reserves for generators, and alerting essential staff. Concurrently, public health advisories are issued to inform communities about potential risks and preventive measures.

Hospitals must activate disaster response plans, which include pre-positioning medical teams, preparing mobile health units, and evacuating vulnerable facilities if necessary. Guidelines for camp hygiene, nutrition, and sanitation are disseminated to prevent disease outbreaks in temporary shelters. During the emergency phase, mass casualty

triage systems are implemented, with Quick Response Medical Teams deployed to affected areas. Camp-based clinics provide essential health services, while psychosocial first aid teams address mental health needs. Continuous disease surveillance monitors for potential outbreaks, enabling rapid containment measures. Post-disaster, health services continue in relief camps, with medical stocks replenished and response efforts evaluated through structured debriefings.

4.7 Site Identification for Relief Camps

Selecting safe locations for relief camps is vital to protect displaced populations. This involves:

1. Pre-identifying structurally sound buildings (community halls, wedding venues) as priority shelters, with schools used only as a last resort to avoid disrupting education.
2. Maintaining updated shelter databases on district websites and the India Disaster Resource Network (IDRN) portal, including maximum capacity assessments.
3. Adhering to minimum space standards: 3.5 m^2 per person (2.5 m^2 in mountainous regions) to prevent overcrowding and ensure dignity.

Site selection criteria prioritize:

1. Proximity to health facilities and transport routes
2. Accessibility for vulnerable groups (elderly, disabled)
3. Availability of water and sanitation infrastructure
4. Separation from hazard zones (floodplains, landslide-prone areas)

Local authorities conduct pre-disaster site inspections to verify safety and logistical readiness, ensuring shelters can be rapidly operationalized when disasters strike.

4.8 Preparedness for deadbody management

Preparedness for managing the dead in disasters requires advance planning, capacity building, and infrastructure development. Dead body management must be integrated into all levels of Disaster Management Plans with clear SOPs. At the district level, a

Dead Body Management Group should be established under the Incident Response System (IRS) for coordination. Training and capacity development of medical officers, forensic experts, police, body handlers, and community volunteers is essential, with emphasis on culturally sensitive handling. Expansion of mortuary capacity, identification of sites for temporary mortuaries (community halls and municipal facilities) , provision of refrigerated storage/transport (refrigerated trucks, shipping containers, or prefabricated tents with air-conditioning and dry ice can serve as mobile mortuaries), embalming facilities, and adequate stock of body bags and PPE are critical. Forensic and DNA laboratories must be strengthened for identification. Community awareness programs should dispel myths about disease from dead bodies and prepare local teams for retrieval, documentation, and assistance in dignified disposal(14).

Table 4.2: Measures of preparedness in disaster management

Preparedness		
Domain	**Actors**	**Responsibilities**
Risk Mapping & Facility Vulnerability Assessment	PHC/CHC staff, Local Govt (Panchayat/Municipality), ASHA volunteers	Check essential medicine & utility backup; map vulnerable populations; update high-risk individuals list (elderly, disabled, immunocompromised) in high-risk facilities

	DMO, District Disaster Management Authority (DDMA), PWD	Conduct structural & functional vulnerability assessments; maintain facility vulnerability database; coordinate retrofitting/relocation plans; inspect access routes
	KSDMA, State Health Dept., NDMA, MoHFW	Issue guidelines for facility risk assessments; approve retrofit/relocation plans; maintain state-level vulnerability database; set technical standards for structural safety
Hospital & Health Facility Preparedness	Hospital Disaster Management Committee (HDMC), Facility managers	Maintain emergency protocols; designate surge capacity areas; ensure security and public information systems; maintain disaster stores, staff rosters, ambulance contact lists
	District Health Office(DMO/DPM),	Maintain district-level resource inventory; coordinate inter-facility referrals during emergencies
	State Health Dept(DHS), National Health Mission	Manage financial protocols for emergency fund allocation; facilitate statewide resource pooling; provide funding & technical support

Capacity Building & Training	Trained ASHA, PHC/CHC staffs, Ward ERTs, Local NGOs	Train the community in basic first aid, and do surveillance, evacuation, and epidemic control; train volunteers in psychosocial support
	District Hospitals & DMHP team, ICDS Supervisors, District Police/Fire force department	Conduct mass casualty, IPC, nutrition, and PFA training; coordinate nutrition emergency response training; conduct joint drills for evacuation & rescue
	Information and Public Relations Department, State Mass Education and Media Department, State Training Institutes & KSDMA, National Institutes (NIMHANS, NCDC)	Develop training modules; conduct Training of Trainers; provide specialist training (mental health, outbreak control)
Community Health Preparedness	ASHA//Local Volunteers, Community Leaders	Household-level education on safe water, hygiene, nutrition, stress coping; organise local awareness campaigns
	Information and Public Relations Department, State Mass Education and Media Department, District Health	Prepare and distribute health risk communication materials; engage schools and community centres in preparedness drives

	Dept (DPM, DMO), Education department	
	State Health Dept(DHS)., IEC Bureau, MoHFW	Conduct statewide awareness campaigns; provide standardized public health advisory templates
Surveillance & Early Warning	Hospital Disaster Management Committee (HDMC), PHC doctors, ASHAs	Stock check, equipment readiness, alert key staff, participate in drills
	District Surveillance Unit (IDSP), DMO Office	Coordinate data flow, monitor early warning indicators; issue public health alerts; prepare rapid deployment teams
	Surveillance State IDSP Cell, NCDC),	Analyse district reports; coordinate and provide technical guidance on outbreak preparedness.
	Early warnings India Meteorological Department (IMD), Central Water Commission(CWC), Geological Survey of India (GSI), Indian National Centre for Ocean	Issue warnings to the district administrations, and if necessary to public based on predefined thresholds of environmental variables

	Information Services (INCOIS), National Centre for Earth Science Studies (NCESS), National Emergency Operations Centre (NEOC)	
Safe Site Identification for Relief Camps	Revenue Department (Thahasildar), LSGD	Identify safe community buildings; ensure minimum facility standards; map local shelters
	DDMA, DEOC, Education Dept.	Maintain updated shelter list in DDMP & IDRN portal; certify structural safety of shelters; arrange for alternate education if schools used as camps
	KSDMA, NDMA, SEOC	Approve shelter site lists; monitor compliance with standards; issue shelter facility guidelines

CHAPTER 5: RESPONSE

The response phase in landslide disaster management involves immediate actions taken during and immediately after a landslide event to save lives, protect property, provide emergency relief, and prevent further damage. It addresses immediate threats presented by the disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.Response is predominantly focused on immediate and short-term needs and is sometimes called disaster relief. This phase is all about quickly organizing people, equipment, and resources to tackle urgent needs. A system called the Incident Command System (ICS) is often used to keep everything running smoothly. It helps emergency teams work together, communicate clearly, and stay on the same path to manage the crisis. Key actions in this phase include evacuating people, opening shelters, providing medical care, search and rescue operations, and keeping the public informed(13).

5.1 Coordination and Command Structure During Disaster Response

An effective disaster response requires a well-defined coordination and command structure that integrates all stakeholders—from state authorities to local communities. This framework ensures timely decision-making, resource mobilization, and seamless communication across agencies. The system operates through a tiered approach, with the Kerala State Disaster Management Authority (KSDMA) at the apex, followed by state departments, district authorities, local bodies, NGOs, and the corporate sector. Each level has distinct yet interconnected responsibilities, enabling rapid deployment of medical teams, efficient evacuation, and uninterrupted relief distribution.

5.1.1 *Kerala State Disaster Management Authority (KSDMA)*

KSDMA serves as the central command hub during disasters, overseeing coordination, policy guidance, and resource allocation. The authority develops standardized emergency protocols, ensures interagency collaboration, and monitors relief operations across affected districts. It maintains communication with national and international agencies to mobilize additional support when required. KSDMA also

issues real-time advisories to streamline medical response, evacuation, and public health measures, ensuring a unified approach to crisis management.

5.1.2 *State Departments*

A coordinated response involves multiple state departments, each contributing specialized expertise. The Health Department leads medical relief, including outbreak control and emergency care, while the Revenue Department manages resource logistics and relief distribution. The Home Department oversees law enforcement, evacuation, and facility security, while Public Works ensures infrastructure stability. Water Resources and Local Self-Government Departments provide sanitation and drinking water, creating a multi-sectoral response that addresses both immediate and long-term health needs.

5.1.3 *District Collector / District Disaster Management Authority (DDMA)*

At the district level, the DDMA, led by the District Collector, executes on-ground response strategies. It activates emergency protocols, deploys medical teams, and coordinates with local bodies to set up relief camps and mobile clinics. The DDMA ensures efficient resource use, from food distribution to patient transfers, while maintaining constant communication with KSDMA for escalated needs.

5.1.4 *Local Authorities*

Municipalities and Panchayats act as frontline responders, translating policies into actionable measures. They manage relief camp operations, deliver last-mile health services, and enforce sanitation and vector control. By working closely with communities, local authorities ensure that vulnerable groups receive targeted support, from emergency medical care to psychosocial assistance.

5.1.5 *NGOs & Community Groups*

NGOs and community volunteers amplify government efforts by providing rapid, localized relief. They operate community kitchens, conduct health camps, and assist in damage assessments. Their grassroots presence enables tailored responses, such as

mental health support and hygiene awareness, ensuring no group is overlooked during recovery.

5.1.6 *Corporate Sector*

Businesses contribute resources, expertise, and logistics to bolster disaster response. From supplying medical equipment to deploying corporate medical teams, the private sector enhances the reach and efficiency of relief operations. CSR initiatives fund mobile hospitals and emergency procurement, demonstrating how public-private partnerships save lives during crises.

5.2 Activation of Health Response Systems

The activation of health response systems during disasters follows a structured and time-bound protocol to ensure rapid and effective medical intervention. At the state level, the Kerala State Disaster Management Authority (KSDMA) immediately operationalizes the State Disaster Management Plan, triggering a cascade of response measures across districts and healthcare institutions. Within 60 minutes of disaster declaration, the Incident Command System (ICS) is activated across all health facilities, with designated Incident Commanders assuming leadership roles to streamline decision-making and resource allocation. This standardized command structure ensures coordinated action among various health entities while maintaining clear chains of authority during the crisis.

5.2.1 *Emergency Medical Care Deployment*

Mobile medical units and emergency health teams are mobilized to disaster-affected areas within two hours of activation. These teams establish first-aid stations at evacuation points and community centers to provide immediate care to the injured. Hospitals implement mass casualty triage protocols to prioritize treatment based on injury severity, while referral centers activate surge capacity plans to accommodate increased patient loads. Critical care networks, including air ambulance services, are coordinated to facilitate urgent patient transfers from inaccessible areas to advanced medical facilities.

5.2.2 *Logistics and Resource Management*

A robust logistics framework ensures uninterrupted healthcare services during emergencies. The system guarantees continuous water supply through dedicated tankers with 10,000-liter capacity for hospitals and relief camps. Backup power solutions, including generators with 72-hour fuel reserves, are activated to maintain essential medical operations. Dedicated transport corridors are established for priority movement of medicines, blood products, and medical personnel, with police escorts ensuring timely delivery to affected regions.

5.2.3 *Infrastructure and Access Maintenance*

The Public Works Department plays a critical role in maintaining health infrastructure accessibility. Emergency teams work round-the-clock to clear and repair hospital access roads, ensuring ambulance passage. Pre-fabricated health units with 100-bed capacity are rapidly deployed to establish field hospitals in worst-affected zones. Modular sanitation systems are installed in relief camps to prevent disease outbreaks, with special attention to vulnerable groups including children and the elderly.

5.2.4 *Multi-Sectoral Coordination*

The health response integrates seamlessly with other emergency services through established coordination mechanisms. Police forces facilitate patient evacuations from inundated areas, while Fire & Rescue teams provide technical support for structural assessments of health facilities. NGOs supplement government efforts by operating community health outreach programs and distributing essential medicines to remote populations. Regular inter-agency briefings ensure synchronized action and efficient resource utilization across all response sectors.

5.2.5 *Public Communication and Information Management*

Transparent and timely information dissemination forms a crucial component of the health response. The Health Department issues hourly situation updates through multiple channels including SMS alerts and social media platforms. GIS-based dashboards display real-time data on hospital bed availability, emergency services, and outbreak alerts. Toll-free medical helplines (104/108) operate 24/7 to provide

emergency guidance and coordinate patient referrals, ensuring accessible healthcare information for all affected communities.

5.2.6 *Emergency Operations Center Activation*

All 14 district Emergency Operations Centers (EOCs) become fully functional upon disaster declaration, serving as nerve centers for health response coordination. These EOCs maintain real-time monitoring of critical healthcare indicators including bed availability, blood bank stocks, and medical supply inventories. Advanced telemedicine networks connect remote treatment centers with specialist doctors in medical colleges, enabling expert consultations for complex cases.

The integrated system demonstrated its effectiveness during the 2021 floods, facilitating treatment for over 15,000 patients within 72 hours through optimized resource deployment and multi-tiered response coordination. Regular simulation exercises maintain operational readiness, ensuring all components can activate within 30 minutes when emergencies strike(15).

5.3 Evacuation Procedures

Evacuation orders during disasters will be issued only by authorized entities, including the District Collector, Police Department, Fire Brigade, Health Department, or Industries Security Officer, ensuring proper legal authority and coordination. To maintain security and public order, evacuations must be conducted with the assistance of community leaders, who help facilitate smooth and organized movement of affected populations. All evacuation operations must be immediately reported to the Divisional Commissioner, District Collector, or Superintendent of Police for oversight and resource allocation.

Medical oversight is critical during evacuations, with a senior medical officer responsible for verifying that water supplies meet safety standards at relief centers. The officer must accompany rescue teams, equipped with essential medical kits, to provide immediate care and prioritize the evacuation of critically injured or medically vulnerable individuals. A standardized triage tagging system, as outlined in the

Annexure 1, must be followed to categorize patients based on injury severity, ensuring efficient medical response and transport prioritization.

5.3.1 Health needs of emergency response team

Emergency Respond team members face a wide range of hazards depending on the nature of the disaster. These hazards can impact their safety, health, and effectiveness in responding to the incident. Especially in landslide disasters, responding team members will face unique and intense physical, mental, and environmental stressors. Physically, team members are at a risk of injuries such as cuts, fractures, and crush injuries from unstable terrain and debris.Fatigue will also be a major concern due to prolonged physical activity and stress. Landslides often release dust, mold, or toxic substances from the disturbed earth; this in turn disturbs the respiratory channels .In addition to these, flooding that often accompanies landslides can contaminate local water sources, increasing the risk of waterborne illnesses. This will in turn increase the risk of water-borne diseases. There will be mental health disturbances for the team members since they are frequently exposed to trauma, injured individuals, and fatalities, all of which can have a psychological impact.

Addressing the health needs of emergency response team members during a disaster is critical to ensure their safety, performance, and long-term well-being. Without proper support they can't work and assist others effectively. Physical exhaustion, untreated injuries, or mental distress can impair decision-making and slow down evacuation efforts. Supporting their health needs not only protects individual responders but it will ensure the overall strength and sustainability of the response effort. Monitoring the health and surveillance of emergency response and recovery workers which include police, firefighters, emergency medical personnel,cleanup, repair, restoration, and recovery workers,volunteers is essential . The Emergency Responder Health Monitoring and Surveillance (ERHMS) framework provides recommendations for protecting emergency response and recovery workers. The first aid kits, access to on-site medical personnel, and up-to-date tetanus vaccinations are essential. Implementing rotational work shifts, providing designated rest areas, and ensuring proper hydration with electrolyte supplements are necessary for recovery and performance. High-grade protective face masks and the avoidance of high-risk areas

without personal protective equipment (PPE) are important. Team members must have access to clean drinking water, water purification systems, and must be vaccinated against cholera and hepatitis A.Immediate access to PFA, mental health support—both in-person and remotely—should be provided. Building peer support systems can also help alleviate stress .Reliable communication tools such as radios and GPS devices are essential for coordination and safety. Temporary shelters should be equipped with adequate sanitation facilities to maintain hygiene and prevent disease.Preventive health measures include routine vaccinations (tetanus, hepatitis A and B, and typhoid) hygiene supplies like hand sanitizers and soap, and sanitary waste disposal systems. Surveillance for early signs of communicable diseases among team members should be an ongoing priority. All responders should be trained in First Aid, CPR, mental health first aid, and landslide-specific hazards. Proper use of PPE and rescue tools. By addressing these interconnected physical, mental, environmental, and preventive health needs, evacuation teams can operate more safely and effectively in disasters.

5.4 Relief Camp Setup and Health Safeguards

During disasters, the establishment of well-organized relief camps is critical to ensuring the safety, dignity, and well-being of displaced populations. These camps serve as temporary shelters that must provide not only basic necessities but also comprehensive health safeguards to prevent disease outbreaks and address the medical needs of vulnerable groups. Effective camp management requires meticulous planning across key areas, including facility standards, water and sanitation, nutrition, medical care, and psychosocial support to mitigate health risks in congested environments.

This framework outlines minimum operational standards for relief camps, emphasizing protection for women, children, the elderly, persons with disabilities, and those with chronic illnesses. It integrates disease surveillance, emergency healthcare delivery, and mental health support to uphold the right to health during displacement.

5.4.1 *Minimum Facility Standards*

Relief camps must be designed to provide safety, security and privacy for all occupants, with special focus on vulnerable groups including women, children, PwD, elderly individuals, widows, those with chronic illnesses, and people living with

HIV/AIDS (PLWHA).Separate accommodation areas should be established for men, women and transgender individuals to ensure dignity and reduce risks of harassment or exploitation. The layout should consider accessibility needs for PwDs and elderly persons, with clearly marked emergency exits and well-lit common areas. As camps established registers to track pregnant women, infants, elderly individuals, and people with chronic illnesses.

5.4.2 Minimum standard of Water and food in camps

Each relief camp must form a Food & Water Sub-Committee responsible for kitchen management and food distribution.

- Water: Safe drinking water must be provided at 2.5-3 liters per person per day, with boiled water prioritized for children and pregnant/lactating women. The total basic water requirement in camps ranges from 7.5 to 15 liters per person per day, including 2–6 liters for personal hygiene. If there is unavailability of safe water, double chlorination must be implemented. Suitable water sources for camps must be identified in advance, and all water intended for consumption should be tested within 24 hours of camp establishment to ensure safety. Certification by health authorities is required, with particular testing for E. coli and coliform bacteria to prevent outbreaks of waterborne diseases. Water points must be located within 500 meters of shelter areas, and where natural or piped supply is insufficient, safe water must be provided through tankers or stored containers.
- Food: Food & Water Sub-Committee should ensure provision of special nutrition for children, pregnant women, lactating mothers and the elderly while maintaining strict hygienic food handling practices to prevent outbreaks. Food security is built on three pillars: availability, accessibility, and affordability. It exists when all individuals, at all times, have physical and economic access to sufficient, safe, and nutritious food to lead healthy and active lives. In relief camps, food management should be coordinated by revenue officials in partnership with departments such as Civil Supplies, SupplyCo, Horticorp, and VFPCK. Rice and essential materials should be procured from ration shops or the Public Distribution System, while vegetables and perishables should be

sourced from government-supported cooperatives, with any shortfall supplemented through open-market procurement. Locally available and culturally acceptable food items should be prioritized in menu planning to ensure community participation and acceptability. Nutrition standards require adults receive minimum 2,400 kcal/day through three meals plus tea/coffee, while children need 1,700 kcal/day including milk and dairy products for those under 12.

Locally available food materials are suggested to be provided to those who are residing in the shelters. Foods should be served in houses for people who can't reside in camps due to justifiable reasons like chronic illness, PwD, elderly population. The menu shall be fixed according to the local context and culture.

As per Kerala State Emergency Operations Centre (KSEOC) suggested menu includes:

Table 5.1 : Recommended Daily Meal Plan for Relief Camps (As per Kerala State Emergency Operations Centre Guidelines)*

Breakfast	Upma/Idli/Tapioca/ Puttu Banana/Sambar/Gram
Lunch	Rice, Sambar/ vegetarian thoran, pickle, pappad, one non-veg item*c
Dinner	Chappathi/Rice/Vegetable curry/Tapioca/Pickle/Salad)
* Please Note: The community shall be consulted for appropriateness of food items and local food habits. Camp committee can decide on non veg menu	

*Source: Minimum Standards of Relief Kerala, KSEOC, KDSMA

5.4.3 Sanitation and hygiene

Sanitation and hygiene are critical components of relief camp management, as poor facilities can quickly lead to outbreaks of diarrhoeal diseases, skin infections, and

other public health concerns in crowded environments. Minimum standards require that each relief camp provide one toilet for every 30 persons, with separate toilets for men and women to ensure privacy and dignity. All sanitation facilities must be accessible to persons with disabilities (PwD) and located no more than 50 meters from living areas, while ensuring safe distance from groundwater sources—pit latrines must be at least 30 meters away and 1.5 meters above the water table. Each individual must have access to a minimum of 18–20 liters of water per day for drinking, cooking, and personal hygiene. Handwashing facilities with soap and water must be available at all toilets and common areas, while the safe and immediate disposal of children's feces must be ensured. Camps should provide dignity kits including sanitary napkins, disposable bags, and soap, along with personal hygiene items such as toothbrushes, oil, and detergent. In areas where toilets lack direct water connections, provisions for water storage must be made. Modern sanitation options such as bio-toilets or e-toilets should be installed wherever feasible to maintain hygiene standards and accommodate diverse needs, including those of PWDs. Hygiene promotion and awareness campaigns are essential to encourage proper use of sanitation infrastructure and sustain cleanliness throughout the camp.This will help relief camps to minimize disease risks, uphold dignity, and create safe and healthy living conditions for displaced populations.

5.4.4 Waste Management at camp

Waste management is a critical element of relief camp operations and must be planned systematically to safeguard public health and the environment. Each camp should be equipped with a sufficient number of dustbins and refuse containers, including provisions in toilets for safe disposal of sanitary napkins and personal hygiene products. Waste disposal sites must be located at least 150 meters away from drinking water sources and kept free from rodents and pests. Segregation of waste at source is mandatory, biodegradable and kitchen waste should be managed through burial or landfilling, non-biodegradable waste should be collected separately for recycling, and biomedical waste must be stored in color-coded containers or bags and disposed of through operated pits or incinerators. Collection and disposal should occur at least twice daily under the supervision of trained personnel, with strict adherence to

hygiene and safety protocols. Vector control measures, regular monitoring, and clear documentation of disposal processes are essential to maintain accountability.

5.4.5 *Medical and Health Support in Camps*

Relief camps must establish comprehensive medical services to address both emergency and routine healthcare needs, beginning with the deployment of a dedicated health team—including doctors, nurses, and paramedics—supported by ambulances and essential medicines. Daily medical rounds should prioritize vulnerable groups (pregnant women, children, elderly, and those with chronic conditions), while maintaining surveillance for outbreaks like diarrhoea, malaria, and respiratory infections through symptom monitoring and rapid testing. Nutrition screening for children under five, antenatal care (ANC) for pregnant women, and mental health first aid must be integrated into camp health services, complemented by isolation zones for infectious cases and referral systems to nearby hospitals for emergencies. Regular health education sessions, immunization drives, and the availability of essential drugs—from insulin to antibiotics—ensure continuity of care, with all interventions documented in camp health registers for accountability and follow-up.

- **Health Team & Medical Facilities:** Each camp must have a dedicated health team including at least one doctor, nurses and ambulance support with emergency equipment. First aid kits should be readily available on-site, with doctors making daily visits and JPHN staff providing 24-hour coverage. Additional JPHNs should be deployed as needed based on camp population.
- **Nutrition Screening & Support:** Health authorities must conduct immediate nutrition screening for children aged 0-5 years to identify malnutrition cases, initiating supplementary feeding through Integrated Child Development Services (ICDS) when required. Pregnant and breastfeeding women should receive nutrient supplements, with special registers maintained to track vulnerable individuals including those with chronic illnesses.
- **Disease Surveillance & Outbreak Control:** Continuous disease monitoring must begin from camp establishment, with daily reporting to the IDSP Unit for conditions like diarrheal diseases, malaria, respiratory infections and others.

ASHA workers and JPHNs should conduct active surveillance under medical supervision, with isolation areas established for communicable cases. Vector control measures including mosquito nets, repellents and fumigation must be implemented regularly.

- **Reproductive & Maternal Health:** MISP should include safe childbirth facilities, blood transfusion access at nearby health centers, contraceptives, and iron/folic acid supplements for pregnant women. Tetanus vaccinations should be administered if due, with priority health checks for pregnant/lactating women within 24 hours of camp arrival.
- **Mental Health Support:** Given the traumatic nature of disasters, camps must provide psychosocial care to address acute stress, anxiety, depression and PTSD among survivors. For extended camp durations, continued mental health services should be arranged through Health and Social Justice departments, with trained counselors available to help process grief, loss and uncertainty.

5.5 Response Measures for Dead Body Management

During a disaster, identifying and managing the deadbodies must ensure proper documentation. Bodies should be tagged as soon as after their retrieval and placed individually in body bags with personal belongings. Transportation through hearse vans (mortuary vans) or covered vehicles, and in the absence of refrigeration, dry ice and chemicals should be used for preservation. Identification should be carried out using standardized forms such as the dead body identification form and the missing person form, supported by fingerprinting and DNA profiling. After identification, bodies must be released to families. In the case of unidentified bodies, they should be disposed of in a traceable manner with documentation to allow future exhumation if required(14).

Table 5.2. Measures of response in disaster management

Response		
Domain	**Actors**	**Responsibilities**
Search, Rescue & Evacuation	Local Fire & Rescue Services, Police, trained community volunteers, LSGD (Panchayat/Municipality)	Rescue trapped individuals; evacuate from high-risk zones; provide basic first aid during rescue; arrange safe transportation to shelters,
	District Fire & Rescue Dept, District Disaster Management Authority (DDMA)	Deploy specialised rescue teams and equipment; coordinate inter-departmental rescue operations; arrange temporary access roads
	State Disaster Response Force (SDRF), NDRF, Indian Armed Forces, MoHFW	Mobilise large-scale rescue operations; provide technical rescue expertise; support air/boat evacuation in inaccessible areas
Emergency Medical Response	PHC/CHC medical officers, staff nurses, ASHA/JPHN, local ambulance services	Provide on-site triage and treatment; stabilise injured persons; arrange referrals; set up temporary medical posts near affected areas

	District Collector / District Disaster Management Authority (DDMA), District Medical Office (DMO), District Hospital teams, 108/ambulance control rooms	Deploy medical teams to affected areas; coordinate inter-facility patient transfers; ensure supply of essential medicines and equipment
	State Health Dept (DHS), Emergency Medical Relief (MoHFW)	Activate statewide emergency health protocols; mobilise state medical response teams; arrange additional medicines, equipment, and specialist doctors
Dead body management	**Recover and retrieval of dead bodies:** Police, Fire Services, NDRF/SDRF, Community Volunteers, Health Workers	Retrieve bodies systematically; tag each body; place individually in body bags; collect and preserve personal belongings; maintain chain of custody for evidence and belongings.
	Transportation and storage: District Administration, Health Dept, Municipal Bodies, Transport Dept, Private cold storage operators	Transport bodies with dignity (hearse vans(mortury van), covered vehicles); arrange temporary mortuaries; ensure refrigerated storage; if unavailable, use dry ice, chemical preservation, or temporary burial.

	Identification and documentation: Forensic Experts, Medical Officers, Police, District Health Dept, DNA/Forensic Labs	Use standardized forms (Dead Body Identification Form, Missing Person Form); match ante-mortem and post-mortem data; apply fingerprinting, forensic methods, and DNA profiling; maintain complete and accurate records.
	Disposal: District Magistrate/ Collector, Health Dept, Local Govt reps, Religious/Community Leaders	Release identified bodies to families for cultural/religious rituals (cremation, burial, etc.); dispose of unidentified bodies in a dignified, traceable manner; ensure documentation for possible future exhumation if required.
Relief Camp Activation & Management	Revenue department, Local self-government institutions, PHC/CHC staff, community volunteers	Open/manage local shelters; ensure food, water, sanitation; register evacuees; prioritise vulnerable groups (elderly, children, pregnant women, disabled)
	District Health Dept, Social Justice Dept, Civil Supplies Dept, PWD, Water Authority	Provide logistical support to camps; ensure continuous food and water supply; monitor health and safety conditions

	State Relief Commissioner, State Health Dept(DHS), MoHFW	Allocate funds and resources for large-scale relief; coordinate with national and international aid agencies.
Medical & Health Support in Camps	Health Team(camp), JPHNs, Anganwadi Workers, ICDS, Health Dept.	Provide on-site medical care, nutrition screening & supplements, chronic disease management, maintain vulnerable persons' records, ensure medicine supply & referral services.
Disease Surveillance & Outbreak Control	Health Dept., IDSP Unit, ASHA, JPHNs, Doctors, local sanitation workers (LSGD)	Continuous disease monitoring from camp start, daily IDSP reporting, active surveillance, isolation for communicable diseases, and vector control using nets, repellents, coils, sprays, and fumigants. Ensure safe drinking water; maintain hygiene in camps; disinfection and vector control; report disease outbreaks
	District Health Dept, Integrated Disease Surveillance Programme (IDSP)	Deploy district-level disease surveillance; arrange laboratory testing; coordinate outbreak control measures

	State Health Dept, National Centre for Disease Control (NCDC), MoHFW	Issue statewide disease alerts; mobilise epidemic response teams; coordinate with national institutes for laboratory confirmation.
Reproductive & Maternal Health	Health Dept., PHCs, JPHNs	Provide MISP services, including safe childbirth, blood transfusion, contraceptives, Iron and Folic Acid (IFA) supplementation, tetanus shots, and check pregnant/lactating women within 24 hrs of arrival unless urgent emergency.
Mental Health & Psychosocial Support	Health Dept., Social Justice Dept., Mental Health Teams	Address trauma, stress, anxiety, depression, grief, and post-traumatic stress disorder (PTSD); arrange psychosocial care in camps and ensure continuity if camps are extended.
Information & Communication	Local govt representatives, community leaders, PHC/CHC staff	Share accurate local updates on safety, services, and risks; counter rumours
	District Information Office, District Health Dept (DHS), All India Radio, Doordarshan, All private	Collect and share reliable information on the disaster situation and affected individuals to ensure coordinated relief efforts.

	audio, visual media, All print media, DEOC, SEOC	Protect privacy: Avoid intruding on personal or family privacy during data collection. Source accurate updates from the SEOC, including early warnings or signs of ongoing risks. Coordinate with SEOC liaison teams at airports and railway stations to support information flow for arriving relief personnel. Engage media partners—TV, radio, community stations—to promptly relay targeted needs and warnings. Respect victims' emotional and cultural context when gathering and disseminating information.
	State Information & Public Relations Dept, MoHFW, SEOC	Issue official state/national advisories; standardise public health messages
Safety & Security in Affected Areas	Local police, community safety committees	Maintain law and order in camps; secure unsafe zones
	District Police, District Home Guards	Manage crowd control in relief centres; protect supply chains

	State Police, Central Armed Police Forces, Ministry of Home Affairs	Provide large-scale security; assist in maintaining law and order in high-impact zones(14)

CHAPTER 6: RECOVERY & REHABILITATION

Health recovery after a disaster focuses on restoring healthcare services, ensuring continuity of essential medical care, and addressing the physical and psychosocial well-being of affected populations. Key actions include rehabilitation of health infrastructure, replenishment of medical supplies, monitoring community health, implementing public and environmental health measures, and providing immediate and long-term MHPSS through coordinated efforts by state departments, NGOs, and other stakeholders.

6.1 Coordination & Command Structure during Recovery Phase

During the recovery phase, a structured command system ensures coordinated rehabilitation of health infrastructure, led by the Department of Revenue and Disaster Management in collaboration with Health authorities. NGOs supplement efforts by rebuilding facilities and restoring services, while the corporate sector contributes through CSR-funded health projects—all operating under government oversight to align with long-term resilience goals. Regular progress reviews and need assessments maintain accountability across stakeholders.

6.1.1 *State Departments*

The Department of Revenue and Disaster Management serves as the nodal agency for coordinating rehabilitation and reconstruction efforts, including the restoration of health infrastructure. Key activities involve reconstructing damaged health centers, retrofitting facilities to enhance disaster resilience, and integrating health facility recovery with broader infrastructure rehabilitation programs. The department works closely with the Health Department to prioritize projects that restore healthcare access, ensuring facilities are rebuilt to improved standards that mitigate future risks.

6.1.2 *Non-Governmental Organizations (NGOs)*

NGOs play a complementary role in health system recovery by implementing rehabilitation projects in coordination with the State Disaster Management Authority and District Collector. Their activities include supporting the reconstruction of health

facilities, replenishing medical equipment, and facilitating community-based health programs. NGOs provide structured feedback to government authorities on project outcomes, ensuring transparency and enabling adaptive management of recovery initiatives.

6.1.3 *Corporate Sector*

The corporate sector contributes to long-term health infrastructure rehabilitation through Corporate Social Responsibility (CSR) initiatives. Under government guidance, private entities may fund the reconstruction of health centers, supply advanced medical equipment, or support capacity-building programs for healthcare workers. These collaborations are formalized through partnerships with district administrations to ensure alignment with state recovery priorities and equitable resource distribution.

6.2 Health-Related Actions

Post-disaster health recovery requires a systematic approach to restore and strengthen healthcare services while addressing emerging public health risks. The immediate focus includes damage assessment of medical infrastructure and rapid restoration of critical facilities like PHCs, CHCs, and referral hospitals, incorporating disaster-resilient designs in reconstruction. Concurrently, emergency medical supply chains must be stabilised by replenishing essential medicines, vaccines, and equipment inventories while implementing digital tracking systems to prevent shortages. Public health interventions prioritise water quality monitoring through daily testing of relief camp water sources, large-scale sanitation drives with proper waste disposal systems, and vector control programmes in waterlogged areas to prevent outbreaks of dengue, leptospirosis, and acute diarrhoeal diseases. Frontline health workers (ASHA, JPHN) conduct active community surveillance through house-to-house visits, tracking malnutrition rates, maternal health indicators, and disease trends, with real-time data integration to the IDSP portal for rapid response. Mental health teams provide psychosocial support through counselling centres and community outreach, while mobile medical units ensure healthcare access in geographically isolated areas. These actions are complemented by capacity-building

programs for medical staff on post-disaster health challenges and community awareness campaigns on hygiene practices, early warning signs of epidemics, and continuity of treatment for chronic diseases, ensuring a comprehensive recovery of the health system's structural and functional capacities (17).

Table 6.1: Health related actions during the recovery phase

Sub-Section	Key Actions
Infrastructure & Services Restoration	Ensure the continuous availability of essential healthcare services post-disaster; create and restore health centres as part of reconstruction; Retrofit and upgrade damaged health infrastructure
Continuum of Health Services	Ensure continuity of care for patients with non-communicable diseases (NCDs), chronic illnesses, palliative care needs, as well as for pregnant and lactating women, children, and people with disabilities during and after disasters. This involves maintaining access to essential medications, routine check-ups, follow-up services, immunisations, nutritional support, and supportive or rehabilitative care.
Medical Supplies & Resources	Refill stock of medicines, tools, equipment, and emergency health kits in hospitals. Supply first aid kits to each family from the health facilities. Health institutes should ensure the mobilisation of necessary resources from Kerala Medical Services Corporation Limited (KMSCL)
Public Health and Hygiene	Disinfect hospital premises and public areas; Implement sanitation measures in healthcare facilities and surrounding communities

Community Health Monitoring	Track ongoing health conditions in the local community through JPHNs, JHIs, and ASHAs

6.3 Relief Camp Epidemiological Surveillance

Effective epidemiological surveillance in relief camps is essential for detecting health threats early and implementing targeted interventions. The system systematically tracks population demographics, mortality trends, disease prevalence, and nutritional status to guide public health actions.

- **Population Monitoring**: Surveillance begins with the comprehensive registration of camp residents, which includes recording the total number, age-sex distribution, and family structures. Special attention is given to vulnerable groups, including children under five, pregnant/lactating women, persons with disabilities, and unaccompanied minors, who require prioritized health and nutrition services.
- **Mortality Surveillance**: The crude mortality rate (CMR) serves as a key indicator of crisis severity, calculated through daily tracking of deaths with documentation of probable causes. Sudden spikes trigger immediate investigations to identify and address preventable mortality factors.
- **Disease Surveillance**: Frontline workers conduct active monitoring for outbreak-prone illnesses, including:

1. Waterborne diseases (acute diarrhoea, cholera, hepatitis)
2. Vector-borne infections (malaria, dengue)
3. Vaccine-preventable diseases (measles, meningitis)
4. Acute respiratory infections (ARI/pneumonia)

Standardised case definitions and rapid diagnostic testing enable early detection and containment of outbreaks.

- **Nutritional Surveillance**: Regular anthropometric assessments track acute malnutrition rates among children under five and pregnant women. Food

distribution systems are evaluated for equity, with supplementary feeding programs adjusted based on identified nutritional gaps. Micronutrient deficiency screening informs targeted supplementation strategies.

6.4 Public Health & Environmental Health Measures

Public health and environmental health measures in disaster and relief settings aim to prevent disease and maintain community well-being. Key actions include ensuring clean water and sanitation, promoting environmental hygiene, controlling outbreaks, distributing hygiene supplies, and facilitating access to supplementary feeding programs for malnourished individuals.

- Provides clean water and sanitation (monitor per capita availability and latrine access).
- Promote environmental hygiene (waste disposal, disinfection, and vector control).
- Control outbreaks with targeted interventions (e.g., oral rehydration for diarrhoea, immunisations for measles).
- Distribute hygiene supplies (soap, safe storage containers).
- Ensure access to supplementary feeding programmes for malnourished individuals.

6.5 Surveillance Cycle

The surveillance cycle is a continuous process that enables timely detection and response to health threats in disaster-affected areas. It involves data collection, analysis, response, and ongoing monitoring. Activities include initial rapid assessments, short-term surveillance using reliable data sources, continuous monitoring of emerging health risks, and tracking coverage of essential health services such as food, water, immunisation, and primary healthcare availability.

Data Collection → Data Analysis → Response → Continuous Monitoring

- Initial rapid assessment: Conduct a rapid assessment of the affected population to determine immediate health risks and priority needs. This includes gathering basic demographic data, identifying vulnerable groups such as children, pregnant women, the elderly, and people with disabilities, and assessing the availability of health facilities and essential services. The assessment also aims to identify immediate disease threats and gaps in food, water, shelter, and healthcare to guide timely response actions.
- Short-term surveillance with simple, reliable data sources to monitor key health indicators in the early phase post-disaster. Collect information on reported illnesses, injuries, and outbreaks through health facility records, community health workers, and rapid reporting tools. Also focus on prevalent communicable diseases such as diarrhoea, respiratory infections, and vector-borne diseases.
- Ongoing monitoring to detect new health threats: Continuously track the health status of the population to identify emerging risks and evaluate the effectiveness of interventions such as vaccination campaigns, nutritional support, and sanitation measures.
- Track coverage of essential health services: Tracking the coverage of essential health services is a critical component of disaster response and public health surveillance. It ensures that affected populations have access to adequate nutrition, safe drinking water, routine immunisations, and functional primary healthcare services. Monitoring these services helps identify gaps, guide resource allocation, and prevent secondary health crises during and after emergencies.
    - Food ration adequacy.
    - Water supply sufficiency.
    - Immunisation rates.
    - Primary healthcare service availability.

6.6 Psychological rehabilitation

Psychological rehabilitation is a vital aspect of disaster management, addressing both immediate and long-term mental health impacts of trauma, loss, and fear of

recurrence. In the state, psychosocial intervention teams were constituted across all districts under the DMHPs, engaging professionals including psychiatrists, psychiatric social workers, clinical psychologists, social workers, psychiatric nurses, and counselors. Helplines at the district level, alongside the statewide DISHA Helpline, ensured that affected individuals, including those in quarantine or isolation, received timely reassurance and access to professional support.

6.6.1 Mental Health and Psychosocial Support (MHPSS)

Disasters often leave behind deep psychological issues in addition to physical damage, making mental health care an essential part of disaster response and recovery. Addressing trauma, grief, and fear is crucial to help individuals and communities regain a sense of normalcy and resilience. Providing timely psychosocial support not only reduces the long-term burden of mental health disorders but also strengthens community solidarity and recovery. Therefore, integrating MHPSS into disaster management is as important as physical relief measures, ensuring sustained healing and well-being of the affected population.

- Addressing long-term trauma from loss of life, injuries, property destruction, and fear of recurrence.
- Providing PFA in the immediate phase and long-term counselling thereafter.
- Continue long-term counselling for sustained recovery.
    - Emotional First Aid and mobilisation of community support systems to be prioritised in the first few weeks.
    - Services to be accessible for up to five years post-disaster.
- Integrate mental health services into local delivery systems for sustained access.
- Services to be provided in: Health institutions, Relief camps, Affected field areas

6.6.2 Community Mental Health Outreach

Following the disasters, reaching affected populations at the community level is critical to ensure no one is left behind in accessing psychological support. Community

mental health outreach serves as a bridge between formal health systems and people in need, enabling early identification of distress, timely care, and continuity of support. Implemented through the DMHP, such outreach initiatives play a key role in addressing diverse psychosocial needs, with a special focus on vulnerable groups whose experiences and coping mechanisms may differ.

- Establishing community mental health outreach through the DMHP.
- Special focus on vulnerable groups (children, elderly, women, persons with disabilities, SC/ST (Scheduled Castes / Scheduled Tribes whose psychological needs may differ(16).

6.6.3 Human Resource Deployment

Effective delivery of MHPSS in disaster situations relies on the timely mobilisation of skilled human resources. Deploying trained counsellors, community-level workers, and specialised mental health professionals ensures that psychological care is available alongside physical relief measures. Dedicated care programs for both survivors and frontline responders are essential to address trauma and stress. By drawing on expertise from medical colleges, mental health centres, district programmes, the private sector, and NGOs, a coordinated and comprehensive mental health response can be sustained.

- Deploy trained counsellors and Community Level Workers (CLWs) with backup specialised mental health services.
- Provide specific care programs for Rescue and relief workers and CLWs and counsellors
- Mental health teams to include: Doctors, Clinical psychologists, and Paramedical staff
    - Teams to be mobilised from: Medical College Hospitals (Psychiatry Departments), Mental Health Centres, District/Community Mental Health Programmes, Private sector, and NGOs(17).

Table 6.2. Measures of recovery in disaster management

Recovery & Rehabilitation		
Domain	**Actors**	**Responsibilities**
Infrastructure & Services Restoration of health facilities	PHC/CHC staff, ASHA, local volunteers	Assist in re-establishing basic services; ensure continuity of essential health care locally
	Infrastructure restoration PWD, private charitable foundations, NGOs	Repair and retrofit health facilities; restore essential utilities in hospitals; mobilise medical supplies
	State Health Dept, KMSCL, MoHFW	Allocate funds/resources for large-scale restoration; coordinate procurement and distribution of medicines, equipment
Continuum of Health Services	PHC/CHC teams, ASHA, JPHN, JHI	Maintain care for NCD patients, pregnant/lactating women, children, and persons with disabilities; continue immunisations, nutrition support
	District Health Dept,	Oversee continuity of specialist care, referrals, and district-level health programmes

	State Health Dept, MoHFW	Provide policy guidance, mobilise specialised medical teams, ensure resource availability
Medical Supplies & Resources	PHC/CHC staff	Maintain and distribute first-aid kits to households; report shortages
	District hospitals, KMSCL district unit, DHS	Restock medicines, tools, emergency health kits
	State KMSCL, MoHFW	Manage bulk procurement and distribution; ensure strategic reserves are replenished
Public Health & Hygiene	Local sanitation workers(LSGD), ASHA, PHC/CHC teams	Disinfect hospitals, public areas; promote sanitation in communities
	District Sanitation Dept, District Health Dept	Implement vector control, waste disposal, and public hygiene campaigns
	State Health Dept, NCDC	Issue guidelines for outbreak control; support statewide hygiene initiatives

Community Health Monitoring	ASHA, JPHN, JHI	Track health conditions; report emerging health threats
	District IDSP unit	Analyse trends; initiate targeted interventions
	State IDSP, NCDC	Coordinate disease surveillance; issue health alerts
Relief Camp Epidemiological Surveillance	PHC/CHC staff, camp health volunteers	Collect population/at-risk group data; track morbidity and mortality
	District Health Dept, IDSP, District Collector	Conduct nutritional surveillance; adjust rations/supplements
	State Health Dept, MoHFW, NCDC	Coordinate outbreak investigations; provide lab confirmation
Public & Environmental Health Measures	LSGD, PHC/CHC staff	Ensure clean water, sanitation, and environmental hygiene in affected areas
	District Water Authority, Sanitation Dept(Suchitwa Mission)	Monitor water quality, latrine access, waste management

	State Health Dept(DHS)	Oversee large-scale environmental health measures; coordinate outbreak control
Surveillance Cycle	PHC/CHC staff, JPHN/JHI/ ASHA	Participate in rapid assessments; collect local data
	District Health Dept (DMO, DPM), IDSP	Conduct short-term surveillance; monitor essential service coverage
	DHS, NCDC	Manage continuous monitoring; track statewide health threats
Psychological Rehabilitation	Community volunteers, trained counsellors, PHC/CHC staff	Provide PFA; mobilise community support systems
	District Mental Health Programme (DMHP), District Health Dept	Deploy counsellors and mental health teams; prioritise vulnerable groups
	State Mental Health Authority, MoHFW	Ensure integration of mental health into recovery plans; maintain services for up to five years post-disaster

CHAPTER 7: PUBLIC HEALTH MEASURES IN DISASTER MANAGEMENT

Natural disasters are often unpredictable and devastating, resulting in significant loss of life, widespread destruction of property, and long-lasting environmental damage. Public health is the cornerstone of effective disaster management; it aims to prevent and reduce the mortality, morbidity, and disability caused by disasters. The main aim of public health measures in disaster management is to reduce both immediate and long-term health impacts. These measures can be adopted into four main stages: prevention and mitigation, preparedness, response, and recovery and rehabilitation. This chapter provides a comprehensive framework for integrating public health principles across all four phases. It outlines targeted strategies for each phase, operationalized at the Local, District, and State levels, ensuring a structured, scalable, and equitable approach to safeguarding community health before, during, and after a disaster.

7.1 Public health measures in prevention and mitigation phase

The Prevention and Mitigation phase forms the foundation of public health disaster management. Its objective is to proactively reduce the community's underlying vulnerability to health risks and strengthen the intrinsic resilience of the public health system itself. This involves a multi-prudential strategy focusing on systemic strengthening, environmental management, and community empowerment to mitigate the potential health impacts of disasters before they occur. This begins with continued risk assessments to identify and evaluate potential health threats, such as infectious disease outbreaks, environmental hazards, or natural disasters. Public health measures are central to reducing disaster-related health risks, minimizing morbidity and mortality, and strengthening the resilience of vulnerable populations. In the prevention and mitigation phase, these measures extend beyond immediate emergency care to encompass WASH, communicable disease prevention, management of NCDs reproductive and maternal health, chronic illness care, and surveillance systems. Together, they ensure both immediate protection and long-term health security for disaster-prone communities.

7.1.1 Strengthening core public health programmes

Public health systems serve as the first line of defense in the prevention and mitigation phase focusing on reducing vulnerability, building community resilience, and ensuring health systems are prepared to respond effectively. Strengthening core public health programs such as disease surveillance, health education, immunization, nutrition, water and sanitation, and mental health services is essential not only to protect populations from immediate hazards but also for long-term health security. A strong, well-coordinated public health infrastructure is key to preventing disease outbreaks, maintaining essential services, and reducing the overall burden of disasters on communities.

7.1.1.1 Management of communicable diseases

The major causes of communicable disease in disasters can be categorized into four areas: Infections due to contaminated food and water, respiratory infections, vector- and insect-borne diseases, and infections due to wounds and injuries. The first step in preventing communicable diseases in disaster settings is to identify key risk factors that increase vulnerability. Disasters often lead to population movement, overcrowding, environmental devastation, poverty, inadequate access to healthcare, poor waste management, food shortages, malnutrition, lack of clean water, and limited shelter facilities. These conditions create an environment highly conducive to the spread of communicable diseases, such as diarrheal diseases, cholera, malaria, dengue, leptospirosis, and influenza.

Prevention requires an integrated approach that includes a rapid disease surveillance mechanism, vaccination campaigns, vector control measures such as fumigation and mosquito net distribution, and the provision of isolation facilities.

- ***Vaccination:*** Before disasters occur, ensuring high immunization coverage against vaccine-preventable diseases such as measles, diphtheria, tetanus, polio, influenza, and hepatitis is essential to reduce the risk of outbreaks in overcrowded and resource-limited settings like relief camps. Strengthening existing vaccination programs is essential to reduce the risk of vaccine-preventable disease outbreaks during and after emergencies. Ensuring

complete immunization before disasters is crucial to reduce the burden of vaccine-preventable diseases. ASHAs/JHIs should verify that all children and eligible adults in their areas are up to date with routine immunization schedules, and other vaccines including measles, diphtheria, tetanus, and influenza. In disaster-prone areas, stockpiling vaccines and establishing cold chain mechanisms as part of preparedness plans are critical to ensure continuity during emergencies. Frontline workers such as ASHAs, JPHNs, and Medical Officers should be trained to rapidly mobilize vaccination drives.

- ***WASH interventions:*** This plays a central role in reducing transmission of waterborne diseases. These include ensuring safe drinking water through regular testing and treatment, provision of a minimum supply of potable water, proper waste disposal systems, and hygiene promotion activities like handwashing campaigns. Together, communicable disease control and WASH interventions reduce mortality and morbidity while building resilience in vulnerable populations.

7.1.1.2 Non-Communicable Disease Management

Non communicable diseases such as hypertension, diabetes, cardiovascular diseases, asthma, and cancer require continuous treatment and monitoring, which is often disrupted during disasters. To prevent complications, relief planning must ensure buffer stocks of essential medicines such as insulin, antihypertensives, and inhalers. Patient health registers maintained at the community and camp levels help track those with NCDs and ensure continuity of care. Regular screening, counseling services, and health education on diet and lifestyle management during disasters are equally important to minimize risks. Integrating NCD management into preparedness and mitigation strengthens the ability of the health system to reduce avoidable deaths and long-term complications.

7.1.1.3 Reproductive, Maternal and Child Health Services

Women, particularly pregnant and lactating mothers, face unique risks during disasters. Relief camps must ensure access to antenatal and postnatal care, safe childbirth facilities, skilled birth attendants, and emergency obstetric care when

needed. Nutritional supplementation with iron and folic acid, contraceptive availability, and breastfeeding support must be prioritized. Implementation of the MISP is critical to safeguard maternal and neonatal health in disaster settings. Culturally appropriate and locally available food support should also be provided to strengthen maternal and child health outcomes. Addressing reproductive health needs not only reduces maternal and child mortality but also upholds dignity and human rights during crises.

7.1.1.4 Chronic and Long-Term Illnesses

Disasters severely disrupt care for patients with chronic illnesses such as tuberculosis, HIV/AIDS, renal diseases, mental health disorders, and other long-term conditions. Continuity of therapy and regular follow-up are crucial to prevent treatment interruptions that could worsen health outcomes. Preparedness should include referral linkages with higher centers, telemedicine support for consultation and monitoring, and provision of psychosocial support services. Ensuring uninterrupted supply of medicines for chronic illnesses through buffer stock mechanisms and emergency supply chains must be an essential part of public health planning. Mental health services, including psychological first aid and counseling, should also be incorporated to address trauma, stress, and long-term emotional well-being.

7.1.2 Integrated Disease Surveillance and Early warning signs

Preparedness begins with reinforcing the IDSP at state and district levels. District Surveillance Units (DSUs) should update protocols for reporting priority diseases such as diarrheal illnesses, malaria, dengue, leptospirosis, influenza, and acute respiratory infections. Strengthening disease surveillance is a vital public health measure in disaster prevention and mitigation. Local, district, and state-level surveillance systems must be integrated to ensure early detection of epidemic-prone diseases. Frontline workers such as ASHAs, JPHNs, and Medical Officers should be trained to recognize early warning signs of outbreaks and initiate rapid reporting. Surveillance can be done based on community and strengthening the laboratory network. A well-coordinated surveillance network linking hospitals, laboratories, and community structures enables timely interventions, outbreak containment, and effective

intersectoral response. Rapid diagnostic kits, mobile health units, and information technology tools should be deployed to enhance early warning capabilities. Robust surveillance and response mechanisms are essential to minimize the health impacts of disasters and protect vulnerable populations. Designated nodal officers must oversee preparedness for outbreak detection and ensure 24/7 communication channels between PHCs, CHCs, and district/state authorities.

7.1.2.1 *Community-Based Surveillance*

Community-Based Surveillance (CBS) forms the critical frontline of the public health early warning system, leveraging the extensive network of grassroots health workers to detect threats at their source. At the local level, HI, JHI, JPHN, ASHAs and trained community volunteers (developed as part of the One Health Initiative of Kerala under the Centre for One Health Kerala) act as vital sentinels within their communities. Their deep integration allows them to recognize deviations from normal health patterns. These frontline workers shall be specifically trained to identify and promptly report early warning signs of outbreak-prone diseases—such as acute febrile illness, diarrhea, jaundice, and clusters of rashes—directly to the Medical Officer at the PHC. This real-time, community-level surveillance is indispensable for triggering immediate initial public health actions and preventing localized clusters from escalating into widespread outbreaks.

The data gathered from local sentinels is consolidated and analyzed at the district level by the IDSP unit. This unit is responsible for the systematic collection of weekly surveillance data from all reporting units, including PHCs, community health centers, and hospitals. Through meticulous data analysis, the district team identifies unusual spikes, temporal trends, and geographical clusters of syndromes. Any aberration from the expected baseline triggers a rapid response field investigation to confirm cases, identify potential sources, and implement preliminary containment measures. The district unit closes the feedback loop by providing regular, actionable feedback to the field staff, which is crucial for improving reporting quality and maintaining motivation.

At the state level, the State IDSP Cell provides the strategic oversight and technical expertise for the entire surveillance architecture. Its primary function is to set scientific epidemic thresholds for various syndromes and diseases based on historical data. Utilising the capacity of the State Health Systems Resource Centre Kerala and the India Meteorological Department, the State IDSP unit will have predictive modelling that incorporates climatic data, seasonal patterns, and other risk factors; the state cell moves from passive reporting to active forecasting. This enables it to issue proactive early warnings to districts deemed at high risk, allowing for the preemptive mobilization of resources and the implementation of preventive measures before an outbreak is fully manifest, thereby significantly enhancing the state's overall preparedness and response capability.

7.1.2.2 *Laboratory Network Strengthening*

A multi-tiered and resilient laboratory network is the cornerstone of evidence-based public health action, providing the confirmatory diagnosis necessary for effective outbreak confirmation and management. At the local level, the focus is on ensuring immediate diagnostic capability at the point of care. PHCs shall be equipped with basic Rapid Diagnostic Test (RDT) kits for common endemic diseases such as malaria, dengue, and cholera. This allows for the swift on-the-spot testing of suspected cases, enabling immediate treatment initiation and the triggering of preliminary public health responses like vector control or hydration therapy without delay, which is critical in remote or inaccessible areas.

The district-level laboratory acts as the operational hub for confirmatory testing and quality assurance. District Public Health Laboratories are strengthened with the equipment and trained personnel necessary to perform more sophisticated confirmatory tests for a wider range of pathogens, moving beyond the scope of basic RDTs. A critical function of this tier is the establishment and maintenance of robust protocols for the safe collection, storage, and transportation of human specimens from peripheral health facilities to the district lab and onwards to the state referral lab. This ensures the integrity of samples and the reliability of test results, which are essential for accurate disease surveillance and for guiding appropriate clinical and public health interventions.

The State Public Health Laboratory serves as the apex referral facility with the most advanced diagnostic capabilities in the network. The State Public Health Laboratory shall utilize the services of the Advanced Clinical Research Laboratory (ACRL) under the Kerala Health Research and Welfare Society (KHRWS) under the government of Kerala, which is equipped to perform highly specialized tests, including Polymerase Chain Reaction (PCR), genomic sequencing, and serotyping, which are crucial for definitively identifying pathogens, understanding transmission dynamics, and detecting new or variant strains. Beyond its diagnostic role, the state lab is responsible for the overall quality control of the entire laboratory network, conducting regular proficiency testing, training district lab personnel, and standardizing procedures across the state. This ensures the accuracy and reliability of diagnostic data at all levels, which forms the definitive evidence base for all public health decision-making during a disaster.

7.1.3 Environmental health risk reduction

Environmental health risk reduction is a key component of disaster preparedness and response, as poor environmental conditions often amplify the spread of diseases and increase vulnerability in affected communities. Effective measures focus on ensuring access to safe water, proper sanitation, waste management, and vector control.

7.1.3.1 *Vector and Rodent Control*

Integrated vector management should be carried out routinely in disaster-prone areas. This includes environmental cleaning drives, elimination of stagnant water, regular fogging or spraying in endemic zones, and distribution of insecticide-treated nets in vulnerable households before monsoon or flood seasons. Rodent control measures must include safe food storage systems in communities, awareness on waste segregation, and pre-positioning of rodent control kits in high-risk regions. Coordination between public health departments (ASHAs/JHI/JPHN) and LSGD (Harithakarmasena and Kudumbasree) should ensure that vector and rodent surveillance is strengthened before disaster strikes.

7.1.3.2 *Sanitation and Solid Waste Management*

Strengthening sanitation systems prior to disasters helps reduce the risk of waterborne and vector-borne disease outbreaks. Local bodies should maintain solid waste management facilities with regular collection and safe disposal, ensuring no accumulation of waste in open areas. Drainage systems must be kept clear to prevent flooding and mosquito breeding. In high-risk areas, contingency plans for rapid deployment of temporary toilets and mobile waste collection units should be prepared. Schools, community halls, and shelters pre-identified as relief camps should already have functional toilets, waste bins, and handwashing facilities installed.

7.1.3.3 *Water Safety and Security*

Preventive measures for water safety begin with mapping and protection of safe water sources, regular testing of community wells and pipelines, and maintaining a robust chlorination schedule. Local governments should ensure water treatment plants and storage systems are disaster-resilient and have backup generators for continuous operation. Rainwater harvesting and protected storage systems must be promoted in vulnerable areas to ensure continuity of safe supply. Community awareness campaigns on boiling water, use of chlorine tablets, and safe storage practices should be implemented before disaster seasons.

7.1.4 Community Empowerment and Risk Communication

Community empowerment and risk communication are essential components in the prevention phase of disaster management. Disaster Risk Communication (DRC) helps in empowering the disaster-prone communities with knowledge and skills to mitigate disaster impact. It can be implemented before, during and after any disaster. Empowering communities means building their capacity to understand local hazards, assess vulnerabilities, and take proactive measures to reduce disaster risks. This involves inclusive participation, training, resource access, and the development of community-based disaster risk management plans. Awareness campaigns and Health education classes should be conducted through LSGD, anganwadis or through household visits. At the district level , through IEC units , culturally appropriate and locally understandable IEC materials should be distributed . Mass media campaigns

through Radio, television, social media helps in educating the public on potential threats and safety measures at state level. Communication about the importance of prepositioning the household emergency kits including First aid supplies (medicines, bandages, antiseptics)

- Survival essentials (torch, battery, radio, dry food, sealed water bottles)
- Safety tools (ropes, knives, sturdy shoes)
- Sanitation items (chlorine tablets for water purification)
- Emergency cash for immediate needs

District and state health departments should work in coordination to design schemes and subsidies that support households and communities in preparing emergency health kits.

7.1.5 Intersectoral Coordination with Health Sector in Mitigation

Intersectoral coordination is a cornerstone of effective mitigation, ensuring that public health priorities are embedded within broader disaster risk reduction strategies. The health sector cannot function in isolation; collaboration with departments such as water and sanitation, housing, education, animal husbandry, agriculture, environment, and local self-governments (LSGDs) is essential to minimize vulnerabilities and safeguard community health through a One Health approach.

At the community level, ASHAs, JPHNs, anganwadi workers, and LSGD sanitation teams, including Harithakarmasena and Kudumbashree, must work together to promote safe WASH practices, strengthen waste management, control vectors and rodents, and conduct health education campaigns. Schools, in coordination with the Education and Health Departments, should integrate disaster health education and simulation drills into their curriculum, fostering a culture of preparedness and resilience among children. One Health Volunteers form an integral component of intersectoral coordination by linking human, animal, and environmental health surveillance. They should support ASHAs, JPHNs, Anganwadi workers, and veterinary field staff by monitoring unusual health events in people and animals, reporting early warning signs of zoonotic or vector-borne diseases, and conducting awareness campaigns on hygiene, sanitation, and safe food practices.

At the district level, the DMO, District Surveillance Unit (IDSP), and Public Health Laboratories should collaborate with PWD, Irrigation, Agriculture, and Veterinary Services to address environmental health risks such as water contamination, livestock-related zoonoses, and slope destabilization. Technical agencies like PWD and Irrigation must align infrastructure development (roads, drainage, slope stabilization) with public health priorities to prevent secondary hazards like vector breeding, flooding, and waterlogging. The integration of One Health surveillance mechanisms, with joint monitoring by human health, veterinary, and environmental departments, is critical for the early detection of zoonotic and climate-sensitive diseases. At the state level, the Directorate of Health Services (DHS), Kerala State Disaster Management Authority (KSDMA), and relevant ministries (Water Resources, Local Self Government, Animal Husbandry, Housing & Urban Development, Education, Environment & Forests) must integrate health-focused policies into all mitigation programmes. Examples include enforcing disaster-resilient hospital building codes, ensuring budgetary allocations for emergency medical supplies, maintaining state-level vaccine reserves, and embedding public health surveillance systems within environmental monitoring networks. The Centre for One Health, Kerala, can serve as a nodal platform for coordinating intersectoral research, training, and integrated surveillance across human, animal, and environmental health, thereby institutionalizing a holistic approach to disaster mitigation.

7.2 Public health measures in Preparedness Phase

Public health preparedness focuses on readiness, ensuring that systems, resources, and communities are capable of mounting a swift and coordinated response when disasters strike. Unlike prevention, which seeks to reduce risks before an event, preparedness emphasizes planning, stockpiling, training, and coordination to minimize disruption of health services during emergencies.

7.2.1 Prepositioning of health care facilities in Preparedness phase

It refers to the strategic planning and allocation of health resources before a disaster happens to ensure a rapid, coordinated, and effective response. It involves capacity building for health staffs, ensuring adequate medical supplies such as emergency

medicines, surgical kits, and first aid materials are stockpiled in secure and accessible warehouses.

7.2.1.1 Capacity building for health staffs

Capacity building is central to creating disaster-ready health systems by equipping healthcare teams with the skills needed for effective emergency response. A tiered training framework should cover clinical skills such as trauma life support, mass casualty triage, and emergency obstetric care, alongside public health training in outbreak investigation, waterborne disease prevention, and rapid health assessments. All cadres must also undergo infection control and psychological first aid training to address both physical and mental health needs during crises.

Learning approaches should include tabletop exercises, simulation drills, and refresher training aligned with seasonal risks. Training-of-trainers models are key to extending expertise to peripheral health centres. Regular competency evaluations, pre-monsoon refresher sessions, and post-disaster debriefings help retain skills and integrate field experiences into future preparedness. These measures build a resilient workforce capable of maintaining standards of care during floods, landslides, epidemics, and other emergencies.

7.2.1.2 Emergency Medical Teams (EMTs)

EMTs play a central role in disaster response. At the preparedness stage, doctors, nurses, paramedics, and support staff should be established, trained, and equipped. Mobile medical units, field hospitals, and caches of emergency supplies including essential medicines, surgical kits, and diagnostics must be pre-positioned. Standard operating procedures (SOPs) for triage, infection control, referral pathways, and continuity of essential services should be institutionalized and tested through regular drills.

7.2.1.3 Emergency medicines, Surgical kits, and First aid materials

Along with developing disaster response plans and training healthcare personnel during the preparedness phase of disasters but also ensuring the availability of essential medical supplies, particularly emergency medicines, surgical kits, and first

aid materials. Emergency medicines such as antibiotics, antipyretics, intravenous fluids, ORS, antihistamines, and life-saving drugs like epinephrine and insulin should be stored in adequate quantities with proper rotation and cold chain maintenance. Surgical kits, including sterilized instruments, sutures, anesthesia supplies, and dressing materials, are essential for performing emergency procedures, especially when dealing with mass casualties or trauma cases.hospitals must prepare comprehensive first aid kits to manage minor injuries, burns, fractures, and wounds at both hospital triage points and mobile clinics. These supplies should be pre-positioned in strategic areas within the hospital, regularly checked, and included in simulation drills. Their proper storage, accessibility, and the training of personnel in their use are essential components of a resilient health system.

7.2.2 Strengthening core public health programmes

It mainly involves building the capacity of health systems, training personnel, pre-positioning resources, and establishing protocols that can be activated immediately when a disaster strikes. Key components include developing comprehensive emergency preparedness plans, conducting risk assessments, and establishing early warning systems to detect and respond to health threats in real-time. Public health preparedness also involves training healthcare staff in emergency response, stockpiling essential medicines and supplies, and ensuring that health facilities have functional backup systems and continuity plans. In addition, coordination among various sectors such as health, emergency services, local governments, and non-governmental organizations is essential for an efficient response. Strengthening public health surveillance, laboratory capacity, and communication systems enhances the ability to detect and respond to outbreaks quickly.

7.2.2.1 Management of communicable diseases

Preparedness measures include stockpiling vaccines, diagnostic kits, and essential drugs for outbreak-prone diseases such as diarrhoeal illnesses, malaria, dengue, leptospirosis, and influenza. Frontline workers (ASHA, JPHN, MOs) should be trained in outbreak detection, reporting, and case management. Early warning

surveillance systems and mock outbreak drills further support timely response. Pre-disaster immunization drives and mock outbreak investigations help ensure readiness to contain epidemics in disaster-affected populations.

7.2.2.2 Non-Communicable Disease (NCD) Preparedness

Preparedness for NCDs requires continuity of care during displacement and service disruption. Patient registers should be maintained for individuals with hypertension, diabetes, cardiovascular disease, and asthma, ensuring that treatment continues even in relief camps. Buffer stocks of essential medicines like insulin, antihypertensives, and bronchodilators must be secured, and referral pathways established for managing complications.

7.2.2.3 Reproductive and Maternal Health and Child Health services

Reproductive health must be integrated into preparedness through implementation of the MISP. Relief facilities should be pre-stocked with safe delivery kits, iron/folic acid supplements, contraceptives, and breastfeeding support materials. Referral linkages for obstetric emergencies and readiness of skilled birth attendants are critical to safeguarding maternal and newborn health during disasters. Health and well being of the children need to be ensured because they are the most vulnerable groups during a disaster. Health authorities and stakeholders conduct risk assessments to identify vulnerable child populations and ensure that essential services such as immunization, nutrition programs, and pediatric care can continue uninterrupted during emergencies.Healthcare workers are trained in pediatric emergency response, psychological first aid, and the management of common childhood illnesses.Emergency supplies such as vaccines, therapeutic foods, and child-friendly medical kits are pre-positioned to ensure quick accessibility. Surveillance systems are strengthened to detect potential disease outbreaks among children early.

7.2.2.4 Chronic and Long-Term Disease Preparedness

Preparedness plans must also cover chronic illnesses such as tuberculosis, HIV/AIDS, renal disease, and mental health conditions. This includes ensuring uninterrupted therapy through buffer stocks, referral agreements with higher centres, and telemedicine support for continuity of specialist care. Psychosocial preparedness

should involve pre-trained counsellors and psychosocial first aid teams to provide mental health support during crises.

7.2.3 Community health awareness

Community health education plays a vital role in disaster preparedness by raising awareness about landslide causes, warning signs, and safe land-use practices. This initiative aims to equip local communities with essential survival and evacuation skills to enhance resilience.

Awareness campaigns should focus on identifying early warning signs, such as ground cracks and leaning trees, enabling communities and authorities to take proactive measures to prevent loss of life, minimize property damage, and facilitate timely evacuations. Minor environmental changes should be systematically reported to ensure early intervention. Safe evacuation routes and designated assembly points should be established and communicated effectively through local health workers (ASHA, JPHN), schools, community meetings, and mass media. Training programs for volunteers and health workers should emphasize first aid, CPR, trauma care, and the proper use of emergency supplies such as helmets, masks, and first aid kits.

Public awareness initiatives should highlight hygiene and sanitation practices, vaccination schedules, and disease prevention measures. Communities should be educated on recognizing early symptoms of diseases and accessing timely medical assistance. Psychological preparedness is equally critical; pre-disaster counseling and awareness programs should address emotional responses such as fear, insomnia, and panic, particularly during high-risk seasons like monsoons. These efforts will reduce anxiety, improve decision-making, and strengthen long-term community resilience. A major focus is on household-level preparedness, where families are encouraged to maintain emergency kits containing essential supplies such as:

- First aid supplies (medicines, bandages, antiseptics)
- Survival essentials (torch, battery, radio, dry food, sealed water bottles)
- Safety tools (ropes, knives, sturdy shoes)
- Sanitation items (chlorine tablets for water purification)
- Emergency cash for immediate needs

ASHA workers, Anganwadi workers, and local volunteers serve as frontline educators, conducting pre-disaster health training on:

1. Hygiene and safe water practices to prevent disease outbreaks
2. Nutritional care for vulnerable groups, including children and pregnant women
3. MHPSS to help communities cope with stress post-disaster

Community drills and participatory risk assessments ensure residents are familiar with evacuation routes and emergency protocols. By integrating local knowledge with structured disaster preparedness programs, communities become active participants in reducing health risks, ensuring faster recovery, and minimizing the impact of disasters on public health. This approach fosters long-term resilience, empowering individuals and families to take proactive measures before, during, and after emergencies.

7.2.4 Environmental sanitation and hygiene

Poor sanitation conditions during emergencies can lead to large-scale outbreaks of diarrhoeal diseases, cholera, typhoid, and other communicable illnesses. Emergency sanitation planning should ensure gender-sensitive, safe, and accessible facilities that prevent contamination of water sources and protect the dignity and privacy of vulnerable groups, especially women, children, elderly, and persons with disabilities.

At the community level, emergency plans must designate safe locations for temporary bathing facilities and toilets, ensuring gender segregation and privacy. Mobile and portable toilet units should be pre-positioned for rapid deployment during disasters, with clear guidelines for maintenance and waste disposal. LSGDs, supported by ASHAs, JPHNs, Anganwadi Workers, and sanitation volunteers (Harithakarmasena, Kudumbashree), should oversee cleanliness in relief camps and temporary shelters. Hygiene kits containing soap, water purification tablets, disinfectants, and menstrual hygiene products (sanitary napkins, reusable pads) must be pre-stocked and distributed equitably.

At the district level, logistics systems must be strengthened to ensure timely provision of sanitation and hygiene materials. District Disaster Management Authorities (DDMAs), in collaboration with DMO and ICDS, should coordinate storage and

distribution of emergency toilets, bathing facilities, disinfectants, and menstrual hygiene kits. Technical teams should be trained in safe waste disposal, drainage management, and preventing cross-contamination of drinking water. Regular monitoring and inspection of sanitation facilities in relief camps must be mandated to ensure safety and compliance with public health standards.

At the state level, the Directorate of Health Services (DHS), Kerala State Disaster Management Authority (KSDMA), and Local Self Government Department should establish frameworks for large-scale procurement and supply chain continuity. Memorandums of Understanding (MoUs) should be signed with vendors for the bulk purchase of critical sanitation supplies, including mobile toilets, bathing units, water treatment equipment, sanitary napkins, and disinfectants. Additionally, state-level guidelines must emphasize eco-friendly waste management and menstrual hygiene protocols during emergencies.

7.2.5 Surveillance and Early Warning Systems in the Preparedness Phase

During the preparedness phase, strengthening surveillance and early warning systems is critical to ensure that health threats are detected and addressed before they escalate during a disaster.

At the community level, frontline health workers such as ASHAs, JPHNs, JHIs, Anganwadi workers, and One Health Volunteers are trained in syndromic surveillance, enabling them to identify and promptly report early warning signs. The surveillance reports are channelled through mobile applications, WhatsApp groups, and IDSP platforms to ensure rapid communication with PHCs and district health authorities.

DSUs play a central role in preparedness by consolidating weekly data from government and private health facilities, laboratories, and veterinary departments, conducting regular trend analysis, and maintaining outbreak response teams equipped with Rapid Diagnostic Test (RDT) kits, transport media, and protective equipment. Preparedness also involves strengthening district public health laboratories, ensuring safe sample transport chains to state referral labs, and conducting simulation exercises for outbreak investigation.

At the state level, the IDSP Cell, State Public Health Laboratory, and State Climate Change Cell integrate epidemiological, meteorological, and entomological data to forecast seasonal and climate-sensitive disease risks such as malaria, dengue, leptospirosis, and heat-related illnesses. Intersectoral collaboration with Animal Husbandry and Fisheries Departments provides additional zoonotic and aquatic health data to strengthen One Health-based early warnings. Preparedness measures further include training and refresher courses for health staff on outbreak detection and response, pre-positioning of diagnostic consumables and emergency medicines, establishing 24/7 communication channels across PHCs, DSUs, and state health authorities, and conducting regular mock drills to test system functionality. Public awareness campaigns are also organized to encourage timely community reporting of unusual health events.

7.2.6 Logistics and Operational preparedness

Logistics and operational preparedness ensure that health systems are equipped to meet the needs of vulnerable populations during disasters. A critical first step is the mapping of high-risk areas and vulnerable groups, led by ASHAs and JPHNs at the community level. This includes identifying persons with tuberculosis, HIV/AIDS, disabilities, chronic illnesses, pregnant and lactating women, palliative care patients, children, and the elderly. Based on this mapping, microplans should be developed for each category of vulnerable population to guarantee uninterrupted access to essential medicines, nutrition, and healthcare services.

Operational preparedness requires inter-departmental coordination with specialized programmes and agencies. For example, the TB Cell should coordinate care for tuberculosis patients, KSACS (Kerala State AIDS Control Society) for PLHIV, the National Health Mission (NHM) for maternal and child health, and the Social Justice Department for persons with disabilities and the elderly. Palliative care services should be linked with local palliative care units to ensure continuity of home-based care. The State Nodal Officer (SNO) of National Programme on Climate Change and Human Health (NPCCHH), in coordination with District Nodal Officers (DNOs), should ensure that climate-sensitive health risks (such as vector-borne diseases, heat stress, waterborne illnesses, and nutrition insecurity) are factored into microplans and

logistics planning. This includes aligning district-level preparedness with the State Action Plan on Climate Change and Human Health (SAPCCHH) and monitoring climate-linked vulnerabilities in real time.

District Health Offices (DMOs) must consolidate community-level microplans, align them with existing health programme resources, and integrate them into the District Disaster Management Plan (DDMP). Logistics preparedness should include pre-positioning essential drugs and supplies for each vulnerable group (e.g., TB drugs, ART, insulin, antihypertensives, dialysis consumables, sanitary napkins, ORS, nutrition supplements), ensuring cold chain mechanisms for vaccines, and maintaining stock registers.

At the state level, the Directorate of Health Services (DHS), Kerala State Disaster Management Authority (KSDMA), and programme-specific agencies (KSACS, TB Cell, Mental Health Programme, Palliative Care Mission) must ensure policy direction, MoUs with vendors for bulk procurement, and statewide buffer stocks. Coordination with the Department of Women and Child Development, Social Justice, and Local Self Government Institutions (LSGIs) is essential for logistics support, transportation, and last-mile delivery.

7.2.7 Relief Camp Health Planning

It involves the careful selection of safe and accessible camp sites that allow adequate space and separate zones for vulnerable groups such as women, children, and the elderly. Essential health services, including primary care, maternal and child health, emergency medical care, and immunization, must be pre-arranged with stocked medicines and supplies. Ensuring access to safe drinking water, sanitation facilities, and hygiene promotion is crucial to prevent disease outbreaks. Health personnel must be assigned and trained to provide 24/7 care. A disease surveillance system should be established to enable early detection of common and high-risk illnesses such as diarrhea, measles, and acute respiratory infections (ARI). Timely and accurate reporting of cases is essential, with daily updates submitted to district or state health authorities to ensure rapid response and resource mobilization. WASH are fundamental to maintaining health and preventing disease outbreaks in relief camps.

Temporary latrines should be constructed with careful attention to cleanliness and accessibility. Bathing areas must be set up with arrangements that respect gender privacy and safety. Hygiene kits containing essentials such as soap, sanitary napkins, and toothpaste should be distributed to all camp residents to promote personal cleanliness. Additionally, regular vector control measures, including insecticide spraying and distribution of mosquito nets, should be implemented to reduce the risk of vector-borne diseases like malaria and dengue.Coordination with local authorities, NGOs, and health agencies is vital, along with proper documentation and management of medical waste . It works closely with key stakeholders such as the District Disaster Management Authority (DDMA), local health departments, and various non-governmental organizations (NGOs). These should be tailored based on the local context, population size, and type of disaster.

7.3 Public health measures in Response Phase

The response phase represents the most critical period in disaster management, where immediate measures are undertaken to save lives, reduce health risks, minimize injuries, and prevent further deterioration of living conditions, and restore essential health services. From a public health perspective, the response phase emphasises rapid assessment, timely emergency medical care, outbreak prevention, and protecting essential community health services. These interventions not only address immediate survival needs but also create a foundation for stabilisation and transition into recovery.

This phase begins right after the disaster strikes and focuses on urgent life-saving interventions, prevention of disease outbreaks, and the rapid restoration of basic health and social services. Disease surveillance systems are activated or strengthened to monitor and control outbreaks, and emergency vaccinations may be administered. Educating the affected populations about disease symptoms, transmission routes, and prevention methods empowers individuals to take protective actions. Effective communication, using culturally appropriate channels, builds trust and encourages community cooperation. Areas prone to vector-borne diseases like malaria or dengue, measures such as insecticide spraying, use of bed nets, and environmental management reduce the risk of vector proliferation.

7.3.1 Rapid Public Health Assessment

A rapid and structured health situation assessment is critical during the initial response phase following a disaster. This process involves the immediate estimation of mortality, injury patterns, and morbidity rates, alongside the active identification of vulnerable populations, including children, the elderly, pregnant and lactating women, and individuals with chronic illnesses or disabilities. The findings from this rapid assessment are indispensable for guiding the strategic allocation of resources, determining priority life-saving interventions, and ensuring efficient coordination to prevent duplication of efforts.

To operationalize this, it is recommended that the Block Level Epidemiologist, under the direct supervision of the Medical Officer In-Charge of the respective PHC/CHC, leads the initial data collection and field assessment. This effort must be seamlessly coordinated with interdepartmental teams, under the overall guidance and coordination of the District Medical Officer (DMO) and the District Health Services (DHS) leadership, to ensure a unified and comprehensive response.

7.3.1.1 Emergency deployment of health services

The activation of health response systems during disasters is a multi-tiered, structured process designed to ensure rapid, efficient, and coordinated health service delivery. It functions through a command-and-control mechanism that links state, district, and community-level actors, supported by dedicated logistics, infrastructure preparedness, and intersectoral coordination. The aim is to minimize preventable mortality, morbidity, and long-term health impacts by ensuring uninterrupted healthcare delivery to affected populations.

Within two hours of disaster declaration, Mobile Medical Units (MMUs) and Quick Response Medical Teams (QRMTs) are mobilized under the direction of the District Medical Officer (DMO), in consultation with the State Health Department and Kerala State Disaster Management Authority (KSDMA). The frontline teams include doctors, staff nurses, paramedics, and ambulance staff, supported by ASHA workers, JPHNs, JHIs, and local volunteers, who assist in triage, first aid, and community mobilization.

At the facility level, Medical Officers and hospital administrators implement mass casualty triage protocols to classify patients based on severity ensuring immediate stabilization for critical patients while organizing referral pathways for specialized care. District Hospitals and Medical Colleges activate surge capacity plans, opening additional wards, converting outpatient spaces into inpatient facilities, and drawing on reserve staff. The Kerala Medical Services Corporation (KMSCL) ensures emergency medicines, oxygen, and equipment are available for the expanded caseload.

Specialized care networks are coordinated at the state level by the Directorate of Health Services (DHS), linking trauma centers, burn units, dialysis facilities, blood banks and obstetric emergency services into a seamless referral chain. DHS and KSDMA must ensure that designated trauma centers and medical colleges are identified as referral hubs. These centers should maintain trained surgical teams (orthopedics, general surgery, neurosurgery, anesthesiology) and stock trauma kits including splints, airway equipment, burn management supplies, and emergency surgical packs. Simulation-based training in mass casualty management, triage and advanced trauma life support should be conducted regularly for doctors, nurses, and paramedics by institutions such as Kerala State Institute of Health And Family Welfare (KSIHFW). Functional blood banks and storage units are critical to meet the surge in demand for trauma, obstetric, and surgical emergencies. District and medical college blood banks, coordinated by the State Blood Transfusion Council, must ensure buffer stocks, uninterrupted cold chain, and backup power. Pre-identified voluntary donor networks (Red Cross, NSS, NGOs) should be activated to replenish supplies.

Emergency air ambulance services are facilitated in partnership with the National Disaster Response Force (NDRF), Indian Air Force, and private emergency providers, while boats and specialized rescue ambulances are coordinated through the Police, Fire & Rescue Services, and Coastal Security units for hard-to-reach areas.

7.3.1.2 Disease Surveillance and Outbreak Control

The conditions following a disaster significantly increase the risk of communicable disease outbreaks, particularly waterborne and vector-borne illnesses. It is therefore imperative to strengthen and activate enhanced disease surveillance systems

throughout the response phase. Immediate outbreak reporting mechanisms must be activated across all health facilities, relief camps, and established community networks. To facilitate rapid confirmation of suspected cases, laboratory support systems must be mobilised and access to rapid diagnostic tools ensured. Concurrently, targeted control measures—including mass vaccination where applicable, emergency chlorination of water sources, intensive vector control campaigns, and the isolation of infectious cases—must be implemented promptly to prevent secondary health emergencies. The execution of these surveillance and control activities will be carried out by frontline health workers, including ASHAs, Health Inspectors (HI), Junior Health Inspectors (JHI), and JPHNs, under the block-level coordination of the Block Epidemiologist and the overall supervision of the Medical Officer In-Charge of the Primary/Community Health Centre.

7.3.1.3 Water, Sanitation, and Hygiene (WASH) Interventions

Ensuring access to safe WASH is fundamental to preventing disease outbreaks and protecting public health in disaster-affected areas. Immediate measures must include the deployment of emergency water purification solutions, distribution of chlorine tablets for household water treatment, and the rapid construction of temporary, gender-segregated latrine facilities. Concurrently, targeted hygiene promotion campaigns and the distribution of hygiene kits—containing soap, disinfectants, and oral rehydration salts (ORS)—are essential to reduce the incidence of diarrheal and other communicable diseases. Public health teams must work in close collaboration with local authorities and community representatives to ensure the equitable provision and accessibility of WASH facilities, with particular attention to the needs of displaced populations in relief camps. The implementation of these critical interventions should leverage the capacity of trained volunteers, grassroots-level workers (such as ASHAs and Anganwadi workers), non-governmental organizations, and local health welfare groups, ensuring a coordinated and community-centered response.

7.3.2 Strengthening core public health programmes

Even amidst a disaster response, the continuity of essential public health services is critical to prevent a secondary health crisis. Core programs, including routine immunization campaigns, antenatal and postnatal care, and the management of chronic diseases such as diabetes, hypertension, and HIV/AIDS, must be maintained without interruption. To ensure this continuity, mobile medical outreach teams should be deployed to reach inaccessible populations, pre-established medicine distribution networks should be activated to provide uninterrupted access to essential drugs, and telemedicine services should be leveraged for remote consultations and follow-up care. Prioritizing and protecting these fundamental health services safeguards vulnerable groups and prevents an additional burden of avoidable morbidity and mortality in the disaster-affected community.

7.3.2.1 Management of communicable diseases

During the response phase of disaster management, the risk of communicable disease outbreaks increases significantly due to disrupted sanitation systems, overcrowded living conditions, and limited access to clean water and healthcare.Rapid Assessment and Surveillance is the first and most critical step in managing communicable diseases during the response phase of a disaster. The primary goal is to quickly identify health risks and detect potential outbreaks early, enabling a timely and effective response. It helps to gather essential data on the affected population's health status, environmental conditions, and the availability of healthcare services. A key component of this process is the establishment of disease surveillance systems. One common approach is syndromic surveillance, which focuses on identifying clusters of symptoms rather than confirmed diagnoses. This allows for the early detection of potential outbreaks of communicable diseases such as cholera, measles, and acute respiratory infections, even before laboratory confirmation is possible. Ensuring access to safe drinking water and adequate sanitation facilities(W.A.S.H) is essential to prevent waterborne diseases like cholera and typhoid. This involves providing chlorinated or treated water, constructing latrines or toilets, setting up handwashing stations, and distributing hygiene supplies such as soap.Rapid mass vaccination can prevent large-scale epidemics in displaced or crowded populations.

7.3.2.2 Management of non-communicable diseases

Managing NCDs such as diabetes, hypertension, cardiovascular diseases, chronic respiratory conditions, and mental health disorders is crucial to prevent complications and deaths among affected populations. Public health measures for NCD management during this phase focus on continuity of care, prevention of intensification , and addressing new stressors caused by the disaster.Ensure uninterrupted access to essential medications (e.g., insulin, antihypertensives, inhalers) is essential. This requires rapid assessment of medication needs, restocking supplies, and establishing distribution points in shelters or clinics. Setting up mobile clinics, temporary health facilities, or integrating NCD care into existing emergency health services ensures patients receive immediate and adequate medical care .Conduct basic screening for common NCDs and their complications, especially in vulnerable groups, to identify . Regular monitoring of vital signs, blood glucose level , and blood pressure will help to prevent emergencies. Disasters often exacerbate anxiety, depression, and PTSD. Early mental health interventions, counseling, and psychosocial support should be integrated into the response to address these needs.Establish clear referral pathways for patients requiring specialized or hospital care. Promote smoking cessation, healthy eating, and safe physical activity as much as possible within the constraints of the disaster environment to reduce additional risks.

7.3.2.3 Reproductive, Maternal Health and Child health Services

Addressing reproductive and maternal health during disaster management is a critical public health priority to reduce maternal and neonatal morbidity and mortality. Establish or maintain safe and accessible maternal health facilities, including emergency obstetric care , ANC , skilled birth attendance, and postpartum care.Provide clean delivery kits, sterile equipment, and trained birth attendants to ensure hygienic deliveries. Ensure referral systems and transport for women needing emergency care for complications such as hemorrhage, obstructed labor, or infections. Provide nutritional supplementation and counseling to pregnant and lactating women to prevent malnutrition, which adversely affects maternal and infant health.Address mental health needs of pregnant women and new mothers, who may experience increased stress, anxiety, or trauma during disasters.Health Education about the

importance of maternal health services, danger signs in pregnancy, newborn care, and family planning through culturally appropriate communication.Health of the children who are more susceptible to illness, malnutrition, and psychological trauma during disaster should be addressed. Rapid assessment of child health status is conducted to identify urgent issues such as dehydration, respiratory infections, injuries, and malnutrition. Ensure the availability of pediatric medical supplies, such as antibiotics, wound care materials, and age-appropriate medications, is vital. Efforts must be made to promote and support safe infant feeding practices, including breastfeeding, to protect vulnerable infants. Establishing child-friendly spaces and providing counseling services can help mitigate long-term mental health effects among children.Protecting children from separation, exploitation, abuse, and neglect through effective child protection measures is also essential during the response phase of disaster management.

7.3.2.4 Chronic and Long term Illness

Managing chronic and long-term illnesses becomes a critical public health priority due to disruptions in healthcare services, medication supply, and support systems. Key public health measures include the rapid identification and prioritization of individuals with chronic conditions.Temporary health facilities and mobile units should be equipped to handle chronic illness management, with clear triage and referral systems for those requiring urgent care. Nutrition support must consider special dietary needs.Ensure continuity of care, which involves maintaining access to medications through emergency stockpiles, mobile health clinics .Special attention must also be given to vulnerable populations, including the elderly, people with disabilities, and children with chronic conditions, to ensure equitable access to care and support during emergencies. Monitor disease exacerbations and track interruptions in care and these should be addressed.

7.3.2.5 Mental Health and Psychosocial Support (MHPSS)

The psychological and emotional impact of disasters is profound and requires an integrated, multi-tiered response. The provision of MHPSS must be prioritised during the response phase to address acute stress, trauma, grief, and anxiety among affected

populations. This involves the immediate deployment of trained mental health professionals and community-level workers to provide PFA, basic crisis counselling, and the establishment of psychosocial support systems. Community-based interventions—including the creation of safe spaces for women and children, organising peer-support groups, and facilitating structured recreational activities—are critical to promote resilience, mitigate distress, and prevent long-term psychological morbidity, including depression, anxiety disorders, and PTSD. The coordination and implementation of these MHPSS activities at the district level shall be led by the DMHP team. Overall guidance, technical support, and resource coordination will be provided by the SNO for the mental health programme.

7.3.3 Minimum Facility Standards at camps

Relief camps must prioritize the health, safety, and dignity of all residents, particularly vulnerable groups such as women, children, the elderly, widows, PwD individuals with chronic illnesses, and people living with HIV/AIDS. To achieve this, camps should ensure gender-sensitive accommodation with separate spaces for men, women, and transgender individuals. This helps reduce the risk of harassment and ensures privacy. Accessibility features such as ramps, wide pathways, and handrails are essential for elderly persons and PwDs. Registers should be maintained to track pregnant women, infants, elderly individuals, and people with chronic diseases, enabling targeted healthcare interventions. Additionally, camp layouts must provide well-lit common areas, clearly marked emergency exits, and safe spaces for women and children to reduce risks of violence and accidents.

- ***Safe water and food management*:** Ensuring adequate water and food supplies is a fundamental health safeguard in camps. Safe drinking water must be provided at a minimum of 2.5–3 liters per person per day, with boiled water prioritized for children and pregnant or lactating women. Overall water needs, including for hygiene and cooking, range from 7.5 to 15 liters per person per day. In cases where safe water is unavailable, double chlorination should be implemented, and all water sources must be tested within 24 hours of camp establishment for contaminants such as E. coli and coliform bacteria, with certification by health authorities. Water points should be located within 500

meters of shelter areas, and when natural or piped sources are insufficient, tankers or stored containers should be arranged. Food management is equally important, and a Food & Water Sub-Committee should oversee kitchen operations and distribution. Nutritional needs of children, pregnant women, lactating mothers, and the elderly must be prioritized. Adults should receive at least 2,400 kcal per day while children require 1,700 kcal, including milk and dairy products for those under 12 years. Food should be locally available, culturally appropriate, and prepared under hygienic conditions to prevent outbreaks. Suggested menus from the Kerala State Emergency Operations Centre include items like upma, idli, tapioca, rice, vegetable curries, and chapathi. Where possible, food should be delivered directly to households of elderly people, PwDs, or those with chronic illnesses who cannot reside in camps.

- ***Sanitation and hygiene at camps*:** Maintaining sanitation and hygiene in relief camps is essential to prevent outbreaks of diarrheal diseases, skin infections, and other public health threats. Camps must provide one toilet for every 30 individuals, with separate facilities for men and women to ensure privacy and dignity. All sanitation units should be accessible for PwDs and located within 50 meters of living areas while maintaining a safe distance of at least 30 meters from groundwater sources. Each individual should have access to 18–20 liters of water per day for drinking, cooking, and personal hygiene. Handwashing facilities with soap and water must be available near toilets and common areas, and proper disposal of children's feces should be ensured. Distribution of dignity kits containing sanitary napkins, soap, toothbrushes, oil, detergent, and disposable bags is crucial to uphold personal hygiene. Where possible, modern solutions such as bio-toilets or e-toilets should be installed to maintain high sanitation standards. Hygiene promotion and awareness campaigns within camps further encourage responsible use of facilities and support the maintenance of a clean environment.
- ***Waste management at camps*:** Effective waste management in relief camps is vital to safeguard public health and maintain environmental hygiene. Each camp should be equipped with adequate dustbins and refuse containers, including special provisions in toilets for the safe disposal of sanitary napkins

and personal hygiene products. Waste disposal sites must be situated at least 150 meters away from drinking water sources and kept free from pests and rodents. Segregation of waste at source is mandatory: biodegradable waste such as kitchen scraps should be disposed of through burial or landfilling, non-biodegradable waste should be collected separately for recycling, and biomedical waste must be stored in color-coded containers or bags and disposed of through properly managed pits or incinerators. Waste should be collected and disposed of at least twice daily under the supervision of trained staff, with strict adherence to hygiene and safety standards. Additionally, vector control measures such as fumigation, proper drainage, and pest monitoring are necessary to reduce risks of mosquito-borne and rodent-borne diseases. Proper documentation of disposal processes ensures accountability and supports systematic camp management.

7.3.4 Medical and health support in camps

Medical and health support in relief camps is critical to protect the displaced population from immediate and long-term health risks. Camps must provide integrated, people-centered healthcare covering emergency treatment, preventive care, maternal and child health, disease surveillance, nutrition, and mental health services.

Each camp must be equipped with a dedicated health team comprising at least one doctor, staff nurses, and JPHNs, supported by ambulance services and emergency medical equipment. First-aid stations should be available on-site, with doctors conducting daily medical visits and nursing staff ensuring 24-hour coverage. The DMO should deploy additional JPHNs, ASHAs, and paramedics in proportion to camp population size. Camp health registers must document consultations, vulnerable groups, and referrals to higher centers for accountability and follow-up.

Health teams, in collaboration with ICDS, must conduct immediate nutrition screening for children under five to identify acute malnutrition and initiate supplementary feeding where required. Pregnant and lactating women should receive nutritional supplements including iron, folic acid, and calcium, with targeted monitoring through special registers. Elderly individuals and those with chronic illnesses (such as

diabetes, hypertension, HIV, or renal disease) should be provided with tailored diet and medicine continuity.

Active disease surveillance should begin at camp establishment, with ASHAs, JPHNs, and Junior Health Inspectors monitoring for diarrheal diseases, malaria, leptospirosis, influenza, and respiratory infections. Daily camp health data should be reported to the District Surveillance Unit (IDSP). Isolation wards/rooms must be designated for suspected infectious cases, while vector control measures—including distribution of mosquito nets, repellents, and periodic fumigation—must be systematically implemented. Rapid Diagnostic Test (RDT) kits should be available for immediate outbreak detection.

Disasters cause significant emotional and psychological distress. Camps must provide psychological first aid and crisis counseling to help survivors cope with acute stress, fear, and grief. Community-level counselors, DMHP staff, and trained volunteers should be deployed to identify and support cases of anxiety, depression, or post-traumatic stress disorder (PTSD). For long-term camps, structured psychosocial support programs must be coordinated with the Health and Social Justice Departments, ensuring continuity of mental health care beyond the immediate emergency phase.

7.3.5 Coordination, Communication, and Logistics in Public Health Response

The effectiveness of the public health response is contingent upon seamless coordination, clear communication, and robust logistical management. A unified command structure, integrating state health authorities, district administrations, and local self-governments, is essential to reduce fragmentation and ensure targeted interventions. Emergency Operation Centres (EOCs) at district and state levels must oversee supply chain logistics, guaranteeing the uninterrupted availability and distribution of critical resources, including essential medicines, vaccines, personal protective equipment (PPE), and therapeutic food supplies. Simultaneously, clear, accurate, and timely public health communication is paramount for risk reduction and disease prevention. Messages focusing on safe hygiene practices, service availability, and health advisories must be disseminated through multiple channels—including

mass media, local leaders, health workers, and community volunteers—to counter misinformation and build public trust. Active community engagement and partnerships with NGOs, community-based organizations, and the private sector are fundamental to enhancing the reach, compliance, and overall efficiency of public health measures, fostering a sense of collective responsibility in managing the crisis.

7.4 Public Health Measures in Recovery and Rehabilitation phase

Public health measures in the recovery and rehabilitation phase form the backbone of rebuilding disaster-affected communities. Unlike the response phase, which focuses on immediate lifesaving actions, recovery is a longer-term process that ensures affected populations return to safe, healthy, and functional living conditions. This phase bridges emergency relief with long-term development and resilience-building.

The primary goal is not only to restore damaged health systems but also to strengthen them in a way that reduces future vulnerability. Restoration of essential healthcare services, prevention of secondary disease outbreaks, rehabilitation of affected individuals, and promotion of mental and social well-being are key priorities. Public health in this phase extends beyond clinical care. It incorporates disease surveillance, environmental health, vector control, nutrition security, water and sanitation management, and psychosocial support. The approach must be multi-sectoral, involving collaboration between health departments, local governments, NGOs, disaster management authorities, and the community itself. By addressing both immediate health risks and long-term needs, recovery and rehabilitation lay the foundation for resilient, healthier communities capable of withstanding future disasters.

7.4.1 Restoration of Health Services and Continuity of Care

The restoration of health services is the foremost priority in the recovery and rehabilitation phase. Disasters often damage hospitals, primary health centers, and sub-centers, disrupting access to essential care when it is needed the most. Immediate steps must focus on repairing partially damaged facilities, rebuilding destroyed structures, and deploying mobile medical units (MMUs) and field hospitals to ensure uninterrupted service delivery until permanent facilities are restored.

To prevent a collapse in service delivery, reserve health staff, volunteer medical teams, and specialists should be mobilized from unaffected regions. Essential medicines, surgical supplies, and diagnostic equipment must be replenished rapidly, with a particular focus on medicines for chronic diseases.

- Continuity of care is vital for vulnerable groups, especially those with pre-existing chronic conditions, pregnant women, children, and the elderly. This requires:
- Re-establishing regular medical check-ups and follow-ups for people with long-term conditions.
- Ensuring the uninterrupted supply of medications like insulin, cardiac drugs, and antiretroviral therapy.
- Restoring access to maternal and child health services, including antenatal care, safe delivery, immunization, and nutrition support.
- Linking patients to referral hospitals and specialized care networks for trauma, dialysis, oncology, or mental health needs.

Digital health records, telemedicine, and community-based follow-up by ASHA workers and JPHNs can help maintain continuity where health systems remain partially disrupted.

7.4.1.1 Rehabilitation of Health Facilities

A systematic effort to restore health facilities must be initiated across all administrative levels. At the local level, Medical Officers in charge of Primary and Community Health Centres (PHCs/CHCs) are responsible for conducting thorough damage assessments of their facilities and submitting detailed reports to authorize necessary repairs. Where temporary structures were used during the response phase, these must be replaced with permanent, retrofitted buildings designed and constructed in compliance with disaster-resilient building codes. Key improvements include

flood-resistant foundations, elevated electrical systems, and reinforced critical care areas to ensure operational continuity during future emergencies. At the district level, the District Medical Officer (DMO), in collaboration with the Public Works Department (PWD), must prioritize, oversee, and quality-assure the structural rehabilitation of all damaged health facilities. Their role includes ensuring that all reconstruction efforts incorporate enhanced resilience standards and are completed in a timely manner. At the state level, the State Health Department (DHS) and the Kerala State Disaster Management Authority (KSDMA) are tasked with allocating necessary funds and technical expertise for large-scale reconstruction projects. They must also enforce strict adherence to the Kerala Disaster Resilient Building Code (or follow guidelines of the National Program for Human Health and Climatic Change) across all new and retrofitted health infrastructure to significantly reduce future vulnerability.

7.4.1.2 Revitalization of Water and Sanitation Systems

The restoration of safe water and sanitation systems is critical to preventing disease outbreaks and ensuring environmental health. At the local level, Local Self-Government Departments (LSGD) must take the lead in managing the repair and chlorination of public water sources to ensure immediate access to safe drinking water. In addition, they are responsible for rehabilitating damaged sewerage systems and overseeing the safe disposal of disaster debris to mitigate risks of environmental contamination and vector breeding. At the district level, the District Suchitwa Mission and the Water Authority must enforce water quality monitoring protocols post-repair to ensure ongoing safety. They are also responsible for supervising the restoration of permanent and functional sanitation facilities in public spaces, schools, and anganwadis, with special attention to gender-specific needs and accessibility. At the state level, the State Public Health Laboratory must provide specialized technical support for comprehensive water safety testing and conduct independent verification. Once systems meet all safety standards, the state lab will provide certification confirming they are safe for public use, thereby restoring community confidence in public utilities.

7.4.2 Strengthening Disease Surveillance and Vector Control

It aims at preventing secondary outbreaks and ensuring timely response to emerging health threats. In the aftermath of a disaster, healthcare systems are often weakened, populations may be displaced, and living conditions can contribute to the rapid spread of communicable diseases. A robust surveillance system allows for the early detection and monitoring of disease trends, guiding public health interventions such as vaccination, sanitation, and medical resource allocation. Restoring and enhancing surveillance mechanisms—including data reporting, laboratory diagnostics, and community-based monitoring—enables health authorities to respond promptly to potential outbreaks. By integrating modern technologies, training health workers, and engaging local communities, disease surveillance becomes a cornerstone of effective rehabilitation, helping to protect vulnerable populations and support the long-term recovery of the public health system.

7.4.3 Rehabilitation and Psychosocial Support

Disasters often leave survivors with not only physical injuries but also lasting psychological trauma and social disruptions. Rehabilitation and psychosocial support are therefore critical to restoring both individual and community well-being in the recovery phase.

Physical Rehabilitation: Many survivors suffer from injuries, fractures, amputations, or disabilities resulting from disasters. Timely rehabilitation services such as physiotherapy, occupational therapy, and provision of assistive devices (e.g., wheelchairs, crutches, prosthetics, hearing aids) are essential to restore functional independence and prevent long-term disability. Special focus should be given to the elderly, PwDs, and those with pre-existing health conditions. Rehabilitation centers and district hospitals should collaborate with NGOs and private providers to scale up these services.

Psychosocial Support: The emotional and psychological burden of disasters fear, anxiety, grief, depression, and post-traumatic stress disorder (PTSD) can significantly affect survivors, particularly children, women, and the elderly. Psychosocial care

should begin immediately after the disaster and continue throughout the recovery phase. This includes:

- Community-based counseling by trained psychologists, counselors, and social workers.
- Peer-support groups to provide collective healing and sharing of experiences.
- School-based programs to help children process trauma and return to routine learning.
- Helplines and tele-counseling for those unable to access direct services.

The first step in disaster-related mental health care is to address acute psychological distress arising from loss of life, injuries, destruction of property, or fear of recurrence. PFA should be provided in the immediate aftermath to comfort and stabilize affected individuals. This needs to be followed by structured counseling and therapy, which may extend over several months or years depending on the individual's recovery process. Emotional first aid and the mobilization of community-based support systems such as peer groups, religious organizations, and self-help groups should be prioritized during the first few weeks to strengthen resilience.

Mental health services must remain accessible for up to five years after the disaster, as trauma and distress often resurface over time. Long-term counseling, psychiatric support, and rehabilitation programs should therefore be planned and resourced accordingly. Integrating these services into the local healthcare system ensures continuity and accessibility for all, including vulnerable groups. Services should be made available in health institutions, relief camps, mobile clinics, and at the community level, so that support reaches those most in need without delay(16).

Social Reintegration and Support Networks: Beyond individual recovery, psychosocial support also involves strengthening community bonds and social networks that are often disrupted. Religious institutions, self-help groups, and local NGOs play a crucial role in re-establishing community resilience and collective coping mechanisms.

7.4.4 Longitudinal Health Monitoring and Surveillance

Ongoing and systematic health surveillance is essential in the post-disaster period to detect, monitor, and respond to the delayed and prolonged public health impacts of the disaster. This enables evidence-based interventions and ensures that recovery efforts effectively address emerging and lingering health threats within the affected communities of Kerala.

7.4.4.1 Community Health Assessment

A comprehensive and continuous assessment of community health status is vital for tailoring rehabilitation efforts to actual needs. At the local level, Junior Public Health Nurses (JPHNs) and Accredited Social Health Activists (ASHAs) shall conduct systematic house-to-house visits to evaluate the health and nutritional status of vulnerable groups, with particular focus on children under five years of age and pregnant women. They are responsible for actively screening for and reporting spikes in acute malnutrition rates, communicable diseases, and mental health concerns. At the district level, the IDSP Unit must analyze aggregated health data from all local sources to identify trends, evaluate the disaster's broader impact on community health, and measure the effectiveness of ongoing interventions. Based on this analysis, the district unit will initiate targeted public health actions and allocate resources to areas with the greatest need. At the state level, the State Health Department (DHS) should commission detailed epidemiological studies and rapid assessments to comprehensively understand the long-term health, nutritional, and socio-economic consequences of the disaster on the affected population. The findings from these studies are crucial for informing state-level policy revisions, guiding future resource allocation, and improving preparedness for subsequent events.

7.4.4.2 Nutritional Rehabilitation

Addressing the deterioration in nutritional status is a critical component of the public health recovery strategy, requiring a coordinated effort across the health and welfare sectors. At the local level, Anganwadi Workers and ICDS Supervisors are tasked with the active identification of children suffering from SAM and Moderate Acute Malnutrition through regular growth monitoring sessions. They must ensure the

immediate referral of critical cases to designated Nutritional Rehabilitation Centres (NRCs) and provide ongoing community-based nutritional support. At the district level, the District Social Justice Department and the ICDS department are responsible for ensuring the effective and efficient functioning of NRCs. Their mandate includes the timely provision of supplementary nutrition to all eligible beneficiaries, including children, pregnant women, and lactating mothers, through the established Anganwadi network. At the state level, the State ICDS Directorate must closely monitor overall nutritional outcomes and trends across all affected districts. A key responsibility is to ensure an uninterrupted and adequate supply of essential nutritional commodities, including Ready-to-Use Therapeutic Food and micronutrient powders, to all distribution points, thereby guaranteeing that field-level efforts are fully supported and resourced.

7.5 Integration of AYUSH in Public Health Disaster Management

The unique and extensive network of Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homeopathy (AYUSH) institutions and practitioners in Kerala represents a significant resource for strengthening public health outcomes across all phases of disaster management. By formally integrating AYUSH systems into the disaster management framework, the state can leverage its traditional medical strengths to provide holistic, accessible, and culturally resonant healthcare, thereby enhancing community resilience and reducing the burden on allopathic facilities during emergencies. This integration focuses on preventive, promotive, and rehabilitative care, aligning with the principles of public health.

7.5.1 Role of AYUSH in Prevention & Mitigation Phase

The foundational principles of AYUSH are intrinsically aligned with the goals of preventive health and building innate resilience, making them a vital component of disaster risk reduction within Kerala's public health framework. This proactive approach focuses on strengthening individual and community immunity before a disaster strikes, thereby mitigating the potential severity of its health impacts. At the community level, this is operationalized through targeted health promotion initiatives. AYUSH practitioners stationed within local communities are strategically positioned

to lead educational programs on traditional wellness practices. These include disseminating knowledge on Rasayana (rejuvenation) therapies and seasonal regimens (Ritucharya), which are designed to bolster the body's natural defenses and enhance overall preparedness in the pre-disaster period, particularly ahead of known hazardous seasons like the monsoon.

Complementing these promotive efforts are direct preventive interventions spearheaded at the state level. The State AYUSH Directorate possesses the mandate and expertise to develop, validate, and distribute standardized prophylactic protocols for use among vulnerable populations. This involves the creation of evidence-based guidelines for common Ayurvedic and Homeopathic formulations known for their efficacy in preventing infections. By pre-emptively distributing these protocols and ensuring adequate availability of necessary formulations through local AYUSH dispensaries and community health workers, the system can act as a first line of defense against outbreaks of water-borne and vector-borne diseases, such as leptospirosis, dengue, and acute gastroenteritis, which are notoriously common in the aftermath of disasters in Kerala. This integrated, two-pronged strategy of health promotion and preventive intervention empowers communities and reduces their vulnerability, embodying the core public health adage of "prevention is better than cure" within the disaster management context.

7.5.2 Role of AYUSH in Preparedness Phase

The integration of AYUSH systems into Kerala's disaster management framework requires deliberate capacity building and logistical planning during the preparedness phase to ensure this vast network of practitioners and resources can be deployed effectively during a crisis. This phase is critical for building a coordinated, multi-disciplinary response capability that leverages the strengths of all medical systems within the state. A cornerstone of this effort is comprehensive capacity building for AYUSH personnel. It is essential that AYUSH officials at both the district and state levels are included in all disaster management training programs, workshops, and simulation exercises conducted by the KSDMA and DHS. Specific training

modules must be developed to orient AYUSH practitioners in fundamental emergency response skills, including basic triage protocols, PFA, sanitation and hygiene promotion, and their defined roles within the broader public health emergency response structure. This training ensures they can work seamlessly alongside allopathic health teams and provide critical support during the initial surge of patients.

Parallel to training, strategic resource planning is imperative to operationalize the AYUSH response. The KSDMA and the State Health Department must formally collaborate with the State AYUSH Directorate to identify, procure, and pre-position essential AYUSH medicines and supplies. This includes a standardized list of prophylactic and common therapeutic formulations from Ayurveda, Homeopathy, Siddha, and Unani systems of medicine. These supplies should be incorporated into the overall health sector emergency stockpile and stored in strategically located warehouses and health facilities across the state, particularly in high-risk and geographically remote districts. This logistical integration guarantees the timely availability of these resources for immediate distribution and use in relief camps and affected communities during a disaster, ensuring a swift and holistic health response that caters to the diverse healthcare preferences and needs of Kerala's population.

7.5.3 Role of AYUSH in Response Phase

During the critical response phase immediately following a disaster, the AYUSH system can be rapidly mobilized to provide essential supportive care and effectively manage the surge of patients presenting with non-critical conditions, thereby alleviating the overwhelming burden on allopathic emergency services and ensuring a more efficient triage system. A key operational strategy involves the deployment of mobile AYUSH units to severely affected areas and relief camps. These units, staffed by trained AYUSH practitioners, can establish on-site consultations to manage a wide spectrum of common ailments, including musculoskeletal pain from rescue efforts, minor injuries, respiratory issues exacerbated by environmental factors, and a high volume of stress-related complaints. By addressing these non-life-threatening conditions comprehensively, these mobile units play a crucial role in decongesting allopathic emergency departments and hospitals, allowing them to focus their resources and expertise on managing severe trauma and critical cases.

AYUSH practitioners are uniquely equipped to deliver immediate and culturally resonant MHPSS at the community level. The psychological trauma following a disaster manifests as widespread acute stress, anxiety, panic, and grief among survivors. AYUSH professionals can lead daily, structured group sessions in relief camps and affected communities involving evidence-based practices such as guided Yoga, meditation, and Pranayama (breathing exercises). These techniques are proven to effectively reduce cortisol levels, alleviate anxiety, promote mental calmness, and foster a sense of collective healing and resilience. This community-based psychosocial first aid is vital for stabilizing the affected population, preventing the onset of longer-term mental health disorders, and complementing the clinical mental health services provided by the DMHP. Such an integrated approach ensures that psychosocial support is accessible and provided at scale during the most acute stage of the disaster.

7.5.4 Role of AYUSH in Recovery & Rehabilitation Phase

The holistic and preventative principles of AYUSH systems make them exceptionally valuable during the extended recovery and rehabilitation phase, enabling a comprehensive approach to addressing the long-term physical and mental health consequences of disasters. This phase benefits significantly from AYUSH's emphasis on restoring balance and promoting sustainable wellness, which aligns perfectly with the goals of rebuilding healthier, more resilient communities. A primary contribution lies in the management of chronic conditions that are often exacerbated by the disruptions and stresses of a disaster. AYUSH facilities and practitioners across Kerala can provide accessible, ongoing care for conditions such as hypertension, diabetes, arthritis, and chronic respiratory issues through holistic treatment protocols that include dietary guidance, lifestyle counselling, and traditional pharmacological and non-pharmacological therapies. Ensures continuity of care for these non-communicable diseases but also offers a culturally familiar and often more affordable healthcare option for affected populations, thereby reducing the long-term burden on the allopathic healthcare system. Incorporating Sports Ayurveda that encompasses personalised diet and nutrition, specific medicines, specialised massage techniques..Beyond clinical management, the AYUSH sector is uniquely positioned to lead community-wide initiatives focused on long-term wellness and resilience

building. This involves designing and implementing sustained programs that educate communities on preventive health practices, including appropriate dietary choices based on traditional knowledge, lifestyle modifications tailored to Kerala's environmental context, and daily stress management techniques such as Yoga and meditation. By empowering individuals and communities to take an active role in their health and well-being, these initiatives foster a culture of preparedness and self-reliance. Proactive promotion of holistic health not only aids in the complete psychosocial and physical recovery of the affected population but also strengthens community resilience against future disasters, ensuring that the health system is better prepared to mitigate the impact of subsequent events.

CHAPTER 8

CONCLUSION

Disaster Management Framework for the Kerala Health Sector provides a structured and holistic approach to safeguarding public health before, during, and after disasters. The framework recognises that disasters disproportionately impact health systems and vulnerable populations, and it outlines evidence-based strategies across all phases of disaster management. By emphasising prevention through infrastructure resilience, community education, and environmental safeguards, the framework reduces baseline vulnerabilities that exacerbate health risks during crises. The preparedness components, including workforce training, risk mapping, and early warning systems, ensure the health sector can respond effectively when disasters strike.

The response protocols prioritise life-saving interventions while maintaining essential health services, particularly for high-risk groups such as children, pregnant women, and the elderly. The framework's integration of mental health support acknowledges the long-term psychosocial consequences of disasters, ensuring comprehensive recovery. Post-disaster rehabilitation focuses on restoring health infrastructure, disease surveillance, and continuity of care to prevent secondary health crises.

While this framework outlines the roles and responsibilities of various departments and personnel, it is recommended that further discussions among state-level officials from relevant departments be conducted to finalize and formally adopt the specific roles and responsibilities detailed herein.

For this framework to achieve its full potential, sustained investment in health systems, intersectoral collaboration, and community participation will be critical. Regular drills, real-time data monitoring, and adaptive policy revisions can further strengthen Kerala's disaster resilience. By institutionalising these measures, the state can mitigate health impacts, protect vulnerable populations, and serve as a model for public health-centred disaster management. Ultimately, the framework's success

hinges on translating planning into action—ensuring no community is left behind when disasters occur.

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ANNEXURE 1

Triage Tagging System

Triage Tag	Priority	Description / Conditions
Red Tag	Priority 1	This tag signifies that the patient has a first priority for evacuation. Red-tagged patients need immediate care and fall into one of the following categories: (1) Breathing problems that cannot be treated at the site. (2) Cardiac arrest (witnessed). (3) Appreciable loss of blood (more than a litre). (4) Loss of consciousness. (5) Thoracic perforations or deep abdominal injuries. (6) Certain serious fractures: Pelvis, Thorax, Fractures of cervical vertebrae, Fractures or dislocations in which no pulse can be detected below the site of the fracture or dislocation. (7) Severe concussion. (8) Burns (complicated by injury to the air passages).

Green Tag	Priority 2	This tag identifies those patients who should receive second priority for evacuation. Such patients need care, but the injuries are not life threatening. They fall into the following categories: (1) Second-degree burns covering more than 30 per cent of the body. (2) Third-degree burns covering 10 per cent of the body. (3) Burns complicated by major lesions to soft tissue or minor fractures. (4) Third-degree burns involving such critical areas as hands, feet, or face but with no breathing problems present. (5) Moderate loss of blood (500–1000 cc). (6) Dorsal lesions, with or without injury to the spinal column. (7) Conscious patients with significant craniocerebral damage (serious enough to cause a subdural hematoma or mental confusion). Such patients will show one of the following signs: ● Secretion of spinal fluid through ear or nose ● Rapid increase in systolic pressure ● Projectile vomiting ● Changes in respiratory frequency ● Pulse below 60 ppm ● Swelling or bruising beneath the eyes ● Anisocoric pupils ● Collapse ● Weak or no motor response

		● Weak reaction to sensory stimulation (profound stupor).
Yellow Tag	Priority 3	This tag is used on patients who are given third priority for evacuation and who fall into the following categories: <u>Minor Lesions</u> (1) Minor fractures (fingers, teeth, etc.). (2) Other minor lesions, abrasions, contusions. (3) Minor burns: ● Second-degree burns covering less than 15 percent of the body ● Third-degree burns covering less than 2 per cent of the body ● First-degree burns covering less than 20 per cent of the body, excluding hands, feet, and face. <u>Fatal injuries</u> (1) Second and third-degree burns over more than 40 per cent of the body, with death seeming reasonably certain. (2) Second- and third-degree burns over more than 40 per cent of the body, with other major lesions, as well as major fractures, major craniocerebral lesions, thoracic lesions, etc. (3) Cranial lesions with brain tissue exposed and the patient unconscious. (4) Craniocerebral lesions where the patient is unconscious and has major fractures.

		(5) Lesions of the spinal column with absence of sensitivity and movement. (6) Patient over 60 years old with major lesions. [It should be noted that the line separating these patients from red-tag casualties is very tenuous. If there are any red-tag patients, this system will have to be followed. If there are none, the yellow-tag patients with apparently fatal injuries become red-tag candidates. The reason is simple: if there are many red-tag patients with a chance to survive and there are yellow-tag patients, who apparently cannot be saved because of their injuries, the time spent on the dying wounded could be better spent on the patients with a chance to survive].
Black Tag	Last Priority	Black tags are placed on the dead, i.e., casualties without a pulse or respiration who have remained in that condition for over 20 minutes, or whose injuries render resuscitation procedures impossible.

ANNEXURE 2

DEAD BODY IDENTIFICATION FORM

1. Body/Body Part (B/BP) Code:- (Use Individual Identification Numbering which will also be endorsed on associated files, photographs or stored objects)
2. Possible identity of body:-
3. Person Reporting:-
(a) Name:
(b) Official Status/Organisation:
(c) Place & Date:
(d) Signature:
4. Recovery details (include place, date, time, by whom, and circumstances of finding. Also indicate if other bodies were recovered in the same area, including names and possible relationships, if identified):-

B/BP Code: _____

A. PHYSICAL DESCRIPTION

A-1	General condition (Mark one) :-					
	(a)	Complete Body	Incomplete Body (describe):		Body Part (describe):	
	(b)	Well-preserved	Decomposed	Partially Skeletonized	Skeletonized	
A-2	Apparent Sex (Mark one and describe evidence):-					
	(a)	Male	Female	Probably Male	Probably Female	Undetermined
	(b)	Describe evidence (genitals, beard, etc):				
A-3	Age Group (Mark one):-					
	Infant	Child	Adolescent	Adult	Elderly	
A-4	Physical Description (Measure or Mark one):-					
	(a)	Height (crown to heel): _____ cms		Short	Average	Tall
	(b)	Weight: _____ Kgs		Slim	Average	Fat
A-5	(a)	Head Hair:-	Colour:	Length:	Shape:	Baldness:	Other:
	(b)	Facial Hair:-	None	Moustache	Beard	Colour:	Length:
	(c)	Body Hair:-	Describe:				
A-6	Distinguishing Features:- (Continue on additional sheets if required. If possible, include a sketch of the main findings)						
	(a)	Physical:-					
		i	Shape of Ears				
		ii	Shape of Eyebrows				
		iii	Shape of Nose				
		iv	Shape of Chin				

B/BP Code: _____

		v	Hands		
		vi	Feet		
		vii	Nails		
		viii	Deformities		
		ix	Missing Limbs/ Amputations		
	(b)	Surgical Implants or Prosthesis (Artificial Limbs):-			
	(c)	Skin Marks:-			
		i	Scars		
		ii	Tattoos		
		iii	Piercings		
		iv	Birthmarks		
		v	Moles		
	(d)	Apparent Injuries (Include location, side):-			
	(e)	Dental condition (describe any obvious features):-			
		i	Crowns		
		ii	Gold Teeth		
		iii	Adornments		
		iv	False Teeth		
		v	Gums		

B/BP Code: _____

B. ASSOCIATED EVIDENCE

B-1	**Clothing** (Describe in as much detail as possible):-		
	(a)	Details of Clothes including Undergarments	
	(b)	Colour of Clothes including Undergarments	
	(c)	Fabrics	
	(d)	Repairs/Patches	
	(e)	Dhobi Marks	
	(e)	Tailor's Labels / Brand Names	
B-2	**Footwear** (Describe in as much detail as possible):-		
	(a)	Type (Boots/Shoes/Sandals/Chappals)	
	(b)	Colour	
	(c)	Size	
	(d)	Brand	
B-3	**Eyewear** (Describe in as much detail as possible):-		
	(a)	Colour/Shape	
	(b)	Contact Lenses	
B-4	**Personal Items** (Describe in as much detail as possible):-		
	(a)	Wrist Watch	
	(b)	Jewellery	
	(c)	Wallet	
	(d)	Keys	
	(e)	Photographs	
	(f)	Mobile Phone (including number)	
	(g)	Medication	
	(h)	Cigarettes/Bidis	
	(i)	Any other	

ANNEXURE 3

MISSING PERSON FORM

	Missing Person Number (MP No.)/ Missing Person Code (MP Code): (Use Individual Identification Numbering & endorse it on associated Files, Photographs, or Stored Objects)
	Interviewer's Personal Particulars:- Personal No.: Rank: Name: Address: Telephone No.: Mobile No.: E-mail ID:
	Interviewee(s) Name (s):
	Interviewee's Relationship with Missing Person:
	Interviewee's Contact Details:- Address: Telephone No.: Mobile No.: E-mail ID:
	Contact person for Missing Person, if different from above:- (who to contact in case of news: Name & Contact details)

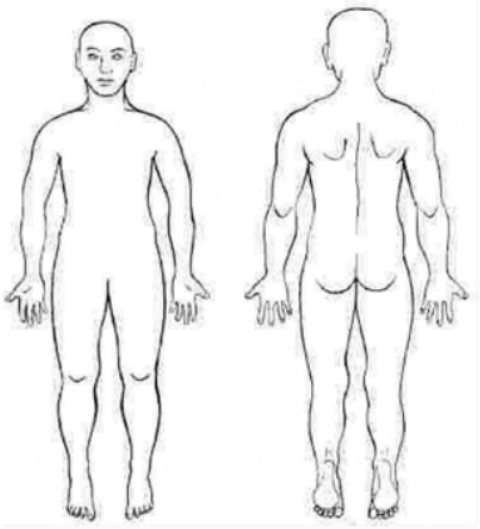
MP No. / MP Code: _____

A.	PERSONAL DETAILS:-				
A-1	Missing Person's Name				
A-2	Address:-				
	(a) Current				
	(b) Permanent				
A-3	Sex (Tick mark as applicable) :-				
	Male:		Female:		
A-4	Date of Birth				
A-5	Age				
A-6	Marital Status (Tick mark as applicable) :-				
	Single:	Married:	Divorced:	Widowed:	
A-7	If Female :-				
	(a)	Maiden Name			
	(b)	Pregnant	Yes:	No:	
	(c)	Children	Yes:	How Many?	No:
A-8	Place of Birth				
A-9	Mother Tongue				
A-10	Religion				
A-11	Occupation				
A-12	Nationality				
A-13	Identity documents:- (Take Photocopy if possible & Describe the information contained):-				
	(a)	Identity Card			
	(b)	Driving Licence			
	(c)	Voter Identity Card			
	(d)	Credit/Debit Card			
	(e)	PAN Card			
	(f)	Any other			

MP No. / MP Code: _____

B.	EVENT :-				
B-1	Circumstances leading to disappearance:- (Use additional sheet if necessary)				
	(a)	Place			
	(b)	Date			
	(c)	Time			
	(d)	Events leading to disappearance			
	(e)	Other Victims & Witnesses who last saw Missing Person alive:- (Including Name & Address)			
			Name	Address	
		i			
		ii			
		iii			
		iv			
		v			
	(f)	Has this case been registered / denounced elsewhere?			
		Yes	No	With whom/where	
B-2	Are other family members missing, and if so, have they been registered/ identified:-				
		Name	Relationship	Status	Address
	(a)				
	(b)				
	(c)				
	(d)				
	(e)				

C-6



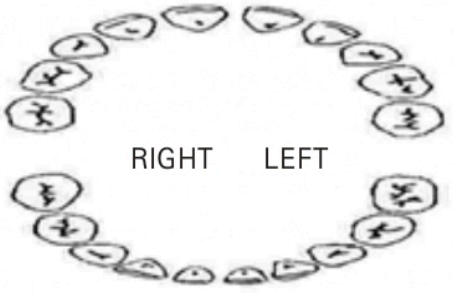
(c)	Past Injuries/Amputations:- (Location, side, fractured bone, joint & if the person limped)		
(d)	Other Major Medical Conditions:-		
	i	Operations	
	ii	Diseases	
	iii	Any Other	
(e)	Implants:-		
	i	Pacemaker	
	ii	Artificial Hip	
	iii	IUD	
	iv	Prosthesis	
	v	Metal plates or screws from operation	
	vi	Any Other	
(f)	Types of Medication used at the time of disappearance		

MP No. / MP Code: _____

C-7	Dental status:-		
	(a)	Dental condition:-	
		Please describe the general characteristic especially taking into account the following :-	
		i	Missing Teeth
		ii	Broken Teeth
		iii	Decayed Teeth
		iv	Discolorations (Disease, smoking, Pan, Tobacco, or Betel Nut
		v	Gaps between teeth
		vi	Crowded or crooked (overlapping teeth)
		vii	Jaw Inflammation
		viii	Adornments (inlays, filed teeth, etc)
		ix	Any other special feature
	(b)	Dental treatment:-	
		i	Crowns such as gold-capped teeth
		ii	Colour : gold, silver, white
		iii	Fillings including colour, if known
		iv	False teeth (Dentures) : Upper / Lower
		v	Bridge or other special dental treatment
		vi	Extraction
	(c)	Indicate the described features in the Chart below :-	

BABY/PRIMARY TEETH

TOP

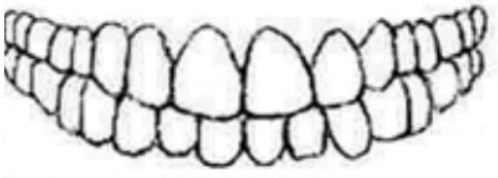


BOTTOM

ADULT/PERMANENT TEETH

TOP

RIGHT LEFT



BOTTOM

MP No. / MP Code: _____

D.	PERSONAL EFFECTS :-					
D-1	**Clothing** (Worn when last seen/at time of disaster : describe in as much detail as possible):-					
	(a)	Type of Clothes				
	(b)	Colours				
	(c)	Fabrics				
	(d)	Repairs/Patches				
	(e)	Brand Names/Tailor's Labels				
D-2	**Footwear** (Worn when last seen/at time of disaster : describe in as much detail as possible):-					
	(a)	Type	Boot	Shoes	Sandals	Chappals
	(b)	Colour				
	(c)	Size				
	(d)	Brand				
D-3	**Eyewear** (Worn when last seen/at time of disaster : describe in as much detail as possible):-					
	(a)	Glasses				
		i	Colour			
		ii	Shape			
	(b)	Contact lenses				
D-4	**Personal Items** (Describe in as much detail as possible):-					
	(a)	Wrist Watch				
	(b)	Jewellery				
	(c)	Wallet				
	(d)	Keys				
	(e)	Photographs				
	(f)	Mobile Phones (including number)				
	(g)	Medication				
	(h)	Cigarettes/Cigars/Pipe/Bidies				
	(i)	Tobacco Pouch/Betel Nut				
	(j)	Any other				
D-5	**Habits** (Please describe including quantity):-					
	(a)	Smoker :-				
		Cigarettes	Cigars	Pipes	Bidies	
	(b)	Chewing :-				
		Tobacco	Betel Nut :-			
	(c)	Alcohol				
	(d)	Any other				

MP No. / MP Code: _____

D.	PERSONAL EFFECTS :-	
D-6	**Identity Documents** (which the person was/might have been carrying when last seen/at time of disaster; Take photocopy if possible - describe the information contained):-	
	(a) Identity Card	
	(b) Driving Licence	
	(c) Voter Identity Card	
	(d) Credit/Debit Card	
	(e) PAN Card	
	(f) Any Other	
D-7	Past Medical History:-	
	(a) Details of Doctor, dentist, optometrist, or other	
	(b) Medical Records	
	(c) Dental Records	
	(d) X-rays	
D-8	**Photographs of Missing person** (If available, enclose photographs or copies of photographs as recent and clear as possible, ideally smiling with teeth visible & also photographs of clothing worn when disappeared):-	

Note : 1. The information collected in this form will be used for the search and identification of the missing person.
2. Its content is confidential and any use outside of the intended context will need explicit consent by the interviewee.
3. If requested, a copy of this Form with contact details of Interviewer will be made available to the Interviewee.

Place & Date of interview _____

Interviewer's Signature _____ Interviewee's Signature _____

Adapted from *Guidelines for First Responders on Management of the Dead in Major Disasters in India*, published by International Committee of the Red Cross Indian Delegation, New Delhi, pp. 53-57.