TRAINING MODULE

Project

Virtual Cadre for Disaster Risk Reduction

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Training Module
for Health Department on Disaster Risk Reduction

Prepared under the
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Project Background

 Kerala is prone to natural disasters and the changing climatic dynamics given its location along the seacoast and with a steep gradient along the slopes of the Western Ghats. The floods and landslides destroyed public and private infrastructure, including houses, roads, bridges, schools, health facilities, and other utility services and seriously influenced the production sectors. However, the recent floods in Kerala highlighted the need for a robust preparedness, response and recovery mechanism to mitigate impacts of disasters. Considering the vulnerability of the state to disasters, highlighted in the disaster management plan of the state, disaster preparedness assumes high priority. Building capacities of individuals and institutions goes a long way towards preparedness. There is a growing global consensus on the need to invest in disaster risk mitigation, with a focus on mainstreaming mitigation into sustainable development. Coastal states are particularly vulnerable to disasters due to growth of population in unsafe areas, climate change, environmental degradation and lack of local capacities. The Section 38(2) (g) of the Disaster Management Act mandates the preparation of departmental Disaster Management Plans and Section 39 to integrate measures of disaster preparedness and mitigation in developmental plans in accordance with the NDMA and SDMA guidelines. However, the departments do not have the needed expertise to prepare Disaster Management Plans and the Disaster mitigation concerns are not integrated in the developmental plans. The Virtual Cadre once full capacitated will be able to support the departments in doing the above-mentioned tasks. Keeping the above at forefront, UNDP is implementing the project titled "Capacity Development of Virtual Cadre Officials of Kerala." The project is being implemented by SEEDS Technical Services Pvt. Ltd. The main objective is to build and strengthen the capacity of virtual cadre officials at state and district level for acting as champions in the area of disaster preparedness and management, eight departments of state government has been selected to provide training on different areas specific to their department in the context of any emergency. This study will involve both formative research to assess and identify training and capacity needs; and the creation of a framework, strategy and plan to effectively address those needs.

Objective

Develop capacities of the departmental virtual cadre of officials at district and state level to act as DRR champions.

Role definition for Virtual Cadre Officials for Disaster Management in Kerala

The Kerala State Disaster management Plan (SDMP) 2016 recommends that the State Government shall ensure that there is a professionally trained virtual cadre of officers in all the departments of the State for disaster management. The virtual cadre will principally be 15 selected individuals (one each in each district and one in the State level) with at least 20 years more of service left. The members of this virtual cadre shall be the departmental nodal officers for disaster management who shall be as individuals responsible for supporting the

district and state disaster management authorities in disaster management. The KSDMA will ensure that these individuals are adequately trained in matters related to disaster management. These officers shall be trained in rapid damage assessment and certification in the respective sector. The disaster-specific nodal departments through this virtual cadre will ensure liaison and coordination with KSDMA and DDMAs in the smooth implementation of the departmental disaster management plan and with SEOC and DEOCs for ensuring coordinated response to events.

Selected Departments of Kerala under the Project

Agriculture: Around 52% of Kerala's geographical area is under cultivation. Being the spice capital of India, Kerala accounts for 89% of total small cardamom and 98% of total nutmeg production in the country. The state also accounts for 34% of total pepper production. Agriculture along with livestock and fisheries contributes to 11% of the Gross State Value Addition (GVSA) at current prices. In Kerala, 17.15% of the population depends on agriculture. The lowest regions of midland plains host paddy fields and the elevated land slopes has rubber and fruit trees along with black pepper, tapioca and other crops. The coastal belt of Kerala is flat with paddy fields, coconut trees and by a network of interconnected canals and rivers.

Animal Husbandry: Around 8.8 million households in Kerala are involved in animal husbandry and nearly 94% of the livestock population is concentrated in rural areas. In the subsector of animal husbandry and dairy development, Alappuzha, Kottayam, Pathanamthitta, Ernakulam, and Thrissur districts suffered the most in the 2018 floods. The share of livestock in Kerala's GSVA is 3.84%.

Mining and Geology: Kerala State is endowed with a number of occurrences/deposits of minerals. The contribution of mining and quarrying sector to Gross State Value Added (GSVA) of Kerala at constant prices is estimated at ₹3,658 crore in 2017-18.

Minor Irrigation: Minor Irrigation departments lifts the schemes, that having a Cultivable Command Area (CCA) up to 2,000 ha. Minor irrigation scheme comprises of surface water schemes like minor irrigation tanks and canal systems, diversion weirs, lift irrigation schemes and sub-surface schemes.

Health: Kerala has made significant gains in health indices such as high life expectancy, low infant mortality rate, birth rate, and death rate. The health status of the marginalised communities like adivasis and fishing workers is also poor compared to that of the general population. Also, 70% of Kerala's healthcare is privately provided, which is making it expensive. In addition, the number of disaster incidents are increasing causing loss of lives and affects a large number of people.

Water Authority: The Kerala Water Authority (KWA) is the primary institution for the development and regulation of water supply and wastewater collection and disposal in Kerala. There are 1081 schemes under Kerala Water Authority in total and have a total installed capacity of 3468 MLD. The per capita availability through the KWA schemes is 176 LPCD.

Land Revenues: The largest department under the Government, with more than 19000 employees, also known as the "Mother of All Departments". Some of the major functions of the department are collection of basic tax, plantation tax, building tax, etc., land/mineral conservancy, census, election, natural calamity operations, redressing grievances of citizens, law and order, distribution of social welfare pensions etc. Although this is also getting affected from the disasters occurred in the state. A total of 342 landslides occurred in the Revenue Department marked land extents.

Soil Conservation: This is one of the important department, which plan, promote, coordinate and oversee the implementation of soil and water conservation programmes with an aim to conserve the valuable resource trinity of soil, water and biomass in a sustainable manner ensuring active participation of all stakeholders.

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Chapter 1
Introduction to Disaster Management

What is disaster management?

We act before, during and after disasters strike, often helping in some of the world's most hostile environments. Our disaster management activities seek to:

1. Save lives and reduce human suffering
2. Protect and restore livelihoods
3. Reduce the risks faced by communities affected by disaster and conflict.

Disaster Management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies; in particular – mitigation, preparedness, response, and recovery in order to lessen the impact of disasters.[1]

Definition of Key Terms

Build back better

The use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies and the environment.

Capacity

The combination of all the strengths, attributes and resources available within an organization, community or society to manage and reduce disaster risks and strengthen resilience.

Annotation: Capacity may include infrastructure, institutions, human knowledge and skills, and collective attributes such as social relationships, leadership and management.

Coping Capacity is the ability of people, organizations and systems, using available skills and resources, to manage adverse conditions, risk or disasters. The capacity to cope requires continuing awareness, resources and good management, both in normal times as well as during disasters or adverse conditions. Coping capacities contribute to the reduction of disaster risks.

Contingency planning

A management process that analyses disaster risks and establishes arrangements in advance to enable timely, effective and appropriate responses. Contingency planning is an important part of overall preparedness. Contingency plans need to be regularly updated and exercised.

Annotation: Contingency planning results in organized and coordinated courses of action with clearly identified institutional roles and resources, information processes and operational arrangements for specific actors at times of need. Based on scenarios of possible emergency conditions or hazardous events, it allows key actors to envision, anticipate and solve problems that can arise during disasters.

Critical infrastructure

The physical structures, facilities, networks and other assets which provide services that are essential to the social and economic functioning of a community or society.

Disaster

A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.

Disaster management

The organization, planning and application of measures preparing for, responding to and recovering from disasters.

Annotation: Disaster management may not completely avert or eliminate the threats; it focuses on creating and implementing preparedness and other plans to decrease the impact of disasters and "build back better". Failure to create and apply a plan could lead to damage to life, assets and lost revenue.

Disaster risk

The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.

Disaster risk management

Disaster risk management is the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses.

Community-based disaster risk management promotes the involvement of potentially affected communities in disaster risk management at the local level. This includes community assessments of hazards, vulnerabilities and capacities, and their involvement in planning, implementation, monitoring and evaluation of local action for disaster risk reduction.

Disaster risk reduction

Disaster risk reduction is aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development.

Early warning system

An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events.

Multi-hazard early warning systems

These systems address several hazards and/or impacts of similar or different type in contexts where hazardous events may occur alone, simultaneously, cascading or cumulatively over time, and considering the potential interrelated effects. A multi-hazard early warning system with the ability to warn of one or more hazards increases the efficiency and consistency of warnings through coordinated and compatible mechanisms and capacities, involving multiple disciplines for updated and accurate hazards identification and monitoring for multiple hazards.

Evacuation

Moving people and assets temporarily to safer places before, during or after the occurrence of a hazardous event in order to protect them.

Exposure

The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.

Hazard

A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.

Multi-hazard means (1) the selection of multiple major hazards that the country faces, and (2) the specific contexts where hazardous events may occur simultaneously, cascading or cumulatively over time, and considering the potential interrelated effects.

Hazards include (as mentioned in the Sendai Framework for Disaster Risk Reduction 2015-2030, and listed in alphabetical order) biological, environmental, geological, hydrometeorological and technological processes and phenomena.

Mitigation

The lessening or minimizing of the adverse impacts of a hazardous event.

Annotation: The adverse impacts of hazards, in particular natural hazards, often cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions. Mitigation measures include engineering techniques and hazard-resistant construction as well as improved environmental and social policies and public awareness. It should be noted that, in climate change policy, "mitigation" is defined differently, and is the term used for the reduction of greenhouse gas emissions that are the source of climate change.

Preparedness

The knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters.

Prevention

Activities and measures to avoid existing and new disaster risks.

Annotations: Prevention (i.e., disaster prevention) expresses the concept and intention to completely avoid potential adverse impacts of hazardous events. While certain disaster risks cannot be eliminated, prevention aims at reducing vulnerability and exposure in such contexts where, as a result, the risk of disaster is removed. Examples include dams or embankments that eliminate flood risks, land-use regulations that do not permit any settlement in high-risk zones, seismic engineering designs that ensure the survival and function of a critical building in any likely earthquake and immunization against vaccine-preventable diseases. Prevention measures can also be taken during or after a hazardous event or disaster to prevent secondary hazards or their consequences, such as measures to prevent the contamination of water.

Reconstruction

The medium- and long-term rebuilding and sustainable restoration of resilient critical infrastructures, services, housing, facilities and livelihoods required for the full functioning of a community or a society affected by a disaster, aligning with the principles of sustainable development and "build back better", to avoid or reduce future disaster risk.

Recovery

The restoring or improving of livelihoods and health, as well as economic, physical, social, cultural and environmental assets, systems and activities, of a disaster-affected community or society, aligning with the principles of sustainable development and "build back better", to avoid or reduce future disaster risk.

Rehabilitation

The restoration of basic services and facilities for the functioning of a community or a society affected by a disaster.

Resilience

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management.

Response

Actions taken directly before, during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.

Annotation: Disaster response is predominantly focused on immediate and short-term needs and is sometimes called disaster relief. Effective, efficient and timely response relies on disaster risk-informed preparedness measures, including the development of the response capacities of individuals, communities, organizations, countries and the international community.

Photograph © SEEDS/Siddharth Behl

Retrofitting

Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards.

Annotation: Retrofitting requires consideration of the design and function of the structure, the stresses that the structure may be subject to from hazards or hazard scenarios and the practicality and costs of different retrofitting options. Examples of retrofitting include adding bracing to stiffen walls, reinforcing pillars, adding steel ties between walls and roofs, installing shutters on windows and improving the protection of important facilities and equipment.

Risk transfer

The process of formally or informally shifting the financial consequences of particular risks from one party to another, whereby a household, community, enterprise or State authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.

Annotation: Insurance is a well-known form of risk transfer, where coverage of a risk is obtained from an insurer in exchange for ongoing premiums paid to the insurer. Risk transfer can occur informally within family and community networks where there are reciprocal expectations of mutual aid by means of gifts or credit, as well as formally, wherein governments, insurers, multilateral banks and other large risk-bearing entities establish mechanisms to help cope with losses in major events. Such mechanisms include insurance and reinsurance contracts, catastrophe bonds, contingent credit facilities and reserve funds, where the costs are covered by premiums, investor contributions, interest rates and past savings, respectively.

Structural and non-structural measures

Structural measures are any physical construction to reduce or avoid possible impacts of hazards, or the application of engineering techniques or technology to achieve hazard resistance and resilience in structures or systems. Non-structural measures are measures not involving physical construction which use knowledge, practice or agreement to reduce disaster risks and impacts, through policies and laws, public awareness raising, training and education.

Underlying disaster risk drivers

Processes or conditions, often development-related, that influence the level of disaster risk by increasing levels of exposure and vulnerability or reducing capacity.

Annotation: Underlying disaster risk drivers — also referred to as underlying disaster risk factors — include poverty and inequality, climate change and variability, unplanned and rapid urbanization and the lack of disaster risk considerations in land management and environmental and natural resource management, as well as compounding factors such as

demographic change, non-disaster risk-informed policies, the lack of regulations and incentives for private disaster risk reduction investment, complex supply chains, the limited availability of technology, unsustainable uses of natural resources, declining ecosystems, pandemics and epidemics.

Vulnerability

The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.

History of Disaster Management in India

Disaster Management during British Administration and Post-Independence

During the British administration, relief departments were set up for emergencies during disasters. The policy was relief-oriented, and activities included designing the relief codes and initialising food for work programmes. Post-Independence, the task for managing disasters continued to rest with the Relief Commissioners in each state, who functioned under the Central Relief Commissioner, with their role limited to delegation of relief material and money.

Emergence of Institutional Arrangement in India

A permanent and institutionalised setup began in the decade of 1990s with set up of a disaster management cell under the Ministry of Agriculture. Following series of disasters such as Latur Earthquake (1993), Malpa Landslide (1994), Orissa Super Cyclone (1999) and Bhuj Earthquake (2001), a high powered Committee under the Chairmanship of Mr. J.C. Pant, Secretary, Ministry of Agriculture was constituted for drawing up a systematic, comprehensive and holistic approach towards disasters. There was a shift in policy from an approach of relief through financial aid to a holistic one for addressing disaster management. Consequently, the disaster management division was shifted under the Ministry of Home Affairs in 2002 vide Cabinet Secretariat's Notification No. DOC.CD-108/2002 dated 27/02/2002 and a hierarchical structure for disaster management evolved in India.

Present Structure for Disaster Management in India

The institutional structure for disaster management in India is in a state of transition. The National Disaster Management Authority has been established at the centre, and the SDMA at state and district authorities at district level are gradually being formalized. In addition to this, the National Crisis Management Committee, part of the earlier setup, also functions at the Centre. The nodal ministries, as identified for different disaster types of function under the overall guidance of the Ministry of Home Affairs (nodal ministry for disaster

management). This makes the stakeholders interact at different levels within the disaster management framework.

Within this transitional and evolving setup, two distinct features of the institutional structure for disaster management may be noticed. Firstly, the structure is hierarchical and functions at four levels – centre, state, district and local. In both the setups – one that existed prior to the implementation of the Act, and other that is being formalized post-implementation of the Act, there have existed institutionalized structures at the centre, state, district and local levels. Each preceding level guides the activities and decision making at the next level in hierarchy. Secondly, it is a multi-stakeholder setup, i.e., the structure draws involvement of various relevant ministries, government departments and administrative bodies.

Disaster Management Act, 2005

This Act provides for the effective management of disaster and for matters connected therewith or incidental thereto. It provides institutional mechanisms for drawing up and monitoring the implementation of the disaster management. The Act also ensures measures by the various wings of the Government for prevention and mitigation of disasters and prompt response to any disaster situation.

The Act provides for setting up of a National Disaster Management Authority (NDMA) under the Chairmanship of the Prime Minister, State Disaster Management Authorities (SDMAs) under the Chairmanship of the Chief Ministers, District Disaster Management Authorities (DDMAs) under the Chairmanship of Collectors/District Magistrates/Deputy Commissioners. The Act further provides for the constitution of different Executive Committee at national and state levels. Under its aegis, the National Institute of Disaster Management (NIDM) for capacity building and National Disaster Response Force (NDRF) for response purpose have been set up. It also mandates the concerned Ministries and Departments to draw up their own plans in accordance with the National Plan. The Act further contains the provisions for financial mechanisms such as creation of funds for response, National Disaster Mitigation Fund and similar funds at the state and district levels for the purpose of disaster management. The Act also provides specific roles to local bodies in disaster management.

Institutional Bodies

National Disaster Management Authority (NDMA)

The National Disaster Management Authority (NDMA) was initially constituted on May 30, 2005 under the Chairmanship of Prime Minister vide an executive order. Following enactment of the Disaster Management Act, 2005, the NDMA was formally constituted in accordance with Section-3(1) of the Act on 27th September 2006 with Prime Minister as its Chairperson and nine other members, and one such member to be designated as Vice-Chairperson. Details of these responsibilities are given as under:

1. Lay down policies on disaster management;
2. Approve the National Plan;
3. Approve plans prepared by the Ministries or Departments of the Government of India in accordance with the National Plan;
4. Lay down guidelines to be followed by the State Authorities in drawing up the State Plan
5. Lay down guidelines to be followed by the different Ministries or Departments of the Government of India for the purpose of integrating the measures for prevention of disaster or the mitigation of its effects in their development plans and projects;
6. Coordinate the enforcement and implementation of the policy and plan for disaster management;
7. Recommend provision of funds for the purpose of mitigation;
8. Provide such support to other countries affected by major disasters as may be determined by the Central Government;
9. Take such other measures for the prevention of disaster, or the mitigation, or preparedness and capacity building for dealing with the threatening disaster situation or disaster as it may consider necessary;
10. Lay down broad policies and guidelines for the functioning of the National Institute of Disaster Management.

National Executive Committee (NEC)

National Executive Committee is constituted under Section 8 of DM Act, 2005 to assist the National Authority in the performance of its functions.

NATIONAL DISASTER MANAGEMENT STRUCTURE
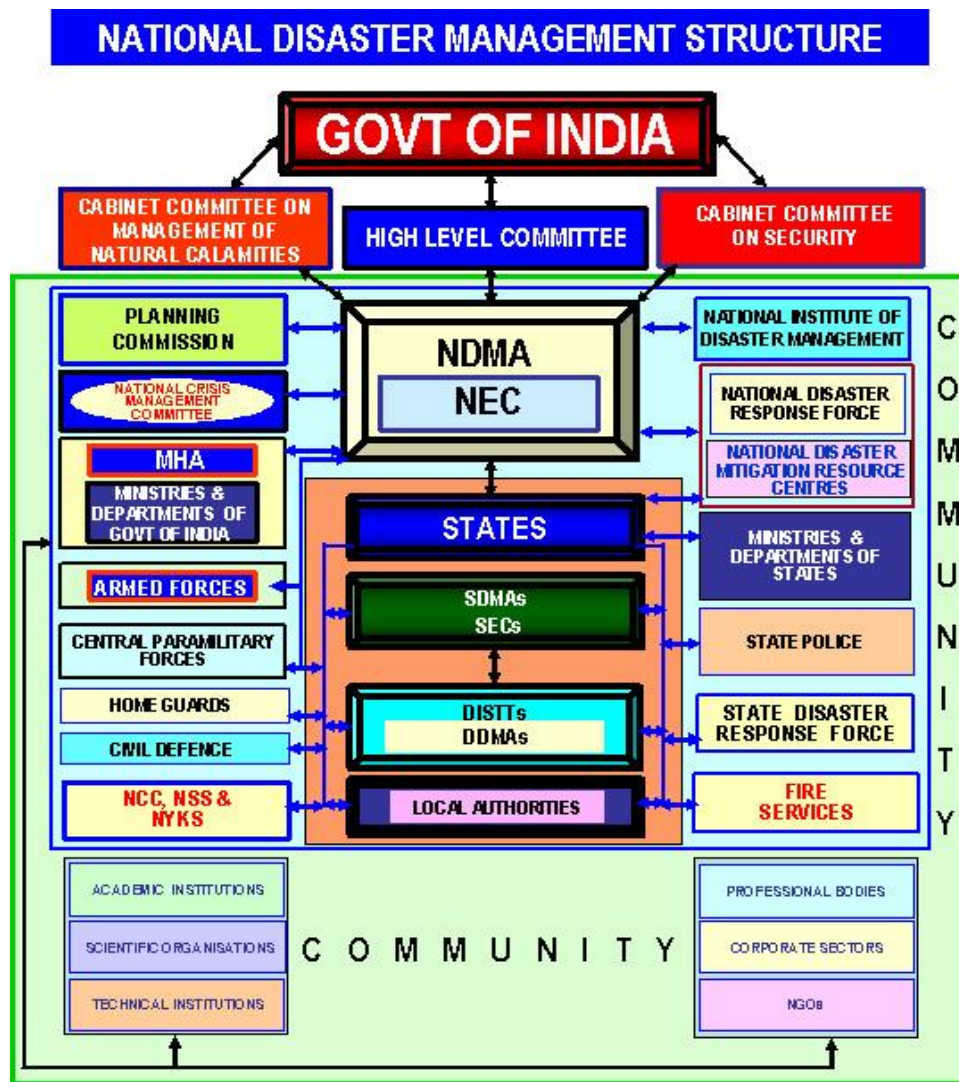
State level Institutions

State Disaster Management Authority (SDMA) The DM Act, 2005 provides for constitution of SDMAs and DDMAs in all the states and UTs.

District level Institutions

District Disaster Management Authority (DDMA)

Section 25 of the DM Act provides for constitution of DDMA for every district of a state. The District Magistrate / District Collector/ Deputy Commissioner heads the Authority as Chairperson besides an elected representative of the local authority as Co-Chairperson except in the tribal areas where the Chief Executive Member of the District Council of Autonomous District is designated as Co-Chairperson. Further in district, where Zila Parishad exist, its Chairperson shall be the Co-Chairperson of DDMA.

The District Authority is responsible for planning, coordination and implementation of disaster management and to take such measures for disaster management as provided in the guidelines. The District Authority also has the power to examine the construction in any area in the district to enforce the safety standards and to arrange for relief measures and respond to the disaster at the district level.

International Frameworks

The Hyogo Framework for Action 2005-2015

The Hyogo Framework for Action (HFA): Building the Resilience of Nations and Communities to Disasters has been the first plan to explain, describe and detail the work that is required from all different sectors and actors to reduce disaster losses. It was developed and agreed on with the many partners needed to reduce disaster risk – governments, international agencies, disaster experts and many others- bringing them into a common system of coordination. The HFA guidelines five priorities for action and offers guiding principles and practical means for achieving disaster resilience. Its goal was to substantially reduce disaster losses by 2015 by building the resilience of nations and communities to disasters. This means reducing loss of lives and social, economic and environmental assets when hazards strike.[2]

In January 2005, 168 Governments adopted a 10-year plan to make the world safer from natural hazards at the World Conference on Disaster Reduction, held in Kobe, Hyogo, Japan. The Hyogo Framework is a global blueprint for disaster risk reduction efforts during the next decade. Its goal is to substantially reduce disaster losses by 2015 - in lives, and in the social, economic, and environmental assets of communities and countries. The Framework offers guiding principles, priorities for action, and practical means for achieving disaster resilience for vulnerable communities.

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.
2. Identify, assess, and monitor disaster risks - and enhance early warning.
3. Use knowledge, innovation, and education to build a culture of safety and resilience at all levels.
4. Reduce the underlying risk factors.
5. Strengthen disaster preparedness for effective response at all levels.[3]

Sendai Framework for Disaster Risk Reduction

The Sendai Framework is a 15-year, voluntary, non-binding agreement which recognizes that the Government has the primary role to reduce disaster risk, but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. It aims for the following outcome:

The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries. The Sendai Framework is the successor instrument to the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters. It is the outcome of stakeholder consultations initiated in March 2012 and inter-governmental negotiations held from July 2014 to March 2015, which were supported by the UNISDR upon the request of the UN General Assembly.

The Four Priorities for Action Plans

Priority 1. Understanding disaster risk

Disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowledge can be used for risk assessment, prevention, mitigation, preparedness and response.

Priority 2. Strengthening disaster risk governance to manage disaster risk

Disaster risk governance at the national, regional and global levels is very important for prevention, mitigation, preparedness, response, recovery, and rehabilitation. It fosters collaboration and partnership.

Priority 3. Investing in disaster risk reduction for resilience

Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment.

Priority 4. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction

The growth of disaster risk means there is a need to strengthen disaster preparedness for response, take action in anticipation of events, and ensure capacities are in place for effective response and recovery at all levels. The recovery, rehabilitation and reconstruction phase are a critical opportunity to build back better, including through integrating disaster risk reduction into development measures.

Chapter 2
Disaster Management Cycle

Important terms

Disaster

A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.

Emergency

It is sometimes used interchangeably with the term disaster, as, for example, in the context of biological and technological hazards or health emergencies, which, however, can also relate to hazardous events that do not result in the serious disruption of the functioning of a community or society.

Disaster management

The organization, planning and application of measures preparing for, responding to and recovering from disasters. it focuses on creating and implementing preparedness and other plans to decrease the impact of disasters and "build back better". Failure to create and apply a plan could lead to damage to life, assets and lost revenue.

Hazard

A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. Hazards may be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, intensity or magnitude, frequency and probability.

Disaster risk

The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.[4]

Approach

A holistic and integrated approach will be evolved towards disaster management with emphasis on building strategic partnerships at various levels. The themes underpinning the disaster management policy are:

(1) Community based DM, including last mile integration of the policy, plans and execution.
(2) Capacity development in all spheres.
(3) Consolidation of past initiatives and best practices.
(4) Cooperation with agencies at national and international levels.
(5) Multi-sectoral synergy.[5]

Goals of Disaster Management:

(1) Reduce, or avoid, losses from hazards;
(2) Assure prompt assistance to victims;
(3) Achieve rapid and effective recovery.

Source: http://www.gdrc.org/uem/disasters/1-dm_cycle.html

Phases of Disaster Management cycle

Since World War II emergency management has focused primarily on preparedness. Often this involved preparing for enemy attack. Community preparedness for all disasters requires identifying resources and expertise in advance and planning how these can be used in a disaster. However, preparedness is only one phase of emergency management.6

The Disaster management cycle illustrates the ongoing process by which governments, businesses, and civil society plan for and reduce the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster has occurred.

Current thinking defines five phases of disaster management cycle:

Disaster Management Cycle

Disaster Strikes A sudden calamitous event bringing great damage, loss, or destruction	In November 1977, the South Indian state of Andhra Pradesh was hit by a devastating cyclone with a wind speed of over 200 kmph. The accompanying storm surge wiped out over 90 villages lying along the coastal belt. It left behind over 10,000 dead, many more injured and total economic loss of 378 crore rupees. Andhra Pradesh, situated on the east coast of India has a 1,030 km coastline, which is highly vulnerable to cyclones. Situated along the coastline are more than 2,500 villages with a population in excess of 6 million.
Emergency Response Actions taken to save lives and prevent further property damage in an emergency.	Immediately after the cyclone, as an immediate response, the government and NGOs extended relief to the affected people. This included search & rescue, water, medicines, food and temporary shelter in relief camps and tents
Rehabilitation Actions taken to return to a normal or an even safer situation following an emergency.	Soon after the initial relief phase, rehabilitation initiatives were taken up by Government and NGOs. Roads, permanent houses, and water, power and communication networks were restored. This also included economic rehabilitation through livelihood support. The union government provided 3.11 crore rupees to small and marginal farmers and workers for their recovery. Over 1.1 crore rupees were sanctioned for irrigation, municipal development and Panchayat Raj.
Mitigation Activities that prevent an emergency, reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable emergencies.	If effective prevention and preparedness measures are implemented, disasters can be avoided by limiting the adverse impact of inevitable natural phenomenon. The development phase that followed the rehabilitation incorporated measures to reduce the impact of future cyclones. Villagers were relocated to safer lands; plantation was promoted, and cyclone resistant construction technologies were practised.
Preparedness Plans or preparations made to save lives and to help response and rescue operations.	After the cyclone, more emphasis was given on community preparedness measures by the government and NGOs. Village Task Forces were formed and trained, and cyclone shelters constructed. By 1990, 740 cyclone shelters were built in strategic locations. An additional 1,100 relief camps had the capacity to accommodate 650,000 people on short notice.

Kerala State Profile

Kerala, the Gods own country, it is popularly known, is a land blessed with natural resources. It is home to 3.44% of India's population. Kerala 's rate of population growth is India's lowest, and Kerala's population as per Census 2001 was 318.41 lakh consisting of 154.69 lakh males and 163.72 lakh females. Kerala's human development indices— primary level education, health care and elimination of poverty—are among the best in India. Kerala has one of the highest literacy rates (97.0%) among Indian states and life expectancy (73 years) was among the highest in India.[7]

Kerala State is vulnerable to a multitude of disasters and is categorized as a multi-hazard prone state. The state experiences various kinds of disasters of recurrent nature which result in loss of life, livelihood and property (public and private), and disruption of economic activity, besides causing immense misery and hardship to the affected population. The state experiences heavy rainfall and flood during the southwest monsoon, with subsequent damage to life and property. Drought conditions have also become more frequent during the pre-monsoon period.

Coastal erosion along the coastal areas is very severe, necessitating frequent evacuation and rehabilitation of the coastal people. Incidences of biological disasters such as epidemics, pest attack are also on the rise. Landslide or landslip is another hazard of the hilly regions of the state. The tsunami that struck Kerala Coast in 2004 has added a new dimension to the disaster scenario of the state.

The State is also vulnerable to cyclone and experiences high winds due to the westward movement of cyclonic storms. Kerala falls under earthquake Zone III makes the state vulnerable to earthquakes of magnitude of 6.5 or more. Possibilities of chemical and industrial disasters and disasters like dam burst also cannot be ruled out. The threat of Global Warming and its resultant climatic variations such as inter seasonal variations in rainfall, environmental issues and rise in sea level increase the vulnerability of the state.[8]

Need for Disaster Management Policy

While disasters cannot be completely avoided, the vulnerability to various hazards can be sustainably and substantially reduced by planned prevention, mitigation and preparedness measures. With this in view, the Kerala State Disaster Management Authority has formulated the 'Kerala State Disaster Management Policy'. The Disaster Management Policy calls for mechanism for coherence and alignment with existing policies of the government and future legislations.

POLICY LEGAL FRAMEWORK FOR DISASTER MANAGEMENT POLICY

Disaster Management Act, 2005
- The State Government, in line with National Disaster Management Act, 2005, has notified Kerala State Disaster Management Rules, 2007

Kerala State Disaster Management Policy
- Aims to establish an optimum system for dealing with disasters, avoiding disruption of economic activity and ensuring continuity in developmental activities

Kerala State Disaster Management Authority
- Apex decision-making body and facilitate, co-ordinate, review and monitor all disaster related activities in the state including capacity building.

State Nodal Departments and Crisis Management Groups
- Management of all types of natural disasters that include water and climate related disasters and geological disasters.
- Management of manmade and human induced disasters including air and rail accidents

Techno – Legal Frameworks
- The state government will follow national building codes. A Techno – Financial Framework consists of Disaster Risk Insurance through appropriate insurance instruments governed by effective regulatory frameworks.

Climate change and Disaster Risk Reduction

Climate change and climate-sensitive disasters, such as those resulting from hydrological, meteorological, biological and climatological hazards have significant and increasing impacts on human health. Climate change and climate-sensitive disasters impact health through common direct and indirect pathways potentially resulting in increased risk of death, disease and injury[9]

The recent disasters demonstrated the link between environment and disaster risk. While the floods cannot be exclusively attributed to climate change impact, climate change predictions do indeed forecast increases in rainfall intensity in Kerala in the years to come. Furthermore, coastal cities in Kerala are prone to waterlogging and flooding due to increased water inflow as well as sea level rise. The agriculture and related activities in Kuttanad, which is a below sea level area, are expected to be severely affected by climate change. So, regardless of whether the present event is linked to climate change, the floods of 2018 and the tropical cyclone Okhi before that serve as warnings about the extreme events which Kerala may

expect more frequently in a world with changing climate. Therefore, assessment of vulnerabilities and actions in climate change adaptation and mitigation should be integral to the 'New Kerala' being envisaged in the post-disaster setting.[10]

Action that addresses the interlinked challenges of disaster risk, sustainable development and climate change is a core priority given that 90% of recorded major disasters caused by natural hazards from 1995 to 2015 were linked to climate and weather including floods, storms, heatwaves and droughts. The five countries hit by the highest number of disasters were the United States (472), China (441), India (288), Philippines (274), and Indonesia, (163).

UNISDR (United Nations International Strategy for Disaster Reduction) is focused on the following:

(1) Achieving stronger recognition of disaster risk reduction and climate change adaptation as essential elements of climate risk management and sustainable development.
(2) Developing specific policies at the international level on the linkages between reducing disaster risk and responding to climate change
(3) Guiding national and regional action to integrate policies and practices and strengthening capacities to support the integration of disaster reduction and climate change by all actors.
(4) Enhance knowledge and understanding of comprehensive risk management approaches.[11]

Chapter 3
Hazards, Vulnerability Analysis of Kerala

Kerala State profile

Feature	Description
Area	38,863 km^2
Location	Graticule 8°18'N & 12°48'N and 74°52'E & 77°22'E
Rivers	44
Forest	11,266 km^2
Coastline	590 km
Population	3,33,87,677 (Census, 2011)
Male Population	1,60,21,290
Female Population	1,73,66,387
Population density	860 people/km^2
Population growth rate	4.9%
Districts	14
Taluks	75
Corporations	6
Municipalities	87
Villages	1664* (including group villages)
Lok Sabha Constituencies	20
Rajya Sabha Constituencies	9
Assembly Constituencies	140
Climate	Humid equatorial tropic climate; the dominant climatic phenomena being the monsoons called the South-West (June to September) and the North-East (October to December) monsoons, the former is more significant than the latter with an annual rainfall of 3104 mm mainly contributed by the South West Monsoon

Kerala is geographically bordered on the west by the Arabian Sea and the east by the Western Ghats. In its north is Karnataka State and to the east is Tamil Nadu State.

Kerala is multi-hazard prone. HDI (Human Development Index) being a composite index of consumption rate (proxy to purchasing power), education and health, is an indicator of the socio-economic vulnerability of the population. The higher the HDI, the higher is the coping capacity, but greater is the cumulative loss potential and thus a higher degree of risk.

Thus, Kerala has a higher degree of disaster risks as compared to the rest of the country. The Kerala State Disaster Management Plan (KSDMP) is an ever evolving document formulated under the Disaster Management Act, 2005 (DM Act, 2005) which establishes a multi stakeholder framework for the partnership of governmental entities, non-government agencies, private sector enterprises and individuals for Disaster Risk Reduction in the State.

Policy

In accordance with Section 18 (2) (a), the Kerala State Disaster Management Authority (KSDMA) has prepared the Kerala State Disaster Management Policy. The policy shall be revisited once in 10 years.

The KSDMP should deal with:

1. The vulnerability of different parts of the State to different forms of disasters
2. The measures to be adopted for prevention and mitigation of disasters
3. The way the mitigation measures shall be integrated with the development plans and projects
4. The capacity-building and preparedness measures to be taken

VULNERABILITY OF KERALA

What is HVRA (Hazard, vulnerability and risk assessment)

1. Combined process of quantifying the spatio-temporal return probabilities of various hazards
2. The expected degree of damage that a given element or set of elements-at-risk is exposed to
3. The expected monetary losses when a given area is exposed to hazards within a given period.

> **A disaster is when the threat of a hazard becomes reality and impacts a vulnerable society.**

Figure 2: Risk to disaster (van Westen, 2008)
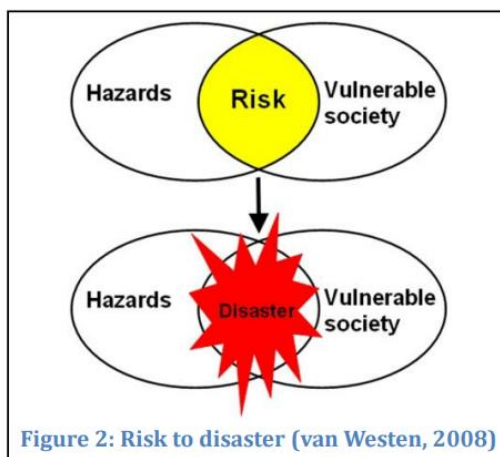
In the context of HVRA, the terms hazard, vulnerability and risk have specific definitions.

Hazard (H) is the probability of occurrence of a potentially damaging phenomenon within a specified period, within a given area. (for example, how to calculate the return probability of epidemics, road accidents, lightning strikes etc.)

Vulnerability (V) the degree of loss to a given element or set of elements-at-risk resulting from the occurrence of a natural phenomenon of a given magnitude. Usually expressed on a scale from 0 (no damage) to 1 (total damage).

Risk (R) the actual exposure of something of human value to a hazard, often expressed in monetary value/time. (For example, an ancestral temple, a tomb, a pregnant woman, etc.)

> **The universally accepted method for conducting HVRA follows the guiding formula:**
>
> # R = H * V * Amount
>
> **where, Amount is the monetary-value of the element(s)-at-risk**

Objective of HRVA

The primary objective of undertaking a HVRA is

1. To anticipate the potential hazards and possible mitigation measures to help save lives
2. Protect property, assets, reduce damage and facilitate a speedy recovery.

The HVRA helps the policy makers, administrators and the community to make risk-based choices to address vulnerabilities, mitigate hazards, and prepare for response to and recovery from hazard events. Further, in areas identified as potential hazard hotspots through HVRA, early warning systems that incorporate instrumented monitoring devices, high-end numerical predictive models and communication devices may be developed and deployed such that sufficient time may be made available to authorities for evacuation and implementing contingency measures in the eve of an impending disaster.

The World Bank has identified five key insights in the process of risk management which includes:

1. Taking on risks is necessary to pursue opportunities for development. The risk of inaction may well be the worst option of all
2. To confront risk successfully, it is essential to shift from unplanned and ad-hoc responses when crises occur to proactive, systematic, and integrated risk management
3. Identifying risks is not enough: the trade-offs and obstacles to risk management must also be identified, prioritized and addressed through private and public action
4. For risks beyond the means of individuals to handle alone, risk management requires shared action and responsibility at different levels of society, from the household to the international community
5. Governments have a critical role in managing systemic risks, providing an enabling environment for shared action and responsibility, and channelling direct support to vulnerable people

Thus, it is reiterated that HVRA alone will not ensure a safe society, but it is the first step towards ensuring a disaster sensitive development plan which can ensure coordinated public and private action for disaster risk reduction.

Hazard profile of Kerala

Kerala state is frequently ravaged by the disastrous consequences of numerous hazards and hence it is a multi-hazard prone State. Natural hazards are part of the natural evolutionary system of the earth which turned into 'hazards' when the human system started interacting with it. The human system itself was subjected to significant transformations over its history. These transformations and their links to the natural system have served as templates of the dynamics of naturally triggered hazards and therefore, of disasters.

Parallel to this societal transformation, the population pressure along the coastline forced the then marginalized sections of the community to migrate from the coastal belt to the relatively inhospitable terrain of the Western Ghats (George and Chattopadhyay, 2001). A study conducted on migration suggested that in the past 80 years the coastal plains recorded a population growth of 306%, whereas the highlands, foothills and uplands together experienced a growth of 1342%.
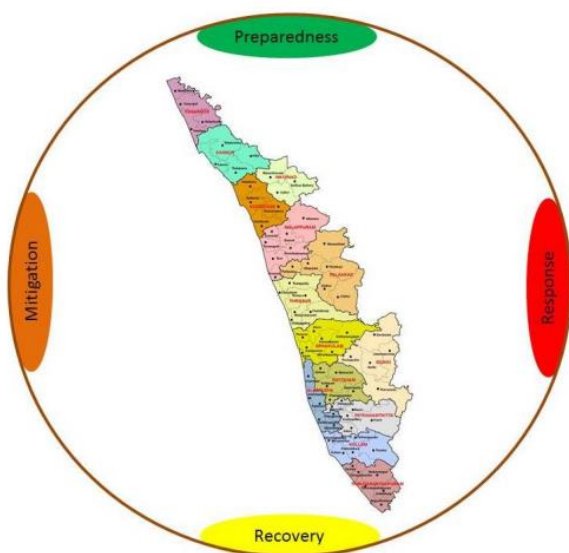
Kerala is prone to high incidence of lightning, especially during the months of April, May, October and November. Apart from floods the mountain regions of the state experience several landslides during the monsoon season. It is known that a total of 65 fatal landslides occurred between 1961 and 2009 causing the death of 257 individuals (Kuriakose, 2010). Between 1871 and 2000, the state experienced 12 moderate drought years. The 570 km long coastline of Kerala is prone to erosion, monsoon storm surges and sea level rise. Land subsidence due to tunnel erosion or soil piping, which is a slow hazard, is recently noticed to be affecting the hilly areas in the state.

KSDMP identifies thirty nine (39) phenomena with potential to cause disasters requiring L2 attention that the state is susceptible to and they are grouped under two categories based on the major triggering factors, they being Naturally Triggered Hazards (Natural Hazards) and Anthropogenically Triggered Hazards (Anthropogenic Hazards). Not all these hazards turn into disasters that are 'beyond the coping capacity of the community of the affected area'.[12]

Role definition aligned with Kerala SDMP 2016

The Kerala State Disaster management Plan (SDMP) 2016 recommends that the State Government shall ensure that there is a professionally trained virtual cadre of officers in all the departments of the State for disaster management. The virtual cadre will principally be 15 selected individuals (one each in each district and one in the State level) with at least 20 years more of service left.

The members of this virtual cadre shall be the departmental nodal officers for disaster management who shall be as individuals responsible for supporting the district and state disaster management authorities in disaster management. The KSDMA will ensure that these individuals are adequately trained in matters related to disaster management. These officers shall be trained in rapid damage assessment and certification in the respective sector. The disaster-specific nodal departments through this virtual cadre will ensure liaison and coordination with KSDMA and DDMAs in the smooth implementation of the departmental disaster management plan and with SEOC and DEOCs for ensuring coordinated response to events.

Role definition aligned with NDMP 2016 and SFDRR

The role of virtual cadre officials are determined through SDMP keeping in mind the Sendai

Framework (2015-2030), the Disaster Management Act 2005, the National Disaster Management Policy, 2009, the Kerala State Disaster Management Rules, 2007 and the Kerala State Disaster Management Policy, 2010 and the National Disaster Management Plan, 2016. The National Disaster Management Plan 2016 lays down an excellent planning framework for India by aligning with the Sendai Framework for Disaster Risk Reduction 2015-2030, to which India is a signatory.
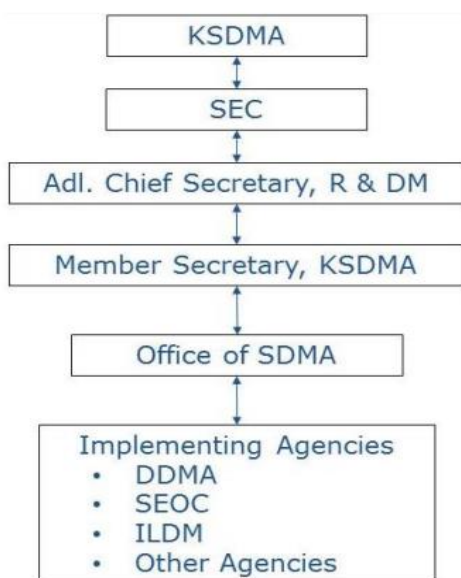
The NDMP incorporates substantively the approach enunciated in the Sendai Framework and will help the country to meet the goals set in the framework.

By 2030, the Sendai Framework aims to achieve substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries. The NDMP has been aligned broadly with the goals and priorities set out in the Sendai Framework for DRR. The framework states that to realize this outcome, it is necessary to prevent new and reduce existing disaster risk through the implementation of integrated and inclusive measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for

response and recovery, and thus strengthen resilience. These measures must cover various sectors such as:

Economic	Structural	Legal
Social	Health	Cultural
Educational	Environmental	Technological
Political and	Institutional.	
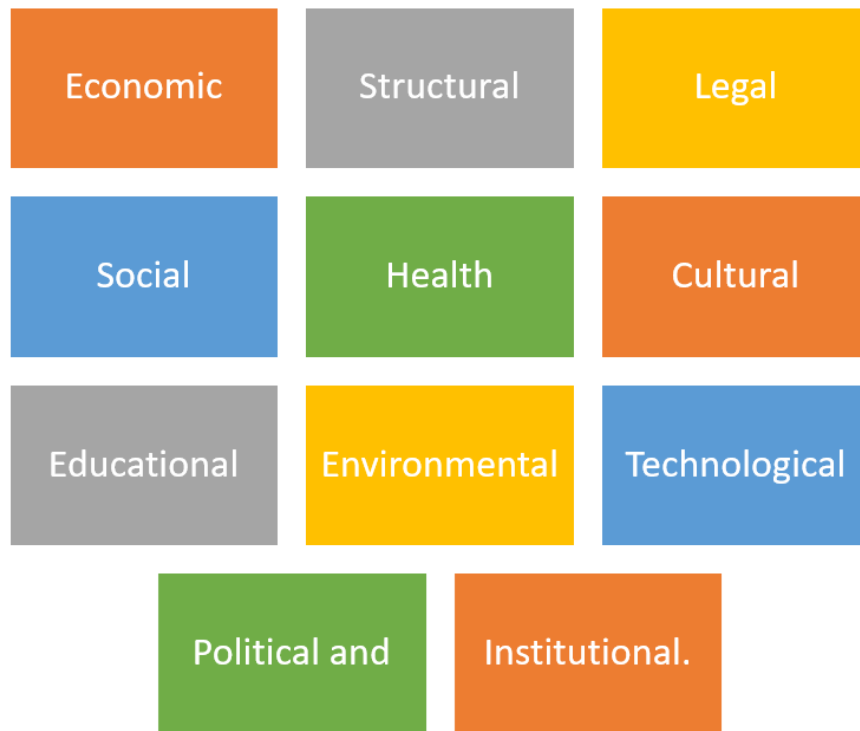
The plan includes measures that will be implemented over the short, medium, and long-term over the time horizon of the Sendai Framework ending in 2030.

Department - wise Disaster management planning

Health Department

Brief Profile of the Department

Kerala has made significant gains in health indices such as high life expectancy, low infant mortality rate, birth rate, and death rate. The health status of the marginalised communities like adivasis and fishing workers is also poor compared to that of the general population. Also, 70% of Kerala's healthcare is privately provided, which is making it expensive. In addition, the number of disaster incidents are increasing causing loss of lives and affects many people.

Role of Department as given in SDMP

Develop plan for hospital preparedness and mass casualty management

Prepare a database of registered hospitals, clinics, diagnostic labs, blood banks, etc. along with their capacities and facilities provide

Establish state-wide medical emergency access number

Standardize and license ambulance services

Ensure availability of adequate supply of life saving equipment and drugs.

Prepare trained psychosocial care teams

Ensure proper and safe management of medical waste

Ensure that antidotes are available for all the chemicals.

Ensure a quick response medical team in every district

Preparation of Departmental Disaster Management Plans

Introduction

The departmental disaster management plan should be comprehensive and spell out the roles of the departments that are responsible to manage the disasters related to them in each phase of the disaster (during normal times, pre-disaster, during and post-disaster phase).

Pre-disaster Phase: Pre-disaster prevention and mitigation activities should be carried out with the normal staff while post-disaster rescue, relief and recovery will need outside resources. Normally in disaster management plans pre-disaster activities are ignored or given less importance. A brief outline of the activities to be undertaken are provided without clearly providing for funds or spelling out the responsibilities. The mitigation plan should consist of the objectives and goals and the necessary strategy to be adopted along with a realistic time frame. The sub-activities and the agencies responsible should also be mentioned in the plan. The plan should also identify the necessary policy and legal framework, which provides the agency the mandate to carry out such activities. If they need a new policy or a legal framework it should also be identified and the time frame with in which such a framework will be provided should also be worked out and mentioned in the plan. It is administrative orders wherever required should be issued.

The most important aspect of the mitigation plan should be provision of funds for the activity and how it will be provided. Disaster mitigation plan cannot be a stand-alone activity. The plan should also mention how mitigation will be integrated with the normal working of the ministry and the special programs or projects undertaken will be integrated with the normal activity of the ministry and made sustainable.

The plan should also provide for a monitoring mechanism and monitoring indicators. The plan should also have a provision for evaluation and mid-term correction.

Preparedness and post-disaster response: The second part of the plan should focus on the preparedness and emergency response. Preparedness is simply keeping the manpower and equipment required for response in a state of readiness. This manpower and equipment resource base should contain what is readily available with government and what should be requested from outside.

As part of the preparedness measure the existing resources should be identified and augmentation of the same if required should also be worked out. Training, capacity building and maintenance and responsible agencies should also be mentioned. The budget for the same should also be provided in the plan.

The sources outside the government will include non-governmental agencies, private industrial houses, neighbouring states, volunteers and international community. The database of what is available in private with in the country; the list of NGOs with their expertise and details about mobilization of volunteers should also be part of the plan.

Disasters are of two types, those that have a warning such as floods, cyclones etc., and those, which strike without warning such as earthquakes and flash floods etc. Many disasters are of seasonal nature such as floods, cyclone etc. Depending on whether a disaster is seasonal or not, the role and duties of the department should be worked out for pre-disaster stage. If the disaster has a prior – warning stage the various activities to be undertaken should be mentioned. For example, cleaning of drains or water channels before the rainy season or vaccination or immunization before rainy or flood season etc.

If the disaster has a warning stage then the method of altering the administrative machinery, volunteers and the communities should be mentioned in the plan along with a evacuation plan if necessary. The method of moving or shifting the response teams etc near to the area where rescue is need should be pre identified.

The main thrust area of the response portion of the plan is post-disaster search, rescue and relief. What should be done, who will do it, when and how it will be done should be clearly covered in the plan. (If necessary one can use a matrix). Though this portion varies from ministry to ministry there are certain general details, which should be covered in every plan such as mobilization of resources, co-ordination with the EOC, reporting system etc. for the purposes of emergency response a SOP should be evolved which should become part of the plan. A matrix which spells out what should be done up to 72 hours starting from zero hour (the time of receipt of information about the disaster) with increasing time intervals starting from 15 mins will be of help.

Some of the annexure required are

- The hazard, vulnerability and risk map
- Contact numbers
- Details of outside resources

Mock-drills and testing and revision and updating the plan:

Periodic mock drills should be conducted, and the plan should be tested. The plan should be revised after each mock drill taking in to account the lessons learnt from the drill. Apart from the revision done the plan should also be updated on a periodic basis. An ideal plan should also contain details about when and how this plan will be tested and updated.

Contents required in Departmental Disaster Management Plans as per National Guidelines.

Chapter 1: Prevention, Mitigation and Preparedness Plan

1. Brief profile of the department

2. Measures necessary for prevention of disasters, mitigation, preparedness and capacity-building in accordance with the guidelines laid down by the National Authority and the State Authority.

3. Integration into its development plans and projects, the measures for prevention of disaster and mitigation in the departmental annual plan.

4. Provision of funds for prevention of disaster, mitigation, capacity- building and preparedness from the respective departmental budget head

5. Drawing up mitigation, preparedness and response plans, capacity-building, data collection and identification and training of personal in relation to disaster management

6. Review the enactments administered by it, its policies, rules and regulations with a view to incorporate therein the provisions necessary for prevention of disasters, mitigation or preparedness

7. Provision of emergency communication in the affected areas for the department

8. Such other actions as may be necessary for disaster management

Chapter 2: Response plan

1. Mechanism for early warning and dissemination thereof based on warnings issued by IMD, State Emergency Operations Centre or the District Control Rooms

2. Trigger Mechanism for response – who in the department will alert the concerned officers in the department and if alerted what triggers are to be initiated by the concerned officer

3. Response plan for responding effectively and promptly to any threatening disaster situation or disaster in accordance with the State plan, and in accordance with the guidelines or directions of the National Executive Committee and the State Executive Committee and the State Government and the SDMA

4. Appointment of Nodal Officers to perform Emergency Support Functions (ESFs)/roles in emergency in the format already circulated by the State Government V. Constitution of the incident Response Teams (IRTs) at all levels with provision of delegation of authority

5. Reporting procedures and formats

6. Role of NGOs and Voluntary Sector and coordination thereof

7. System of assessing the damage from any disaster

8. Roles and responsibilities and coordination mechanism for the department

9. Disaster Specific response Plan – Response plan for major disasters such as earthquake, flash flood/cloud burst, snow avalanche, landslide etc in which State level response would be needed

10. Identification of suppliers for departmental supplies and pre-contracting for supplies in case of emergencies

Chapter 3: Relief, Rehabilitation and Reconstruction

1. Norms of relief if applicable

2. Minimum Standards of relief

3. Rehabilitation Plan

4. Financial mechanism

5. Action plan for reconstruction – 'Building back better'

6. Please mention schemes of insurance and relief packages available in the department. Norms of the National /State Disaster Response Fund may be mentioned separately

Chapter 4: Knowledge Management

1. Documentation of losses in the animal husbandry & dairy sector for every department

2.   Documentation of lessons learnt

3.   Documentation of best practices and uploading of the same in the departmental websites

Chapter 5: Review, updating and Dissemination of Plan

1.   DM Plan is a "living document" – would require regular improvement and updating – at least once a year

2.   System of updating – who, when and how?

3.   Dissemination of Plan to stakeholders – how? – Printing of document, uploading in departmental website, meetings, seminars etc

Annexures

1.   Important contact details – National, State, local level of the department etc

2.   Resource list (available with Department) with contact persons details (kindly follow IDRN Format) www.idrn.gov.in

3.   Resources available with National Govt. level

4.   Detailed Standard Operating Procedures (SOPs) for all phases of disasters – before, during and after

5.   List of NGOs/INGOs/CBOs working in the field of the department

6.   List of suppliers relevant for the department

7.   Damage Assessment Formats

8.   Reporting formats

Emergency Operation Centre

The State Emergency operation Centre (SEOC) will be hub of all the activities related with disaster response in the state. The primary function of the SEOC is to implement the State Disaster Management Plan, which includes coordination, data collection, operation management, record keeping, public information, and resource management.

For the effective management of resources, disaster supplies and other response activities, focal points or centres will have to be established. These points will have to be well networked starting from the State to the District and finally leading to the disaster site.

Emergency Operations Centres at the State (SEOC) and the District (DEOC) and Incident Command Post (ICP) at the disaster site are the designated focal points that will coordinate overall activities and the flow of relief supplies from the State.

The State Emergency Operations Centre (SEOC) will be maintained and run round the clock which will expand to undertake and coordinate activities during a disaster. Once a warning or a First Information Report is received, the SEOC will become fully operational.

```
                        ┌─────────────┐
                        │    SEOC     │
                        └──────┬──────┘
                               │
                        ┌──────┴──────┐
                        │ SEOC In charge │
                        └──────┬──────┘
                 ┌─────────────┴─────────────┐
```

ESF Commander Operations Desk

1. Communication
   Public Health and Sanitation
3. Power
4. Transport
5. Search and Rescue
6. Donations
7. Public Works and Engineering
8. Information and Planning
9. Relief Supplies
10. Food
11. Drinking Water
12. Shelter
13. Media
14. Help lines

Support Desk

Logistics

Finance and Human Resources

Knowledge Network
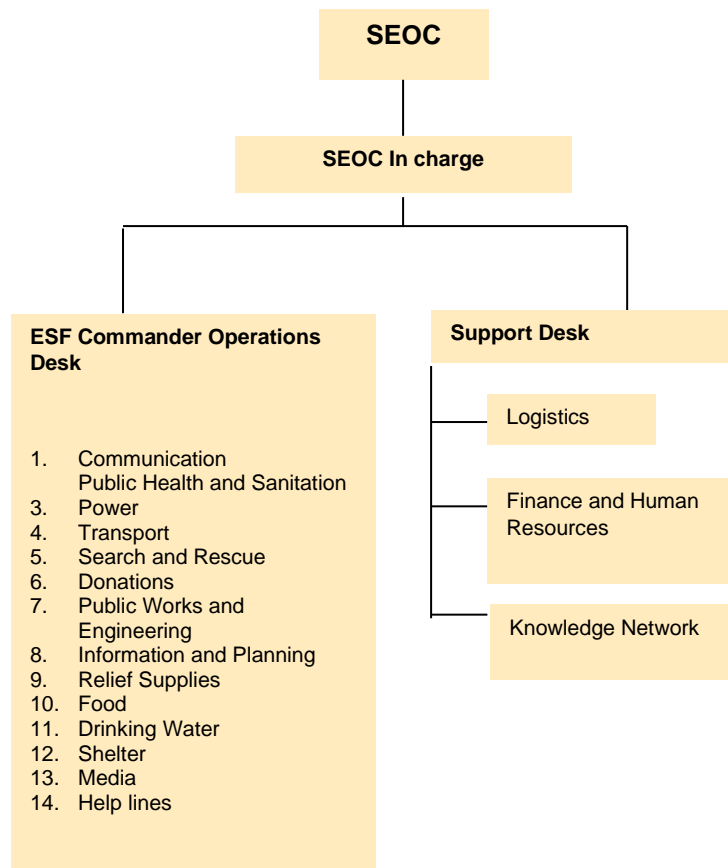
During a disaster situation, the SEOC will be under direct command of the Chief Secretary or the designated person by him as the Chief of Operations.

During non-disaster times, the State Emergency Operations Centre stays operational throughout the year in preparedness mode, working during day time in order to take care of the extended preparedness activities of data management, staff awareness and training, which is essential for the smooth functioning of the SEOC during crisis situations and handling of emergency Toll Free Contact Lines. During an emergency, the SEOC will get upgraded and will have all emergency stakeholders manning it round the clock.

The aim of the EOC will be to provide centralized direction and control of all the following functions:

− Emergency operations

− Communications and warning, which includes handling of 24 hrs emergency toll free numbers.

− Centralised state level disaster resource database

− Requesting additional resources during the disaster phase from neighbouring districts of the affected area

− Coordinating overseas support and aid.

− Issuing emergency information and instructions specific to departments, consolidation, analysis, and dissemination of Damage Assessment data and preparation of consolidated reports.

Organizational Setup of SEOC

The EOC will comprise the following:

SEOC In-charge

- During non-disaster times, the SEOC will work under the supervision of the relief commissioner.

- In a disaster situation, the SEOC will come under direct control of the Chief Secretary or the person designated by him as the Chief of Operations. He is the primary role player in the EOC and is responsible for the overall coordination and decision-making. He will also report the status of the SEOC operations and the disaster situation to the Chief Secretary.

Operations Section

The Operations Section will ensure smooth and planned functioning of the SEOC. It will fulfil the following functions:

- Handle requests for emergency personnel, equipment and other resources

- Designate responsibilities and duties for management of the SEOC

- Manage storage, handling and set-up of incoming equipment and personnel

- Ensure medical care, feeding and housing for SEOC personnel

- Maintain documentation of resource inventories, allocation and availability.

- Manage finances for SEOC operations

Representatives in SEOC

Representatives of State Departments of the following departments will be present at the SEOC to take part in the operations and facilitate quick coordination between the SEOC command and their parent departments towards ensuring quick information availability and decision-making:

- Department of Public Works

- Department of Irrigation

- Department of Energy

- Department of Home

- Department of Revenue

- Department of Health

- Department of Agriculture

- Department of Industries

Emergency Support Functions (ESF) have been established, to support the SEOC functions. Each ESF is headed by a lead department for coordinating the delivery of goods and services to the disaster area, and it's supported by various departments and agencies.

During a disaster, the ESFs will be an integral part to carry out response activities.

After a major disaster or emergency requiring State response, primary agencies, when directed by the EOC will take actions to identify requirements and mobilize and deploy resources to the affected are and assist the State in its response actions under fourteen ESFs

Location of SEOC

The SEOC is established in the Department of Revenue. The layout of the SEOC is given below.

- The Chief of Operations will initiate the activation of emergency services of the SEOC.

- Activation of the SEOC should immediately follow the declaration of a State Level Emergency.

- The Individuals staffing the SEOC are responsible for establishing communications with their respective departments through radio and telephone etc.

- The SEOC Chief or designee will determine what staff he/she deems necessary to effectively operate the SEOC apart from the prescribed staff.

- The designated officers of the Police will provide security at the SEOC.

Back-up SEOC

It is recommended that an alternate SEOC must also be established. It is suggested to setup the backup SEOC within the secretariat building, as most of the departmental heads sits there.

SEOC Layout

A conceptual layout of SEOC is given below.
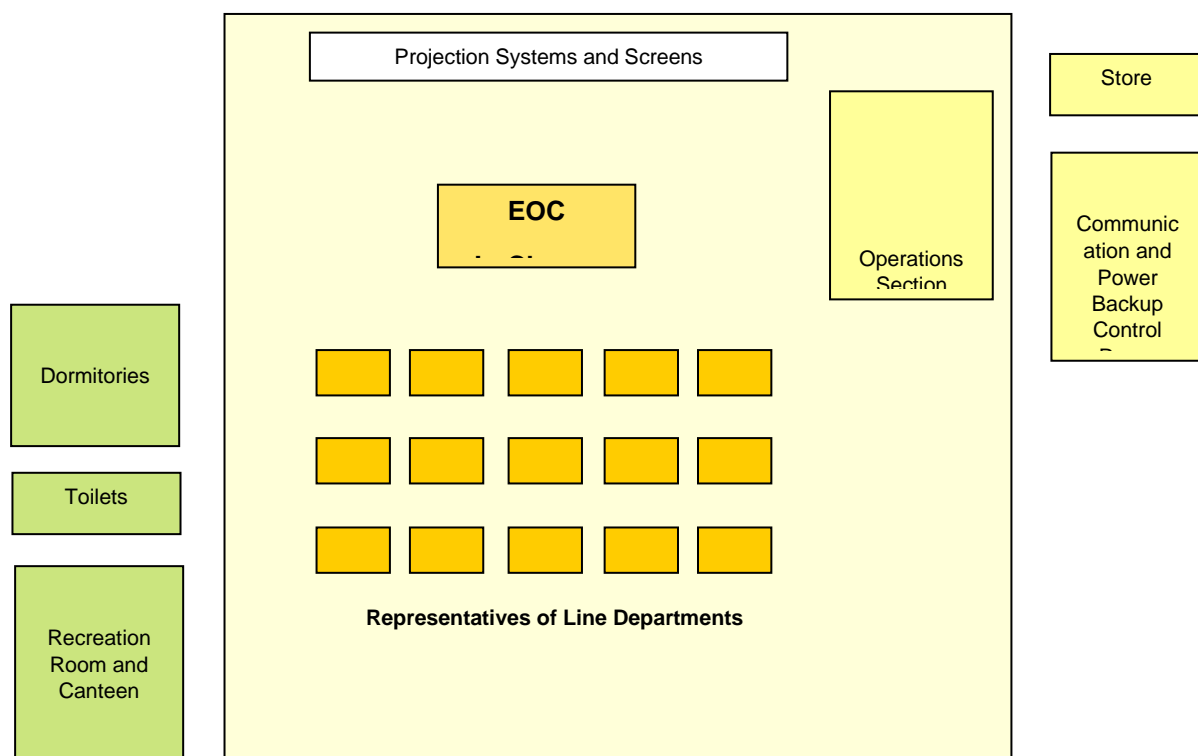
Equipment Requirements

The SEOC will need to operate round the clock and may itself be subjected to adverse conditions due to the impact of disaster. It needs to be equipped with the following hardware and software for its efficient functioning:

- Resource Inventories and databank of maps and plans at block, district and state level on a GIS platform for quick retrieval and analysis.

- State-of-art communication equipment for staying linked with the Chief Secretary's office, headquarters of line departments, district collectors, field teams, media, and national and international support agencies.

- A mobile command vehicle with communication equipment.

- Workstations and communication lines for all representatives of the line ministries.

- Radios and television sets tuned to different news channels and coverage.

- Video conferencing facility.

- Projection equipment and screens.

- Emergency power backup.

- Stock of drinking water, food, medicines, bedding and essential items required for personnel manning the SEOC for long time durations.

Resource Inventories

Resource inventories are useful in quick retrieval of vital information regarding availability and sources of rescue and relief material and personnel during times of emergency. Resource inventories are essential elements of EOC operations. Such inventories will be prepared and maintained through regular updating at the State and District levels. Inventories will include the following basic elements, and other locally relevant information:

- Contact details of all personnel and organisations concerned with emergency management

- List, with specifications and availability procedures, of all equipment that may be useful for responding to an emergency. This will include communication equipment, transport vehicles, earth moving equipment, cranes, and tools etc. that are available with agencies within the jurisdiction.

- List, with specifications and rate schedules, of relief material that can be sourced from local aid agencies and markets. This will include dry rations, tents and bedding, clothing, utensils, first-aid items and other basic necessity items

Data Transmission Process
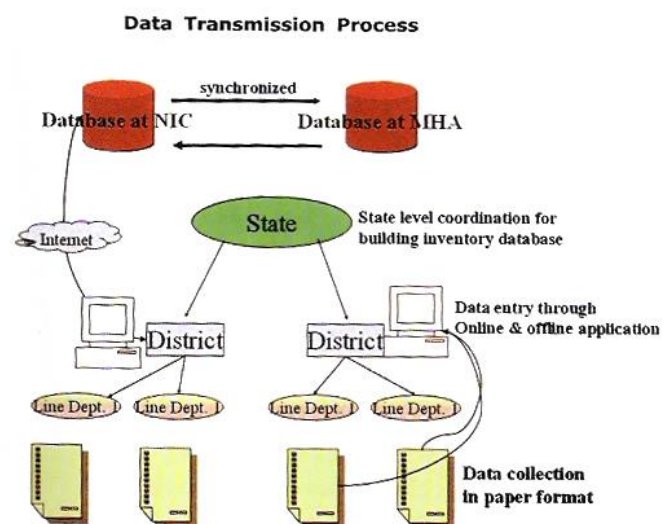
India Disaster Resource Network (IDRN)

When disasters strike, the disaster managers at the district/ State level respond with the resources at their command. The difficulty is that while the Disaster Manager (District Magistrate/ Collector) is generally aware of the resources at his command in the district, he is not aware of the resources available in the neighbouring districts within the State or in the neighbouring States. The disaster manager at the State level [the Relief Commissioner] does not have an inventory of resources available within the State. Therefore, all the resources available within the State are not brought to bear for saving lives, and when some specialist equipment is required, there is a lack of knowledge as to the whereabouts of the equipment either in the neighbouring district or in the neighbouring State. Lives can be lost because of such delays/ lack of required resources. The IDRN addresses this lacuna in our disaster management system.

India Disaster Resource Network (IDRN) is one of the initiatives under the GOI-UNDP Disaster Risk Management Programme for disaster reduction. It is a nation-wide electronic inventories of essential and specialist resources for disaster response both specialist equipment and specialist manpower resources. The IDRN lists out the equipment and the resources by type and by the functions it performs, and it gives the contact address and telephone numbers of the controlling officers in-charge of the said resources so that the equipment can be promptly mobilized. The IDRN is a live system providing for updating of inventory every year. Entries into the inventory are made at two levels – district and State level. The Objectives of IDRN are:

- To collect and collate information on resources available in the country for emergency response.

- To enhance the decision-making capabilities of Government functionaries in quick response to emergencies.

IDRN is accessible to the Emergency officers, District Collectors, Relief Commissioners and other disaster managers at various levels of Government.

Activities of SEOC

The responsibilities of SEOC at the state level shall be to provide centralized direction and control of the following activities:

Non-disaster time

During non-disaster times, the activities of the EOC will be under the supervision of the relief commissioner. Following are the activities during non-disaster times.

- Ensure that all districts prepare and regularly update the District Disaster Management Plans.

- Encourage districts to prepare area-specific plans for areas prone to specific disasters.

- Monitor training imparted to state level officials, private sector and NGOs in coordination with the HIDM.

- Keep record of the State and district disaster management plans.

- Disseminate information about the State DMP to other departments.

- Ensure that the warning and communication systems and instruments in the SEOC are in working conditions round the clock.

- Keep and update state level disaster resource inventory

- Establish functional facility of Toll free emergency numbers.

Flow of Information between SEOC and DEOC during normal conditions

State Emergency Operations Center (EOC)

Divisional Commissioner

District EOC (DEOC)

Training, monitoring support and budget allocation if required.

Report on Status of preparedness/vulnerability data of the district
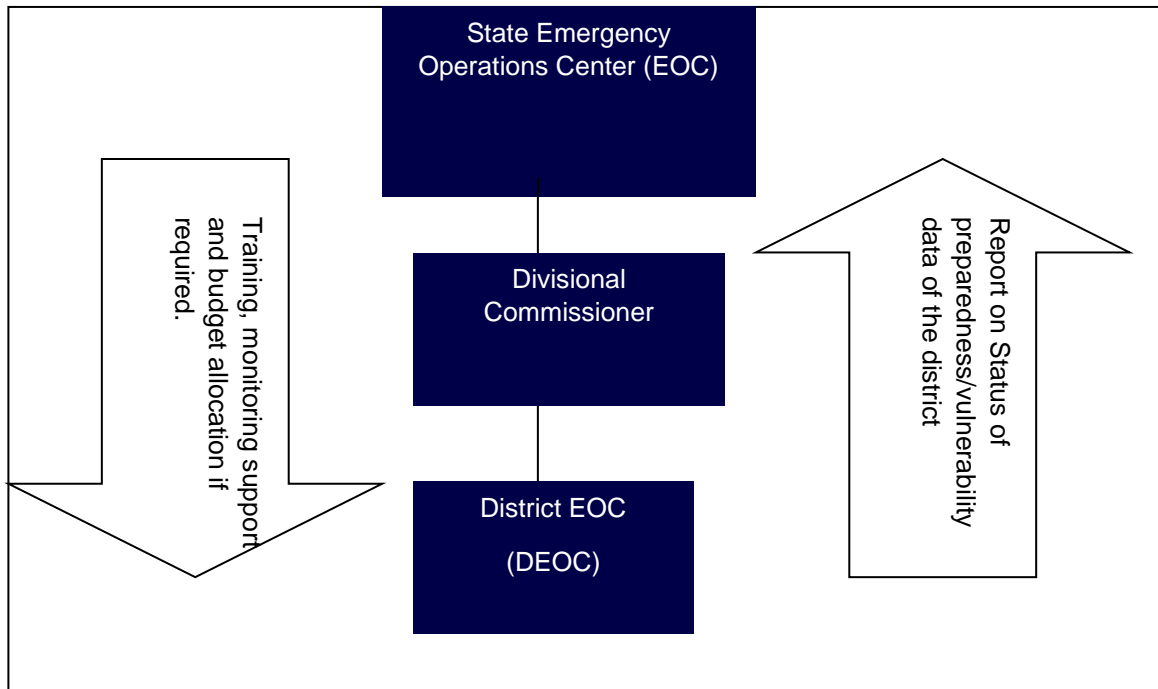
Activation Procedure of the EOC

Once the Sub-Divisional officer/SDM deems a disaster to be beyond the management capacity of local authorities, the District Disaster Management Authority (DDMA) will declare it as a District Level Disaster and activate the DEOC. Once the DDMA deems a disaster magnitude to be beyond its management capability, it will forward the report to the SEOC for deliberation at the SDMA and subsequent appropriate State intervention. On verification of the magnitude of the disaster, and the scale of response required, the State Emergency Operations Centre will get activated and after declaring a State Disaster, will take control.

- **Step 1:** The State EOC is activated on orders from the SDMA. On receipt of a disaster warning or a FIR, the Chief Minister, after verification that the situation merits declaration of a State Disaster, will convene a meeting of the State Disaster Management Authority. Based on the ratification of the Authority, the Chief Minister, will declare a State Disaster.

- **Step 2:** SEOC is upgraded to emergency mode. The SEOC, till then operating in the preparedness mode, will be upgraded to the emergency mode. Concerned line departments will be informed to post their representatives at the SEOC on round the clock basis with immediate effect. SEOC will be activated and all community preparedness measures will be put into operation and the ESF to be on full alert and activate their SOPs. The activation of the SEOC should be followed when DDMA declares a major disaster.

- **Step 3:** Field Assessment Reports. The Chief Secretary/Relief Commissioner will assume the role of the Chief of Operations for Disaster Management. The Chief of Operations of the EOC will coordinate for setting up the ESFs and are asked to prepare and send the Field Assessment Report to the SEOC. The Chief of Operations of the SEOC will spell out the priorities coordinate services of the ESFs, including national and aid agencies.

Quick response teams of specialized personnel will have to be sent for effective management of disaster. Depending on the magnitude of the disaster, two different types of teams will be fielded by the SEOC: (i) Rapid Assessment Teams; (ii) Quick Response Teams

Rapid Assessment Teams

The Rapid Assessment Teams will be multi-disciplinary teams comprising four or five members. They will mainly comprise senior level specialized officers from the field of health, engineering, search and rescue, communication and one who have knowledge of disaster affected area, physical characteristic of the region, language etc. These officials should share a common interest and commitment. There should be a clear allocation of responsibilities among team members. To make a first / preliminary assessment of damage, the assessment report will contain the following basic elements or activities:

- Human and material damage
- Resource availability and local response capacity
- Options for relief assistance and recovery
- Needs for national / international assistance

Quick Response Teams / Rapid Response Teams

Deployment of search and rescue teams can help in reducing the numbers of deaths. A quick response to urgent needs must never be delayed because a comprehensive assessment has yet to be completed. The following teams must be sent to disaster site or disaster affected area as early as possible, even prior to First Information Report.

- First Aid Team
- Search and Rescue team
- Communication Teams
- Power Team
- Relief Teams
- Rehabilitation teams
- Transport Team

All other focal departments will keep ready their response teams, which may be deployed after receiving the first information report.

Incident Command System

The SEOC will need to field its own field teams and through them establish an Incident Command System. The system will comprise:

- Field command
- Field information collection
- Inter-agency coordination at field level
- Management of field operations, planning, logistics, finance and administration

Rapid Assessment Teams and Quick Response Teams described below will be fielded by the SEC through the SEOC as part of the Incident Command System.

OVERALL COMMAND FLOW CHART (EOC and ICS)

CONSTANT and OPERATIONAL all year round

EOC – State
State Chief In-charge

EOC – District
District Chief In-charge

Composition of SEOC

State Chief Incharge

ESF Heads

Logistics Officer

Finance Officer

Composition of DEOC

District In charge

Extension ESF Heads

Logistics Officer

Finance Officer

Variable according to Intensity and Need

Incident Commands headed by experienced personnel (State Level) are placed at local site operation levels to facilitate quick and spot decisions. The number of Incident Commands depends on severity of disaster.

Incident Command	Incident Command	Incident Command

Composition of DEOC

- Incident commander – Appointed by State
- Information officer
- Safety Officer
- Intra-agency coordinator
- Operations officer
- Planning Officer
- Logistics Officer
- Finance Officer
- Operation Teams
- Damage assessment
- Search and Rescue
- Medical Assistance
- Donation mgt
- Relief Camps Team

Institutional arrangement of SEOC

Chapter 4
Departmental Plan – Health Department

Health department – Brief Profile

Kerala has made significant gains in health indices such as high life expectancy, low infant mortality rate, birth rate, and death rate. The health status of the marginalised communities like adivasis and fishing workers is also poor compared to that of the general population. Also, 70% of Kerala's healthcare is privately provided, which is making it expensive. In addition, the number of disaster incidents are increasing causing loss of lives and affects many people.

Role of Department as given in SDMP

♣ Develop plan for hospital preparedness and mass casualty management

♣ Prepare a database of registered private hospitals, clinics, diagnostic labs, blood banks, etc. along with their capacities and facilities provide

♣ Establish state-wide medical emergency access number

♣ Ensure authentic medical database enlisting public and private facilities available in the state. This includes details of manpower, logistics, medical equipment, medicines, antidotes, personal protective equipment, disinfectant, vaccines, etc.

♣ Standardize and license ambulance services

♣ Ensure availability of adequate supply of life saving equipment and drugs, portable supplies like portable oxygen cylinders, portable x-ray machines, triage tags, etc. and update IDRN with these details

♣ Formulate trained medical first responder, quick response medical team, stationary and mobile decontamination facilities, identification of poison centres, mobile hospital, antidotes plan and crisis management plan at hospitals chemical disaster preparedness

♣ Prepare trained psychological and psychosocial care teams

♣ Impart training to manpower for emergency services

♣ Ensure proper and safe management of medical waste

♣ Ensure that antidotes are available for all the chemicals used in the MAH units and small scale chemical industrial units in the respective district and taluk hospitals

♣ Ensure that anti-venom and anti-rabies vaccines are adequately available upto Taluk Hospitals of the State

♣ Ensure a quick response medical team in every district for handling Chemical, Biological, Radiological and Nuclear Disasters

♣ Ensure that vulnerable hospitals and clinics as identified in the vulnerability assessment annexures are made disaster resilient

Key Observations

• One key observation in PDNA report was that the health workforce was not guided by standard operating protocols, including alerts for evacuation of health facilities. This resulted Capacity Development of Virtual Cadre Officials of Eight Departments of Government of Kerala: Training Needs Assessment – Working Draft SEEDS Technical Services 16 in damage to equipment and supplies and need for emergency evacuation of inpatients, doctors, and paramedics as water started flooding the health facilities.

• At present, the department mainly looks at epidemiological aspects during a disaster response

• The department is having an infection control rooms in case of infectious disease spreading or medical related emergency, but not for any other disasters

Standard Operating Procedures

Actions During Normal Times (Mitigation)

– Plan and implement mass health awareness programmes

– Develop Disaster Management Plan for the Department of Health & Family Welfare

– Develop Disaster Management Plan for each hospital in the State

– Organise disaster management trainings for staff of the public health department

– Organise disaster management trainings for hospital staff

– Carryout mock evacuation drills in hospitals periodically

– Ensure that hospital staff are aware of the hospital rooms and buildings which are damage proof.

– In the case of hospitals located in proximity to industrial areas obtain Chemical Data Sheet from the different industries.

– Ensure that all new health facility structures are designed and constructed disaster-safe

– Carryout safety audit of all health facilities in the State and identify weak structures

– Undertake structural retrofitting of weak structures

Actions Before Disaster / Epidemic (Preparedness)

– Within the affected district / local govt. all available personnel will be made available to the District Disaster Manager. If more personnel are required, then out of station officers or those on leave may be recalled.

– All personnel required for disaster management should work under the overall supervision and guidance of the District Collector.

- Establish radio communications with Emergency Operations Centre, district and divisional commissioner, district control room and hospitals (including private) within the division.

- Ensure that personnel working within the district come under the direction and control of the Collector / Civil Surgeon.

- Appoint one person as "NODAL OFFICER – Health Services at the State Level.

- The Civil Surgeon will act as "Officer-in-Charge – Health Services at the District Level.

- All district level officials of the department would be asked to report to the District Collector.

- The District Collector will provide Officer-in-Charge – Health Services, or the field staff as the need be, with all relevant authorisations with respect to the following:
  - o Recruiting casual labourers
  - o Procuring locally required emergency tools, equipment and materials
  - o Expending funds for emergency needs

- The Officer-in-Charge – Health Services will ensure that all field staff and other officers submit the necessary reports and statement of expenditure in a format as required by the collector.

- Review and update precautionary measures and procedures, and review with staff, the precautions that have been taken to protect equipment and the post-disaster procedures to be followed.

- Fill department vehicles with fuel and park them in a protected area.

- Stock emergency medical equipment, which may be required after a disaster.

- Determine type of injuries illnesses expected and drugs and other medical items required, and accordingly ensure that extra supplies of medical items can be obtained quickly.

- Provide information to all hospital staff about the disasters, likely damages and effects, and information about ways to protest equipment and property.

- Discharge all ambulatory patients whose release does not pose a health risk to them. If possible, they should be transported to their home areas.

- Non-ambulatory patients should be relocated to the safest areas within the hospital. The safest rooms are likely to be:
  - o On ground floor
  - o Rooms in the centre of the building away from windows
  - o Rooms with concrete ceilings.

- Equipment supplies such as candles, matches, lanterns and extra clothing should be provided for the comfort of the patients.

- Surgical packs should be assembled and sterilized.

- A large enough number should be sterilized to last four to five days.

- The sterilized surgical packs must be stored in protective cabinets to ensure that they do not get wet. Covering the stock with polythene is recommended as an added safety measure.

- All valuable instruments, such as surgical tools, ophthalmoscopes, portable sterilizers, CGS, dental equipment, etc., should be packed in protective coverings and stored in rooms considered to be the most damage-proof.

- Protect all immovable equipment, such as x-ray machines, by covering them with tarpaulins or polythene.

- Keep mobile medical units in preparedness.

- All electrical equipment should be unplugged when disaster warning is received

- Check the emergency electrical generator to ensure that it is operational and that a buffer stock of fuel exists. If an emergency generator is not available at the hospital, arrange for one on loan.

- All fracture equipment should be readied.

- If surgery is to be performed following the disaster, arrange for emergency supplies of anaesthetic gases (usually supplied daily)

- Check stocks of equipment and drugs, which are likely to be most needed after the disaster. These can be categorized generally as:
  - Drugs used in treatment of cuts and fractures, such as tetanus toxoid, analgesics and antibiotics
  - Drugs used for the treatment of diarrhoea, water-borne diseases and flu (including oral rehydrating supplies)
  - Drugs required to treat burns and fight infections
  - Drugs needed for detoxication including breathing equipment.

- Assess the level of medical supplies in stock, including:
  - Fissure materials
  - Surgical dressings
  - Splints
  - Plaster rolls
  - Disposable needles and syringes
  - Local antiseptics.

- Request central warehouse for immediate despatch of supplies likely to be needed to hospitals on an emergency priority basis.

- Fill hospital water storage tanks and encourage water savings. If no storage tanks exist, water for drinking should be drawn in clean containers and protected.

- Water purification tablets should be stocked

- Prepare an area of the hospital for receiving large number of casualties

- Develop emergency admission procedures (with adequate record keeping)

- Orient field staff with EMRP standards of services and procedures including tagging.

- Hospital administrators should
  - Establish work schedules to ensure that adequate staff are available for in-patient needs
  - Organise in-house emergency medical teams to ensure that adequate staff are always available to handle emergency casualties.
  - Set up teams of doctors, nurses and dressers for visiting disaster sites.

Actions During Disaster / Epidemic (Response)

Evacuation

- All evacuations will be ordered only by the District Collector, Police, Fire Brigade, Health Department or by the Industries Security Officer.

- For appropriate security and for maintaining law and order, evacuation should be undertaken with assistance from community leaders.

- All evacuations should be reported to Divisional Commissioner and District Collector, or Superintendent of Police immediately.

- For evacuation follow the evacuation procedures as outlined in "Operating Procedures for Evacuation".

- For Marooned Persons

- o A senior medical officer will ensure that water supplied is in accordance with acceptable standards of potable water and is packed under appropriate conditions and containers.
- o A senior medical officer should accompany the rescue team along with required medical kit and ensure priority for shifting of those seriously injured or requiring immediate medical attention (the procedure for tagging as given in the Annexure should be followed).

Relief

– Transport should be arranged for the transfer of seriously injured patients from villages and peripheral hospitals to general hospitals. If roads are blocked, a method should be established to request helicopter transport.

– Establish health facility and treatment centres at disaster sites.

– The provision of medical services should be coordinated by the District Medical Officer (DMO) with district control room.

– Procedures should be clarified between
  - o Peripheral hospitals
  - o Private hospitals
  - o Blood banks
  - o General hospitals and
  - o Health services established at transit camps, relief camps and affected villages.

– Maintain check posts and surveillance at each railway junction, bus depots and all entry and exit points from the affected area, especially during the threat or existence of an epidemic.

– An injury and disease monitoring system should be developed to ensure that a full picture of health risks is maintained. Monitoring should be carried out for epidemics, water and food quality and disposal of waste in transit and relief camps, feeding centres and affected villages.

– Plan for emergency accommodations for auxiliary staff from outside the area.

– Information formats and monitoring checklists should be used for programme monitoring and development, and for reporting to Emergency Operations Centre. This is in addition to existing reporting system in the department.

– Seek security arrangements from district police authorities to keep curious persons from entering hospital area and to protect staff from hostile actions.

– Establishment of a public information centre with a means of communication to assist in providing an organized source of information. The hospital is responsible for keeping the community informed of its potential and limitations in disaster situations.

– The local police, rescue groups and ambulance teams should be aware of the resources of each hospital.

– On the recommendations of the EOC ("NODAL OFFICER-Health Services") Collector / District Control Room / Public Health Department will
  - o Send required medicines, vaccines, drugs, plasters, syringes, etc.
  - o Arrange for additional blood supply.
  - o Provide for sending additional medical personnel equipped with food, bedding, tents, etc.
  - o Send vehicles and any additional medical equipment.

Actions After Disaster / Epidemic (Recovery)

– Disinfect hospital premises and public areas

– Replenish stock of medicines, tools and accessories in hospitals

– Hold meetings with staff and discuss the departments' performance

- Draw lessons from the performance and identify actions to be taken for future improvement
- Implement action plan for improving future performance

Annexure: Triage

Triage is a process of prioritizing patients based on the severity of their condition. This rations patient treatment efficiently when resources are insufficient for all to be treated immediately. The term comes from the French Language, meaning 'sorting'. The outcome may result in determining the order and priority of emergency treatment, the order and priority of emergency transport, or the transport destination for the patient, based upon the special needs of the patient or the balancing of patient distribution in a mass-casualty setting.

In this process, each patient in a mass casualty incident is checked by qualified medical professional and a colour tag is attached to each patient to indicate a given degree of injury and the priority for evacuation. Various tags are – Red, Green, Yellow, and Black.

Triage Tags	Description
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 • Severe concussion • Bums (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 bums covering more than 30 per cent of the body. (2) Third-degree bums covering 10 per cent of the body. (3) Burns complicated by major lesions to soft tissue or minor fractures. (4) Third-degree bums 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	This tag is used on patients who are given third priority for evacuation and who fall into the following categories:

Triage Tags	Description

Priority 3	<u>Minor Lesions</u>
	
	   (1) Minor fractures (fingers, teeth, etc.).
	   (2) Other minor lesions, abrasions, contusions.
	   (3) Minor bums:
	        • Second-degree bums covering less than 15 percent of the body
	        • Third-degree bums covering less than 2 per cent of the body
	        • First-degree bums covering less than 20 per cent of the body, excluding hands, feet, and face.
	
	<u>Fatal Injuries</u>
	
	   (1) Second and third-degree with bums over more than 40 per cent of the body, with death seeming reasonably certain.
	   (2) Second- and third-degree bums 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.

ORDER OF EVACUATING CASUALTIES

When casualties are **NOT** trapped or buried	When casualties **ARE** trapped or buried

(1)   Red-tag casualties
 	
   (2)   Green-tag casualties
 	
   (3)   Yellow-tag casualties
	(1) Red-tag casualties
	
	   (2) Green-tag casualties
	
	   (3) Yellow-tag casualties
	
	   (4) Black-tag casualties not trapped or buried
	
	   (5) Trapped black-tag casualties

Annexure: Vector Control Standards

Vector control programmes should be planned so as to cope with two distinct situations:

- The initial phase immediately following the disaster, when control work should concentrate on the destruction, by a physical or chemical process of vermin on persons, their clothing, bedding, and other belongings, and on domestic animals. An emergency sanitation team should be available from the beginning for carrying out this disinfestation.

- When the period after the disaster subsides, control work should be directed towards proper food, sanitation, safe disposal of wastes, including drainage, and general and personal cleanliness.

Suggested Vector Surveillance Equipment and Supplies

- Collecting bag
- Collecting forms
- Mouth or battery powered aspirators
- Tea strainer
- Flashlight and spare batteries
- Grease pencil
- Memo pad
- Sweep net
- Pencil
- Tweezers
- White enamelled dipper
- Keys and other references
- Labels
- COC light traps (optional)
- Collecting vials
- Aedes aegypti ovitraps (optional)
- Bulb syringe or medicine dropper

- Fly grill
- Mirror
- Teaching aids
- Transfer bags
- Plastic bags
- Plastic cups
- Alcohol
- Rubber bands
- Forceps
- Scissors
- Insecticide dusting pan
- Snap Traps
- Formaldehyde
- Live traps
- Acute rodenticides
- Gloves
- Anticoagulant rodenticides
- Flashlights and batteries

Annexure: Equipment & Supplies

In the absence of clear indication from the field, the advance party to the disaster site should carry a minimum kit comprising the following materials and equipment. (This is only a sample list and should be updated to suit the specific conditions prevailing in the area after careful assessment)

Equipment Description	Quantity
Equipment for paediatric intravenous use	36
Tensiomerers for children and adults	12
Assorted ferrules	2 boxes
Tracheal cannulae	36
Set of laryngoscopes for infants, children, and adults	1 each
Endotracheal tubes, No.7 Murphy	36
Endotracheal tubes. No.8	36
Nasogastric probes	36
Oxygen masks, for adults and children	2 boxes
Large scissors for cutting bandages	3
Plastic linings	60
Phonendoscopes	15
Sterilization Unit Supplies	
Tracheotomy set	6
Thorachotomy set	6
Venous dissection set	6
Set for small sutures	12
Bottles for drainage of thorax	10
Hand scissors, No.4	6
Syringes (disposable) x 2 cc	60

Equipment Description	Quantity
Syringes (disposable) x 10 cc	90
Syringes (disposable) x 50 cc	60
Ambulance Fleet: The ambulances will carry the following equipment:	
Oxygen, oxygen mask, and manometer.	
Stretchers and blankets.	
Emergency first aid kit.	
Suction equipment.	
Supplies for immobilizing fractures.	
Venoclysis equipment.	
Drugs for emergency use.	
Minimal equipment for resuscitation manoeuvres.	
Each ambulance should be staffed by at least a physician, a nurse, a stretcher-bearer, and a driver. The medical and paramedical personnel should be experienced in procedures for the management of patients in intensive care units.	

Equipment Description	Quantity
Equipment and Supplies required for Vermin control for a population of 10000 (this may be decided according to local conditions)	
Power sprayers	2
Hand-pressured sprayers. capacity 20-30 litres	50
Dusters (hand-operated. plunger type)	60
Dusters, power-operated	2
Space sprayer	1
Adequate supply of accessories and spare parts for the above equipment	
Insecticides:	
DDT, technical powder	0.5 tons
DDT, 75 % water wettable	1-2 tons
DDT, 10 % powder	1 ton
Dieldrin, 0.625-1.25 % emulsifiable concentrate or wettable powder	100 kg
Lindane, 0.5 % emulsifiable concentrate or wettable powder	100 kg
Chlordane, 2 % emulsifiable concentrate or wettable powder	100 kg
Malathion, 1 % emulsifiable concentrate or wettable powder	100 kg
Dichlorvos emulsion	100 litres
Rodenticides, anticoagulant type (warfarin, etc.)	1-2 kg
Rodent traps	100
Screen, for fly control	10 rolls
Garbage cans, capacity 50-100 litres	300-500
The Quantity depends on availability and on the number of distribution points	

Annexure: Preparedness Checklist for Public Health Department

(to be filled in by the Civil Surgeon and District Health Officer and submitted to the District Collector)

Preparedness Measures taken	Details/ Remarks
The department is familiar with disaster response plan and disaster response procedures are clearly defined.	
A hospital plan for the facilities, equipment and staff of that particular hospital has been developed	
Orientation and training for disaster response plan and procedures undertaken	
Special skills required during disaster situations are imparted to the officials and the staff	
Hospital staff are aware of damage - proof hospital rooms/buildings	
Reviewed and updated • Precautionary measures and procedures • Precautions that have to be taken to protect equipment • Post-disaster procedures to be followed	
All hospital staff have been informed about the possible disasters in the district, likely damages and effects, and information about ways to protect life, equipment and property	
An area of the hospital has been earmarked for receiving large number of casualties	
Emergency admission procedures with adequate record keeping developed	
Field staff oriented about • EMRP • Standards of services • Procedures for triage tagging	
An officer has been designated as Nodal Officer for Disaster Management	
Sources of materials required for response operations have been identified	

Prepared by:

Signature: Date:

Designation: Place:

Annexure: Preparedness Checklist for Hospitals

(to be filled in by the Officer-in-Charge Health Services and submitted to District Control Room and the Department Head)

Action Taken	Y/N	Details /Remarks
Radio communications established with • Emergency Operations Centre • Divisional Commissioner / Magistrate • District Control Room • Hospitals • Private Hospitals		
The Civil Surgeon designated as 'Officer-in-Charge - Heath Services		
The following emergency medical equipment are stocked • Drugs used in treatment of cuts and fractures, such as tetanus toxoid, analgesics and antibiotics • Drugs used for the treatment of diarrhoea, water-borne diseases and flu (including oral rehydrating supplies) • Drugs required to treat burns and fight infections • Drugs needed for detoxication including breathing equipments		
Discharge of all ambulatory patients whose release does not pose a health risk to them		
Non-ambulatory patients relocated to safest areas within the hospital		
Equipment supplies such as candles, matches, lanterns and extra clothing provided for the comfort of the patients		
Adequate supplies of anaesthetic gases for surgery cases available		
The hospital water storage tanks were filled		
An area of the hospital designated for receiving large number of casualties		
Emergency admissions • Procedures developed • Records maintained • Work schedules to ensure availability of adequate staff		
In-house emergency medical teams to ensure that adequate staff available at all times to handle emergency casualties		
Emergency accommodation provided for medical personnel from outside the area		
Security arrangements made at hospitals		
Public information centre established at the hospitals		

The local police, rescue groups, and ambulance teams were made aware of the resources of each hospital		

Inspected By :

Signature: Date:

Designation: Place:

Annexure: Preparedness Checklist for Field Centres

(to be filled in by the Officer-in-Charge Health Services and submitted to District Control Room and the Department Head)

Action Taken	Y/ N	Details / Remarks
Surgical packs assembled and sterilised		
Field staff aware of triage tagging procedures		
Emergency admissions • Procedures developed • Records maintained • Work schedules to ensure that adequate staff is available		
Teams of doctors, nurses and dressers for visiting disaster sites set-up		
Transport for the transfer of seriously Injured patients from villages and peripheral hospitals to general hospitals available		
Health facility and treatment centres established at disaster sites		
Water quality monitoring done at • Transit camps • Relief camps • Feeding centres • Sources of water • Affected areas		
Epidemic surveillance is being done at • Transit camps • Relief camps • Affected areas • Feeding centres		

Inspected By :

Signature: Date:

_____

Designation: Place:

_____

Annexure: Preparedness Checklist for Casualty Treatment Post at Camp Sites and Affected Villages

(to be filled in by the Officer-in-Charge Health Services and submitted to District Control Room and the Department Head)

Action Taken	Y/N	Details /Remarks
Liaise with SOC for suitable location		
Finalise suitable location: • Near water supply • Clear access / egress routes • Communication link with SOC • Close to disaster site • Suitably protected against weather conditions • Sufficient privacy • Separate area for relatives and visitors • Adequate sanitation facilities for patients • Adequate sanitation facilities for staff • Adequate sanitation facilities for relatives and visitors		
Coordinating hospital notified		
First Aid facilities available		
Inform Police of location		
Whether Police personnel posted at treatment post		
Request for additional medical assistance sent • Civil Hospital • District Control Room		
Stocks of triage tags are available on hand		
Records kept on • Names and addresses of casualties (As far as possible) • Type of injuries (As far as possible) • Whether transferred for further treatment		
Records communicated to • Police • SOC		
Information about intentions to close Casualty Treatment Post communicated to • SOC • Police		

Inspected By :

Signature: Date:

Designation: Place:

Annexure: Report and Checklist on Epidemics for Each Camp Site and Affected Village

(to be filled in by the Officer-in-Charge Health Services and submitted to District Control Room and the Department Head)

Time:		
Name of the village:		
Name of the camp:		
Epidemic Threat [Mark as applicable]	An epidemic **exists** at the location	An active threat of epidemics **does not** exist at the location
Brief description of assessment of risk of epidemics in affected area/ location:		
Brief description of assessment of risk of epidemics in affected area/ location and reasons thereof		

Services / Disciplines mobilised:

Discipline/ Organisation	Notified (Y/N)	Time	Whether mobilised (Y/N)	Stand by (Y/N)	Alert (Y/N)	Contact Person with Address & Tel.

Compiled By:

Signature: Date:

Designation: Place:

Annexure: Checklist for Epidemic Situations

(to be filled in by the Officer-in-Charge Health Services and submitted to District Control Room and the Department Head)

Action Taken	Y/N	Details/ Remarks
Warning and Instructions to public issued		
Cordoning off of affected areas recommended		
Logistical support required		
Cordoning off to roads required		
Alternate routes to and from affected areas required		
Alternative communication		
Waste disposal system adequate		
Sterilisation system adequate		
Life saving drugs adequate		
Facilities for inoculation and vaccination exist		
Supply of inoculation and vaccination exists		
Accommodation for required number exists		
Facilities for special diet exist		
Risk of spread exists		
Isolation of affected persons done		
Facilities for testing water/ wastewater for contamination exist		
Facilities for treatment of contaminated water/ wastewater exist		
Suitable protection of workers ensured		

Inspected By :

Signature: Date:

Designation: Place:

Annexure: Biological Disasters

Bio-terrorism

Apart from the natural transnational movement of the pathogenic organisms, their potential use as weapons of biological warfare and bio-terrorism has become far more important now than ever before. Utilization of organisms causing smallpox and anthrax by such terrorist groups can cause greater harm and panic. Biological agents are living organisms or their toxic products that can kill or incapacitate people, livestock, and plants. Bio-terrorism can be defined as the use of biological agents to cause death, disability or damage mainly to human beings. Thus, bio-terrorism is a method of terrorist activity to prevail mass panic and slow mass casualties. The three basic groups of biological agents, which could be used as weapons, are bacteria, viruses, and toxins. Most biological agents are difficult to grow and maintain. Many break down quickly when exposed to sunlight and other environmental factors, while others, such as anthrax spores, are very long lived. Biological agents can be dispersed by spraying them into the air, by infecting animals that carry the disease to humans, and by contaminating food and water. Potentially, hundreds of human pathogens could be used as weapons; however, public health authorities have identified only a few as having the potential to cause mass casualties leading to civil disruptions.

Causes and Method of Delivery

There are number of causes why biological weapons are potentially more powerful agents to mass casualties leading to civil disruptions. To attract widespread attention and to harm a selected target, these outfits can utilize possibly any biological material, which fulfils some of the criteria of bio-weapons.

- Biological agents can be disseminated with readily available technology. Common agricultural spray devices can be adopted to disseminate biological pathogens of the proper particle size to cause infection in human population over great distances.

- The perpetrators can use natural weather conditions, such as wind and temperature inversions as well as existing building infrastructures (e.g. ventilation system) or air movement related to transportation (e.g. subway cars passing through tunnels) to disseminate these agents and thus to infect or intoxicate a large number of people.

- The expense of producing biological weapons is far less than that of other weapon systems.

The methods of biological agent dissemination and delivery techniques include:

- **Aerosols** – biological agents are dispersed into the air, forming a fine mist that may drift for miles. Inhaling the agent may cause epidemic diseases in human beings or animals.

- **Animals** – some diseases are spread by insects and animals, such as fleas, mice, flies, mosquitoes, and livestock.

- **Food and water contamination** – some pathogenic organisms and toxins may persist in food and water supplies. Most microbes can be killed, and toxins deactivated, by cooking food and boiling water. Most microbes are killed by boiling water for one minute, but some require longer. Follow official instructions.

- **Person-to-person** – spread of a few infectious agents is also possible. Humans have been the source of infection for smallpox, plague, and the Lassa viruses.

Types

There are three categories of biological agents potential enough to cause mass casualties. However, those in category A have the greatest potential for fear and disruption and most significant public health impacts. The list of these biological agents with a very brief description about them is given below.

- The disease **anthrax** is caused by the gram-positive, non-motile Bacillus anthracis. Anthrax has been a scourge of cattle and other herbivores for centuries. During the industrial revolution, the inhalation form was first recognized as an occupational pulmonary disease in workers in the wool industries of Europe. Anthrax makes an ideal biological weapon. The inhalation form of disease is highly lethal. The spores can maintain virulence for decades and they can be milled to the ideal particle size for optimum infection of the human respiratory tract. Different clinical forms of the disease are observed, depending on the route of exposure. Inhalational anthrax presents with non-specific symptoms that cannot be distinguished from many more common diseases based on early clinical manifestations or routine laboratory tests. Therefore, despite aggressive medical care sometimes develop rapidly progressive disease and die.

- If used as a biological weapon, **smallpox** represents a serious threat to civilian population because of its case fatality rate of 30% or more among unvaccinated persons and the absence of specific therapy. Smallpox has long been considered as the most devastating of all infectious diseases and today its potential for devastation is far greater than at any previous time. Smallpox virus is a member of genus Orthopoxvirus, and it is closely related to the viruses causing cowpox, vaccinia and monkey pox. It is one of the largest DNA viruses known, and it has a bricklike appearance on electron microscopy. Transmission of this virus can occur in several different ways: generally by droplets, occasionally by aerosol, by direct contact with secretions or lesions from a patient, and rarely by formites contacted with the infection virus from a patient. Transmission risk increases if the index patient is coughing or sneezing or if he or she has hemorrhagic disease. Typically, the virus enters the respiratory mucosa and then travels to regional lymph nodes where it replicates. The incubation period from infection to onset of rash ranges from 7 to 17 days, averaging 12 to 14 days. Smallpox scabs remain infectious until they fall off, whereas chickenpox is no longer infectious once the lesions are crusted.

- The mere mention of the word **plague** conjures up many images because has already demonstrated a historical potential to kill millions of people across the globe. It is a disease that results from infection by non-motile, gram-negative coccobacillus Yersinia pestis. When stained, its bipolar appearance is often described as resembling a safety pin. Pestis has two important properties that differentiate it from B. anthracis- person-to-person transmissibility and a lack of spore production. Following the bite of an infected flea, plague bacilli are carried via the lymphatic to the regional lymph nodes where they multiply exponentially. This is only weapon besides smallpox, which can cause devastation beyond those persons who are initially infected. With modern air travel, containing an outbreak of plague could be challenging. A vaccine for plague does exist; however, it is no longer being produced, and it does not demonstrate efficacy against infection by aerosol.

- **Botulism** or Botulinum toxins are deadly. A toxin is any toxic substance that can be produced in an animal, plant, or microbe. The toxins produce serious disease in human beings. Many natural toxins can be produced by chemical synthesis or can be expressed artificially. Toxins are natural and non-volatile and generally do not penetrate intact skin, which happens in case of chemical weapons. There are different types of toxins and they are immunologically distinct, meaning that antibodies developed against one do not cross-react against others. Those that most commonly cause human disease are types A, B, and E. Humans can be intoxicated either by oral means, inhalation, or wound infection. Mass casualties can be produced through contamination of food source or by aerosol dissemination. The incubation period of botulism can range from as short as 24 to 36 hours to several days from the time of inhalation.

- **Tularemia** is caused by Francisella tularensis, which is a gram-negative, non-motile coccobacillus. Tularemia is a zoonotic disease acquired in a natural setting by humans through skin or mucous membrane contact with the body fluids or tissues of infected animals or from being beaten by infected deerflies, mosquitoes, or ticks. It can remain viable for weeks in the environment or in animal carcasses and for years if frozen. Unlike anthrax, which requires thousands of spores to infect someone, tularemia can cause illness with as few as 10 to 50 organisms. After an incubation period of 2 to 10 days, pneumonia symptoms develop associated with weight loss and non-productive cough. The drug of choice for treatment is streptomycin with other aminoglycosides.

History: Major Events across the Globe

Biological warfare has a long history of mass destruction through epidemic and pandemic diseases. Limited

biological warfare is reported to have been carried out by Japan during World War-II. Recently, mycotoxins have been reported to be used in Afghanistan. Even before that it has also been documented that the Red Indians in North America were given the smallpox infected blankets. Nevertheless, the recent Anthrax attack in 2001 through letters caused worldwide concerns regarding the threats of bio-terrorism. Beginning in mid-September 2001, the USA experienced unprecedented biological attacks involving the intentional distribution of bacillus anthracis spores through the postal system. The full impact of this bio-terrorist activity has not been assessed, but already the toll is large. Hundreds of people were affected. In the 20th-century series of cases, the mortality rate of occupationally acquired Inhalational anthrax was 89%, but majority of these cases occurred before the development of critical care units and in most cases before the advent of antibiotics. Prior to 2001 attacks, at Sverdlovsk, it had been reported that 68 of the 79 patients with Inhalational anthrax dies. However, a separate report from a hospital physician recorded 358 ill with 45 dead. A recent analysis of available Sverdlovsk data suggests that there may have been as many as 250 cases with 100 deaths.

Documented Intentional Use of Biologicals

- Japan used plague bacilli in China during 1932-1945 causing 260,000 deaths.

- Dispersal of anthrax spores due to accident in production unit in USSR caused 68 deaths in 1979.

- In 1984, Osho followers used Salmonella typhimurium in salad in a restaurant in Oregaon, USA, leading to 751 cases.

- Shigella dysenteriae Type 2 employed in Texas USA, in 1996.

- Anthrax through postal envelopes in USA in Oct-Nov 2001 leading to 22 cases and 5 deaths.

Impact

Even a small-scale biological attack with a weapon grade agent on an urban center could cause massive morbidity and mortality, rapidly overwhelming the local medical capabilities. For example, an aerosolized release of little as 100kg of anthrax spores upwind of a metro city of a size of Washington DC has been estimated to have the potential to cause up to three millions of deaths.

Prevention & Mitigation Measures: General Measures of Protection

(1) The general population should be educated and the made aware of the threats and risks associated with it.

- Only cooked food and boiled/chlorinated/filtered water should be consumed

- Insects and rodents control measures must be initiated immediately

- Clinical isolation of suspected and confirmed cases is essential.

(2) An early accurate diagnosis is the key to manage casualties of biological warfare. Therefore, a network of specialised laboratories should be established for a confirmatory laboratory diagnosis.

(3) Existing disease surveillance system as well as vector control measures have to be pursued more rigorously.

(4) Mass immunization programme in the suspected area has to be more vigorously followed up.

(5) Enhancing the knowledge and skills of clinicians plays a vital role in controlling the adverse impact of the attack. As bio-terrorism related infections would remain rare events, creative ongoing strategies will be required to sustain attention to potential new cases.

Action Plan for Biological Disaster Management in India

Biological Disaster could arise from a source located either inside the country or outside the country (warfare). Management of such a situation could be dealt with effectively only if there is a disaster plan well integrated in the system and also there is mechanism of post disaster evaluation.

Inter-disaster stage:

This is the period between two disasters in which pre-disaster planning in terms of system development should be done.

Action plan has following elements:

One of the simplest & easy methods to suspect is to take notice of a situation during which more patients with similar ailments from a particular locality start consulting health guide at village level,

(a) Constitution of a Crisis Management Structure

– Identification of Nodal Officers for Crisis Management at District, State & Central Level.

– Identification of Focal points for control of epidemic at District, State & Central Level.

– Constitution of advisory committees - Administrative and Technical

– Preparation of contingency plan including Standing Operating Procedure at District, State & Central Level.

(b) System of Surveillance

– System of information collection at District, State & Central Level

– System of data analysis

– System for flow of information from District to State and to Central Level during crisis period.

– Establishment of control rooms at District, State & Central Level.

(c) System of Epidemiological Investigation

– System of field investigation

– System of active surveillance

– Arrangement for support facilities

(d) Confirmation of pathogens by laboratory set up

– System of laboratory investigation at District, State & Central Level

– Quality Control of Laboratory Practices

(e) Training to different level workers

Pre impact stage of warning (Early Detection):

Early warning signals

Early identification of an outbreak of disease of international public health importance shall require knowledge of early warning signals amongst all the echelons of health care providers. Some of the suggested early warning signals, which must command quick investigation by professionals, may include the following:

– Sudden high mortality or morbidity following acute infection with short incubation period

– Acute fever with haemorrhagic manifestations

– Acute fever with altered sensorium and malaria and JE excluded in endemic areas

– Even one case of suspected plague or anthrax

– Occurrence of cases, which are difficult to diagnose with available clinical and laboratory support and their non-responsive to conventional therapies

– Clustering of cases/deaths in time and space with high case fatality rate

– Unusual clinical or laboratory presentations

A comprehensive list of all the trigger events that shall attract immediate attention of local public health machinery need to be developed by a group of experts.

By suspicion:

Management Plan should aim to identify crisis situation at a very early stage preferably confined to a limited area. This can be done only by suspecting danger of impending disaster by local health employees (at village by village health guide, at sub centre level by multi purpose worker and PHC level by doctors at PHC).

Alertness of institution dealing with emergency health, medical services/ Confirmation by identified laboratories:

If such a situation arises, after providing symptomatic treatment at PHC level, services of well established laboratory at district or medical college level might be requisitioned to identify the organism and also to seek guidance for specific treatment and management.

Constant surveillance and monitoring till there is no risk of any outbreak.

Disaster Stage:

When disaster strikes following actions would be needed:

Public Health Control Measures:

Aim of control measures, is to contain the disease initially but eliminate ultimately by following public health measures:

- Identification of all infected individuals based on an established case definition
- Eliminating or reducing source of infection (Isolation and treatment of patients) identified by epidemiological and laboratory studies
- Interrupting Transmission of disease: Spread of disease depend on mode of transmission which could be prevented by:
    o Possibility of reducing direct contacts with patients;
    o Vector control: Rodents/Mosquitoes control;
    o Food control;
    o Environmental control: Transmitted by water/air; and
    o Control through sewerage system.
- Protecting persons at risk (Community) Immunisation and Health Education plays major role in protecting person at risk.

Trigger mechanism: The trigger mechanism is an emergency quick response mechanism like ignition switch when energised spontaneously sets the vehicle of management into motion on the road of disaster mitigation process.

- System of alert and mechanism of activation of Disaster Plan.
- Immediate organisation of field operation for curative and preventive medical care including immunization.
- Checking of initial information on an epidemic.
- Preliminary analysis of the situation.
- Arrangement for laboratory support.

- Emergency health services advisory committee meeting to take stock of the situation and to advise further action.

- Field investigation about:
    - Safety pre-cautions
    - Case finding

- Deputation of Quick Response Teams
    - Search for source of infection and contact tracing
    - Special investigation for common source of infection.

- Analysis of investigation data to identify type, source of outbreak and mode of transmission:
    - Ecological data
    - Clinical data
    - Epidemiological data
    - Laboratory data
    - Entomological data

- General control measures to prevent further out break:
    - Protective measure for contacts & Community
    - Control of common source of outbreak like food, water or mosquito etc.
    - Immunization, emergency mass immunization and specific immunization, mass chemoprophylaxis.

Post disaster stage:

Evaluation after disaster is most important step in disaster management in order to rectify deficiencies in the management and to record the entire operation for future guidance for which following measures are necessary:

- Evaluation of control measures
- Cost effectiveness
- Post-epidemic measures
- Sharing of experience
- System for documentation of events.

Management of Biological disaster on above principles and steps should be taken by the health authorities of the State Government with the available infrastructure.

Future Plan

The followings are the some of the key issues and concerns across the globe that need to be included in the future plan of bio-terrorism management.

- Since vaccines against a number of potential biological warfare agents have already been developed and some have already been in use, mass immunization of the population would be done on a priority basis.

- Vaccines against remaining agents would have to researched and developed.

- Mass public awareness before, during and after such an attack must be emphasized upon.

The strategies that must be incorporated include accurate threat intelligence, physical countermeasures, medical

countermeasures and education and training of physicians and ancillary health care providers including first-aid providers.

Dos & Don'ts in a Biological War Attack

<u>Before:</u>

Children and older adults are particularly vulnerable to biological agents. Ensure from a doctor/the nearest hospital that all the required or suggested immunizations are up to date.

<u>During:</u>

− In the event of a biological attack, public health officials may not immediately be able to provide information on what you should do. It will take time to determine what the illness is, how it should be treated, and who is in danger. Close the doors and windows when a biological attack is imminent.

− Watch television, listen to radio, or check the Internet for official news and information including signs and symptoms of the disease, areas in danger, if medications or vaccinations are being distributed, and where you should seek medical attention if you become ill.

− The first evidence of an attack may be when you notice symptoms of the disease caused by exposure to an agent.

− Be suspicious of any symptoms you notice, but do not assume that any illness is a result of the attack.

− Use common sense and practice good hygiene.

− However, if you notice of an unusual and suspicious substance nearby:

  o Move away quickly.

  o Cover your head and nose

  o Wash with soap and water.

  o Listen to the media for official instructions.

  o Seek medical attention if you become sick.

− If you are exposed to a biological agent:

  o Ultra efficient filter masks can be used

  o Follow official instructions for disposal of contaminated items such as bag and cloths.

  o Take bath with soap and put on clean clothes.

  o Seek medical assistance. If required and advised, stay away from others or even quarantined.

<u>After</u>

− Pay close attention to all official warnings and instructions on how to proceed.

− The delivery of medical services for a biological event may be handled differently to respond to increased demand.

− The basic public health procedures and medical protocols for handling exposure to biological agents are the same as for any infectious disease.

− It is important for you to pay attention to official instructions via radio, television, and emergency alert systems.

Annexure: Home Hygiene: Water Quality

Two-thirds of our body weight is water. It is possible to live without food for three weeks but impossible to live without water for more than three days. Water borne infection is responsible for 80% of the diseases in India and some other developing countries.

In Uttar Pradesh, after water works sanitation began:

– The Cholera death rate decreased by 71.4%.

– The Typhoid fever death rate decreased by 63.6%.

– The Dysentery death rate decreased by 23.1%.

– Diarrhoeal diseases decreased by 42.7%.

Unfortunately, even after being treated water gets polluted.

Whenever there is contamination of the drinking water sources, especially when there is water logging after rains, there is an outbreak of infection.

Sources of water

Safe and wholesome water is defined as water, which is:

– Free from disease carrying micro organisms

– Free from dangerous chemical substances

The three main sources of water are:

– Rain

– Surface water - reservoir, stream, tank etc.

– Ground water - shallow wells, deep wells, springs, etc.

In urban areas and big towns, the corporation or municipality undertakes the treatment of water from surface water sources and supplies it to users.

Pollutants in water

Naturally found water is not pure H_2O. It contains natural impurities of various kinds - both dissolved and suspended impurities. These are the impurities derived from atmosphere, catchment area and soil. They can be dissolved substances - hydrogen sulphide, oxygen, ammonia, sodium or suspended impurities such as clay, silt, sand, mud and microscopic plants and animals.

The more hazardous water pollution is caused by human activity like urbanization and industrialization. Sources of pollution resulting from these are:

– Industrial and trade waste which contain toxic agents ranging from metallic salts to complex synthetic organic chemicals.

– Sewage, which contains decomposable organic matter and disease carrying microbes.

– Agricultural pollutants like fertilizers and pesticides such as DDT, Aldrin, dioxin.

– Nuclear wastes.

Hazards of using polluted water

Biological Hazards are caused by the presence of an infective agent or an aquatic host. The presence of virus, bacteria, worms etc. causes:

– Cholera

– Gastric Problems

– Typhoid

– Dysentery (both amoebic and bacterial)

– Round worm infestation

– Guinea worm infestation

– Jaundice

Chemical Hazards: The pollutants include various chemicals, such as detergents, solvents, cyanides, heavy metals, mineral and organic acids, nitrogenous substances, bleaching agents, dyes, pigments, sulphides, ammonia, toxic and biocidal organic compounds of great variety. Chemical pollutants may affect our health not only directly but also indirectly by accumulating in aquatic life such as fish that are consumed by humans. Some of the diseases that can be spread by chemical pollutants are:

– Skin infections

– Intestinal disorders (by Polychlorinated biphenyls)

– Disorders of liver, bone and circulatory system, birth anomalies (by Vinyl chloride)

– Anaemia, bone marrow damage, leukaemia (by Benzene)

– Damage to central nervous system (by Phthalates)

– Carcinogenic problems (by Nitrosamine)

Though pollution seems to be an inevitable consequence of modern industrial technology, the challenge is to determine the level of pollution that permits economic and social development without causing hazards to health.

Quality of drinking water

– Clear, colourless, odourless and tasteless.

– Free of chemical substances such as chlorides, hardness, free and saline ammonia, albuminoid ammonia, nitrites and nitrates, oxygen, and dissolved oxygen. Toxic substances such as arsenic, cadmium, cyanide, lead, mercury, and selenium etc. indicate chemical contamination of water.

– Free of bacteria such as E. coli, and faecal streptococcus, clostridium perfringens, which indicate faecal pollution.

Purification of water at home

Purification of water is of great importance. Urban Water supply is purified in three stages: storage, filtration and chlorination. Despite this process, water gets polluted when it is piped to users due to various factors specific to India. Therefore, further purification at home becomes necessary. ⌷SEP⌷SEP⌷

Boiling and Filtering:

This is an easy, time tested and a satisfactory method of purification in households. Water must be brought to a rolling boil for five to ten minutes. It kills bacteria, spores, ova, cysts and sterilizes water. It also removes temporary hardness by driving off carbon di-oxide and precipitating calcium carbonate.

There are some disadvantages in the process. The taste is altered. The precipitates have to be filtered out. It gives

no residual protection, meaning, after boiling, if the water is transferred to another container, which is infected, the effects of boiling will be lost.

Chemical Disinfection:

This is useful when purifying stored water as in sumps, overhead tanks or well water.

Bleaching Powder: This is chlorinated lime. It is a white powder with a pungent smell. 2.3 grams of bleaching powder is required to disinfect one cubic meter of water. Bleaching powder is an unstable compound. When it is exposed to air, light or moisture, it quickly loses its chlorine content and becomes ineffective. Highly polluted and turbid water cannot be purified by this method.

Chlorine Solution: If 4 kg of bleaching powder with 25% available chlorine is mixed with 20 litres of water it will give a 5% chlorine solution. Like bleaching powder this is also unstable and has to be stored in a cool, dark place.

Chlorine tablets: These are available in the market under various trade names, such as halazone tablets. These are expensive but effective for small quantities of water.

Smarter chlorine tablets have been introduced recently. These are about fifteen to twenty times as powerful as the halogen tablets. One pill of 0.5gms is enough to disinfect 20 litres of water.

Potassium Permanganate and Iodine are disinfecting agents too but high costs and side effects are their drawbacks.

Filters:

Porcelain Candle filters: Water can be filtered with ceramic filters. The main part of a filter is, a candle made from porcelain or infusorial earth. The surface is coated with silver catalyst so that the bacteria coming into contact with it is killed. This method removes the bacteria found commonly in drinking water but is not effective with virus that can slip through the filter. The candle has to be washed thoroughly once a week as it gets clogged with coagulated bacteria and other impurities.

U-V Filters: These are gaining wide acceptance in urban households. A U-V filter apparatus usually consists of a preliminary filter, which strains out physical impurities. An activated carbon cartridge rids the water of organic impurities like colour, odour, free chlorine etc. An ultraviolet beam eliminates bacteria and viruses. As this is done on the line, as the water runs out of the tap, there is less risk of recontamination. The activated carbon should be changed at intervals depending on the usage and quality of water supply.

Annexure: Home Hygiene: Air Quality

Air is special to our planet. Air is the breath of life. It has other functions. Sound travels through air. Smell is carried by air. Air plays an important role in weather control.

We know air is a mixture of gases. The normal composition of air by volume is approximately Nitrogen 78.1 percent, Oxygen 20.93 percent and Carbon dioxide 0.03 percent. The balance is made up of other gases, like Argon, neon, krypton, xenon and helium, which occur in traces. In addition to these, it contains water vapour, traces of ammonia and suspended matter such as dust, bacteria, spores and vegetable debris.

Air pollution

Actually, air has never been pure. Foreign substances have been present in the air at all times and everywhere. Even without industrial activity, just the presence of life is enough to make air impure. The bright side is that despite respiration of men and animals, decomposition of organic matter, air in open spaces can keep its composition remarkably constant This happens because of self cleansing mechanisms which operate in nature such as the movement of air, atmospheric temperature, sunlight and rain. The presence of plant life also recharges the purity of air.

When the foreign matter level in the atmosphere becomes too much, as it is in the urban areas in India, the air becomes harmful to man and his environment. The built-in cleansing process of air becomes ineffective. This is when air is said to be polluted and polluted air poses health hazards.

Sources of air pollution

Air pollution is one of the negative aspects of industrialisation. Every industrialised nation pollutes air. However, in poorer countries, less resource in terms of money and effort are spent on precautionary methods. There is overpopulation, fewer green belts and machinery is often not well maintained to minimise pollution. The air we breathe carries residues from the following sources:

- **Burning:** Smoke, dust and sulphur dioxide emanating from industrial and domestic combustion of coal, oil and other fuel pollute the air.

- **Polluting Industries:** Chemical, metallurgical industries, oil refineries, fertiliser factories.

- **Modern transport:** Motor vehicles are the major source of air pollution in the urban areas. Motor vehicles, trucks, trains, aircraft and other forms of transport contribute to air pollution by emitting hydrocarbons, carbon monoxide, lead, nitrogen oxides and particulate matter. In strong sunlight some of these hydrocarbons and oxides of nitrogen may be converted in the atmosphere into a photochemical pollutant of an oxidising nature. The problem becomes worse in poorly maintained vehicles.

- **Burning of refuse and Nuclear programs:** also contribute to air pollution.

The hazards of air pollution

The Union Carbide gas leak in Bhopal was a tragedy of gargantuan proportions and the loss of life and damage to survivors resulting from it cannot be easily forgotten. The nerve gas attack on the Japanese metro was another shocking incident. We know that human activity involves the handling of many hazardous chemicals. There is always the possibility that gross human error or diabolism can unleash a disaster. Education and awareness can help avoid these.

Long-term effects of the slow but surely increasing toxicity is pretty serious too. We are all contributing to this, and suffering too, in an inevitable cycle. Air pollution, not surprisingly, affects the respiratory system. Diseases like chronic bronchitis and primary lung cancer are suspected to be related to long-term inhalation of polluted air.

Plants and Animals: Unfortunately, mankind's industrial progress has not been very beneficial to the other lives that share the planet with him. Plants are very sensitive to sulphur dioxide, fluorine compounds, smog etc. Spotting and burning of leaves, destruction of crops, and retarded growth of plants have been observed. Fluorides are very toxic to animals. Cattle suffer by eating foliage contaminated with fluorides.

Fringe problems: Building grills corrode. Buildings get grimy. Your white clothes don't remain white if you travel in open vehicles in any Indian metro. There is always a bad odour hanging in the air.

<u>**Prevention and Control**</u>

- **Check it at source.** There should be a check on releasing toxic substances in the air. Arrestors are available to contain pollution for many kinds of machinery and processes.
What you can do: If you are an industrialist, find efficient ways to contain air pollution in your unit. If you are a resident of an apartment where an inverter is used as an alternative source of electricity, abide by pollution control standards. Have your vehicle checked for emission control. Don't burn, or permit burning, of tyres or discarded substances, near your house.

- **Modernise.** Change polluting machinery or implement a more refined process / machinery. Increased use of electricity and natural gas in place of coal is an example of replacement.
What you can do: In households we have replaced coal choolas with LPG. Try solar panel alternatives.

- **Recharge.** This is a slow but sure process. It aids the self-cleansing property of the environment. The establishment of green belts between industrial and residential areas is an attempt at recharging.
What you can do:

  o Plant or nurture at least one tree in your lifetime.

  o Protect yourself. The use of a mask and scarf while driving in crowded places filters out at least the solid impurities.

- **Disinfect.** Better ventilation can diffuse the concentration of bacteria. Sterilised atmospheres like operating theatres use U-V light to control infection.

Annexure: Home Hygiene: Mosquito Control

Bug life abounds around the house. Animal conservator Gerald Durrel felt what a tree is to creatures, a city is to man. Even concrete has become an accepted habitat of pests. Here we take a look at the one bug that is the most prevalent in India and that, which causes a variety of diseases: the mosquito.

Types of Mosquitoes

If it is any consolation, mosquitoes are present in all parts of the world. There are four species in India, which are the main cause of concern from the health point of view. The species and the diseases they spread are:

Species	Diseases
Anopheles	Malaria
Mansonoides	Malayan (Brugian) filariasis and Chigungunya fever
Culex	Bancroftian filariasis, Japanese encephalitis, West Nile fever and Viral arthritis
Aedes	Dengue fever (among others)

About the Mosquito

Feeding: The male mosquitoes live on plant juice. Only the females feed on blood, once in 2-3 days for nourishment of eggs. Some species prefer human blood, some animal blood. Usually they feed in the evening or the early part of the night.

Resting: They rest during the day in dark, cool corners. They hibernate in severe winters or when the environmental conditions are not favourable.

Breeding: Anopheles prefers clean water, Culex dirty water, Aedes artificial collection of water and Mansonoides water with particular vegetation.

Life span: They live from 8-34 days. Both high and low temperatures are fatal for them. They don't seem to fly very far (only about 11 km) from the place where they breed.

Mosquito Control

Destroying their breeding places: Depending on the breed of mosquitoes, water sources should be treated, covered up or drained. This is the most effective method.

Chemical control: Pouring oils such as diesel, kerosene or mosquito larval oil on the surface of stagnant water cuts off air supply to pupae and kills them. But this can't be done to large water bodies as it will render water unfit for drinking and kill fish. Paris green (Copper acetoarsenite) and larvicides such as Fenthion are also used.

Spraying: Spraying DDT on surfaces where mosquitoes rest is effective for over six months. This can be tried in residential areas. Pyrethrum flower extract can also be sprayed. It is a nerve poison and kills mosquitoes instantly. But it cannot prevent mosquitoes flying in from other places and breeding.

Protection from mosquito

Mosquito nets: If you have a little patience and if you do not have the habit of getting up frequently at night, this is the best option. A rectangular net, made of white cotton with fine holes is the best kind. White colour helps easy detection. Cotton fabric is cooling (Unlike nylon nets). But if you forget to tuck in tight, the mites will have a midnight feast.

Screens: Fine meshes such as netlon keep out mosquitoes effectively. But this means closing windows, compromising on natural illumination and ventilation.

Repellents: Mosquito mats; creams and coils have been found to be pretty effective against mosquitoes.

Annexure: General Hygiene & Safety Checklist

Name of the Health Facility:_____

Examined Sector:_____

Details	True	False	Not applicable
I. WORKPLACES			
1.1 The work sites are adequate for the tasks that are carried out			
1.2 Meet the minimum requirements of surface and location			
1.3 Present overall order and cleanliness			
1.4 There is a schedule for cleaning the work area			
1.5 The number of trash cans is adequate for the facilities' needs			
1.6 Trash cans are adequately distributed			
1.7 The floor is kept free of objects at all times			
1.8 The floor is not slippery			
1.9 The floors have a drainage system with grills, strainers, or any other safe and dependable means that allows for general maintenance and prevents the pooling of liquids			
1.10 The material utilized in the workplace is continually classified (both necessary and unnecessary)			
1.11 Objects are properly stacked			
1.12 The aisles, work areas and storage areas are adequate and properly designated			
1.13 There is sufficient space between machines and facilities			
1.14 The floor is defined with yellow bands 10 to 15 cm wide			

Details	True	False	Not applicable

1.15 Work surfaces are even

1.16 If outside areas have ditches, wells, apertures, or unevenness, they have protections, signaling, or safety and hygiene notifications

1.17 Fixed and portable ladders and platforms meet the minimum requirements of design and construction

1.18 Step ladders are properly used

1.19 Platforms are constructed with adequate materials and have rails and plinths

1.20 Openings in the floors have rails

1.21 There is a minimum height of 2.5 m from floor to ceiling

1.22 There is a minimum free surface of 2 m2 for each worker

1.23 Ceilings and walls have safety characteristics to withstand natural phenomenon (meteorological and seismic)

1.24 Materials used for ceilings and walls are water proof, non-toxic and resistant

1.25 Ceilings and walls have coating or thermal insulation that diminishes heat transfer

1.26 Ceilings and walls are glare free

1.27 Pale colors are utilized on the walls to avoid disturbing workers' behavior

II. SERVICES AND AUXILIARY INSTALLATIONS

2.1 Fresh potable water is provided in quantities sufficient for consumption by the workers

2.2 There are appropriate dressing rooms in sufficient quantity

2.3 The dressing rooms are kept clean, washed, and disinfected

2.4 The dressing rooms have proper illumination

2.5 The dressing rooms floors are non-slippery

2.6 There is enough space in the dressing rooms according to the number of users.

2.7 Adequate toilet facilities are provided (lavatories, urinals, showers and sinks) in sufficient quantity and are accessible to the workers

Details	True	False	Not applicable

2.8 One toilet is available per every 20 male workers and 1 per every 15 female workers

2.9 The floors and walls are continuous, smooth, and waterproof and made from materials that permit washing with disinfectants

2.10 The toilets are cleaned at least once a day

2.11 The toilets have adequate lighting and ventilation

2.12 Dressing rooms and toilet facilities are available separated for each sex

2.13 Dining rooms and adequate facilities for eating and resting are available

2.14 An emergency first aid kit is available

2.15 A nursing room or first aid room is available

2.16 A system for emergency lighting is available

III. FIRE PREVENTION AND EXTINCTION

3.1 Sites with fire hazards are isolated from the rest of the workplace

3.2 Sites where combustible substances are used are built with fire resistant material

3.3 Combustible waste is disposed of in closed, fire-proof and marked containers

3.4 Fire detection systems are available

3.5 Fire extinction systems are available

3.6 Extinguishers comply with established standards

3.7 The quantity of extinguishers is sufficient in regard to the risk in the company

3.8 Personnel is trained to use the fire extinction equipment

3.9 Fire extinction equipment is located and appropriately distributed with regard to the source of risks

3.10 Fire extinction equipment is visibly located and appropriately marked

3.11 Fire extinction equipment is free from obstacles in such a way that free access to them is permitted

3.12 When fire extinction equipment is used it is immediately reconditioned or replaced (whatever is appropriate)

Details	True	False	Not applicable

3.13 There is an external entity or a health facility's worker in charge of carrying out the inspection of the health care facility's extinguishers

3.14 The person in charge is properly trained to carry out this task

3.15 Inspection is carried out monthly

3.16 Handling instructions for the extinguishers are legible and visible

3.17 A written registry of extinguisher inspections is kept

3.18 There are water intakes for the fire department

3.19 Extinguishers are properly loaded, compressed, and free from dirt

3.20 There are labels indicating prevention and danger of fire

IV. ELECTRIC SYSTEMS

4.1 Adequate maintenance is performed to avoid overheating the machines

4.2 Motors and electric equipment are grounded

4.3 The electric system is in optimal condition in order to avoid short circuits

4.4 The electric installations are in good condition, including distribution boxes

4.5 There are no temporary or unforeseen installations in the health care facility

4.6 Outlets, fuse boxes and cable unions are in good condition

4.7 The motors, electric boards, and boxes of switches are free from dirt

4.8 Electric system boxes are not left uncovered

4.9 Cables in contact with flammable materials are duly covered

4.10 There are spark-proof lamps available

4.11 Review periods for the electrical system are defined

4.12 Electrical lines are fully protected and isolated

4.13 Electrical lines are placed as far away as possible from personnel contact

4.14 Cells or compartments where transformers, switches and distribution boxes are installed are properly prepared and protected to avoid every dangerous contact

Details	True	False	Not applicable

4.15 The necessary steps are taken when revisions or repairs to the system are carried out (electricity is disconnected, and it is ensured that no one connects it)

4.16 All the plugs are grounded

4.17 All the switches utilized are of closed type and are risk proof

V. SIGNALING

5.1 Notification signs are placed on out-of-order (repairing and maintenance) machinery and equipment

5.2 The emergency doors and exits are marked where required

5.3 Pipes, containers, and tanks with hazardous substances have adequate labels

5.4 There are signs and/or other notices restricting the access of external personnel to specific dangerous areas of work

5.5 There are signs by which the risks present in the work areas are indicated

5.6 The special installations and auxiliary services (extinguishers, emergency showers, etc.) are indicated by labels or other signs

5.7 The signs are located in places that are easily visible from different points of the workplace

VI. EMERGENCY EXITS

6.1 There are duly identified emergency exits

6.2 The quantity of emergency exits is adequate

6.3 They have adequate lighting

6.4 They open and rotate easily towards the outside

6.5 The emergency exits are free from obstacles

6.6 The emergency exits are sufficiently wide to permit evacuation

6.7 There are emergency stairs

Details	True	False	Not applicable

VII. MACHINERY AND EQUIPMENT

7.1 Are adequately designed and constructed in order to avoid lateral and backwards overturning

7.2 The equipment and machines receive periodic preventative maintenance

7.3 Operators of machines and equipment are trained

7.4 There are available standards for operating the machines and equipment and to prevent over turnings.

7.5 Machines and equipment have cabins and safety entrances adequately designed and constructed

7.6 Machines and equipment are provided with rails to go up and down

7.7 The cabins are designed and constructed to be comfortable and to protect the worker against dust and noise

7.8 The equipment and machinery have seats designed such that they can be adjusted in accordance with the anthropometric characteristics of the operator and in order to alleviate vibrations

7.9 The front of the tractor is ballasted when the equipment is heavy

7.10 Moving parts and implements have adequate protection guards

7.11 Equipment platforms have access stairs and adequate railing

7.12 Machines and equipment have signs or indicators

7.13 The signs and indicators provide clear information safely and quickly

7.14 The machines and equipment have controls

7.15 The controls are designed and prepared compatible with the characteristics of the body part with which they are operated

7.16 The functions of the controls are easily identifiable

7.17 The controls are designed to prevent accidental operations

VIII. HAND TOOLS

8.1 The right tools are selected according to the task in which they are going to be used

Details	True	False	Not applicable

8.2 The conditions of the tools are adequate, so they do not represent danger for the user

8.3 Tools are subject to review and periodic control, as part of their maintenance program.

8.4 Tools are stored in places especially designed to safely keep them

8.5 Means or special safety instruments are employed to safely transport the tools

8.6 Adequate procedures are used for the transportation and use of the tools

IX. MACHINERY

9.1 The methods of prevention and protection are considered when machinery is designed and installed

9.2 Sharp objects and energy conductive elements are duly protected with guards and protection devices designed and constructed according to national standards

9.3 Machines and equipment are anchored to the floors and facilities in such a way that vibrations are alleviated

9.4 There is a program for preventive maintenance of the machines

9.5 Systems of signaling are available in those machines that involve dangers

X. STORAGE, MANIPULATION, AND TRANSPORTATION OF MATERIALS

10.1 The storage place of the materials and tools is firm as are the foundations

10.2 Corridors are free from objects

10.3 Exits are free from obstacles or stacked materials

10.4 Free space is left at the floor level in order to promote ventilation, cleaning and control of rodents

10.5 There are specific places for storage of materials

10.6 All the materials utilized are documented

10.7 The chemical substances are classified according to their degree of danger

10.8 All the containers with chemical substances are clearly identified and labeled

Details	True	False	Not applicable
10.9 Labels provide all the information related to the material's use, risks, relevant first aid, etc			
10.10 When transfers of products are made, the new containers are labeled			
10.11 Containers and packages are adequate for loading and unloading, manipulation, transportation, and storage			
10.12 Storage sites for chemical substances are adequate			
10.13 Hazardous chemical substances are stored in adequate places			
10.14 Storage places are well ventilated and have systems of fire detection and control			
10.15 Sites have contention systems in cases of spills			
10.16 Sites are provided with signaling systems to warn about hazards and prohibitions			
10.17 Safety procedures and instructions for the preparation and mixture of the chemical substances are followed			
10.18 The protective clothing and the equipment are adequate for using and manipulating chemical substances			
10.19 The standards relative to hazardous substance transportation are complied with			
10.20 Personnel is properly trained for the manipulation and transportation of hazardous substances			
10.21 All the necessary precautions for the manipulation and transportation of the materials are taken			

XI. CHEMICAL RISKS

11.1 Hazardous chemical substances are not handled or used			
11.2 The risks related to such substances have been identified			
11.3 The concentration levels of such substances in the environment are periodically evaluated			
11.4 Technical procedures are applied to control polluting agents in the source, in the environment and in the receptor			
11.5 Work environment is completely free from health hazards to workers through inhalation, skin contact or intake of the chemical substances			

Details	True	False	Not applicable

11.6 Risks of the chemical substances are reported to the workers

11.7 Equipment and personal protective clothing are provided to workers whenever this is required

11.8 Equipment and personal protective clothing are adequate

XII. NOISE AND VIBRATION

12.1 Machines and tools that generate noise and vibrations are not utilized

12.2 Causes of noise and vibration are identified

12.3 Noise levels to which the workers are exposed are measured periodically

12.4 Technical procedures of noise control in the source, in the environment, and in the receptor are applied

12.5 Adequate auditory protection equipment is provided

12.6 Cases of irritability, headache, insomnia, etc. attributed to the facility's level of noise and vibration occur

12.7 Techniques for vibration control are utilized on floors and work platforms

12.8 Special accessories for controlling exposure to tools vibration are employed

XIII. THERMAL ENVIRONMENTS

13.1 There are no external radiant sources of heat

13.2 There are no internal radiant and convective sources of heat

13.3 Means of heat control in the source (localized extraction, isolation, etc) are available

13.4 There are general ventilation systems for heat convective sources control

13.5 Exposure to thermal environments is periodically evaluated

13.6 Equipment and clothing for protection against the heat are utilized

13.7 Protective clothing against the cold are utilized

13.8 The times of exposure and rest in the thermal environments are regulated

Details	True	False	Not applicable

13.9 Methods and physical workload are studied

XIV. BIOLOGICAL RISKS

14.1 No work with human beings, animals and vegetables that pose a biohazard for the workers is performed in this health care facility

14.2 Products that can create biological contamination are not handled

14.3 Work is not conducted in places with overcrowding or organic dirt or among people or sites with precarious hygiene

14.4 The workplace is free from the presence of biological and mechanical vectors

14.5 There is control of the biohazards

14.6 Adequate personal protective equipment is available

XV. ILLUMINATION AND VENTILATION

15.1 The activities carried out do not require any artificial lighting

15.2 Great visual acuity is not required to develop the work

15.3 There is sufficient light to perform the tasks

15.4 Illumination levels are measured

15.5 The work environment is free from any type of reflection by shiny surfaces

15.6 The light tone is comfortable for vision

15.7 A program for lighting maintenance is set

15.8 The color and contrast system is adequate

15.9 Adequate ventilation is provided

15.10 There are no sources of heat or elements that influence the environment, temperature and moisture

XVI. RADIATION

Details	True	False	Not applicable

16.1 Workers are not exposed to ionizing radiation, infrared radiation, ultraviolet, microwaves, radiofrequencies, etc

16.2 Adequate radiation control methods are used

16.3 Workers utilize equipment and personal protective clothing

16.4 Workers have knowledge of the risks of the exposure to radiation

XVII. WASTE

17.1 Solid and liquid waste are not generated by the work processes (please investigate chemical, radioactive, biologic wastes, etc)

17.2   Generated waste is controlled without affecting the environment (water, soil and air)

17.3   Workers utilize protective equipment when handling the waste

17.4   Workers understand the risks of health care facility wastes

17.5   Disposal containers for used needles and sharp objects made with hard material and properly utilized, are provided in sufficient number

XVIII. ERGONOMICS

18.1 Products, pieces, and tools are kept at a distance that permits being easily reached

18.2 Load handling is adapted to the worker's height

18.3 Tables and inclined shelves that permit performing tasks with less effort are provided

18.4 Manual tasks are performed in accordance with the workers' height (elbow height)

18.5 Studies aiming to minimize the required effort for the tasks performed have been conducted

18.6 Studies have been conducted to seek the correct position for each task

18.7 Studies have been conducted to reduce repetitive

18.8 Studies have been conducted to help minimize fatigue

Details	True	False	Not applicable

18.9 Studies have been conducted to minimize direct pressure (palm of the hand, thighs and forearms)

18.10 Adjustable chairs and work tables in accordance with the size of the worker are available

18.11 Tasks that require the worker to maintain the same position are not carried out

18.12 Enough room for each object and easy access to everything needed is available

18.13 A comfortable environment in the facility (clean, well-lit and ventilated) is provided

18.14 Deficiencies of light and shades that conceal details of their work do not occur

18.15 Poor contrasts between the work station and the background does not occur

XIX. PERSONAL PROTECTION

19.1 Protective equipment for the head is utilized

19.2 The helmets utilized are resistant to impact

19.3 The helmets utilized are fire resistant

19.4 The helmets utilized are light-weight

19.5 The helmets utilized when working with high-voltage equipment have electrical isolation

19.6 The helmets utilized are resistant to aggressive chemical spills

19.7 The helmets are comfortable

19.8 The helmets utilized do not interfere with work activities

19.9 Visitors utilize the protective equipment for the head wherever it is needed

19.10 Noise protection equipment is utilized in those areas where intensity higher than the 85dB(A) is reached (plants and offices)

19.11 Visitors utilize the auditory protection equipment wherever necessary

19.12 Noise protection equipment is comfortable

19.13 The equipment does not induce adverse effects on the skin or on the ear

Details	True	False	Not applicable
19.14 The protective equipment adequately attenuates the noise			
19.15 The useful time life of noise protection equipment is established			
19.16 The status of noise protection equipment is periodically reviewed			
19.17 Protective equipment for the eyes against the projection of particles is utilized			
19.18 Protection equipment for the eyes is utilized in the operations where toxic substances are handled			
19.19 The protective glasses are impact resistant			
19.20 Safety goggles have plastic lenses to prevent eye scratches due to particles frequently released in some operations			
19.21 Glasses with filters are utilized in welding operations to protect against brightness and radiant energy			
19.22 The welding area, personnel visiting the plants are instructed not to observe the spark or the brightness of the welding operations			
19.23 Face protective equipment is utilized when required			
19.24 The status of the protective masks is reviewed periodically			
19.25 The person in charge of carrying out the revisions of the equipment is defined			
19.26 The useful time life of the face protection equipment is defined.			
19.27 Masks are utilized in operations with sources of odors			
19.28 Special masks are utilized in paint operations			
19.29 The useful time life of the masks' carbon is defined			
19.30 Replacement of carbon is adequate			
19.31 Aprons are utilized in the operations that require it			
19.32 The aprons are adequate to the operations in which are utilized			
19.33 The aprons are comfortable			
19.34 Gloves are utilized in the activities that require them			
19.35 Gloves types are adequate to the activities carried out			
19.36 The size of the glove fits the worker who utilizes it			

Details	True	False	Not applicable

XX. GAS CYLINDERS

20.1 The cylinders are kept separated from the area where welding and cut operations are carried out

20.2 Are not placed indoors

20.3 Placing cylinders in locations where they can be exposed to mobile equipment, substances, etc. is avoided

20.4 Are safely and well placed in order to avoid displacement

20.5 Are visibly labeled

20.6 The equipment is utilized with hands free from grease or oils

20.7 When carrying out welding jobs, an extinguisher is kept close in case of fire

20.8 Are transported by wheelbarrows and are not dragged

20.9 When the cylinders are moved, the protective cover of the valve is in place and closed

20.10 The cylinders are raised appropriately (not through the valves and covers)

20.11 Valves are checked and are in good condition

20.12 The person in charge of reviewing the cylinders is defined

XXI. ELECTRIC WELDING

21.1 The floor is clean and free from oil, grease or paint and from any other combustible material

21.2 It is ensured that the work area is not wet or moist

21.3 The work area is inspected at the end of the day

21.4 The energy feed is turned off before any maintenance is carried out on the machine

21.5 The use of gas or inflammable liquid plumbing to ground the equipment is avoided

21.6 To ground the equipment, electrical wiring is used

Details	True	False	Not applicable

21.7 Power that surpasses the capacity of the wire is not used

21.8 There are no welding tubes with compressed gas

Remarks:

(1) In general, anything that corresponds to the column "false" (incorrect phrases) should be considered a potential hazard. Attention should be given to determine whether it represents a significant risk.

(2) In general, the statements that fall in the "true" or "non-applicable" columns represent the absence of the hazard or an adequately controlled risk.

Annexure 8.1 Medical Facility Standards

Get Kerala-specific information of this chapter from <u>http://www.dhs.kerala.gov.in/</u>

With the objective of providing health services in Urban and Remote areas, the department provides three tier medical services in the state of Uttar Pradesh. Under this, at the first level, Health Services are provided in urban areas. Health services at the second and third level are provided in rural areas.

<u>**Level 1 Health Service**</u>

First level Health Services are provided in Urban areas through District Male and Female or Combined Hospitals and are at district level. These hospitals are generally 100 – 500 bedded Hospitals, where various medical facilities are provided. At present there are 80 District Level Hospitals, 6 Combined Hospitals and 63 Female Hospitals are available.

District Hospital Male

GENERAL SERVICES

- Surgery Department
- Paediatrics Department
- Orthopaedic Department
- Ophthalmic Department
- ENT Department
- Dental Department
- Anaesthesia Department
- Pathology Department
- Radiology Department
- Ultrasound Department
- Intensive Care Unit
- Blood Bank
- Physiotherapy Department
- Occupational Therapy Unit
- Intensive Cardiac Care Unit
- Plastic and Burn Unit
- Dialysis
- Neurology Services
- Cat scan Services
- Antahrogy Department, Private Ward, Paying Ward

FAMILY WELFARE

- Male Vasectomy
- No Scalepill Vasectomy
- Female Vasectomy
- Minilap
- Laparoscopic
- Nirodh
- Pills
- Post-mortem
- ARV

MISCELLANEOUS SERVICES

- Rain Basera

District Hospital Female

GENERAL SERVICES

- Prenatal Tests
- Delivery Services
- Operation Facilities
- Emergency/ Complicated Delivery facilities
- Postnatal Services
- Abortion Facilities
- Paediatrics Department
- Immunization
- Pathology
- Ultrasound
- Neonatology
- Infertility Clinic

FAMILY WELFARE

- Female Vasectomy
- Minilap
- Laparoscopy
- Oral pills
- Nirodh

- Copper-T

Health Post (For urban population of 50,000 to 55,000, of which 30,000 to 40,000 will be slum population)

As of now the Health Posts or Primary Urban Health Centers (P.U.H.C) have been established in 5 cities in U.P which are having a large share of Slum population - Meerut, Ghaziabad, Allahabad, Varanasi and Aligarh under the National Urban Health Mission. The services in Health Post are as enlisted below:

S. No	Type of service	PUHC	Outreach
1	Maternal Health	Antenatal care, postnatal care, referral, management of regular maternal health conditions, referral of complicated cases. Intra natal care, i.e. normal deliveries, appropriate and prompt referral of cases needing specialist care.	Registration, ANC, identification of danger signs, referral for institutional delivery, follow-up. Counseling and behaviour promotion.
2	New born care	Management of neonatal hypothermia / jaundice.	Promotion of exclusive breast-feeding for 6 months.
3	Family Welfare	Distribution of OCP/CC, IUD insertion, referral for sterilization, management of contraceptive related complications.	Counseling, distribution of OCP/CC, referral for sterilization, follow-up of contraceptive related complications.
4	Child Health and Nutrition	Diagnosis and treatment of childhood illnesses, referral of acute cases/ chronic illness. Identification and referral of neonatal sickness.	Immunization, identification of high risk cases, referral, follow up, distribution of ORS, paediatric cotrimoxazole, post natal visits and counselling for newborn care
5	RTI/STI (including HIV/AIDS)	Diagnosis and treatment, referral of complicated cases.	Symptomatic search, referral, community level follow up for ensuring adherence to treatment regime of cases under going treatment.
6	Nutrition Deficiency Disorders	Diagnosis and treatment of seriously deficient patients, referral of acute deficiency cases Early identification of mild and severe under nutrition, counselling for optimal feeding practices or referral.	Height /weight measurement, distribution of therapeutic doses of IFA, promotion of iodised salt, nutrition supplements to identified children and pregnant /lactating women. Collaborate with the Anganwadi Workers (AWW) under ICDS.
7	Vector born diseases	Diagnosis and treatment, referral of terminally ill cases.	None
8	Mental health	Referral and follow up.	Referral and follow up.
9	Chest infections (TB/asthma)	Diagnosis and treatment, referral of complicated cases (MDR, reactions, terminal illness).	Symptomatic search and referral, ensuring adherence to DOTS and other treatment.

S. No	Type of service	PUHC	Outreach
10	Cardio vascular diseases	Clinical diagnosis, management and referral of hypertension; follow up of referred cases.	BP measurement, symptomatic search and referral, follow up of under treatment patients.
11	Diabetes	Blood/urine testing, Clinical diagnosis and referral; follow up of referred cases.	Symptomatic search and referral follow up of under treatment patients.
12	Trauma care (burns and injuries)	First aid, emergency resuscitation, documentation for medico legal cases (if applicable) and referral. Stabilization of the patient before referral, dog bite/snake bite/scorpion bites cases and other emergency conditions.	Not applicable.
13	Other surgical interventions	Identification and referral.	Not applicable
14	Referral of cases	Refer to 24x7 accredited private hospitals within network; or to district hospital or Medical College hospital, as per need.	Refer to the PUHC or higher centres
15	IEC/BCC	Distribution of health education material	Health camps/ fairs, events in schools / with women's groups
16	Counselling	Patient / Attendant counselling	Individual and group/family counselling – HIV /AIDS, mental disorders, stress management, tobacco / alcohol substance abuse.
17	Personal and social hygiene	Not applicable	IEC on hygiene, community mobilization for cleanliness drives, disinfection of water sources, etc.

Level 2 Health Service

At this level health services are provided through Community **Health Centre** established at the Tehsil and Block Level. Presently the standard for setting up the CHC is population. For each 1 Lakh population in rural areas one CHC is set up. Each CHC is set up with the objective of providing standard Health services to the public in the rural areas. Accordingly CHC also acts as 'referral unit' in rural areas.   Each CHC has 30 beds. Operationalisation of CHC requires expenditure of Rs. 20 lakh approximately towards the cost of equipment / infrastructure and salary etc. At present in the state there are 308 CHCs operational. As per July 1987 to March 1997 standards 6 Specialities were required at CHC level viz. Physician, Surgery, Gynaecologist, Paediatrics, Radiologist and Dental Doctor. The standard was revised and as per March 1997 to May 1999, 7 Specialties were required at CHC levels, which were Physician, Surgery, Gynaecologist, Dental Doctor, and Pathologist. At present as per standard laid

from May, 1999 following 5 specialties are required at CHC – Physician, Surgery, Gynaecologist, Nishchetak, Radiologist.

GENERAL SERVICES-

- OPD
- Services of Antrogi Department
- Test Facilities
- X-Ray facilities
- Operation facilities
- Ambulance facility
- Abortion
- Delivery
- Required/ Complicated   delivery
- Immunization
- Complaint Book
- Eye Cure
- Leprosy cure
- TB cure

FAMILY WELFARE

- Registration of Pregnant woman.
- Tetanus immunization of pregnant woman.
- Prenatal care of pregnant woman.
- Safe Delivery.
- Postnatal care of Infant and mother.
- Immunization of TB, Polio, Diphtheria, Tetanus, Whooping Cough and Measles in Infants.
- Cure of Diarrhoea and Pneumonia.
- For the prevention from night blindness and anaemia, distribution of vitamin A solution and iron folic acid tablets respectively.
- To detect and cure from contagious diseases.
- Publicity of AIDS.
- Registration of death and birth.
- Female worker should have the complaint book

Level 3 Health Service

At the third level Health Services are provided in Remote Rural areas through the Primary Health Centres (30,000 Population), Additional Primary Health Centres and Sub Centre (5,000 Population in Plains & 3,000 in Bundelkhand). PHCs/ Additional PHCs are established level at the village Level, having 4 beds each. There are presently 1,85,65 sub-centres, 810 Block level PHCs and 2830 additional PHCs operational. Basically mainly

Mother and Childcare programme is implemented using Sub Centre. Apart from these there are few rural women hospitals where safe delivery facility is provided. Around 20,000 sub centres on 5000 village population are functioning manned by ANMs.

Primary Health Center (PHC)

GENERAL SERVICES

- Cure for General Patients
- General Test services: Stool, Urine, Blood, Malaria and TB
- Services of different programs and contagious   diseases
- Immunization Services
- Eye cure
- Leprosy cure
- Malaria

FAMILY WELFARE

- Registration of Pregnant woman.
- Tetanus immunization of pregnant woman.
- Prenatal care of pregnant woman.
- Safe Delivery.
- Postnatal care of Infant and mother.
- Immunization of TB, Polio, Diphtheria, Tetanus, Whooping Cough and Measles in Infants.
- Cure of Diarhhorea and Pneumonia.
- For the prevention from night blindness and aneamia, distribution of vitamin A solution and iron folic acid tablets respectively.
- To detect and cure from contaginous diseases.
- Publicity of AIDS.
- Registration of death and birth.
- Female worker should have the complaint book.
- Vasectomy Male
- Vasectomy Female

Sub – Centre

FREE SERVICES & FACILITIES

- Registration of Pregnant woman.
- Tetanus immunization of pregnant woman.
- Prenatal care of pregnant woman.

- Safe Delivery.

- Postnatal care of Infant and mother.

- Immunization of TB, Polio, Diphtheria, Tetanus, Whooping Cough and Measles in Infants

Annexure 8.2 Emergency Health Kit

First Aid Supplies

- First aid kit and manual
- Germicidal hand wipes or waterless,
- Alcohol-based hand sanitizer
- Antiseptic wipes
- Pairs of large, medical grade, non- latex gloves
- Cold pack
- Scissors
- Tweezers
- Assorted sizes of safety pins
- Cotton balls
- Thermometer
- Tube of petroleum jelly or other lubricant
- Sunscreen

Non-Prescription and Prescription Medicine Kit Supplies and Medical Support Equipment

- Antibacterial ointment
- Aspirin and non-aspirin pain reliever
- Anti-diarrhea medication
- Antacid (for stomach upset)
- Laxative
- Vitamins
- Prescription Drugs (two week supply)
- Dentures and cleaning solution
- Eyeglasses/contact lenses and cleaning solution
- Hearing aid and batteries
- Medical support equipment (wheelchairs, battery if motorized, walkers, cane, dressings, oxygen and tubes, feeding equipment, etc.).

Sanitation and Hygiene Supplies

- Towelettes, body wipes, soap, hand sanitizer
- Heavy-duty plastic garbage bags and ties for personal sanitation uses and toilet paper
- Washcloth and towel

- Medium-sized plastic buckets with tight lid
- Tooth paste, toothbrushes
- Disinfectant and household chlorine bleach
- Shampoo, comb, and brush
- Feminine supplies
- Deodorants, sunscreen Toilet paper
- Razor, shaving cream
- Diapers, Disposable incontinence supplies
- Lip balm, insect repellent
- Mirror

Annexure 8.3 Location of Health Facilities

Get Kerala-specific information for all 15 districts of Kerala from http://www.dhs.kerala.gov.in/

District Hospitals: Male

Name of Division	S.NO	Name of District	No of beds
Agra	1	District hospital male, Agra	118
	2	District hospital male, Aligarh	232
	3	District hospital male, Aeta	117
	4	District hospital male, Firozabad / T.B Sanitorium	224
	5	District Joint hospital male, Sikohabad, Firozabad	100
	6	District Joint male hospital male, Haathras	30
	7	District hospital male, Maainpuri	78
	8	District hospital male, Mathura	74
Allahabad	9	T.B Sapru District male hospital, Allahabad	171
	10	Motilal Nehru District male Hospital, Allahabad	165
	12	District hospital male, Pratapgarh	190
	13	District hospital male, Fatehpur	118
Azamgarh	14	District hospital male, Azamgarh	164
	15	District hospital male, Balia	176
	16	District Joint hospital male, Mau	100
Bareilly	17	District hospital male, Bareilly	325
	18	Mental District hospital male, Bareilly	408
	19	District hospital male, Shajahanpur	105
	20	District hospital male,Peelibheet	130
	21	District hospital male,Badaun	
Faizabad /Devipatan	22	District hospital male,Balrampur	100

District Hospitals: Male

Name of Division	S.NO	Name of District	No of beds
	23	District hospital male,Behraich	201
	24	District hospital male,Gonda	174
	25	District hospital male,Barabanki	140
	26	District hospital male,Faizabad	220
	27	Sri Ram District hospital male,Ayodhya,Faizabad	85
	28	District hospital male,Sultanpur	226
Gorakhpur / Basti	30	District hospital male,Basti	298
Jhansi / Chitrakut	31	District hospital male,Kaili, Basti	300
	32	District hospital male,Deveria	208
	33	District Joint hospital male,Siddharthnagar	64
	34	District hospital male,Gorakhpur	305
	35	District hospital male,Hamirpur	68
Kanpur	36	District hospital male,Lalitpur	83
	37	District hospital male,Banda	103
	38	District hospital male,Chitrakut	30
	39	District hospital male,Mahoba	30
	40	District hospital male,Jalaun	180
	41	District hospital male,Jhani	172
	42	U.H.M District hospital male,Kanpur	416
Lucknow	43	K.P.M District hospital male,Kanpur	
	44	District hospital male,Kanpur Dehat	100
	45	District hospital male,Farukhabad	200
	46	District hospital male,Itawa	300
	47	District hospital male,Raibareilly	200

District Hospitals: Male

Name of Division	S.NO	Name of District	No of beds
	48	District hospital male,Hardoi	184
	49	District hospital male,Unnao	110
	50	District hospital male,Sitapur	207
	51	District hospital male,Kheri	167
	52	Balrampur District hospital male,Lucknow	656
	53	D.R.L.M District hospital male,Gomtinagar,Lucknow	181
	54	D.R.L.M District hospital male, Lucknow	351
	55	Rani Laxmi Bai D.R.L.M District Joint hospital male,Rajajipuram ,Lucknow	30
	56	Bhao Rai Devras District Joint hospital male,Mahanagar ,Lucknow	30
	57	T.B District hospital male,Thakurganj,Lucknow	175
Meerut / Saharanpur	58	P.L Sharma District hospital male,Meerut	250
Muradabad	59	S.M.S.J District hospital male,Khurja	68
	60	District Joint hospital male,Sikandrabad	50
	61	District hospital male,Bulandshaher	177
	62	District Joint hospital male,Gautambudh Nagar	100
	63	District hospital male,Gaziabad	120
	64	District hospital male,Saharanpur/ T.B Sanitorium	296
	65	District hospital male,Muzaffarnagar	172
	66	District hospital male,Muradabad	187
	67	District hospital male, Rampur	150
	68	District hospital male, Rampur	80
Varanasi / Mirzapur	69	District hospital male,Gyanpur Santarvidas Nagar	100
	70	District hospital male,Chandauli	100
	71	District hospital male,Jaunpur	185

District Hospitals: Male

Name of Division	S.NO	Name of District	No of beds
	72	District hospital male,Mirzaput	155
	73	District hospital male,Sonbhadra	100
	74	District hospital male,Ghazipur	150
	75	S.S.P.G District hospital male,Varanasi	282
	76	P.Deendayal District hospital male,Varanasi	250
	77	Mental District hospital male,Varanasi	331
	78	Lal bahadur District hospital male,Ramnagar Varanasi	153

District Hospitals: Female

Name of Division	S.NO	Name of District	No of beds
Agra	1	District Hospital Female, AGRA	331
	2	District Hospital Female, Aligarh	110
	3	District Hospital Female, Ata	34
	4	District Hospital Female, Firozabaad	30
	5	District Hospital Female, Mahamaya Nagar	30
	6	District Hospital Female, Mainpuri	30
	7	District Hospital Female, Mathura	76
Allahabaad	8	District Hospital Female, Allahbaad	142
	9	District Hospital Female, Pratapgarh	62
	10	District Hospital Female, Fetehpur	40
Azamgarh	11	District Hospital Female, Azamgarh	100
	12	District Hospital Female, Balia	65
Bareli	13	District Hospital Female, Bareli	114
	14	District Hospital Female, Pilibhit	70
	15	District Hospital Female, Shanhajanhpur	41
	16	District Hospital Female, Bandau	79
Faizabaad/ Devepatan	17	District Hospital Female, Balrampur	100
	18	District Hospital Female, Behraich	92

District Hospitals: Female

Name of Division	S.NO	Name of District	No of beds
	19	District Hospital Female, Gonda	100
	20	District Hospital Female, Barabanki	73
	21	District Hospital Female, Faizabaad	148
	22	District Hospital Female, Sultanpur	82
Gorakhpur/ Basti	23	District Hospital Female, Basti	125
	24	District Hospital Female, Deveria	81
	25	District Hospital Female, Gorakhpur	198
Jhansi/Chitrakoot	26	District Hospital Female, Hemirpur	30
	27	District Hospital Female, Lalitpur	30
	28	District Hospital Female, Banda	32
	29	District Hospital Female, Jaalon	50
	30	District Hospital Female, Jhansi	47
Kanpur	31	A.H.M. Female Hospital, Kanpur Nagar	210
	32	District Hospital Female, Kanpur Dehat	
	33	District Hospital Female, Farukhabaad	30
	34	District Hospital Female, Itava	43
Lucknow	35	District Hospital Female, Unnao	60
	36	District Hospital Female, Raebareli	71
	37	District Hospital Female, Hardoi	64
	38	District Hospital Female, Sitapur	132
	39	District Hospital Female, Kheri	52
	40	Veerangna avantibai Female Hospital, Lucknow	192
	41	Veerangna Jhakaribai Female Hospital, Lucknow	50
Meerut/ Saharanpur	42	District Hospital Female, Meerut	116
	43	District Hospital Female, Bulandshahar	60
	44	District Hospital Female, Ghaziabaad	68
	45	District Hospital Female, Saharanpur	110
	46	District Hospital Female, Mujffar Nagar	102
	47	District Hospital Female, Muradabaad	80
	48	District Hospital Female, Rampur	40
	49	District Hospital Female, Bijnor	50
	50	District Hospital Female, Jaunpur	110
	51	District Hospital Female, Mirzapur	60
	52	District Hospital Female, Gajipur	81
	53	District Hospital Female, Varansi	180

Annexure: Symptoms of Diseases and Medicines

Disease	Signs and symptoms	Medicine
Tuberculosis	- Persistent cough for 3 weeks or more - Weight loss - Chest pain - Tiredness - Shortness of breath - Loss of appetite - Fever, particularly with rise of temperature in the evening - Coughing up blood (Haemoptysis) - Night sweats.	- isoniazid, - rifampicin, - pyrazinamide, - ethambutol
Asthma	- Night-time coughing - Shortness of breath with exertion but no dyspnoea at rest - Chronic 'throat-clearing' type cough - Complaints of a tight feeling in the chest	- Inhaled medications include beta-2 agonists, anticholinergics, corticosteroids, and cromolyn sodium. - Oral medications include aminophylline, leukotriene antagonists, beta-2 agonists, and corticosteroid tablets.
Cancer (lung)	- a new persistent cough or worsening of an existing chronic cough, - blood in the sputum, - persistent bronchitis or repeated respiratory infections, - chest pain, - unexplained weight loss and/or fatigue, and/or - Breathing difficulties such as shortness of breath or wheezing.	Avastin or Tarceva
Cancer (stomach)	- Discomfort in the stomach area - Feeling full or bloated after a small meal - Nausea and vomiting - Weight loss	5-FU (fluorouracil), BCNU (carmustine), methyl-CCNU (Semustine), and doxorubicin (Adriamycin), as well as Mitomycin C, and more recently cisplatin and taxotere in various combinations
Heart Attack	- Pain, fullness, and/or squeezing sensation of the chest - Jaw pain, toothache, headache - Shortness of breath - Nausea, vomiting, and/or general epigastric (upper middle abdomen) discomfort - Sweating - Heartburn and/or indigestion - Arm pain (more commonly the left arm, but may be either arm) - Upper back pain - General malaise (vague feeling of illness)	Nitroglycerin, .metoprolol, atenolol, aclopidogrel, propranolol, aspirin, clopidogrel (Plavix).
Cholera	- Abdominal cramps - Dehydration - Diarrhea has a "fishy" odor	Monodox, Oraxyl, Vibra-Tabs, Vibramycin, Doxy 200, Doxy 100, Cipro, Cipro XR

Disease	Signs and symptoms	Medicine
	- Dry mouth - Dry skin - Excessive thirst - Leg cramps - Low urine output - Low Blood Pressure - Nausea - Rapid heart rate - Sunken eyes - Tiredness - Unusual sleepiness - Vomiting - Watery diarrhea	
Malaria	- fever - shivering - arthralgia (joint pain) - vomiting, - Anemia (caused by hemolysis) - hemoglobinuria - retinal damage - convulsions	Artemether-lumefantrine,Chloroquine, Quinine, Amodiaquine, Cotrifazid, Mefloquine, Primaquine, Hydroxychloroquine
Typhoid	- sustained fever as high as 40 °C (104 °F) - profuse sweating - gastroenteritis - Nonbloody diarrhea. - Less commonly a rash of flat, rose-colored spots may appear.	Antibiotics, such as ampicillin, chloramphenicol, trimethoprim-sulfamethoxazole, Amoxicillin and ciprofloxacin
HIV/AIDS	- Neurological (encephalitis, meningitis) - Eyes (retinitis) - Lungs (pneumocystis, Pneumonia, Tuberculosis, Tumours) - Skin (Tumours) - Gastrointestinal (Esophagitis, Chronic diarrhoea)	- There is currently no vaccine or cure for HIV or AIDS. The only known methods of prevention are based on avoiding exposure to the virus or, failing that, an antiretroviral treatment directly after a highly significant exposure, called post-exposure prophylaxis (PEP). - PEP has a very demanding four-week schedule of dosage. It also has very unpleasant side effects including diarrhoea, malaise, nausea and fatigue.
Dengue fever	- Severe headache - Muscle and joint pains (myalgias and arthralgias—severe pain that gives it the nick-name break-bone fever or bone crusher disease) - Fever - Rash. - Gastritis with some combination of associated abdominal pain, nausea, vomiting, or diarrhoea	Paracetamol
Hepatitis A	- Fatigue - Fever - Abdominal pain - Nausea	- There is no specific treatment for hepatitis A. - Sufferers are advised to rest, avoid fatty foods and alcohol (these may be poorly tolerated for

Disease	Signs and symptoms	Medicine
	- Diarrhoea - Appetite loss - Depression - Jaundice, a yellowing of the skin or whites of the eyes - Sharp pains in the right-upper quadrant of the abdomen - Weight loss - Itching	some additional months during the recovery phase and cause minor relapses), eat a well-balanced diet, and stay hydrated
Measles	- high fever - coughing - a maculo-papular rash - common complications include diarrhoea, pneumonia, and ear infections	There is no cure for measles. Most patients with uncomplicated measles will recover with rest and supportive treatment.
Meningitis	- severe headache - fever - nausea - vomiting - lethargy - delirium - photophobi - A stiff neck.	Rifadin IV, Rocephin, Septra, Septra DS, Principen, Penicillin-VK, Primaxin IV, Sulfatrim Pediatric, Triamonide 40, Pen-V, Ceftin, Flagyl
Jaundice	- Dark urine colors - Itching (pruritis) - Light stool colors - Signs of liver disease or cirrhosis (if due to liver disease) - Vitamin deficiencies (if due to bile duct blockage) - Yellow mucous membranes - Yellow sclerae - Yellow skin	- Home Remedies - Jaundice treatment using tomato-a glass of fresh tomato juice, mixed with pinch of salt and pepper, taken early in the morning is considered an effective remedy for the disease. - Sugarcane juice-one glass of sugarcane juice, mixed with juice of half a lime, and taken twice daily, can hasten recovery from jaundice.
Small pox	- acute onset of fever - chills - headache - nausea - vomiting - severe muscle aches	- No drug is currently approved for the treatment of smallpox. - However, antiviral treatments have improved since the last large smallpox epidemics, and studies suggest that the antiviral drug cidofovir might be useful as a therapeutic agent. - The drug must be administered intravenously, however, and may cause serious renal toxicity
Hepatitis B	- Ill-health - loss of appetite - nausea - vomiting - body aches - mild fever - dark urine - itchy skin - chronic inflammation of the liver and then progresses to development of jaundice	Antiviral drugs lamivudine (Epivir), adefovir (Hepsera), tenofovir (Viread), telbivudine (Tyzeka) and entecavir (Baraclude) and the two immune system modulators interferon alpha-2a and pegylated interferon alfa-2a (Pegasys)

Disease	Signs and symptoms	Medicine
Influenza	• Body aches, especially joints and throat • Extreme coldness and fever • Fatigue • Headache • Irritated watering eyes • Reddened eyes, skin (especially face), mouth, throat and nose • Abdominal pain (in children with influenza B)	• Neuraminidase inhibitors and M2 protein inhibitors (adamantane derivatives).
Diphtheria	• fatigue • fever • a mild sore throat • problems swallowing • neck swelling, informally referred to as "bull neck • listlessness, • pallor, • Fast heart rate.	• Erythromycin (orally or by injection) for 14 days, Procaine penicillin G given intramuscularly for 14 days.
Diarrhoea	• Frequent, watery motions. • Loss of appetite. • Nausea, vomiting. • Stomach pains. • Fever. • Blood in the motions. • Pus in the motions (yellow mucus). • Inability to drink liquids because of vomiting. • Pronounced drowsiness due to dehydration or intoxication. • Acute diarrhoea in infants. • Acute diarrhoea in very old people. • Dehydration.	• Loperamide (Imodium), bismuth subsalicylate, pain-killers, such as morphine or codeine.

Annexure: Personal Protective Equipment (PPE)

Personal protective equipment (PPE) is any type of facemask, glove, or clothing that acts as a barrier between infectious materials and the skin, mouth, nose, or eyes (mucous membranes). When used properly, personal protective equipment can help prevent the spread of infection from one person to another. Emergency care personnel who provide medical care to victims of hazardous incidents have the responsibility of first protecting themselves by wearing adequate protective equipment. Whenever possible, they will select the level of equipment based on the known properties of the hazard. When the type of hazard is unknown, they will assume a worst-case exposure and use the highest level of adequate protection.

Doctors routinely use personal protective equipment to protect themselves against blood and body fluid exposure while caring for patients. They may use more specialized PPE when participating in pre-hospital response (usually as part of a specialized team) or when providing medical care to contaminated people at the hospital.

Many types of protective equipment are currently available, ranging from maximum protection with a positive pressure respirator and total body encapsulation to minimum protection with a simple surgical mask and a pair of latex gloves. These are the various types of protective respiratory devices and clothing.

Protective Respiratory Devices

The basic types of respirators are atmosphere supplying (self-contained breathing apparatus [SCBA], supplied-air respirator [SAR]) and air purifying respirator (APR).

- **Self-contained breathing apparatus:** SCBA consists of a full-face piece connected by a hose to a portable source of compressed air. The open-circuit, positive-pressure SCBA is the most common type. This self-contained breathing apparatus provides clean air under positive pressure from a cylinder. The air then is exhaled into the environment. SCBA provides the highest level of respiratory protection.

- **Supplied-air respirator:** SAR consists of a full-face piece connected to an air source away from the contaminated area via an airline. Because SARs are less bulky than SCBA, they can be used for longer periods. Supplied-air respirators are also easier for most hospital personnel to use. SARs, like self-contained breathing apparatus, provide a high level of respiratory protection.

- **Air-purifying respirator:** An APR consists of a face piece worn over the mouth and nose with a filter element that filters available air in the environment before inhalation. Three basic types of APRs exist: powered, disposable, and chemical cartridge or canister.

  Powered air-purifying respirators (PAPRs) deliver filtered air under positive pressure to a face piece mask, helmet, or hood, which provides respiratory and eye protection. Non-powered air-purifying respirators operate under negative pressure, depending on the effort of the wearer who is breathing in to draw air through a filter. Because PAPRs function under positive pressure, they provide high-level respiratory protection.

  A variety of chemical cartridges or canisters, which eliminate a variety of chemicals including organic vapours and acid gases, are available.

  Disposable air-purifying respirators usually are half masks, which do not provide adequate eye protection. This type of APR depends on a filter, which traps particles in the outside air. The use of a high-efficiency particulate air (HEPA) filter alone or in combination with a chemical cartridge enhances disposable APRs. For exposures to biological agents in the air, PAPRs with HEPA filters are most efficient, followed by elastomeric half-mask HEPA filter respirators and non-HEPA disposable APRs. All air-purifying

respirators are limited by the adequacy of their face seals, which may not fully seal tightly. Accordingly, APRs do not provide adequate respiratory protection in environments immediately dangerous to life or health

- **High-efficiency particulate air filter:** HEPA filters remove very small particles with an efficiency of 98-100%, efficiently excluding most aerosolized biological warfare agent particles. HEPA filters are incorporated into a variety of protective respiratory devices including PAPRs and elastomeric half-mask respirators.

- **Surgical mask:** Surgical masks in a medical setting are designed to protect the sterile field of the patient from contaminants generated by the wearer. Although surgical masks filter out large-size particles in the air, they offer no respiratory protection against chemical vapors and little against most biological aerosols.

Protective Clothing

Most protective clothing is aimed at protection against chemicals and chemical warfare agents. Skin (intact, not damaged) provides an effective barrier against all biological warfare agents except the trichothecene mycotoxins. This toxin is capable of causing burn like lesions on the skin.

- **Chemical-protective clothing:** Chemical-protective clothing consists of multilayered garments made out of various materials that protect against a variety of hazards. Because no single material can protect against all chemicals, multiple layers of various materials usually are used to increase the degree of protection. Aluminum-lined, vapor-impermeable garments increase the level of protection. Protection is maximized by total encapsulation (completely covering the wearer). An assortment of types of chemical-protective hats, hoods, gloves, and boot covers are used with the garments.

- **Barrier gown and latex gloves:** Barrier gowns are waterproof and protect against exposure to biological materials, including body fluids, but do not provide adequate skin or mucous membrane protection against chemicals. Latex gloves also protect wearers from biological materials but are inadequate against most chemicals. Barrier gowns, surgical masks, latex gloves, and leg and/or shoe covers (used in hospitals and in operating rooms) together are called universal precautions.

PPE used for Swine flu surveillance

The following personal protective equipment was used by the medical personnel while surveillance activities during the swine flue outbreak: gown extending below knee level, face mask N-95 variety (NIOSH 95), shoe cover, head cover, goggles, swab, and liquid viral transport medium. These equipment were provided by NICD.

Action Plan for Health Department / Epidemic (Disaster)

Health Resources in the State

Health Infrastructure			
Particulars	**Required**	**In position**	**Shortfall**
Sub-centre			
Primary Health Centre			
Community Health Centre			
Multipurpose worker (Female)/ANM at Sub Centres & PHCs			
Health Worker (Male) MPW(M) at Sub Centres			
Health Assistant (Female)/LHV at PHCs			
Health Assistant (Male) at PHCs			
Doctor at PHCs			
Obstetricians & Gynaecologists at CHCs			
Physicians at CHCs			
Paediatricians at CHCs			
Total specialists at CHCs			
Radiographers			
Pharmacist			
Laboratory Technicians			
Nurse/Midwife			

Health Institutions

Health Institution	Number
Medical Colleges	
District Hospitals	
Referral Hospitals	
City Family Welfare Centre	
Rural Dispensaries	
Ayurvedic Hospitals	
Ayurvedic Dispensaries	
Unani Hospitals	
Unani Dispensaries	
Homeopathic Hospitals	
Homeopathic Dispensary	

Hospitals for Mass Casualty Management

S.No.	Name of Hospital	No. of beds
1		
2		
3		
4		
5		
6		
7		
8		
9		

Mitigation Action Plan (During Normal Times)

Disaster mitigation refers to the activities that need to be undertaken in order to avoid a future disaster or to reduce the negative impact of a future disaster. In this case, the government should plan for the following:

Hospital Buildings

- Identify the epidemic prone areas and assess the medical response capability in the area and assess the requirement and feasibility

- Set up new hospitals or upgrade existing hospitals

- Set up new PHCs, mobile units, etc.

- Conduct surveys for the structural safety of the health sector buildings in the earthquake prone areas. Identify the vulnerable buildings and making them safe by retrofitting.

- Similarly identify the health sector buildings in the flood prone areas. Take up necessary mitigation measures like relocation, or strengthening etc.

- Survey the health facility buildings for their non-structural safety. Take up necessary non-structural mitigation measures.

Name of the District	Facility to build/ repair/ retrofit/ upgrade/ non-structural mitigation work	Location	Size and requirements	Cost estimates	Reason for demand

Equipment & Vehicles

- Identify the requirements of equipment including vehicle for effective medical response and take stock of the existing equipment, vehicle etc., and arrive at the gap.

- Plan necessary strategy for closing the gap by purchase, hire, or even requisitioning them from private sources.

Equipment required	Purpose	Where is it to be given	Cost	To be procured	To be hired	To be requisitioned from private

Manpower

- Plan the personnel requirement including doctors, specialists, and support medical staff for effective management of epidemic situation.

- Assess the existing manpower and identify the gap.

- Work out the method of closing the gap by recruiting, hiring or taking private sector help including volunteers.

Type of personnel required	Number	To be recruited	To be made available from private	Volunteers	Estimated expenditure

Manuals & Guidelines

- Plan who will prepare manuals and guidelines and when.

- The following manuals are necessary:

  o First aid manual for health workers and volunteers

  o Emergency medical response manual

  o Manual for prevention of epidemics, etc.

  o Manuals for nurses, paramedical staff, doctors, volunteers, etc.

  o Manual for conducting mock drills

Type of manual required	For whom	How many to be printed	How to distribute	Estimated cost	Remarks

Awareness Materials

– Plan awareness activities such as preparation of awareness creation materials, do's and don'ts in the form of pamphlets, booklets, audio-visual material, etc., for various types of health related disasters targeting various groups of people such as women, community, children, etc.

	Target population						Cost
	Community	Students	General public	Government employees	Women	Children	
Type of material							
Pamphlets							
Booklets							
Video							
Audio							

Capacity Building

– Develop disaster management plan for all hospitals. Provide training to staff on hospital disaster management plan.

– Assess the existing capability of the officers, doctors and staff; identify the gaps for effective response and plan out the training programmes.

– Identify the agency that can give training for doctors, nurses, and other health workers. Plan for preparation of training materials and actual conduct of training.

– Plan training and capacity building programmes.

– Plan to conduct mock evacuation drills in hospitals.

Category which needs training	Type of training	Estimated cost	Remarks
Doctors			
Nurses			
Health Workers			

Budget

– Once all the above mitigation measures are identified the estimated budget for each activity should be done and finally the total budget for the entire mitigation phase should be arrived at. The sources of funding should also be worked out.

– Some of the activities can be taken up in the regular budget of the ministry and the additional requirement should be calculated and it should be taken up with the government for additional grant for mitigation activities.

Type of activity undertaken in mitigation	Estimated cost	Source	Additional funding requirement

Hospital Disaster Management Plans

It is understood that Hospital Disaster Management Guidelines have been prepared for Kerala in 2018. It is suggested that Hospital Disaster Management Plans should be prepared for all hospitals in disaster prone areas.

Preparedness Action Plan (Before Epidemic)

Preparedness activities will comprise all activities that should be done in preparation to meet the response and immediate relief requirements in the event of a disaster. The Health Department will be required to quickly respond to outbreak of an epidemic in the aftermath of any disaster or due to seasonal changes. In this stage, the

government should plan the following activities before an epidemics outbreak. The following preparedness actions should be taken before an expected epidemic season.

State Level Action

− Appoint one person as "NODAL OFFICER – Health Services at the State Level.

− Call for reports from district health officials on preventive actions planned in the districts.

− Identify gaps in district resources and list the supports needed for the districts.

− Issue instructions to district health officials to be observed for effectively managing the epidemic situation and ensure compliance.

− Supply the necessary stock of medicines and other medical supplies to district health facilities.

− Ensure availability of blood in the blood banks.

− Mobilize additional ambulances and place them in remote areas from where patients may have to be quickly shifted to hospitals.

− Instruct all staff not to avail leave during the emergency period.

District Level Action

− The Civil Surgeon will act as "Officer-in-Charge – Health Services at the District Level.

− Critically analyse the available medical resources within the district and share them with the neighbouring districts. This is aimed at the networking of facilities between districts including hospital facilities, ambulances, blood bank, special medical equipment, trained manpower like quick reaction medical teams (QRMT), specialist doctors, etc.

− Within the affected district / local govt. all available personnel will be made available to the District Disaster Manager. If more personnel are required, then out of station officers or those on leave may be recalled.

− All personnel required for disaster management should work under the overall supervision and guidance of the District Collector.

− Establish radio communications with Emergency Operations Centre, district and divisional commissioner, district control room and hospitals (including private) within the division.

− Ensure that personnel working within the district come under the direction and control of the Collector / Civil Surgeon.

− All district level officials of the department would be asked to report to the District Collector.

− The District Collector will provide Officer-in-Charge – Health Services, or the field staff as the need be, with all relevant authorisations with respect to the following:
   o Recruiting casual labourers
   o Procuring locally required emergency tools, equipment and materials
   o Expending funds for emergency needs

− The Officer-in-Charge – Health Services will ensure that all field staff and other officers submit the necessary reports and statement of expenditure in a format as required by the collector.

− Review and update precautionary measures and procedures, and review with staff, the precautions that have been taken to protect equipment and the post-disaster procedures to be followed.

− Fill department vehicles with fuel and park them in a protected area.

− Stock emergency medical equipment, which may be required after a disaster.

− Determine type of injuries illnesses expected and drugs and other medical items required, and accordingly ensure that extra supplies of medical items can be obtained quickly.

- Hold periodic meetings with NGOs, private sector, and experts outside the government. Allocate clear-cut roles and responsibilities.

- Provide instructions on administering vaccination or immunization depending on the requirements.

Hospital Level Action

- Provide information to all hospital staff about the disasters, likely damages and effects, and information about ways to protest equipment and property.

- Make space in the hospital for accommodating new patients expected due to epidemics or disaster. Discharge all ambulatory patients whose release does not pose a health risk to them. If possible, they should be transported to their home areas. Stop admitting non-emergency patients. Convert waiting areas and non-patient care areas into makeshift wards. If necessary, be prepared for setting up extra beds in tents adjacent to hospital. Get support of private hospitals.

- Non-ambulatory patients should be relocated to the safest areas within the hospital. The safest rooms are likely to be:
  o On ground floor
  o Rooms in the centre of the building away from windows
  o Rooms with concrete ceilings.

- Equipment supplies such as candles, matches, lanterns and extra clothing should be provided for the comfort of the patients.

- Surgical packs should be assembled and sterilized.

- A large enough number should be sterilized to last four to five days.

- The sterilized surgical packs must be stored in protective cabinets to ensure that they do not get wet. Covering the stock with polythene is recommended as an added safety measure.

- All valuable instruments, such as surgical tools, ophthalmoscopes, portable sterilizers, CGS, dental equipment, etc., should be packed in protective coverings and stored in rooms considered to be the most damage-proof.

- Protect all immovable equipment, such as x-ray machines, by covering them with tarpaulins or polythene.

- Keep mobile medical units in preparedness.

- All electrical equipment should be unplugged when disaster warning is received

- Check the emergency electrical generator to ensure that it is operational and that a buffer stock of fuel exists. If an emergency generator is not available at the hospital, arrange for one on loan.

- All fracture equipment should be readied.

- If surgery is to be performed following the disaster, arrange for emergency supplies of anaesthetic gases (usually supplied daily)

- Check stocks of equipment and drugs, which are likely to be most needed after the disaster. These can be categorized generally as:
  o Drugs used in treatment of cuts and fractures, such as tetanus toxoid, analgesics and antibiotics
  o Drugs used for the treatment of diarrhoea, water-borne diseases and flu (including oral rehydrating supplies)
  o Drugs required to treat burns and fight infections
  o Drugs needed for detoxication including breathing equipment.

- Assess the level of medical supplies in stock, including:
  o Fissure materials
  o Surgical dressings
  o Splints
  o Plaster rolls

- o Disposable needles and syringes
- o Local antiseptics.

- Request central warehouse for immediate despatch of supplies likely to be needed to hospitals on an emergency priority basis.

- Fill hospital water storage tanks and encourage water savings. If no storage tanks exist, water for drinking should be drawn in clean containers and protected.

- Water purification tablets should be stocked

- Prepare an area of the hospital for receiving large number of casualties

- Develop emergency admission procedures (with adequate record keeping)

- Orient field staff with EMRP standards of services and procedures including tagging.

- Hospital administrators should
  - o Establish work schedules to ensure that adequate staff are available for in-patient needs
  - o Organise in-house emergency medical teams to ensure that adequate staff are always available to handle emergency casualties.
  - o Set up teams of doctors, nurses and dressers for visiting disaster sites.

- The equipment available should be checked once in a year and the competent authority should issue certificate of fitness.

- If equipment are found dysfunctional then repairs should be made and kept ready.

Type of equipment	Location	Checking and certifying authority	Time of testing	Requirement of repair	Estimated cost	Source of funds

Personal Protective Equipment (PPE)

Personal protective equipment (PPE) is any type of facemask, glove, or clothing that acts as a barrier between infectious materials and the skin, mouth, nose, or eyes (mucous membranes). When used properly, personal protective equipment can help prevent the spread of infection from one person to another. Emergency care personnel who provide medical care to victims of hazardous incidents have the responsibility of first protecting themselves by wearing adequate protective equipment. Whenever possible, they will select the level of equipment based on the known properties of the hazard. When the type of hazard is unknown, they will assume a worst-case exposure and use the highest level of adequate protection.

Doctors routinely use personal protective equipment to protect themselves against blood and body fluid exposure while caring for patients. They may use more specialized PPE when participating in pre-hospital response (usually as part of a specialized team) or when providing medical care to contaminated people at the hospital.

Many types of protective equipment are currently available, ranging from maximum protection with a positive pressure respirator and total body encapsulation to minimum protection with a simple surgical mask and a pair of latex gloves. These are the various types of protective respiratory devices and clothing.

Protective Respiratory Devices: The basic types of respirators are atmosphere supplying (self-contained breathing apparatus [SCBA], supplied-air respirator [SAR]) and air purifying respirator (APR).

– **Self-contained breathing apparatus:** SCBA consists of a full-face piece connected by a hose to a portable source of compressed air. The open-circuit, positive-pressure SCBA is the most common type. This self-contained breathing apparatus provides clean air under positive pressure from a cylinder. The air then is exhaled into the environment. SCBA provides the highest level of respiratory protection.

– **Supplied-air respirator:** SAR consists of a full-face piece connected to an air source away from the contaminated area via an airline. Because SARs are less bulky than SCBA, they can be used for longer periods. Supplied-air respirators are also easier for most hospital personnel to use. SARs, like self-contained breathing apparatus, provide a high level of respiratory protection.

– **Air-purifying respirator:** An APR consists of a face piece worn over the mouth and nose with a filter element that filters available air in the environment before inhalation. Three basic types of APRs exist: powered, disposable, and chemical cartridge or canister.

Powered air-purifying respirators (PAPRs) deliver filtered air under positive pressure to a face piece mask, helmet, or hood, which provides respiratory and eye protection. Non-powered air-purifying respirators operate under negative pressure, depending on the effort of the wearer who is breathing in to draw air through a filter. Because PAPRs function under positive pressure, they provide high-level respiratory protection.

A variety of chemical cartridges or canisters, which eliminate a variety of chemicals including organic vapors and acid gases, are available.

Disposable air-purifying respirators usually are half masks, which do not provide adequate eye protection. This type of APR depends on a filter, which traps particles in the outside air. The use of a high-efficiency particulate air (HEPA) filter alone or in combination with a chemical cartridge enhances disposable APRs. For exposures to biological agents in the air, PAPRs with HEPA filters are most efficient, followed by elastomeric half-mask HEPA filter respirators and non-HEPA disposable APRs. All air-purifying respirators are limited by the adequacy of their face seals, which may not fully seal tightly. Accordingly, APRs do not provide adequate respiratory protection in environments immediately dangerous to life or health

– **High-efficiency particulate air filter:** HEPA filters remove very small particles with an efficiency of 98-100%, efficiently excluding most aerosolized biological warfare agent particles. HEPA filters are incorporated into a variety of protective respiratory devices including PAPRs and elastomeric half-mask respirators.

– **Surgical mask:** Surgical masks in a medical setting are designed to protect the sterile field of the patient from contaminants generated by the wearer. Although surgical masks filter out large-size particles in the air, they offer no respiratory protection against chemical vapors and little against most biological aerosols.

Protective Clothing: Most protective clothing is aimed at protection against chemicals and chemical warfare agents. Skin (intact, not damaged) provides an effective barrier against all biological warfare agents except the trichothecene mycotoxins. This toxin is capable of causing burn like lesions on the skin.

– **Chemical-protective clothing:** Chemical-protective clothing consists of multi-layered garments made from various materials that protect against a variety of hazards. Because no single material can protect against all chemicals, multiple layers of various materials usually are used to increase the degree of protection. Aluminium-lined, vapour-impermeable garments increase the level of protection. Protection is maximized by total encapsulation (completely covering the wearer). An assortment of types of chemical-protective hats, hoods, gloves, and boot covers are used with the garments.

– **Barrier gown and latex gloves:** Barrier gowns are waterproof and protect against exposure to biological materials, including body fluids, but do not provide adequate skin or mucous membrane protection against chemicals. Latex gloves also protect wearers from biological materials but are inadequate against most

chemicals. Barrier gowns, surgical masks, latex gloves, and leg and/or shoe covers (used in hospitals and in operating rooms) together are called universal precautions.

PPE used for Swine flu surveillance

The following personal protective equipment was used by the medical personnel while surveillance activities during the swine flu outbreak: gown extending below knee level, face mask N-95 variety (NIOSH 95), shoe cover, head cover, goggles, swab, and liquid viral transport medium. These equipment were provided by NICD.

Response Action Plan (During Epidemic)

Response activities will comprise all activities that should be done to reduce morbidities and mortalities. In times of disasters/epidemics, the district health systems, suddenly, must provide medical facilities to an unusually large number of patients out of which many would require the first-aid treatment only. In order to provide medical facilities to the needy in time, it is necessary to screen out large number of minor injuries from the serious ones. With the above intention, mass casualty management at the district level should be planned in two stages (i) pre-hospital management; and (ii) emergency hospital organization.

Pre-Hospital Management

Objective of this stage is to render first aid to victims at the spot of disaster and their transportation to nearby hospital as a part of life saving measures. The Chief Medical Officer of the district is generally responsible for organising this. Following are the components needed at this stage.

First Aid Parties

The objective of the first aid party is to render First Aid to casualties at the place of incident and transport the casualties on stretchers to nearby First Aid Post. In addition to the pre-hospital first aid parties available from the government set up, additional requirements can be met by taking the services of other medical care providers such as the Armed Forces, Railways, Red Cross, NGOs and other private stakeholders.

First Aid Posts

Primarily First Aid Posts are meant for treating the lightly wounded casualties those not requiring hospitalisation, thus relieving congestion at the hospitals. They are also responsible for screening casualties sent by First Aid Parties, to sort out who need immediate hospitalisation. Cases demanding urgent medical attention should be sent directly to the networked hospital without delay. First Aid Post may be static or mobile. A mobile First Aid Post is meant to rush medical aid to the site of disaster for the treatment of casualties on the spot.

First Aid Post may be housed in existing government, local body, charitable, or private dispensary depending upon their situation and needs of the community. The location of these posts should be planned and find a mention in the mass casualty management plan of the district. Where possible, these posts may be set up in the vicinity of a hospital as cases can be effectively screened and admitted to the hospital without delay.

The Post should ideally consist of three areas – Reception; Treatment area; and Waiting area. They should be located in such a manner that adjacent posts should not be more than 3 km apart so that no casualty has to travel long distance to get first aid.

The First Aid Post should be kept manned round the clock during emergency. A nominal role of doctors and nurses volunteering to man the First Aid Posts may be maintained in each post along with their addresses and telephone numbers.

Ambulance Services

An efficient ambulance service is an essential part of the casualty service for the transportation of casualties from the scene of disaster to First Aid Posts and Hospitals. Ambulance for lying cases may be improvised from trucks,

lorries and buses with adequate stretcher fitments. Vehicles for First Aid Parties and sitting casualties may be improvised from private cars, vans, taxis, tempos and other similar light vehicles.

Mobile Surgical Units

Mobile surgical units are generally required in catastrophic disasters like earthquakes where the hospital itself might be victim of the disaster. Mobile surgical units might not be available with the district or the state authorities but if available there, number and location should be available with the district medical authority to call them whenever need arises. The district authority should also network with the existing health care providers like the Railways and Defence Services who already have their own mobile surgical units.

Mobile surgical units are small surgical teams along with operation theatre set up on wheels. These units are sent to the disaster sites for performing lifesaving emergency surgeries. The unit should function in close coordination with the first aid posts.

Each mobile surgical unit should have three doctors including one Anaesthesiologist. It should also have one fully trained nurse, one operation theatre assistant, two first aid assistants and a driver.

Emergency Response Management

Actions to be taken during a disaster or epidemic situation are:

– Ambulances should be arranged for the transfer of seriously injured patients from villages and peripheral hospitals to general hospitals. If roads are blocked, a method should be established to request helicopter transport.

– Send First Aid Teams to disaster/epidemics sites.

– Establish health facility and treatment centres (First Aid Posts) at disaster sites.

– The provision of medical services should be coordinated by the District Medical Officer (DMO) with district control room.

– Procedures should be clarified between
   o Peripheral hospitals
   o Private hospitals
   o Blood banks
   o General hospitals and
   o Health services established at transit camps, relief camps and affected villages.

– Maintain check posts and surveillance at each railway junction, bus depots and all entry and exit points from the affected area, especially during the threat or existence of an epidemic.

– An injury and disease monitoring system should be developed to ensure that a full picture of health risks is maintained. Monitoring should be carried out for epidemics, water and food quality and disposal of waste in transit and relief camps, feeding centres and affected villages.

– Plan for emergency accommodations for auxiliary staff from outside the area.

– Information formats and monitoring checklists should be used for programme monitoring and development, and for reporting to Emergency Operations Centre. This is in addition to existing reporting system in the department.

– Seek security arrangements from district police authorities to keep curious persons from entering hospital area and to protect staff from hostile actions.

– Establishment of a public information centre with a means of communication to assist in providing an organized source of information. The hospital is responsible for keeping the community informed of its potential and limitations in disaster situations.

– The local police, rescue groups and ambulance teams should be aware of the resources of each hospital.

- On the recommendations of the EOC ("NODAL OFFICER-Health Services") Collector / District Control Room / Public Health Department will
  - Send required medicines, vaccines, drugs, plasters, syringes, etc.
  - Arrange for additional blood supply.
  - Provide for sending additional medical personnel equipped with food, bedding, tents, etc.
  - Send vehicles and any additional medical equipment.

Type of activity undertaken in response	Estimated cost	Source	Additional funding requirement

Recovery Action Plan (After Epidemic)

- Disinfect hospital premises and public areas

- Replenish stock of medicines, tools and accessories in hospitals

- Hold meetings with staff and discuss the departments' performance

- Draw lessons from the performance and identify actions to be taken for future improvement

- Implement action plan for improving future performance

Type of activity undertaken in recovery	Estimated cost	Source	Additional funding requirement

KERALA STATE DISASTER MANAGEMENT AUTHORITY

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