

# CDAlert

Monthly Newsletter of National Institute of Communicable Diseases,  
Directorate General of Health Services, Government of India

February 2005

Vol.9 : No.2

## POST DISASTER PUBLIC HEALTH ISSUES

Disasters such as floods, earthquakes, cyclones, landslides, drought and famine occur every year in various parts of the country affecting a large population. This has always been a major concern of the Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India to cope with the public health emergencies and in particular communicable disease outbreaks following these disasters. Preparedness is the essential component in disaster management.

### DISASTER – DEFINITION

The disaster can be defined as a serious disruption of the functioning of a society, causing widespread human, material or environmental losses, including loss of lives and deterioration of health and health services. This disruption is on a scale sufficient to warrant an extraordinary response from outside the affected community or area (WHO 1995). In other words, it can be said to occur when combined effect of hazards and vulnerability outweighs the capacity of the community to manage the event or its effect.

### DISASTER - TYPES

The disaster can be natural or manmade; acute or slow in onset; intentional or unintentional.

### I. Natural disasters

- Meteorological
  - Hurricanes, cyclones, tornadoes, typhoons.
  - Snowstorms, floods, heavy rains, cloud burst and thunderstorm.
  - Drought and famine.
  - Heat and cold waves.
- Topographical
  - Earthquakes
  - Landslides
  - Avalanches
  - Tsunami
- Environmental
  - Epidemics

### II. Manmade disasters

- Nuclear/biological/chemical warfare/terrorism
- Accidents (road, rail, civil aviation)
- Fire
- Civil strife/conflict situation/complex emergencies

### GLOBAL SCENARIO

World over including in South-East Asian countries, there is an increasing trend for both natural and manmade disasters (Table-1). According to United Nations, in 2001 alone, natural disasters of medium to high impact caused at least 25,000 deaths around the world, more than double the

previous year, and economic losses of around US\$ 36 billion. 60 per cent of major world disasters occur in Asia Pacific region due to the characteristic geological and geographical characteristics.

The global concern was reflected in declaring the decade 1990-2000 as the International Decade for Natural Disaster Reduction.

Table-1 shows the number of disasters which occurred in South East Asian countries since 1960.

**Table 1 - Number of disasters in South-East Asian countries since 1960**

Country	1960-69	1970-79	1980-89
India	34	102	172
Bangladesh	18	37	77
Indonesia	20	46	88
Myanmar	10	10	24
Nepal	7	8	19
Sri Lanka	5	8	25
Thailand	4	5	25
<b>Total</b>	<b>98</b>	<b>216</b>	<b>430</b>

## INDIA – KEY VULNERABILITIES

India has been traditionally vulnerable to natural disasters due to its following geo-climatic conditions:

- Heavy concentration of rainfall over a period of two months makes 40 million

hectares of land area vulnerable to floods. Severe floods in the gangetic basin and Brahmaputra valley are now an annual feature.

- Arid and semi-arid regions render 68% of the net sown area vulnerable to drought.
- 60% of the landmass is prone to earthquakes (54% in seismic zone III & IV).
- Coastline of 5,700 km is prone to tropical cyclones particularly in the east coast and Gujarat.
- Sub Himalayan/ Western Ghat is vulnerable to landslides. The Himalayan ranges, especially the Pirpanjal ranges, are prone to heavy snowfall and avalanches.

In the decade 1990-2000, on an average, 30 million people were affected by disasters and 4,344 people lost their lives each year.

The population pressure and the marginalized/ under-privileged communities living in vulnerable disaster-prone areas tend to compound its effect.

Some major natural disasters and related outbreaks in India are shown in Table-2.

## DISASTER : HEALTH IMPACTS

Disaster causes negative impact on the overall health of the community besides interfering in its sustainable development. Direct health implications of disaster are

**TABLE 2 - Some major natural disasters and related outbreaks in India**

Year	Type	Place	Death	Injuries	Outbreak (if any)
2004	Tsunami	Andhra Pradesh, Kerala, Tamil Nadu, A&N Islands, Pondicherry,	10,749 (5,640 missing)	N.A.	<ul style="list-style-type: none"> <li>➤ focal outbreak of measles in coastal Tamilnadu.</li> <li>➤ increase incidence of malaria cases in known endemic areas of southern group of A&amp;N islands.</li> </ul>
2004	Flood	Assam, Bihar, Gujarat	N.A.	N.A.	Sporadic incidence of diarrhoeal diseases
2001	Earthquake	Bhuj, Gujarat	19,800	1.66 lakhs	Sporadic incidence of water borne diseases
1999	Super Cyclone	Orissa	N.A.	N.A.	Leptospirosis
	Cyclone	Andhra Pradesh	N.A.	N.A.	

death and injury. Disruption of human ecology and environmental concerns are of prime importance due to:

- (1) Disruption/ damage to sanitation and sewage facilities creates enabling environment favourable for occurrence of vector borne and water borne diseases,
- (2) The affected communities living in temporary shelters/ resettlements have limited or no access to safe drinking water, food etc. In addition, prevailing unhygienic sanitary conditions make it conducive for spread of food and water-borne diseases.
- (3) Overcrowding in temporary shelters results in spread of communicable diseases.
- (4) Effects on mental health include Post Traumatic Stress Disorder; excessive grief, sleep disorders; exaggeration of existing illness; death wish & suicidal ideation.
- (5) Reproductive Health – Pregnant mothers and newborns become vulnerable and require additional care.

Among all the adverse health impacts, the impact of communicable diseases is often delayed for weeks or months after the acute event. Water and food-borne disease transmission potential increases immediately and week after the disaster. Vector borne diseases may appear after four weeks or more due to disruption of vector control efforts, washing away of residual insecticides, increased number of vector breeding sites and more man-vector contact. Nutritional problems appear after months. Table-3 gives the summary of health effects according to the type of hazard.

## POST DISASTER PUBLIC HEALTH INTERVENTIONS

Emphasis on post disaster public health measures is necessitated by the following additional factors:

- Destruction of health care infrastructure.
- Interference in public health services specially for:
  - Safe drinking water
  - Sanitation measures
  - Immunization
  - Rodent/mosquito control
- Ecological changes and its effect on vector populations
- High population density due to displacement

Public health interventions to prevent disease outbreaks after disaster should essentially focus on:

### I. Post disaster sanitation measures for:

- Safe water supply
- Food hygiene
- Proper sewage systems/disposal of excreta
- Vector/rodent control.
- Public health education.

### II. Strengthening epidemiological surveillance system

Surveillance system should be in place as early as possible after the natural disaster. Surveillance in natural disaster can be defined as a systematic collection, compilation, analysis and interpretation of deaths, injuries and illnesses in order to provide information about any adverse health effects related to a disaster event in a community. This also tells us about early warning signals of impending outbreaks. Surveillance system allows:

- Assessment of human health impacts of a disaster
- Early identification of potential problems to planning and effective preventive control measures
- Early detection of outbreak, if it occurs

The surveillance should focus on main health problems that can have a response. The system should be simple, feasible and easily adaptable to new needs.

**TABLE 3 - Health effects of various hazards**

Health effects	Earthquake	Floods	Land-slides	Epidemics	Fires	Conflict situation
Deaths/severe Injuries	Many	Few	Many	Many	Few	Many
Requiring extensive treatment	Many	Few	Few	Few	Many	Many
Increased risk of epidemics	Yes	Yes	Yes	-	-	Yes
Damage to water systems	Severe	Light	Severe (but localized)	None	None	Limited (depends on the factions fighting)
Damage to health facilities	Severe (structural and equipment)	Severe (equipment only)	Severe (but localized)	None	Depends on location	Limited (Depends on the factions fighting)
Damage to health services	High	High	Low	Moderate	Moderate	High
Food shortage	Possible (due to distribution problems)	Common	Common (but localized)	None	Possible (if crops destroyed)	Common (in prolonged conflicts)
Major population movements	Common (generally limited)	Common	Common (generally limited)	Rare	Unlikely	Common (generally limited)

The effectiveness of a surveillance system depends on effective and earliest reporting of occurrence of any disease in the community and immediate initiation of appropriate control measures. A simple format can be used to gather information on epidemic-prone diseases.

- diarrhoeal diseases including cholera, enteric fever, viral hepatitis A & E
- Vector-borne diseases (eg. malaria, dengue, acute encephalitis)
- Vaccine-preventable diseases (eg. measles)
- Others (eg. meningitis, leptospirosis)

**Post-disaster public health measures**

- Safe water supply
- Food hygiene
- Proper disposal of excreta
- Immunization
- Vector/rodent control
- Public health education

In post-disaster phase, important epidemic-prone diseases can be grouped as under:

- Water-borne diseases (eg. acute

**GUIDELINES FOR CONTROL OF EPIDEMIC-PRONE DISEASES IN DISASTER SETTINGS**

**(A) Guidelines for prevention and control of water borne diseases**

**1. Setting up of control rooms**

- Control rooms to be set up at district and state level
- Nodal officers should be identified at the state and district levels for collecting data

and analysing relevant surveillance reports and ensuring appropriate follow up action.

- For technical assistance and help in investigation of outbreaks, control room of National Institute of Communicable Diseases (NICD) and Directorate General of Health Services may be contacted. The addresses are: (i) Director, NICD, 22 Shamnath Marg, Delhi-110054; Tel: 23981289 Fax: 23928700, 23922677; (ii) Director, EMR, Directorate General of Health Services, Nirman Bhawan, New Delhi-110011; Tel: 23061302; Fax: 23061457; Mobile: 9868619799. Clinical samples can be sent to NICD round the clock. Guidelines for sample collection will be detailed out in subsequent issue of CDA/ert.

## 2. Surveillance of water-borne diseases (WBD)

Information on occurrence of WBD is to be collected from all the health facilities including temporary/mobile health units.

## 3. Identify source of contamination of water and remedial measures

- Identify source(s) of contamination of drinking water and ensure repairing of water pipes (if indicated), make it safe for use or make alternative arrangements for safe drinking water by supplying through 'Tankers'.
- Check water for chlorination, and if possible for bacteriological contamination.
- If surface water/hand pump water is found contaminated, it should not be used for drinking purposes.
- Boiling will kill or inactivate *V.cholerae* and other common organisms that cause WBD. Boiling is, however, expensive and may not be practical in areas having fuel shortages.

## 4. Chlorination of water

- Ensure proper chlorination of water sources including draw wells/shallow wells as per the standards laid down for minimum residual chlorine level.

- Chlorine releasing tablets may be distributed for domestic use:
  - ◆ Crush commercially available chlorine-releasing tablet.
  - ◆ Put in the water container with 20 litres of water
  - ◆ Allow to stand for 30 minutes
  - ◆ Use water within 24 hours

## 5. Storage of water at household level

- Encourage storage of drinking water in clean, covered and narrow mouthed containers.
- Use only tap or ladle to draw water if stored in a wide-mouthed container.

## 6. Safety of food

- Avoid raw and uncooked food unless it can be peeled or shelled.
- Cook food thoroughly and eat it while still hot.
- Cooked food should not be stored for a long time. Keep the food covered and reheat it thoroughly before consuming.

## 7. Information Education & Communication (IEC)

Increase awareness in the community about personal hygiene and sanitation including the importance of hand washing with soap after defecation and before preparing or eating food.

## 8. Case management

- Treatment facilities should be readily available and accessible. Manage dehydration and electrolyte imbalance due to acute watery diarrhoea by using ORS (Oral Rehydration Salt) solution. Monitor the clinical condition of the patients during and after rehydration until diarrhoea stops. IV fluids (Ringer lactate solution) should be used only for the initial rehydration of patients with severe dehydration. Plain glucose solutions are ineffective and should not be used.
- Antimicrobials are unnecessary for the treatment of ordinary diarrhoeas; the anti-diarrhoeal preparations are contraindicated. In case of suspected cholera cases, tetracycline and norfloxacin may be given.

## 9. Community participation

Community must be encouraged to participate in activities for the prevention and control of outbreaks including taking appropriate action for storage of water at household level and personal hygiene. They must be aware of danger signals of dehydration and when to seek immediate medical care.

### (B) Guidelines for prevention and control of vector-borne diseases

#### 1. Active surveillance of Acute Fever cases

Information on occurrence of acute fever cases should be collected from all the health facilities including temporary/mobile health units. If clustering of cases is found in time and space, investigations should be carried out to find out the cause. Examine peripheral blood smears for malaria parasites and manage the cases appropriately.

#### 2. Vector Surveillance

Vector surveillance should be immediately initiated to monitor the existing vectors and should include search for adult vector mosquitoes and their immature forms, and identification of mosquito species and density. Increase in density of the vectors and their breeding sites in the area should be taken as early warning signals for vector borne disease outbreaks.

#### 3. Vector Control

The success of vector control depends on reducing the density and longevity of the species responsible. Reducing the vector density can be achieved by measures directed at the breeding sites: environmental management (drainage, filling, levelling of depressions/borrow pits etc.) or the use of insecticides (larvicides). The target vectors must be susceptible to the chemical. In addition, this chemical should not kill non-target organisms (such as fish) or present a hazard to people drinking water from the same source. Longevity reduction

depends on the use of insecticides that kill the adult vectors, which is often called for, in emergencies, due to the urgent nature of the problem and the risk of vector-borne disease epidemics.

#### 4. Community participation

The community must be encouraged to take steps to protect themselves from mosquitoes by eliminating mosquito breeding sites and taking personal protection measures such as use of bed nets, mosquito repellents etc.

### (C) Guidelines for prevention and control of measles in relief camps

- In areas where immunization coverage is poor, all children between 6 months and five years of age (irrespective of their previous immunization status) who are to be housed in make-shift relief camps should be administered a dose of measles vaccine as soon as they arrive in the camps. Once the outbreak has started, vaccination may not have a substantial impact on the course of the outbreak, as the children are likely to have been exposed to the virus by the time the response is initiated. Nevertheless, the cases should be treated appropriately.
- Strengthen surveillance system for vaccine preventable diseases including measles for early detection of cases/clustering of cases/early identification of outbreaks.
- Strengthen routine vaccination for measles and other vaccine preventable diseases in disaster affected and surrounding areas.
- Educate community for immediate reporting of measles cases.

### TOP PUBLIC HEALTH PRIORITIES

- Initial assessment should include rapid collection and analysis of data including mortality, morbidity, malnutrition, vaccine coverage and mapping of area.
- Measles immunization is an absolute priority and should be initiated within a week. It should be given to 6 month to 5

yr-old children. The vaccination strategy should be mass campaign followed by routine vaccination.

- Vitamin A supplementation is to be given with measles to all children between 6 months and 5 years of age residing in camps.
- Safe water and proper sanitation to prevent risk of diarrhoeal diseases. Quality indicators may be set up and should be monitored.
- Food and nutrition: Malnutrition is common after displacement and contributes to deaths. Daily minimum of 2100 Kcal/day/individual should be available. Assessment for it should be quick.
- Shelter and site planning should be done to prevent transmission of diseases related to over-crowding, rain etc.
- Health care in emergency phase

includes availability of guidelines for medical management, drugs supplies, diagnostic kits and reagents, biosafety measures equipment etc.

- Control of communicable diseases/ epidemics. The greatest killers are diarrhoea, measles, acute respiratory infections and malaria. Preventive measures should be enforced. Preparedness plans for dealing with epidemics should be in place.
- Public health surveillance to monitor health status of population.
- Human resources and training.
- Inter-sectoral co-ordination between different concerned sectors (details given in box).
- Media management.

[Ref: Guidelines for assessing disaster preparedness in health sector, WHO/PAHO Washington, 1995]

### INTER-SECTORAL COORDINATION: Suggested areas of responsibility and action

#### State/ District Administration and Municipalities/ Panchayati Raj Institutions

- mobilize resources by organizing meetings with concerned government departments, non-governmental agencies and community leaders
- ensure safe water supply (including water quality monitoring) and sanitation
- ensure vector control measures
- ensure adequate health care facilities including transportation of serious patients
- provide relevant information to mass media
- monitor status of control and prevention activities

#### District/ Municipal Health Office

- organize adequate health care facilities
- alert health personnel to report cases and monitor trends
- arrange active surveillance in affected areas
- conduct IEC activities
- carry out vector control measures
- mobilize necessary medical health supplies including drugs, ORS packets, chlorine tablets, vaccines, etc. in adequate quantity
- convene meeting under district administrator to seek co-operation of other government departments and NGOs

#### Pubic Health Engineering / Public Works Departments

- ensure safe water supply including water quality monitoring
- repair leakage in piped water supply

#### Education/ Social Welfare Departments

- Involve teachers and welfare staff for camp management, IEC activities and to function as depot holders for ORS, chlorine and chloroquine tablets
- Provision of school buildings for establishment of camps

#### Agriculture, Animal Husbandry and Forestry Departments

- ensure/ support vector control measures
- promote environmental health

## DOs & DON'Ts in post disaster situation for control of Epidemic Prone Communicable Diseases

### DO's

### DON'Ts

#### Water Borne Diseases

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Drink water from a safe source or water that has been disinfected (boiled or chlorinated).</li> <li>• Store water in narrow mouthed container.</li> <li>• Cook food or reheat it thoroughly and eat it while it is still hot.</li> <li>• Keep food items covered.</li> <li>• Wash hands before preparing or eating food and after defecation.</li> <li>• Increase fluid intake in case of diarrhoea. Use ORS solution or home available fluids as soon as diarrhoea starts.</li> <li>• Refer the diarrhoea case to a health facility in case of following:             <ul style="list-style-type: none"> <li>○ Child is irritable, restless or lethargic or unconscious.</li> <li>○ Eating or drinking poorly.</li> <li>○ Child has marked thirst.</li> <li>○ Child has fever or blood in stool.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Don't drink water from unsafe sources.</li> <li>• Don't eat uncooked food unless it is peeled or shelled.</li> <li>• Don't eat cut fruits.</li> <li>• Don't defecate indiscriminately.</li> </ul> |
|---|--|

#### Vector Borne Diseases

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Use insecticide treated bed nets (ITBN) or insect repellents while sleeping to keep away mosquitoes.</li> <li>• Wear cloths that cover arms and legs.</li> <li>• Keep patients protected from mosquito bite in acute phase.</li> <li>• Empty water containers at least once a week.</li> <li>• Cover and seal septic tanks and soak-away pits.</li> <li>• Remove water from coolers and other places where water has remained stagnant.</li> <li>• All fever cases to be given presumptive treatment for malaria.</li> </ul> | <ul style="list-style-type: none"> <li>• Don't allow water to stagnate.</li> <li>• Do not allow discarded items to accumulate such as tyres, tubes, empty coconut shells, household items and objects where water may collect.</li> <li>• Discourage children from wearing shorts and half sleeved cloths.</li> </ul> |
|---|---|

#### Vaccine Preventable Diseases

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Do ensure vaccination especially measles along with vitamin A supplementation for all children between the age of six months to 5 years residing in camps.</li> <li>• Ensure routine immunization to all children.</li> </ul> | <ul style="list-style-type: none"> <li>• Don't hide occurrence of cases of vaccine preventable diseases especially measles.</li> </ul> |
|--|--|

### ...about CDAlert

**CDAlert** is a monthly newsletter of the National Institute of Communicable Diseases (NICD), Directorate General of Health Services, to disseminate information on various aspects of communicable diseases to medical fraternity and health administrators. The newsletter may be reproduced, in part or whole, for educational purposes.

Chief Editor: Dr. S.P. Agarwal

Editorial Board: Dr. Shiv Lal, Dr. Usha K. Baveja, Dr. R. L. Ichhpujani, Dr. Shashi Khare, Dr. A.K. Harit

Guest Editor: Dr. S. Venkatesh, Dr. A.C. Dhariwal, Dr. D. Bora, Dr. Avdesh Kumar

Publisher: Director, National Institute of Communicable Diseases, 22 Shamnath Marg, Delhi 110 054

Tel: 011-23971272, 23971060 Fax : 011-23922677

E-mail: [dirnicd@bol.net.in](mailto:dirnicd@bol.net.in) and [dirnicd@del3.vsnl.net.in](mailto:dirnicd@del3.vsnl.net.in)

Acknowledgement: Financial assistance by WHO/USAID is duly acknowledged.