

# Managing Children During Disasters

Reference Manual



Nepal Paediatric Society  
(NEPAS)

# Managing Children During Disasters

---

Reference Manual

---



Unpublished Module  
Copyright: 2018 NEPAS

## List of contributors:

---

**Dr. Arun Kumar Neopane**

Associate professor  
Department of Paediatrics  
Nepalese Army Institute of Health Sciences  
Sanobharayang, Kathmandu

**Dr. Krishna Prasad Bista**

President, Nepal Paediatric Society  
Consultant Paediatrician  
Kanti Children's Hospital  
Maharajgunj, Kathmandu

**Dr. Arun Sharma**

Associate professor  
Department of Paediatrics  
Tribhuvan University Teaching Hospital  
Institute of Medicine  
Maharajgunj, Kathmandu

**Dr. Ram Hari Chapagain**

Assistant professor  
National Academy of Medical Sciences (NAMS)  
Consultant Paediatrician  
Kanti Children's Hospital, Kathmandu

**Dr. Arun Kunwar**

Consultant Child and Adolescent psychiatrist  
Kanti Children's Hospital  
Maharajgunj, Kathmandu

**Mr. Khubiram Adhikari**

Ministry of Education, Science and Technology  
Kathmandu

**Dr. Laxman Shrestha**

Former president, Nepal Paediatric Society  
Professor  
Department of Paediatrics  
Tribhuvan University Teaching Hospital  
Institute of Medicine  
Maharajgunj, Kathmandu

**Dr. Binod Lal Bajracharya**

Former President, Nepal Paediatric Society  
Consultant paediatrician

**Dr. Moon Thapa**

Associate professor  
Department of Paediatrics  
Nepalese Army Institute of Health Sciences  
Sanobharayang, Kathmandu

**Dr. Rita Shrestha**

Professor  
Central Department of Psychology  
TU, Kathmandu

**Mr. Tulsi Prasad Dahal**

Section Officer  
Ministry of Home Affairs  
Kathmandu

# Preface

---

On 25<sup>th</sup> April 2015, a 7.8 magnitude earthquake struck Nepal causing widespread destruction and loss of life. The initial earthquake was followed by thousands of aftershocks and another powerful quake on 12<sup>th</sup> May measuring 7.3 in magnitude. Out of 8 million people affected, 1.7 million (21.25%) were children. 1.4 million children required urgent food assistance; 1,26,000 children between 6 to 23 months needed nutritious food and 70,000 children between 6 to 59 months with moderate acute malnutrition needed supplementary food. Some 1 million children were unable to return to school when classes resumed at the end of May 2015, with over 30,000 classrooms destroyed and 15,350 damaged.

Government of Nepal (GoN), through its multiple cluster leads and co-leads including Nepal Army, Nepal police, and Nepal Armed Police started the rescue phase immediately and international assistance arrived within days. Work continued till recovery and rehabilitation phase and is still continuing.

Nepal Paediatric Society (NEPAS) contributed in its capacity in the recovery phase by providing medical care to earthquake victims, conducting medical camps at severely earthquake affected areas like Gorkha, Rasuwa and Sindhupalchowk, educating its members and the public on psychosocial support for children affected by the disaster and providing typhoid vaccination to earthquake affected children living in temporary shelters in Bhaktapur. NEPAS coordinated and partnered with number of governmental and nongovernmental organizations in helping out the affected children.

A natural disaster of this size (and effect) had never happened in Nepal in such a destructive scale before and has been a constant reminder to all of us that we may have many such events in days to come. Many of us immediately realized that we were not well prepared for managing natural disasters of that magnitude. In the aftermath of the disaster, we all longed for well documented action points for managing children in disaster. Although different institutions of GoN, national and international agencies were involved in the rescue, recovery and rehabilitation of children effectively during the earthquake, we felt a need of a written national level guideline or protocol for managing children during disasters to guide everyone involved in the care of children so as to synchronize actions of all institutions to avoid duplication of work and improve the final outcome.

The American Academy of Pediatrics (AAP) raises funds to support disaster relief activities worldwide and some members of AAP showed willingness to support Nepali children struck with disaster. Repeated communication between NEPAS and AAP helped NEPAS to apply for support

of AAP in disaster preparedness for Nepali children. NEPAS applied for financial support under the Friends of Children's Fund (FCF) Grant Program of AAP and was awarded the grant. While the FCF grant was under review, NEPAS also received the AAP- Non Communicable Disease (AAP-NCD) small grant project which helped NEPAS to prepare a basic training package for its members on managing children in disaster. A pilot project was conducted in Bharatpur by training thirty participants of private, public and government institutions on March 2017. With larger support received from FCF funds, NEPAS prepared to work further on disaster preparedness for children with the objectives of identifying specific roles and responsibilities for different agencies in times of disasters, preparing a national protocol/guideline for management of children affected by disasters and training stakeholders on different phases of disaster management and the importance of planning. A total of 119 trainees (80 paediatricians, 18 school teachers, 12 government officials, and 9 medical officers) were trained at five different places of Nepal (Kathmandu, Nepalgunj, Bhairahawa, Damak and Bharatpur). A dissemination program involving all stakeholders related to disaster response (both governmental and non-governmental) was conducted on 08 December, 2018 in Kathmandu with 50 participants. Comments and suggestions from participants were also incorporated in the modules and manual to bring it to its present state.

NEPAS has prepared a module for participants and this reference manual on "Managing children during disasters" with the objective to provide guidance and reference to deal with children during disaster. We hope that everyone working for children will not feel lost while searching for guidance in any future disaster that is likely to strike this country.

# Acknowledgement

---

Nepal Paediatric Society would like to acknowledge everyone who helped and supported this organization in development of this reference manual and training programs conducted as a part of this initiative.

This work would not have been possible without the financial support of the American Academy of Pediatrics (AAP). We would like to acknowledge the support of academy members who contributed for generation of the fund, the committee members of AAP who communicated with NEPAS about this fund and also the members of the Friends of Children's fund grant committee who endorsed NEPAS application for execution of this project.

We would like to express our sincere gratitude to Mr. Chuda Mani Bhandari, Chief, Health Emergency and Disaster Management Unit (HEDMU), Health Emergency Operation Center (HEOC) for providing us important suggestions and feedbacks.

We would also like to acknowledge Dr. Naveen Phuyal and Dr. Lee Budathoki from Department of Preventive Medicine, Nepalese Army Institute of Health Sciences for assisting us in manual preparation.

We are indebted to our fellow paediatricians Dr. Ajaya Dhakal, Dr. Dhruba Shrestha, Dr. Hem Sagar Rimal, Dr. Keshav Agrawal, Dr. Piyush Kanodia, Dr. Raju Kafle and Dr. Yuba Nidi Basaula for helping us as resource persons during training at different places of Nepal.

We are thankful to representatives from the Ministry of Health and population (MoHP), Ministry of Home Affairs (MoHA), Ministry of Education and Technology (MoE), Central Child Welfare Board (CCWB), Family Welfare Division, Department of Health Services (FWD-DoHS), different humanitarian agencies (WHO, UNICEF, FAO, UN-HABITAT, WFP, SC, UNDP, NRCS), Child NGO Federation-Nepal (CNFN), Nepal Medical Association (NMA), National Private and Boarding School Association Nepal (NPABSAN) who attended the dissemination program and provided us suggestions and feedbacks for the modules.



# List of abbreviations

---

BCG	Bacille Calmette-Guérin
BLS	Basic life support
CCCM	Camp Coordination Camp Management
CPR	Cardiopulmonary resuscitation
DMC	Disaster Management Committee
DPT	Diphtheria, Pertusis, and Tetanus
ENC	Essential Newborn Care
EOC	Emergency Operation Centre
FAO	Food and Agriculture Organization
GoN	Government of Nepal
HAART	Highly-active antiretroviral therapy
HEOC	Health Emergency Operation Center
IFRC	International Federation of Red Cross and Red Crescent Societies
IOM	International Organization for Migration
IPV-IM	Inactivated polio vaccine-intramuscular
LBW	Low Birth Weight
MCI	Mass Casualty Management
MHPSS	Mental health and psychosocial support
MMR	Measles, mumps, rubella
MoAD	Ministry of Agriculture and livestock Development
MoE	Ministry of Education, Science and Technology
MoFALD	Ministry of Federal Affairs and General Administration
MoHA	Ministry of Home Affairs
MoHP	Ministry of Health and Population
MoIC	Ministry of Information and Communication
MoUD	Ministry of Urban Development
MoWCSW	Ministry of Women, Children and Social Welfare
NDRRM	National Disaster Risk Reduction and Management
NEOC	National Emergency Operation Center
NHRC	National Human Rights Commission



OPV	Oral polio vaccine
PALS	Pediatric advanced life support
PCV	Pneumococcal conjugate vaccine
PFA	Psychological first aid
RMNCH	Reproductive, maternal, newborn, and child health
ROSC	Return of spontaneous circulation
RRT	Rapid Response Team
SBA	Skilled birth attendants
SC	Save the Children
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNFPA	United Nations Population Fund
UN-HABITAT	United Nations Human Settlements Programme
UNHCR	United Nations High Commissioner for Refugees
VPD	Vaccine-preventable diseases
WASH	Water, sanitation, and hygiene
WFP	World Food Programme
WHO	World Health Organization

## Table of Contents

	Page No.
<b>Chapter 1:</b> Disaster Phases and Response .....	1-8
<b>Chapter 2:</b> Triage and Life Saving Skills (Basic and Advanced) .....	9-19
<b>Chapter 3:</b> Nutritional Management of Children in Disaster .....	20-26
<b>Chapter 4:</b> Mental Health and Psychosocial Support to Children and Adolescents affected by Disasters .....	27-34
<b>Chapter 5:</b> Birth Preparedness and Immediate Newborn Care.....	35-40
<b>Chapter 6:</b> Immunization .....	41-49
<b>Chapter 7:</b> Education and Disaster .....	50-55
<b>Chapter 8:</b> Water, Sanitation, Hygiene (WASH) and Shelter during Disasters .....	56-73



## Chapter 1

# Disaster Phases and Response

### Introduction

A disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources<sup>1</sup>.

### Types of Disasters

Disasters can be broadly divided into two types: natural and manmade<sup>2</sup>.

**Table 1: Types of disasters**

Types of disasters		Details	Examples
1.	Natural	Naturally occurring physical phenomena caused either by rapid or slow onset of events	<ul style="list-style-type: none"><li>• Geophysical (earthquakes, landslides, tsunamis and volcanic activities)</li><li>• Hydrological (avalanches and floods)</li><li>• Climatological (extreme temperatures, droughts and wildfires)</li><li>• Meteorological (cyclones and storms/ wave surges)</li><li>• Biological (disease epidemics and insect/animal plagues)</li></ul>
2.	Technological or manmade	Events that are caused by humans and occur in or close to human settlements	<ul style="list-style-type: none"><li>• Complex emergencies/conflicts, famine, displaced populations, industrial accidents and transport accidents</li><li>• Can include environmental degradation, pollution and accidents</li></ul>

**Table 2: Types of natural and human-induced hazards in Nepal:<sup>3</sup>**

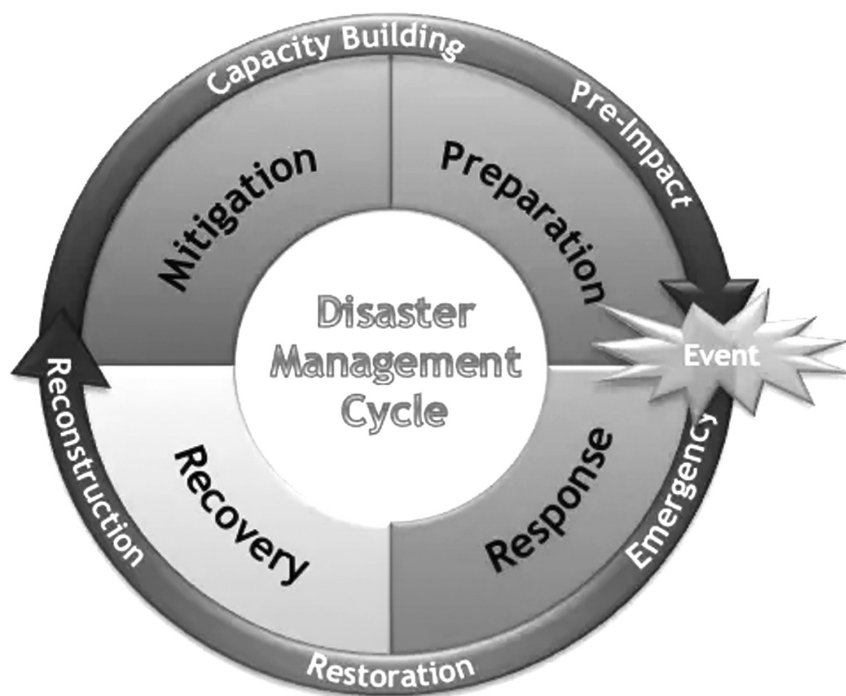
Types of hazard	Prevalence
<b>Natural hazards</b>	
Earthquake	All areas of Nepal lie in a high-hazard, seismically active earthquake region
Flood	Terai (sheet floods), Middle Hills

Landslide and landslide due to dam breaks	Hills, mountains
Debris flow	Hills and mountains, severe in areas of elevations greater than 1700 m that are covered by glacial deposits of previous ice-age
Glacier lakes outburst floods (GLOF)	Origin at the tongue of glaciers in Higher Himalayas, higher mountains, flow reaches down to middle hill regions
Avalanche	Higher Himalayas
Forest fires	Hills and Terai (forest belt at foot of southern-most hills)
Drought	All across the country
Windstorms	All across the country
Hailstorm	Hills
Lightening	All across the country
<b>Human-induced hazards</b>	
Epidemics	Terai and hills, also in lower parts of mountain region
Fire	Mostly in settlements in the Terai, also in middle-hill regions
Road accidents	Urban areas, along road network
Industrial/technological Hazards	Urban / industrial areas
Soil erosion	Hills
Social disruptions	Follows disaster-affected areas and politically disturbed areas

**Table 3: Phases of disasters and responses<sup>4</sup>:**

<b>Phase</b>		<b>Time period</b>	<b>Response</b>
1.	Preparedness	Regularly	<p>Preparedness for policy, structure (develop institutions), mitigation, stockpiling, mapping (WWW- who, what &amp; where) and planning for response</p> <p><b>Principle- Planning for response and response as per plan</b></p>
2.	Rescue or response phase	First 48 to 72 hours	<p>Disaster Management Committee (DMC) is activated with the task of making a chain for disseminating and collecting information, taking stock of the consequences of the disaster and coordination with external groups (volunteers, associations and clusters) to monitor assistance.</p>

3.	Recovery and rehabilitation phase	<p>Usually after 2-3 days to 6-8 weeks after disaster (recovery) and 6-8 weeks after disaster (rehabilitation)</p> <p><b>Principle (rehabilitation)- Build back better</b></p>	<p>External assistance arrives. Reality of disaster begins to sink in the affected population. Temporary shelters are arranged for the affected population, periodic reports are prepared, and mortuary services are organized.(Early recovery)</p> <p>The DMC gradually organizes itself to deal with the post-disaster period, assigning responsibilities in various fields like transport and highway maintenance; communications and information; water supply, food, means of survival; public works, building; sanitation; health; and public law and order. Helping the community towards their normal livelihood. (Rehabilitation)</p>
----	-----------------------------------	--	--



**Figure 1:** Disaster management cycle

(Adopted from <https://www.quora.com/What-is-disaster-management-cycle>)

### Disaster Risk Management Mechanism in Nepal

As provisioned by Disaster Risk Reduction and Management Act 2074, the National Disaster Risk Reduction and Management (NDRRM) Authority under the Ministry of Home Affairs is the key authority of Government of Nepal to reduce disaster risk and its management<sup>4</sup>. The management and coordination organizational structure from federal to local level as per this Act is depicted in

Figure 2, where representatives of the key government agencies and stakeholders at respective levels are integral part of the organogram.

There are 11 different clusters (Table 4) as identified by National Disaster Response Framework 2071, among which health and nutrition clusters are led by the Ministry of Health and Population (MoHP). The framework has also identified the mechanism for response coordination, international attention & accepting the international humanitarian support and response activities with timeline and responsible agencies for any disaster event.

There are number of policies, strategies, guidelines, standards, protocols, plans, and SOPs for reducing disaster risk and its management in Nepal. Nepal Health Sector Strategy 2015-2020 (NHSS) is recognised as the strategy that will guide the sector over the next five year period. The goal of NHSS 2015-2020 is improved health status of all people through accountable and equitable health service delivery system. It's achievement will be measured through outcome and output level indicators. Outcome 8 is: Strengthened management of public health emergencies. The key outputs for the achievement of outcome 8 is given in Table 5.<sup>6</sup>

National Emergency Operation Center (NEOC) at Ministry of Home Affairs (MoHA) and Health Emergency Operation Centre (HEOC) at Ministry of Health and Population (MoHP) are established for overall disaster management coordination. MoHA is scaling up of Emergency Operation Centre (EOC) at the provincial and district levels, the MoHP at provincial levels and Ministry of Federal Affairs and General Administration is at the local levels. Moreover, to strengthen the disaster response coordination of public and private hospitals at the local level, the MoHP has introduced the Hub Hospital approach Concept (Figure 3 & 4). The local bodies are responsible for disaster preparedness and response as provisioned by the Local Self Governance Act 2055.



Note: State Disaster Management Committee may be subject to change as per Federal set up

**Table 4: Cluster coordination structure of Nepal<sup>6</sup>**

<b>Name of cluster</b>	<b>Cluster Lead</b> (Government of Nepal )	<b>Cluster co-leads</b> (humanitarian agencies)
Health	Ministry of Health and Population (MoHP)	World Health Organization (WHO)
WASH	Ministry of Urban Development (MoUD)	United Nations Children's Fund (UNICEF)
Shelter	MoUD	International Federation of Red Cross and Red Crescent Societies (IFRC)/ United Nations Human Settlements Programme (UN-HABITAT)
Food Security	Ministry of Agriculture and Livestock Development (MoAD)	World Food Programme (WFP)/Food and Agriculture Organization (FAO)
Logistic	Ministry of Home Affairs (MoHA)	WFP
CCCM (Camp Coordination Camp Management)	MoUD	International Organization for Migration (IOM)
Education	Ministry of Education and Technology (MoE)	UNICEF/Save the Children (SC)
Protection	Ministry of Women, Children, and Social Welfare (MoWCSW)/National Human Rights Commission (NHRC)	United Nations High Commissioner for Refugees (UNHCR)/UNICEF/United Nations Population Fund (UNFPA)
Telecommunication	Ministry of Information and Communication (MoIC)	WFP
Nutrition	MoHP	UNICEF
Early recovery network	Ministry of Federal Affairs and General Administration (MoFALD)	United Nations Development Programme (UNDP)

**Table 5: Nepal Health Sector Strategy 2015-2020<sup>7</sup>: Outputs for the achievement of outcome 8 (Strengthened management of Public Health Emergencies)**

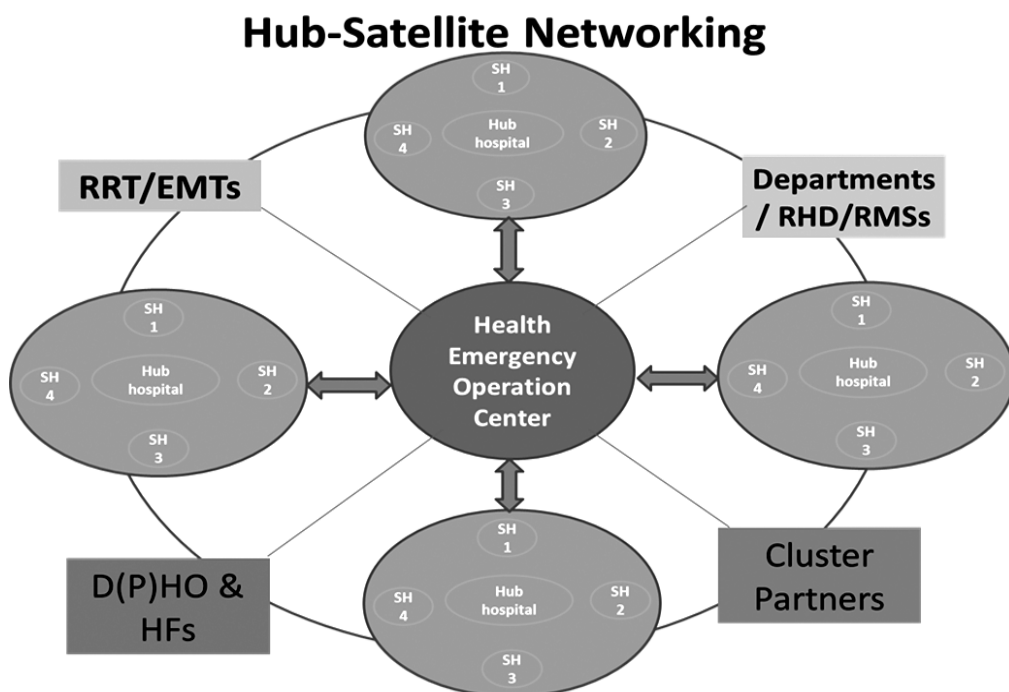
<b>Outputs</b>	<b>Key Interventions</b>
Output 8.1: Public health emergencies and disaster preparedness improved	<ol style="list-style-type: none"> <li>1. Revise national level protocols and operational guidelines for emergency situations with clear roles and responsibilities.</li> <li>2. Develop district level protocols and operational guidelines for emergency operations [health clusters, Rapid Response Teams (RRTs); intra- and inter sectoral coordination and mechanism].</li> </ol>



	<ol style="list-style-type: none"> <li>3. Preposition buffer stocks of supplies and medicines at strategic locations at national and sub-national levels for outbreaks.</li> <li>4. Finalize and implement integrated disease surveillance system.</li> <li>5. Establish trauma management capacity in hospitals near highways and in major urban centers.</li> <li>6. Establish emergency response funds at national, regional and district levels.</li> <li>7. Establish regional level health emergency management centers.</li> <li>8. Develop human resources mobilization plans during emergencies.</li> </ol>
Output 8.2: Strengthened response to public health emergencies	<ol style="list-style-type: none"> <li>1. Capacitate RRTs at all levels, to respond to public health emergencies.</li> <li>2. Develop Mass Casualty Management Plans for all hospitals above 50 beds and test those plans periodically.</li> <li>3. Use financial and non-financial incentives to mobilize and manage trained human resources during emergencies.</li> <li>4. Implement disease surveillance and response mechanisms.</li> </ol>

HUB HOSPITAL [Tertiary/referral facilities] <b>LEAD/COORDINATING</b>	SATELLITE HOSPITAL [All government & private hospitals] <b>ASSOCIATED/ SUPPORTING</b>
All Zonal, Sub Regional, Regional/Provincial, Central Hospitals and Govt. Academies	All government hospitals and private hospitals (50 beds and above)
<b>Hub Hospital Concept focuses on:</b> <ul style="list-style-type: none"> <li>• Developing partnerships with all public, private hospitals and medical colleges in the hub area.</li> <li>• Strengthening coordination and sharing of resources.</li> <li>• Developing consolidated plans &amp; preparedness.</li> <li>• Mapping, use &amp; exchange of resources.</li> <li>• Capacity building &amp; awareness.</li> <li>• Applying the one door communication system.</li> <li>• Managing the referral system.</li> <li>• Forming Rapid Response Team &amp; their early deployment.</li> <li>• Providing effective health care services to any disaster/emergency situation</li> </ul>	

**Figure 3:** Hub Hospital Concept



**Figure 4:** Hub-Satellite Networking

RRT- Rapid Response Team; EMTs- Emergency Medical Teams; Departments- Department of health services; RHD- Regional Health Directorate; RMSs- Regional Medical Stores; D(P)HO- District Public Health Officer; HFs- Health facilities; SH- Satellite Hospitals

### Key learning points:

By the end of this chapter, readers should be able to:

1. Define disaster.
2. Discuss types of disasters with examples.
3. Enumerate different phases of disasters and the responses conducted.
4. Explain Hub Hospital Concept.
5. Outline disaster risk management mechanism in Nepal.

### References

1. International Federation of Red Cross and Red Crescent Societies. Available from: <http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/what-is-a-disaster/>
2. International Federation of Red Cross and Red Crescent Societies. Disaster and Crisis Management [Internet]. Available from: <https://www.ifrc.org/en/what-we-do/disaster-management>.
3. Nepal Country Report: ISDR Global Assessment Report on Poverty and Disaster Risk 2009.
4. Bhawe SY, Choudhury P, Pemde HK, Mathur YC. IAP Workshop on Disaster Management Practices: Recommendations and IAP Plan of Action. *Indian Pediatr* 2005; Sep; 42(9):887-903.
5. Disaster Risk Reduction and Management Act, 2074, Government of Nepal. Available from: [drrportal.gov.np/uploads/document/1109.pdf](http://drrportal.gov.np/uploads/document/1109.pdf)

6. Ministry of Home Affairs, Government of Nepal. National Disaster Response Framework (NDRF) March 2013. Available from: [http://www.ifrc.org/docs/IDRL/2011%20National%20Disaster%20Response%20Framework%20\(unofficial%20translation%20\).pdf](http://www.ifrc.org/docs/IDRL/2011%20National%20Disaster%20Response%20Framework%20(unofficial%20translation%20).pdf)
7. Ministry of Health and Population, Government of Nepal. Nepal Health Sector Strategy 2015-2020. Available from: <http://nhsp.org.np/wp-content/uploads/2016/08/NHSS-English-Book-final-4-21-2016.pdf>

## Chapter 2

# Triage and Life Saving Skills (Basic and Advanced)

### Introduction

Triage is derived from the French word “trier,” meaning ‘to sort or sieve.’ Originally developed for use in military conflicts, triage is equally applicable to civilian disasters and day-to-day emergency settings. Healthcare providers should use the principle of triage for the provision of emergency care in disaster. Triage decisions need to be made very quickly following the principle that best possible outcome for the greatest number of patients is ensured at the cost of best possible outcome for each patient.

Triage is dynamic and the triage category will change as the patient’s condition progresses, so that his/her need for intervention alters. To reflect this process, triage must be repeated regularly- it is only a snapshot of the patient’s condition at that time. It must also be a simple procedure that is fast, reliable and reproducible. Triage tools, when applied correctly, form a key component of clinical risk management in the highly stressed emergency care environment. The study of triage has been at the core of disaster medicine since its roots in wartime necessity and has been transferred to general population tools when resources are limited in challenging times<sup>1</sup>.

A typical triage framework describes a five-stage triage process:

Stage 1. Sort, determine whether patients can walk, move, or are they unconscious?

Stage 2. Assess whether the patient exhibits spontaneous breathing. Start lifesaving interventions.

Stage 3. Assess respiratory rate.

Stage 4. Assess perfusion.

Stage 5. Assess mental status.

The goal of mass casualty triage is to prioritize patients for treatment and/or transport. At the end of this assessment, patients can be categorized as minor (green tagged), delayed (yellow tagged), immediate (medical care required, red tagged), or expectant (death expected, black tagged)<sup>2</sup>.

## **Triage systems**

There are a number of triage systems including pediatric-specific systems. These systems are grounded on basic physiologic criteria. JumpSTART is one of these triage systems and is among the most commonly used triage system in child casualties.

### **JumpSTART Pediatric MCI Triage Tool:**

The JumpSTART Pediatric Mass Casualty Management (MCI) Triage Tool<sup>3</sup> is the world's first objective tool developed specifically for the triage of children in multicasualty/disaster setting.

JumpSTART (Figure 6) was developed in 1995 to parallel the structure of the START system, the adult MCI triage tool (Figure 7) most commonly used in the United States and adopted in many countries around the world.

JumpSTART's objectives are to:

1. Optimize the primary triage of injured children in the MCI setting
2. Enhance the effectiveness of resource allocation for *all* MCI victims
3. Reduce the emotional burden on triage personnel who may have to make rapid life-or-death decisions about injured children in chaotic circumstances.

JumpSTART provides an objective framework that helps to assure that injured children are triaged by responders using their heads instead of their hearts, thus reducing overtriage that might siphon resources from other patients who need them more and result in physical and emotional trauma to children from unnecessary painful procedures and separation from loved ones.

Undertriage is addressed by recognizing the key differences between adult and pediatric physiology and using appropriate pediatric physiologic parameters at decision points<sup>3</sup>. For most patients, JumpSTART triage can be accomplished within the 15 second goal.

### **Pediatric life support<sup>4</sup>:**

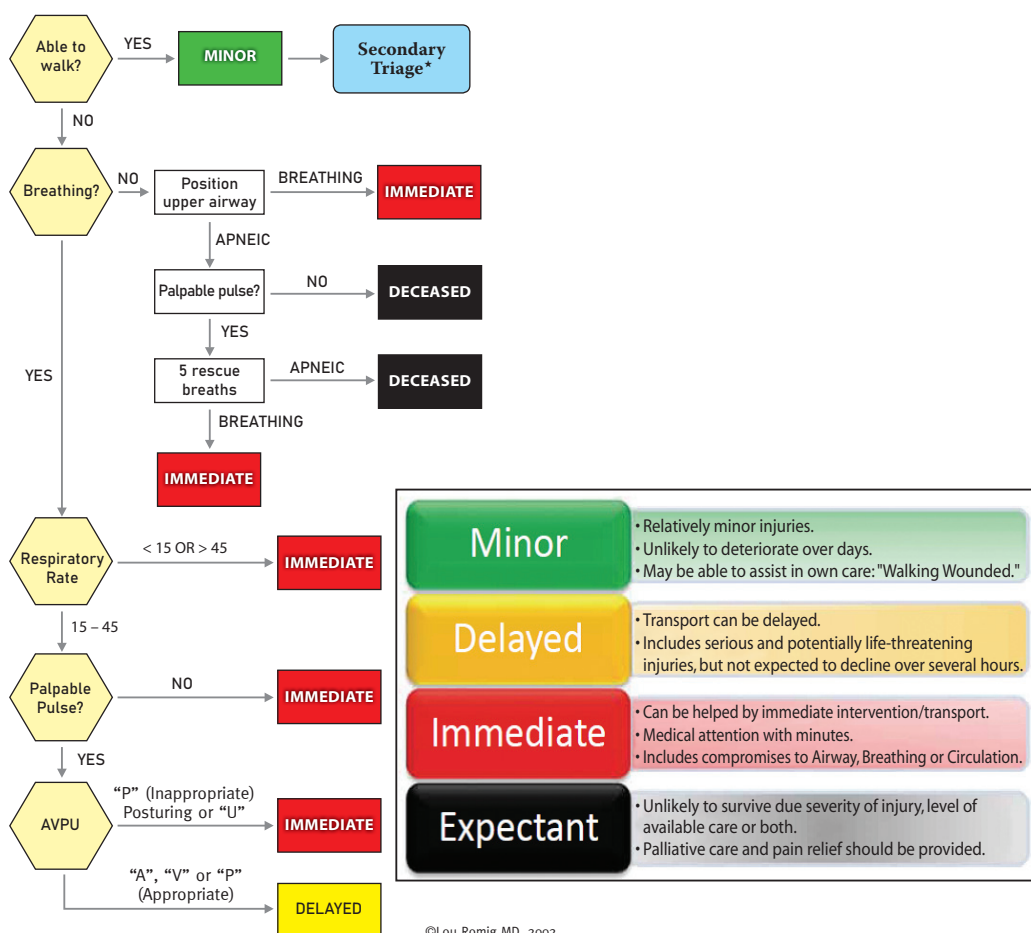
- Basic life support (BLS) is the most critical component of immediate care for survival of disaster victims. For paediatricians and lay rescuers alike, knowledge and skills of basic life support helps them deliver the most important component of care for best likelihood of survival and subsequent quality of life in disaster victims.
- Pediatric BLS should therefore be a part of disaster education for paediatricians and general public as a community effort for improving survival of any critically sick or injured child.
- Pediatric BLS is an important link in the chain to survival that also includes prevention, early cardiopulmonary resuscitation (CPR), prompt access to the emergency response system, and rapid pediatric advanced life support (PALS), followed by integrated post-cardiac arrest care.



**Figure 5:** American Heart Association (AHA) pediatric Chain of Survival

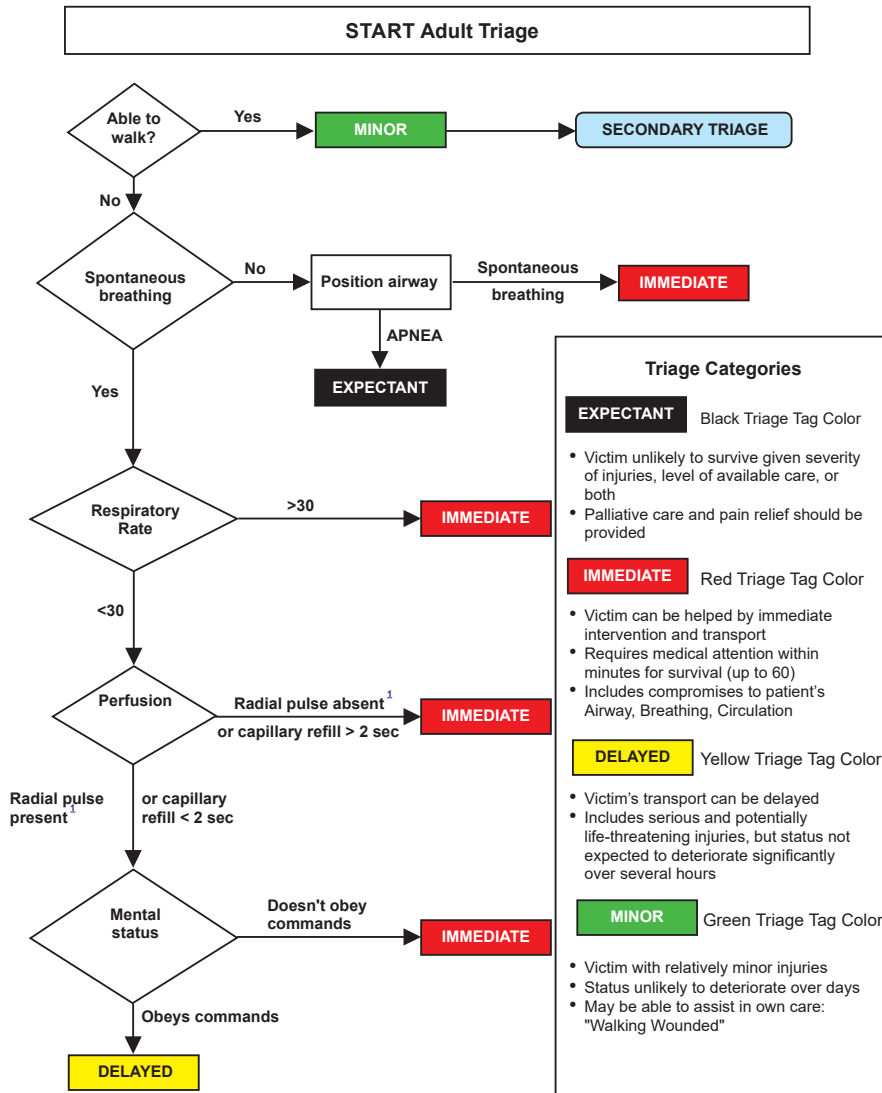
Rapid and effective bystander CPR is associated with successful return of spontaneous circulation (ROSC) and neurologically intact survival in children following out-of-hospital cardiac arrest. Bystander resuscitation may have the greatest impact for out-of-hospital respiratory arrest, because survival rates >70% have been reported with good neurologic outcome.

## JumpSTART Pediatric MCI Triage®



AVPU scale (A = alert, V = responds to voice, P = responds to pain, U = unresponsive)

**Figure 6:** JumpSTART Pediatric Mass Casualty Management Triage Tool<sup>3</sup>



Adopted from <http://www.start-triage.com>

**Figure 7:** START Adult Mass Casualty Management Triage Tool

### Age definitions for BLS provision in children

In most instances, determining whether to treat a child as a child or as an adult is based on age. Typically, an adult is defined as someone about the age of 12 (adolescent) or older; someone between the ages of one and 12 years has been considered to be a child for CPR care; and an infant is someone younger than one year of age.

However, for emergency care and during a disaster setting, a child is defined as someone between the age of one year to the onset of puberty as evidenced by breast development in girls and underarm hair development in boys. An infant is considered under the age of one year.

### **Basic life support guidelines<sup>4</sup>:**

The latest revisions to pediatric cardiopulmonary resuscitation were published in 2015 by American Heart Association. The description is based on these 2015 guidelines for emergency cardiovascular care.

In any disaster setting, healthcare workers or lay rescuers should look for signs of life to decide the need for immediate CPR. 'Signs of life' like response to stimuli, normal breathing (rather than abnormal gasps) or spontaneous movement if absent guide initiation of CPR.

Separate algorithms for one- and two-person provider CPR have been published to better guide rescuers through the initial stages of resuscitation (Figure 8 and Figure 9). The algorithms emphasize high quality CPR and use of an automated external defibrillator (AED) device wherever available.

During cardiac arrest high-quality CPR, particularly high-quality chest compressions are essential to generate blood flow to vital organs and to achieve ROSC.

Before initiating BLS, it is important to ensure that the area is safe for the rescuer and the victim. Although provision of CPR carries a theoretical risk of transmitting infectious disease, the risk to the rescuer is very low.<sup>5</sup> The Chest compressions are best delivered on a firm surface.<sup>6</sup>

For an unresponsive victim, BLS should be performed in circulation, airway and breathing (CAB) sequence. If the infant or child is unresponsive and is not breathing, an attempt to feel for a pulse (brachial in an infant and carotid or femoral in a child) should be done in 10 seconds. It can be difficult to feel a pulse, especially in the heat of an emergency, and studies show that healthcare providers, as well as lay rescuers, are unable to reliably detect a pulse. If pulse is not felt within 10 seconds, chest compressions should be started.

If there is a palpable pulse  $\geq 60$  per minute but inadequate breathing, rescue breaths should be initiated at a rate of about 12 to 20 breaths per minute (one breath every 3 to 5 seconds) until spontaneous breathing resumes. Pulse should be reassessed about every 2 minutes.

If the pulse is  $< 60$  per minute and there are signs of poor perfusion (ie, pallor, mottling, cyanosis) despite support of oxygenation and ventilation, chest compressions should be started. If the infant or child is unresponsive, not breathing, and has no pulse, chest compressions should be started.

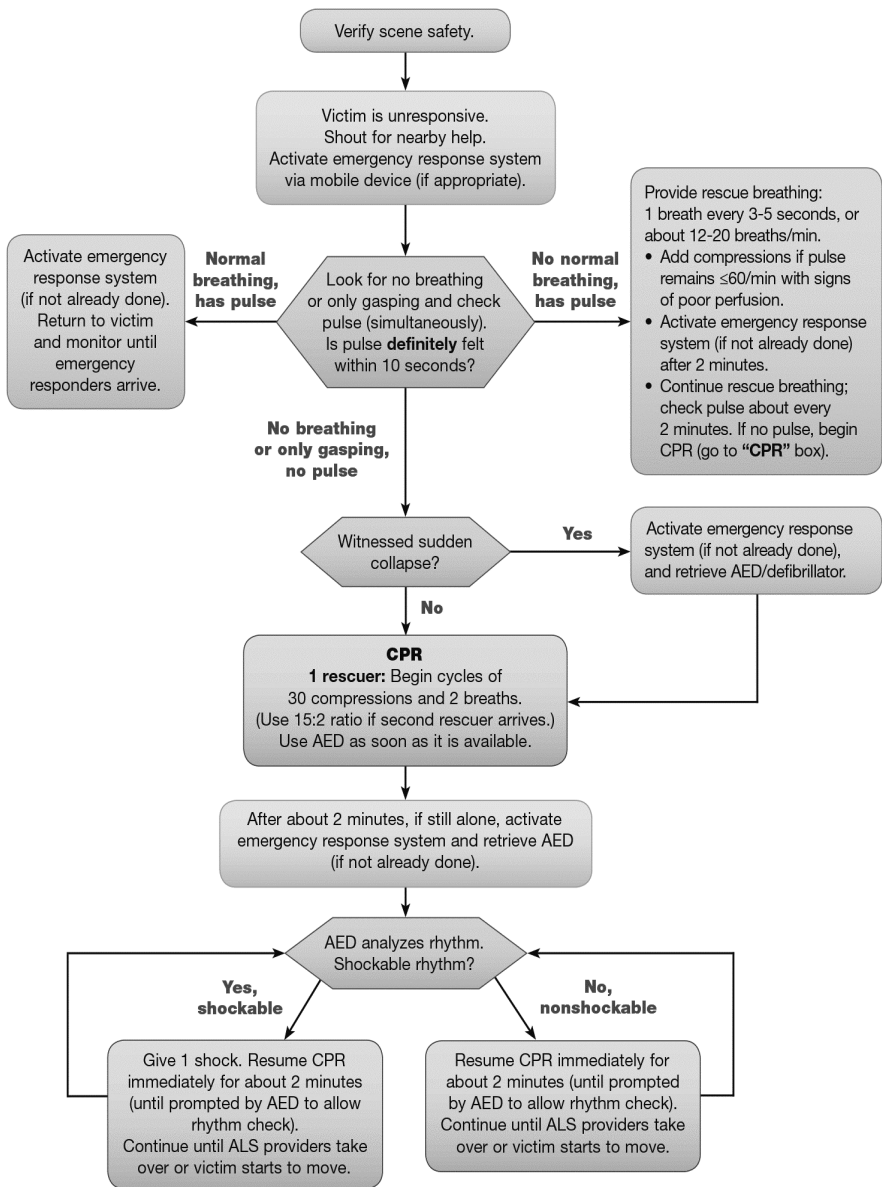
The lone healthcare provider should use the two-finger chest compression technique for infants (Figure 10a). Rescuers should compress the sternum with two fingers placed just below the intermammary line. The compression should be at least one third the depth of the chest, or about 4 cm (1.5 inches).<sup>7</sup>

The two-thumb–encircling hands technique (Figure 10b) is recommended when CPR is provided by two rescuers. For a child, providers should compress the lower half of the sternum at least one third of the antero-posterior dimension of the chest or approximately 5 cm (2 inches) with the heel of one or both hands. Caution should be applied to not press on the xiphoid or the ribs.<sup>8</sup>



For the two thumb technique, the infant’s chest should be encircled with both hands; fingers spread around the thorax; thumbs placed together over the lower third of sternum. The thumbs should forcefully compress the sternum<sup>9</sup>. The two-thumb-encircling hands technique is preferred over the two-finger technique because it produces higher coronary artery perfusion pressure, results more consistently in appropriate depth or force of compression and may generate higher systolic and diastolic pressures.<sup>10</sup>

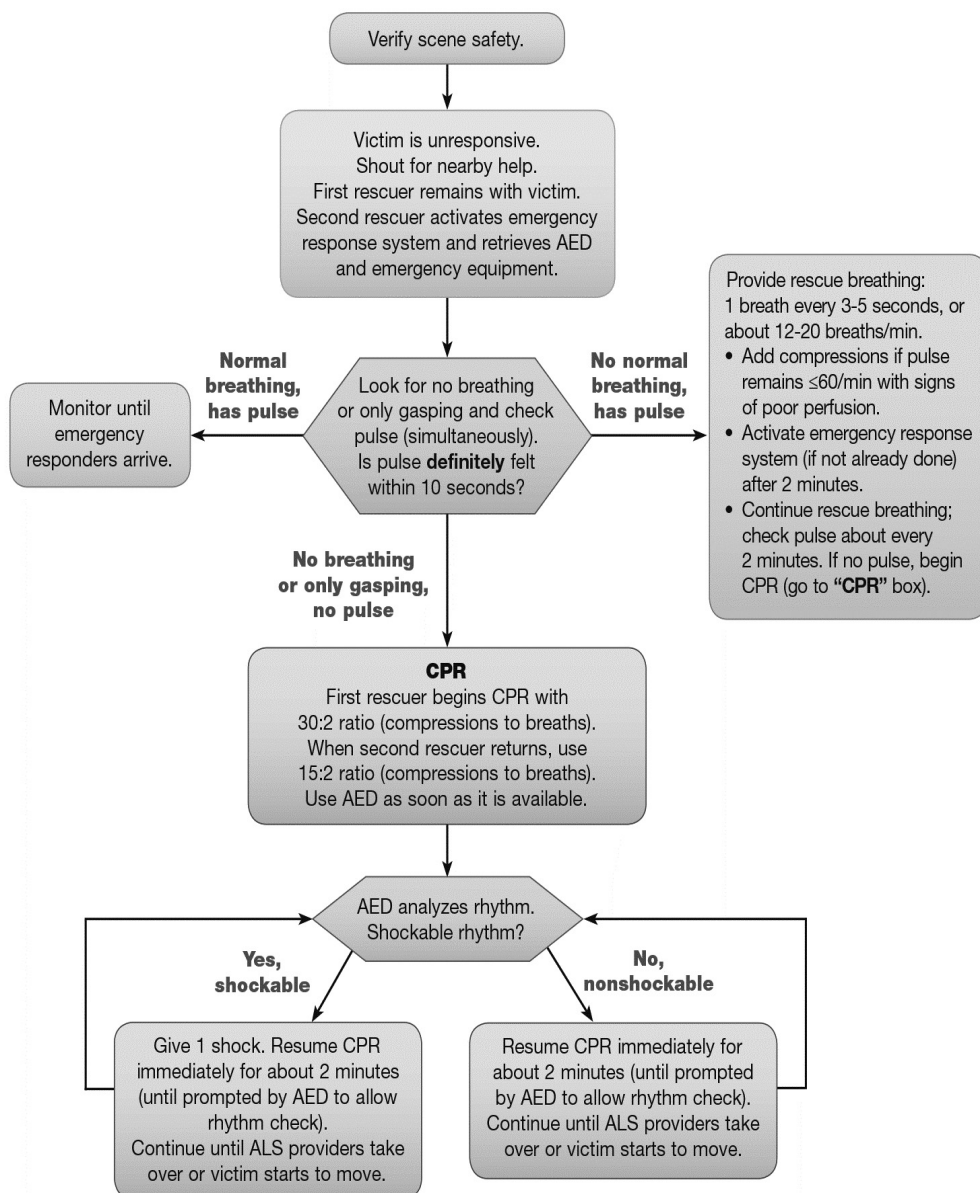
**Figure 8<sup>4</sup>:**  
**BLS Healthcare Provider**  
**Pediatric Cardiac Arrest Algorithm for the Single Rescuer—2015 Update**



© 2015 American Heart Association

Figure 9<sup>4</sup>:

# **BLS Healthcare Provider** **Pediatric Cardiac Arrest Algorithm for 2 or More Rescuers—2015 Update**



© 2015 American Heart Association



**Figure 10a:** Two-Finger Chest Compression Technique in Infant (One rescuer)<sup>7</sup>



**Figure 10b:** Two Thumb-Encircling Hands Chest Compression in Infant (Two rescuers)<sup>7</sup>

After each compression, the chest should be allowed to recoil completely because complete chest re-expansion improves the flow of blood returning to the heart and thereby blood flow to the body during CPR. During pediatric CPR, incomplete chest wall recoil is common, particularly when rescuers become fatigued. Incomplete recoil is associated with higher intrathoracic pressures and significantly decreased venous return, coronary perfusion, blood flow, and cerebral perfusion<sup>11,12</sup>.

The quality of chest compressions may deteriorate within minutes even when the rescuer denies feeling fatigued. When there are two rescuers, they should therefore rotate the compressor role approximately every two minutes to prevent compressor fatigue and deterioration in quality and rate of chest compressions. The switch should be accomplished as quickly as possible (ideally in less than five seconds) to minimize interruptions in chest compressions<sup>13</sup>.

Rescuers should aim for a target of 100-120 compressions in a minute. After 30 compressions (15 compressions if two rescuers), airway should be opened with a head tilt-chin lift and two breaths rescue breaths should be given.

It is important to be suspicious for a spinal injury in a disaster scenario and jaw thrust should be performed without head tilt to open the airway. Because maintaining a patent airway and providing adequate ventilation is important in pediatric CPR, head tilt-chin lift maneuver should still be performed if the jaw thrust does not open the airway.

A lone rescuer should use a compression-to-ventilation ratio of 30:2. For two-rescuer infant and child CPR, one provider should perform chest compressions while the other keeps the airway open and performs ventilations at a ratio of 15:2. Ventilations should be delivered with minimal interruptions in chest compressions. If an advanced airway is in place, cycles of compressions and ventilations should no longer be delivered. Instead the compressing rescuer should deliver at least 100 compressions per minute continuously without pauses for ventilation. The ventilation rescuer delivers 8 to 10 breaths per minute (a breath every 6 to 8 seconds).

To give rescue breaths to an infant, mouth-to-mouth-and-nose technique should be used with or without a barrier device; to give breaths to a child, mouth-to-mouth technique should be used. It is important to make sure that the breaths are effective (ie, the chest rises) and each breath last about one second. If the chest does not rise, it is important to reposition the head, make a better seal, and try again.

Bag-mask ventilation should be performed by healthcare providers whenever available. This entails selecting the correct mask size, opening the airway, making a tight seal between the mask and face, delivering effective ventilation, and assessing the effectiveness of that ventilation. A self-inflating bag with a volume of at least 450 to 500 mL should be used for infants and young children, as smaller bags may not deliver an effective tidal volume or the longer inspiratory times required by full-term neonates and infants. In older children or adolescents, an adult self-inflating bag (1000 mL) may be needed to reliably achieve chest rise. The EC clamp technique is the most effective way of delivering the bag and mask ventilation (Figure 11)<sup>14</sup>.



**Figure 11:** The EC Clamp Technique of Bag-Mask Ventilations. Three fingers of one hand lift the jaw (they form the “E”) while the thumb and index fingers hold the mask to the face (making a “C”)<sup>14</sup>

### **Foreign body airway obstruction (FBAO):**

Although rare, foreign body airway obstruction/ choking may sometimes be required to be dealt with in paediatric disaster victims.

Airway obstruction may be partial or complete. Partial obstruction can be recognized when: breathing is labored or noisy, and some escape of air from the mouth can be felt. Complete obstruction can be recognized when: there may be efforts at breathing, there is no sound of breathing, and there is no escape of air from nose and/or mouth. Airway obstruction may not be apparent in the non-breathing unconscious person until rescue breathing is attempted.

The simplest way to assess severity of a FBAO is to assess for effective cough. The person with an effective cough should be given reassurance and encouragement to keep coughing to expel the foreign material.

If the cough is ineffective, for a conscious person, back blows should be performed with the heel of one hand on the middle of the back between the shoulder blades. The aim is to relieve the

obstruction with each blow rather than to administer all five blows. An infant may be placed in a head downwards position (across the rescuer's lap), prior to delivering back blows.

If back blows are unsuccessful the rescuer should perform up to five chest thrusts in the same area used for chest compression during CPR. These are similar to chest compressions but sharper and delivered at a slower rate. The infant should be placed in with the head downwards and on the back across the rescuer's thigh, while children and adults may be treated in the sitting or standing position.

If the obstruction is still not relieved and the person remains responsive, alternating five back blows with five chest thrusts should be continued till the victim becomes unresponsive or the foreign body is evacuated. For unconscious patients CPR should be started and continued.

### **Paediatric advanced life support (PALS):**

Most paediatric cardiac arrests arise from decompensated respiratory or circulatory failure (i.e. they are predominantly secondary cardiorespiratory arrests). Cardiorespiratory arrests generally have poor outcome in children; hence identification of the seriously ill or injured child is an absolute priority.

Directed specific interventions for compensated or decompensated stages of illness/injury can be life-saving and prevent progression to cardiorespiratory arrest. Any unwell child or infant should be assessed in a systematic manner to identify the extent of physiological disruption and interventions started to correct the situation.

### **Key learning points: By the end of this chapter, readers should be able to:**

1. Describe triage in a setting of a mass casualty.
2. Define the JumpSTART Pediatric Mass Casualty Management (MCI) Triage Tool
3. Describe pediatric BLS Algorithm.

### **References:**

1. Jenkins JL, McCarthy ML, Sauer LM, et al. Mass-casualty triage: time for an evidence based approach. *Prehosp Disaster Med.* 2008;23(1):3–8.
2. Aacharya RP, Gastmans C, Denier Y. Emergency department triage: an ethical analysis. *BMC Emergency Medicine.* 2011;11:16.
3. TheJumpSTARTPediatricMCITriageToolPrinciplesofMulticasualtyTriage:TheJumpSTARTPediatric MCI Triage Tool and other pediatric disaster and emergency medicine resources. [http://www.jumpstarttriage.com/JumpSTART\\_and\\_MCI\\_Triage.php](http://www.jumpstarttriage.com/JumpSTART_and_MCI_Triage.php)
4. Atkins DL, Berger S, Duff JP, Gonzales JC, Hunt EA, Joyner BL, Meaney PA, Niles DE, Samson RA, Schexnayder SM. Part 11: pediatric basic life support and cardiopulmonary resuscitation quality: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation.* 2015;132(suppl 2):S519–S525.
5. Mejicano GC, Maki DG. Infections acquired during cardiopulmonary resuscitation: estimating the risk and defining strategies for prevention. *Ann Intern Med.* 1998;129: 813– 828.

6. Noordergraaf GJ, Paulussen IW, Venema A, van Berkomp PF, Woerlee PH, Scheffer GJ, Noordergraaf A. The impact of compliant surfaces on in-hospital chest compressions: effects of common mattresses and a backboard. *Resuscitation*. 2009;80:546–552.
7. Clements F, McGowan J. Finger position for chest compressions in cardiac arrest in infants. *Resuscitation*. 2000;44:43– 46.
8. Phillips GW, Zideman DA. Relation of infant heart to sternum: its significance in cardiopulmonary resuscitation. *Lancet*. 1986; 1:1024 –1025.
9. Finholt DA, Kettrick RG, Wagner HR, Swedlow DB. The heart is under the lower third of the sternum: implications for external cardiac massage. *Am J Dis Child*. 1986;140: 646–649
10. Menegazzi JJ, Auble TE, Nicklas KA, Hosack GM, Rack L, Goode JS. Two-thumb versus two-finger chest compression during CRP in a swine infant model of cardiac arrest. *Ann Emerg Med*. 1993;22:240 –243.
11. Aufderheide TP, Pirrallo RG, Yannopoulos D, Klein JP, von Briesen C, Sparks CW, Deja KA, Conrad CJ, Kitscha DJ, Provo TA, Lurie KG. Incomplete chest wall decompression: a clinical evaluation of CPR performance by EMS personnel and assessment of alternative manual chest compression decompression techniques. *Resuscitation*. 2005;64:353–362.
12. Yannopoulos D, McKnite S, Aufderheide TP, Sigurdsson G, Pirrallo RG, Benditt D, Lurie KG. Effects of incomplete chest wall decompression during cardiopulmonary resuscitation on coronary and cerebral perfusion pressures in a porcine model of cardiac arrest. *Resuscitation*. 2005;64:363–372
13. Ochoa FJ, Ramalle-Gomara E, Lisa V, Saralegui I. The effect of rescuer fatigue on the quality of chest compressions. *Resuscitation*. 1998;37:149 –152.
14. Terndrup TE, Kanter RK, Cherry RA. A comparison of infant ventilation methods performed by prehospital personnel. *Ann Emerg Med*. 1989;18:607– 611.

## Chapter 3

# Nutritional Management of Children in Disaster

### Introduction

All major emergencies, by definition, threaten human life and public health. They often result in problems in food storages, impair or jeopardize the nutritional status of a community, and cause mortality and morbidity in all age groups. Nutrition is therefore a public concern in emergency management<sup>1</sup>.

Nutrition is the science that interprets the interaction of nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism and excretion<sup>2</sup>.

Malnutrition occurs when the dietary intake of an individual does not cover his/her nutritional needs, harming health, well being, and / or productivity. The World Health Organization defines malnutrition as the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions. Malnutrition includes undernutrition and overnutrition.

Malnutrition is caused by an inadequate or unbalanced food intake and / or illness. It encompasses a range of conditions, including chronic malnutrition and deficiencies of micronutrient such as vitamin A, iron, iodine and zinc. Over nutrition occurs when the body has more nutrients than necessary, often caused by overeating, inactivity or certain medical conditions. It can lead to overweight or obesity.

Good nutrition- an adequate, well balanced diet combined with regular physical activity- is a cornerstone of good health. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity<sup>3</sup>.

**Underweight** is defined as weight for age below minus two standard deviations (SD) of the WHO Child Growth Standards median. Evidence has shown that the mortality risk of children who are even mildly underweight is increased, and severely underweight children are at even greater risk.

**Stunting** is defined as height for age below minus two SD (moderate stunting) and minus three SDs (severe stunting) of the WHO Child Growth Standards median. Stunting is the result of long-

term nutritional deprivation during the most critical periods of growth and development in early life. It often results in delayed mental development, poor school performance, and reduced intellectual capacity. This in turn affects economic productivity at the national level.

**Wasting** is defined as weight for height below minus two SDs of the WHO Child Growth Standards median. Wasting in children is a symptom of acute undernutrition, usually as a consequence of insufficient food intake or a high incidence of infectious diseases, especially diarrhoea. Wasting in turn impairs the functioning of the immune system and can lead to increased severity and duration of and susceptibility to infectious diseases and an increased risk for death.

**Overweight** is defined as weight for height above plus 2 SD of the WHO Child Growth Standards median. Childhood obesity is associated with a higher probability of obesity in adulthood, which can lead to a variety of disabilities and diseases, such as diabetes and cardiovascular diseases<sup>4</sup>.

**Severe acute malnutrition (SAM)** is defined as the percentage of children whose weight for height is below minus three SDs from the median of the WHO Child Growth Standards, or by a mid-upper arm circumference less than 115 mm, with or without nutritional edema.

Undernutrition is estimated to be associated with 2.7 million child deaths annually or 45% of all child deaths. Infant and young child feeding is a key area to improve child survival and promote healthy growth and development. The first 2 years of a child's life are particularly important, as optimal nutrition during this period lowers morbidity and mortality, reduces the risk of chronic disease, and fosters better overall development<sup>5</sup>.

### **Nutritional status of Nepalese children**

Asia has the largest number of malnourished children. India accounts for 40% of malnourished children in the world. Nepal's nutritional status is also not satisfactory. According to Nepal Demographic and Health Survey 2016, 36% children under age 5 are stunted (short for their age), 10% are wasted (thin for their height), 27% are underweight (thin for their age), and 1% are overweight (heavy for their height).

Fifty-five percent of children under age 2 are breastfed within 1 hour of birth, and 66% of children under 6 months of age are exclusively breastfed. More than half (53%) of the children age 6-59 months and 41% of the women aged 15-49 years are anemic<sup>6</sup>.

Not all disasters produce food shortages that are so severe as to have a critical impact on the nutritional status of the affected population. The nature of food and nutrition problems depends on the type of disaster, its duration and the size of the area affected, and the nutritional status of the population prior to the disaster.

Earthquakes usually have little effect on long-term food supplies. By contrast, hurricanes, floods, and tsunamis directly affect the availability of food, by ravaging crops, killing livestock and domestic animals, and destroying stored food. Any type of disaster will disorganize transportation systems, communications, and social and economic routines. Thus, despite existing food storage, the population may not have access to them<sup>7</sup>.



In emergencies, very large quantities of food commodities are shipped, stored, and distributed. Although it is possible to track the food to distribution points, it is much more difficult to know what happens to the food after it is dispensed: who gets what and how much. It is essential, therefore, to monitor every stage in the movement of food commodities and nutritional outcomes<sup>8</sup>.

Infant and child morbidity and mortality rates often dramatically increase during emergencies. Malnutrition during the early years of life has negative impact on cognitive, motor-skill, physical, social and emotional development. As part of estimating food and nutritional needs, specific interventions are required during emergencies to protect and promote optimal infant-and child-feeding practices.

At 6 months of age, infants should start receiving complementary foods in addition to breast milk. These should be safely prepared from locally available foods that are rich in energy and micronutrients to meet the infants' changing nutritional requirements. This can be a significant challenge during emergencies, since constraints often exist. Available foods may be difficult to prepare into a soft, semi-solid form.

Environmental conditions may hinder safe food preparation and feeding. Traditional ingredients that were normally used to prepare weaning foods may not be available. Basic food-aid commodities (cereals, pulses and oil) do not, by themselves, readily meet the nutritional needs of young children<sup>9</sup>.

### **Guiding principles for feeding infants (0-6 months) during emergencies<sup>9</sup>**

1. All infants, including those born into populations affected by emergencies, should normally be exclusively breast-fed for the first six months.
  - The beneficial effects of colostrum in breast milk are especially important; infants should be breast-fed on demand from birth.
  - Every effort should be made to identify ways to breast-feed infants whose mothers are absent or incapacitated.
  - Re-lactation should be attempted before the use of infant formula is considered.
2. Every effort should be made to create and sustain an environment that encourages exclusive breastfeeding for the first six months, and continue frequent breastfeeding thereafter for up to two years.
3. The quantity, distribution and use of breast milk substitute, eg. infant formula at emergency sites should be strictly controlled, using the following guidelines:
  - Nutritionally adequate infant formula, fed by cup, should be provided to infants who do not have access to breast milk.
  - Those responsible for feeding infant formula should be adequately trained and equipped to ensure its safe preparation and use.
  - Feeding infant formula to a minority of children should no way interfere with protecting and promoting breastfeeding for the majority.

- The use of infant feeding bottles and artificial teats in emergency settings should be actively discouraged and cup feeding promoted instead, as cups are much easier to keep clean.

**Table 6: Options for addressing nutritional needs of older infants and young children<sup>9</sup>**

Source of food	Examples	Remarks
1. Basic food-aid commodities from general ration with supplements of inexpensive locally available foods	Cereals, pulses, oil and sugar combined together with a variety of vegetables and fruits (cereals and pulses must be prepared using ground or milled forms)	<ul style="list-style-type: none"> <li>- Combination of cereals and pulses with added oil and sugar suitable for complementary food.</li> <li>- Recipes can be developed using local foods with input from nutrition and/or health expertise.</li> <li>- Tradition complementary feeding practices must be observed and understood.</li> </ul>
2. Blended foods (as part of general ration/ blanket or supplementary)	<ul style="list-style-type: none"> <li>- Corn- Soya Blend (CSB), Wheat-Soya Blend (WSB)</li> <li>- Varieties of locally produced blended foods</li> </ul>	<ul style="list-style-type: none"> <li>- Blended foods are processed by roasting or extrusion to improve digestibility.</li> <li>- Usually additional oil required in preparation.</li> <li>- For growth and development, blended foods are usually fortified with Zinc, Iron and other micronutrients.</li> </ul>
3. Additional foods in supplementary feeding programmes	<ul style="list-style-type: none"> <li>- Fruits, vegetables, fish, eggs or other suitable locally available foods</li> </ul>	<ul style="list-style-type: none"> <li>- Valuable source of vitamins and minerals.</li> </ul>

**Table 7: Energy requirements for emergency- affected populations**

#### Energy requirements for emergency-affected populations

Developing country profile (demography and anthropometry); Kilocalories per day

Age/sex group (years)	Male <sup>a</sup>		Female <sup>a</sup>		Male and Female <sup>a</sup>	
	% of total population	Energy requirement per caput	% of total population	Energy requirement per caput	% of total population	Energy requirement per caput
0	1.31	850	1.27	780	2.59	820
1 <sup>b</sup>	1.26	1,250	1.20	1,190	2.46	1,220
2 <sup>b</sup>	1.25	1,430	1.20	1,330	2.45	1,380
3 <sup>b</sup>	1.25	1,560	1.19	1,440	2.44	1,500
4 <sup>b</sup>	1.24	1,690	1.18	1,540	2.43	1,620

0-4	6.32	1,320	6.05	1250	12.37	1,290
5-9	6.00	1,980	5.69	1730	11.69	1,860
10-14	5.39	2,370	5.13	2040	10.53	2,210
15-19	4.89	2,700	4.64	2120	9.54	2,420
20-59 <sup>c</sup>	24.80	2,460	23.82	1990	48.63	2,230
60+ <sup>c</sup>	3.42	2,010	3.82	1780	7.24	1,890
Pregnant			2.4	285 (extra)	2.4	285 (extra)
Lactating			2.6	500 (extra)	2.6	500 (extra)
Whole Population	50.84	2,250	49.16	1910		2,080

**Source:** WHO. The management of nutrition in major emergencies. Geneva, 2000.

a: Adult weight: male 60 kg, female 52 kg.

b: Population estimates for years 1, 2, 3 and 4 are not available from UN. Estimates for these years were made by interpolation between the figures given by UN for 0 year and 5 years.

c: The figures given here apply for "light" activity level (1.55 x BMR for men, 1.56 x BMR for women). (The BMR [basal metabolic rate] is the rate of energy expenditure of the body when at complete rest [e.g. sleeping]. It is estimated at 1,355 kcal/person/day.)

## How to conduct nutritional management effectively in disaster?

Nutritional management can be conducted differently in different phases as shown in Table 8.

**Table 8: Conducting effective nutritional management during disasters**

Phase	Activities	Remarks
Preparedness	Educate health workers	<ul style="list-style-type: none"> <li>Normal nutritional requirements of infants and young children,</li> <li>Indicators of malnutrition,</li> <li>Various signs and symptoms related to nutritional deficiencies and</li> <li>Identification of the most vulnerable groups in the population, like pregnant and lactating women, infants and young children and children with disabilities.</li> </ul>
	Identify list of foods that can be used during disasters and keep in stock with regular replacement	Beaten rice (chiura); roasted gram (bhuteko chana); roasted maize (bhuteko makai); roasted soybeans (bhuteko bhatmas); mixture of roasted grains of maize; soya beans and wheat grounded into flour (satthu or Sarbottam pitho); a type of sweet bar made from flour, sugar and butter (lakhamari).
	Store various nutritional supplements and pediatric vitamin formulations and replace regularly.	To be used promptly when disaster occurs.
	Perform periodic nutritional assessment of children under five in all districts.	For assessment of nutritional status and baseline data about malnutrition, vitamin and mineral deficiencies.

Response Phase	Distribute foods identified and stored in the preparedness phase to children.	Community will be battling with life-threatening scenarios.
Recovery Phase	Ensure adequate provision and intake of food	<ul style="list-style-type: none"> <li>• Rationing of food may be needed.</li> <li>• Children should be given priority for nutritious food to prevent death and illness caused by malnutrition.</li> <li>• Paediatrician and public health specialist/nutritionist should calculate the calorie requirement as per age, gender and other conditions and act accordingly.</li> </ul>
	Encourage breast feeding	Breast-milk substitutes, fed by cup, should be available only for infants less than six months of age for whom breast-feeding is not possible and breast milk is not available due to mother's death or illness.
	Discourage the use of infant-feeding bottles and artificial teats.	Increases the risk of diarrhea and malnutrition many folds during and after disaster.
	Make appropriate food available in shelters for children.	Shelters should be considered priority areas for food distribution
Rehabilitation Phase	Perform nutritional assessment of children in the affected area.	<ul style="list-style-type: none"> <li>• Prevention, timely identification and treatment of malnourished children, and</li> <li>• Comparison of pre and post disaster status.</li> </ul>
	Establish feeding programs	<ul style="list-style-type: none"> <li>• Feeding programs should be designed for children and lactating mothers.</li> <li>• Provide each child at least three, simple, nutritious meals per day.</li> </ul>
	Emphasize and encourage breast feeding	Breast milk is the ideal food for healthy growth and development of infants and young children. The availability of nutrients from breast milk exceeds that from any other substitute. Breast milk not only provides all the nutrient requirements for infants but also protects children from infection.

	Address micronutrient needs	<ul style="list-style-type: none"> <li>• Supply fortified food items in the general ration (vegetable oil with vitamin A and vitamin D; salt with iodine; wheat and maize flour with vitamin A, thiamine, riboflavin, niacin, folic acid and iron).</li> <li>• Promote the production and local availability of vegetables and fruit.</li> <li>• Promote beneficial food-preparation practices like fermentation, sprouting grains and pulses.</li> <li>• Provide fresh food items in general ration or facilitate access to fresh foods (rich in micronutrients).</li> <li>• Ensure food diversification: adding to the ration a food rich in a particular vitamin or mineral (e.g. ground nuts, dried fish).</li> <li>• Distribution of vitamin/mineral supplements.</li> </ul>
--	-----------------------------	---

### Key learning points:

By the end of this chapter, readers should be able to do the following:

1. Define nutrition, malnutrition and its effect.
2. Describe the impact of disaster on nutrition.
3. Enumerate the different activities that can be implemented in different phases of disaster to manage nutritional issues effectively.

### References

1. WHO Geneva. The Management of nutrition in major emergencies (2000)
2. *US National Library of Medicine, National Institutes of Health. Joint Collection Development Policy: Human Nutrition and Food. 14 October 2014.*
3. WHO nutrition. Available from: <http://www.who.int/topics/nutrition/en/>
4. WHO. Nutrition Landscape Information System (NLIS)-Country Profile Indicators: Interpretation Guides 2010. Available from: [http://www.who.int/nutrition/nlis\\_interpretation\\_guide.pdf](http://www.who.int/nutrition/nlis_interpretation_guide.pdf)
5. WHO Media centre. Infant and young child feeding - Fact sheet. Updated July 2017.
6. Demographic Health Survey 2016. Pages 223-38.
7. Department of Emergency Preparedness and disaster relief. Food and Nutrition in disasters: guidelines prepared by the PAHO/WHO institute of Central America and Panama (INCAP) [Internet]. Available from: [http://www.paho.org/disasters/index.php?option=com\\_content&view=article&id=553:nutrition-and-food-safety-in-emergency-situations-incap&Itemid=663&lang=en](http://www.paho.org/disasters/index.php?option=com_content&view=article&id=553:nutrition-and-food-safety-in-emergency-situations-incap&Itemid=663&lang=en)
8. Katona AJ. Emergency nutrition. Food and Nutrition Bulletin. The united nations university 1998; 19(1): 46-8
9. WHO, UNHCR, UNICEF & WFP. Food and Nutrition Needs in Emergencies. 2003. Available from: <https://www.enonline.net/attachments/864/food-and-nutrition-needs-in-emergencies.pdf>

## Chapter 4

# Mental Health and Psychosocial Support to Children and Adolescents affected by Disasters

### Introduction

During disaster, children not only have basic survival needs, such as food, water and shelter, but also suffer great emotional trauma and require psycho-affective needs such as love, recreation and play<sup>1</sup>.

A child's cognitive, physical, educational, and social developmental level and experience will determine the perception of the trauma resulting from the disaster<sup>2</sup>. Other factors that can influence the effect of a disaster on a child's wellbeing are: physical injury sustained, proximity to the impact zone, witnessing the injury or death of a family member or friend, duration of life disruption, parental reactions, and family disruption<sup>3</sup>.

The most important effect of a disaster on children and adolescents is the disruption of the normal routine through personal injury; destruction of their home, school, or community; or injury or death of friends or relatives. In addition, the loss of predictability and control of their environment affects children of different ages in distinct ways<sup>4</sup>.

Toddlers usually respond to the disruption by increased dependence on caregivers, sleep disturbances, and developmental regression. School children and preteens may show hostility toward peers and family members, re-enact the trauma during play, regress in developmental milestones, and avoid activities enjoyed previously<sup>5</sup>.

Adolescents also may have sleep disturbances; lose pleasure in activities enjoyed previously, show fatigue, and begin abusing illicit substances<sup>6</sup>. Children and adolescents also may display anxiety; depression; guilt; and symptoms of posttraumatic stress disorder, such as nightmares, sleep disruption, avoidance of reminders of the disaster, and irritability<sup>7</sup>.

According to Sphere (2011) and Inter-Agency Standing Committee Guidelines on Mental Health and Psychosocial Support in Emergency Settings (IASC) 2007, psychological first aid (PFA) describes a humane, supportive response to a fellow human being who is suffering and who may need support.

One of the goals of PFA is to encourage and make the survivors feel able to help themselves. Since 2002, psychological first aid has been recommended as a key part of the provision of psychosocial support following disasters. PFA contributes to preventing short-and long-term psychological problems after traumatic incidents by fostering adaptive functioning and coping. It covers both psychological and social support.





Children who might require PFA are those who are separated from their family or care-givers, have watched loved ones or others being hurt or killed, have been physically hurt, felt threatened, are worried and concerned because their parents or care-givers are grieving or concerned too, and those who feel guilty about surviving when others died.

There are three main action principles to adhere to when giving PFA to children and adults (Table 9). They are LOOK, LISTEN and LINK<sup>8</sup>.

The action principle **LOOK** has three main components:

- i. **Check for safety:** This includes being observant and aware of potential dangers in the environment such as conflicts, damaged roads, unstable buildings, fire or flooding. If you feel unsafe, you must find other ways to support the children. You should also do your utmost to find a safe environment to communicate with children and care-givers in distress.
- ii. **Look for children with obvious urgent basic needs:**
  - a) Do any children or their families appear to be critically injured and in need of emergency medical help?
  - b) Do any children or their families seem to need rescuing, such as people trapped or in immediate danger?
  - c) Do any children or their families have obvious urgent basic needs, such as protection from the weather, torn clothing?
  - d) Are there children or their families who may need help in terms of accessing basic services and special attention to be protected from discrimination and violence?
  - e) Be aware of people around you who can help. Know your role and try to get help for children and their families who need special assistance or who have obvious urgent basic needs.
  - f) Refer critically injured children and their parents or care-givers to medical personnel or others trained in physical first aid.
- iii. Look for children, parents and care-givers with serious distress reactions

**Table 9: Action principles while giving PFA<sup>8</sup>**

Did you do all of the following?	
<b>PREPARE</b> 	Learn about the crisis event
	Learn about available services and supports
	Learn about safety and security concerns
<b>LOOK</b> 	Observe for safety
	Observe for people with obvious urgent basic needs
	Observe for people with serious distress reactions
<b>LISTEN</b> 	Make contact with people who may need support
	Ask about people's need and concerns
	Listen to people and help them feel calm
<b>LINK</b> 	Help people address basic needs and access services
	Help people cope with problems
	Give information
	Connect people with loved ones and social support

The action principle **LISTEN** also has three main components:

**(i) Approach children and their parents or care-givers who may need support:**

Part of the initial contact with the distressed child and family is asking about their needs and concerns. However, be aware that people who are very distressed may find it difficult to explain clearly what they need.

**(ii) Ask about children and parents' or care-givers' needs and concerns**

**(iii) Listen to children and their parents or care-givers, and help them feel calm:**

This can be provided by staying close to the child and parent or care-giver, listening if they want to talk about what happened, and not pressuring anyone to talk if they don't want to.

The action principle **LINK** has four components:

- i. Help children and their families to address basic needs and access services
- ii. Help children and their families cope with problems.
- iii. Provide information.
- iv. Connect children and their families with each other, and with social support.



## Complementary supports for different groups

A key to organizing mental health and psychosocial support (MHPSS) in emergencies is to develop a layered system of complementary supports that meets the needs of different groups<sup>9</sup>, as illustrated by a pyramid (Figure 12).

### i. **Basic services and security**

The well-being of people should be protected through the (re)establishment of security, adequate governance and services that address basic physical needs (food, shelter, water, basic health care, control of communicable diseases).

An MHPSS response to the need for basic services and security may include: advocating that these services are put in place with responsible sectors; documenting their impact on mental health and psychosocial well-being; and influencing humanitarian actors to deliver them in a way that promotes mental health and psychosocial well-being.

### ii. **Community and family supports**

This layer represents emergency response for a smaller number of people who are able to maintain their mental health and psychosocial well-being if they receive help in accessing key community and family supports.

In most emergencies, there are significant disruptions of family and community networks due to loss, displacement, family separation, community fears and distrust. Even when family and community networks remain intact, people in emergencies will benefit from help in accessing greater community and family supports.

Useful responses in this layer include family tracing and reunification, assisted mourning and communal healing ceremonies, mass communication on constructive coping methods, supportive parenting programmes, formal and non-formal educational activities, livelihood activities and the activation of social networks, such as through women's groups and youth clubs.

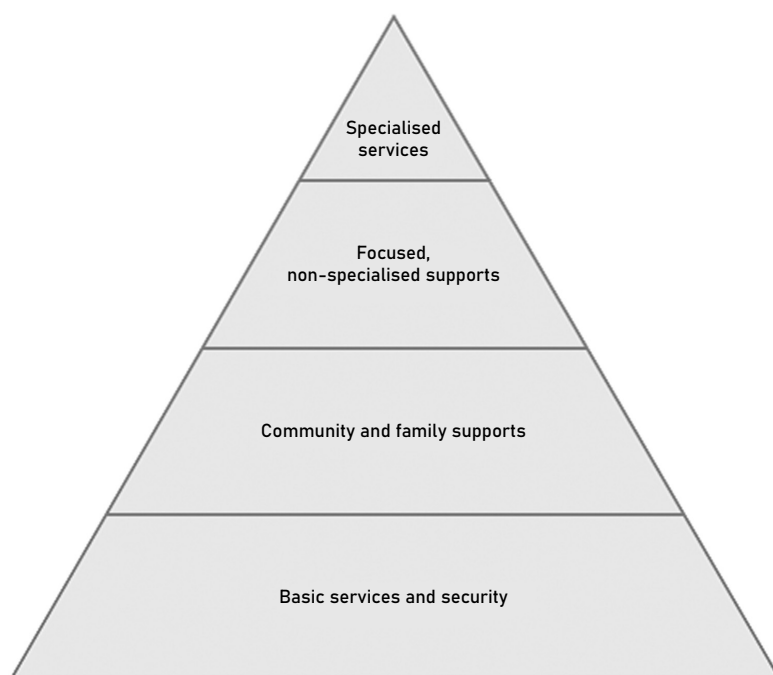
### iii. **Focused, non-specialized supports**

The third layer represents the support necessary for the smaller number of people who additionally require more focused individual, family or group interventions by trained and supervised workers (but who may not have had years of training in specialized care). This layer also includes psychological first aid (PFA) and basic mental health care by primary health care workers.

### iv. **Specialized services**

The top layer of the pyramid represents the additional support required for the small percentage of the population whose suffering, despite the supports already mentioned, is intolerable and who may have significant difficulties in basic daily functioning. This assistance should include psychological or psychiatric supports for people with severe mental disorders whenever their needs exceed the capacities of existing primary/general health services.

Such problems require either (a) referral to specialized services if they exist, or (b) initiation of longer-term training and supervision of primary/general health care providers.



**Figure 12:** Intervention pyramid for mental health and psychosocial support in emergencies<sup>9</sup>

**Table 10: How to provide psychosocial support and PFA in disaster?**

Phase	Activities	Remarks
Preparedness	Train health workers and school teachers	Identify and address psychological issues during disaster, including psychological trauma management training and psychological first aid.
	Work with community leaders	Identify the needs of children and their families; and to evolve strategies for rapid and effective psychological intervention when required.
	Keep appropriate recreational items in stock	
Response Phase	Psychosocial support might not have a priority	Except in acute cases
Relief Phase	Perform psychological triage (Figure 13)	Psychological Simple Triage and Rapid Treatment (PsySTART) Rapid Mental Health Triage <sup>10</sup>
	Identify children at risk of strong reactions to stressful event and who need PFA	Apply action principles of PFA promptly: Look, Listen and Link

	Give students extra reassurance, support and encouragement	Organize activities that encourage them to share experiences and express their fears and concerns.
	Encourage children and youth to become involved in social service projects	Offers them opportunity to contribute to their family, school and community.
Rehabilitation Phase	Encourage physical activities, games, music and dance	Provides a sense of security by relieving tension, stress and anxiety.
	Continue providing PFA	More intensive psychosocial interventions are delivered during long-term recovery period.
	Encourage children to draw pictures about disasters	In order to express their feelings. Sharing pictures with other children will help them realize that they are not the only ones feeling sad, scared and angry.
	Enforce media censorship	Media channels covering news and stories related to disaster to be censored for children to decrease fear and anxiety.
	Establish psychosocial rehabilitation programs	Offers children opportunities to develop a sense of confidence and control to handle future stress.

Figure 13: PsySTART Triage Tag<sup>10</sup>

PsySTART Disaster Mental Health Triage System

Last Name		Home Address (pre-event)			
First Name					
DOB	(month/day/year)	Gender: Male      Female	City	State	Zip code

Medical record number \_\_\_\_\_ Mark Positive

Expressed thought or intent to harm self/others?		
Felt or expressed extreme panic?		
Felt direct threat to life of self or family member?		
Saw/heard death or serious injury of other?		
Multiple deaths of family, friends or peers?		
Death of immediate family member?		
Death of friend or peer?		
Death of pet?		
Significant disaster related illness or physical injury of self or family member?		
Trapped or delayed evacuation?		
Home not livable due to disaster?		
Family member currently missing or unaccounted for?		
Child currently separated from all caretakers?		
Family members separated and unaware of their location/status during disaster?		
Prior history of mental health care		
Confirmed exposure/ contamination to agent?		
De-contaminated?		
Received medical treatment for contamination/ exposure?		
Health concerns tied to exposure?		
No triage factors identified?		

Danger

Emergency care  
Immediate Crisis intervention  
Screening, assessment  
Trauma focused CBT

High Risk

Crisis intervention  
CBITS/SSET  
School based screening

Moderate Risk

Low Risk

PFA  
Listen, protect & connect  
Re-assess  
Self care

CBT- cognitive behavior therapy  
CBITS- cognitive behavioral intervention for trauma in school  
SSET- support for students exposed to trauma; PFA- Psychological first aid

## Key learning points:

By the end of this chapter, readers should be able to do the following:

1. Describe the effects of a disaster on children and adolescents.
2. Identify children and adolescents at risk of mental health needs and those who might require psychological first aid (PFA).
3. Describe action principles to adhere to when giving PFA to children and adolescents.

## References

1. Warfield C. The Disaster Management cycle [Internet]. 2008. Available from: [http://www.gdrc.org/uem/disasters/1-dm\\_cycle.html](http://www.gdrc.org/uem/disasters/1-dm_cycle.html).
2. Vogel JM, Vernberg EM. Children's psychological responses to disasters. *J Clin Child Psychol* 1993;22(4):464–84.
3. Pynoos RS, Nader K. Mental health disturbances in children exposed to disaster: preventive intervention strategies. In: Goldston SE, Yaker J, Heinicke CM, Pynoos RS, eds. *Preventing Mental Health Disturbances in Childhood*. Washington, DC: American Psychiatric Press; 1990:211–234.
4. American Academy of Pediatrics, Committee on Psychosocial Aspects of Child and Family Health. How Pediatricians can respond to the Psychosocial Implications of Disasters. *Pediatrics* 1999;103(2):521–23.
5. Saylor CF, Swenson C, Powell P. Hurricane Hugo blows down the broccoli: pre-schoolers post-disaster and adjustment. *Child Psychiatry Hum Dev* 1992;22(3):139–49.
6. Sugar M. Adolescents and their reactions to disaster. Presented at the annual meeting of the American Society for Adolescent Psychiatry; San Francisco, CA; May 1992.
7. Shannon MP, Lonigan CJ, Finch AJ Jr, Taylor CM. Children exposed to disaster. I. Epidemiology of post-traumatic symptoms and symptom profiles. *J Am Acad Child Adolesc Psychiatry* 1994;33(1):80–93.
8. The Sphere Project (2011) Humanitarian Charter and Minimum Standards in Disaster Response. Geneva. The Sphere Project. <http://www.sphereproject.org>
9. Inter-Agency Standing Committee: IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings; June 2007.
10. Schreiber M. The PsySTART Disaster Mental Health Triage and Incident Management System, 2010.

## Chapter 5

# Birth Preparedness and Immediate Newborn Care

### Introduction

Disasters disrupt people's lives, families, and communities. Disasters can affect access to medical and social services, increase stress, intensify physical work, and expand care giving duties<sup>1</sup>. This may affect health outcomes among women of reproductive age (15 to 44 years), especially pregnant and postpartum women and newborns<sup>2</sup>.

Pregnant women are classified as a population with special clinical needs. The needs specific to reproductive health and expecting mothers, such as basic prenatal care and accessibility to medical personnel, must be recognized in order to implement effective emergency preparedness plans.

In developing countries, women are economically vulnerable owing to their poor labor force participation rate. As a result, women are less prepared to meet the immediate costs of recovery from the effects of disasters. Women suffer from social vulnerability owing to their low status in society. They are more likely to be neglected and discriminated against in terms of disaster assistance and aid during the recovery phase<sup>3</sup>.

A safe birth and a healthy start in life are at the heart of thriving and stable communities<sup>4</sup>. Accordingly, the neonatal period merits special attention within humanitarian settings, when health services and systems may be interrupted and emergency support is brought in through national and international mechanisms<sup>5</sup>.

The neonatal period is part of a continuum of care for mother and baby encompassing a spectrum of reproductive, maternal, newborn and child health (RMNCH) services. In disasters, staff working at all levels should deliver RMNCH services across the continuum of care as follows<sup>5</sup>:

#### 1. Households/community Settings (including camps):

This care is provided to women and babies in their homes or in camp settings by community health workers (CHWs), outreach workers or other trained health workers. These workers may be linked to a health post or peripheral health facility.

CHWs provide preventive and promotive care and are the main linkages to service sites including follow-up of women and newborns after discharge from the health facility.

**2. Peripheral health facilities:**

This care includes clinics operating out of permanent structures, temporary clinics in camp settings and mobile clinics. Typically, these primarily outpatient services are delivered by mid-level staff such as nurses and midwives, with support for referral to hospital if needed, and connections to community structures after discharge.

**3 Hospitals**

Inpatient referral care is provided by midwives, nurses and physicians with pharmacy and laboratory support services.

Preventing excess illness and death among newborns requires that care be available and functional, and tailored to the local situation. In humanitarian settings that require international responses, the coping capacity of the affected community is overwhelmed, and external assistance is brought to the affected area.

Staff designing and managing humanitarian response programs have a responsibility to ensure that protocols are in place to provide appropriate newborn care. The priority is always for institutional delivery. Service providers should offer basic emergency obstetric care (BEmOC), comprehensive emergency obstetric care (CEmOC) (or appropriate referral), skilled birth attendants, essential newborn care (ENC), and identification and basic care for sick or small babies (or appropriate referral)<sup>5</sup>.

**Managing Newborn Health Care in High-Risk Settings:**

Threats to safety and security are an unfortunate reality for pregnant and postnatal women, their families and the humanitarian health workers serving them within crisis settings. Safe access to health services for the crisis-affected population must be prioritized by:

- 1. Establishing temporary health outposts/facilities as close as possible to the crisis-affected communities.
- 2. Providing mobile services when feasible and when the security situation allows.
- 3. Deploying home visiting staff (CHWs or others) that can safely reach pregnant and postnatal women in their households.
- 4. Ensuring that health workers have the supplies they need, and are trained to detect newborn danger signs, treat life-threatening newborn conditions to the greatest extent possible and transfer pregnant and postnatal women to referral facilities (or hospitals) when the security situation allows.

**Table 11: Birth preparedness and immediate newborn care during disaster**

Phase	Activities	Remarks
Preparedness	Train health care workers (HCWs)	Identify high risk pregnancies, at risk/ sick newborns, conduct normal delivery with minimum equipment and care of the newborn  HCWs act as first responders and correctly identify those requiring referral.

	Keep record of trained HCWs and circulate information about their availability.	Increases accessibility at grassroots level (villages) during and immediately after disaster when help from outside is difficult.
	Plan for transfer	Identify safe and reliable methods of transportation of sick patients in advance.
	Earmark certain hospitals in cities for only maternal and newborn care during disaster	Reduces reaction time for referral of such cases and decreases burden from most hospitals taking care of the injured.
	Keep relief materials required for mothers and newborns in stock beforehand in disaster stores at various location	Stores should have Clean Home Delivery Kit (CHDK) or Sutkeri Samagri, gowns, sanitary napkins, newborn dresses, caps, wraps, blankets and diapers.
	Identification of clean, safe and warm place like schools, offices for MCH services and conduct delivery in a maternity centre or hospital prior identified	Local hospital and health facility limited in number and overburdened hence such facility can be invaluable.
	Develop guidelines and conduct training for maternal and newborn care	Provide newborn healthcare in humanitarian settings- field guide by UNICEF and Save the children can be used.
Response Phase	Consider maternal and neonatal health as priority, however delivery might have to be conducted with minimal resources available or by untrained persons	Due to limited human and material resources and all efforts directed towards issues related to survival, shelter, food, water and sanitation.
	Use skilled birth attendants (SBAs) in villages	Locally available, trained at community level hence provide prompt and appropriate services.
	Prioritize the involvement of SBAs and health workers in conducting deliveries and referring to Essential Newborn Care (ENC) <sup>6</sup> .	<ul style="list-style-type: none"> <li>ENC is the care that every newborn baby needs regardless of where it is born or its size. It should be applied immediately after the baby is born and continued for at least the first 7 days after birth. Many ENC interventions are simple and can be provided by a SBA or a trained Community Health Worker (CHW) or Traditional Birth Attendant (TBA) or by a family member supporting the mother in a health facility or at home.</li> </ul>



Identify women in preterm labor and refer to nearest health facility	Preterm babies will require in-patient care.
Adhere to Essential Newborn Care (ENC)	<p>Components of ENC include:</p> <p><b>1. Thermal care:</b> Drying, warming, skin-to-skin contact, delayed bathing.</p> <p><b>2. Infection prevention/hygiene:</b> Clean birth practices, hand washing, clean cord/skin/eye care. Chlorhexidine (CHX) cord care is recommended for newborns born at home and in settings where the neonatal mortality rate is above 30 per 1000 live births.</p> <p><b>3. Feeding support:</b> Skin-to-skin contact, support for immediate and exclusive breastfeeding, not discarding colostrum.</p> <p><b>4. Monitoring:</b> Frequent assessment for danger signs of serious infections and other conditions that require extra care outside the household or health post.</p> <p><b>5. Postnatal care checks:</b> Women and babies should receive care at or as close to home as possible in the first week of life. The first 24 hours are the most critical time and should be prioritized for a postnatal visit. Every effort should be made to reach those babies born at home as soon as possible after delivery.</p>
Ensure basic preventive measures to reduce the risk of early neonatal infections	<p>Employ clean birth practices at delivery. Wash hands before and throughout delivery.</p> <p>Ensure that the mother and family wash hands before handling the baby.</p> <p>Emphasize hygienic cord care (use CHX).</p> <p>Administer antibiotics to women with prolonged rupture of membrane.</p> <p>Treat any maternal infections during pregnancy and labor.</p>

	Identify signs of serious bacterial infection in neonates early <sup>7</sup>	<p><b>Critical illness:</b> no movement/unconscious, history of convulsions, unable to feed, severe bleeding, or bulging fontanelle;</p> <p><b>Clinically severe infection:</b> Fever (temperature greater than or equal to 38°C), hypothermia (temperature less than 35.5°C), poor feeding, reduced movement, severe chest in-drawing</p> <p><b>Isolated fast breathing:</b> Respiratory rate &gt;60 breaths per minute</p>
	Extra care for small babies	<p>Adopt Kangaroo Mother Care (KMC), in which the baby is carried with skin-to-skin contact</p> <p>Provide additional support for breastfeeding including the use of a breast pump, administering the milk by cup or another utensil</p> <p>Ensure safe oxygen management and monitoring of newborns for saturation</p> <p>Provide supportive care for respiratory distress syndrome and, if appropriate and available, continuous positive airway pressure (CPAP) and/or surfactant.</p>
Relief Phase	Ensure the presence of trained persons during delivery and adherence to essential newborn care principles	For better management of maternal and neonatal care.
	Safeguard availability of basic drugs, equipment and better support by referral centers by this time	Proper planning and distribution of resources needed.
	Prioritize the limited resources of HCWs	Follow the principle that most sick should get the first priority.
	Relocate obstetricians and pediatricians officially to the affected areas	Manage maternal and newborn health effectively.
	Refer all babies born before 37 weeks gestation and all Low Birth Weight (LBW) newborns (< 2500g) to more advanced care	Preterm and LBW babies might require advanced care.
Rehabilitation Phase	Conduct delivery in a maternity centre or hospital prior identified.	

## Key learning points:

By the end of this chapter, readers should be able to do the following:

1. Describe how reproductive, maternal, and newborn services can be affected during disaster.
2. Define how effective birth preparedness and newborn care can be provided during disaster phases.

## References

1. Zotti ME, Tong VT, Kieltyka L, Brown-Bryant R. Making Evacuation Decisions: The case of high risk pregnant and postpartum women. In: David E, Enarson E, eds. *The Women of Katrina: How Gender, Race, and Class Matter In an American Disaster*. Nashville, Tenn: Vanderbilt University Press; 2012;90–104.
2. CDC: Reproductive Health in Emergency Preparedness and Response. Available from: <https://www.cdc.gov/reproductivehealth/emergency/index.html>
3. Enarson E & Morrow B. Why gender? Why women? An introduction to women and disaster. (1998). 1–10.
4. Bhutta ZA, Das JK, Bahl R, et al. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? *Lancet* 2014, 384(9940):347–70.
5. UNICEF and Save the Children. Newborn health in humanitarian settings: Field guide. March 2016. Available from: <http://www.unicefinemergencies.com/downloads/eresource/docs/Health/NewBornHealthBook-ProductionV17-Web.pdf>
6. World Vision International: Intervention 2: Essential Newborn Care. Available from: <https://www.wvi.org/health/intervention-2-essential-newborn-care>
7. Pocket Book of Hospital Care for Children, World Health Organization, 2013. [www.who.int/maternal\\_child\\_adolescent/documents/9241546700/en/](http://www.who.int/maternal_child_adolescent/documents/9241546700/en/)

## Chapter 6

# Immunization

### Introduction:

Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease<sup>1</sup>.

Immunization is a tool proven for controlling and eliminating life-threatening infectious diseases and is estimated to avert between 2 and 3 million deaths each year. It is one of the most cost-effective health investments, with proven strategies that make it accessible to even the most hard-to-reach and vulnerable populations.

### Immunization in Nepal

In 1979, the National Immunization Program (known at the time as the Expanded Program on Immunization) was initiated in three districts with only two antigens [Bacille Calmette-Guérin (BCG) and Diphtheria, Pertusis, and Tetanus (DPT)] and was rapidly expanded to include all 75 districts with each of the six recommended antigens [BCG, DPT, oral polio vaccine (OPV), and measles] by 1988.

In 2003, the monovalent hepatitis B (HepB) vaccine was introduced. Later, in 2009, a vaccine against *Hemophilus influenzae* type B (Hib) was also introduced. In addition, pneumococcal conjugate vaccine (PCV) and inactivated polio vaccine-intramuscular (IPV-IM) were introduced in 2015 in phases.

In 2018, inactivated polio vaccine-intramuscular was replaced by fractional dose of inactivated polio vaccine (fIPV)-intradermal and rotavirus vaccine was also planned to be included in the immunization schedule (but has not been implemented till date).

All children in Nepal need to receive the recommended number of doses of BCG, DPT-HepB-Hib, OPV, PCV, fIPV, and measles/rubella vaccines during their first year of life<sup>2</sup>.

A regular vaccine supply is maintained in Nepal with a three months minimum stock. Vaccine safety and vaccine storage are the main issues during disasters when power cuts and damage to health institutions occur and disrupt cold chain maintenance.

## **Immunization during disasters:**

Humanitarian crises and emergencies are ubiquitous and frequently unpredictable in time and location. However, with increasing awareness of populations and regions at risk, responses to such events are becoming more and more systematic and better organized. Apart from attending to the immediate need for emergency medical care, food, shelter and access to water and sanitation, preventive public health measures are looked upon as critical issues for consideration as response to a humanitarian emergency. One such measure is the potential use of vaccines against vaccine preventable diseases<sup>3,4</sup>.

Measles is most often recommended, and is widely accepted as a priority health intervention in emergencies<sup>5,6,7</sup>. Simultaneous introduction with other antigens is not generally recommended, but campaigns can include polio vaccination where outbreaks or threats to eradication programs exist and tetanus vaccination for people with open wounds or pregnant women. Vitamin A supplementation is almost universally recommended for implementation during a measles vaccination campaign. Vaccine coverage or needs assessments are also recommended to determine the targeted specific age ranges. Coverage rates of less than 90% for under 15 years old are given as qualifying criteria for recommendation of immediate mass immunization.

Of the vaccines considered for diseases with epidemic potential, three are recommended only after the outset of an outbreak: hepatitis A, meningococcal meningitis, and yellow fever. Vaccinations for measles and polio are both recommended preventatively and after the start of an outbreak, and cholera is not recommended after the start of an outbreak<sup>4</sup>. Vaccines for tetanus, pertussis, and diphtheria are generally not recommended for mass vaccination campaigns, and should rather be implemented through routine immunization programs when conditions stabilize.

Routine immunizations through national expanded programme for immunization (EPI) services should be reinstated as soon as conditions stabilize, and may indeed be one indication of a rehabilitating health system.

## **Tetanus toxoid**

A single dose of tetanus/diphtheria (Td) toxoid should be given to anyone who will be entering the disaster area if they have not received a booster within the previous five years.

Wounds received in flood waters are not in fact tetanus prone, so individuals who are certain that they have had a booster within the last 10 years may safely choose to decline another booster. Single antigen tetanus should NOT be used unless Td is not available.

## **Hepatitis A**

A single dose of hepatitis A vaccine should be given to anyone who meets the following conditions:

1. Living or working in a shelter,
2. Providing medical or personal care to survivors,
3. Working in a jail, prison, detention center, or other law enforcement capacity,
4. Working with the mentally handicapped,

5. Functioning as a first responder,
6. Working with corpses or in a mortuary,
7. Working, preparing or handling food in a shelter.

Administration of the dose creates protective antibody in about two weeks. A booster dose should be offered after six months to all those immunized to assure long-term immunity.

Hepatitis A immunization is not indicated for those engaged in clean-up or those exposed to flood waters. There is no increased risk of hepatitis A in sewer workers or those working in flood waters. If an individual has had a single dose of Hepatitis A vaccine more than six months ago, give the booster. If the individual has had the two dose series, no booster is required.

## **Hepatitis B**

Three doses of hepatitis B vaccine are required to protect those at risk for exposure. This includes anyone who meets the following conditions:

1. Providing medical care to anyone; or functioning as a first responder,
2. Caring for the mentally or physically handicapped in a residential setting,
3. Working in a refugee shelter and possibly exposed to blood or body fluids,
4. Working in law enforcement; or working with corpses or in a mortuary.

The accelerated schedule should be used. The immunizations should be given on day 0, day 7 and day 21. This provides immunity in approximately one month. A booster dose should be given in one year to provide lasting immunity.

If the individual has previously completed a hepatitis B vaccine series, no further treatment is needed. If they have received only one previous hepatitis B vaccination, a single booster dose must be administered.

## **Rabies**

A three dose series for pre-exposure immunization is needed for anyone who will be working directly with animals including those working in animal shelters and those capturing loose animals. These are given on day 0, day 7 and day 21. The series should be administered as soon as possible and the next two doses should be scheduled accordingly.

A single booster dose should be given if the person has had previous rabies immunization, but has not had a booster or antibody tested within the last five years. If an individual has had pre-exposure immunization and is exposed to rabies, an immediate booster should be given and a second dose in three days to complete the five shot series for post-exposure treatment.

Human rabies immunoglobulin (HRIG) is not required if the person has ever received rabies immunization, even if the series is not complete. If a partially immunized person is exposed to rabies, the series should be continued as post-exposure by counting the number of doses already given and completing the five doses by day 28. Post-exposure is given on days 0, 3, 7, 14 and 28.

## **Influenza**

As soon as it becomes available, influenza immunization should be given to the entire population of the disaster affected areas. Because most of the displaced population will have been absorbed into the community without an increase in housing space, there is bound to be massive overcrowding in homes and schools. After normalization, opening the schools are in priority.

The opening of school always brings with it an increase in respiratory and infectious diseases. This can be expected to be much worse in these crowded conditions. Children, high risk adults, medical and relief workers and those in shelters or institutions should be the first to be immunized but the most effective situation would be to immunize as much of the population as possible to create herd immunity.

## **Measles**

It is standard practice to give a booster dose of measles vaccine to all children under 15 years of age who are residing in shelters or refugee camps.

Everyone over the age of 12 months who is in a shelter or other crowded group setting should receive one dose of measles, mumps, rubella (MMR) vaccine unless they have a documented record of two doses of MMR or were born before 1957.

## **Varicella**

Everyone over the age of 12 months who is in a shelter or other crowded group setting should receive one dose of varicella vaccine unless they have a documented record of immunization or a reliable history of chickenpox.

## **Records**

Permanent medical records of all immunizations given should be created using standard forms and systems. In addition, all persons given immunizations in a disaster area should be given a wallet-sized card with their name and date of birth and the date of each immunization given. Where a series of shots are required (such as hepatitis B or rabies), there should be blanks on the card for the number of shots in the series so that the documentation remains on one card.

## **Immunization Decision During Disaster**

WHO has considered three important decision making steps on the use of vaccines in acute humanitarian emergencies<sup>8</sup> (Figure 14).

The steps are as follows:

Step 1: Determine and grade risk of the VPD (epidemiological risk assessment).

Step 2: Assess vaccines and amenability to service delivery (considerations for vaccines).

Step 3: Assess contextual constraints and facilitators, alternative interventions and competing needs (contextual considerations and competing needs).

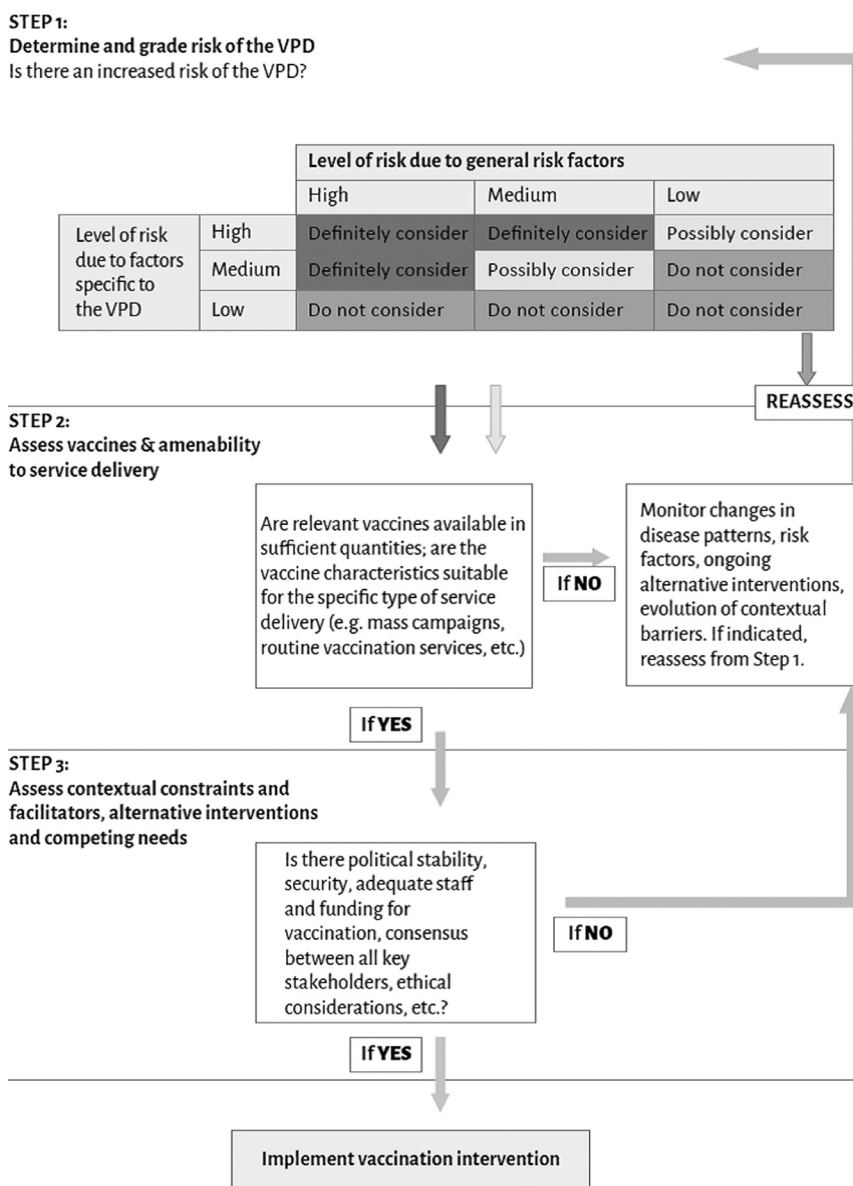
The decision- making framework provides a clear and consistent approach to assess the:

1. Local epidemiological risk of VPDs among the affected population,

2. Vaccine selection and characteristics to consider, and
3. Local contextual constraints that further assist in effective and timely decisions.

The ultimate aim of the decision-making framework is to assist the user to thoughtfully, deliberately, ethically, and rationally determine whether or not the delivery of one or more vaccines to specific target populations during the acute phase of an emergency would result in the overall saving of lives, a reduction in the population burden of disease, and generally more favorable outcomes than would otherwise be the case.

**Figure 14:** Decision making steps on vaccine use during acute humanitarian emergencies<sup>8</sup>





**Table 12: Determining the presence of key general risk factors<sup>8</sup>:**

Risk factors	Main effect on VPDs	Key questions to ask	Possible indicators to consider
High prevalence of malnutrition	Increased risk of infection, disease progression and case fatality	<p>Is there evidence of a nutritional crisis, either already established or unfolding?</p> <p>Is there an unusually high prevalence of acute and/or chronic malnutrition, among young children or the general population (e.g. history or reports of specific micronutrient deficiencies especially vitamin A)?</p>	<ul style="list-style-type: none"> <li>• Prevalence of acute malnutrition among children aged 6–59 months, <math>\geq 15\%</math> or <math>\geq 2\%</math> measured within the last three months above and beyond seasonal levels</li> <li>• Average nutritional intake or food ration <math>&lt; 2100</math> kcal per person per day</li> <li>• Deteriorating food security indicators (e.g. price of staple foods or livestock, yield of last harvest)</li> </ul>
High burden of chronic diseases	Increased risk of infection, disease progression and case fatality	Is there unusually high burden of chronic diseases in the general population?	Prevalence of chronic diseases including diabetes, cardiovascular, cancer, immunosuppressive drugs, and renal diseases in the general population
Young population &/or high birth rate	<p>Greater pool of susceptible for VPDs mainly affecting children</p> <p>Higher herd immunity threshold</p>	<p>Are there a high number of children?</p> <p>Is there an increase in deliveries?</p>	<ul style="list-style-type: none"> <li>• Proportion of children aged under 5 years <math>\geq 15\%</math></li> <li>• Crude birth rate <math>\geq 30</math> per 1000 people per year</li> </ul>
High HIV/AIDS burden	Increased risk of infection, disease progression and case fatality	<p>Do persons with HIV/AIDS make up a high proportion of the population?</p> <p>Is there a low access to highly-active antiretroviral therapy (HAART), or have HAART programmes been disrupted by the emergency?</p>	<ul style="list-style-type: none"> <li>• HIV sero-prevalence <math>\geq 15\%</math> and HAART coverage <math>&lt; 50\%</math> or probably falling due to the emergency</li> </ul>

Low access to curative and supportive health services	Increased case fatality for all VPDs  Increased risk of some vertically transmitted VPDs (neonatal tetanus, hepatitis B)	Has the emergency resulted in reduces access to quality outpatient and inpatient curative health services and if so, to what extent?	<ul style="list-style-type: none"> <li>• &lt;1 basic health unit per 10 000 people or &lt;1 hospital per 250000 people</li> <li>• High proportion of non-functional or inaccessible health facilities</li> </ul>
Overcrowding	Increased transmissibility of airborne, droplet and faecal-oral VPDs	Does the population live in a large camp or a high-density urban community?  How close together are residential structures?	Size of camp >10 000 people <3.5 m <sup>2</sup> covered floor area per person
Insufficient water, sanitation & hygiene	Increased transmissibility of faecal-oral diseases (mostly), vector-borne, airborne and droplet diseases	Does the population have inadequate access to water, sanitation and hygiene (e.g. soap, health promotion)?  Camp settings near unprotected water sources (swamps or vector-breeding sources)?	<ul style="list-style-type: none"> <li>• &lt;15 litres water available per person per day</li> <li>• &gt;20 persons per latrine</li> <li>• &lt;250 g of soap per person per month</li> </ul>

**Table 13: Relevance of each general risk factor to each VPD<sup>8</sup>:**

	High prevalence of malnutrition	High prevalence of chronic disease	Young population &/or high birth rate	High HIV/AIDS burden	Low access to curative health services	Over-crowding	Insufficient water, sanitation & hygiene
<b>AIRBORNE-DROPLET</b>							
Diphtheria	Moderate	Low	Low	Unknown	Moderate	High	Low
Hib disease	Moderate	Low	High	Moderate	High	Moderate	Moderate
Influenza	Unknown	Moderate	High	Moderate	Moderate	High	Unknown
Measles	High	Low	High	Moderate	High	High	Moderate
Meningococcal meningitis	Low	Low	Low	Moderate	High	High	Low
Mumps	Low	Low	High	Low	Low	Moderate	Low
Pertusis	High	Low	High	Low	Moderate	High	Low
Pneumococcal disease	High	High	High	High	High	High	Low
Rubella	Moderate	Low	High	Low	Moderate	Moderate	Low
Tuberculosis	High	High	Low	High	High	High	Low
Varicella	Moderate	Low	Moderate	High	Low	High	Moderate
<b>FECAL-ORAL</b>							
Cholera	Moderate	Low	Low	Unknown	High	High	High
Hepatitis A	Unknown	Low	Low	Low	Low	Low	High
Hepatitis E	Unknown	Low	Low	Low	Low	Low	High

Polio	Low	Low	Low	Low	Low	High	High
Rotavirus	Moderate	Low	High	Low	High	Moderate	Low
Typhoid fever	High	Low	Low	Moderate	Moderate	Moderate	High
<b>VECTOR- BORNE</b>							
Japanese encephalitis	Unknown	Low	Moderate	Unknown	Moderate	Low	Moderate
Yellow fever	Moderate	Low	High	Unknown	Low	Low	Moderate
<b>OTHER or MIXED</b>							
Hepatitis B	Unknown	Low	High	High	Moderate	Moderate	Moderate
HPV	Low	Low	Low	High	Low	Low	Low
Rabies	Low	Low	Moderate	Low	High	Low	Moderate
Tetanus	Low	Low	High	Low	High	Low	High

**Table 14: Immunization during different phases of disaster can be maintained by the following:**

Phase	Activity	Remarks
Preparedness	Maintain routine vaccination; ensure that adequate stocks of vaccines for typhoid, hepatitis A and rabies, as well as polyvalent antsnake venom, are utilized by the national immunization programs.	Services and demands of these vaccines may be more after a disaster strikes.
	Stocking of other items required for vaccination like syringes, vaccine carriers/iceboxes etc	To be use in case of emergency.
	Proper maintenance of current cold chain and alternative plans of cold chain.	Cold chain disruption may occur during disaster
Response Phase	Vaccination and immunization will not have priority at this time.	Shifts skilled manpower from lifesaving actions.
Relief Phase	Continue and strengthen routine vaccination	Long term benefits for better health. Routine immunizations through national immunization programme should be reinstated as soon as conditions stabilize, and may indeed be one indication of a rehabilitating health system.
	Mass vaccination	Not advised until justified after evidence of progressive increase in the number of cases with the risk of an epidemic.
	Storage of vaccine in the affected areas	Ensure that proper cold chain exists in the region before dispatching vaccines.
	Supply vaccines to the affected areas	Follow the routine method if existent. Temporary use of vaccine carrier box, day carrier box etc may be used as situation demands.

	Adoption of vaccination policy	Should be decided at the national level and strictly adhered by all.
Rehabilitation Phase	Restore the best immunization practices	Direct all actions to restore the best immunization practices as per National Immunization Program (NIP) guidelines to achieve optimum coverage

### Key learning points:

By the end of this chapter, readers should be able to do the following:

1. Define immunization.
2. Discuss immunization during disaster.
3. Enumerate the different vaccines necessary during disaster.

### References:

1. World Health Organization. Immunization. Available from: <http://www.who.int/topics/immunization/en/>
2. Ministry of Health. Nepal Demographic and Health Survey 2016. P 202-4. Available from: <https://www.dhsprogram.com/pubs/pdf/FR336/FR336.pdf>
3. Connolly MA, Gayer M, Ryan MJ, Salama P, Spiegel P, Heymann DL. Communicable diseases in complex emergencies: impact and challenges. *Lancet*. Nov 27-Dec 3 2004;364(9449):1974-83
4. World Health Organization. Vaccination in Humanitarian Emergencies: Literature review and case studies. Available from: [http://www.who.int/immunization/sage/meetings/2012/april/2\\_SAGE\\_WGVHE\\_SG1\\_\\_Lit\\_Review\\_CaseStudies.pdf](http://www.who.int/immunization/sage/meetings/2012/april/2_SAGE_WGVHE_SG1__Lit_Review_CaseStudies.pdf)
5. UNICEF. Emergency Field Handbook: A guide for UNICEF staff. 2005
6. World Health Organization, UNICEF. WHO/UNICEF Joint Statement: Reducing Measles Mortality in Emergencies. 2004.
7. The Sphere Project: Humanitarian Charter and Minimum Standards in Humanitarian Response, 2011.
8. WHO. Vaccination in Acute Humanitarian Emergencies: A Framework for Decision Making. May, 2017. Available from: [www.who.int/vaccines-documents/](http://www.who.int/vaccines-documents/)

## Chapter 7

# Education and Disaster

### Introduction

Schools are generally considered to be safe havens for millions of children and the greatest socializing institutions after the family. However, the recent experiences with natural disasters, in-school violence, and acts of terrorism demonstrate the need for schools to be prepared for all-hazard crisis possibilities.

It is important to note that there is a fundamental link between day-to-day emergency readiness and disaster preparedness. Schools that are well prepared for an individual emergency involving a student or staff member are more likely to be prepared for complex events such as community disasters<sup>1</sup>.

School disaster planning is a facet of larger community planning and, therefore, requires coordinated planning and allocation of community resources. Plans should be developed in partnership with other community groups, including law enforcement, fire safety, public health, emergency medical services (EMS), and pediatric and mental health professionals<sup>2</sup>.

In the event of an emergency in a school or in the community while a child is under school jurisdiction, EMS also includes school nurses, teachers, and other school staffs. In addition, schools play a role in medical surge capacity (the ability of health care systems to adequately care for large numbers of patients). Schools lend space (eg, shelter, temporary clinics, and morgues) and sometimes supplies (eg, school meal diversion) to the community during times of crises.

Disasters like earthquakes do not only damage educational infrastructures and buildings, but also disturb children's regular educational activities, especially for those living in rural areas<sup>3</sup>. Disaster risk reduction measures can create safer school buildings and safer learning environments that will help to prevent mortality and morbidity; these measures can also promote optimal health for school children<sup>4</sup>.

Following the April 2015 Nepal earthquake, a preliminary report was published on "Children's Earthquake Recovery Consultation" conducted by four child-centered agencies (Plan International, Save the Children, UNICEF and World Vision International), in coordination with the Ministry of Federal Affairs and Local Development (MoFALD) and the Central Child Welfare Board (CCWB).

The study employed focus group discussions involving more than 1,800 girls and boys from the 14 most severely earthquake-affected districts. These discussions aimed to assimilate information directly from children the challenges they were facing in the aftermath of the earthquakes; to assess the impact of the disaster on their roles, responsibilities and future opportunities; and to seek their views on and recommendations for recovery.

The three priority issues of concern identified by the children on the report were as follows:

1. Inadequacy and insecurity of tents and other temporary shelters in which many are living as a result of destruction or damage to their homes .
2. Impact of school closures on their learning and social interactions and the uncertainty of returning to school.
3. Lack of access to safe water supplies, sanitation and medical care and the resulting fears for their health and that of family and community members.

The wider impacts that were identified through the consultations included the following:

1. Profound feelings of sadness and grief at deaths and loss of homes, belongings, schools, temples and other places of worships, communities and ways of life.
2. Fear of another earthquake and other potential threats, and anxiety about the future.
3. An increased burden of domestic chores and other tasks to support their parents in ensuring adequate food, shelter and water.
4. Increased feelings of vulnerability, particularly among girls, regarding exploitation and abuse<sup>5</sup>.

The ministry of education, science and technology has also included disasters and disaster management in the national school curriculum from grade six to grade ten. At present, disasters and management in school curriculum is as depicted in Table15.

**Table 15: Contents on disasters and disaster management in Nepal's national school curriculum**

Grade	Contents	
	Social studies and population	Science and environment
Six	<ul style="list-style-type: none"> <li>• Introduction to disaster and disaster management (fire, flood and landslide).</li> <li>• Effective measures of disaster management: pre-disaster, during disaster and post-disaster.</li> </ul>	Causes and responses to natural hazards- reasons and remedies (landslides, soil erosion and fire).
Seven	<ul style="list-style-type: none"> <li>• Disaster management (epidemic cholera and accidents).</li> <li>• Importance of pre-cautions to be taken for disaster management.</li> </ul>	Effects of natural hazard on the environment and effective solutions (Earthquakes and volcanoes).

Eight	Response to earthquakes and storms	<ul style="list-style-type: none"> <li>• Different hazards and their management.</li> <li>• Management and effective measures of risk minimization for earthquakes, floods, fires, landslides, and epidemics.</li> </ul>
Nine	Water induced hazards and their management	<ul style="list-style-type: none"> <li>• Natural and human made disasters.</li> <li>• Causes, effects and responses to natural hazards [avalanches (snow slide), glacial lakes (Snow Lake), explosions and storms].</li> </ul>
Ten	Impacts and effective measures for management of earthquakes and tsunamis	

**Table 16: Effective management of school health during different phases of disaster**

Phase	Activities	Remarks
Preparedness	Develop an emergency preparedness and response plan for all schools during disasters	This should be undertaken by the ministry of education, science and technology in collaboration with other stakeholders to cater for all common disasters.
	Train teachers and school administrators	This training would allow effective response to disasters that may occur during school hours.
	Practice mock drills on weekly or fortnightly basis in schools	Practice of the plans through drills and community- wide exercises ensures that gaps will be identified and weaknesses will be addressed <sup>6</sup> .
	Take classes for faculty and students (by paediatricians and other agencies)	First-aid for emergency situations should be taught. The faculties should be trained to understand what can be expected from students during and after a disaster.
	Individual schools can identify school crisis teams and clearly delineate the roles that staffs would play during emergencies	The crisis teams work with community stakeholders involved in crisis planning (such as local emergency planning committees-LEPCs) and link internal crisis planning to the other community crisis plans. The school crisis teams should assess the medical equipment as well as mental health and other resources available in the school environment.

	<p>Include chapters on issues concerning disaster risk reduction and disaster management in textbooks of grades five to ten</p>	<p>Depending upon their level of understanding, grade five curriculums should include an introduction to disasters.</p> <p>Basic skills (disaster drills- such as those listed below) should also be included in school curriculum and textbooks :</p> <p>a) Earthquake drill:</p> <ul style="list-style-type: none"> <li>• Practice drop, cover and hold.</li> <li>• Evacuate classroom in less than 1 minute without pushing and falling.</li> <li>• Evacuate school in less than 4 minutes.</li> <li>• Lookout for friends.</li> <li>• Stay away from weak areas/ structures.</li> <li>• Help those who need assistance</li> </ul> <p>b) Fire/ chemical accident drill:</p> <ul style="list-style-type: none"> <li>• Evacuate from classroom</li> <li>• Ensure safe storage of inflammable liquids/ chemicals</li> <li>• Turn off electricity and remove or close down gas connections.</li> </ul>
	<p>Identify children with special health care needs, prepare additional disaster- preparedness planning and valid emergency care plans for them</p>	<ul style="list-style-type: none"> <li>• Prepare plans for managing individual emergencies related to children's illness and complex medical needs of students in the event of a larger community emergency.</li> <li>• Students in wheelchairs may need evacuation chairs that can glide down stairwells when the elevator is inoperable. Multiple evacuation routes need to be preplanned, and staff members need to be assigned for them.</li> <li>• Medication availability during a prolonged lockdown or shelter-in-place situation poses a challenge for students with diabetes and other chronic diseases<sup>7</sup>.</li> </ul>
	<p>Set up building standards for schools</p>	<p>This helps to reduce risks of damage or collapse</p>
	<p>Parental understanding of the emergency plan and the reunification process</p>	<p>Classrooms should have folders that contain emergency contact information, individual health plans, name tags, and other critical information for all students, particularly the youngest ones. These folders should be with the teacher during an evacuation. Parents should be informed annually about the individual school's emergency plans. They should clearly understand that well-meaning attempts to approach a school in disaster could direct resources away from children, undermine emergency efforts, and increase risk to students.</p>



Response Phase	Education will not be a priority	All efforts have to be directed towards issues related to survival, shelter, food, water and sanitation
	The school crisis team is activated, and the routines, which ideally have been practiced, are rolled out depending on the nature of the crisis	School nurses, teachers, and other school staff become a seamless part of EMS. School facilities are often designated as disaster evacuation shelter sites. This also provides an opportunity for school officials to assess family and child needs.
Recovery Phase	Conduct a safety review of existing school infrastructure.	A multidisciplinary team should be formed beforehand including safety engineers and review must begin as early as practically feasible.
	Replace and retrofit unsafe schools as early as possible	This should be carried out with support from local government (rural municipality/municipality), provenance/federal government and non-government organizations.
	Prioritize re-establishing and reopening schools.	Although returning to the classroom does not ensure that children are ready to address learning tasks, evidence points to the restorative power of the educational routine in guiding children through emotional crises <sup>8</sup> .
	Use temporary shelters where schools are destroyed by disaster.	Use outdoor classrooms, tree shade classrooms, tents or other public structures as classes. Build temporary learning center in a safe place.
	Focus on non-formal educational activities	Non- formal educational activities support children's recovery.
Rehabilitation Phase	Prioritize rebuilding disaster resistant schools during this phase	Adhere to the stipulated building code and retrofit buildings.
	Ensure continuity of education	Conduct classes in temporary learning center.
	Engage school administrators, staff, students, and parents in ongoing disaster prevention activities for the school community	Such engagement mobilizes communities into groups for improved disaster risk reduction preparedness practices, social harmony and psychosocial counseling.
	Replace school supplies and textbooks	To resume classes.
	Make flexible time schedules for students facing difficulties integrating into the classroom	This includes variable school hours and shifts, outreach education programs, childcare programs for young mothers, and peer support
	Reorient educational programs	Develop, support and maintain survival and life skills in addition to vocational and academic skills for children.

	Identify and keep record of various qualified persons in the field of education	This will help in conducting teacher training courses; provide ongoing support and guidance, psychological counseling, follow-up, monitoring and supervision.
--	---	---

### Key learning points:

By the end of this chapter, readers should be able to do the following:

1. Describe how schools can be affected by disasters.
2. Define how an effective school health plan can be established during different phases of disaster.

### References

1. American academy of pediatrics. Disaster planning for schools. Pediatrics 2008; 122(4):895-901.
2. Markenson D, Reynolds S; American Academy of Pediatrics, Committee on Pediatric Emergency Medicine, Task Force on Terrorism. The pediatrician and disaster preparedness. Pediatrics. 2006;117(2).
3. United Nations Office for Disaster Risk Reduction Asia and the Pacific. Guidance notes: assessment and mitigation planning for risk reduction. Bangkok: United Nations Office for Disaster Risk Reduction Asia and the Pacific; 2010.
4. Save the Children. Comprehensive school safety: working towards a global framework for climate-smart disaster risk reduction, bridging development and humanitarian action in the education sector. Fairfield: Save the Children; 2012.
5. Plan International, Save the Children, UNICEF, World Vision International. After the earthquake: Nepal's children speak out: Nepal Children's earthquake recovery consultation [Internet] 2015 Jul.
6. Available from: <http://plan-international.org/files/global/publications/emergencies/after-the-earthquake-nepals-children-speak-out.pdf>.
7. Loyacono TR. Responding to school emergencies. Emerg Med Serv. 2005;34(4):43–44, 46, 48 passim
8. American Academy of Pediatrics, Committee on Pediatric Medicine. Emergency preparedness for children with special health care needs. Pediatrics. 1999;104(4). Available at: [www.pediatrics.org/cgi/content/full/104/4/e53](http://www.pediatrics.org/cgi/content/full/104/4/e53)
9. Zenere F. Hurricane experiences provide lessons for the future. NASP Communique'. 2005;33(5). Available at: [www.nasponline.org/publications/cq/cq335flhurricane.aspx](http://www.nasponline.org/publications/cq/cq335flhurricane.aspx).

## Chapter 8

# Water, Sanitation, Hygiene (WASH) and Shelter during Disasters

### Background:

Water and sanitation are critical determinants for survival in the initial stages of a disaster. People affected by disasters, especially children, are generally much more susceptible to illness and death from disease, which to a large extent are related to inadequate sanitation, inadequate water supplies and inability to maintain good hygiene<sup>1</sup>.

Water, Sanitation and Hygiene (WASH) intervention during disasters refers to the provision of safe water for drinking, washing and domestic activities; the safe removal and final disposal of waste (faecal and solid waste disposal); and health promotion activities to encourage protective healthy behavioural practices amongst the affected population<sup>2</sup>.

Children usually represent a large proportion of the population in emergencies. Moreover, mortality and morbidity rates amongst children under five years of age are often significantly higher than within the general population. They should therefore be a primary target group of humanitarian responses.

Disasters, natural or manmade, can compromise vital water and waste management infrastructure. Inadequate provision of WASH can lead to an increased risk of diseases such as diarrhoea, hepatitis A, cholera, typhoid and shigella dysentery, intestinal helminthes, malaria and trachoma<sup>3</sup>. Inadequate management of human excreta poses a serious health risk because of potential contamination and loss of local water sources<sup>4</sup>.

There is a common belief that the feces of infants and young children are not harmful but this is not necessarily true. In fact, there is evidence that children's feces could be more risky than adults' feces as a result of a higher prevalence of diarrhea and pathogens such as hepatitis A, rotavirus, and E. coli in children than in adults. Therefore, children's feces should be treated with the same concern as adult feces, using safe disposal methods that ensure separation from human contact and household contamination. In particular, the unsafe disposal of children's feces may be a major contaminant in household environments, posing a high risk of exposure to young infants<sup>5</sup>.

Lack of adequate supplies of clean water restricts the functioning and safe practices of health

facilities and health workers<sup>3</sup>. Pathogenic risks from exposure to medical waste include hepatitis B & C; HIV; hemorrhagic fever; skin, respiratory and gastroenteric infections. It is estimated that 20% of health care waste is infectious<sup>6</sup>.

The main objective of WASH programs during disasters is to reduce the transmission of fecal-oral diseases and exposure to disease-bearing vectors through promotion of the following <sup>1</sup>:

1. Good hygiene practices
2. Provision of safe drinking water
3. Reduction of environmental health risks
4. Conditions that allow people to live with good health, dignity, comfort and security.

**Table 17: Water-and excreta-related diseases and transmission mechanisms<sup>1</sup>:**

Medium	Diseases	Route of transmission	Transmission mechanism
Water borne or water-washed	Cholera, shigellosis, diarrhea, salmonellosis etc. Typhoid, paratyphoid etc. Amebic dysentery, giardiasis hepatitis A, poliomyelitis, rotavirus, diarrhea	Fecal-oral  Bacterial Fecal-oral Non bacterial	Water contamination  Poor sanitation Poor personal hygiene Crop contamination
Water-washed or water-scarce	Skin and eye infections  Louse borne typhus and louse borne relapsing fever		Inadequate water  Poor personal hygiene
Excreta related helminthes	Roundworm, hookworm, whipworm etc.	Soil transmitted helminthes	Open defecation, ground contamination
Beef and pork tapeworms	Taeniasis	Man- animal	Half cooked meat, ground contamination
Water based	Schistosomiasis, guinea worm, clonorchiasis	Prolonged exposure to infected water	Water contamination
Water related insect vector	Malaria, dengue, sleeping sickness, filariasis etc.	Mosquito/ fly bite	Bites/breeding near water
Excreta-related insect vectors	Diarrhea, dysentery	Transmitted by flies and cockroaches	Unhealthy environment

Simply providing sufficient water and sanitation facilities will not, on its own, ensure their optimal use or impact on public health.

In order to achieve the maximum benefit from a response, it is imperative that disaster-affected people have the necessary information, knowledge and understanding to prevent water-and sanitation-related diseases and to mobilize their involvement in the design and maintenance of those facilities.

### **Provision of water during disasters:**

In any emergency, provision of adequate and safe drinking water is the first priority.

Mechanisms to deliver access to safe water can include the following:

- a. Set up of surface water treatment systems (SWATs)  
Where surface water is the most available and accessible source of water to meet the demands of the affected population, its treatment can be the most effective method to secure access to safe water in sufficient quantity and quality.
- b. Extraction of ground water from protected sources  
Ground water is usually the safest and relatively cost-efficient source of water for humanitarian operations. It is usually free of pollutants, especially when it is extracted from a protected source such as a borehole or a lined well.  
It only needs disinfection (chlorination) when health threats require for residual chlorine for protection due to transport and handling /manipulation at household level.
- c. Water trucking  
Water trucking is usually the most rapidly available alternative for the provision of water at the onset of an emergency. However, given its significant technical limitations and time constraints, it should be considered only as an interim solution and when other solutions for water supply are not possible.

### **General guidelines on water needs during emergencies<sup>1</sup>:**

- a. Average water use for drinking, cooking and personal hygiene in any household is at least 15 liters per person per day.
- b. The maximum distance from any household to the nearest water point should be 500 meters.
- c. Queuing time at a water source should be no more than 30 minutes.

Table 18 shows quantity of water required for survival.

### **Water sources selection:**

The preferred water source depends on: availability, proximity and sustainability of sufficient quantity of water; whether treatment is needed; and its feasibility, including the existence of any social, political or legal factors concerning the source.

Generally, ground water sources and/or gravity-flow supplies from springs are preferable, as they require less treatment and no pumping. During disasters, a combination of approaches and sources is often required in the initial phase. All sources need to be regularly monitored to avoid over-exploitation.

**Needs:**

The quantities of water needed for domestic use may vary according to the climate, people, personal habits, cultural and religious practices, and the sanitation facilities available. Water consumption generally depends on the location and the distances of water source. Attention should be given to ensure water availability for livestock and irrigation where livelihood depends on these.

**Table 18: Simplified table of basic survival water needs<sup>1</sup>**

Requirement	Quantity of water	Influencing factors
Sustenance (drinking and food)	2.5-3 liters per day	Depends on: the climate and individual physiology
Basic hygiene practices	2-6 liters per day	Depends on: social and cultural norms
Basic cooking needs	3-6 liters per day	Depends on: food type, and social as well as cultural norms
Total basic water needs	7.5-15 liters per day	
Source: Sphere standard		

For paediatricians involved in providing care for children during disasters, the approximate water requirement for different aspects of healthcare management has been standardized (Table 19).

**Table 19. Minimum water quantities for institutions and other uses<sup>1</sup>**

Types of institution/location	Minimum amount of water required
Health center and hospitals	5 liters/out-patient; 40-60 liters/in-patient/day. Additional quantities may be needed for laundry equipment, flushing toilets, etc.
Cholera center	60 liters/patient/day; 15 liters/carer/day
Therapeutic feeding centers	30 liters/in-patient/day; 15 liters/carer/day
Operating theatre/maternity	100 liters / intervention
SARS isolation	100 liters / isolation
Viral haemorrhagic fever isolation	300-400 liters / isolation
Schools	3 liters/pupil/day for drinking and hand washing
Public toilets	1-2 liters/user/day for hand washing; 2-8 liters/cubicle/day

**Quantity/coverage:** During a disaster the priority is to provide equitable access to an adequate quantity of water even if it is of intermediate quality. Disaster affected people are significantly more vulnerable to disease; therefore, water access and quantity indicators should be fulfilled even if they are higher than the norms of the affected or host population.

**Maximum numbers of people per water source:** The number of people per source depends on the yield and availability of water at each source. The approximate guidelines based on availability of water point for eight hours in a day are mentioned in Table 20.

**Table 20: Number of people supported by different water sources**

<b>Number of people per water source (Eight hours per day)</b>	<b>Basis of estimation (flow rate)</b>
250 people per tap	7.5 liters/ min
500 people per hand pump	17 liters/min
400 people per single user open well	12.5 liters/ min

**Water quality during disasters:**

- a. Water should be treated with a residual disinfectant such as chlorine if there is a significant risk of source or post-delivery contamination. For all water supplies, water treatment with disinfectant should be performed so that there is chlorine residual of 0.5mg/l and turbidity is below 5 NTU (nephelometric turbidity units) at the tap.

In the case of specific diarrhoeal epidemics, it is recommended to ensure that there is residual chlorine of above 1mg/l. Household-level water treatment should be meticulously performed.

- b. Faecal coliform bacteria (>99% of which are E. coli) are an indicator of the level of human and/or animal waste contamination in water and the possibility of the presence of harmful pathogens. There should be no faecal coliforms per 100ml of water at the point of delivery.
- c. Merely providing treated water will have little impact unless people understand its health benefits. People may prefer to use unprotected sources, e.g. rivers, lakes and unprotected wells, for reasons such as taste, proximity and social convenience. In such cases, promotional messages and discussions are important.

**Water storage and collection:**

- a. Each household should have at least two clean water-collecting containers of 10–20 liters, one for storage and one for transportation.
- b. Water collection and storage containers should have narrow necks and/or covers for buckets or other safe means of storage, drawing, and handling, and should be demonstrably used.

**Water treatment and purification:****1. Straining and aeration:**

Pouring water through a clean cotton cloth will remove suspended silt and solids. The cloth must always be used with the same surface uppermost. The cloth may be cleaned using soap and clean water.

Aeration increases the oxygen content of water; removes volatile substances affecting taste and odor; and reduces carbon dioxide content, hydrogen sulfide and methane. Some dissolved minerals precipitate due to oxidation and can be removed by sedimentation and filtration.

## 2. Sedimentation

Suspended solids and some pathogens will settle to the bottom of the container. According to WHO, up to 50% of bacteria die after 24 hours of storage in a sterile container.

## 3. Filtration

The process of natural cleansing of water through sand or other porous material is termed as filtration. Many portable water filters can remove disease-causing parasites such as cryptosporidium and giardia from drinking water. In a portable water filter, filter with pore size small enough to remove parasites should be chosen. Most portable water filters do not remove bacteria or viruses.

## 4. Disinfection

Storage, sedimentation and filtration of water reduce the contents of harmful bacteria but none of them can guarantee the complete removal of germs. Disinfection is a treatment process that ensures drinking water is free from harmful organisms or pathogens.

There are various methods of achieving disinfection at the household level: disinfection by boiling, disinfection by using chlorine, solar disinfection (SODIS) and other water treatment chemicals.

Disinfection using chlorine is one of the easiest methods during emergencies and is effective in removing most pathogenic bacteria and viruses. However, parasites like cryptosporidium and giardia are not effectively removed.

### How to prepare a chlorine solution?

- a. Take 40 grams of bleaching powder in a liter of jug/ vessel.
- b. Add a little water to make a paste.
- c. Add 1 liter of water on the prepared paste; leave the solution for five minute to settle down.
- d. Pour the clear solution into colorful vessel and store it properly. The solution is chlorine solution with a 1% concentration.
- e. This chlorine solution can be used as per requirement considering the volume of water in a vessel. For example, one glass of 1% chlorine solution can disinfect 1000 liters of water; 1 liter of 1% chlorine solution can disinfect 10,000 liters of water.
- f. The prepared water should be left for 30 minutes before drinking, after which the water should have a chlorine concentration of 0.2-0.5 mg/l as free residual chlorine. Low concentration of chlorine does not kill bacteria, and high concentration of chlorine in water disturbs its odor.

Chlorine demand always depends upon other parameters such as turbidity, pH, temperature, and other chemical contaminants. Hence it is best to measure free residual chlorine (FRC) and maintain at levels > 0.5 mg/L.

### Hygiene promotion<sup>6</sup>:

Communities affected by a disaster often lack basic water and sanitation facilities. They are likely to be traumatized and vulnerable to disease. Disruption of familiar practices or the relocation to new environments can result in deterioration in existing hygiene behaviours. This, in turn, contributes to an increased risk of disease transmission and epidemics.



Effective hygiene promotion is widely accepted to be one of the most valuable tools to reduce the burden of diarrhoeal diseases after a disaster. Hygiene promotion is a general term used to cover a range of strategies aimed at improving people's hygiene behavior and prevent the spread of disease. By creating a series of barriers to infection, hygiene behavior significantly influences on the transmission of water- and sanitation-related diseases (Figure 15).

Effective hygiene promotion is community specific. Programs must be designed to meet the needs of a particular community. This can only be achieved through careful planning, monitoring, and evaluation of activities. The most important practices to be targeted are as follows:

- a. Appropriate use and maintenance of sanitation facilities
- b. Safe disposal of feces
- c. Handwashing after defecation and before food preparation
- d. Use and proper storage of safe drinking-water
- e. Control of flies, mosquitoes and other disease vectors

Hand washing is the most effective hygiene promotion strategy for controlling water- and sanitation- related disorders during disasters.

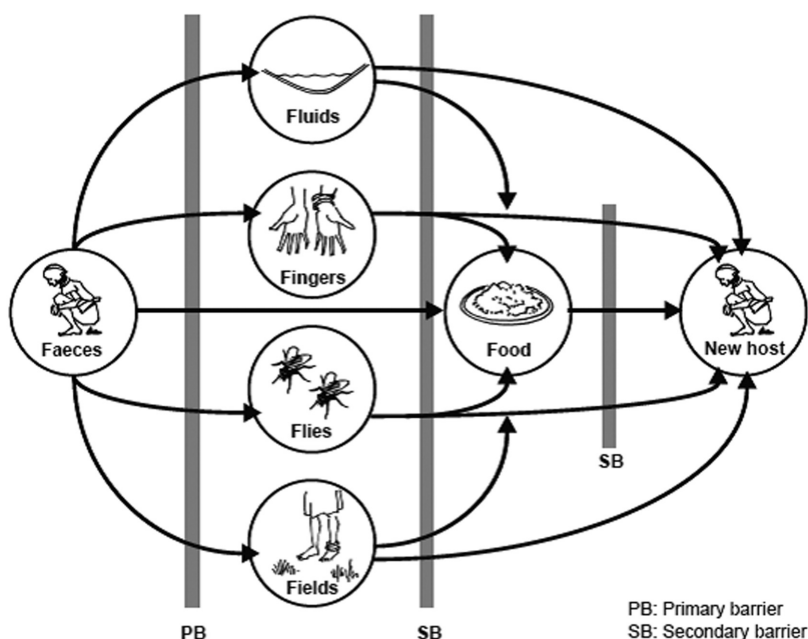
### **Basic hygiene items<sup>1</sup>:**

A basic minimum hygiene items pack consists of - water containers (buckets), bathing and laundry soaps, and menstrual hygiene materials. The recommended standard list of basic hygiene items are as follows:

- One 10-20 liter capacity water container for transportation and another 10-20 liter capacity water container for storage per household;
- One 250g bathing soap per person per month,
- One 200g laundry soap per person per month along with acceptable material for menstrual hygiene, such as one washable cotton cloth per person.

### **Principles of hygiene promotion<sup>6</sup>:**

1. Target a small number of risk reduction practices: Target behaviours most likely to directly reduce the spread of disease first (like including handwashing with soap and safe disposal of faeces).
2. Target specific audiences: Identify community groups that can have largest influence.
3. Identify the motives for changed behavior: People often change hygiene practices for reasons not directly related to health, such as a wish to gain respect from neighbors, or personal pride.
4. Use positive hygiene messages: People learn best and listen longer when entertained.
5. Identify the best way to communicate: Traditional and existing channels of communication are easier to use and are usually more effective than setting up new ones.
6. Use a cost-effective mix of communication channels: Using several methods of communication with your audience reinforces the message and improves acceptance.
7. Carefully plan, execute, monitor, and evaluate.



**Figure 15:** Hygiene barriers to transmission of disease from feces/ the Five F's

## Sanitation

Sanitation is the efficient disposal of excreta, urine, refuse, and sullage. Initially, indiscriminate defecation is usually the main health hazard in disaster affected areas.

## Excreta disposal

Safe disposal of human excreta creates the first barrier to excreta-related disease, helping to reduce disease transmission through direct and indirect routes. Safe excreta disposal is, therefore, a major priority and in most disaster situations should be addressed with as much speed and effort as the provision of a safe water supply.

The provision of appropriate facilities for defecation is one of a number of emergency responses essential for people's dignity, safety, health, and well-being<sup>1</sup>.

**Table 21: Toilet types recommended for different phases of disaster response**

Demarcated defecation area	First phase/ first few days
Trench latrines	First phase/ upto 2 months
Pit latrines	Plan from start to long term
Ventilated improved pit latrines	Middle to long term
Ecological sanitation with urine diversion	Context based, from the beginning
Septic tanks	Middle to long term

**Table 22: Indicators for minimum service levels for excreta disposal<sup>7</sup>**

Indicator	Immediate emergency	Stabilization phase
Coverage	50 people per latrine cubicle	20 people per cubicle
	The ratio of female to male cubicles should be 3:1	
Location	Less than 50m one way walking distance. At least 6m from a dwelling.	Less than 25m one way walking distance. At least 6m from a dwelling.
Privacy and security	Doors should be lockable from the inside. Latrines should be illuminated at night where necessary. Provision made for the washing and drying of menstruation cloths where necessary.	
Hygiene	Hand-washing (with soap) facilities should be supplied to locations close to all toilets. Appropriate materials for anal cleansing should be provided.	
Vulnerable groups	Adequate latrines should be accessible to disabled people, the elderly, the chronically sick, and children	

### Children's and infant's Excreta

Children under five years often make up a significant proportion of the population in many poorer countries- up to 20% in some instances. It is therefore important to find methods of safely disposing their excreta. This issue must be discussed with mothers especially to identify whether nappies, potties or specially designed latrines will be necessary.

The safest way to dispose of a child's feces is to help the child use a toilet or latrine or, for very young children, to put or rinse their feces into a toilet or latrine which may obviously be difficult during a disaster.

Latrines are rarely used by children, nor are they designed for children's use. Moreover, children tend to defecate in open fields in more close proximity to settlements during disasters. Again, this puts young children at high risk of exposure related to their exploratory behaviours and their prolonged proximity to the ground.

### Excreta management for babies and infants

- Children under 12 months have no bowel or bladder control and are usually only able to exert some control by the age of 18 months to 2 years.
- Some children are only ready for potty or toilet training at 3 years.
- Stress within the home can make potty training particularly difficult and the process can take weeks or months to complete. The stress of the emergency context may make it a particularly difficult time to start potty training.
- A common misconception is that children's faeces are not a health hazard even if inappropriately disposed.
- Children are often not prepared to wait (or do not have sufficient bowel or bladder control) and more toilets will be needed so that they do not have to queue.

- f. Space for care givers taking young children to the toilet should be included in toilet designs (this is also useful for people with disabilities).
- g. It is important to ensure appropriate dimensions for squatting plates, height of locks and hand-washing facilities that are child friendly.

**Table 23: Disposal options for young children's excreta during emergencies**

<b>Age of children</b>	<b>Excreta disposal options</b>		<b>Comments</b>
Babies under 18 months	Cloth nappies or cloth inserts	Disposable nappies	Biodegradable or compostable nappies or nappy liners are available but from limited suppliers. Requirements must be discussed with care givers (numbers required, laundering or disposal); may need to provide bucket with lids and detergent for cloth nappies etc.
Children 18 months to 5 years	Potties with lids	Open-air infant friendly toilets or adapted adult toilets; e.g, use potty over squat hole or provide scoop /trowel or combined adult and child toilet with two squat holes	Disposal of feces and washing of potties required. Extra space needed for care givers in toilets, possible use of peepoo bags. Attention needed for heights of handwashing facilities.
Children 5 years to 11 years	Child- friendly toilets	Adapted adult toilets	Modifications for children with disabilities. Include and promote handwashing. Attention to size of hole, height of handwashing facilities, lighting, and handrails.
Children over 12 years	Adult toilets	Child friendly toilets in schools	Menstrual Hygiene Management for adolescent girls; modifications for children with disabilities, and promoting handwashing.

All of the options above will require hygiene promotion to ensure effective use and maintenance of the facilities or items provided such as subsequent disposal following the use of potty, the laundering process following the use of nappies, disposal of wastewater.

### **Menstrual hygiene management (MHM)**

Education about menstruation and the provision of facilities such as laundry areas, additional privacy and disposal facilities for sanitary towels should be age orientated. The provision of privacy areas for girls at schools could make managing their periods easier as well as provide a venue for discussion/education on menstrual hygiene and safety.

## Vector control<sup>1</sup>

A vector is a disease-carrying agent and vector-borne diseases are a major cause of sickness and death in many disaster situations.

Mosquitoes are the vector responsible for malaria transmission, which is one of the leading causes of morbidity and mortality. Mosquitoes also transmit other diseases, such as yellow fever, dengue and haemorrhagic fever. Non-biting or synanthropic flies, such as the house fly, the blow fly and the flesh fly, play an important role in the transmission of diarrhoeal disease. Biting flies, bedbugs and fleas are a painful nuisance and in some cases transmit significant diseases such as murine typhus, scabies and plague. Ticks transmit relapsing fever, while human body lice transmit typhus and relapsing fever. Rats and mice can transmit diseases, such as leptospirosis and salmonellosis, and can be hosts for other vectors, e.g. fleas, which may transmit Lassa fever, plague and other infections.

Vector-borne diseases can be controlled through a variety of initiatives, including appropriate site selection; provision of shelter, water supply, excreta disposal, solid waste management, drainage, and health services (including community mobilization and health promotion); use of chemical controls, family and individual protection; and effective protection of food stores.

Key strategies to protect children from vector borne diseases in any disaster include the following:

- a. They have access to shelters that do not harbour or encourage the growth of vector populations and are protected by appropriate vector control measures.
- b. Families should be supplied with insecticide-treated mosquito nets and taught how to use them effectively.
- c. Food stored at the household level should be protected from contamination by vectors such as flies, insects and rodents.
- d. Site selection for settlement is important in minimizing the exposure of the affected population to the risk of vector-borne disease. With regard to malaria control, for example, camps should be located 1-2 kilometers upwind from large breeding sites, such as swamps or lakes, whenever an additional clean water source can be provided.
- e. Environmental mosquito control is important in many vector-borne diseases. The three main species of mosquitoes responsible for transmitting disease are *Culex* (filariasis), *Anopheles* (malaria and filariasis) and *Aedes* (yellow fever and dengue). *Culex* mosquitoes breed in stagnant water loaded with organic matter such as latrines; *Anopheles* in relatively unpolluted surface water such as puddles, slow-flowing streams and wells; and *Aedes* in water receptacles such as bottles, buckets, and tyres. Examples of environmental mosquito control include good drainage, properly functioning ventilated improved pit latrines, keeping lids on the squatting hole of pit latrines and on water containers, and keeping wells covered and/or treating them with a larvicide (e.g. for areas where dengue fever is endemic).

Vector control takes many forms such as indoor residual spraying for mosquitoes, distribution of bed-nets (long lasting insecticide treated nets - LLINs), spraying toilets to control flies, setting traps for flies or rodents. Children need to be considered in relation to all of these activities, especially to ensure safety.

## **Solid waste management<sup>1</sup>**

Solid waste management is the process of handling and disposal of organic and hazardous solid waste that, if unattended appropriately, can pose public health risks to the affected population and can have a negative impact on the environment. Such risks can arise from the breeding of flies and rodents that thrive on solid waste and pollution of the surface and ground water sources due to leachate from mixed household and clinical or industrial waste.

Uncollected and accumulating solid waste and debris following a natural disaster may also create a depressing environment, which might help discourage efforts to improve other aspects of environmental health. Solid waste often blocks drainage channels and leads to an increased risk of flooding, resulting in environmental health problems associated with stagnant and polluted surface water. Waste pickers may also be at risk of infectious disease from hospital waste mixed with household waste.

The safe disposal of solid waste is critical for public health. This is especially true during an emergency, when existing collection and disposal systems are disrupted, and extra waste is created by the emergency itself. Although disposal of all types of solid waste is important, biological or healthcare waste poses a special challenge for pediatricians caring for children during disasters.

## **Healthcare solid waste management**

Infectious sharps (like syringe, needles, blades, glass and other contaminated materials) or non-infectious sharps (like bandages, gauzes or items soaked in blood) both require appropriate disposal in emergency situations. Improper handling and disposal of healthcare solid waste can have direct impacts. It can potentially cause risk from the disposed toxic chemicals or reuse of contaminated syringes if they are accessible. It can also have adverse impacts on human health and environment by polluting the air and water bodies.

## **Waste management steps**

1. Segregation
2. Storage
3. Transportation
4. Disposal

Given below are some possible waste management techniques:

1. Pit method:
  - a. This method is used to manage infectious non-sharps health care waste.
  - b. In this method, infectious non-sharps health care waste is kept in a pit and immediately covered with lime and soil.
2. Encapsulation:
  - a. This method is used for the treatment of sharps.
  - b. In this process sharps are placed within high density polyethylene containers or metal drums up to three quarters full. An immobilizing material such as plastic foam, sand, cement or clay is added. Once dry, the containers are sealed and disposed of in landfill sites or waste burial pits.

- c. The following proportions are recommended: 65% pharmaceutical waste, 15% lime, 15% cement, 5% water.
3. Incineration (drum incinerator)
  - a. Waste is completely combusted at high temperatures (over 1000°C) and under controlled air-flow
  - b. Incineration is one of the few technologies with which all types of health-care waste can be treated properly and can result in a significant reduction in the volume and weight of the wastes treated.
4. Chemical treatment
  - a. It is suitable mainly for treating liquid infectious wastes such as blood, urine, feces or hospital sewage.
  - b. Typically, 1% bleach (sodium hypochlorite) solution or a diluted active chlorine solution (0.5%) is used.

### **Shelter during disasters<sup>1</sup>**

Pediatricians should prepare themselves for a disaster as well as provide the families of their patients with information about creating a family emergency plan should they need to stay in temporary shelters. A family should be instructed to have about three days supplies of physical and material needs required to support themselves in case disaster.

WHO recommends at least 4m<sup>2</sup> of floor space for each person in an emergency shelter. Shelters are more effective if they keep families and other traditional community groups together and are close to resources such as food, water, latrines, medical care, and transportation. When homes are destroyed, it is far better to locate shelters as close to or within the pre-existing community whenever possible. Shelters should have an identifiable person who is available, accountable, and responsible for communicating with agencies or organizations for supplies and assistance.

Planning for shelters must consider the possibility of prolonged use that would require additional supplies and greater attention to organizational details. Planning should include sources of supply and methods of transportation. The needs of pregnant women, infants, and young children must be considered with respect to feeding and nutrition, diapers, basic first aid kits, and hygiene as well as safety. Shelters must also consider children with special health care needs. There should be a provision for regular medical support in the shelter. It may be important to identify and isolate a child with measles or varicella to prevent disease spread.

Shelter life must also be organized so that children are supervised and have the opportunity for constructive play and entertainment. Supervised activities enable the staff to inform children and calm them down while allowing them to participate in family activities and tasks. Drawing and other creative activities can help children to express themselves and reduce the stress. Adolescent activities are also important to keep energy channeled constructively and reduce the potential of adolescent violence.

Safety in shelters is as important as safety at home. It is important to keep drugs, medical supplies, and potentially dangerous personal items out of children's reach.

Pediatricians must advise shelter operators that all children, parents and family members should

be oriented about shelter rules on arrival and informed that strict adherence is required. They should specifically describe child-specific issues, including counseling on physical, sexual abuse and violence.

Children should be strictly monitored, following a non-discrimination policy, especially so if unaccompanied by their parents. It is important to support tracking of parents or relatives of unaccompanied children, and to make strict shelter rules regarding allowing members outside the family or other people entering shelters, time limit for visitors. Identifying responsive and interested adolescents within the shelter and involving them in helping maintain security, rules and regulations inside the shelter are equally important.

Child-Friendly Spaces (CFSs) can be established quickly and respond to children's rights to protection, psychosocial well-being, and non-formal education. CFSs are typically used as temporary supports that contribute to the care and protection of children in emergencies. The primary beneficiaries of CFSs are children (people under 18 years of age).

The objectives of CFS are to achieve the following<sup>9</sup>:

1. Mobilize communities around the protection and well-being of all children, including highly vulnerable children
2. Provide opportunities for children to play, acquire contextually relevant skills, and receive social support

Shelter development should be done keeping in mind that children may be particularly at risk of exploitation and abuse. Human-made and natural disasters typically cause loss of livelihoods. This places families at risk of making decisions they would not otherwise make as a coping mechanism. This includes selling their children or sending them away in exchange for false promises made by traffickers hoping for a better future for their children.

Both girls and boys are vulnerable to being trafficked, specifically for commercial sexual exploitation; typically, though, girls are most at risk. Table 24 presents an action plan (based on the principles presented above) for responses in each phase of disaster.

**Table 24: Action plan for responses targeted in each phase of the disaster response**

<b>Water and sanitation</b>		
Preparedness	Educate the community	Safe drinking water, simple and safe waste and excreta disposal practices, and control of vector-borne diseases.
	Train health workers	Disinfection of water, safe waste/excreta disposal practices, controlling vector-borne diseases and ways of preventing and managing diarrheal diseases.
	Stock and replace water purification tablets, chlorine, hygiene kits, sanitary napkins etc	Ensure safe water and sanitation



	Broaden health education	Include information on sanitation, health and hygiene during disasters in education curriculum for students of grade five and above.
Response Phase	Prioritize clean drinking water	Ensure provision of safe drinking water to prevent from diseases that spread through contaminated water.
	Disinfect water	Use chlorine tablets (one small tablet for 2 liters and large tablet for 20 liters of water to be kept for 30 minutes before drinking) or household bleach (5% chlorine).
	Perform a sanitary survey	Evaluation of water source, water treatment system and distribution system.
	Organize emergency latrines separately for girls and boys. Pit latrines should be planned, one for every 15-20 people	Should be sited in a way to minimize security threats to users, especially girls, throughout the day and the night. Latrines should be at least 30 meters away from any ground water source.
	Construct special toilets for disabled children	Like toilets with seats or hand rails or provision of bed pans, potties or commodes.
	Provide all girls with appropriate materials for menstrual hygiene	Distribute sanitary napkins to all girls of menstruating age.
Recovery Phase	Ensure safe water supply	The use of tanks for the disinfection of existent water sources is practical solution. New, easily accessible water points can be started, if feasible.
	Treat water sources	Minimize cases of water-borne diseases; chlorination is advised.
	Facilities at shelters and camps	Provide basic hand-washing facilities, cleaning and bathing facilities and adequate amount of water.
	Convey health education messages	Waste disposal and personal hygiene.
	Provide hygiene education	Especially for children and parents in shelter.
	Continue water surveillance and make more temporary latrines available as per need	Family toilets are the preferred option where possible.

	Ensure safety to girls	Provide toilets with lighting, or households with torches.
	Provide adequate hygiene kits	Hand-washing with soap and water after cleaning the bottom of a child who has been defecating, and before eating and preparing food.
	Restore sewage disposal/safe water supply	
	Provide periodic monitoring and maintenance	Of sanitary facilities especially in shelters and schools.
Rehabilitation Phase	Ensure food, water and energy security at community level	Emphasize on finding new alternative sources of safe water to be used in different type disaster, restoration of water storage methods, waste disposal techniques, food and personal hygiene and fuel supplies.
	Emphasize preventive aspects at administrative level	Focus areas: Build proper sewage lines/excreta disposal system, disposal of solid waste, prevent breeding of vectors: flies, mosquitoes, centralize the water disinfection process, set up piped water supply, and install wells and hand pumps.
<b>Shelter</b>		
Preparedness	Identify, locate and certify shelter areas ahead of time	Cater for all types of disaster.
	Earmark shelters to children with disabilities	This is necessary since their needs are different.
	Take into account	Personal privacy, child convenience, and related issues while designing, locating and planning of shelters.
	Provide appropriate recreational items at shelters.	Helps to restore children's physical and mental well being.
	Collect bedding, blankets and clothing required in shelters and keep in stock.	Specially to cater for first 48 hours following a disaster.
	Ensure privacy for girls in shelter areas.	Separate rooms and toilets for girls and boys.
Response Phase	Orient children, parents and family members on arrival	Child-specific issues, including counseling on sexual abuse and violence.
	Monitor children strictly in shelter	Especially of unaccompanied children.

Recovery Phase	Non-discrimination must be the stated policy of all shelters	Toward children with disabilities, HIV/AIDS, street children and others.
	Identify unaccompanied children at shelters	Provide extra care and support.
	Support tracking	Parents or relatives of unaccompanied children at the community level by shelter management teams and local authorities.
	Monitor and supervise children	Protect children from intimidation, coercion, violence, drug abuse or sexual harassment and abuse.
	Make strict shelter rules (including visit time limit)	Effectively manage visitors to shelters.
	Identify responsive and interested adolescents within the shelter	Seek Volunteering assistance from adolescents and involve them in helping maintain security inside the shelter.
	Take periodic counseling classes to children in shelters	Representatives from children's organizations should visit shelters on a regular basis and create awareness
	Start psychosocial support to children.	Focus on children showing abnormal responses and unaccompanied children.
	Make Child friendly spaces (CFS) available at shelters	Items like toys, books and educational materials should be provided in CFS. Volunteer teachers should be identified and used for formal and non formal education in CFS. CFS helps to restore children's normal routine and recovery.
	Organize regular visits by pediatricians in the shelter	Cater for physical ailments and continue psychosocial support at this phase.
	Continue regular monitoring and adequate supervision of children at shelters	Prevents children from abuse and trafficking.

### Key learning points:

At the end of this chapter, readers should be able to do the following:

1. Describe the importance of WASH interventions in any disaster.
2. Enumerate the minimum standards for WASH during a disaster.
3. Describe the principle of hygiene promotion.
4. Outline the importance of sanitation in disaster especially related to human excreta disposal and solid waste management.
5. Outline the importance of vector control strategies in any disaster.

### References:

1. World Health Organization. The Sphere Project Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response, 2011.

2. World Health Organization. Disaster Risk Management for Health Fact Sheets: Disaster Risk Management for Health WATER, SANITATION AND HYGIENE, 2011.
3. WHO (2011) 10 facts on sanitation. Available from: <http://www.who.int/features/factfiles/sanitation/en/index.html>
4. WHO (2005) Essential hygiene messages in post-disaster emergencies. Available from: [http://www.emro.who.int/Sudan/pdf/hygiene\\_emergencies.pdf](http://www.emro.who.int/Sudan/pdf/hygiene_emergencies.pdf)
5. Management of Child Feces: Current Disposal Practices - World Bank, June 2015; documents. [worldbank.org/.../98062-BRI-Box391500B-PUBLIC-WSP-CFD-Summary](http://worldbank.org/.../98062-BRI-Box391500B-PUBLIC-WSP-CFD-Summary)
6. WHO (2011) Four steps for the sound management of health-care waste in emergencies Available from: [http://www.searo.who.int/en/Section1257/Section2263/Section2310/Section2320\\_12500.htm](http://www.searo.who.int/en/Section1257/Section2263/Section2310/Section2320_12500.htm)
7. World Health Organization. Technical notes (10) on drinking water, sanitation and hygiene in emergencies: Hygiene promotion in emergencies. 2013.
8. World Health Organization. Technical notes (13) on drinking water, sanitation and hygiene in emergencies: Planning for excreta disposal in emergencies. 2013.
9. UNICEF. Guidelines for Child Friendly Spaces in emergencies. Jan 2011.

# Index

---

## A

Addressing nutritional needs of older infants and young children, 23

## B

Basic life support, 10, 13  
Basic services and security, 30  
Birth preparedness, 36, 40

## C

Cardiopulmonary resuscitation, 10, 13  
Children's earthquake recovery consultation, 50  
Children with special health care need, 53, 68  
Cholera, 42, 47, 51, 56, 57, 59  
Clean home delivery kit, 37  
Cluster coordination structure, 5  
Clusters, 4, 5  
Community and family supports, 30  
Considerations for vaccines, 44  
Contextual considerations and competing needs, 44  
Continuous positive airway pressure, 39  
Cord care, 38

## D

Decision- making framework, 44  
Disaster management cycle, 3  
Disaster risk management mechanism, 3, 7  
Disaster phases, 1, 40  
Disaster response, 4, 63, 69  
Disaster types, 1

## E

Earthquake, 1, 50, 53,  
Earthquake drill, 53  
Emergency medical services, 50  
Energy requirements for emergency-affected populations, 23  
Epidemiological risk assessment, 44  
Essential newborn care, 36-39

## F

Feeding infants during emergencies, 22  
Fire/chemical accident drill, 53  
Flood, 1, 2, 21, 42, 43, 51, 52  
Focused, non-specialized supports, 30  
Foreign body airway obstruction, 17

## G

Ground water, 58, 67, 70

## H

Hazards types, 1, 2  
Hepatitis A, 42, 43, 47, 48, 56, 57  
Hepatitis B, 41, 43, 47, 48, 57  
Hub hospital, 4, 6  
Hub hospital concept, 6  
Hub-satellite networking, 7

## I

Immediate newborn care, 35, 36  
Immunization, 41, 42, 48  
Influenza, 44, 47

## **J**

JumpSTART Pediatric MCI Triage Tool, 10, 11

## **K**

Kangaroo mother care, 39

## **L**

Landslide, 1, 51, 52

LINK, 28, 29, 31

LISTEN, 28, 29

LOOK, 28, 29, 31

## **M**

Malnutrition, 20, 21, 22

Measles, 41, 42, 44, 47

Meningococcal, 42, 47

Mental health and psychosocial support, 27, 30

Mock drills, 52

## **N**

Nepal health sector strategy 2015-2020, 4, 5

Non-formal educational activities, 30, 54

Nutritional management, 20, 24

## **O**

Overcrowding, 44, 47

Overweight, 20, 21

## **P**

Pediatric cardiac arrest algorithm, 14, 15

Psychological first aid, 27, 28, 30, 31, 33

Psychosocial support, 27, 28, 30, 31, 72

PsySTART Rapid Mental Health Triage, 31, 32, 33

## **R**

Rabies, 43, 48

Reproductive health, 35

Reproductive, maternal, newborn and child health (RMNCH) services, 35

## **S**

Safe water, 51, 56, 58, 63, 69, 70, 71

School crisis team, 52, 54

School curriculum, 51, 53

School disaster planning, 50

School health, 52

Severe acute malnutrition, 21

Skilled birth attendants, 36, 37

Specialized services, 30

Stunting, 21

Surface water, 58, 66, 67

## **T**

Temporary shelters, 3, 51, 54, 68

Tetanus, 41, 42, 48

Triage, 9, 10, 11, 12, 18

Two-finger chest compression, 13, 16

Two thumb-encircling hands chest compression, 13, 16

## **U**

Underweight, 20, 21

## **V**

Vaccine, 41, 42, 45, 48

Varicella, 44, 47, 68

Vectors, 57, 62, 66, 71

## **W**

WASH, 5, 56, 57, 72

Wasting, 21

Water borne, 57

Water trucking, 58

Water- washed, 57

## **Y**

Yellow fever, 42, 48, 66



