

# **Emergency Preparedness and Major Health Problems in Emergencies**

**A Training Manual  
For the Staff Working in Primary Health Care**

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## **Disaster and Health**

Disasters can be natural or man made such as famine, floods, earth quakes conflicts and wars. Disasters may cause destruction of homes and institutions; displacement of populations; shortage of foods and services; diseases, injuries and deaths and a wide range of human rights abuses. Immediate interventions are required in order to reduce human suffering and promote recovery.

Disasters always have significant impacts on the public health of affected populations. These impacts can be direct or indirect. Direct impacts include injury, and psychological trauma. Indirect impacts include increased rates of infectious diseases and malnutrition. Indirect health impacts are usually related to factors such as inadequate quantities and quality of water, breakdown in sanitation, interruption in food supplies, disruption of health services, overcrowding and population displacements. Preventive and clinical services should aim to control diseases of epidemic potential. A mass measles vaccination campaign will be a major priority for populations at risk of a measles outbreak, especially refugees. In most disaster settings, referral services and hospital- based care although important have a smaller public health impact than primary health care interventions.

The groups most at risk in emergencies are women, children, older people and disabled individuals who are referred to as vulnerable groups.

When the health infrastructure has been affected it is important that the health services that remain in place are based on relevant primary health care principles and that all people have access to health information that allows them to protect and promote their own health and well-being. Health Information and education should be provided to the affected populations. Information on the major endemic health problems, major health risks, the availability and location of health services, and behaviours that protect and promote good health.

Mobile Clinics maybe necessary in order to meet the health needs of isolated or mobile communities who have limited access to care.

Every one has the right to health in a normal situation, as well as during disasters. Enjoyment of this right involves all factors and conditions that affect well-being such as access to safe water and proper sanitation, adequate food, nutrition and housing, healthy environmental conditions, access to health related information and respect to human dignity.

But the right to health can only be assured if the health system is in place, the population has access to it, trained and committed staff is present and the health system is capable to meet minimum standards of need. Natural and man-made disasters can undermine the right to health through disrupting these conditions in a number of ways:

1. Destruction of health facilities
2. Disruption of the health system
3. Population displacements
4. Shortage of adequate food, safe water and sanitation

## 5. Overcrowding

### **Impact of disaster on the Health System**

#### **Human resources**

- Death and injuries to health workers
- Difficulty attracting health staff, and retaining staff in peripheral areas
- Poor morale
- Disruption of training and supervision

#### **Infrastructure**

- Disruption and looting of health facilities
- Disruption of referral system
- Destruction of communication channels between different levels of services

#### **Equipments and supply**

- Lack of drugs
- Lack of maintenance
- Lack of access to new technologies
- Disrupted cold chain

#### **Health system management and organization**

- Tendency toward more centralized urban – based vertical programs
- Breakdown of policy institutions (this leads to crises approach to planning)
- Reduction in information upon which to base policy decision
- Limited opportunity for planning and management training
- Limited ability to monitor health funds and other resources used
- Rapid and uncontrolled privatization

#### **Decline of economic support**

- Reduction in central and local government budget
- Growth of illegal economy
- Increased poverty in household level
- Increased dependence on foreign aid

#### **Disruption of services**

- Shift from primary to secondary care
- Disrupted campaigns, health promotion, disease control, outreach
- Reduced access and utilization because of fear, curfews and land mines

#### **Public health impacts**

The public health impacts of emergencies can happen either directly due to the disaster or indirectly due to effect on the factors mentioned above:

1. direct impact: physical injuries and psychosocial trauma
2. Indirect: increased rates of infectious diseases, malnutrition and complications of chronic diseases.

## Planning emergency response

The main primary goals of humanitarian response in disasters are to prevent and reduce excess mortality and morbidity and to promote a return to normalcy. The public health and medical needs of the affected populations varies according to the type and extent of the disaster. Since the resources are limited, prioritisation of the health interventions is very important. This requires understanding the communities' prior health status, health risks, resources and capacities. In the early stages of the disaster information may be limited and accurate data may not be available. A multisectoral assessment including all agencies working in the area, health authorities and community representatives is required, to set priorities and plan for interventions. Priority health interventions must be designed to ensure the greatest benefit is provided to the greatest number of people. Priority interventions will usually include provision of safe water, sanitation, food security, shelter, control of malnutrition and preventive and clinical services to control diseases and prevent outbreaks.

The most vulnerable groups should receive special considerations such as women, children, older people, disabled people, ethnic minorities and people with chronic diseases.

## Top ten priorities in emergency response

1. **Initial assessment:** carefully seek information on the prevalence of the emergency elaborating on who is affected, what endemic diseases there are, the risk factors related to illness (water, sanitation and nutrition, available health services, facilities and staff). Evaluation requires knowledge of not only the victim's needs but also the limitations in meeting those needs. Constraints could include lack of transport, fuel, security, finance, logistics and personnel.
2. **Measles immunization:** measles can kill up to 40% of children during disasters therefore mass vaccination should be a priority and vitamin A should be given at the same time. Disasters do not generate new diseases but by altering the environment they increase transmission of diseases that already exist in the area.
3. **Water and Sanitation:** reasonable amount of safe water and appropriate sanitation should be available for every person during the disaster to avoid transmission of communicable diseases and other health problems.
4. **Food and Nutrition:** food security includes access to food (including affordability) adequacy of food supply or availability and the stability of supply and access over times. It also covers the quality, variety and safety of food and the consumption and biological utilization of food. A clean environment and good food is the base for good health. The disruption in life of displaced people often means they are without means to provide food for them. On average 2100Kcal per person per day is required. Supplementary food is often needed for more vulnerable groups such as pregnant and lactating

women, children and elderly and the sick. For the severely malnourished, an intensive feeding programme may have to be established.

5. **Shelter and site planning:** Overcrowding and lack of proper shelter enhances transmission of diseases. Shelter gives people protection from elements that can cause disease and injury.
6. **Health Care:** the effectiveness of a medical/curative care programme relies not on its ability to treat patients, but on its ability to prevent treatment being needed Drug use must be limited to the most essential ones. WHO provides lists of such drugs.
7. **Control of Communicable Diseases and epidemics:** Rates of communicable diseases are increased. The best way to control these diseases, and prevent epidemics includes sufficient clean water, adequate sanitation, food and shelter. Diarrhoea, measles, respiratory infection, malaria, intestinal helminthes, meningitis, tuberculosis and anaemia are the most common medical problems found in the emergency situation.
8. **Public heath surveillance:** epidemiological surveillance is crucial for the control of communicable diseases and to prevent any foreseeable outbreak. In emergency situations there are constant changes and it is imperative to re-evaluate victims need and monitor the efficiency of the programme.
9. **Human resources and training:** in an emergency situation the infrastructure including the health system will be disrupted which could include lack of skilled staff. Therefore community participation is essential to allow the community to express their needs and share responsibility in defining the priorities and developing and running relief activities. Training aims to provide the victims with necessary skills to make them responsible for their own health care and it is a necessary step in assisting the population towards self-sufficiency.
10. **Coordination:** many organizations governmental and nongovernmental may be involved in giving assistance. Coordination is paramount to prevent duplication, animosity and waste of money. Coordinated planning is essential when planning medical assistance.

## Water and sanitation

About 80% of disease is somehow related to water and sanitation. Safe disposal of human excreta provides the first barrier to excreta related diseases. Therefore safe disposal of excreta is a major priority in disasters. Adequate number of latrines should be available for the population. On average one latrine must be available for 20 persons, ideally 1 latrine per family. When public latrines are established there should be appropriate mechanisms for encouraging use and maintenance.

The latrines should be situated not more than 50 meters from the dwellings, and they should be kept clean otherwise they will be the focus for disease transmission. Children's faeces are more dangerous than adults; therefore they should be disposed of in latrines or buried in the ground.

Category	Examples
Non-bacterial feco-oral	Viral: Polio Protozoal: Amoebiasis, Giardiasis Helmenthic: Ascariasis, Anclystomaiasis
Bacterial feco-oral	Cholera, Typhoid, Shigellosis, Salmonellosis
Water-based helminthes	Schistosomaiasis
Vector born diseases	Insect flies, Cockroaches, Rodents

All people should have access to safe and sufficient quantities of drinking water, and for cooking, personal and domestic use. At the acute stage of the emergency at least 5 litres of water should be provided. Average water use for these purposes in any household is at least 15 litres per person per day. The maximum distance of the water source should be 500 metres. Water sources and systems must be maintained to provide sufficient amount of save water. Water from deep wells and protected springs may be considered safe but surface and near surface water consider contaminated and must be treated by appropriate methods. Chlorination is the best way for water disinfection using chlorine compounds. In the absence of chlorination, unsafe drinking water should be boiled.

Chlorination of water can be done at home by adding 3 drops of chlorine solution to one litre of water and used after 30 minutes. Chlorine solution can be prepared by adding 3 teaspoonfuls (33 Gram) of chlorine powder to one litre of water.

Wastewater collected from washing areas, and facilities may be contaminated. It should be properly drained and kept away from water sources.

Solid waste if not properly disposed of can become a source for breeding of vectors and water contamination and pollution. Household waste must be put in containers and regularly collected, burned or buried in a specified pit. All households must have access to plastic bags or bins. Medical waste must be separated, and disposed of separately.

In addition to the above-mentioned measures to ensure a healthy environment, personal hygiene should also be promoted. Healthy practices should be promoted such

as hand washing before and after eating, after defecation, use of latrines, bathing, cutting nails and hygienic food handling.

## Vector control

The presence of vectors such as insects and rats is directly linked to the physical and climatic conditions of the environment. They are likely to be a hazard in emergency situations such as refugee settings. It is vital to know how, where and when to act against a particular vector. All vector control activities should follow the general principals.

- The environment should be made unfavourable to the development and survival of vectors.
- Adequate latrines to prevent dissemination into the environment of pathogenic agents.
- The elimination of the stagnant water and protection of water containers to prevent mosquito's breeding
- The collection and disposal of solid waste to prevent rats and flies assembling
- Site planning to reduce overcrowding in refuge settings
- Personal hygiene with provision of soap and water

Vector	Health Risks	Environmental Hygiene	Control
Mosquitoes Anopheles	Malaria	Destroy breeding sites for all types -Eliminate stagnant water -Protect water containers	1. Indoor residual spraying 2. Larvicidal drugs 3. Impregnated bed nets
Lice	Epidemic typhus Relapsing fever	Reduce overcrowding Improve hygiene	Insecticide Powdering for individuals and clothes
Fleas	Plague, endemic typhus	Clean shelters and surroundings	Insecticide powdering for clothes and beddings, destroy fleas and rats
Flies	Eye infections (trachoma), diarrheal diseases	Safe refuse disposal, safe food handling, safe waste - water disposal	Insecticides
Ticks	Relapsing fever	Household hygiene	Insecticides
Mites	Scabies, scrub typhus	Personal hygiene	Benzyl benzoate for patients

## **Major health problems during disasters**

### **Diarrhoea**

Diarrhoea remains a major cause of death in developing countries especially in children less than five years of age. Every year more than 3.5 million deaths occur due to diarrheal diseases. The following organisms can cause diarrhoea:

1. Viruses: Rota viruses
2. Bacteria: E. Coli, Shigella, Vibrio Cholera, Salmonella
3. Protozoa: E. Histolotica, Giardia Lambia

Most episodes of diarrhoea last less than a week and can be treated by oral rehydration. Around 3-20% cases of acute diarrhoea persist for two weeks - this causes increased mortality. Diarrhoea causes loss of water, electrolyte, extra cellular fluid blood volume, tachycardia and hypotension.

### **Control of diarrhoea:**

1. Oral rehydration is highly effective in preventing death
2. Promotion of breast feeding for 6 months
3. Improving weaning practices
4. Improving water supply and sanitation
5. Promote personal and domestic hygiene
6. Immunization (measles)
7. Specific chemotherapy

### **Managing dehydration**

Whatever the cause of diarrhoea the major consequence will be dehydration and therefore correction of fluid and electrolyte loss should be the first priority. Rehydration is best started orally through oral fluids, breast-feeding, diet and oral rehydration salts (ORS). Intravenous fluids and specific drugs may be used as required. If dehydration is < 5% treat by oral fluids freely, encouraging normal feeding and breast-feeding for children.

### **What is ORS?**

Original WHO/UNICEF ORS is made up of 20g glucose, 3.5g sodium chloride, 2.5g sodium bicarbonate, 1.5 g potassium chloride. Add water to a volume of 1litre.

- If dehydration is 5-10 % body weight loss give ORS 80 ml /per kg initially, and then additional ORS after each bowel action.
- Severe dehydration ( > 10% body weight lost ) - Ringers lactate 30ml/kg over 30mins then 70ml/kg over 2 hours + additional fluid to replace continuing losses, ideally orally but I.V if oral intake is poor

Community health workers/volunteers can be trained to monitor adherence to ORS at home.

## **Viral diarrhoea**

Rotaviruses are the most common causes of diarrhoea worldwide accounting for 134 million episodes yearly. Virtually all children have been infected by age of 4 years. The incubation period is 24-48 hours with vomiting, fever and watery diarrhoea. The reservoir of the virus is human body and transmission occurs by feco-oral route due to poor standards of personal and environmental hygiene. Virus shedding continues for 8 days. The peak prevalence is in children between 6 and 24 months.

Diagnosis is done by viral identification in the stool by ELISA, electron microscopy or passive agglutination techniques

### **Treatment and control:**

Dehydration can be treated by ORS or IV fluid. Breast-feeding should be continued. The virus survives in contaminated water, on hands and is resistant to commonly used disinfectant. Personal and environmental hygiene is important to interrupt transmission of the virus.

## **Bacillary Dysentery (Shigellosis)**

It is caused by various species of gram-negative bacilli, Shigella. The infection is derived from cases of the disease, from convalescent patients, and from carriers. The organisms are excreted in the faeces and may gain access to food through contaminated fingers of patients and carriers. The organisms can also pass from person to person by contact with utensils and (lavatory seats, door handles, crockery and clothes). Flies on food can also carry the organism.

Bacillary dysentery is characterized by diarrhoea (bloody, mucus and pus), fever, and sudden onset of abdominal pain and tenesmus. The incubation period is 1-7 days. Young children are more liable to acquire the infection and when infected suffer more clinical symptoms. Diagnosis can be based on clinical findings and confirmed by presence of faecal leucocytes, cultures and PCR.

### **Treatment and control**

Dehydration is usually not a major problem in shigellosis but there is no harm in giving ORS. Strict personal hygiene should be encouraged in the patient and among the contacts. Severe cases require antibiotic therapy with Ampicillin, Cotrimoxazol, Ciprofloxacin. Public health control measures include sanitary disposal of faeces, a pure water supply, food hygiene and control of flies. Health education is essential to improve personal hygiene and food and domestic hygiene. Hands must be washed before food handling and after defecation.

## **Cholera**

Cholera is caused by Vibrio Cholerae which has two biotype (Classical and Eltor) each biotype has three serotypes (Enaba, Ogawa, Hikojima). Cholera is characterized by rapid onset of vomiting, profuse dehydrating diarrhoea with rice water stool and toxemia. Muscular cramps, suppression of urine of shock occurs later. The incubation period is 1-7 days. In severe case of diarrhoea death may occur within hours from dehydration. Electrolyte loss may lead to hypokalemia and hyponatremia, which

may cause Ileus, muscle weakness and cardiac arrhythmias. Cholera occurs in many areas of the tropics particularly in Southeast Asia and Africa.

Transmission usually takes place by feco-oral route. Infection is acquired after ingestion of a large number of Vibrios present in water and food. The reservoir is sick persons, a convalescent patients or a carrier. For every typical cases of the disease there may be 10-100 symptoms less persons excreting the Vibrio. Cholera can be transmitted from contaminated water, food, and inanimate objects and by flies.

Diagnosis can be based on clinical signs. WHO definition for a suspected case of cholera during outbreaks is any patient aged 5 years or more with acute watery diarrhoea with or without vomiting. Definite diagnosis is only done by isolation of the Vibrio Cholerae from the faeces or rectal swabs.

### **Treatment and control**

Early diagnosis, isolation and notification of cases are very important. A search for the source of infection should be made and the source should be dealt with. Disinfection of stools, fomites, house and clothing should be carried out. Oral rehydration has dramatically improved the prognosis of acute diarrheal diseases. ORS solution can be used. Sever cases require IV fluids

Antibiotics reduce the diarrhoeal period but will not replace rehydration fluids. Choice of antibiotics depends on the sensitivity of the strains. Tetracycline, Doxycycline and Cotrimaxasol are all-effective. Before discharging the patient from hospital two negative stool cultures are required. Contacts of patients must observe cleanliness and wash their hands and should not consume food or drink in the patient's room. In certain situations chemoprophylaxis with a single dose of Doxycycline may be required for close family contacts.

In the community steps must be taken to promote safety of the water sources and the environmental sanitation. Chlorination should be stepped up to 1.3 parts per million. Excreta and refuse disposal must be controlled and fly- breeding sources eliminated. Food sanitation should be enforced and public swimming pools should be closed. People should be instructed to boil water, to eat only cooked foods and to raise personal hygiene. Close attention to ice production should be ensured. Camps and hospital for isolation of cases should be improvised. Overcrowding should be discouraged during epidemics. Travelling should be controlled from endemic areas. Oral and parentral cholera vaccines are available but at present they are not useful enough as a public health tool.

### **Amoebiasis**

Amoebiasis is caused by protozoa Entamoeba Histolytica. The parasite lives in the lumen of the large intestine and under suitable conditions it invades mucosa and sub-mucosa. When diarrhoea occurs amoebae are expelled with faeces. Amoebae are very sensitive to environmental changes and so are short lived outside the body. Under favourable conditions in the intestine the amoebae cease feeding and form into characteristic cysts. The cyst is the infective form; they are expelled with faeces and remain for several weeks.

Amoebiasis has worldwide distribution but the clinical disease occurs more frequently in tropical and subtropical countries it's estimated that 500 million peoples are infected each year and around 8% will develop after malaria and Schistosomiasis, Amoebiasis is the most common parasitic cause of disease. The reservoir of the disease is human. The disease is spread by ingestion of cyst from contaminated food or water by convalescent patients or asymptomatic individuals. The disease can be transmitted by direct contact of contaminated hands of carriers or indirectly through contaminated food infected by food handlers and flies.

Diagnosis is made clinically and confirmed microscopically by finding motile amoebae in the freshly passed stools. In asymptomatic infections cysts will be found.

#### **Treatment and control**

The main method of control is sanitary disposal of faeces and personal hygiene. Washing hands especially after defecation and before food handling is essential. Individual patients may require antiprotozoal drugs.

### **Giardiasis**

A disease caused by Giardia Lambia which is a worldwide parasite and normally lives in the upper part of the small intestine. The cyst, which is the infective form, is excreted in the faeces of the infected person. Humans are the only source of the infection. Heavy infection causes chronic diarrhoea and weight loss. The infection is transmitted by direct ingestion of cysts as a result of unsanitary habits or contaminated food or water. Diagnosis is made by finding cysts in formed stools or cysts and vegetative form in the fluid stools.

#### **Treatment and control**

Patients can be treated by Metronidazol. The main control measures are the provision and use of safe excreta disposal, and promoting personal hygiene. Boiling is most reliable method for killing Giardiasis. It is vital to ensure that water supply is Giardia free.

### **Bacterial Food Poisoning**

Bacterial food poisoning is commonly due to three species of bacteria (Salmonella, Staphylococcus Aureus, and Clostridium Perfringens). **Salmonella food poisoning** typically presents with diarrhoea, vomiting and fever. The incubation period is 12-24 ours. The source of infection is usually animals infected with salmonella such as cattle, poultry, dogs, cats and mice. The disease is commonly spread from meat either as a result of illness in cattle or by contamination of the meat by intestinal contents of infected animals in the abattoirs. Eggs and milk products can be a source of poisoning. Typically the infection occurs as explosive small epidemic among groups of people who have eaten the same food.

**Staphylococcus food poisoning** is characterized by a sudden onset of nausea and vomiting some times accompanied by diarrhoea and shock. The incubation period is very short 1-6 hours. The infection is caused ingesting food contaminated by staphylococcus toxin. The source of infection is humans who carry the organism in

the nose, throat and skin lesion. Food is contaminated either by droplet infection or by direct contact with infected lesions. The mode of transmission is through manufacture foods eaten cold such as hams, tinned meats, sauces and un-pasteurised milk.

**Clostridium food poisoning** presents with diarrhoea and abdominal pain. Vomiting is not very common. The incubation period is 12-24 hours. The source of infection can be human, animal, fly faeces. Spores of clostridium survive for long period in the environment. Transmission is by ingestion of meat which has been precooked and eaten cold or reheated in the next day.

Diagnosis generally based on clinical symptoms. Serological agglutination methods are needed to identify salmonella. ELISA test can be used for detection of staphylococcus entero-toxin in the food. Clostridium can be isolated from the stools of patients and from food remnants while the entero-toxin is detected by ELISA.

#### **Treatment and control**

A proper standard of personal hygiene and food hygiene is the most effective methods of controlling food poisoning. Veterinary inspection of abattoir must be thoroughly carried out and animals should be inspected before and after slaughter. Meat and meat product should be thoroughly cooked. Food should be carefully stored and covered and kept away from rats, mice and flies and kept as cool as possible. Health education is essential to raise the standards of food and personal hygiene.

### **Acute Respiratory Infections (ARI)**

ARI is a major cause of morbidity and mortality throughout the world particularly in the developing countries where 25-30% of deaths among children under five years of age are caused by ARI; 90% of them attributable to pneumonia alone. In emergency situations and among refugee populations the risk of ARI is higher because of overcrowding, malnutrition, lack of shelter, vitamin A deficiency, pollution and other factors. ARI are acute infections of the upper and lower areas of the respiratory tract caused by a variety of viruses and bacteria. During emergencies simple definitions can be used to diagnose ARI. Any case of fever and cough with rapid breathing can be considered moderate to severe.

#### **Treatment and control**

Most ARIs recover spontaneously without drugs. Management of fever, continuation of breast feeding is recommended. When patients develop difficulty in breathing they should be taken to hospital. Improving the nutritional status of children, vitamin A supplementation, reduction of overcrowding and proper shelters and clothing are general measures to prevent ARI. Regular immunization of children against measles, diphtheria, pertussis is an essential measure to protect children from these diseases.

### **Measles**

Measles is an acute viral infection, which presents with fever, cough, coryza and characteristic skin rash. Punctuate buccal mucosal rashes (Koplik's spots) appear before the onset of the skin rash. The incubation period is usually 10 days and the skin rash appears 3-4 days after the onset of the prodromal symptoms. Death may occur from secondary bacterial infections notably bronchopneumonia. Measles tends to be

more severe and fatal in malnourished children with vitamin A deficiency; it can also cause severe protein calorie malnutrition. Babies are usually immune in the first few months of life. Measles tends to occur in epidemics and it is a major public health concern during emergencies and in refuge settings.

Humans are the reservoir for measles virus. Transmission is by droplets or by contact with sick children or with freshly contaminated toys and utensils. Diagnosis is largely based on the clinical features. Serological tests can be used for confirmation. Polymerase chain reaction can detect the virus from urine specimens.

### **Treatment and control**

Isolation is of limited value because by the time symptoms appear several contacts may have been exposed to the virus. Passive immunization by human immune globulin may modify the disease or prevent it in contacts. Individual patients may be treated at home with bed rest and supportive treatment. Severe cases may require hospitalization for dehydration, pneumonia and other complications. The best way to prevent measles is active immunization with live attenuated virus which is usually given at age of 9 months and gives protection for many years. In disasters risk of outbreak is high and mass vaccination is usually recommended before this happens. Vitamin A is usually given with measles vaccination. During the emergency phase it is not possible to have information regarding measles immunisation of displaced and refugee populations and it is necessary to vaccinate them regardless of whether they have been previously vaccinated.

### **Malaria**

Four species of plasmodium infect human: falciparum, vivax, malariae, ovale. There are 300-500 million cases annually and 80% of them are in Africa. It causes 1 million deaths annually and 90% of them caused by falciparum in Africa. The host is certain species of female anopheles mosquito. Clinically, malaria is characterized by fever, hepatomegaly, splenomegaly, anaemia and involvement of individual organs. The life cycle of the parasite includes a period within the mosquito (extrinsic incubation period) and a period of development in human body. The anopheles mosquito sucks the gametocyte from the blood of infected persons and after different stages inside the mosquito body the parasites develop to an infective stage called sporozoites which are then injected to a healthy person leading to malaria disease.

Spread of malaria depends on presence of favourable environmental, vectorial, parasitic and host factors. A relatively high humidity is required for survival of adult vectors while rainfall is essential to provide breeding sites. The parasite can develop best in temperature of around 20 degrees or above. Mosquitoes vary in their living and biting patterns. They bite between dusk and dawn and generally choose well-oxygenated water to lay their eggs. The incubation period is shortest in falciparum (6-25) days and longest in malariae (18-59). Duration of infection is usually 1 year for falciparum and several for the others. Falciparum species multiply rapidly more than the others and tends to cause more severe form of disease. In areas of stable malaria infants born to immune mothers are partially protected from clinical malaria for 4-6 months. After this age the child is susceptible to severe and fatal attacks of malaria. Malaria is less common in adults and mortality is extremely rare. Mild and moderate malnutrition is considered a risk factor in severe malaria. Malaria can be suspected

clinically in endemic areas, and confirmed by finding malaria parasites in thin and thick blood films. Serological technique is also used for detection of antibodies for epidemiological purposes.

### **Treatment and control**

Control of malaria is concentrated in three areas: vector control, chemoprophylaxis and vaccinations (in the future). The cheapest and most effective control is vector control which aims to break the cycle of transmission. Destruction of the adult mosquitoes can be done by indoor spraying by residual insecticides such as DDT. The use of larvicides is limited to densely populated areas with few breeding places.

Individual protective measure includes chemoprophylaxis, impregnated mosquito nets and repellents. Chemoprophylaxis is advised to travellers visiting endemic areas. Malaria is more severe in pregnant women than non-pregnant women and mortality is higher. It is also a major cause of abortion, still birth, premature labour and low birth weight. Three tablets of Fansidar (sulphadoxine and pyrimethamine) are given in the second trimester and repeated in the third trimester. In the past, weekly chloroquine was given. It should be noted that no anti-malarial drug is 100% effective. The risk of malaria must be balanced against the risk of adverse effects of the drugs.

Environmental modification to eliminate breeding areas is the most effective and sustainable measure of mosquito control but remains a long term objective in tropical countries.

## **Typhoid**

The organism that causes Typhoid is *Salmonella typhi* and *Salmonella paratyphi*. It is a Gram negative bacteria

### Distribution

- Environmental contamination
- Faecal contamination of water sources
- Role of carriers – persons who excrete organisms in stools or urine who are not themselves ill.

### Transmission

- Affects humans only ( unlike the non-typhoid salmonellae)
- Contaminated food and water
- Bacteria killed by thorough cooking
- Contamination of food after cooking
- Predominantly a paediatric disease
- Incubation period 7- 14 days

### Clinical – Signs and Symptoms

- Fever in (99%)
- Weakness and Apathy
- Anorexia
- Headache
- Diarrhoea
- Cough (35%)

- Deafness (15%)
- Hepatomegaly (50%)
- Splenomegaly (35%)
- Abdominal pain
- Rose spots (0-50%)

#### Diagnosis

- Pathology – low albumin, alkaline phosphate raised, WBC normal or low.
- Blood culture especially in the first week.
- Stool culture in the second week
- Urine culture third week
- Widal – widely used but not helpful

#### Complications

- Haemorrhage – Hospital – transfuse
- Perforation – Hospital – surgery, resect extensive length of perforation.
- Severe Typhoid – Coma, shock.

#### Treatment

- Chloramphenicol (500mg/kg body weight total dose) this is cheap and well tolerated, but resistance is an increasing problem.
- Ciprofloxacin 500mg bd (20mg/kg/day) 10 days
- Ceftriaxone 1g iv bd x 10 days
- Dexamethasone 3mg/kg iv over 30 mins then 1mg/kg iv 6 hourly FOR SEVERE TYPHOID.

#### Prevention

- Clean water – chlorination.
- Proper Sanitation
- Health Education – improve personal hygiene
- Vaccination is available but has not yet contributed to control.

### **Leishmaniasis**

Leishmaniasis occurs in many areas such as China, India, Middle East and parts of Africa. It is estimated that 400,000 new cases happen each year. Leishmaniasis may be cutaneous, mucocutaneous or visceral. It is caused by several species of protozoa Leishmania.

The disease is transmitted by the sand fly from an infected person to a normal person. In visceral Leishmaniasis sand fly ingests the parasite with the blood when it bites the patients. After development, when the sand fly next feeds some of these parasites are injected into the new host. They develop and settle in the mononuclear cells especially in the liver, spleen and bone marrow. In cutaneous Leishmaniasis( Baghdad Boil) the sand fly feeds on the cutaneous lesions of an infected person and the parasite multiplies in the skin tissue of a healthy person.

Diagnosis of visceral Leishmaniasis is made by finding the parasite in the blood, lymph nodes, spleen and bone marrow aspirate. Several serological tests are also available like ELISA and indirect immunofluorescence, complement fixation test. Cutaneous Leishmaniasis may be diagnosed by finding the parasites in the lesion by needle aspiration or biopsy. Serological test can also be used. The Leishmania test becomes positive two to three months after the lesion appears and remains positive for life.

#### **Treatment and control**

Control of visceral Leishmaniasis consists of identifying and treating infected persons, including cutaneous Leishmaniasis and destroying the sand fly and the rodent reservoirs. Pentavalent antimonials are initial treatment of choice for visceral Leishmaniasis. Sand fly bites can be avoided by sleeping on the upper floors of house and by using repellents and impregnated bed nets. The sand fly can be destroyed by residual spraying of dwellings with DDT and the breeding places in walls can be plastered.

### **Viral Hepatitis A**

There are 6 types of viral hepatitis: A and E are transmitted by feco-oral route and B, C, D, G are blood born. Hepatitis A is wide spread but it is more common in the tropics and subtropics, most infections are acquired during childhood and most of them are sub-clinical. The virus is transmitted directly or indirectly. Sporadic cases may happen from person to person but outbreaks usually occur through food or water contamination.

Human are the reservoir of the virus, excreting the virus in faeces and possibly urine. Patients continue to shed the virus until the onset of the clinical symptoms. In clinical cases the disease is characterized by loss of appetite, jaundice, hepatomegaly and raised level of liver enzymes. Average incubation period is 20 days (15-40). Usually children tolerate the infection and recover more rapidly than adults. Pregnancy exacerbates hepatitis. Diagnosis is based on clinical features; confirmation is by finding immunoglobulin M antibodies to the virus in the serum.

#### **Treatment and control**

Most patients do not need hospitalization; they need only supportive measures like bed rest, rich carbohydrate diet and avoiding fatty diet and drugs. Control depends on personal and environmental hygiene such as proper sewage disposal, and safe drinking water. Food handlers should not resume work until three weeks after recovery. A vaccine is available and licensed for use but it is still expensive and not feasible for wide usage.

### **Viral Hepatitis B**

Hepatitis B is also worldwide infection caused by hepatitis B virus transmitted through blood and blood products, accidental inoculation such as through contaminated hypodermal needle in drug addicts, tattooing, etc, insect bites,

intrauterine (from mother to child), sexual intercourse and contamination skin lesions. Clinical features are usually more severe than hepatitis A, and can cause liver failure.

Hepatitis B can cause persistent hepatitis and its responsible for around 80% of the cases of hepatocellular carcinoma. Carrier state is common in hepatitis B and may remain for than 6 months. In some developing countries up to 50% of cases may become carriers.

Diagnosis based on clinical features and confirmed by serological tests. At least three separate antigens. HB surface antigen (HbsAg), HB core antigen (HbcAg), HB enzyme antigen (HbeAg). The HbcAg is a valuable marker of infectivity.

### **Treatment and control**

Individual patients may need hospitalizations and supportive treatment according to severity. Control of the disease is done by vaccination, hygiene promotion and counselling. Hepatitis B vaccine is now widely used; three doses at ages of 0, 1 and 6 months are required for complete protection. Passive immunization with HB immunoglobulin gives additional protection to people exposed to the virus such as health workers after needle prick or sexual partners of acute cases.

### **Tuberculosis (TB)**

TB remains one of the major health problems in many developing countries. An estimated 8-10 million people develop clinical TB every year. The disease is caused by mycobacterium TB. The human type produces most of the pulmonary lesions and the bovine type is mainly responsible for extra pulmonary lesions.

Humans are the reservoir of the human strain and pulmonary infection is the main source of infection. The reservoir of the bovine stain is cattle with milk and meat being the source of infection. Transmission of the infection is mainly airborne by droplets and dust. The bacillus can survive for a long time in dried sputum and dust. Transmission is enhanced by overcrowding and poor ventilation. Infection may also occur by ingestion of contaminated milk and meat.

On first infection the patient develops the primary lesion which consists of a small pulmonary lesion with involvement of regional lymph nodes, called Ghon focus. Usually the primary complex heals spontaneously, but organisms may persist for many years within the lesion. This primary infection is usually symptomless but in some cases more sever manifestations may happen such as pneumonia or haematogenous spread to other parts of the body (bone, joints and meninges).

Secondary infection may occur as a result of reactivation of an existing lesion or by exogenous reinfection. Secondary infection may present with cough, haemoptysis, chest pain, fever, malaise and weight loss. Incubation period is 4-6 weeks.

Diagnosis is done by direct microscopy and culture. The gram positive acid fast bacillus can be found by Ziehl-Neelsen method. The organism can be isolated on culture using special media or by inoculation into guinea pigs. Tuberculin test is usually positive in infective persons and strongly in active disease. In previously

unexposed persons conversion from negative to positive may be used as an indication of disease. Tuberculin test usually becomes positive 4-6 weeks after primary infection and after immunization.

### **Treatment and control**

WHO control policy includes 4 elements: government commitment, case detection, DOTS strategy and a good monitoring system. The control of TB can be considered at the following levels of preventions: general health promotion, specific protection (immunization and chemoprophylaxis), early diagnosis and treatment, rehabilitation and surveillance.

1. General health promotion: improvement in housing (good ventilation and avoidance of overcrowding) will reduce the chances of airborne infections. Health education should be directed towards safer personal habits with regard to spitting and coughing. Good nutrition enhances host immunity.
2. Specific protection: vaccination with BCG vaccine administered intradermally gives significant but not absolute immunity, in particular it protects against disseminated miliary TB and TB meningitis. BCG vaccination at birth is widely practiced in developing countries and it is part of the expanded programme of immunization (EPI) strategy. BCG can also be used selectively in tuberculin negative persons who are at high risk e.g. close contacts, doctors, nurses and hospital ward attendants. BCG vaccination may cause local ulceration, regional adenitis and rarely disseminated infection. Chemoprophylaxis may be done by giving Isoniazid for one year for close contacts of patients, persons who are recently tuberculin converted and children under three years who are tuberculin positive from naturally acquired infection. To control bovine TB, infected animal must be identified and eliminated. Milk should be pasteurized and killed cattle should be examined for signs of TB.
3. Early diagnosis and treatment: case finding should aim to identify active case as early as possible. This depends on maintaining a high level of suspicion in clinical practice and screening of high risk groups. Screening methods include tuberculin testing, direct sputum examination and chest X ray. High risk group that should be screened include contacts of TB patients, persons who cough for more than three weeks, hospital staff, people living in overcrowded lodging and immigrants from high incidence areas. WHO recommends the short course directly observed therapy (DOTS). This consists of two months of Isoniazid, Rifampicin, Pyrazanimide, Ethambutol given daily, followed by 4 months of Isoniazid and Rifampicin given three times weekly. Health workers council and observe their patients swallowing each dose and monitor the patients progress until the end. Political and financial commitments and a reliable drug supply are essential parts of the DOTS strategy.
4. Rehabilitation: management of cases may require physiotherapy such as breathing exercises and body exercises. Mental and social rehabilitation may be done by reassurance psychotherapy or occupational therapy.

5. Surveillance: an effective surveillance system should be in place to collect, evaluate and analyze TB related data and used for programme evaluation, and development.

## **HIV/STD**

Sexually transmitted diseases are infections which are specifically transmitted during sexual intercourse. The commonest ones are:

- Herpes Genitalis caused by Herpes Simplex Virus
- Lymphogranuloma Venereum caused by Chlamydia Trachomatis
- Soft chancre caused Haemophilus Ducreyi
- Granuloma Inguinale caused calymmatobacterium granulomatis
- Gonorrhoea caused by Neisseria Gonorrhoeae
- Syphilis caused by Treponema Pallidum
- Trichomoniasis caused by Trichomonis Vaginalis.

The infective agents include viruses, bacteria and protozoa and usually sensitive to drying and cooling below body temperature. The only reservoir is human so transmission is usually through direct close contact but rarely through fomites. The lesions are generally present on the genitalia and the infective agents are also present in the secretion and discharges of urethra and vagina. Extra-genital lesions may occur through haematogenous spray as in syphilis. Transmission can occur through:

- Genital contact
- Extra-genital sexual contact e.g. kissing
- Non-sexual transmission e.g. mother to child (HIV, Syphilis, Ophthalmia Neonatorum), or accidental contacts when doctors, midwives, etc handle tissues infected with syphilis.
- Fomites e.g. contaminated towels may transmit vulvovaginitis to pre-pubescent.
- Blood and blood products

Host factors such as pattern of sexual behaviour and personal hygiene and cultural factors like community attitudes towards sex and marital life are important in transmission of the diseases.

## **Treatment and control**

General control measures include elimination of the reservoir and breaking the transmission cycle. The most important measure is to identify and treat the patients. Sexual contacts must be investigated and treated. Sex education is important to alert people on the risks of these diseases and the modes of transmission in order to help them to avoid exposure to these disease. Male and female condoms can diminish the risk of infections.

## **Tetanus**

Tetanus is caused by clostridium Tetani which is a gram positive obligate anaerobic organism. It forms terminal spores which are highly resistant to drying and even

boiling. Tetanus is found worldwide but common in the tropics. The reservoir of the infection is the soil and the faeces of various animals including man. The organism enters the body through wounds and according to the portal of entry the following types are described:

1. Post traumatic: deep penetrating wounds when contaminated with soil, dung or foreign organic material. Superficial wounds and burns may also cause tetanus.
2. Post puerperal: from contaminated instruments during labour and abortion.
3. Neonatal: through contamination of the umbilical cord.
4. Post surgical: from contaminated surgical instrument.
5. Chronic ulcers such as guinea worm infections.
6. Cryptogenic: in many cases a clear cause can not be found.

Tetanus is an acute disease characterized by increased muscle tone, spasms, fever and a high mortality rate if untreated. Usually hypertonia and spasm are generalized but in mild cases muscle rigidity may be confined to the legs or laryngeal muscles. Trismus is usually an early symptom. Risus Sardonius is often seen in patients. In tetanus neonatorum the first symptom is failure to suck in a baby who had sucked normally for the first few days after the delivery. The incubation is usually between 3 days and 3 weeks. Diagnosis can be made clinically without laboratory test.

### **Treatment and control**

Prevention of tetanus falls in three lines: antibiotic, passive immunization and active immunization. Protection of wounds from contamination with good cleaning and careful debridement are essential. Antibiotics especially penicillin can suppress the multiplication of *Clostridium Tetani*. Clean instruments should be used. Passive immunization with tetanus immune globulin is used to protect individuals with dirty wounds who have no clear history of active immunization. Active immunization with tetanus toxoid is the most effective measure of preventing tetanus. Tetanus vaccine is usually given with Diphtheria toxoid and Pertussis vaccine (Triple Vaccine). WHO estimates that in 1999 there were 270,000 deaths from neonatal tetanus which could have been prevented with administration of two doses of tetanus vaccine to pregnant women.

### **Eye Conditions**

There are an estimated 161 million people with visual impairment, 37 million are blind and 124 million have low vision. 90% of blindness is in the developing world and 80% of this is avoidable – that is to say, treatable or preventable.

Causes of blindness as a percentage of total blindness in 2002 (WHO 2004)

- Cataract = 47.8 %
- Glaucoma = 12.3 %
- Age-related macular degeneration = 8.7%
- Corneal opacities = 5.1%
- Diabetic retinopathy = 4.8 %
- Childhood blindness = 3.9%
- Trachoma = 3.6 %
- Onchocerciasis = 0.8%
- Others = 13% ( Trauma, Leprosy, Refractive Error)

The eye conditions frequently seen during an emergency are caused by trauma conjunctivitis.

## Trachoma

Trachoma is a recurrent, chronic eye infection, the infecting organism is *Chlamidia trachomatis*, and the main vector is the common fly. It is seen in populations with poor hygiene, sanitation and overcrowding, such as refugees and displaced people. It is one of the major causes of blindness, and is a serious public health problem in many parts of Central Asia, Africa, South –East Asia and the Middle East.

### Causes

- Overcrowding
- Poor hygiene and sanitation
- Flies
- Runny noses
- Discharge
- Dry and dusty environment

### Clinical signs and symptoms

- Usually bilateral
- Corneal opacity
- Follicles inflamed, scarring
- Inturned eyelashes
- Severe discomfort

### Treatment

- Tetracycline ointment 1% to both eyes twice daily for 6 weeks
- If there is intense inflammatory activity, a systemic antibiotic can be used such as Doxycycline 100mg twice a day for 21 days
- Treatment in late stage is surgical.

## Control and Prevention

Health Education – communities educated in the prevention of trachoma

- Provision of clean water
- Regular face and hand washing
- Use of well designed ventilated pit latrines
- Refuse should be burned, and not left lying in the open as this will attract flies.
- Animals should be housed some distance from the family home
- If Trachoma is affecting the refugee/ displaced population, any decision to launch a control programme must be based on the prevalence of trachoma leading to blindness and this will be assessed through a sample survey, following WHO guidelines.

## Conjunctivitis

Conjunctivitis is an infection of the eye, and the causative agent is mainly viral but it may be bacterial. Outbreaks of conjunctivitis are commonly seen in refugee camps as overcrowding, an insufficient water supply, poor sanitation, and exposure to wind and dust provide ideal conditions for it to develop. Conjunctivitis is also seen in the newborn (*Ophthalmia Neonatorum*) due to vaginal infections in the mother.

### Signs and Symptoms

- Redness caused by conjunctival haemorrhages
- Irritation
- Discharge – clear watery (viral) Thick yellow (Bacterial)
- Swelling of eyelids
- Severe infection could result in severe pain, change in vision, sensitivity to light.

### Treatment for Newborn Conjunctivitis (Infectious)

- Clean eyelids
- Apply Tetracycline ointment 1% hourly
- Advise both parents regarding STD
- Treat all newborns

### Treatment for both Viral and Bacterial Conjunctivitis

- Clean eyelids
- Apply Tetracycline three times a day for one week

### Control and Prevention

- Personal hygiene such as washing hands and face should be promoted
- Adequate supply of soap and water
- Prompt diagnosis and case treatment.
- Adults and children with conjunctivitis should be educated to prevent the spread.

## **Scabies**

Scabies is an infection of the skin caused by mite, *Sarcoptes Scabiei*. The mite is 0.3-0.4 mm. the female lays its eggs on the skin which hatch within 3-5 days to larvae. These mature within 3 weeks to adults which mate in the skin surface. The disease is common in tropics especially in overcrowded areas. The reservoir is human being.

Transmission is by direct contact with an infected person or indirectly through contaminated clothing. The skin rash consists of small papule, vesicles and pustules with intense pruritis. Another typical feature is presence of burrows which are superficial tunnel made by the adult mite. Secondary bacterial infection is common. Lesion occurs most frequently in the most area of skin such as between the fingers. The incubation period ranges a few days to several weeks. Diagnosis is done clinically and confirmed by identifying adult mite with a microscope.

### **Treatment and control**

Personal hygiene with regular bath with soap and water, laundering of clothes and avoidance of overcrowding help to prevent the spread of the infection. The infected person should be treated by the application of benzyl benzoate or tetraethyl thiuram monosulphide following a thorough bath. Other affected member of the family must also be treated. Mass treatment may be useful in refugee camps.

## **HELMINTHS – Worms**

### **Roundworms e.g. *Ascaris***

- Mode of infection via the mouth
- Distributed throughout tropics and sub tropics
- Adults live in small intestine
- Cause abdominal pain, nausea, diarrhoea and vomiting
- Obstruction of the bile duct and intestine

### ***Trichuris trichiura***

- Mode of infection via the mouth
- Adults live in caecum
- Light infections asymptomatic, heavy infections can cause diarrhoea with blood and mucous
- Anaemia
- Rectal prolapse

### ***Enterobius vermicularis***

- Mode of infection via the mouth
- Distribution worldwide, more common in temperate climates
- Adults live in rectum, but migrate
- Many cause asymptomatic, local irritation
- In children – insomnia, irritability, poor concentration, restlessness, anorexia
- Infection of genitor-urinary tract in females and appendicitis

### **Hookworms**

- Mode of infection via the skin and mouth
- Distributed throughout tropics and sub-tropics
- Dry cough and eosinophilia
- Abdominal pain and diarrhea
- Severe hookworm depends on worm burden and nutritional status and concomitant infection, heart failure, hypoproteinaemia, physical and mental stunting in children
- mortality mainly in children

### **Treatment and Prevention**

- WHO recommended drugs for the treatment of nematodes are Albendazole, Mebendazole and pyartel.
- Personal hygiene
- Simple health program of health education and antihelminthics to school children 5-14 years as this is the age group that is the major contributor to transmission of infection.

### **Tapeworms – *Taenia saginata***

- Distributed wherever cattle are raised and beef is eaten
- Transmitted by eating raw or undercooked beef which contains the larval stage – cysticercus.
- Auto-infection by carrying eggs from the anus to the mouth on the fingers.

### Clinically

- Mainly asymptomatic, segments passed in the stool
- Vague abdominal symptoms in some cases, epigastric pain, nausea, change in appetite, weight loss.
- Rarely, allergic reactions – urticaria, pruritus ani. Moderate eosinophilia in some cases.

### Treatment and prevention

- Thorough cooking of meat
- Sanitary disposal of faeces
- Personal hygiene

## **Meningitis**

Meningitis is an inflammation of the meninges, the layers surrounding the brain and spinal cord. The inflammation is usually, though not always caused by infectious organisms. Meningitis can be caused by a number of bacteria such as streptococci or tuberculosis, as well as by many viruses, fungi, and even non-infectious processes such as cancer. Large outbreaks of meningitis are exclusively due to meningococcus, also known as neisseria meningitidis.

### Meningococcus:

- Is a bacterium, and is seen on microscopy as negative gram diplococci.
- Surrounding the bacterium there is an extra layer called a capsule made of polysaccharides. The immune system makes antibodies to these polysaccharides, but is not able to respond as strongly to polysaccharides as it would to a pathogen without a capsule.
- The capsule also contains lipopolysaccharide (LPS) which is a common feature on the surface of gram negative bacteria, and can provoke an extreme immune reaction in the human host, far from being protective, causes septicaemic shock.
- Unlike many other human pathogens, meningococci infect man alone. There is no animal or environmental reservoir of this infection, it is found only in people.

### The Carrier State

Many people carry these bacteria in their throats with no symptoms whatsoever.

### What makes people immune to Meningococcus?

Immunity is mediated by antibodies. Protective antibodies can be acquired by an individual in a variety of ways;

- Babies inherit them from immune mothers, but inherited antibodies only last for the first few months of life
- Antibodies are generated by meningococcal disease.
- Antibodies are generated by meningococcal infection without disease.
- Antibodies are generated by vaccination, but they don't last for very long.

People are more likely to have protective antibodies as they get older. The asymptomatic carrier can generate protective immunity by building up antibodies against meningococcus without ever suffering from the disease.

### Why do epidemics of meningococcus occur ?

- Environmental factors: Epidemics only occur in the dry season.
- People with concurrent upper respiratory tract infections are more likely to get invasive meningococcal disease.
- Bacterial factors; It is known that particular clones or strains of meningococcus are more likely to cause epidemics than others, although it is not fully understood why.

Meningococcus is spread from person to person by direct contact with saliva, mucous, or droplets from the nose and throat of an infected person.

### Clinical Signs of Meningococcal disease.

- Rapid progression
- Fever
- Neck stiffness
- Rash – maybe petechial or purpuric
- Shock and multi- organ failure
- Adult Respiratory Distress Syndrome (ARDS)
- Diffuse Intravascular Coagulation (DIC) leading to uncontrolled bleeding.
- Coma
- Death

### Treatment

- In outbreaks, the most cost – effective and practical treatment is a single dose of chloramphenicol.
- In the developed western world the antibiotic of choice would be Benzyl Penicillin.
- Patients should be immediately referred to hospital after receiving a single dose of IM antibiotic.

## **Malnutrition:**

The immediate causes of malnutrition are disease and/ or inadequate food intake, which in turn result from inadequate food, health or care at household or community levels. Malnutrition, including micronutrient deficiency, is associated with increased morbidity and mortality for affected individuals. Therefore, when rates of malnutrition are high, it is necessary to ensure access to services which correct as well as prevent malnutrition.

The aim of preventive programmes is to ensure that the causes of malnutrition identified and addressed this include ensuring that people have safe access to food of adequate quality and quantity, and have the means to prepare and consume it; ensuring that the living environment and the health services minimize the risk of disease Programmes aiming to correct malnutrition may include special feeding programmes, medical treatment and/or supportive care for malnourished individuals. The average population requirements of food should be around 2100 kcal per person per day of which 10-12 % should be provided b protein and 17% by fat.

To prevent malnutrition the following points should be taken into considerations:

- There is access to a wide range of foods that meet the nutritional requirements of individuals.
- There is access to vitamin A, C and iron rich food or fortified food or appropriate supplements.
- There is access to iodide salt.
- Exclusive breast feeding is promoted in the first 6 months of life and healthy infant feeding is practised.

The groups which at a higher risk of malnutrition during disasters are Infants under 6 months of age, children under 5, pregnant and lactating women, the older persons, the disabled and people with chronic disease like TB and HIV/AIDS.

### **Infant feeding:**

Excusive breast-feeding is the healthiest way to feed children until the age of six. Exclusive breast-feeding is even more important in during disasters because of difficulty in keeping proper hygiene and safe feeding practices. In the contrary milk substitute can be dangerous i.e. preparation may not be safe, bottle may not be clean and the water may be contaminated.

Colostrum milk is rich with immune element, which is necessary for the new born infant. Breast-feeding should commence directly after birth. Breast-feeding should continue for at least two years while complementary feeding can be started after the age of 6 months immediately. Efforts should be made to provide households with means and skills to prepare complementary foods for their children. This may be through provision of certain food items, utensils, fuel and clean water. Vitamin A should be provided and iron supplementation may be required.

### **Pregnant and lactating women:**

The risk associated with inadequate nutrition of pregnant and lactating women include pregnancy complications, maternal mortality, low birth weight and impaired breast feeding performance. When the general food ration is inadequate, supplementary

feeding should be available for this group. They will also need supplements of iron and folic acid.

### **Older People:**

Older people can be particularly a risk of malnutrition and anaemia due to difficulty in access to food, poverty, neglect, disease and disability. Therefore older people should have easy access to foods, which are easy to prepare, consume, and which contain additional protein and micronutrient requirements for older people.

### **Correction of malnutrition**

Malnutrition can be acute (low weight for height) which is usually due to acute conditions such as diarrhea; or it can be chronic (low weight for age) which is due to chronic problems. Malnutrition can also be classified according to degree to weight loss into mild, moderate and severe.

Malnutrition is associated with increased risk of morbidity and mortality therefore when rates of malnutrition are high it is necessary to ensure access to services to correct and prevent malnutrition e.g. improvement of the general food ration, improving food security, improving access to health care, sanitation and potable water. In disasters targeted supplementary feeding is often the primary strategy for correction of moderate malnutrition and prevention of severe malnutrition. Severe malnutrition is corrected through therapeutic care which can include hospital-based and home based care. The correction of micronutrient deficiency is done through supplementation.

## **MOTHER AND CHILD HEALTH**

### **Child birth**

Childbirth in developing countries is not safe. WHO estimated that 150 million deliveries and 500,000 maternal deaths occur every year, this figure has recently been re-estimated to near 600,000 deaths, i.e. more than one maternal death every minute.

Complications of pregnancy and childbirth do not only affect the mother:

- 3 million deaths of infants under one week old per year
- 4.3 million deaths of infants under one month old per year
- More than 500,000 newborn deaths caused by poor hygiene at delivery or by hypothermia.

### **Antenatal care**

Main Medical Causes Of Maternal Deaths

Direct Causes:

- Haemorrhage
- Sepsis
- Toxaemia (Hypertensive disorders)
- Obstructed labour
- Unsafe abortion

### Indirect Causes

- Viral hepatitis
- Heart disease
- Malaria
- Diabetes
- Anaemia

Women during emergencies especially those in refugee camps may face increased risks in pregnancy because of additional factors such as malnutrition, mental trauma and violence.

A significant number of maternal mortality can be avoided by a combination of adequate organized antenatal, delivery and postnatal care aiming at the detection and treatment of these problems. During and in the post-emergency phase dealing with these problems is more difficult due to security problems, and also cultural problems complicate referrals. It is therefore essential to prepare:

- Minor obstetric emergencies such as retention of placenta, infection and anaemia should be dealt with at the health centre or hospital on site, if there is one. (In the refugee setting.)
- Major obstetric emergencies will need to be transported promptly from the refugee setting to the nearest surgical facility. During the emergency planning stage the nearest surgical facility should be identified with a referral system set up, and transport organized for this.
- Identifying staff that may be available in the refugee population: nurses, trained TBA's etc. TBA's can provide an important role in the refugee setting. These should be identified and given refresher-training courses, supervision and provided with delivery kits to enable them to carry out clean deliveries.

Antenatal care should cover the following:

- Identification and referral for adequate treatment of high risk pregnancies
- Identification and referral for adequate treatment of complications
- Prevention, screening and treatment of anaemia
- (Iron and folic acid supplementation.)
- Immunization against tetanus.
- Administration of essential micronutrients if needed i.e. iodine, vitamin C. etc.
- Screening for Syphilis, and treatment if positive

Antenatal check-ups should be carried out at least twice during the pregnancy, with extra check-ups if needed. A referral system must be established and adequate care provided for women at risk. All essential obstetric care, including surgery, anaesthesia and blood transfusions must be available at hospital level, nearby. Immunization against tetanus should be carried out in line with EPI policies. Ideally all women aged 15-44 should be immunized, not only pregnant women.

### Delivery Care

- Women who are not at risk can usually deliver at home with the assistance of a TBA. The TBA's should have delivery kits to ensure safe deliveries and know the risk factors for early referral to the nearby health centre.

- Women at risk should be referred to a health centre with competent staff who can supervise labour
- Basic surgical facilities should be accessible to deal with caesarean sections, anaesthesia, transfusions etc. Transport should be provided

#### Postnatal Care

- Check up after delivery should take place before the fourth week. During this check up vitamin A should be given to the child to protect the infant up to the age of 6 months.
- During the postnatal period, it is essential to promote exclusive breast-feeding for 6 months – aids maternal and child health. It also has a contraceptive effect. Breast-feeding is even more important in Emergencies due to the number of refugee camps and the greater risk of diarrhoea.
- During this period it may be necessary for lactating women to be admitted into a supplementary feeding programme

#### Causes of infant mortality

- Malnutrition
- Diarrhoea
- Accidents
- Infectious diseases
- Malaria
- ARI, TB, measles, tetanus, polio, diphtheria, whooping cough, HIV/AIDS

#### Prevention and Treatment

- Political
- Economic
- Education
- Improved maternal health
- Birth control/spacing
- Immunisation
- Breast feeding
- Safe drinking water/sanitation

## **Immunization:**

Routine immunization of children against diphtheria, Pertusis, tetanus, poliomyelitis, measles and TB is a vital tool to promote child health. Usually a standard schedule is used to ensure immunization of children against these diseases, see the table below:

<b>Age in Weeks</b>	<b>Vaccine</b>	<b>Disease</b>
1	Polio and BCG	Poliomyelitis and Tuberculosis
6	DTP and Polio	Poliomyelitis, Diphtheria, Pertusis, Tetanus
10	DTP and Polio	Poliomyelitis, Diphtheria, Pertusis, Tetanus
14	DTP and Polio	Poliomyelitis, Diphtheria, Pertusis, Tetanus
9 Months	Measles	Measles

Many developing countries have difficulty in providing regular immunization to their children, so WHO and UNICEF have jointly sponsored an expanded programme for immunization (EPI) to assist countries to design, implement and evaluate their immunization programme, train their health staff and acquire vaccine and essential supplies.

Some of the vaccines are live attenuated organisms which must be refrigerated to maintain their potency otherwise the efficacy of the vaccine will be lost. The process of keeping these vaccines in adequate temperatures from the point of manufacturing of the vaccine down to its administration to the children is called Cold Chain Maintenance. It's crucial to properly maintain the vaccines especially during emergencies where there may be power interruptions. Health facilities should be provided with proper refrigerators including kerosene refrigerator if necessary and cool boxes for keeping vaccines. Mobile teams should also be cautious in keeping the vaccines properly.

## **TRAUMA**

The PHC is required to give First Aid treatment to patients brought there with e.g. landmine, gunshot, burn injuries etc. Injuries caused by firearms increase during times of conflict.

### **Immediate Management of Bleeding**

- Apply direct pressure to the wound or bleeding area
- Press firmly on the wound with a sterile dressing or pad
- Maintain pressure until bleeding stops
- Do not manipulate the wound this may dislodge the clot.
- Bandage the wound firmly
- If bleeding does not stop with these steps, apply another bandage and press firmly without removing the original bandage.
- Transfer the patient to hospital or nearest health post
- If there are signs severe bleeding and shock, put an IV canula and start Ringer's solution, if this is possible.

If there is injury to the lungs, the patient may be dyspnoeic. Put the patient in semi-sitting position. Examine the chest wound. If there is sucking of air from the wound, ask the patient to exhale and immediately close the wound with a clean pad. This may close the wound and reduce pressure on the lungs. Use a large compass to prevent sucking it into the chest. Transfer the patient immediately to hospital.

Patients with fractures of limbs should have the broken limb splinted and bandaged to immobilize it and reduce pain and bleeding. Amputated limbs should be covered with a large pad and bandaged. If there is a lot of bleeding, the limb should be raised. Patients should be transferred to hospital immediately.

### **Burns**

Burns can be caused by hot liquids, fires and chemical. According to degree of the damage to the skin, burns are classified to three degrees: first degree burns involve damage of the superficial layer of the skin (epidermis) the skin will be red, and painful. In the second degree burns, the damage involves the middle layer of the skin (dermis), blisters are formed and the area is painful. In the third degree burns, the damage involves the deeper layers of the skin exposing the subcutaneous layers, the wound may appear pale and dry or it may be charred and brown, there may be no pain because of destruction of the nerve ending.

Treatment:

1. Stop the burning. Do not allow to person to run, let the person roll down on the ground and smother the flames with blanket.
2. Cool the burned area. For first and second degree burn where the blisters are not broken, cool with cold water at least for 10 minutes. For larger and open burns use no moistures.
3. Once cooled, removed clothing from the burned area, if clothing is sticking to the skin, cut around material, do not pull off as this may do more damage.
4. Do not touch the burn or burst the blisters. Apply Flamazine cream, and then cover with a sterile dressing. Burns to hands and feet can be covered by plastic gloves. If the burns are small they can be treated at the health centre Larger and deep burn must be transferred to hospital.

### **Management of Shock:**

Shock is a state of acute imbalance between the oxygen demands of the body and its availability to the cells. Oxygen is transported to the tissues by blood. A state of shock may occur either because the amount of the blood is not sufficient in the vessels or it's not available to the tissues. In cardiogenic shock, there is sufficient blood in the vessels but it's not carried to peripheral tissues because failure of the pumping mechanism of the heart. In septic shock the blood is carried normally to the periphery but because of the infection the tissues and organs cannot utilize it. Extensive blood and fluid loss causes hypovolaemic shock.

Signs and symptoms of shock include:

- Cold sweaty skin
- Restlessness, anxiety and loss of consciousness
- Increased rate of respiration
- Tachycardia
- Hypotension

Management of shock include:

- Maintenance of a clear airway
- Intravenous fluids
- Control of bleeding
- Treatment of the cause

### **Rational use of drugs**

W.H.O says that essential drugs are one of the most cost-effective elements in health care and their potential health impact is remarkable. Safe, inexpensive essential drugs can be life-saving in conditions such as respiratory infections, diarrhoeal diseases, tuberculosis and malaria. Simple iron-folate preparations can reduce maternal and child mortality from anaemia of pregnancy; treatment of sexually transmitted diseases reduces transmission of the AIDS virus.

The irrational use of medicines is a major problem. Worldwide, more than 50% of medicines prescribed, dispensed or sold inappropriately; 50% of patients take them incorrectly, and one-third of the world's population lacks access to essential medicines. Problems are as follows:

- Prescribing too many medicines per patient
- Overuse of antimicrobials (particularly for non-bacterial infections) or failure to complete a course.
- Overuse of injections when other formulations are more appropriate
- Failure to prescribe according to clinical guidelines
- Inappropriate self medication, often of prescription-only medicines

According to W.H.O, essential drugs are 'those that satisfy the health care needs of the majority of the population; they should be available at all times in adequate amounts and in the appropriate dosage forms, and at a price that individuals and the community can afford'

The concept of essential drugs (EDC) was launched in 1977, and became one of the eight pillars of W.H.O's 'Primary Health Care' strategy. Every two years an expert committee updates the W.H.O list of essential drugs (EDL) Factors which make using the EDC necessary are:

- Rational Prescribing – The EDL gives access to the necessary drugs, promotes the use of the correct drug for the correct case, at the correct dose, for the correct length of time. A restricted list helps to focus the mind.
- Patient compliance – Will a patient understand and remember instructions? For one item? For six items? You will need to design instructions that can promote compliance. Remember those patients who can't read or write, older people and disabled.
- Preconceived ideas – magic bullets, antibiotics as prophylactics, a pill for every ill. In these cases it is important that the prescriber is not led by the patient.

In conclusion,

- Use National (EDL) drug policy/W.H.O. Consult the guidelines and W.H.O colleagues.
- Promote community awareness about the correct use of medicines, eg that drugs not always needed, etc
- Training/Information: who is prescribing? What information is available to prescribers and patients?
- How do patients view drugs? How do health workers view drugs? Who is leading in the patient – prescriber relationship?
- A focus on essential drugs is a fundamental part of primary health care
- Strengthen health systems using procurement principles eg cost-effective, correct quantity and quality.

**Rational use** = Right drug, right time, right dose, right cost, right information.

## **Health Education**

The aim of health education is to encourage people to appreciate their health and let them know what they can do as individuals and communities to promote their own health. The ultimate objective of health education is to change attitudes and behaviours of people in matters concerning health. The more people value health, the more they will be willing to make efforts to promote their own health. At the individual level they will be more prepared to make the effort on such matters as exercise, cleanliness, diet, tobacco and alcohol. At the community level they will be more prepared to allocate resources to improve the environmental sanitation and the health services.

Health education covers all aspects of health behaviour including prevention, the use of health services and self-treatment. Health education should be an integral part of the health services and all health staff should be contributing to it. Health education specialists are required to make accurate assessment, to develop suitable material for health education, to train other staff and to evaluate health education programmes.

### **Health education methods**

Health messages can be shared with the audience in a variety of methods and using a range of material. In passive or one way communication the message is passed from the messenger to the passive recipient, the recipient has no chance to interact, ask, and provide input. While in this way a large number of people could be reached, such as by posters, radio and TV programmes, learning is more limited and less sustained.

In active or participatory communication the messenger and the recipient interact more closely and learning is more effective and sustained. Communication in such a way builds on what people know; discussion is promoted; problems are addressed and may be solved and community participation is encouraged.

Tools for participatory communication include handouts, leaflets, wall charts, VIPPs, cards, posters, pictures, maps, video and audio cassettes.

**Group discussion** is a participatory way of communication usually involving running a discussion among 6-12 people. The group facilitator helps guide the discussion rather than doing it solely. Usually a particular issue is addressed in order to retain the focus and reach consensus. No one should be allowed to dominate the group; every one should have the opportunity to contribute since each opinion counts. Full participation must be encouraged. Visual aids such as charts, drawings etc. could be used.

**Discussion posters** are illustrations that are used to trigger discussion around a particular issue. For example a drawing on immunization could be showed to participants to start a discussion around it. The facilitator could ask what participants see, how they understand it, what could be done to solve the problem etc. Feedback from facilitators could be used to improve further editions of the poster.

**VIPP cards**, visualization in participatory programming cards, are useful communication tools particularly in participatory assessment and planning stages. Small cards are distributed among participants to express their views on the issue under discussion. Cards can be of different colours for different purposes. Usually rules are set for using cards such as writing clearly, using key words rather than sentences to express ideas, importance of all opinions, etc. cards. In the end the cards are grouped according to concepts/ priority/ relevance and a discussion is run around them.

**Story telling** is an entertaining way of health education. The facilitator reads a simple informative story about the issue. Or he/she can ask participants to tell stories. Illustrations could be used to tell the story. A discussion is held around the idea of the story.

**Puppet show** is another entertaining way of telling stories particularly in rural areas and for children. Puppets could be very simple and locally made. Story can be simple and around a health problem. Nevertheless it needs some expertise and may not be feasible in all situations. It is better to make the show interactive by involving viewers during the show.

**Role playing** can be simply imitation of simple life situations by preferably participants such as a mother going to a doctor, a health worker trying to vaccinate a child etc. Two or more persons can be involved. Positive and negative actions can be addressed.

Performing **simple dramas** is another way of presenting health messages to the interested populations. Several actors participate in telling the story. It needs a proper place be it a stage or proper platform. It is presented in front of the community who are then invited to discuss the content.

**Flip cards** are a set of picture in form of a book or in a set that are ordered in a particular way and the sequence cannot be changed. The message or story is told through these pictures. It is easy to carry a round. Questions and clarifications are addressed.

**Mapping** is simple way where by individuals are helped to describe their community by drawing main features of the community, their needs, problems and sources of livelihood on a board, paper, on the ground in form of a map. The activity is followed up with discussion of needs. Mapping is useful in participatory assessment and planning.

**Flyers** contain the information on a particular issue presented in a clear and concise way. Flyers must be formatted in an attractive way and may contain instructive illustrations. Copies can be distributed to individuals. These can be used in participatory discussions.

**Videos** are effective way of presenting information. A public service announcement (spot) is a very short presentation (usually less than one minute) of a message in an attractive and informative way. It should be able to catch the attention of the viewer and the timing and frequency of airing are very important for coverage. Other video productions such as instructive programmes, interviews and dramas can also be used to promote health awareness. These videos can be used in a group setting with discussion as participatory methods of communication. Accuracy of the information presented is essential.

**Radio** is also an important tool for communication. Public service announcements, instructive programmes, interviews and dramas can be aired to promote health awareness. These are more important in rural areas where TV is less accessible. Radio programmes can be used in a group setting with discussion as participatory methods of communication. Accuracy of the information presented is essential.

## **Appendix 1**

### **Health Services Assessment Checklist**

#### **Preparation**

- Obtain available information on the disaster-affected population and resources from host country and international sources.
- Obtain available maps and aerial photographs.
- Obtain demographic and health data from host country and international sources.

#### **Security and access**

- Determine the existence of ongoing natural or human-generated hazards.
- Determine the overall security situation, including the presence of armed forces or militias.
- Determine the access that humanitarian agencies have to the affected population.

#### **Demographics and social structure**

- Determine the total disaster-affected population and proportion of children under five years old.
- Determine age and sex breakdown of the population.
- Identify groups at increased risk, e.g. women, children, older people, disabled people, people living with HIV/AIDS, members of certain ethnic or social groups.
- Determine the average household size and estimates of female- and child-headed households.
- Determine the existing social structure, including positions of authority/influence and the role of women.

#### **Background health information**

- Identify pre-existing health problems and priorities in the disaster-affected area prior to the disaster. Ascertain local disease epidemiology.
- Identify pre-existing health problems and priorities in the country of origin if refugees are involved. Ascertain disease epidemiology in the country of origin.
- Identify existing risks to health, e.g. potential epidemic diseases.
- Identify previous sources of health care.
- Determine the strengths and coverage of local public health programmes in refugees' country of origin.

#### **Mortality rates**

- Calculate the crude mortality rate (CMR).
- Calculate the under-5 mortality rate (U5MR: age-specific mortality rate for children under 5 years of age).
- Calculate cause-specific mortality rates.

**Morbidity rates**

- Determine incidence rates of major diseases that have public health importance.
- Determine age- and sex-specific incidence rates of major diseases where possible.

**Available resources**

- Determine the capacity of and the response by the Ministry of Health of the country or countries affected by the disaster.
- Determine the status of national health facilities, including total number, classification and levels of care provided, physical status, functional status and access.
- Determine the numbers and skills of available health staff.
- Determine the capacity and functional status of existing public health programmes, e.g. Expanded Programme on Immunisation (EPI), maternal and child health services.
- Determine the availability of standardised protocols, essential drugs, supplies and equipment.
- Determine the status of existing referral systems.
- Determine the status of the existing health information system (HIS).
- Determine the capacity of existing logistics systems, especially as they relate to procurement, distribution and storage of essential drugs, vaccines and medical supplies.

**Consider data from other relevant sectors**

- Nutritional status
- Environmental conditions
- Food and food security

## *References*

1. The sphere project. Humanitarian charter and minimum standards in disaster response. 2004 edition.
2. Medicines sans frontiers. Refugee health: an approach to refugee situations.
3. A. Lukas, H Gilles. Short textbook of public health medicine for the tropics. fourth edition 2003.
4. Qandil. Communicable diseases in the refugee settings. 2003
5. Braunwald E, Fauci AS et al. Harrison's Manual of Medicine. McGraw-Hill publishers;2002.
6. WHO guidelines on different diseases

# Appendix 2 Sample Weekly Surveillance Reporting Forms

## Mortality Surveillance Form 1\*

Site .....

Date from Monday ..... To Sunday: .....

Total population at beginning of this week: .....

Births this week: ..... Deaths this week: .....

Arrivals this week (if applicable): ..... Departures this week: .....

Total population at end of week: ..... Total under 5 years population: .....

	0-4 yrs		5+ yrs		Total
	male	female	male	female	
<b>Immediate cause</b>					
Acute lower resp. infection					
Cholera (suspected)					
Diarrhoea – bloody					
Diarrhoea – watery					
Injury – non-accidental					
Malaria					
Maternal death – direct					
Measles					
Meningitis (suspected)					
Neonatal (0-28 days)					
Other					
Unknown					
<i>Total by age and sex</i>					
<b>Underlying cause</b>					
AIDS (suspected)					
Malnutrition					
Maternal death – indirect					
Other					
<i>Total by age and sex</i>					

\* This form is used when there are many deaths and therefore more detailed information on individual deaths cannot be collected due to time limitations.

- Frequency of reporting (i.e. daily or weekly) depends upon the number of deaths.
- Other causes of mortality can be added according to the context and epidemiological pattern.
- Ages can be further disaggregated (0-11 mths, 1-4 yrs, 5-14 yrs, 15-49 yrs, 50-59 yrs, 60+ yrs) as feasible.
- Deaths should not be reported solely from site health facilities, but should include reports from site and religious leaders, community workers, women's groups and referral hospitals.
- Whenever possible, case definitions should be put on back of form.



## Weekly Morbidity Surveillance Reporting Form

Site .....

Date from Monday: ..... To Sunday: .....

Total population at beginning of this week: .....

Births this week: ..... Deaths this week: .....

Arrivals this week (if applicable): ..... Departures this week: .....

Total population at end of week: ..... Total under 5 years population: .....

Morbidity Diagnosis*	Under 5 years (new cases)			5 years and over (new cases)			Total new cases	Repeat cases Total
	Male	Female	Total	Male	Female	Total		
Acute respiratory infections**								
AIDS (suspected)								
Anaemia								
Cholera (suspected)								
Diarrhoea – bloody								
Diarrhoea – watery								
Eye diseases								
Malaria								
Malnutrition								
Measles								
Meningitis (suspected)								
Injuries – accidental								
Injuries – non-accidental								
Sexually transmitted infections								
Genital ulcer disease								
Male urethral discharge								
Vaginal discharge								
Lower abdominal pain								
Scabies								
Skin diseases (excluding scabies)								
Worms								
Others								
Unknown								
Total								

\* More than one diagnosis is possible; diseases can be removed or added as fits the current situation.

\*\* Acute respiratory tract infections: in some countries, this category may be divided into upper and lower tract infections.

– Causes of morbidity can be added or subtracted according to context and epidemiological pattern.

– Ages can be further disaggregated (0-11 mths, 1-4 yrs, 5-14 yrs, 15-49 yrs, 50-59 yrs, 60+ yrs) as feasible.

Visits to health facility	Under 5 years			5 years and over			Total	
	Male	Female	Total	Male	Female	Total	Male	Female
<b>Total visits</b>								

**Utilisation rate:** Number of visits per person per year to health facility = total number of visits in 1 week / total population x 52 weeks

– Ages can be further disaggregated (0-11 mths, 1-4 yrs, 5-14 yrs, 15-49 yrs, 50-59 yrs, 60+ yrs) as feasible.

**Number of consultations per clinician:** Number of total visits (new and repeat) / FTE clinician in health facility/ number of days health facility functioning per week.

# Appendix 3

## Formulas for Calculating Rates of Mortality and Morbidity

### Crude Mortality Rate (CMR)

- *Definition:* The rate of death in the entire population, including both sexes and all ages. The CMR can be expressed with different standard population denominators and for different time periods, e.g. deaths per 1,000 population per month or deaths per 1,000 population per year.
- *Formula most commonly used during disasters:*

$$\frac{\text{Total number of deaths during time period}}{\text{Total population}} \times \frac{10,000 \text{ persons}}{\text{No. days in time period}}$$

= deaths/10,000 persons/day

### Under-5 Mortality Rate (U5MR)

- *Definition:* The rate of death among children below 5 years of age in the population.
- *Formula most commonly used during disasters (age-specific mortality rate for children less than 5 years):*

$$\frac{\text{Total number of deaths in children <5 years during time period}}{\text{Total number of children <5 years}} \times \frac{10,000 \text{ persons}}{\text{No. days in time period}}$$

= deaths/10,000 /day



### ***Number of Consultations per Clinician per Day***

- *Definition:* Average number of total consultations (new and repeat cases) seen by each clinician per day.
- *Formula:*

$$\frac{\text{Total number of consultations (new and repeat)}}{\text{Number FTE* clinicians in health facility}} \div \text{Number of days health facility open per week}$$

\* FTE ('full-time equivalent') refers to the equivalent number of clinicians working in a health facility. For example, if there are six clinicians working in the out-patient department but two of them work half-time, then the number of FTE clinicians = 4 full-time staff + 2 half-time staff = 5 FTE clinicians.