

Communicable diseases and severe food shortage

WHO Technical Note

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This technical note is a product of Disease Control in Humanitarian Emergencies (DCE) and the Communicable Diseases-Working Group on Emergencies (CD-WGE), a standing technical working group at WHO coordinated by DCE since 2001. The CD-WGE consists of 30 disease focal points from different departments and clusters at WHO-HQ, including experts on diarrhoeal diseases, malaria, acute respiratory infections, nutrition, tuberculosis, HIV, immunization, water and sanitation, child health and surveillance/early warning and outbreak response. The CD-WGE provides technical and operational support on communicable disease issues to WHO regional and country offices, ministries of health, other United Nations agencies, and nongovernmental and international organizations.

This technical note is a compilation of existing WHO guidelines. Each disease focal point in the CD-WGE has reviewed the adapted guidance and has verified that the original published guidelines are current. The focal points have also, according to their expert opinion, provided comment on whether the published guidelines have been adapted appropriately for emergency settings. A CD-WGE meeting was held to review the document collectively and ensure the adapted guidance has been prioritized to reflect the needs during acute humanitarian emergencies. Contributions have been edited by DCE staff to ensure concise and practical information for use by public health practitioners in emergency settings.

The CD-WGE includes the departments of Global Alert and Response (GAR), Food Safety, Zoonoses and Foodborne Diseases (FOS), Public Health and Environment (PHE) in the Health Security and Environment (HSE) cluster; the Special Programme for Research and Training in Tropical Diseases (TDR); the Global Malaria Programme (GMP), Stop TB (STB), HIV/AIDS and Control of Neglected Tropical Diseases in the HTM cluster; Health Statistics and Informatics (HIS) in the Information, Evidence and Research (IER) Cluster; the departments of Child and Adolescent Health and Development (CAH), Making Pregnancy Safer (MPS), the department of Country Focus (CCO) in the Partnerships and UN Reform (PUN) cluster; Reproductive Health and Research (RHR), Immunizations, Vaccines and Biologicals (IVB) in the Family and Community Health (FCH) cluster; Violence and Injuries Prevention (VIP) and Nutrition for Health and Development (NHD) and Chronic Diseases Prevention and Management (CHP) in the Noncommunicable Diseases and Mental Health (NMH) cluster; Clinical Procedures unit of Essential Health Technologies, (CPR/EHT) in HSS cluster, Health and Medical Services (HMS) and Security Services (SEC) in the General Management (GMG) cluster, and the cluster of Health Action in Crises (HAC) and the Polio Eradication Initiative (POL) and as a Special Programme in the Office of the Director General.

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Preface

The purpose of this document is to provide health professionals in United Nations agencies, nongovernmental organizations, Red Cross/Red Crescent societies, donor agencies and local authorities with up-to-date technical guidance on communicable disease control in populations affected by severe food shortages. They are intended to support a common strategy consistent with current WHO guidance.

The objective of the document is to provide, in a format which is more accessible for field use, a summary of existing WHO information regarding the principles of identification and management of communicable diseases in malnourished populations. It addresses synergistic risk factors for communicable disease transmission and malnutrition, the prevention of morbidity and mortality due to communicable diseases in malnourished populations, and clinical considerations for the diagnosis and treatment of specific communicable diseases in malnourished patients.

The topic areas addressed have been selected on the basis of the burden of morbidity and mortality, as well as the potential for an increase in severity in situations of severe food shortages.

Communicable diseases represent a significant challenge to those providing health-care services in severe food shortage situations. It is hoped that this document will facilitate the control of communicable diseases in populations currently affected by severe food shortage situations.

These guidelines may need to be updated in 18 months–2 years as the epidemiological information evolves or as new guidance become available.

Severe food shortage and malnutrition

- Over one billion people worldwide are undernourished, the vast majority in developing countries. Recent dramatic increases in food commodity prices have pushed tens of millions more people into poverty, putting basic nutritional requirements out of reach and greatly increasing the scale of the crisis (1).
- Malnutrition is the largest single underlying cause of death worldwide and is associated with over 1/3 of all childhood deaths (2).

Malnutrition and communicable diseases

- The combination of communicable diseases (CDs) and malnutrition is a major public health problem, particularly among infants and children. Over 8 million preventable deaths are estimated to occur in these groups annually in developing countries (3): the majority are associated with malnutrition (4). Both undernutrition and micronutrient deficiencies increase the morbidity and mortality from CDs.
- Among young children, malnutrition is an underlying cause in over 60% of deaths resulting from diarrhoea, over 50% of deaths as a result of pneumonia and malaria, and over 40% of deaths as a result of measles (5).
- The relationship is synergistic; malnutrition compromises natural immunity leading to increased susceptibility to infection and more frequent and severe episodes of CDs. Likewise, infection can aggravate or precipitate malnutrition through decreased appetite and intake, malabsorption, nutrient loss or increased metabolic needs.
- Severe acute malnutrition often masks symptoms and signs of infectious diseases making prompt clinical diagnosis and early treatment difficult.
- Nutritional and CD interventions must be integrated to address the overall impact of malnutrition on mortality from CDs effectively.

Risk factors for food shortages

- Although environmental factors such as drought, floods or insect invasion play a role, food shortages generally occur due to a complex combination of factors. Factors contributing to both short and long term food shortages include conflict and civil strife; economic and social change or inequities resulting in or aggravating poverty, or leading to collapse of basic infrastructure and systems; increased food prices; poor governance; and inappropriate land management and farming methods.
- Severe food shortages are often associated with factors which increase the risk of CDs, such as population displacement, lack of safe food and water, poor sanitation, overcrowding, collapse of preventive public health measures such as immunization and vector control, and lack of access to basic health services.

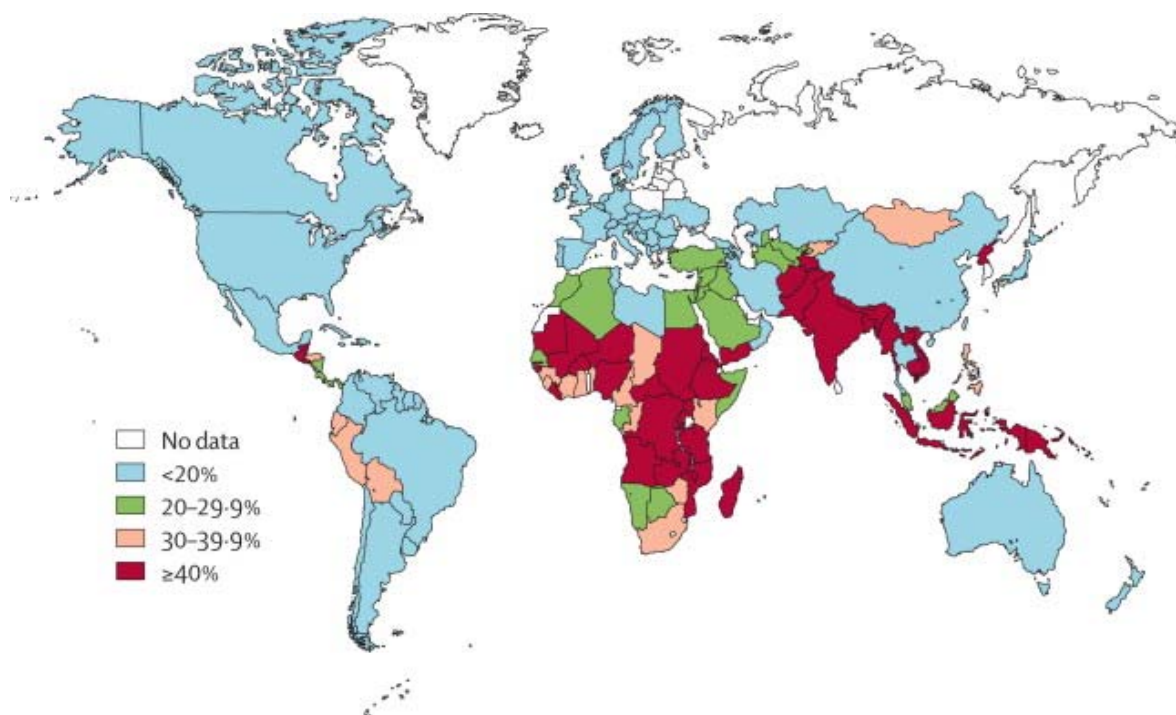


Figure 1. Prevalence of stunting in children under 5 years. WHO Global Database on Child Growth and Malnutrition, 2009. ©World Health Organization

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Prevention of high morbidity and mortality

- Primary prevention can greatly reduce morbidity and mortality from CDs in undernourished populations. Priority measures include support to improve access to safe and adequate food/water/sanitation, immunizations, vector control measures, health education on hygiene/hand-washing, appropriate shelter and site planning for displaced populations, and promotion of appropriate infant and young child feeding practices (6).
- Early diagnosis and appropriate case management for CDs can also limit mortality – appropriate case definitions and treatment protocols must be available in health centres, together with staff that are trained in their use. Case management of CDs should include nutrition counselling, food safety education, and provision of nutrient-rich food supplements when necessary to prevent severe and moderate acute malnutrition.
- Severe acute malnutrition is a life threatening condition requiring urgent treatment (see *Clinical Considerations* section below). Until recently, the recommendation was to refer cases of severe malnutrition to inpatient facilities, where they were managed through a combination of therapeutic diets and medical care. The recommendations changed recently with the advent of highly fortified, ready-to-use therapeutic foods (RUTF) which allow the management in the community of large numbers of children affected by non-complicated severe acute malnutrition. However, 15 to 20% of cases (those with medical complications) will still need inpatient care until their condition has stabilized (7).
- The community-based approach has expanded the coverage of treatment programmes which, combined with hospital-based treatment, has greatly improved survival rates for severely

malnourished children in countries with emergencies such as the Democratic Republic of the Congo, Ethiopia, Malawi and Niger (7).

- Food aid – made available via adequate and appropriate general food distributions – may be necessary. Programmes should target severely malnourished children for therapeutic feeding, and moderately malnourished children and pregnant and lactating women for supplementary feeding. Community education to increase awareness among populations of services available and to facilitate access to these services should be a priority.
- In emergency settings, regular assessments of the nutritional status of vulnerable population groups are critical. In addition, assessments of household access to food (including costs in the market), food hygiene and safety practices during preparation, food intake/feeding habits and agricultural practices are important to ensure that ongoing nutritional needs are being met.
- Although the risk of death is higher in those with severe acute malnutrition, most malnutrition-related deaths occur in those with mild-moderate acute malnutrition due to the higher number of mild-moderate acute cases. To increase child survival, food aid interventions must include improved targeting and appropriate supplementary feeding programmes for moderately malnourished populations.
- Helminth and schistosome infections are common in malnourished persons, contributing to reduced food intake and/or increased nutrient wastage via vomiting, diarrhoea, or blood loss. These effects aggravate malnutrition, anaemia and stunting levels and retard both physical and cognitive development. Management of malnutrition should include deworming.
- To prevent deaths from epidemic-prone diseases among malnourished populations, CD surveillance should be instituted to monitor disease trends and allow early warning of outbreaks.

Clinical considerations

- Nearly all severely malnourished children have bacterial infections when first admitted to therapeutic feeding programmes. Many have multiple infections, with infection of the lower respiratory tract occurring very commonly. A high proportion of deaths often occur within 24 hours of admission for treatment. Institution of efficient emergency assessment and treatment should therefore be systematic.
- Children with severe malnutrition can be promptly identified in the communities and health facilities by using the priority signs described in the integrated management of childhood illness (IMCI) guidelines (8). The priority signs are visible severe wasting, MUAC < 115mm of infants 6 months to 5 years of age, or bilateral pedal oedema (9). They should then be referred for further assessment and treatment
- Common problems encountered in severe acute malnutrition include hypothermia, hypoglycaemia, severe dehydration and electrolyte disturbances, septic shock, severe anaemia and severe vitamin A deficiency. Nonspecific signs include severe palmar pallor, lethargy, drowsiness, unconsciousness, and continual irritability and restlessness. Clinical management, particularly fluid management, must be thorough, carefully monitored and supervised (10). Table 1 summarizes common symptoms, signs, and interventions in children with severe malnutrition.
- Table 2 summarizes some useful laboratory tests for CD management in malnutrition. It is important that the phases and principles of management of severely malnourished children are followed as outlined in the *Management of the child with a serious infection or severe malnutrition* guidelines (10).

Table 1: Summary of common symptoms, signs, and interventions in children with severe acute malnutrition (adapted from *Management of severe malnutrition: a manual for physicians and other health workers, WHO, 1999*) (11)

Common clinical characteristics in children with severe acute malnutrition	Common clinical interventions for severe acute malnutrition
<ul style="list-style-type: none"> • Multiple infections including pneumonia, malaria, meningitis, sepsis, conjunctivitis, ear infection, and skin infections, as well as co-morbidities such as HIV/AIDS • Hypothermia or lack of fever despite the presence of infection • Hypoglycaemia • Dehydration • Anaemia • Chronic cough • Persistent diarrhoea • Dysentery • Urinary tract infections • Vitamin A deficiency 	<ul style="list-style-type: none"> • Glucose supplementation • Vitamin A supplementation • Deworming protocol • Screening with rapid diagnostic test or microscopy for malaria and artemisinin-based combination therapy if malaria positive • Broad-spectrum antibiotics for multiple infections • Early, aggressive treatment with parenteral antibiotics for pneumonia • Rehydration protocol for cases with severe dehydration • Zinc supplementation for acute diarrhoea (this can be achieved through therapeutic feeding. Zinc included in therapeutic foods) • Prioritized use of LLINs (long-lasting insecticidal nets) • Treatment of severe anaemia • Treatment of corneal ulceration • Treatment of septic shock • Therapeutic feeding • Psychosocial stimulation • HIV AIDS treatment (during and after rehabilitation)

Table 2: Summary of laboratory features for CD management in severe malnutrition

Test	Result and significance
Useful tests	
Blood smear microscopy and rapid diagnostic tests (RDT)	Presence of malaria parasites or initial positive rapid diagnostic test is indicative of infection (RDT may stay positive 2–3 weeks after clearance of parasites and cannot be used for treatment follow-up)
Haemoglobin or packed cell volume	Haemoglobin of < 40g/l or packed cell volume <12% is indicative of severe anaemia
Urine microscopy and culture	Presence of bacteria on microscopy (or >10 leucocytes per high-power field) is indicative of infection
Stool microscopy	Presence of blood is indicative of dysentery Presence of <i>Giardia</i> cysts or trophozoites is indicative of infection
Chest X-ray	Pneumonia causes less shadowing of the lungs in malnourished children than in well-nourished children (leading to underdiagnosis) Vascular engorgement is indicative of heart failure Bones may show rickets or fractures of the ribs
Skin test for tuberculosis	Often negative in children with tuberculosis or those previously vaccinated with BCG vaccine
Tests that are of little or no value	
Serum proteins	Not useful in management but may guide diagnosis
Electrolytes	Rarely helpful and may lead to inappropriate therapy

Key public health interventions

In undernourished or malnourished populations, the presence of the most prevalent CDs necessitates key priority health interventions, as follows.

Measles: Malnourished children are at particularly high risk of complications and death following an attack of measles. The disease can trigger acute protein-energy malnutrition and worsen vitamin A deficiency. Measles morbidity and mortality in malnourished populations is easily preventable with vaccination targeting those aged 6 months through 14 years. Vitamin A supplementation is necessary in those under 5 years of age as it minimizes the complications of measles such as blindness, pneumonia and diarrhoea. Systematic measles vaccination and vitamin A should be routinely administered on admission to the therapeutic feeding programme.

Acute respiratory infection/pneumonia: Malnutrition is associated with increased incidence, severity and mortality from acute respiratory infections, particularly in children. Early, empiric, broad-spectrum antibiotic treatment of children clinically diagnosed with pneumonia is critical to reduce morbidity and mortality.

Malaria: Severely malnourished children with malaria may have no fever, or be hypothermic. Symptoms of malaria usually only show up once the child regains weight. All severely malnourished children must be screened routinely for the presence of malaria parasites *on admission, and weekly thereafter* until discharge. The decision to treat a severely malnourished child for malaria is usually based on a positive laboratory test only. Initial diagnosis can be made using either a rapid diagnostic test (RDT) or microscopy. RDTs are based on detection of HRP-II antigens and can remain positive for 2–3 weeks after parasites have been cleared from the patient's bloodstream, follow-up screening of treated patients must therefore be done with microscopy. Malnourished populations are at high risk of complications from malaria and should be prioritized to receive LLINs (long-lasting insecticide-impregnated nets) approved by WHOPEs* to protect against mosquito bites. The risk of further infections should be reduced by protecting all patients in health facilities from dusk till dawn with LLINs, and making LLINs available to take home on discharge (and for children treated at home). Children with moderate malnutrition will have symptoms of malaria in the same way as patients whose nutritional status is normal; therefore screening for malaria should be based on the presence of symptoms and confirmation by RDT or microscopy. Supplementary feeding programmes should distribute LLINs to every child on enrolment. Indoor residual spraying (IRS), a vector control intervention which can interrupt or reduce malaria transmission in certain settings, may be useful when applied (with entomological guidance) in therapeutic feeding centres.

Diarrhoeal diseases: Diarrhoeal illness is both a cause and an effect of malnutrition; in children, malnutrition is associated with the majority of diarrhoeal deaths. Malnutrition compromises natural immunity to food- and water-borne pathogens, leading to increased susceptibility to infection, which in turn can aggravate or precipitate malnutrition. Prompt rehydration can be lifesaving but requires a much slower rate of infusion in severely malnourished patients (10, 11). In addition to rehydration which must be cautiously monitored, the most important measure in the treatment of diarrhoeal diseases in children under five is to ensure continued feeding, including breastfeeding, during and after the diarrhoeal episode. Zinc supplementation (which is included in the mineral and vitamin mix added to therapeutic milk) can reduce the severity of the diarrhoeal episode and prevent further occurrences over the next 2–3 months.

* WHO Pesticide Evaluation Scheme <http://www.who.int/whopes/en/>

Tuberculosis: Although not a leading cause of mortality during the emergency phase, tuberculosis often emerges as a critical problem once measles and diarrhoeal diseases have been adequately controlled. Tuberculosis, often in combination with HIV/AIDS, is common in malnourished populations. If tuberculosis is strongly suspected (recent contact with a known tuberculosis case, the presence of chronic cough, or a chest infection not responding to antibiotics), the management of the patient, in diagnosis and in treatment, must be in line with the national tuberculosis guidelines.

HIV: People with HIV have increased energy and micronutrient requirements, and are particularly susceptible to malnutrition. If malnourished, HIV-infected individuals have an increased risk of opportunistic infections and death. Feeding programmes must take into account the increased nutritional requirements of malnourished individuals with HIV. Nutritional care and support (including individual nutrition counselling), combined with Antiretroviral therapy (ART) is key. HIV-infected children with severe malnutrition should not be given ART during the initial, or stabilization phase, but should be given ART during and after the subsequent rehabilitation phase.

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Further reading

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http://www.who.int/diseasecontrol_emergencies/publications/9241546166/en/index.html
- Communicable diseases in complex emergencies
http://www.who.int/infectious-disease-news/IDdocs/Lancet_CDs_complex_emergencies.pdf
- Ensuring optimal feeding for infants and children during emergencies (WHO 1999)
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