Malnutrition in Humanitarian Emergencies

Bridget Fenn
Outline

• Nutrition in emergencies – Background
• Nutrition – Introduction
  – Causes
  – Main types of malnutrition in emergencies
    • Macronutrient
    • Micronutrient deficiency
• Burden of malnutrition and its contribution to mortality
• Malnutrition and infectious diseases
• Emergency rehabilitation – prevention & control
• Resources
Malnutrition and risk of illness and death

• Not infectious disease....... Responsible for over 50% of child deaths globally
• Some emergencies result in very high levels of severe malnutrition
• ‘Cut-offs’ for severe malnutrition is threshold where mortality risk rises sharply
• Risk of death of malnourished associated with infectious disease – malaria, diarrhoea, measles, ARLI, HIV/AIDS
Malnutrition and risk of illness and death

• Nutritional status also affected by **reduced food intake** due to worsening food security

• Malnutrition/mortality relationship is complicated
  – Other factors affect mortality

• Important to interpret mortality data with nutrition and health information
  – Crude Mortality Rate (CMR): <1.0/10,000 individuals/day
  – Under-five Mortality Rate (U5MR): <2.0/10,000 U5s/day
Mortality & Malnutrition

• Mortality and malnutrition data are both critical to define high-risk groups and to target programme during an emergency.

• Although...the utility of case-definitions for malnutrition are defined more by their ability to reflect mortality risk than their ability to reflect nutritional status

• But...Lancet malnutrition series missed out acute malnutrition.
EMERGENCIES

INFECTIOUS DISEASE
HIV/AIDS

MALNUTRITION

VULNERABILITY

• Poverty
• Chronic food insecurity
• Poor infrastructure
• Increase food prices

Increase in number of emergencies; famine, drought

CLIMATE CHANGE

EMERGENCIES
Malnutrition

Normal
Normal weight and height

Wasted
Thinner than normal

Stunted
Shorter than normal

Wasted and stunted
Thinner and shorter than normal
Chronic malnutrition

- Stunting – (too short for age) an indicator of the long-term cumulative effects of nutrition deficiency.
- Children <5 yrs particularly affected.
- Short term implications – growth faltering and weight loss with associated micronutrient deficiencies.
- Increases susceptibility to disease & infection.
- Longer term effects – impaired physical & mental development.
- Consequences of stunting increase the demands on medical, public health and food assistance in crisis situations.
Chronic & Acute

• Underweight

• A combination of wasting and stunting – difficult to determine appropriate intervention.

• But is used as a measure of trends in general undernutrition e.g. is a Millennium Development Goal (MDG) target:
  – MDG 1 – Target - To reduce underweight by 50% by 2015
Acute malnutrition

• Wasting – (too thin for height) often an indicator of the current or recent situation.

• Wasting results from an acute shortage of food, is reversible with re-feeding, and has a relatively high mortality rate.

• Poses more severe health risks than chronic malnutrition leading to weight loss and specific micronutrient deficiencies – resulting in impairment of bodily functions esp. resistance to disease.

• Increased levels of acute malnutrition in a population result in increased illness and death. These consequences often characterise nutrition emergencies and famine situations.
Severe Acute Malnutrition (SAM)

- Normal physiological mechanisms adapt
  - Mobilise energy & nutrient reserves
  - Decrease energy & nutrient demands

- Initially beneficial and allow homoeostasis

- As severity increases these adaptations prevent body’s ability to respond to top stresses e.g. infection
Clinical forms of SAM

- **Marasmus** – severe weight loss leaving ‘skin and bones’
- **Kwashiorkor** – bloated appearance due to water accumulation (oedema)
- **Marasmic-kwashiorkor** – a combination of both
Marasmus

- Extremely emaciated (fat & muscle tissue grossly reduced)
- Thin flaccid skin, hanging in loose folds; “baggy pants”, “old man’s appearance”
- Normal hair
- Frequent infections with minimal signs
- Electrolyte imbalance (no oedema)
- Frequent association with dehydration
- Alert & irritable
Kwashiorkor

- Bilateral pitting oedema, beginning in the lower legs and feet, can become more generalized (hands and arms, “moon face”)
- Reduced fat muscle tissue (often masked by the oedema)
- Hair changes colour (yellow/reddish) and becomes sparse; curly hair becomes straight; dry & brittle, easily pluckable.
- Skin lesions and hypo-pigmentation:
  - dark skin may become lighter esp. in the skin folds
  - outer layers of skin may peel off ➔ ulceration
  - the lesions may resemble burns ➔ prone to infection.
Kwashiorkor

• Frequent infections
• Electrolyte imbalance
• Frequent association with dehydration (often masked by oedema)
• Generally apathetic, lethargic, miserable, and irritable. They show no signs of hunger, and it is difficult to persuade them to eat.
Marasmic kwashiorkor

- Marasmic kwashiorkor: refers to marasmic children with oedema but without other signs of kwashiorkor.
## Prevalence & distribution

<table>
<thead>
<tr>
<th>Regions†</th>
<th>Under-5 population 2000 (x1000)</th>
<th>Wasting prevalence (%)</th>
<th>Wasting numbers (x1000)</th>
<th>Annual mortality numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Moderate and severe</td>
<td>≥2 Z scores below WFH</td>
<td>≥2 Z scores below WFH</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>106,394</td>
<td>10</td>
<td>3</td>
<td>10,639</td>
</tr>
<tr>
<td>Middle East and north Africa</td>
<td>44,478</td>
<td>7</td>
<td>2</td>
<td>3,114</td>
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<tr>
<td>South Asia</td>
<td>166,566</td>
<td>15</td>
<td>2</td>
<td>24,985</td>
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<tr>
<td>East Asia and Pacific</td>
<td>159,454</td>
<td>4</td>
<td>-</td>
<td>6,378</td>
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<tr>
<td>Latin America and Caribbean</td>
<td>54,809</td>
<td>2</td>
<td>0</td>
<td>1,096</td>
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<tr>
<td>CEE-CIS and Baltic states</td>
<td>30,020</td>
<td>4</td>
<td>1</td>
<td>1,201</td>
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<tr>
<td>Industrialised countries</td>
<td>50,655</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Developing countries</td>
<td>546,471</td>
<td>9</td>
<td>2</td>
<td>49,182</td>
</tr>
<tr>
<td>Least developed countries</td>
<td>110,458</td>
<td>10</td>
<td>2</td>
<td>11,046</td>
</tr>
<tr>
<td>Total</td>
<td>707,584</td>
<td>60,228</td>
<td>13,139</td>
<td>3577,241</td>
</tr>
</tbody>
</table>


**Table:** Worldwide burden of acute malnutrition in children aged less than 5 years

- 32% stunted
- 146 million children underweight
- Malnutrition rates are higher in South & Central Asia?
Indicators

• Wasting – Weight-for-Height (W/H)
• Stunting – Height-for-Age (H/A) or Length-for-Age (L/A) if child <24 months or <85cm
• Underweight – Weight-for-Age (W/A)

• All of these indicators are measured in either Z-scores, percentiles or percentage of the median

• MUAC, MUAC/Age, MUAC/height
Nutritional assessment: sampling and indicators

• **Sampling:**
  - Children 6-59 mos
  - Adolescents, adults

• **Indicators:**
  - Acute emergency:
    • wasting, oedema
  - Stable emergency:
    • wasting, oedema
    • underweight
    • stunting

• **Reporting W/H, oedema, MUAC:**
  - Moderate wasting (MAM):
    • <-2 to -3 Z scores; >=70%<80% W/H
  - Severe wasting (SAM):
    • <-3 Z scores; <70%
  - Moderate+severe wasting (GAM)
    • <-2 Z scores; <80% W/H
  - Oedema:
    • Nutritional oedema, regardless of W/H
  - MUAC
MUAC

• Mid Upper Arm Circumference (MUAC):
  • MUAC <125mm >110mm
  • MUAC < 110 mm OR the presence of bipedal oedema

• Still need consensus about whether to use MUAC as a measure of wasting prevalence.
## Body Mass Index (BMI)

### Malnutrition in Adults

Malnutrition is often assessed using the Body Mass Index (BMI), which is calculated as follows:

\[
\text{BMI} = \frac{\text{Weight (in kg)}}{\text{Height (in m)}^2}
\]

### Table of BMI Ranges

<table>
<thead>
<tr>
<th>Type &amp; level of malnutrition</th>
<th>BMI range (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obese</td>
<td>30.0+</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0-29.9</td>
</tr>
<tr>
<td>Normal</td>
<td>18.5-24.9</td>
</tr>
<tr>
<td>CED* Mild</td>
<td>17.0-18.4</td>
</tr>
<tr>
<td>CED Moderate</td>
<td>16.0-16.9</td>
</tr>
<tr>
<td>CED Severe</td>
<td>&lt;16.0</td>
</tr>
</tbody>
</table>

* Chronic Energy Deficiency
## Clinical & biochemical indicators

<table>
<thead>
<tr>
<th>Micronutrient deficiency</th>
<th>Clinical indicator</th>
<th>Biochemical indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron deficiency anaemia</td>
<td>Pallor of palms or inside of eyelids or mouth</td>
<td>Haemoglobin estimation</td>
</tr>
<tr>
<td>Vitamin A deficiency</td>
<td>Night blindness</td>
<td>Haemoglobin measurement</td>
</tr>
<tr>
<td>Vitamin A deficiency</td>
<td>Bitot’s spots</td>
<td>Serum Vitamin A level</td>
</tr>
<tr>
<td>Iodine deficiency</td>
<td>Goitre</td>
<td>Urinary iodine level</td>
</tr>
</tbody>
</table>
## Anaemia

<table>
<thead>
<tr>
<th>Category of public health significance</th>
<th>Prevalence of anaemia (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td>&gt;= 40</td>
</tr>
<tr>
<td>Moderate</td>
<td>20.0-39.9</td>
</tr>
<tr>
<td>Mild</td>
<td>5.0-19.9</td>
</tr>
<tr>
<td>Normal</td>
<td>&lt; 5.0</td>
</tr>
</tbody>
</table>
# Vitamin A

<table>
<thead>
<tr>
<th>Type of indicator &amp; population group</th>
<th>Indicator</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children 2-5 yrs</td>
<td>Night blindness</td>
<td>&gt;= 1.0</td>
</tr>
<tr>
<td></td>
<td>Bitot’s spots</td>
<td>&gt;= 0.5</td>
</tr>
<tr>
<td><strong>Women of childbearing age</strong></td>
<td>Night blindness during pregnancy</td>
<td>&gt;= 5.0</td>
</tr>
<tr>
<td><strong>Biochemical</strong></td>
<td>Plasma retinol &lt; 0.70 Micromoles/L (20 microgm/dL)</td>
<td>&gt;= 15.0</td>
</tr>
</tbody>
</table>
# Iodine

<table>
<thead>
<tr>
<th>Population status</th>
<th>Iodine intake</th>
<th>Median (μg/l) children 6+ yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe deficiency</td>
<td>Insufficient</td>
<td>&lt;20</td>
</tr>
<tr>
<td>Moderate deficiency</td>
<td>Insufficient</td>
<td>20-49</td>
</tr>
<tr>
<td>Mild deficiency</td>
<td>Insufficient</td>
<td>50-99</td>
</tr>
<tr>
<td>Adequate</td>
<td>Adequate</td>
<td>100-199</td>
</tr>
<tr>
<td>Likely to provide adequate intake for pregnant/lactating women – may pose slight risk of &gt;adequate intake in overall population</td>
<td>Above requirements</td>
<td>200-299</td>
</tr>
<tr>
<td>Risk of adverse health consequences (iodine-induced hyperthyroidism, autoimmune thyroid diseases)</td>
<td>Excessive</td>
<td>300+</td>
</tr>
</tbody>
</table>
Malnutrition & Mortality

Ref: Checchi et al 2006
Malnutrition & Mortality

• acute malnutrition ➔ very high mortality rates.

• the mechanisms of food procurement and distribution often break down at the same time as basic public health and clinical treatment measures are eroded.

• ➔ exposure to disease-causing organisms more common and treatment for disease becomes less available.

• ➔ increases the mortality resulting from acute malnutrition.
Malnutrition & Mortality

*Moderate or severe acute malnutrition = <80% median weight/height World Health Organization reference population in children <5 years of age.*
Malnutrition & Mortality

• Nutrition and mortality data should be collected, analyzed, and interpreted together during emergencies.

• Both may help identify the underlying public health causes of malnutrition in emergencies, e.g. measles or diarrhoea, that may interact with poor food security to increase mortality risk.

• Such data may also challenge the assumption that only children younger than 5 years are at a higher risk for malnutrition and mortality.

• The lack of anthropometric data on adults, particularly older persons, may result in groups at potentially high risk of mortality due to undernutrition not being targeted for selective feeding interventions.
Careful....

A high mortality rate does not necessarily mean that SAM rate is low – especially when other risk factors for malnutrition exist within the population (& prevalence from pre-emergency surveys). Survivor bias.

If the mortality rate increases rapidly, the prevalence of malnutrition may plateau because the rate of death from malnutrition may = the rate at which children become newly malnourished.

But also consider...

Situations where SAM is low and mortality high could suggest that malnutrition is not a public health problem in that population.
Malnutrition & infectious disease

- Malnutrition
  - Impaired child development
  - Compromised immunity
    - Infection
      - Disease
        - Energy loss
          - Reduced productivity
  - Socioeconomic & political instability
    - Impaired development of education and health system
      - Poverty
Malnutrition & Infectious Disease

• Malnutrition is particularly lethal in combination with infectious diseases such as ARLI, malaria, measles, diarrhoeal diseases - the major killer diseases affecting children.

• Infection and micronutrient deficiencies can induce immunodeficiency in otherwise healthy children, increasing susceptibility to diarrhoea and other infections.

• This can lead to a vicious cycle of repeated infections, reduced immunity, and deteriorating nutritional status.

• Malnutrition magnifies the effect of disease.

• A malnourished person has more severe disease episodes, more complications, and spends more time ill for each episode.
Malnutrition/infection cycle

Inadequate dietary intake

Appetite loss
Nutrient loss
Malabsorption
Altered metabolism

Weight loss
Growth faltering
Immunity lowered
Mucosal damage

Disease: - incidence
- severity
- duration
Undernutrition attributable deaths

• Among the primary causes of death in young children:
  – Diarrhoea 60.7%
  – Measles 44.8%
  – Pneumonia 52.3%
  – Malaria 57.3%
Malnutrition & Infectious Disease

• Large supplementation trials show that routine vitamin A supplements (6-72 mo) can reduce overall mortality by at least 23% where vitamin A deficiency exists in a population.

• Effective

• Cheap

• Even more effective vitamin A & vaccines e.g. Vitamin & measles vaccine – given together at NIDs.

• Previous deaths (before vaccine) 7-8 million; now 900 000
Questions

Which disease:

1. depletes iron
2. is considered the most contagious in humans
3. is treated effectively with zinc supplements
4. can cause blindness
5. is the most common respiratory disease
Questions

1. when associated with undernutrition, is most common cause of death in young children
2. depletes vitamin A levels
3. could causes major obstetric problems if left untreated
4. is often complicated with ARLI and diarrhoea
5. only needs to have 1 case for it to become an epidemic
Measles

• The most contagious disease known to humans.

• Causes loss of vitamin A, frequently \(\rightarrow\) acute vitamin A deficiency and blindness.

• Half of children who become blind die within 1 yr.

• May ultimately be responsible for more child deaths than any other single microbe - due to complications from pneumonia, diarrhoea and malnutrition.
Measles

• Post-measles diarrhoea is especially difficult to treat and has a very high mortality risk.

• Measles also ➔ in long-term complications including:
  • deafness
  • chronic lung disease
  • poor growth
  • recurrent infections.
Measles

• Relationship between measles and malnutrition is complex

• Children with measles are generally more susceptible to wasting

• Children who have wasting are more likely to develop complications of measles and have higher case-fatality rates.

• Dose-response relationship between the degree of wasting and cumulative incidence of measles in the previous 2 weeks.

• A higher infectious dose of measles is associated with more severe disease

• Children contracting measles from siblings or in crowded places generally receive higher infectious doses.
Measles prevention

• Crowded emergency settings, large population displacements and high levels of malnutrition.

• Mass measles vaccination campaigns (EPI) – 6mo-15yrs.

• If the vaccination coverage for the population is unknown, the campaign should be carried out on the assumption that the coverage is inadequate.
Measles & Vitamin A

• Measles is known to interact particularly with malnutrition and vitamin A.

• It is a common precipitating cause of potentially blinding eye lesions in young children, and of severe growth faltering and malnutrition.

• Risk of mortality from measles is reduced by 50% with Vitamin A supplementation.
Malaria

- 500 million people live in malaria-endemic areas.
- Major cause morbidity & mortality
- Often affects poor and malnourished populations - vulnerable, children & pregnant women
- Malaria causes haemolysis, which in turn causes anaemia.

But...

- Conflicting evidence that undernutrition is an underlying cause of malaria morbidity & mortality
Iron deficiency

• Uncorrected iron deficiency leads to:
  – severe anaemia (major obstetric problem; maternal mortality)
  – lbw risk (2x as high in malaria-endemic area)
  – Stillbirths, miscarriage
  – reduced work capacity
  – diminished learning ability
  – increased susceptibility to infection
Reduce Malaria or supplement iron?

• Conflicting information

• Iron supplementation protects a child who is at high risk of dying from severe anaemia in the first 2 years of life.

• The malaria parasite requires iron for its multiplication in blood, and thus may be less infective in the iron-deficient individual.
Roll-Back-Malaria

• However, antimalarial prophylaxis protects against severe anaemia much more.

• Evidence - Reducing malaria makes more of a difference than iron supplementation in preventing severe anaemia.

• Prevention
  • Bednets
  • Spraying
  • Larvae control & environmental management
Diarrhoeal diseases

- Diarrhoea associated with malnutrition is probably the commonest cause of death in young children worldwide.

- Every year around 10 million children under 5 die: 5 million from malnutrition - about 2 million with diarrhoea (out of a total of 2.5 billion episodes of diarrhoea)

- Most episodes of diarrhoea are infectious and are caused by a variety of bacteria, viruses, and parasites.

- Studies shown that 50% of deaths related to diarrhoea linked to persistent diarrhoea (>14 duration); about 10% of diarrhoea cases lead to persistent diarrhoea.
Diarrhoeal diseases

- Undernutrition increases the incidence and severity of diarrhoea.
- Diarrhoea is detrimental to nutritional status (acute weight loss, malnutrition & stunting).
- Diarrhoeal diseases account for 10-80% of growth retardation in the first few years of life worldwide, affected by:
  - aetiology and clinical type of diarrhoea,
  - the source and adequacy of dietary intake,
  - treatment,
  - feeding practices.
- The case fatality rate is highest among children aged 6-12 months because:?
Diarrhoeal diseases

• Dehydration is the most direct effect of diarrhoea, accounting for the majority of deaths.

• The widespread adoption of oral rehydration therapy (ORT) has greatly reduced the mortality related to diarrhoea.

But...

• Diarrhoeal illnesses in young children continue to be a leading cause of morbidity and mortality worldwide treatments). Why?
Zinc

• Numerous RCTs – proven effectiveness

• WHO and Unicef recommend the therapeutic use of zinc for 10-14 days at a daily dose of:
  – 10 mg in infants less than 6 months old and
  – 20 mg daily in older children.
Diarrhoeal diseases-clinical management

Four main components:

• Replacement of ongoing losses of fluid and electrolytes (75 mmol/l of sodium and 75 mmol/l of glucose and an osmolarity of 245 mmol/l.)

• Zinc therapy

• Antimicrobial therapy when indicated

• Continued feeding to provide enough nutrients to meet both the patient's usual maintenance requirements and the increased needs imposed by infection and malabsorption
Acute respiratory infection - ARLI

• Pneumonia the most common
• Pneumonia often affects children with lbw or those whose immune systems are weakened by malnutrition or other diseases.
• Malnutrition and failure to thrive are known risk factors for ARLI.
• Symptoms accompanying pneumonia – breathing difficulties, fever, and anorexia ➔ weight loss.
• With SAM the symptoms may be less obvious
ARLI prevention

- Maintain nutritional status
- Keep immunization rates against measles and pertussis high
- Control:
  - Overcrowding
  - Smokey fires
  - Ventilation
- Early treatment for coughs & breathing difficulties
Co-morbidity

• Pneumonia and diarrhoea - A causal link between diarrhoeal disease and subsequent risk of ARLI is biologically plausible.

• Diarrhoea may also increase the risk of ARLI in the short term by causing: acute micronutrient loss, stress on the immune system, dehydration or immobilization, thereby creating a vulnerable period of increased risk of infections.
• There is some evidence that ARLI is a common finding and cause of death of malnourished children hospitalized for severe diarrhoea.

• However, in hospital case series it can be difficult to distinguish between cause, effect and co-occurrence due to common risk factors
Integrated Management of Childhood Illness IMCI

• IMCI is disease control through management of the five most common causes of childhood deaths - pneumonia, diarrhoeal diseases, malaria, measles and malnutrition.

• The IMCI treatment guidelines have been developed to assist health workers to recognize easily signs of illness and take appropriate action, even if there are co-existing health conditions.

• IMCI also helps prevent illness through promoting improved nutrition and vaccination.
Malnutrition and HIV Work in Tandem

Malnutrition: insufficient dietary intake, mal-absorption, diarrhea, altered metabolism and nutrient storage

Weakens the immune system
Increases vulnerability and susceptibility to infection

HIV infection

Increased nutrient requirements

HIV/AIDS & Emergencies: 3 perspectives

- HIV/AIDS in emergency
  In conflicts, infrastructure is destroyed/services collapse

- HIV/AIDS as emergency
  High HIV infection rates and related infections overwhelm existing services

- HIV/AIDS as emergency in emergency
  Public services are doubly overwhelmed by HIV/AIDS and additional demands
How do emergencies increase HIV/AIDS related vulnerability?

- Reduce social stability/support
- Overwhelm or destroy essential public services
- Reduce household and community resources
- Increase personal insecurity and risk of sexual assault.

Disruption of social norms and care capacity

Services cannot manage HIV/AIDS related requirements

Assets and social safety nets deplete

Risk of HIV infection increases
Addressing HIV/AIDS in emergency settings: challenges and problems

- Collapsed/inadequate health and public services.
- Limited financial, social & economic resources.
- Lack of information (on infection levels, trends, target populations, ...).
- Special situations of emergency-affected populations (access, security, language, culture, stigma..)
- Institutional and human resource constraints.
Chronic livelihood insecurity.

Shocks such as drought or conflict tip situation into acute emergency.

Acute crisis develops, with increased risks to lives and livelihoods.

HIV/AIDS undermines livelihood security.

HIV/AIDS increases vulnerability to shocks.

HIV/AIDS-affected people/households have less capacity to respond and sustain more severe losses/impacts.
Nutrition Rehabilitation

• No different to food already distributed in an emergency…except that:

• An increase in energy requirements of 10% in adults who are asymptomatic, and 20 – 30% for symptomatic adults.

• 50-100% increase for children with acute weight loss and infection.
For children and adults with Severe malnutrition/oedema and HIV

<table>
<thead>
<tr>
<th>Weight (Kg)</th>
<th>RUTF Paste g/day</th>
<th>RUTF Paste g/wk</th>
<th>PLUMPY’NUT® sachet/day</th>
<th>PLUMPY’NUT® sachet/wk</th>
<th>BP100® bars/day</th>
<th>BP100® bars/wk</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-3.4</td>
<td>105</td>
<td>750</td>
<td>1¼</td>
<td>8</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>3.5-4.9</td>
<td>130</td>
<td>900</td>
<td>1½</td>
<td>10</td>
<td>2½</td>
<td>17½</td>
</tr>
<tr>
<td>5-6.9</td>
<td>200</td>
<td>1400</td>
<td>2</td>
<td>15</td>
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<tr>
<td>7-9.9</td>
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<td>1800</td>
<td>3</td>
<td>20</td>
<td>5</td>
<td>35</td>
</tr>
<tr>
<td>10-14.9</td>
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<td>2800</td>
<td>4</td>
<td>30</td>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td>15-19.9</td>
<td>450</td>
<td>3200</td>
<td>5</td>
<td>35</td>
<td>9</td>
<td>63</td>
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<tr>
<td>20-29.9</td>
<td>500</td>
<td>3500</td>
<td>6</td>
<td>40</td>
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<td>70</td>
</tr>
<tr>
<td>30-39.9</td>
<td>650</td>
<td>4500</td>
<td>7</td>
<td>50</td>
<td>12</td>
<td>84</td>
</tr>
<tr>
<td>40-60</td>
<td>700</td>
<td>5000</td>
<td>8</td>
<td>55</td>
<td>14</td>
<td>98</td>
</tr>
</tbody>
</table>
Multivitamins and HIV Disease Progression

• Studies from Africa suggest that a daily multivitamin:
  – Reduces rate of decline on the immune system by one-third
  – CD4 counts remain higher
  – Viral loads are reduced

• It is suggested that multivitamins are a cheap and useful tool in delaying the need to commence HAART.

Fawzi et al, (2004) NEJM 351;1
TB

• To make matters worse:
  • infection with HIV weakens the immune system and can activate latent TB infection.
  • multiplies the risk of initial infection with TB.
• About one-third of all AIDS deaths today are caused by TB.
• HIV & TB increase hospital workloads treating SAM both directly (infection) & indirectly (on food security, livelihoods)
  • Inc. SAM
  • Inc. mortality
Integration of HIV/AIDS activities with food and nutrition support in refugee settings: specific programme strategies

**HIV/AIDS ACTIVITIES**
- Health care and treatment activities for the HIV/AIDS-affected
- Support and care activities for the HIV/AIDS-affected
- HIV/AIDS prevention activities

**INTEGRATED PROGRAMME STRATEGIES**
- Integrating programme strategies at 3 levels:
  - Individual level
  - Household/family level
  - Community/population level
- Integrating aspects in two ways:
  - Incorporating HIV/AIDS activities into food and nutrition programmes (Chapter 3)
  - Incorporating food and nutrition activities into HIV/AIDS programmes (Chapter 4)

**FOOD/NUTRITION ACTIVITIES**
- Emergency food distribution and nutrition activities
- Training, capacity building, and institutional support activities
- Food and livelihood security activities
Objectives of nutritional programmes

• To ensure adequate food supply for entire affected population and thereby prevent malnutrition and other adverse health consequences

• To provide nutritional rehabilitation for moderately and severely malnourished

• To prevent nutritional deterioration for ‘vulnerable groups’
Potential strategies to address and prevent malnutrition

- Supplementary Feeding
- Therapeutic Feeding
- Promotion and support for breast feeding
- General Food Ration
- Vitamin A distribution
- Nutrition Education
- Sanitation
- Income Generation
- Livestock
- Measles vaccination
- Fortification
- Water
- Provide curative treatment for infectious disease
## Feeding programme criteria

<table>
<thead>
<tr>
<th>Malnutrition Rate</th>
<th>Proposed Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>• GAM &gt; 20% OR</td>
<td>• Blanket SF for all U5s</td>
</tr>
<tr>
<td>• GAM 10-19% plus aggravating factors</td>
<td>• TFP</td>
</tr>
<tr>
<td>(mortality &amp; morbidity, security etc)</td>
<td>• GFD (2100 kcals)</td>
</tr>
<tr>
<td>• GAM 10-19% OR</td>
<td>• Targeted SFP</td>
</tr>
<tr>
<td>• GAM 5-9% plus aggravating factors</td>
<td>(moderately malnourished, TFC discharged, elderly, pregnant/lactating)</td>
</tr>
<tr>
<td>• GAM &lt;10% AND no aggravating factors</td>
<td>• TFP</td>
</tr>
<tr>
<td></td>
<td>• GFD (2100 kcals)</td>
</tr>
<tr>
<td></td>
<td>Unlikely need for population level intervention</td>
</tr>
</tbody>
</table>
General ration distribution

General distribution refers to the free distribution of a combination of food commodities to the affected population as a whole.

Objectives:
- To meet the immediate food needs
- Famine prevention OR livelihood protection
- Livelihood recovery
What is an adequate ration?

- Meets minimum nutritional requirements for light activity
- Includes a range of commodities
- Is acceptable and broadly familiar
- Fit for human consumption
- Easily digestible for children, elderly, etc.
- Maximises the use of available resources
- Is economical (fuel requirement, preparation time & waste)
Calculation of ration

1. Estimate population’s nutritional requirements
   • The age and sex structure
   • Health, nutritional and disease status
   • Physical activity level.
   • Environmental temperature

2. Review the types and quantities of different commodities.

3. Calculate the nutritional composition of the ration.
Nutritional requirements

2,100 Kcals energy per person per day

- 10 to 12 % in form of protein
- 17 % in form of fat.
- There are also requirements for micronutrients established by WHO
## Examples of general rations

### MCIC food parcel to refugees in Macedonia
**May-October 1999**

<table>
<thead>
<tr>
<th>Food item</th>
<th>Quantity</th>
<th>Kcals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat flour</td>
<td>1 kg</td>
<td>3,500</td>
</tr>
<tr>
<td>Pulses</td>
<td>0.5 kg</td>
<td>1,675</td>
</tr>
<tr>
<td>Vegetable oil</td>
<td>1 litre</td>
<td>8,850</td>
</tr>
<tr>
<td>Sugar</td>
<td>0.5 kg</td>
<td>2,000</td>
</tr>
<tr>
<td>Pasta</td>
<td>1 kg</td>
<td>3,700</td>
</tr>
<tr>
<td>Rice</td>
<td>1 kg</td>
<td>3,600</td>
</tr>
<tr>
<td>Honey</td>
<td>0.1 kg</td>
<td>304</td>
</tr>
<tr>
<td>Chocolate</td>
<td>0.2 kg</td>
<td>1,010</td>
</tr>
<tr>
<td>Turkish delight</td>
<td>0.2 kg</td>
<td>772</td>
</tr>
<tr>
<td>Biscuits</td>
<td>0.2 kg</td>
<td>728</td>
</tr>
<tr>
<td>Goulash tin</td>
<td>0.4 kg</td>
<td>376</td>
</tr>
<tr>
<td>Gjuvec*</td>
<td>2 kg</td>
<td>1,180</td>
</tr>
<tr>
<td>Beef pate</td>
<td>0.3 kg</td>
<td>957</td>
</tr>
<tr>
<td>Sausage**</td>
<td>0.5 kg</td>
<td>1,560</td>
</tr>
<tr>
<td>Sardine tins</td>
<td>0.625 kg</td>
<td>1,300</td>
</tr>
<tr>
<td>Chicken pate</td>
<td>0.3 kg</td>
<td>603</td>
</tr>
<tr>
<td>Tea</td>
<td>0.1 kg</td>
<td>-</td>
</tr>
<tr>
<td>Coffee</td>
<td>0.1 kg</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total per day</strong></td>
<td></td>
<td>1,070</td>
</tr>
</tbody>
</table>

### WFP general ration to victims of drought in Ethiopia
**April-December 2000**

<table>
<thead>
<tr>
<th>Food item</th>
<th>Quantity</th>
<th>Kcals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals (wheat or sorghum)</td>
<td>15 kg</td>
<td>49,800</td>
</tr>
<tr>
<td>Blended food</td>
<td>4.5 kg</td>
<td>17,100</td>
</tr>
<tr>
<td><strong>Total per day</strong></td>
<td></td>
<td>2,230</td>
</tr>
</tbody>
</table>
Distribution methods

- Direct to households with ration cards
- By local government
- By local NGOs
- By traditional elders
- By community-based relief committees
- Direct to individuals in form of cooked food.
Types of SFP

• Blanket – all under 5 year olds
• Targeted – malnourished / vulnerable
• Wet – ration eaten at the SF centre
• Dry – ration taken home

Consider: levels of malnutrition
access to affected population
Targeted SFPs

In general, the target is children aged 6 to 59 months but can include older children, pregnant women or the elderly

• **Admission:**
  70 to <80% or <-2 to -3 Z-score
  MUAC 110mm to <125mm

• **Discharge:**
  >85% W/H over 2 to 4 consecutive weeks
Examples of rations

<table>
<thead>
<tr>
<th>Wet ration</th>
<th>Dry ration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day</strong></td>
<td><strong>Day</strong></td>
</tr>
<tr>
<td>Maize</td>
<td>CSB</td>
</tr>
<tr>
<td></td>
<td>50g</td>
</tr>
<tr>
<td>DSM</td>
<td>Oil</td>
</tr>
<tr>
<td></td>
<td>30g</td>
</tr>
<tr>
<td>Oil</td>
<td>Sugar</td>
</tr>
<tr>
<td></td>
<td>20g</td>
</tr>
<tr>
<td>Sugar</td>
<td>29g</td>
</tr>
<tr>
<td></td>
<td>10g</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total 1000 kcal</strong></td>
</tr>
<tr>
<td>508 kcal</td>
<td>1,000 kcal</td>
</tr>
<tr>
<td>Protein 15.3g (12%</td>
<td>Protein 41g (16.4%</td>
</tr>
<tr>
<td>of ration)</td>
<td>of ration)</td>
</tr>
<tr>
<td>Fat 21.6g (38%</td>
<td>Fat 42.6g (38%</td>
</tr>
<tr>
<td>of ration)</td>
<td>of ration)</td>
</tr>
</tbody>
</table>

In addition, other foods such as fruits and vegetables and high energy biscuits may be distributed.
Routine & Individual medical treatment

- Dependent on level of staff and availability of supplies – otherwise refer
- Micronutrient intervention?

- ORS
- Iron/Folate
- Malaria treatment
- Other Vitamins

- Measles immunization
- Vitamin A
- Mebendazole
Potential problems

Beneficiaries may not receive food:

• Underestimation of affected population
• Political priorities of donor and host governments
• Internal disputes
• Lack of agency resources
• Late delivery of food aid
• Poor access
Problems of implementation

• Theft
• Looting and pillage
• Attack
• Taxation
• Diversion
• Manipulation
• Coercion/extortion
Therapeutic feeding

Aimed at severely malnourished individuals:

• In-patient care (‘traditional’ TFC)

• Two phases (10 steps – WHO management protocol)
  – I Stabilisation
  – II Rehabilitation

• But... Case-fatality still high why?
How do bodily changes link with treatment?

Risk of heart failure and hypoglycaemia, problems absorbing and digesting food

- Special diet (low protein, adequate carbohydrate)
- Small frequent meals

Risk of dehydration

- Rehydration

Risk of hypothermia

- Keep child warm

Risk of infection and septic shock

- Antibiotics, vitamin and mineral supplements, measles vaccination, malarial treatment

Reduced ability to metabolize iron

- Withhold iron (initially)
Inappropriate practices

• Too much energy and protein during Phase I.
• No distinction made between Phase I and II.
• Failure to monitor food intake.
• Lack of feeding at night.
• Lack of provision of blankets.
• Diuretic given to treat oedema.
• Anaemia treated at admission with iron.
Inappropriate practices (cont.)

• Intravenous fluids given for indications other than circulatory collapse.

• Use of high sodium diet and ORS.

• No Vitamin A or antibiotics given.

• Children not vaccinated on entry to TFC

• Lack of breastfeeding support

• Mothers/carers not fed
Therapeutic feeding

• Evidence that wider implementation of guidelines – case-fatality rate still high:
  
• CMAM

• Out-patient care (CTC programmes) - integrated public health approach to treat SAM (with no complications)

• MUAC only

• RUTF/F100/F75
Severe acute malnutrition

With complications

1. Bilateral pitting oedema grade 3* (severe oedema)
   or
2. MUAC <110 mm and bilateral pitting oedema grades 1 or 2 (marasmic kwashiorkor)
   or
3. MUAC <110 mm or bilateral pitting oedema grades 1 or 2 and one of the following:
   - Anorexia
   - Lower-respiratory-tract infection†
   - Severe palmar pallor
   - High fever
   - Severe dehydration
   - Not alert

   Inpatient care IMCI/WHO protocols

Without complications

MUAC <110 mm
or
Bilateral pitting oedema grades 1 or 2* with MUAC ≥110 mm
and
- Appetite
- Clinically well
- Alert

Outpatient therapeutic care protocols
Resources

• Online forum for those working in nutrition - http://www.en-net.org.uk


• Online search facility: http://fex.ennonline.net

• The International Emergency and Refugee Health Branch CDC: http://www.cdc.gov/nceh/ierh/ResearchandSurvey/enasoftware.htm
References


• WHO (2000) Management of nutrition in major emergencies
