

Review of Nutrition and Mortality Indicators for the IPC: Guidance on Reference Levels and for Decision-making¹

Summary of key Recommendations for IPC practitioners



This note summarizes the results of a review of current and potential IPC nutrition and mortality indicators, and provides recommendations for interpretation and guidance. The full Report can be consulted for more information².

The basis of any indicators selected for the IPC is that they must help in making a single statement on the severity of the food security situation (situation analysis). With regards to nutrition indicators, the classification system must be simple and take account of the type of growth failure, its severity, duration and magnitude.

Given the role of the IPC, the purpose of anthropometric indicators is to detect changes in food security rather than to identify mortality risk. In emergency phases however, anthropometric indicators that identify mortality risk are also appropriate as these phases indicate general humanitarian emergencies as well as food crises.

Indicators reviewed already included in the IPC:

- Weight-for-height (WH - wasting)
- Height-for-age (HA - stunting)
- Crude death rate (total deaths/10,000 persons/day)
- 0-5 death rate (deaths of children below 5 years of age /10,000/day)

Other indicators reviewed not yet included in the IPC:

- Body mass index (BMI - adult under-nutrition)
- Mid-upper arm circumference (MUAC)
- Weight-for-age (WA - underweight)
- Under-5 child mortality rate (deaths of children under 5 per 1,000 live births)
- Infant mortality rate (deaths of children below 1 year of age/ 1,000 live births)

Table 1 below provides a summary of the recommendations for nutrition and mortality key reference outcomes for each Phase of the IPC (highlighted in blue).

Phase Classification	Key Reference Outcomes	Reference Levels
1 Generally Food Secure	Stunting	< 20% (< 2 HAZ)
	Acute Malnutrition – Low WH and/or oedema	< 3% (< 2 WHZ), Mean WHZ > -0.40
	Maternal Undernutrition ³	< 10% (<18.5 BMI among non pregnant women aged 15 – 49)
2 Moderately/ Borderline Food Insecure	Stunting	20 – 40% (< 2 HAZ), increasing
	Acute Malnutrition – Low WH and/or oedema	> 3% but < 10% (< 2 WHZ). Mean WHZ -0.40 to -0.69. Usual range, stable
	Maternal Under-nutrition	- 10 – 19% (<18.5 BMI among non pregnant women aged 15 – 49)
3 Acute Food and Livelihood Crisis	Crude Death Rate 0-5 Death Rate	0.5 – 1 /10,000/ day 1 - 2 /10,000/day
	Acute Malnutrition – Low WH and/or oedema	10 – 15% (< 2 WHZ), Mean WHZ -0.70 - -0.99; > than usual, increasing
	Stunting	> 40% (< 2 HAZ), increasing
	Maternal Under-nutrition	- 20 – 39% (<18.5 BMI among non pregnant women aged 15 – 49)
4 Humanitarian Emergency	Crude Death Rate	> 1 – 5 / 10,000/ day, or a doubling of the baseline rate
	0-5 Death Rate	>2 - 10/ 10,000/day
	Acute Malnutrition – Low WH and/or oedema	> 15% (< 2 WHZ) Mean WHZ < -1.00; > than usual, increasing
	Maternal Undernutrition	> 40% (<18.5 BMI among non pregnant women aged 15 – 49)
5 Famine/ Humanitarian Catastrophe	Crude Death Rate	> 5/ 10,000/ day
	0-5 Death Rate	> 10/10,000/day
	Acute Malnutrition – Low WH and or oedema	> 30% WHZ < -2

1. Review of Nutrition and Mortality Indicators for the IPC, Reference Levels and Decision-making by Helen Young and Susanne Jaspars, September 2009.

2. http://www.ipcinfo.org/attachments/IPC_NutMortalityIndicatorsReview.pdf

3. Maternal undernutrition reference levels are based on the 1995 WHO Expert Committee, which gives no reference levels for extreme food insecurity i.e. for the Famine/ Humanitarian Catastrophe Phase.

I. FINDINGS ON EXISTING INDICATORS

Weight for Height (WH - Wasting)

Low Weight for Height (WH) is an indicator for acute under-nutrition (wasting). As acute food insecurity and famine are commonly associated with high levels of acute malnutrition, it is appropriate to continue to use WH in all phases of the IPC and to recognize its particular relevance in Phases 3-5.

The use of Global Acute Malnutrition (GAM, corresponding to low WH plus oedema) is also recommended. Severe Acute Malnutrition (SAM) is not recommended as a key reference outcome because of the small numbers of children usually concerned and therefore wide confidence intervals (the same argument applies to oedema).

Beyond the IPC, there is a need for standardization of reference levels between different stakeholders and systems. There are currently three different classification systems and associated reference levels pertaining to prevalence of low WH or GAM for judging the severity of malnutrition. However, until common reference levels are established, the use of the current WH reference levels (WHO), in combination with an analysis of trends, is recommended.

Height for Age (HA - Stunting)

The inclusion of the Height for Age (HA) indicator (indicating stunting) in the early phases of the IPC is appropriate (particularly Phases 1 and 2, but also Phase 3) as an indicator of underlying vulnerability, but not as a key reference outcome, as it is felt that evidence is insufficient to link HA rates with the prevalence of food security. However, HA could be of use as a reference outcome in the early Phases, particularly as a recent study indicated that prevalence of stunting among young children (0 – 24 months) is related to food insecurity as well as socio-economic status in the longer-term. Stunting is therefore likely to be of most relevance to the IPC when considered among children between 0 and 24 months.

Crude Death Rate and 0-5 Death Rate as Mortality Indicators

Crude and 0--5 death rates are of particular relevance in the emergency phases to reflect the severity of the crisis. Excess mortality should also be included if accurate baseline mortality rates are available, as it is a good indicator of the im-

pact of an emergency in particular in protracted emergencies where the number of excess deaths increases with increased duration.

The reference levels for CDR and 0-5 DR used by the IPC are broadly standardized within the humanitarian community for emergencies. However CDR and 0-5DR are not well suited to distinguish between Phases 1 and 2.

II. FINDINGS ON POTENTIAL IPC INDICATORS

Body Mass Index (BMI - Adult under-nutrition)

Adult BMI (in non-pregnant women aged 15 to 49 years) is a promising indicator. Low BMI is correlated with risk of long term mortality and also with number of days in bed and sick events, level of physical activity and low birth weight. Evidence strongly suggests that a serious decline in nutritional status of adults, as reflected by elevated prevalence of low BMI, is associated with corresponding decline in food insecurity. BMI should be included in all five phases of the IPC, with an emphasis on low BMI in the upper phases. For the lower phases it has the potential to capture the double burden of over- and under-nutrition. Therefore, low BMI (<18.5 among non pregnant women aged 15 to 49 years) is included in all phases using the cut-off of 18.5 to estimate prevalence of under-nutrition.

Mid-Upper Arm Circumference (MUAC)

There is a strong consensus that MUAC is the best predictor of short term mortality among under-5 children. MUAC is the preferred indicator for case definitions of wasting based on a cut-off of 115mm (as recommended by WHO/ UNICEF in 2009). The prevalence of low MUAC (<115mm) is appropriate in the emergency phases of the IPC as supporting evidence to indicate mortality risk in the population and to identify the need for feeding programmes. However, low MUAC is not a good indicator of food insecurity. The only MUAC reference levels that exist for the IPC at present are those developed by FSAU in Somalia based on a 125mm cut-off. Prevalence of low MUAC (<115mm) are similar (based on the new WHO child growth standards) to prevalence of severe acute malnutrition (WH below 3 Z-scores). As mentioned, the low number of SAM cases results in wide confidence intervals

and for this reason it is difficult to develop reference levels. However a study has suggested that a prevalence of 1% SAM is indicative of excess mortality⁴. A prevalence of 1% or above is therefore the reference level recommended as supporting evidence to indicate mortality risk in Phases 4 and 5.

Weight for Age (WA – underweight)

There is a general consensus to use WA in Phases 1 to 3 as an indicator of underlying vulnerability but not as a reference outcome and not in the higher Phases (4 and 5). One advantage is that WA is often available. In addition, recent evidence has shown an association between the prevalence of low WA among children 0-24 months of age and different levels of food security. A disadvantage for the IPC is that WA is a composite indicator and therefore difficult to interpret (not clear whether it reflects stunting or wasting, or both).

Under-5 Child Mortality Rate and Infant Mortality Rate

U5MR and IMR are not appropriate for use in the emergency phases of the IPC as the estimates cover the past 5 years and are centred about 2.5 years in the past. Trends can however be monitored if surveillance systems are present, and this should be encouraged by the IPC. Until such systems are available, it is not possible to suggest which levels might distinguish between Phases 1 and 2.

III. RECOMMENDATIONS FOR INTERPRETATION AND GUIDANCE

Seasonality

Mortality and acute malnutrition indicators (GAM, low MUAC and possibly underweight) may fluctuate according to seasonal changes in food security, health environment and care practices.

Seasonal calendars describing the usual or expected seasonal changes for different regions within a country (possibly relating to different livelihood groups where there are seasonal differences) should be developed and used to help interpret mortality and malnutrition data. Seasonal changes are often greatest in rural populations who depend on agricultural seasons.

Monitoring trends: age groups

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BMI

Body shape, height decline linked to ageing, and seasonal fluctuations in weight all influence BMI. They must be taken into account when interpreting prevalence of low BMI.

Weight for Age

Decline in WA rates can be used as confirmation of deteriorating food insecurity as well as for monitoring long-term trends, measuring impact over time, and for advocacy purposes. The rapidity of the deterioration is important to note as indirect evidence of a worsening situation.

Mortality

Excess mortality rates should be included if accurate baseline mortality rates are available, as they are a good indicator of the impact of an emergency. Excess mortality is a direct count of the dying, therefore a threshold is not needed as it indicates the absolute severity of a crisis. At the humanitarian emergency and famine/humanitarian catastrophe Phases, there are likely multiple causes for increasing mortality, one of which is acute food insecurity but morbidity may be equally, if not more, important, particularly in the famine/humanitarian catastrophe Phase.

Underlying causes of malnutrition

Guidance must be developed to explain how as food insecurity evolves and deepens the underlying causes of malnutrition (food, health and care) change and interact with each other. In situation of high food insecurity, its importance as a cause of malnutrition increases and drives the other two groups of underlying causes.

4. Mason, J. (2002). "Lessons on Nutrition of Displaced People." *Journal of Nutrition* 132(7): 2096S-2103S

Public health crises

The IPC should also consider differentiating between different levels of prevalence disease and public health crises. The humanitarian emergency and famine/ humanitarian catastrophe Phases show the disease outcome 'pandemic', which is relatively unspecific and fails to distinguish between the humanitarian emergency and famine/humanitarian catastrophe Phases. Population density, crowding and shelter might also be relevant reference outcomes needed to help differentiate public health risks that might exacerbate the contribution of malnutrition to mortality.

IV. EVIDENCE-BASE OF THE RELATIONSHIP BETWEEN MALNUTRITION AND MORTALITY

Malnutrition and Mortality

- Four indicators, WA, WH and MUAC-for-height or MUAC-for-age, are equally effective in predicting mortality risks associated with acute malnutrition in younger children (below 24 months of age), but not in older children.
- Moderate stunting (HA between -1 and -2 Z-scores) tends to carry higher mortality risks among younger children than older children.
- The majority of nutrition-related deaths are found to be in children with mild to moderate malnutrition, presenting an argument against focussing interventions on the severely malnourished only.
- Malnutrition has its biggest impact in populations with already high mortality levels, because the risk of dying associated with malnutrition is modified by certain factors including the age range of children, morbidity, season, and breastfeeding.
- The association between malnutrition and mortality is exponential rather than linear, explaining why a rapid increase of mortality is often evident in situations where malnutrition rates are worsening

Food insecurity, nutritional status and mortality

Food insecurity may play a role in increasing the risk of dying associated with wasting, as a possible result of a rapid decline in nutritional status of children without necessarily causing them to fall below a defined cut-off point. This potentially has serious implications for the interpretation of prevalence estimates of acute malnutrition.

Malnutrition and Mortality in Humanitarian Crises

As food insecurity deepens, the three underlying causes combine (food insecurity, social and care environment, access to health care and the health environment) and multiply the effect on nutritional status. Along the various Phases of the IPC there is likely to be an exponential increase in malnutrition and mortality rates because of the synergistic relationship between underlying causes.

Issues for interpretation of different indicators in relation to the phases of the IPC

Valid conclusions require that anthropometric indicators are interpreted in the context of their underlying causes, taking account of modifying factors including age, morbidity, seasonality, breastfeeding etc.

To properly understand and interpret nutritional data, it should be reviewed from the following inter-related perspectives:

- Reference levels of anthropometric indicators
- Trends over time and seasonality
- Underlying causes
- Implications for risk of mortality (malnutrition and mortality relationships)

The study was commissioned by the SCAN Task Force on Assessment, Monitoring and Evaluation (TF/AMES) and the IPC Global Technical Working Group . It was conducted by Helen Young of the Feinstein International Centre, Tufts University, and by Susan Jaspers from the Overseas Development Institute (ODE).

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