

# Calculation of indicators

|          |                                          |            |          |                                                                    |            |
|----------|------------------------------------------|------------|----------|--------------------------------------------------------------------|------------|
| <b>1</b> | <b>Calculation of general indicators</b> | <b>643</b> | <b>2</b> | <b>Calculation of specific indicators for water and sanitation</b> | <b>647</b> |
| 1.1      | Estimation of population                 | 643        | 2.1      | Quantity of water available and water consumption                  | 647        |
| 1.2      | Mortality                                | 644        | 2.2      | Access to water point                                              | 648        |
| 1.3      | Morbidity                                | 645        | 2.3      | Water quality                                                      | 648        |
| 1.4      | Nutritional status                       | 645        | 2.4      | Sanitation                                                         | 649        |

## 1 Calculation of general indicators

### 1.1 Estimation of population

If there is no reliable information regarding population figures, it is possible to estimate this in an approximate manner. There are two main possibilities:

1) Select three random areas 100 metres by 100 meters. Count the population of each area and to calculate the average. Estimate the population of all the area by applying this average to the whole area of the settlement.

Example: total area of settlement 6 km<sup>2</sup>:

– area A: 100 people,

– area B: 150 people,

– area C: 180 people,

Average: 143 people.

Estimation for all the area: (143 people / 0.01 km<sup>2</sup>) x 6 km<sup>2</sup> : 86 000 people.

2) Estimate the average number of people in a family (average of 20 families selected by random) and families living in each house. Count the houses and estimate the population. If the population is high it is possible to extrapolate smaller representative areas.

### INDICATORS FOR AGE-DISTRIBUTION OF POPULATION (AS A PERCENTAGE OF THE TOTAL POPULATION)

| Age (year) | Africa (%) | Latin America (%) | Asia (%) |
|------------|------------|-------------------|----------|
| < 1        | 4          | 3                 | 3        |
| 1-4        | 13         | 10                | 12       |
| 5-14       | 27         | 24                | 26       |
| 15-44      | 42         | 45                | 44       |
| > 45       | 14         | 18                | 16       |

Sex distribution is around 50:50.

## 1.2 Mortality

Mortality can change quickly, normally it is estimated for 1 day, 1 week or 1 month. There are several indicators, but the more commonly used are the crude mortality rate (related to all the population) and the under-five specific mortality rate. Mortality can be also calculated for specific causes (cause-specific mortality rate).

It is important to do an interpretation by proper analysis and information exchange with the health system (verifying the sources and accuracy of mortality data and the population break-down). Interpretation must also identify trends and look for causes.

### INDICATORS

- Crude mortality rate (CMR) = total number of deaths reported over a given period of time, per estimated mid-period population. Commonly expressed in number per 10 000 people per day in emergencies.
- Under-five specific mortality rate (U5MR) = number of under-five deaths reported over a given period of time, per estimated mid-period under-five population. Commonly expressed in number per 10 000 per day in emergencies.
- Cause-specific mortality rate = number of deaths attributed to a specific cause over a period of time, per estimated mid-period population. Commonly expressed in number per 10 000 per day in emergencies.
- Case fatality rate = number of deaths per number of cases of the disease in question. Commonly expressed as a percentage.

### MORTALITY RATE CALCULATION

- Count the deaths every day during 1 week and calculate the average.
- Mortality rate:  $(\text{number of deaths} \times 10\,000) / (\text{number of days} \times \text{population}) = \text{number of deaths} / 10\,000 \text{ people} / \text{day}$ .
- Mortality rates for specific groups (e.g. under-fives) or by specific causes: the same formula but only considering the deaths and groups directly concerned.

### MORTALITY RATES AS INDICATORS OF THE SERIOUSNESS OF A SITUATION IN DEVELOPING COUNTRIES

| Crude mortality rate   | Situation          | <5 Mortality rate      |
|------------------------|--------------------|------------------------|
| 0.5 / 10 000 / day     | Normal             | <1 / 10 000 / day      |
| <1.0 / 10 000 / day    | Under control      | <2 / 10 000 / day      |
| (1 – 2) / 10 000 / day | Serious situation* | (2 – 4) / 10 000 / day |
| >2 / 10 000 / day      | Out of control**   | >4 / 10 000 / day      |
| >5 / 10 000 / day      | Catastrophic       | >10 / 10 000 / day     |

\* Alert cut-off.

\*\* Emergency cut-off.

These thresholds have to be used with caution and in relation with contextual analysis. Trend analysis is also recommended to follow a situation: if nutrition and/or mortality indicators are deteriorating over time, even if not above threshold rates, this indicates a worsening situation.

### 1.3 Morbidity

Disease patterns are assessed by:

- Discussion with health workers from the affected population and host health-care services; this may be a way getting qualitative information.
- Direct observation by medical staff; this is useful for assessing the presence of certain health problems, such as measles.
- Retrospective sample surveys when quantitative data is needed on the incidence of diseases over a period of time.

#### INDICATORS

- Incidence: number of new cases of a specified disease reported over a given period of time, per estimated mid-period population at risk. Commonly expressed as new cases per 100 per month, or per 1 000 per week in emergencies.
- Prevalence: number of current cases, new and old – of a specific disease at a given point in time, per population at risk at the same point in time. Commonly expressed as a percentage.
- Attack rate: number of new cases of a specified disease reported over the duration of an epidemic, per estimated total population at risk over the same period. Commonly expressed as a percentage.

### 1.4 Nutritional status

A prevalence of acute malnutrition between 5-8% indicates a worrying nutritional situation, and a prevalence greater than 10% corresponds to a serious nutrition situation (Standing Committee of Nutrition, United Nations System, 1995)

|                | Global acute malnutrition (%) | Severe acute malnutrition (%) |
|----------------|-------------------------------|-------------------------------|
| Normal         | < 5                           | < 1                           |
| Under control  | < 10                          | < 2                           |
| Out of control | > 10                          | > 2                           |
| Catastrophic   | > 20                          | > 5                           |

#### CALCULATION OF THE INDICATORS

Nutritional status can be evaluated using clinical, anthropometric or biological measurements. In field conditions, anthropometric measurements and the presence of oedema are the indicators generally used.

The anthropometric measurements most commonly used are:

- weight;
- height;
- mid-upper arm circumference (MUAC).

Weight and height on their own reveal little about nutritional status. They must be used in conjunction with each other or with reference to age, to establish anthropometric indices. The presence of bilateral oedema is considered to be characteristic of Kwashiorkor.

#### ACUTE MALNUTRITION (FOR 6 – 59 MONTHS)

The two symptoms of acute malnutrition are a low weight-for-height index and the presence of bilateral oedema. Malnutrition is classed as either severe or moderate according to the weight-for-height index figure.

### *Severe acute malnutrition*

- Weight-height index < 70 % of the median (or < - 3 Z-scores).
- And/or presence of bilateral oedema (If oedema is present the individual is diagnosed as severely malnourished, regardless of the weight-for-height index figure).

### *Moderate acute malnutrition*

- Weight-height index  $\geq$  70 % and < 80% of the median (or  $\geq$  - 3 Z-scores and < - 2 Z-scores).

### *Global acute malnutrition (total of malnourished individuals)*

- Weight-height < 80% of the median (or < - 2 Z-scores).
- And/or presence of bilateral oedema.

Among children presenting oedema, a distinction may be made according to the weight-height index figure.

### *Kwashiorkor*

- Presence of oedema and weight-height index  $\geq$  80% of the median (or  $\geq$  - 2 Z-score).

### *Marasmic-Kwashiorkor*

- Presence of oedema and weight-height index < 80% of the median ( or < - 2 Z-scores).

## USING MUAC

There is no internationally recognised threshold for the classification of malnutrition according to MUAC. ACF uses the following thresholds, for children aged from 6 to 59 months.

| MUAC                    | Diagnosis                       |
|-------------------------|---------------------------------|
| < 110 mm                | Severe malnutrition             |
| $\geq$ 110 and < 120 mm | Moderate malnutrition           |
| $\geq$ 120 and < 125 mm | Serious risk of malnutrition    |
| $\geq$ 125 and < 135 mm | Moderate risk of malnutrition   |
| $\geq$ 135              | Satisfactory nutritional status |

For more information, please refer to *Assessment and treatment of malnutrition in emergency situations*, Action contre la Faim, 2002.

## FOOD-SECURITY INDICATORS

In terms of food security, it is important to distinguish whether people are able to produce most of the components of their daily diet (cereals, meat, fish, vegetables etc), or whether they need to buy most of their food. The indicators presented below are classified following this logic, and apply to rural areas, where ACF commonly works.

There are no specific reference values that can be used to define general indicators for assessing food security in all possible contexts; the different socio-economic and agro-economic contexts influence the reference values and have to be considered, which is why the list of potential indicators shown here should be adapted to each specific context where they are to be applied.

Data relating to the following food security indicators could be compared with the reference data of a normal year in each context, unlike water and sanitation and nutrition indicators, that are compared to standard reference values.

### 1) *Key indicators for food producers*

- Size of private farms: Ha of arable land/family.
- Number of crops per family: fewer different crops = more external risks for production.

- Kind of crops: staple crops (main components of the diet), cereals, cash crops etc.
- Production: yield/Ha.
- Market – subsistence ratio: kg sold/kg produced.
- Livestock: Number of head/family.

2) *Key indicators for people who need to work off the farm*

- Household assets: value, productive assets (land, machinery) and non-productive assets.
- Average incomes of the whole family per month.
- Number of active members/family.

3) *Key indicators for both groups*

- Economic security, measured by access to the basic food basket in the specific context: total family incomes/total price of the basic food basket.
- Food security:
  - number of meals/person/day,
  - number of different components of the dish,
  - number of months per year without access to a normal diet.

## 2 Calculation of specific indicators for water and sanitation

### 2.1 Quantity of water available and water consumption

#### INDICATOR 1: NUMBER OF LITRES PER PERSON PER DAY.

- *Option 1*: water consumption through direct observation, estimation of consumption per family or person:
  - household survey;
  - verification of quantity of water taken per person at the water point (for example during 1 day).
- *Option 2*: water available through theoretical calculation: sum of capacity of supply of all the water point / total population. The capacity of supply depends on two factors:
  - capacity of the water point (calculation through yield tests);
  - capacity of supply of the water-abstraction system.

#### *Type of water point and capacity of supply*

- *Handpumps*: average yield is approximately 1 m<sup>3</sup> / hour, so with 8 hours of use this is 8 m<sup>3</sup> per day. A more precise yield can be calculated by measuring the time taken to fill a 200-litre drum and estimating the yield for 1 hour.
- *Electric pumps*: the hourly yield given by the characteristics of the pump can be multiplied by an estimate of the hours of use per day. Sometimes submersible pumps are overestimated with respect to the characteristics of the well, so it is important to verify the yield through direct observation (using a 200-litre drum).
- *Solar pumps and wind pumps*: the same procedure can be used as for electrical pumps but the variations due to changes in weather conditions must also be considered.
- *Springs*: there are several empirical methods used to calculate spring yield (see Chapter 10). The more common is to calculate the time taken to fill a known volume and estimate the yield for 1 hour. Take care with seasonal variations.
- *Distribution networks*: calculation of the total yield pumped (stored) per day.
- *Taps*: a 3.4" tap with 10 m of head provides 0.2 to 0.3 litres per second (the same as a Talbot tap with 5 m of head).
- *Water trucking*: capacity of the tanker x number of trips.

INDICATOR 2: NUMBER OF PEOPLE PER TYPE OF WATER POINT (AS A REFERENCE TO CALCULATE THE QUANTITY OF WATER AVAILABLE PER PERSON PER DAY)

*Estimation*

- Theoretical: number of people / number of water points (same type).

*Reference indicators*

- 1 handpump can supply 500 people.
- 1 open well can supply to 400 people.
- 1 tap can supply to 250 people

INDICATOR 3: QUANTITY OF WATER AVAILABLE IN SPECIFIC PLACES (LITRES PER PERSON PER DAY)

See reference indicators in Annex 1.

## 2.2 Access to water point

- Indicator 1: distance from the home to the water point.
- Indicator 2: time required to arrive at the water point.
- Indicator 3: queuing time.

### REFERENCE INDICATORS

- Minimum distance: 500 metres (Sphere).
- Maximum time required to arrive: 1/4 hour (in difficult terrain).
- Maximum queuing time: 15 minutes (Sphere).

## 2.3 Water quality

See Chapter 4.

INDICATOR 1: COLOUR, ODOUR AND TASTE. QUALITATIVE INDICATOR

INDICATOR 2: NUMBER OF FAECAL COLIFORMS / 100 ML OF WATER (REFERENCE INDICATOR: 0 FAECAL COLIFORMS / 100 ML)

INDICATOR 3: PHYSICOCHEMICAL PARAMETERS

- Reference indicators are the WHO guidelines for drinking-water quality.
- It is necessary to do the analysis of some specific parameters of concern for health when there is the following evidence:
  - The parameter of concern has previously been identified as a problem in the area.
  - The composition of geological formations can produce this contamination in the water.
  - There has been an accident or contamination event (a spill of pesticides, fertilizers etc.)
  - A disease related to a specific aspect of water quality is detected.

*Note* – There are other reasons not related to health to carry out physicochemical analysis: acceptance (test), possible damage to the water system (e.g. salty waters can accelerate the oxidation of iron pipes, and other material may be more appropriate) etc. For this reason, if time and resources are available, it is recommended to include the analysis of other parameters (major elements and toxic minerals) to characterise the water resources in the region.

## INDICATOR 4, DISINFECTION EFFICIENCY

- Residual free chlorine (mg/litre).
- Turbidity (NTU).

## 2.4 Sanitation

### EXCRETA DISPOSAL

- Indicator 1: public latrines: number of people using 1 latrine.
- Indicator 2: family latrines: % of families with latrines.

### HYGIENE FACILITIES

- Indicator 1: % of families with family showers and/or number of people per communal shower.
- Indicator 2: number of families per washing basin.
- Indicator 3: refuse collection, number of families per refuse bin.
- Indicator 4: weight of soap per person per month.
- Indicator 5: number and size of water containers per family.

### WATER MANAGEMENT

- Indicator 1: % of functioning water points.
- Indicator 2: number of repairs done during the previous year.
- Indicator 3: % of water points with functional water-management system.
- Indicator 4: availability of spare parts in the area.