

- NUTRITION SURVEY -
RECOMMENDATIONS FOR SOMALIA

NUTRITION WORKING GROUP

NAIROBI, FEBRUARY 1997 (ORIGINAL VERSION)
MARCH 1999 (REVISED VERSION)

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1. INTRODUCTION

There have been many nutrition surveys conducted in Somalia. A variety of problems have been identified : diversity of methodologies, of sampling methods, variety of cut-offs used for age, height. If standard criteria are not used, it is impossible to compare surveys done in different areas or times.

The purpose of this document is to provide standard cut-offs and recommendations for nutrition surveys in Somalia, and for decision making.

2. BEFORE CONDUCTING A NUTRITION STATUS SURVEY

2.1 Objective of a nutrition survey

Before starting a survey it is important to clearly define the objective of conducting the survey.

- What does the organisation want to measure?
- What does the organisation want the results for?
- How will the organisation respond to the results?
- Has the organisation conducting the survey considered the capacity of others to respond? (too often surveys make unrealistic recommendations on the basis of poor quality information)
- What supporting information is needed to :
 - justify the need for a nutrition survey
 - facilitate proper interpretation of the data

2.2 Initial information to collect

Nutrition surveys should only be conducted once background information clearly highlights the need for a survey.

The types of background information necessary include :

- An indication of a nutrition problem resulting from a food deficit in the area.
- General context : population movements, drought period.....
- Previous nutrition survey information collected either pre-1990 or after 1990 in the area
- Other studies conducted in the area that will assist in identifying change
- Information on health, mortality rates, major infectious diseases
- Food availability & food prices
- Other relevant issues

2.3 How and where to find the information?

- UNDOS : library, population data, income data, etc.
- WHO/UNICEF : health and nutrition information (present and past)
- FSAU/WFP/FAO: food, agriculture & nutrition information (present & past)
- SCF-UK FEAT : food economy information
- UNCU
- FEWS/USAID : market prices and agricultural information
- ICRC/FRCS : background information on the locality
- Other NGOs in the location
- UNHCR : population movement and returnees
- IOM : displaced populations

3. SAMPLING METHODOLOGY

If the above information justifies the need for a nutrition survey then a survey may be conducted. The evaluation of the nutrition status of a population is by convention based on the estimation of the malnutrition prevalence within a random selected 6 - 59 months aged children using anthropometric data.

3.1 Two-stage cluster sampling

3.1.1 Classical approach

If a nutrition survey is indicated by the other information collected then where possible a 30 x 30 cluster sampling¹ would be used taking into account the following :

- the need to know the study universe (i.e. clearly define the area of interest).
- The importance of visiting the area to be surveyed prior to the survey should be emphasised:
- to enable the area of interest to be clearly defined
 - including a mapping of the area of interest, and
 - information on population figures in the area and types of population interested in urban, rural, pastoral, agricultural...
- if a 30 x 30 cluster sampling survey has been conducted, then one should not break the data down and use the data to make hypothesis about sub-groups within the population.
 - however, other information collected both before and during the survey may lead to a hypothesis being presented within the report discussion.

3.1.2 Alternative approach

- 30 separate clusters should be surveyed. If the number of clusters is reduced, the reliability of the estimate obtained may be poor and provide an inaccurate picture of the true nutritional status of the population being surveyed.
- A greater number of children per cluster does not compensate for a reduced number of clusters.
- More than 30 clusters may be surveyed, but this will not significantly increase the accuracy/reliability of the results.
- It is possible to reduce the number of children per cluster, but the precision will be affected (see the formula used for the calculation of the sample size).
- When the population is small, an alternative approach could be systematic sampling or blanket sampling
- If the main objective is to compare two groups according to their nutritional status, two different surveys, one for each group, are required.
- When difficulties arise regarding the standard methodology, consult the Nutrition Working group.

3.1.3 Two-stage cluster sampling methodology

This method is used in large populations, when no register is available and households cannot be visited systematically. Sampling is done in two stages:

- Clusters, or sampling sites, within the total population are randomly selected. Clusters maybe natural grouping such as villages or, in a camp, blocks of a few houses. Where natural groupings do not exist, artificial clusters maybe defined by imposing a grid on to a map.
- Within each selected cluster, an appropriate number of individuals, or households, are randomly selected.

This process is done separately within each population of interest. If, for instance, a comparison is to be made between two separate sub-groups of population (e.g. displaced and residents), the same number of clusters (30x30) may be surveyed in each sub-group.

¹ 30 clusters with 30 children in each cluster (900 children in the sample).

General principle:

The larger the number of clusters, the higher is the probability of having good representativeness of the population under study. In nutrition survey, 30 clusters must be assessed.

3.2 Random sampling

Random sampling is the best method - when it can be used - since it is the only one that ensures representativity. A list of every individual in the population is needed. It must be up to date and enable every individual to be located. Individuals are randomly drawn from the list using a random number table. In practice, reliable population lists are rarely available.

If no complete list is available, it is sometimes practical to :

- Go to the area and make a list of all households included in the area of interest. Be sure to list all households.
- Assign an identification number to each household on the list.
- Select the desired number of household using a random number table. The households selected become the sample for the survey.
- Visit all of these -and only these- households. No households may be excluded or substituted for any reason. All children in the specified age group belonging to each selected household must be measured (issue under discussion, ACF proposes ALL children in a household, issue to be cleared between WHO and HQ ACF)

3.3 Systematic sampling

Systematic sampling eliminates the need for complete, up-to-date registers, but requires:

- a reasonably accurate plan (map) showing all households
- an orderly layout, or site plan, which makes it possible to go systematically through the whole site.

This technique has been used in well-organised camps, where households are arranged in blocks and lines.

3.4 Stratified sampling

Another approach to sampling is stratified sampling, which can be used with any of the above techniques. In stratified sampling the universe is stratified by certain characteristics thought to influence nutritional status : age, sex, social or ethnic group, environment, ... Each stratum is an independent universe from which samples may be drawn by one of the above-listed methods.

4. SELECTION OF THE CHILDREN

- Children between **65 cm and 110 cm** should be measured: only children more than 65 cm and less than 110 cm tall should be included in the sample.

65 cm < height < 110 cm

- Age data should also be collected but the height of the child would be the factor that decided whether a child was included in the survey or not.
- A wooden stick marked at 65 and at 110 cm could serve to select (WHO recommends 60-100 cm for stunted populations, issue to be solved between WHO and HQ ACF).

5. ANTHROPOMETRIC MEASUREMENTS

5.1. Age

A local calendar of events can be used (see annex 9.1 for local calendar samples). The mother is asked whether the child was born before or after certain major events until a fairly accurate age is pinpointed. If that is not possible, height can be used as a proxy for age groups:

< 75 cm	⇒	< 1 year old
75 cm - 95 cm	⇒	< 1 - 3 years old
96 cm - <110 cm	⇒	< 4- 5 years old

5.2. Weight

A 25kgs hanging spring scale, graduated by 0.1 kg, is used. The child's clothes are removed. Sometimes it might be impossible to undress the child. The average weight of the clothes should be evaluated and deducted from the measure. When the child is steady, the weight is recorded to the nearest 100 g. The scale should be read at eye-level and re-adjusted after each measurement.

5.3. Height

Child's height > 65 cm and < 110 cm	⇒	child included in the sample
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Children aged more than to 2 years old are measured standing up ; children less than 2 years old are measured lying down - or if age is difficult to assess, children more than 85 cm are measured standing, those less than or equal to 85 cm, lying down.

5.4. Oedema

Children with oedema are severely malnourished even though their weight may not fall below - 2 Z-Scores. Therefore oedema must be checked for and noted on the data sheet. In order to determine the presence of oedema, normal thumb pressure is applied to the **two feet** for three seconds. If a shallow print or pint remains on **both feet** when the thumb is lifted, then the child has oedema.

Nutritional oedema must be found on both feet.

The nutrition working group recommends special attention during training, particularly when checking oedema on young children.

Mid upper arm circumference (MUAC) ² See footnote 2.

6. EQUIPMENT LIST

A list of equipment needed is attached in annex 9.2.

1.1. ² *Mid upper arm circumference (MUAC)*

MUAC should not be used in nutrition survey.

MUAC is less reliable to measure and is recommended for use only for rapid screening of populations to get an idea of the situation. However if this measurement is used, its use and the interpretation should be precise.

MUAC measurement is not so easy to do correctly. MUAC is measured on the left arm, at the mid-point between elbow and the shoulder. The arm should be relaxed and hanging down the side of the body. A special measuring tape is placed around the arm. The measurement is read from the window of the tape without pinching the arm or leaving the tape loose. The MUAC is recorded to the nearest 0.1 cm.

Contrary to the weight for height indicator, there is not 1 set of universal cut-off point for interpreting MUAC. There is agreement between different agencies to use the following cut-off points:

< 110 mm	⇒	Severe acute malnutrition
110 < 125 mm	⇒	Moderate acute malnutrition
< 125 mm	⇒	Global acute malnutrition
125 < 135 mm	⇒	At risk of acute malnutrition

7. ANALYSIS AND REPORTING

7.1 Analysis

Survey data should be analysed according to a pre-defined and standard plan. Examples of interpretative analysis are given in annex.

7.2 Mode of expression to be used

Expression in Z-Scores has a **true statistical meaning**, where as percentage of the median does not. However, it is requested by the nutrition working group to report the results using both modes of expression : **Z-Scores and % of the median**. Z-Scores are often less comprehensible to field staff and more confusing to calculate by hand. (Expression in % of the median is used in feeding centres).

Nutritional status	W/H Z-Score	W/H % of MEDIAN
Severe acute malnutrition	<-3 or oedema	< 70 % or oedema
Moderate acute malnutrition	Between - 3 and < -2	between 70% and <80%
Global acute malnutrition	<-2 or oedema	< 80 % or oedema

(WHO recommends to use “serious acute malnutrition” as expression for W/H<-2Zscores, “critical severe malnutrition” for W/H<- 3Zscores and “total” instead of “global”; the issue is under discussion with the HQ of NGO's concerned).

7.3 Interpretation of the results in context

Figures obtained through a single cross-sectional nutrition survey only reflect the nutritional status of the population **at the time of the survey**, in a certain area. Taken alone, these figures do not give any indication of the trend, whether the nutritional status is improving or deteriorating. Additional information, collected at the preparatory phase, will allow the interpretation of the results in context³.

In a cluster sample survey, figures should not be analysed for each cluster or by sub-groups of clusters. **The whole sample is the one representative of the population.**

The proportion of malnutrition observed in the sample can be compared to malnutrition rates observed in a previous survey. One can only conclude that there was a statistically significant difference between two surveys if confidence intervals do not overlap.

7.4 Reporting

A report on the survey should be written as soon as preliminary results are available. The report should indicate the procedure used in defining the survey (see annex 9.4 for a detailed example of writing a report).

7.5 Map

The nutrition survey report should include **a map** indicating the area covered.

³ - Information that will indicate whether there is a nutrition problem resulting from a food deficit in the area.

- General context : population movements, drought period...
- Previous nutrition survey information collected either pre 1990 or since 1990 in the area
- Other studies conducted in the area that will assist in identifying change
- Information on health : mortality rates, major infectious diseases...
- Food availability & food prices
-

8. NUTRITION WORKING GROUP SUPPORT

The Nutrition working group highlighted the need to feed back its recommendations to the following groups :

- the donors in order that they might support efforts
 - to improve the quality of information collected that leads to a clearly defined need for a nutrition status survey.
 - to improve the quality and therefore the usefulness of nutrition surveys
- other NGOs who may plan to do nutrition surveys in the future
- the statistical working group - both to agree on approaches when the “classical” approach is not feasible and to assist in the dissemination of the information.

8.1 Before conducting nutrition surveys

The Nutrition Working group proposes 2 - 3 key people who will be available to provide advise on information requirements and on appropriate methodology for conducting nutrition survey. (to contact the Chair of the NWG).

8.2 For interpretation and recommendations

Two to three key people from the Nutrition Working group will be available to discuss results, interpretations and recommendations. The recommendations and proposed interventions should also be discussed with those who are expected to intervene prior to completing the report.

EPINUT, the free-of-charge CDC Atlanta statistical package for the analysis of nutrition surveys, is available at WHO or ACF, and can also be downloaded directly from the CDC Atlanta web-site.

ANNEXES

9.1 Calendar samples

9.1.1 Traditional calendar for Northeast Zone of Somalia (Source UNICEF)

Month	Events	1992	1993	1994	1995	1996	1997
Jan.			49	37 Cholera outbreak in Bossaso	25	13 Ramad. ***	1 Ramad ***
Feb.	End of Dira		48	36 Ramad ***	24 Ramad ***	12 Cholera outbreak in Bossaso	
Mar.	Beginning of Gu'	59 Ramad ***	47 Ramad ***	35	23	11	
Apr.		58	46	34	22	10 IID AI-AD ***	IDD AI-AD ***
May	End of Gu'	57 Funda mentali st conflict	45	33 IID AL-AD ***	21 IID AL-AD ***	9	
Jun.	Beginning of Haga	56 IID AI-AD ***	44 IID AL-AD ***	32	20	8	
Jul.		55	43	31	19	7 Mawlid ***	Mawlid ***
Aug.	End of Haga	54	42	30 Mawlid ***	18 Mawlid ***	6	
Sep.	Beginning of Deyr	53 Mawlid ***	41 Mawlid ***	29	17	5	
Oct.		52	40	28	16	4	
Nov.	End of Deyr	51	39	27	15	3	
Dec.	Beginning of Dira	50	38	26 Bossaso flood	14	2	

Full Rainy Season

Beginning or end of rainy season

IID AL-AD: Two months after Ramadan.

Mawlid: Prophet's day, 5 months after the end of Ramadan

9.1.2 Calendar of special events (Source: ACF-F)

Month	Annual events	1991	1992	1993	1994	1995
Jan	Beginning of dry season	58 War broke in Mogadishu Siad Barre escape	46	34 George Bush in Baidoa	22	10 Siad Barre died. Regional Governor nominated in Gedo
Feb	Middle of dry season	7 Jabut Conference	45	33	21 meeting between SNF/SD M/SPM	9 Outbreak cholera in Bardera
Mar	End of dry season	56 Civil war Darood/Hewiye. USC attacked Gedo	44 50 peace keepers from Pakistan	32	20	8 UNOSOM departure
Apr	Beginning of Gu season	55	43 French minister visited Baidoa	31	19	7
May	Middle of Gu season	54	42	30	18	6
Jun	End of Gu season	53 Djibouti conference and 2nd nomination Ali Mahdi	41	29 Pakistanis were killed	17	Illing visited Gedo. Aideed set up his government
Jul	Beginning of Haga season	52	40	28	16	
Aug	Middle of Haga season	51	39	27 Fighting UNOSOM/SNA	15 Bardera district council nominated	Nomination of Regional Development Commission
Sep	End of Haga season	50	38	26 UNOSOM killed 50 SNA	14	Baidoa taken by Aideed
Oct	Beginning of Deyr season	49	37 Murder of Sheikh Mursal	25 UNOSOM rangers/SNA fighting	13	
Nov	Middle of Deyr season	48 Civil break between USC	36	24	12 Mahdi elected SSA chairman	
Dec	End of Deyr season	47	35 UNITAF deployed in Somalia	23	11	

9.2 Calculation of the sample size

$$n = t^2 \times \frac{p \times q}{d^2}$$

- n = sample size
 t = parameter related to the error risk, equal 1.96 or 2 for an error risk of 5%
 p = expected prevalence of malnutrition in the population, expressed as a fraction of 1
 q = 1 - p, expected proportion of children not presenting malnutrition, expressed as a fraction of 1
 d = absolute precision, expressed as a fraction of 1

The calculated sample size should be doubled for 2-stage cluster sample surveys.

9.3 Equipment needed

- Length board > 115 cm
- Weighing scale, 25 kg x 100 g
- Wooden sticks with marks at 65 cm, 85 cm and 110 cm.
- Weighing pants (2)
- Standard weight (10 kg)
- Questionnaires, data sheets
- Random number table
- Field guide
- Pencils, erasers, sharpeners
- Clipboards, staplers, sticky staple, rubber bands
- Tables, pocket calculators

UNICEF can provide scales and length boards. WHO can provide EPINUT and EPIINFO software.

9.4 Analysis of nutritional data

9.4.1 Distributions

Distributions according to age and sex:

	Boys		Girls		Total	
	N	%	n	%	n	%
6 – 17 months						
18 - 29 months						
30 - 41 months						
42 - 53 months						
54 - 59 months						
Total						

Distributions according to weight/height index in Z-Scores or presence of oedema:

	< - 3 Z-Scores		>= - 3 and < - 2 Z-Scores	>= - 2 Z-Scores	Oedema	
	N	%	n	%	n	%
6 – 17 months						
18 - 29 months						
30 - 41 months						
42 - 53 months						
54 - 59 months						
Total						

9.4.2 Indicators

- Proportion of children presenting oedema (%)
- Acute global malnutrition : % with a 95% confidence range for this estimate
- Acute severe malnutrition : % with a 95% confidence range for this estimate

9.4.3 Interpretative analysis

Distribution according to nutritional status and age

	Global acute malnutrition	
	Proportion	Confidence interval
6 – 29 month children	from% to%
30 - 59 month children	from% to%

	Severe acute malnutrition	
	Proportion	Confidence interval
6 – 29 month children	from% to%
30 - 59 month children	from% to%

9.4.4 Confidence interval

When calculating the sample size, the notion of precision was introduced. This is the reason why the proportion of children presenting with malnutrition **should be expressed with a corresponding precision which determines the 95% confidence interval.**

The confidence interval is the prevalence found plus or minus the precision achieved. Calculation of the precision uses the formula already used for determining the sample size but in another way. As a matter of fact, when calculating the sample size (n), an expected prevalence was estimated and a desired precision (d) was used. Now that the survey has been carried out, the approach is reversed : the sample size is known, and the prevalence has been measured, this varies the precision achieved. If the observed prevalence is closer to 50% than the predicted one, the precision will be worse than expected. If the observed prevalence is less than expected, the precision will be better than expected. This highlights the importance to overestimating the expected prevalence when calculating the sample size, in order to be on the safe side when the survey is completed.

Formula for calculation of random/systematic survey precision

$$d = t \times \frac{p \times q}{n}$$

Formula for calculation of cluster survey precision :

Unless a computer is available, a simplified formula can be used in estimating precision for cluster surveys, assuming a design effect of 2.

$$d = t \times 2 \times \frac{p \times q}{n}$$

9.5 Writing of the report

The following elements should be part of the report.

Summary

- objectives of the survey
- methodology used
- main results
- recommendations

Introduction

- context in which the survey was carried out
- population surveyed : population figures (total and < 5 years)
- date of the survey
- which geographic area
- add a map

Objectives of the survey

- what was measured ?
- in which population ?
- why ?

Methodology

- sampling methodology
- sampling size and parameters used (error risk, expected prevalence and expected precision)
- variables measured and recording information (type of measuring instruments)
- composition of the teams
- training of the data collectors

Analysis and results

- distribution of the sample, according to age and sex
- mode of expression of the indices
- definition of grades of malnutrition
- distribution according to the indices
- malnutrition rates with confidence interval

Interpretation of the results, discussion and recommendations

- to put the results back in the context
- to compare with previous surveys when reliable.
- see also paragraph 2.2. "initial information to collect".

10. REFERENCES

- WHO. Regional Office for the Eastern Mediterranean- 1995- Field guide on rapid nutritional assessment in emergencies
MSF (1995) - Nutrition guidelines