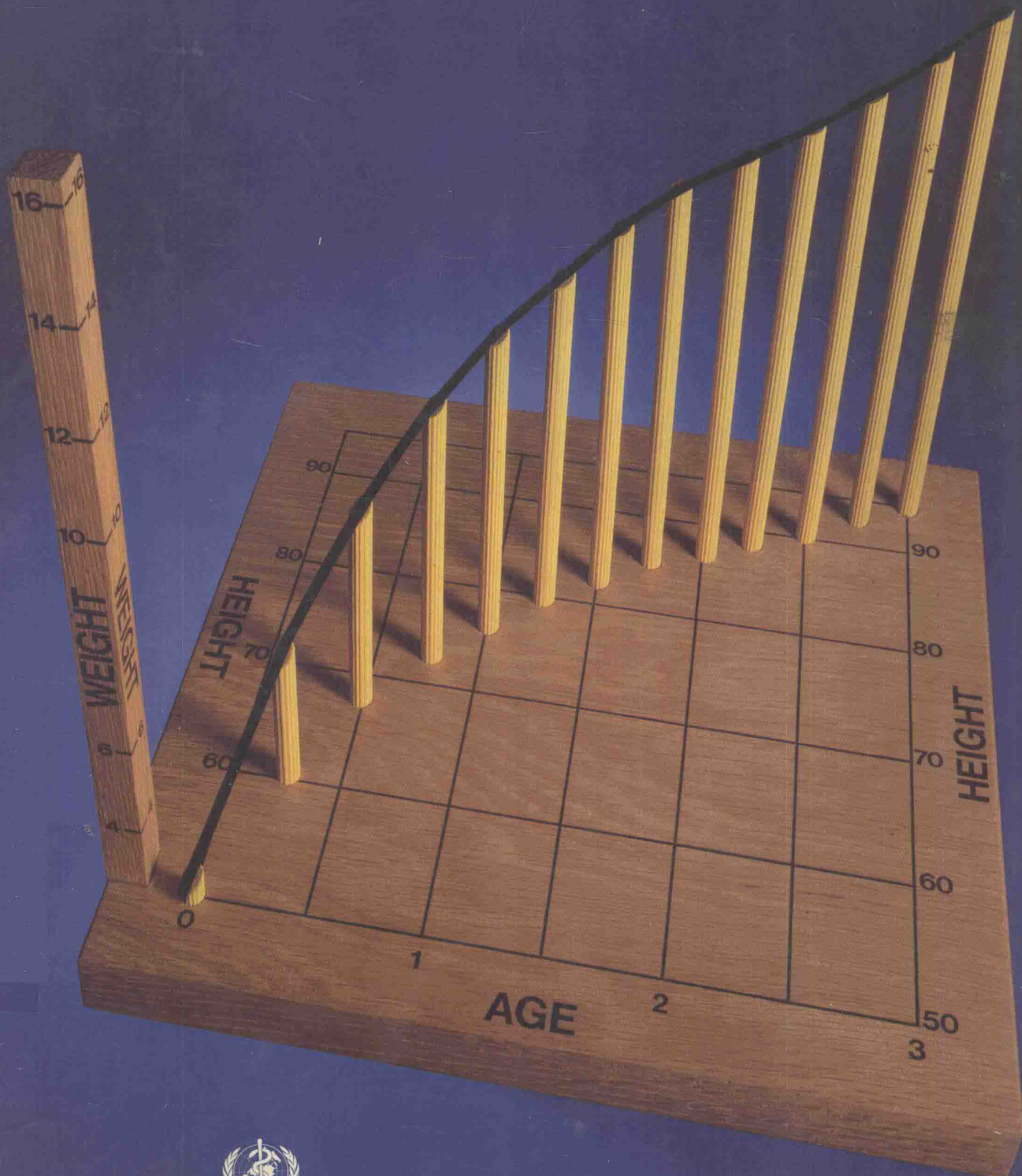


Measuring Change in Nutritional Status



WORLD HEALTH ORGANIZATION GENEVA

MEASURING CHANGE IN NUTRITIONAL STATUS

Guidelines for Assessing the Nutritional Impact
of Supplementary Feeding Programmes
for Vulnerable Groups



WORLD HEALTH ORGANIZATION
GENEVA

1983

ISBN 92 4 154 166 0

© World Health Organization 1983

Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. For rights of reproduction or translation of WHO publications, in part or *in toto*, application should be made to the Office of Publications, World Health Organization, Geneva, Switzerland. The World Health Organization welcomes such applications.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

The authors alone are responsible for the views expressed in this publication.

PRINTED IN SWITZERLAND

81/5249 - Computaprint/Typelec/Kundig - 6500

Contents

	Page
Preface	7
1. Objectives	9
2. Population groups to whom the proposed methodology is applicable	10
3. Selection of measurements	11
4. Methods of taking measurements	12
4.1 Age	12
4.2 Weight	12
4.3 Height	12
4.4 Standardization	13
5. Data collection and sampling	15
5.1 Frequency of measurements	15
5.2 Collection of data	15
5.3 Sampling design	15
5.4 Control group	16
5.5 Cross-sectional versus longitudinal studies	17
6. Data analysis and interpretation	19
6.1 Choice of indicators	19
6.2 Data processing	19
6.3 Data analysis	21
6.4 Interpretation of results	25
7. Implications of findings	29
8. Illustration of data analysis	30
8.1 Introduction	30
8.2 Country A programme	31
8.3 Country B programme	39
References	40
Annex 1. Standardization procedures for the collection of weight and height data in the field	41
Annex 2. Statistical aspects of sampling	46
Annex 3. Reference data for the weight and height of children	61

MEASURING CHANGE IN NUTRITIONAL STATUS

MEASURING CHANGE IN NUTRITIONAL STATUS

Guidelines for Assessing the Nutritional Impact
of Supplementary Feeding Programmes
for Vulnerable Groups



WORLD HEALTH ORGANIZATION
GENEVA

1983

ISBN 92 4 154 166 0

© World Health Organization 1983

Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. For rights of reproduction or translation of WHO publications, in part or *in toto*, application should be made to the Office of Publications, World Health Organization, Geneva, Switzerland. The World Health Organization welcomes such applications.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

The authors alone are responsible for the views expressed in this publication.

PRINTED IN SWITZERLAND

81/5249 - Computaprint/Typelec/Kundig - 6500

Contents

	Page
Preface	7
1. Objectives	9
2. Population groups to whom the proposed methodology is applicable	10
3. Selection of measurements	11
4. Methods of taking measurements	12
4.1 Age	12
4.2 Weight	12
4.3 Height	12
4.4 Standardization	13
5. Data collection and sampling	15
5.1 Frequency of measurements	15
5.2 Collection of data	15
5.3 Sampling design	15
5.4 Control group	16
5.5 Cross-sectional versus longitudinal studies	17
6. Data analysis and interpretation	19
6.1 Choice of indicators	19
6.2 Data processing	19
6.3 Data analysis	21
6.4 Interpretation of results	25
7. Implications of findings	29
8. Illustration of data analysis	30
8.1 Introduction	30
8.2 Country A programme	31
8.3 Country B programme	39
References	40
Annex 1. Standardization procedures for the collection of weight and height data in the field	41
Annex 2. Statistical aspects of sampling	46
Annex 3. Reference data for the weight and height of children	61

Preface

An unpublished document entitled "Measurement of Nutritional Impact" was issued by the World Health Organization in 1979 (document FAP/79.1) for field use in connexion with supplementary feeding programmes, particularly those supported by the World Food Programme. In view of the interest aroused by that document, it has been decided to revise it in the light of experience gained in many countries and to publish it for a wider audience.

The present, revised text was prepared by the following WHO staff members: Dr G. J. Lavoipierre (Food Aid Programmes), Dr W. Keller (Nutrition), Mr H. Dixon (Health Statistical Methodology), and Dr J.-P. Dustin (Food Aid Programmes); Mr G. ten Dam (Tuberculosis and Respiratory Infections) assisted in the preparation of Annex 2.

1. Objectives

The purpose of supplementary feeding programmes is to improve the nutritional status of vulnerable population groups. It has not always been possible, however, to measure as intensively and objectively as would have been desirable the impact of such programmes on the nutritional status of recipient groups. This state of affairs is not surprising if one considers that the budgetary and staff resources available in these programmes (whether national or international) are in general too limited for an adequate collection and analysis of the requisite data. Furthermore, the assessment of nutritional status is not always an easy undertaking.

In the preparation of these guidelines, therefore, the following considerations have constantly been borne in mind: the operational feasibility of the methods suggested in view of the limited resources already mentioned, and the selection of the minimum number of simple measurements which would allow evaluators to detect a positive change in the nutritional status of recipient populations.

Essentially, these guidelines have two objectives:

- to assist countries receiving food aid in identifying the presence and/or absence of nutritional changes in selected population groups benefiting from food supplements (infants, preschool children, and primary-school children); and
- to permit recipient countries to modify, as necessary, the scope and organization of supplementary feeding programmes based on the measurements carried out in pursuit of the first objective.

Even where generally accepted methods of assessment exist, they have to be adapted to the requirements and possibilities of the case in hand. The evaluation of feeding programmes needs an approach which differs from procedures that may be considered adequate for surveys of varying sizes and for varying purposes.

The methods suggested in these guidelines therefore have a very specific and limited purpose, which is that of verifying that the anticipated nutritional impact of food supplementation has actually taken place.

2. Population groups to whom the proposed methodology is applicable

The proposed methodology is aimed exclusively at programmes whose objective is to provide supplementary food to vulnerable groups *to improve their nutritional status*. Other kinds of assistance (e.g., food for work and food for emergency relief), which do not require to achieve the same specified nutritional impact, are not included.

Essentially, four categories of recipients of supplementary food are dealt with in this publication:

- (1) Infants under 1 year of age.
- (2) Children aged 1 to under 2 years.
- (3) Preschool children aged 2 to under 6 years.
- (4) Primary-school children aged 6–10 years.

Although there may be primary-school children whose age is above 10 years, it is advisable to exclude them from the evaluation, because anthropometric changes associated with puberty might bias the results. The methodology proposed below is not concerned with any other recipients or group of recipients.

It should be noted that pregnant and lactating women have also been excluded, because there are still some uncertainties about the best method to be utilized to evaluate their nutritional status using anthropometric indicators. Among the difficulties faced by evaluators in interpreting anthropometric data collected from pregnant and lactating women, the following three are the most pertinent:

- (1) During pregnancy, weight gain is influenced by factors other than food intake and nutrition. In some ethnic groups, for example, women are well looked after during pregnancy and lactation and get extra food.

- (2) During lactation, there are large individual variations in the amounts of milk produced and in the speed with which milk production declines. It may be impossible in practice to assess the metabolic stress of milk production or even the end of lactation.

- (3) In many societies, only a small proportion of mothers breast-feed their children for more than 3 months after birth.

In the absence of a comparable control group of pregnant and lactating women, interpretation of anthropometric data would therefore be in the nature of guesswork.

3. Selection of measurements

The most important nutritional problem in the world today is that of protein-energy malnutrition (PEM) (1); it is also the deficiency which, in general, supplementary feeding is intended to correct. For this reason it is suggested that the following three measurements should be chosen to evaluate the presence or absence of nutritional impact in programmes aimed at feeding the vulnerable groups listed above in section 2:

- age,
- weight, and
- height: length supine for children aged less than 2 years
height standing for children aged 2 years or more.

(The change from measuring supine length to measuring standing height is made at 2 years because at that age children are generally able to stand up.)

These three measurements are combined to form three indicators of nutritional status:

- weight for age,
- weight for height, and
- height for age.

These indicators are compared with those obtained from an international reference population. The recommended data for this purpose are those collected by the United States National Center for Health Statistics (2, 3).

In addition to allowing for an evaluation of nutritional impact, the comparison would enable national medical authorities to diagnose the problem of malnutrition in an epidemiological sense (prior to requesting assistance for supplementary feeding); moreover, it would permit screening procedures to select within each age category individual children in need of food supplementation.

4. Methods of taking measurements

4.1 Age

Where there is general registration of births and where ages are generally known, the recording of age is a straightforward procedure, with age measured to the nearest month or year as the case may be. For example, an infant whose date of birth is 13 July 1981 could be recorded as being 6 months old if seen between 13 December 1981 and 12 January 1982 (both dates inclusive); similarly, a child born on 13 July 1975 could be recorded as 6 years old if seen between 13 July 1981 and 12 July 1982 (both dates inclusive). However, in order to reduce errors made by hasty calculations in the field, it is advisable to record both the date of birth and the date of examination and to calculate the age at a central station.

Where the date of birth is not recorded or such recording is irregular, two alternatives ought to be considered:

Alternative A — the child is under 2 years of age and the cultural pattern in the country is such that mothers usually recall the date on which they gave birth. In this case, by questioning the mother it should be possible to establish the month of the year in which the child was born and the age should be recorded to the nearest month. Example: the mother recalls that her baby was born in March 1980 and the child is seen on 13 January 1982. The date of birth is recorded as March 1980 and the age of the child is calculated to be 21 months.

Alternative B — irrespective of the age of the child, mothers find it difficult to remember the date on which they gave birth. In this case the age of the child is estimated by the investigator and the month and year of birth are entered on the record with the specification that the information is a clinical estimate.

4.2 Weight

Two types of measuring instrument are suggested:

- *For children below 6 years*: a Salter spring balance (Model 235 PBW) with the scale measuring up to a maximum of 25 kg with increments of 100 g. With this type of balance the child hangs in a specially designed "bag". The model is sturdy, compact and easily transported.
- *For children aged 6–10 years*: a bathroom scale on which the child is made to stand. The apparatus usually reads to a maximum of 100 kg with increments of 100 g.

In both age groups the readings are taken to the nearest 100 g.

4.3 Height

For older children—2 years and above—a vertical measuring rod can be employed. After removing the shoes the subject should stand on a flat surface by the scale with feet parallel and

with heels, buttocks, shoulders and back of head touching the upright. The head should be held comfortably erect, with the lower border of the orbit of the eye in the same horizontal plane as the external canal of the ear. The arms should be hanging loosely at the sides. The headpiece of the measuring device, which can be a metal bar or a wooden block, is gently lowered, crushing the hair and making contact with the top of the head. The presence of unusually thick hair requires to be taken into account. The measuring scale should be 175 cm high and capable of measuring to an accuracy of 0.1 cm.

For infants and children under 2 years of age, recumbent length (crown–heel length) has to be measured, since the measurement of standing height is either impossible or very inaccurate with an uncooperative child. This is usually carried out with a wooden length-board. An example is the baby length measurer designed by the Appropriate Health Resources and Technologies Action Group, Ltd. (AHRTAG) (Fig. 1).

The infant is laid on the board, which is itself on a flat surface. The head is positioned firmly against the fixed headboard, with the eyes looking vertically. The knees are extended, usually by firm pressure applied by an assistant, and the feet are flexed at right angles to the lower legs. The upright sliding footpiece is moved to obtain firm contact with the heels and the length read to the nearest 0.1 cm.

4.4 Standardization

Height and weight are probably the two simplest measurements than can be taken to assess the nutritional status of a population. Like all measurements, however, they are subject to bias and errors in recording if they are not properly standardized. Four steps should be taken to obtain good standardized records:

- train the health personnel in the proper methods of using the measuring apparatus and scales;
- adjust the scales regularly before each measuring session;
- check for observer error; and
- whenever possible, rotate field workers among groups of subjects to be measured so as to reduce the effect of individual bias.

Scale adjustment of a spring balance (Salter type 235) is easily done by bringing the scale needle back to the exact zero mark using the side screw provided for this purpose. A similar adjusting device exists on bathroom scales. Accuracy should be checked before each measuring session (especially if the scale is used by a mobile team and subjected to rough handling in transport) by comparing the scale reading with a known weight (e.g., a 20-litre plastic container filled to the brim with water, which will weigh 20 kg).

The verification of observer error has been well described by Habicht ((4); see also Annex 1). The procedure is meant to determine how closely the measurements of height and weight taken by untrained observers approximate to the values of an accepted standard, and where the errors are being made so that they can be eliminated or at least minimized. It should always be utilized when staff are trained in the recording of height and weight measurements.