

SIGNIFICANCE AND RELATIVE VALUE OF DIFFERENT
INDICATORS OF NUTRITIONAL STATUS*

by Dr M. Behar**

The cross-sectional appraisal of the nutritional status of population groups is carried out by means of nutritional surveys. I would like to discuss some of the main practical problems which should be considered in planning, development and utilization of these types of surveys.

Innumerable reports of nutritional surveys of a varied nature, conducted all over the world, abound in the pertinent literature and many other such studies have been prepared but not published. The information gained has undoubtedly contributed to the knowledge of the nutritional status of different population groups, but with few exceptions, these studies have not been fully and properly utilized for action programmes aimed at correcting the problems encountered. There is no doubt that the way in which these studies were planned and carried out has contributed to this situation.

1. Objectives of a nutritional survey

The first and most important consideration in the planning of a nutritional survey is to define its objectives as clearly and precisely as possible. This is vital because it should serve as the basis for deciding on the sampling of the population, on the methodology to be used, and on the analysis and utilization of the information obtained.

The objectives of a nutritional survey may be very general and comprehensive,

* Presentation 652

** Chief, Nutrition Unit. World Health Organization, Geneva, Switzerland

for instance:

- to determine the nature and magnitude of the prevailing nutritional problems of a given population; and to obtain as much information as possible on the responsible factors.

In this case, what we might call a comprehensive epidemiological nutrition survey would be needed. This type of survey, which should include different methods for assessment of the situation, can be of great value in the planning of applied programmes because it provides information not only on the problems themselves, but also on the responsible factors in the specific populations studied, as well as on their relative importance. It would, therefore, offer adequate bases for deciding on the corrective actions needed. In addition to their usefulness for diagnostic purposes, such surveys also provide baseline information for evaluating the results of future programmes or of directed or naturally occurring changes.

On the other hand, a nutritional survey can be more limited in scope and planned for obtaining data only on one or on several specific aspects of the problem. For example, its purpose might be to collect information only on the dietary intake of the population under study, or to assess the nutritional situation exclusively by biochemical methods or by anthropometric measurements. Such limited surveys can be useful as original studies for specific purposes or as a follow-up of previous studies carried out in more detail. They may be needed, for instance, when the epidemiological factors of the specific nutritional disorder are well known and the study is to be carried out for the purpose of gathering quantitative information on the magnitude of the problem, or, in the case of dietary studies, data for the

design of education programmes. They can also be carried out as follow-up studies of more comprehensive previous surveys, using only one or two methods of assessment as indices for measuring natural or induced changes.

Independently of the scope of the survey in relation to the number and nature of the methods used, these studies can be planned to collect data in regard to most nutrients for the whole population under study: on the other hand, they may be directed toward obtaining information on specific nutrients or on restricted sectors of the population. We may be interested in knowing the situation concerning only vitamin A or energy, or on certain specific population groups clearly defined on the basis of age, sex, social status or any other pertinent characteristics. The choice of these possibilities must be determined primarily by the objectives of the survey, which should therefore be precisely defined.

2. Methodology

A variety of methods can be used in the execution of nutritional surveys (1, 2). Some provide direct information relevant to the actual nutritional status of the population. These include:

- clinical examinations
- anthropometrical measurements
- biochemical determinations
- physiological studies

Others render information on the factors determining the nutritional condition of the population under study or are related to them. These include:

- studies on total food availability in relation to the nutritional needs of the population.

- studies on dietary habits and practices
- measurement of food and nutrient intake
- studies of the pertinent socio-cultural and economic conditions of the populations.

Finally, others such as the analysis of mortality data reflect one of the consequences of the problem under study.

It is important to emphasize that, when applied, all of these methods are actually measuring different things. Consequently, they cannot be used indiscriminately, and care should be taken when drawing conclusions from the data obtained. For instance, it is frequently concluded from information collected in a dietary survey that the population is suffering from certain nutritional deficiencies, an appreciation which obviously cannot be derived with certainty from information on food intake. Such studies can give rise to strong concern at the probability of nutritional deficiencies, but they do not suffice to establish the presence of malnutrition.

The different methods used for the appraisal of nutritional status are not mutually exclusive: on the contrary, they are complementary. We will therefore try to classify them in such a manner that their relative value will be better understood. For this purpose, we will use the concept of the natural history of a disease (3), placing the different methods at the levels at which they operate or can be more useful in the case of nutritional deficiencies, as indicated in Figure 1.

As shown graphically in this scheme, methods such as determination of food availability in relation to population needs (food balance sheets), dietary surveys, socio-economic studies or others concerning the environmental

factors which can affect the nutritional status of a population, define the situation in relation to the problem in its pre-pathogenic stage. In other words, they indicate whether conditions conducive to the development of nutritional problems are present or not, but they do not actually assess the problems.

Biochemical methods are particularly useful in the pathogenic preclinical levels, when they constitute the only available basis for diagnosis other than more complicated physiological or metabolic studies. Biochemical methods, of course, may also be useful in the clinical stages, where they have a confirmatory value.

Clinical nutrition surveys, studies of morbidity data and anthropometric studies assess the problem in its clinical stages. In connection with the latter, it is important to remember that they do not necessarily indicate whether the problem is present at the moment of conducting the survey, because anthropometric studies can be assessing permanent damage resulting from previous nutritional deficiencies which may no longer be present when the research is conducted.

Finally, analysis of mortality rates and information from post-mortem examinations provide data related to the final developmental level of the nutritional problems. Here again, post-mortem examinations can also be used for assessing the problem in previous levels, but with the analysis of mortality data they are the only ones available for the last stages.

3. Sampling

With regard to the sample selected for study, the main consideration is to ascertain that it is qualitatively and quantitatively adequate to allow

extension of the information obtained in the sample survey to the population for which it is desired, within an accepted degree of confidence. It must be representative of the population as a whole or interpretation must be restricted to the population that it does represent. In general, we can say that the larger the sample the greater the confidence in relation to the reliability of the data collected. On the other hand, the larger the sample the more expensive and time consuming will the study be. Furthermore, in the case of large samples it is more difficult to utilize more elaborate and precise techniques requiring specialized personnel, and this could result in the loss of accuracy of the information obtained. Consequently, a compromise is necessary and the ideal appears to be having the smallest sample which can possibly provide reliable information. The availability of previous data on the approximate prevalence and variability of the characteristic or characteristics in which we are interested can be most helpful in deciding on the size of the sample. If this should not be the case, it would seem advisable to carry out a preliminary study so as to attain information on the approximate prevalence and variability, prior to deciding on the size of the final sample. As a last resource, it may be necessary to rely on data collected in the course of similar studies in other comparable areas, or on any other information which may give an idea of the magnitude of the problem to be studied.

Another important decision in the sampling phase concerns the choice of a sampling unit, which in nutritional surveys could be the community, the family, or the individual. The objectives of the study will serve as one of the basic elements for this decision. In surveys designed to establish the prevalence of specific nutritional deficiencies, for instance, the individual

can be a better unit sample; individuals of special interest in relation to age, sex, or other characteristics can then be properly included. On the other hand, if the survey is intended to determine environmental factors that affect or are related to the nutritional situation of a population group such as socio-economic status and dietary practices, the family is a better unit for sampling. The community will serve as a sampling basis when factors such as the social structure, communications systems, marketing and ecological conditions are of interest. Finally, there are some types of information such as the per capita food availability, which can only be attained on a state or national basis. It is therefore clear that for a comprehensive survey some information is obtained from the whole area under study, other data is collected from the communities, other still from the family, and finally from the individual. As can be seen, sampling is a complex process which must take all these factors into consideration.

Previous demographic information on the population to be studied such as total number of inhabitants, composition, and geographic distribution is fundamental for adequate sampling. These data are not always available, particularly in underdeveloped countries. Under these circumstances, surveys can still be carried out in specific population groups without adequate sampling. However, in such cases great care must be taken before any attempt is made to generalize the information obtained to the total population of the area.

4. Analysis and interpretation

The need for obtaining meaningful and clearly understandable information from the analysis of the data collected in nutritional surveys in relation to the objectives previously established, should be emphasized. For example,

data obtained on nutrient intake is frequently analyzed only to attain average values for the population or for its different sectors classified by age, sex, location, etc. Average values are then compared to recommended allowances so as to conclude on the degree of adequacy. In this case, it would be more meaningful and useful to analyze the data in order to obtain pertinent information on the percentile distribution of the intake values within the population or its different sectors. In this way, percentages of the individuals or families studied which are above or below certain limits in relation to recommended allowances can be established. Whenever possible, the limits for the different groups should be set on the basis of their significance in relation to health.

Another general point in relation to the analysis of nutritional surveys is the need to correlate and integrate data of the different parameters measured, since this can provide valuable information for interpretation of results. The analysis and interpretation of the information, as obtained, in separate units, limit the value of the study.

5. Reporting

The last stage of a nutritional survey, the reporting stage, should be carried out in accordance with the objectives. Its basic purpose should be the most effective utilization of the information obtained. This phase, therefore, merits also much care and attention. In general terms, it is recommended that in addition to the technical reports prepared as for publication in scientific journals or to be presented in scientific meetings and fully understood only by specialists, it is advisable to prepare less technical and more meaningful reports for policy making and other authorities

who are not specialists, but who will be responsible for putting into action the recommendations derived from the study. This is not usually done, and as a result the persons in charge of applying the information may not understand or appreciate its value. For this reason, we believe that it is the responsibility of the specialists to translate such information into terms understandable by the non-specialists.

In some of these studies it may also be useful to prepare appropriate popular reports which can transmit pertinent information to the general public in order to obtain their understanding and cooperation which is required in the development of adequate actions directed to correcting the problems found.

REFERENCES

1. Jelliffe, D.B. The Assessment of the Nutritional Status of the Community (with special references to field surveys in developing regions of the world). Geneva. World Health Organization, 1966, 271 p. (WHO Monograph Series No 53)
2. US Interdepartmental Committee for National Defense. Manual for Nutrition Surveys. 2nd edition. Bethesda, Maryland. ICNND, National Institutes of Health, 1963
3. Laevell, H. R. and E.C. Clark. Preventive Medicine for the Doctor in his Community. 3rd edition. New York, Mc Graw-Hill, 1965, pp 14-38

Instituto de Salud Colectiva
Universidad Nacional de Lanús

Figure 1. METHODS OF NUTRITIONAL ASSESSMENT RELATED TO THE NATURAL HISTORY OF DISEASE

