

# **NUTRITION**

## **Monitoring and Assessment**

edited by  
**Tara Gopaldas**  
and  
**Subadra Seshadri**

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# Foreword

Monitoring and assessment form the cornerstone of all planning and implementational activities. Our massive national nutritional programmes *all* require high calibre and well-trained personnel to design and conduct such monitoring and evaluation exercises. It was, therefore, considered imperative to offer a special course in nutritional monitoring and assessment to the postgraduate students at the Department of Foods and Nutrition, M. S. University of Baroda. There are, no doubt, some manuals, monographs, and texts on the subject—the most widely used one perhaps being the WHO monograph, *Nutritional Assessment in the Community* by D. B. Jelliffe (1966). However, all these source materials come from outside India. Another important consideration was the recent recognition by the scientific community of the need for much more nutrition intervention research and process evaluation. Such studies cannot be carried out without well-oriented researchers and field investigators. It was felt that it would help not only our proposed postgraduate course but also several other postgraduate research and academic institutions if we could mesh the tremendous expertise and experience on the subject that already exists in India.

Hence, a workshop on Nutritional Field Monitoring and Assessment was planned. In this effort, all my colleagues and students enthusiastically helped and shouldered many organizational responsibilities. However, two of my colleagues, namely, Professor Sunder Gujral and Mrs Subadra Seshadri, stand out for having assisted me in listing a series of topics which we felt both postgraduate teachers as well as postgraduate students required to know in order to be in the forefront of surveys and studies involving nutritional monitoring and/or assessment. In the process of selecting topics we asked ourselves what areas required clearer definition, fresh thinking and greater introspection. We also considered which areas were very important but blurred. Out of such questioning emerged twelve major topic areas.

Next we required a generous sponsor to meet the expenses of the workshop. But for the generosity of UNICEF, New Delhi and the personal involvement of Dr Sam Dalal, Senior Programme Officer, UNICEF, New Delhi, this workshop would not have materialized.

No less than 20 national and international experts in the field were invited to share their experience and insights at this workshop. Most of the speakers invited were good enough to send their manuscripts to us well in advance. Each paper was presented by an expert and was summed

up and further delineated by an expert discussant. This led to presentations and discussions of a high technical order.

Shri M. S. Dayal, IAS, Joint Secretary, Ministry of Social Welfare (now re-named Ministry of Human Resource Development), Government of India, set the tone by his excellent inaugural address on the assessment of national nutrition programmes. Dr D. N. Kakkar, the noted social anthropologist and Deputy Director General, ICMR (Special Cell), New Delhi added an anthropological and sociological dimension to the topic with his paper, 'The Concept of Nutritional Field Monitoring and Evaluation: the Whys and Wherefores.' Dr Umesh Kapil, Senior Scientific Officer, added valuable insights to this presentation as a discussant. Dr Sheela Talwalkar, Statistical Officer, Ciba Geigy Research Unit, Bombay and Shri J. G. Shastry, Assistant Director, National Institute of Nutrition, combined to give a masterly presentation and discussion on 'Appropriate Sampling Methods and Statistical Applications for Nutrition Monitoring and Evaluation'. Dr Prema Ramachandran, the noted expert in maternal nutrition, could not be present in person. However, the discussant Dr Kamala Gopal Rao, Programme Officer, UNICEF, New Delhi did an excellent job of both presenting and discussing the topic, 'Use of Socio-economic and Mortality Data for Assessment of Nutritional Status'. Professor Tara Gopaldas dealt with the topic 'Process Evaluation—A New and 'Important Concept' and exemplified her talk with case studies. Dr K. Vijayaraghavan ably assisted by Dr Mrunalini Puar, Professor Sunder Gujral and Dr U. V. Mani presented and discussed the important topic of 'Invasive Parameters, Biological Specimens, their Sensitivity, Specificity and Cost'. Dr M. C. Swaminathan's excellent paper on 'Non-invasive Parameters for Field Monitoring and Evaluation: their Sensitivity, Specificity and Cost' was read out by Professor Gujral. The topic, 'The Unexplored Realms of Social Monitoring/Evaluation and Social Accountability of Nutrition Programmes' was presented by a young planner—Dr Ashok Iyengar of the Planning Commission of India and was thought-provoking. The topic 'Indicators for Monitoring and Evaluation of Nutritional Status in the Primary and Middle School Age Group (6–15 years)' was dealt with by Professor Tara Gopaldas.

Dr Kalyan Bagchi, Nutrition Advisor, ICMR, New Delhi unfortunately could not be present on this occasion to share with us his valuable experience on the 'Evaluation of Nutrition Education'. However, happily for us he sent his paper. Mrs Subadra Seshadri added some observations on certain issues in monitoring and evaluation of nutrition education programmes.

'Role and Development of National Nutrition Monitoring Bureau' was succinctly presented by Dr Prahalad Rao, Deputy Director of the

National Institute of Nutrition. The last and perhaps most difficult area—'The Grey Area of Cost-effectiveness and Cost-benefit Analysis of Nutrition Programmes', was admirably presented by Mrs Mary Ann Anderson, Nutrition Advisor, USAID, New Delhi.

All the speakers and discussants gave generously of their valuable time and expertise, culminating in a set of recommendations and this report.

Our thanks go to Miss Sissy Abraham, Workshop Officer, for painstakingly transcribing the taped talks of each speaker and discussant; Miss Anima Saxena and Miss Uma Iyer for assisting in the compilation of the papers; and Shri B. M. Khaire for typing the entire manuscript.

We greatly appreciate the generous grant made available by UNICEF in order to bring out this report in volume form.

Tara Gopaldas

# Introduction

M. S. DAYAL

The subject of the seminar out of which this book has emerged is of great interest to the Ministry of Social Welfare. The seminar highlighted three words—nutrition, monitoring and assessment.

Nutrition here obviously refers to nutrition of human beings, and if you accept the human being as an entity consisting of a physical body and organs of perception, action and mind, then the purpose of nutrition should obviously be to achieve an acceptable level of physical and mental activity in human beings. That would lead us, to some extent, to determine the scope of nutritional monitoring and assessment. As far as mental activity is concerned, although it is related to the physical well-being of man, it is also a function of education.

Monitoring could be defined as a continuous process of overseeing or review of the implementation of an activity to ensure that inputs are flowing, that work schedules are being adhered to and that outputs are being achieved according to a plan.

We can define assessment as measurement of a status or a situation. Thus, nutritional assessment would mean measurement of nutritional status of an individual, a family, a household, a community or specified groups of people. But obviously, measurement implies existence of some acceptable indicators and tools.

If these terms are put together, they constitute what we may understand by nutrition monitoring and assessment.

So, when we are thinking in terms of grey areas of monitoring and assessment, we have to limit its scope in a manner that is acceptable. We use concepts and methods which are clear, easy to apply, simple and reliable. However, if we were to look at nutritional status with reference to the ultimate objective of an optimum level of physical and mental activity, then the work becomes very difficult, time-consuming and fraught with all sorts of disputed issues. Therefore, the scope of nutritional monitoring and assessment will have to be limited to specific purposes.

One purpose may be long-term planning and perhaps we can allow



some time for the studies. But there are other purposes like timely warning so that interventions are possible in order to prevent and manage emergencies. Another purpose may be to identify medium-term and immediate nutrition problems so that one can develop programmes and manage them in order to tackle these medium-term and immediate problems. To fulfil these purposes, the system of nutritional monitoring and assessment should not only be able to provide timely information but should also employ methods which are of fairly high validity and reliability and at the same time, easy to apply.

You could think of nutritional monitoring and assessment measures in three ways. These are indirect measures like infant mortality or even early childhood mortality in the age group of 12 to 60 months. Even qualitative information about the situation of crops will give an idea of the impending nutritional situation; knowledge about the staple foods that people eat; awareness of some nutritional problems they are likely to face; prevalent food prices; wages; and the existence of certain diseases. For instance, if there is an epidemic of malaria you can assume that even if plenty of food is available, there will be a large number of malnourished people. If there is an epidemic of gastroenteritis, it can be assumed that there will be accompanying malnutrition. These are a few indirect measures which give you some information about the nutritional situation either for the society or for individuals in particular localities.

There are more direct measures which could be used for global assessment or for assessment at the level of an individual. Such direct measures would include level of food production and food availability which would include crop yields, market data, imports and exports; dietary surveys; and nutritional status surveys which would include, apart from some sociological data, data on clinical examination, biochemical tests and anthropometry.

In times of natural disasters, there are some other indicators too. For instance, there may be considerably reduced capacity for physical activity and yet people may have to travel long distances in order to have access to food, as happens in famines. Sometimes, there may be indicators of an obvious decline in human moral and social values as a result of acute food scarcity. There may be a considerably increased incidence of disease and infection. These indicate the situation of malnutrition in times of disaster.

Whatever measures are being used, whether these are indirect or direct or whether they are used in disaster situations, they must have certain requisites if they are to be reliable and to be used effectively. People are needed, they have to be trained, a system of reporting must be in existence, and also a system by which information flows. There

must be supervision of all these personnel, their training and their reporting.

The measures for assessment of nutritional situations become beneficial or more useful if the system is truly simple and is so easy to apply that it can be established almost as routine. We have in our country, at least on certain aspects, information flowing regularly which has led to the adoption of some useful practices.

Although it may not be possible to maintain adequate levels of nutrition in times of natural disasters, survival is now assured. Information reaches well in time to enable the government as well as voluntary organizations to initiate steps to tackle the problem.

All measures of nutritional status have certain advantages. They serve as shorthand indicators of health, welfare and survival of individuals and communities. They help us in identifying individuals who are in need of special attention. Most of these measures are quite cheap. It is easier to collect information with respect to these measures than on other indices like poverty, level of housing or sanitation and hygiene.

But all measures have their limitations too. Indicators have to be selected in relation to the system to be studied. The measures will change depending on whether you are studying the individual system, or the family, or communities, or special groups of people.

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# 1 The Concept of Nutritional Field Monitoring and Evaluation: the Whys and Wherefores

D. N. KAKKAR

The concept of 'nutritional surveillance' is concerned with everything that affects nutrition from food production, storage and distribution and intake to health status itself. The need for nutritional surveillance arises from the fact that the main cause of malnutrition in developing countries is poverty. However, poverty alone does not cause malnutrition. Since malnutrition is a multifaceted problem, it needs to be studied from a holistic point of view. Our studies in Punjab enabled us to identify many interacting factors which had some association with severe malnutrition in the physical, biological and cultural environment. Broadly speaking, the incidence of severe malnutrition was higher among the scheduled castes and backward classes as compared to the non-scheduled castes. This reflected several factors including absence of land holdings, low income, poor housing, large family size, defective pattern of child rearing, and reliance on folk medicine practices even for the treatment of certain critical illnesses.

Undoubtedly an understanding of the relationship between socio-cultural background and malnutrition is essential for the development of an adequate system of nutritional field monitoring. This paper will discuss how nutritional field monitoring was done in rural Punjab where the Indian Council of Medical Research, in collaboration with the Johns Hopkins University, conducted a major study on interactions of nutrition and infections in which the author worked as one of the principal investigators.

## BACKGROUND OF THE NARANGWAL STUDY

The main policy issue underlying the Narangwal study was to determine whether there was synergism of programmes to control malnutrition and infection similar to the known synergism between these problems.

The following were some of the policy questions which led to the Narangwal study:

- i. Can nutrition interventions reduce the incidence, duration and impact of infections?
- ii. Can control of infection improve nutritional status?
- iii. Is there a synergism in programme effects so that a combined nutrition and infection control programme would have a greater impact on cost-effectiveness than what would be expected from each programme alone?
- iv. Can better field programmes be developed to combine the most effective measures against malnutrition and infection so that these measures can be implemented within the existing constraints?

Ten study villages in the nutrition project were selected in clusters of two to three villages scattered around two to three community development blocks. The best possible efforts were made to get reasonable comparability between the different groups of villages in terms of major socio-cultural and economic indicators. Careful attention was paid to keeping the village clusters separated to minimize communication between them about differences in the packages that were offered to them. Efforts were made to assess the true potential of each village in terms of its willingness and cooperation in relation to the service interventions that were provided to it according to the objectives of the study.

#### OBJECTIVES OF THE STUDY

##### *Research Objectives*

- (a) To measure the extent to which health care, mainly focused on infectious disease control, influenced morbidity prevalence, mortality and nutrition status.
- (b) To determine the effects of nutrition care, consisting of nutrition education and selective supplementation, on child growth and development, mortality and infectious disease experience.
- (c) To determine the effects of combined nutrition care and health care on the same indicators of child health.
- (d) To determine the influence of selected socio-economic and demographic factors on each of these interactions.

##### *Applied Research Objectives*

To evolve practical field procedures for implementing service programmes that are effective, feasible, cost-effective and within the administrative constraints of rural health services for:

- (a) Selected nutrition care measures;

- (b) Selected infection control and health care measures;
- (c) Finding the optimal functional combination of both nutrition care and health care measures; and
- (d) Defining the population characteristics, such as age of child, which determine when each component of the integrated care package can be most effectively and efficiently introduced.

The service packages received by the selected villages were (1) nutrition care, (2) health care, mainly concentrating on infection control and (3) integrated services (both nutrition and health care). In addition, there was a control group of villages. The entire field experiment was conducted from 1969 to 1973 in these villages. Actually, preparatory work was started in 1967 which included preliminary surveys of anthropometric status and morbidity; selection of study villages; standardizing methods for data collection and health services; staff training; and establishment of rapport with the local population. One of our major concerns was to attain a high level of quality control in data collection. Prior methodological experience in the Khanna and Guatemalan studies proved of considerable help in selecting variables to be measured. Careful attention was paid to the development of intervention packages. In the analysis, an attempt was made to find out the interrelationships between the complex interacting variables concerning nutritional status, morbidity and mortality. It was hypothesized that, in addition to their direct effects, poor nutrition would adversely affect morbidity, and high morbidity would decrease nutritional level; and that poor nutrition and high morbidity together would act synergistically in raising child mortality. Some of the results of the Narangwal study are discussed below.

## RESULTS

### *Growth and Development*

- i. Nutrition care alone or in combination with health care significantly improved both weight and height of the children studied beyond 17 months of age.
- ii. At 36 months, children from the nutrition care villages weighed on an average 560 g more and were 1.3 cm taller than children in the control villages.
- iii. Children in the health care villages had mean weights and heights intermediate between those in the nutrition care and control villages.
- iv. Of the socio-economic and demographic variables, sex and caste were shown to have an especially pronounced and additive effect which ranged from 0.6 to 0.75 kg in weight and about 2 cm in height. A male high-caste child from a nutrition care village averaged about

2 kg more in weight and 6 cm in height at 36 months of age than a female low-caste child from a control village.

Thus, this is the first project to show in a controlled experiment significant differences in average growth rate of all children in communities receiving specific nutrition and health inputs. Results from regression analysis on a sub-sample of 180 children on whom exact dietary measurements were obtained showed a strong correlation between dietary intake and achieved anthropometric status. Psychomotor development was found to have been directly affected by past nutritional status.

### *Morbidity*

- i. There was a significant reduction in the average duration of episodes of infectious disease in health care villages or nutrition and health care villages as compared to villages without health care.
- ii. In health care villages each episode of diarrhoeal disease was reduced on the average by two days, lower respiratory tract infection by 1½ days, fever by 1 day, cough by 2½ days, and skin infections by 1½ days in comparison with villages without health care.

### *Mortality*

- i. Prenatal mortality was significantly reduced in nutrition care villages (31 per 1000 live and still births) as compared to health care villages (45 per 1000 live and still births). This decline in mortality probably resulted from improved nutritional supplementation to pregnant mothers.
- ii. Neonatal, post neonatal and 1 to 2 year mortality were reduced to one half in the villages where services for control of infectious diseases were provided as compared to the control villages.
- iii. Nutrition care produced an intermediate effect under one year of age and an equivalent effect on mortality among 1 to 2 year old children.

## MONITORING AND EVALUATION

A system was developed to monitor the effectiveness of project services which included the following procedures:

- i. A simple method for immediately reporting deaths of children under 3 years in village homes.
- ii. A method to determine the most probable cause of deaths.
- iii. Weekly meetings of supervisors and field staff at which reported deaths were discussed.
- iv. Discussion of changes in morbidity patterns and other related topics and review of service records. Holding of meetings also in the subcentre villages.



- v. Revision of standing orders and other procedures based on the results of these discussions.
- vi. Re-training of the staff in regular, bi-weekly in-service training sessions.
- vii. Maintaining high priority files for follow-up of children at increased risk of illness or death because of anaemia, tuberculosis, malnutrition etc. Because of this procedure, of the three selected health problems, the situation in respect of diarrhoea and pneumonia improved dramatically in response to surveillance and early treatment. However, reduction in neonatal tetanus was mainly brought about by immunization.

The evaluation of the programme was attempted by a separate team. The following field methods from the functional analysis research project were adopted:

- i. Work sampling which produced detailed information on the time spent by project staff in providing specific services in the study villages. Observers kept track of all service tasks on at least 24 days sampled throughout one year of the project, recording the functions and activities performed at two-minute intervals on the observation days.
- ii. Information was abstracted from individual service records for all years of the project. These data consisted of a description and count of all project services.

In conclusion, the task of improving nutrition is a problem of 'cultural construction', in which the collaborative efforts of nutritionists, food technologists, social scientists and particularly medical anthropologists, are required.