

## Original Article

# New perspectives on regional opportunities for community nutrition

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This brief keynote speech provides an annotated check list for topics to be covered during the meeting. The topics presented include specific indicators of nutrition, new regional information and communication technologies, empowerment of communities, effective nutrition and health interventions, advances in agricultural research, progress in food technology and the potential of biotechnology and genomics to benefit the region. Other issues to be considered are land decentralization, south-south and south-north cooperation, program monitoring and evaluation, human rights and ethics.

**Key words:** community empowerment, human rights, nutrition indicators, nutrition intervention, programme evaluation.

### Introduction

When I received the invitation to cover the topic 'New perspectives on regional opportunities for community nutrition', I realized that it would be a difficult task. However, little did I know what the organizers of this meeting had in mind. As soon as I accepted I received the following list of topics to cover in my presentation: (i) specific indicators of nutrition; (ii) application of new information and communication technologies in research and research in the region; (iii) how to address the challenging issue of overcoming poverty where nutrition knowledge and technology are integrated with other disciplines that can play a significant role in alleviating poverty; (iv) empowerment of community participation; (v) autonomy, land decentralization issues in Indonesia; (vi) international cooperation south-south; (vii) international cooperation south-north; and (viii) human rights issues and democracy in Asia.

Before receiving this list I had also identified other issues that I believed needed emphasis or at least mention in such a talk including: (i) advances in agricultural research; (ii) advances in food technology; (iii) advances in biotechnology and genomics; (iv) effective nutrition and health interventions; (v) lifestyle approach; (vi) monitoring and evaluation; and (vii) ethical considerations.

To cover all of these topics in any depth would obviously be impossible. What should I do? I decided that because this is intended to be a keynote speech to stimulate subsequent discussions, I will try to provide a kind of annotated check list for this purpose.

### Specific indicators of nutrition

The traditional indicators of nutritional status are anthropometric measurements, clinical examinations, determination of haemoglobin and ferritin, as well as other laboratory

measurements in blood or plasma of specific nutrients or indicators of their status.<sup>1</sup> Dietary intake, while not a measure of nutritional status, is a convenient indicator of nutritional problems in a community and a guide to how they might be corrected.

All of these quantitative measures are useful in various situations although employing them all in a single survey is costly, invasive, and may not be required. Those indicators selected should be based on need and usefulness. However, all of them are static measures. For advocacy of control measures, evidence of the functional consequences of malnutrition is important and feasible to obtain.

Both a portable treadmill and the Harvard step test are effective for measuring physical capacity, but they are suitable only for men. Relatively simple and low-cost measures for physical capacity and cognitive performance are available. Tests such as the number of 'sit-ups' that can be performed or grip strength are revealing. For children of any age, careful recording of their activity is useful.<sup>2</sup>

Pollitt and Metallinos-Katasaras have pioneered the measurement of cognitive performance in children in relation to nutritional deficiencies. However, most of their procedures require considerable training and a set-up for testing that is not conveniently mobile.<sup>3</sup> Pollitt's studies in Indonesia with Soemantri and others are widely known.<sup>4</sup> Chavez of Mexico has selected from the larger battery of tests used by Pollitt and other psychologists that are simple to use in the field and that have proved to be sensitive to changes in the nutrition of children.<sup>2</sup> They include the

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Bayley test for infants, exploratory behaviour index for preschool children, and school performance.

Laboratory determinations of immunological status are the newest and most sensitive indicators of impaired nutritional status, but they require a venous blood sample, a sophisticated laboratory, and are expensive and non-specific. They include determination of complement C3; CD-3, CD-4, and CD-8 T cells; lymphocyte stimulation index; and selected immunoglobulins. They are particularly useful in double-blind intervention studies because they can detect subclinical degrees of protein, iron, zinc, and some other deficiencies. Morbidity and disease-specific mortality are also useful indicators. An indirect indicator of immunological status is morbidity from diarrhoeal and respiratory disease, but this requires longitudinal observation and is dependent on seasonal factors. Absenteeism from school or work is an indirect indicator of morbidity.

Functional measurements should now be part of the evaluation of all well-controlled intervention trials. Where pregnant women are included in the intervention, birth-weight is an important indicator of the nutrition of the fetus during pregnancy and its possible improvement. Low birth-weight reflecting fetal malnutrition has implications for the later premature development of chronic degenerative diseases.<sup>5</sup>

Previous attempts to demonstrate the benefit of the fortification of cereals with limiting essential amino acids failed, largely because the criteria used, serum total protein and albumin, were not sufficiently sensitive indicators. The results of two recent field trials of the lysine fortification of wheat flour are examples of the advantage of sensitive immunological measures. They were carried out in populations consuming approximately two-thirds of their protein as wheat. Eighty families, each on the outskirts of Peshawar, Pakistan and near Schendu, Henan Province, China received wheat flour either plain or fortified with lysine for 3 months. At the end of this period there was an improvement in protein status of the latter group as judged by increases in complement C3, CD-4 and CD-8 T cells in a child, woman, and man in each family.<sup>6,7</sup> Total T cells were measured in China and found to be increased. The proteins with rapid turnover, serum prealbumin and transferrin, also increased.

### **The application of new information and communication technologies in research and research in the region**

Two generations ago radio was a new way to reach rural families. Now more and more such families have access to television. Public health nutritionists should be taking full advantage of this medium for disseminating nutrition and health information.

For the present, computers have the greatest relevance to nutrition workers for recording and analysing the large amounts of data from field studies. The time will come, however, when more and more villages and individuals will have internet access. Therefore, programmes to improve nutrition and health will need to include reliable information on the internet.

Advanced professional education and training programmes, such as those sponsored by the South-East Asian Ministries of Education Organization, Tropical Medicine and Public Health, Regional Centre for Community Nutrition (SEAMEO-TROPMED RCCN), should include training and experience in data management programmes such as EPI-INFO and SAS or SPSS. They should also require mastery of Microsoft PowerPoint or its equivalent so that they can disseminate the results of their work effectively.

### **How to overcome poverty when nutrition knowledge and technology are integrated with other disciplines**

This topic alone would require a week-long conference to consider in any depth. However, professionals with nutrition knowledge are essential to the effectiveness of plant and animal breeders, agricultural and economic planners, food technologists and the food industry, physicians and public health professionals, and educators.

### **Empowerment of community participation**

Qualitative methods have been developed to assist communities in analysing their own needs. Those introduced by Chambers in India<sup>8</sup> allow the community to make their own diagnosis of their problems and arrive at their own conclusions as to what actions the community can take. The method was initially known as 'Rapid rural appraisal' and renamed 'Participatory rural appraisal' to be more descriptive.<sup>9</sup>

The rapid assessment procedures (RAP) might be better referred to as rapid 'anthropological' procedures because they use the qualitative approaches of anthropology to learn community needs and perceptions. Quantitative surveys cannot determine why interventions are succeeding or failing. However, open-ended probing interviews that follow a general outline, combined with direct and participatory observation can do so. The generalizability of findings from a limited number of in-depth interviews can then be determined by focus groups.

### **Effective nutrition and health interventions**

There are an increasing number of successful nutrition and health interventions. Iodation of salt for human consumption is a well established and effective method of preventing iodine deficiency disorders and is facilitating the global elimination of this major health threat.<sup>10</sup> Cereal fortification with thiamine, riboflavin, niacin, iron, and calcium has been routine in most industrialized countries for half a century and this measure is at last spreading rapidly to developing ones. Adding folic acid to the fortificant mix, as the USA has done, is capable of reducing the prevalence of neural tube defects.<sup>11</sup>

The most widespread and serious nutritional deficiency in the developing world is that of iron.<sup>12</sup> Two approaches are proving effective and should be promoted in all Asian countries. Iron fortification of wheat flour on a national scale has proved effective in Venezuela,<sup>13</sup> and is now being evaluated in a number of other countries. Weekly iron supplementation in school children, adolescent girls, and women of child-bearing age has proved effective in China,

Thailand and Kazakhstan on a fairly large scale. Other well-established and effective fortification includes sugar with vitamin A in Central America, margarine and milk with vitamins A and D, and water with fluorine.

Some supplementation programmes have proved successful. Periodic massive doses of vitamin A have prevented this deficiency in young children and lower mortality in this age group. I have already mentioned the effectiveness of weekly iron supplementation. I might have added iron supplementation of pregnant women, which is highly desirable but not sufficient when women enter pregnancy with moderate to severe anaemia.

Although it is axiomatic that dietary improvement is the way to improve nutritional status permanently, there are economic and social obstacles to this as a short-run approach in developing countries. The best example that I could find of a successful dietary approach to improving micronutrient status is the campaign to increase provitamin A intake in Thailand, emphasizing 'ivy gourd' and other locally available food sources of this vitamin.<sup>14</sup> The massive publicity, mainly in industrialized developing countries, about the dangers of dietary fat, particularly saturated fat and cholesterol, has had some effect in reducing levels of serum cholesterol and heart disease, but is having difficulty in combating the rising prevalence of being overweight and obesity.

#### Advances in agricultural research

The tremendous importance of agricultural research is well recognized. The 'green revolution' has made it possible for the cereal production of developing countries to keep up with or even exceed population growth. The contributions of the International Rice Research Institute (IRRI) in the Philippines alone have changed the rice production status of the South East Asian region. The Center for Wheat and Maize Research (CYMMIT) in Mexico has done the same for wheat and maize production. Other research units in the Consultative Group on International Agricultural Research (CGIAR) system and national agricultural research programmes continue to be essential for the welfare of rural communities in the region and the food supply of all countries. Animal husbandry and aquaculture research is also important for the present and future.

In the past the improvements in agricultural production, although often spectacular, have been largely quantitative. However, there are important new possibilities for improving the nutritional quality of basic food crops. The IRRI in Los Baños, the Philippines has identified a variety of rice with significant iron content and is breeding it into popular rice varieties. Efforts to increase the carotene of sweet potatoes have progressed at the Center for International Agricultural Research in the Tropics in Cali, Colombia. However, the best recent example of the power of traditional agricultural research to improve the nutritional quality of cereal grains is the development of quality protein maize for which two researchers in Mexico, Evangelina Villegas and Surinder Vasal, received the 2000 World Food Prize.

They began with a maize variety with a gene, 'opaque-2', that increased the proportion of the limiting essential amino acids lysine and tryptophan. Then over many years they developed a variety with this gene that was also high yielding and had excellent cooking properties. Moreover, its protein value was nearly equal to that of milk and soy.<sup>15</sup> At long last the importance of this development is recognized and the production of quality protein maize (QPM) is spreading rapidly in Africa and parts of Latin America. The difference in the growth of both non-ruminant animals and children consuming quality protein maize is quite remarkable. Adolfo and Miriam Chavez (pers. comm., 2000) have now completed an evaluation of this maize compared with ordinary maize when consumed by children in Mexico City and 14 other communities. Children in the QPM group had fewer illnesses and increased physical activity. Their improved cognitive performance is illustrated in Fig. 1.

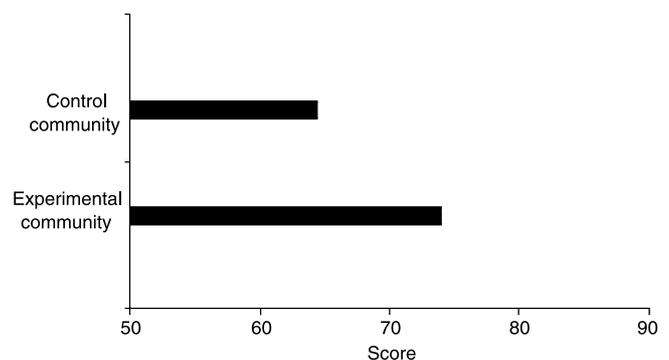
#### Advances in food technology

Although associated more with centrally processed foods, it would be a mistake to underestimate the potential contributions of food technology at the village level. For example, it can reduce post-harvest losses at the village level, preserve or improve the nutrition value of processed foods, and guide the development of low-cost, protein-rich weaning foods.

#### Potential of biotechnology and genomics

The potential of biotechnology and genomics is an important new topic that SEAMEO-TROPMED RCCN must recognize as of great future importance to food production and to health. The capacity to identify genes with desirable properties in one species and incorporate them into another species will not only speed up traditional plant and animal breeding programmes but also bring about improvements previously impossible. Because of gene splicing specificity and precision, its products are better characterized, more predictable, and safer than those made with conventional breeding techniques.

Better yielding and more disease-resistant transgenic maize, wheat, and rice are already in production. These techniques are being used not only to increase productivity and pest resistance but also to improve the nutritional properties of basic foods. The example closest to wide



**Figure 1.** Effect of quality protein maize on mental development (Bayley test in infants). Control community, 64.3 ± 4.2; experimental community, 73.8 ± 5.3.

application for improved nutritional value is the insertion of genes for the production of beta-carotene from a daffodil and a bacterium into high yielding rice. With no adverse effects on agronomic characteristics, significant provitamin A activity is conferred on rice. The IRRI in the Philippines is planning a large-scale programme to make the seed widely available throughout Asia.

What is truly new is that agriculturalists have begun the task of characterizing the genome of key food plants. Once the plant genes that control nutrient content are identified there is no barrier to inserting them into other plants without changing any other characteristics or posing a hazard to either consumers or the environment.

#### **Autonomy, land decentralization issues in Indonesia**

The topic of autonomy and land decentralization issues in Indonesia is outside of my competence. However, clearly these issues are fundamental to nutritional improvement of rural communities in much of Indonesia and other countries of the region. Problems of local autonomy and land tenure are sources of instability and make it difficult to overcome the poverty that is the cause of most malnutrition. Policies that prevent communities from taking initiatives to improve their lot help to perpetuate poverty and malnutrition.

Of course these are political issues, difficult for nutrition professionals to influence, but they are as important to nutritional improvement as more specific nutrition and health interventions. Nutrition professionals need to be advocates for policies that help rural communities. They have an obligation to be effective lobbyists, in the best sense of the word, to convince governments of the importance of actions on behalf of the nutrition and health of communities.

#### **International cooperation south–south**

The SEAMEO-TROPED RCCN and the Deutsche Gesellschaft für Technische Zusammenarbeit (German Ministry of Economic Cooperation; GTZ) have done an exceptional job of developing cooperation among the nutrition organizations and professionals in South-East Asia, the strongest of any developing country region. This has contributed importantly to the development of nutrition programmes and policies in the region. It has provided students for the academic programmes here in Jakarta and promoted exchanges of professionals in the region. The exemplary existing ties for participation in training and research activities among nutrition institutions in the SEAMEO member countries should be continued and strengthened.

There would be mutual benefit in establishing cooperation with a very few selected nutrition institutes in developing countries outside of the region. The Institute of Nutrition and Food Technology of the University of Chile, Santiago, Chile, the Institute of Public Health and the Department of Nutrition of the University of Morelos, Cuernavaca, Mexico, the National Institute of Nutrition in Hyderabad, India, and the Centre for Studies of Sensory Impairment, Ageing and Metabolism (CeSSIAM) in Guatemala would be useful partners outside of the region.

#### **International cooperation south–north**

The policy of inviting selected individuals from industrialized country institutions to participate in the training programmes of SEAMEO-TROPED in Jakarta has been very helpful to the training and research programme and should be continued. The support of GTZ not only with funds but also with highly competent nutrition professionals from Germany and The Netherlands has been a major contribution to the programme's success.

In addition, a few other industrialized country institutions would be sympathetic with and helpful to the programme, such as the University of California, Davis, California; Cornell University, Ithaca, New York; Wageningen Agricultural University, Wageningen, The Netherlands; and the London School of Tropical Hygiene and Medicine, London, England.

#### **Monitoring and evaluation**

Neither monitoring nor evaluation of programmes is a new approach. However, they need to be given new orientation and higher priority. Even when the efficacy of interventions has been established by well-controlled studies, there is no assurance that they will be effective when implemented on a large scale. Although programme evaluation receives lip service, it is rarely adequately implemented. Process evaluation is much easier and less costly than impact evaluation, but it is not sufficient to justify continuing expenditures on large-scale interventions. Unfortunately, it is very difficult, and sometimes impossible, to conduct a valid impact evaluation when adequate baseline observations are not available.

The intended beneficiaries of intervention programmes have a right to confirmation that their cooperation is worthwhile and those responsible for financing them need similar evidence. Thus after successful supervised field trials of an intervention, it is important that baseline studies on a representative sample of the population to be affected are carried out before they are implemented as a public health nutrition programme.

The major nutritional problems of the low-income populations of Indonesia and other countries of the region are iron deficiency, iodine deficiency disorders, and subclinical vitamin A deficiency. The effectiveness of programmes to prevent them can be assessed by changes in laboratory indicators from baseline laboratory observations. In the case of iron, tests of cognitive and physical capacity can provide additional information. All of these can most economically and sustainably be addressed by fortification of appropriate foods.

A reduction in chronic undernutrition is associated with an increase in physical activity. An important indicator of undernutrition in pregnancy is low birthweight, which can be readily assessed by change over time in the proportion of low birthweight infants.

Recent studies in Pakistan and China, to which I have already referred, indicate that subclinical protein deficiency can also be a problem. A programme to improve protein quality can best be assessed by change from baseline immunological parameters and perhaps in a rapid-turnover serum protein such as transferrin. It is not sufficient to evaluate programmes of nutrition and health education by

surveys of improved knowledge, there must also be determination of their effect on nutrition health practices.

All programmes need monitoring. Monitoring need not be concerned with impact, but it must assure that the process is being implemented as intended. For example, the iodation of salt was very effective in the 1960s in eliminating iodine deficiency disorders as a public health problem in Guatemala, yet a survey in the 1980s showed that it was no longer effective. The laws and regulations requiring salt iodation were still in place, but they were not being enforced and the iodine content of the salt was not being monitored by the health authorities. The cost of permanent monitoring needs to be built into the budget for any long-term programme.

### Human rights

The International Convention on Human Rights, to which nearly all countries of the world adhere, includes the right to access to food. Hunger and malnutrition are a violation of human rights. Governments have a moral, as well as economic and social obligation to stop the continuing physical and mental impairment of future generations by malnutrition. International human rights agreements generate a legal obligation for governments to take active steps to control nutritional deficiencies in their populations.

### Ethics

Too often researchers in both developing and industrialized countries have failed to take ethical considerations sufficiently into account in planning and conducting human population studies. Informed consent is essential and, if oral, should be obtained without coercion, witnessed and formally recorded. Every institution should have an institutional committee to review every project involving the use of humans as experimental subjects to ensure that their interests are protected. Subjects should not be exposed to any significant foreseeable risk. Moreover, all research involving the use of humans as experimental subjects should provide some benefit or potential benefit to all subjects (experimental or control). Although at the time the control group may receive no immediate benefit from the intervention itself, they can be provided with other perceived benefits. Under no circumstances must either the control or intervention group be at any known risk of harm. These principles should be part of all training programmes.

### Concluding remarks

In summary, I have commented briefly on a large number of topics that will be appropriate for the discussions to follow. I would like to pay tribute once more to Darwin Karyadi and all of the staff of the regional nutrition centre of SEAMEO-TROPMED for the achievements of the past 10 years and congratulate you on them. Previous directors of the programme also contributed importantly to its development and current success. It has been a great privilege and pleasure to have participated not only in the development of this programme, but also in a number of other missions on behalf of nutrition and public health in Indonesia.

Soekirman, during his many years at BAPPENAS, deserves great credit for the successful implementation of nutrition policies by the Government of Indonesia. I hope that nutrition is now so much a part of the consciousness of today's political leaders, that the current political and economic crisis will not in the long run jeopardize the remarkable progress that has been achieved in overcoming or reducing the burden of malnutrition on the population of Indonesia.

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