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OPERATIONAL AND APPLIED RESEARCH NEEDS  
FOR FOOD AND NUTRITION PLANNING

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**OPERATIONAL AND APPLIED RESEARCH NEEDS  
FOR FOOD AND NUTRITION PLANNING\***

A consensus has been reached, in recent years concerning the necessity for nutrition planning. International Organizations have insisted that each country develop its own nutrition policy and attempt implementation by coordinating the different sectors which have to do with food and nutrition systems.

It is now accepted that nutrition deficiencies, which affect to a greater or lesser degree all of the underdeveloped countries, are due to multiple causes which are interrelated among themselves and are interdependent. Malnutrition and undernutrition cannot be separated from poverty and misery. The first is the consequence of the second.

The success of nutrition planning in underdeveloped countries is closely related to the development of the necessary economic resources and their adequate distribution and utilization by the different parts of society. In recent years nutrition scientists have reached some measure of agreement that many millions of people in developing countries suffer from malnutrition, not because they do not know what to eat or not even because they cannot obtain the right kind of food but rather because they do not have means for obtaining enough adequate food.

The food system in underdeveloped countries is inefficient. Food production is scarce and marketing is rudimentary. Large amounts of food (in excess sometimes of 40%) are lost due to primitive food storage, preservation, or manufacturing practices. Biological utilization of food is hampered because of poor environmental sanitary conditions while scarce economic resources are misused because of inadequate nutrition understanding. A simple listing of the different

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factors which condition malnutrition demonstrates that the problem is multifactorial and that it cannot be solved with simplistic, unilateral approaches. Nutrition planning is necessarily required and it must be coherent with the global planning of economic and social development for each country.

The need for planning has presented a new challenge to nutrition specialists. Many have had to increase their horizons and face conditions which are different from the laboratory problems to which they are accustomed. As a first necessity, they have had to develop arguments to convince development planners that nutrition is an important goal. In each case it has been necessary to demonstrate that malnutrition and undernutrition constitute serious obstacles to social and economic development programs.

In order to develop a nutrition policy it is necessary to have an information system which is capable of providing a detailed evaluation of the situation and measures of the parameters which allow evaluation of change that may occur in the system as a consequence of the actions undertaken. It is necessary to know what is the real nutrition situation, which are the most important nutrition deficiencies, who they affect and what are their principle determinants.

Decision making requires information from the whole feeding system including potential and real food production in each country, the comparative production advantages of each region and changes in the international commodity market. It is important to evaluate the availability of human resources and the conditions of the food production, processing, storage, transportation and marketing infrastructure. It is also necessary to evaluate the degree of efficiency of the existing infrastructure and losses which occur in each step of the

system and to know the state of the food processing industry and factors which may be retarding its development.

Information is also required concerning food habits, beliefs and taboos which may interfere with nutrition. It is important to understand how foods are prepared and distributed within the family.

The urgency of nutritional problems demands direct intervention programs. Since resources are always limited it is indispensable that prior research on costs and benefits be carried out. It is necessary to analyse and compare interventions across sectors. It is also necessary to determine the feasibility of each intervention and to develop systems which permit evaluation of results. As programs cannot be separated from the community where they are carried out, it is necessary that methodologies be developed which ensure community participation.

The need for planning has increased the requirements for applied and operational research. At present, Latin American countries and bilateral agencies are spending millions of dollars in nutrition programs in spite of serious doubts about their ultimate benefit and utility. It is obvious that prior cost-benefit and feasibility studies and subsequent evaluation of results have been lacking. The shortage of applied and operational research has been the principal obstacle to the successful utilization of basic knowledge which already exists.

The United Nations Agencies have been developing procedures to assist countries in nutrition planning but the procedures have been highly theoretical and general and disconnected from the realities and decision-making groups in each country. It is essential that applied research be implemented

and accelerated in the developing countries to assure more rational and efficient use of increasingly scarce food and financial resources. The interventions which are now underway are almost always unrelated to research results and are not designed to generate information which can be used for evaluating the effectiveness of these interventions.

Gaps which must be filled in order to reach an adequate research level.-

A. Perhaps one of the most serious problems in reaching an adequate level is that many governments remain unconvinced of the necessity and utility of research. Many times questions like this appear -"Why bother with complicated research", and "why not simply concentrate our attention on getting more food to the people who suffer from severe malnutrition?"-

It is difficult to convince governors and decision makers that the problem is not so simple. If the etiology of malnutrition is not understood, the identification of alternative interventions which are reliable and efficient is not possible.

For example, in Chile simple questions such as this were responsible for the development of extensive free milk-distribution to infants and preschool children. Several hundred millions of dollars have been spent during recent years and still malnutrition exists. Many reasons have been identified to explain why the desired effect was not achieved. All of this could have been foreseen if prior research had been undertaken or if the nutritional results of the programs had been evaluated periodically. Huge resources have been lost and what is more serious, time has also been lost by not giving sufficient importance to applied and operational research and it will be difficult in the future to obtain the necessary funds and facilities in order to carry it out.

B. Another factor which has impeded the development of research has been political pressures which cause decision makers to ignore research and the possibility of seeking alternative interventions. For example which intervention is more cost effective in reducing malnutrition, the free distribution of milk or the improvement of environmental sanitary conditions, or perhaps the development of a nutrition education program? The question is difficult to answer because the necessary research has not been undertaken. Nevertheless, for political reasons the first intervention was adopted.

Many Latinamerican countries have developed extensive school lunch, and breakfast programs, completely forgetting the preschool and nursing child. Apparently, this decision was made primarily on political criteria. In order instances we have seen that intervention programs have been most used by the socioeconomically well off and have not reached those groups which exist in extreme poverty. The first of course are able to organize themselves and bring pressure politically. The poor have little political weight and research in these cases may be avoided.

C. On other occasions aid programs of the United Nations Agencies and other donors interfere with scientific development. These agencies impose programs which are accepted a priori as adequate and impede or retard research in the various countries where they are undertaken.

D. Perhaps the most serious limit to scientific development is the lack of manpower. Even when countries want to expand their nutrition interventions, they face serious shortages of managerial talent. The manpower problem is even more severe in expanding nutrition research. The complexity of food and non-food factors affecting nutritional and health status is such that nutrition research capabilities must encompass multidisciplinary work. While basic research

can often be carried out entirely within single disciplines of science, applied research must be multidisciplinary. In Latinamerica there are very few institutions which can attack multidisciplinary problems. Nutrition interventions frequently require knowledge of biochemistry, medicine, anthropology, sociology, economic, engeneering, agronomy, food technology and marketing. They also require a leader who can integrate these disciplines, who has a global view of the problem, who can form a cohesive team with common goals and who enjoys taking risks.

Applied research must necessarily be undertaken in all countries two or three regional centers are not enough. Each country must approach its different problems and work out their solutions in the field.

In Latinamerica the scarce human resources which are capable of undertaking research are found almost exclusively in the universities. Unfortunately, they are separated from each other by the various faculties and can only join together for coordinated work with considerable difficulties.

Perhaps the first requirements for increasing applied research in nutrition, is the development of research institutions where multi sectorial research is possible. Wherever the human resources exist such an institution should be promoted or created. There are presently several of such centers which depend to some degree on international organizations. Obviously they have made important scientific contributions but have had only limited impact in applied and operational research. Many of the researchers are international employees who cannot or do not wish to take the risk of committing themselves to the solution of problem in that country but rather prefer to restrict their work to strictly scientific and academic pursuits.

E. Finally, one of the most common, practical difficulties in applying nutrition science to nutrition interventions has been the separation between researchers and those who are responsible for applying the research. The first, in general are scientists, the second are government employees. The separation has impeded the development of programs and has tended to place the two groups in antagonistic positions. This can only be avoided by trying to join the two positions through common objectives, which is not easy

#### Suggestions for research priorities

Nutrition planning requires the constant and adequate flow of information in order to make decisions. Without a doubt the first research effort should be directed at the development of an efficient information system which can satisfy this requirement. Based on this information, alternative interventions can be divided in two large groups: those interventions which affect the nutritional status indirectly or those which affect it directly.

Examples of the first group are those which are destined to increase family purchasing power or those which will increase the general level of education or control infectious diseases (vaccination, improve sanitation) or those which will increase the availability of food generally (agricultural development, agrarian reform, agroindustrial promotion, farm credit, price supports, etc.) or those which will reduce losses (improved food preservation, transportation, storage or processing), or finally those which will have an impact on food import or export policy.

The direct interventions are those which are aimed specifically at improving the nutritional situation of high-risk groups. These include treatment, and rehabilitation of the malnourished; complementary feeding; promotion of breast feeding; distribution of nutritional supplements and food fortification.



These direct interventions are more related to the health sector and therefore merit our first attention in this XVI Meeting of the Advisory Committee on Medical Research. Indirect interventions most affect areas outside of health, such as Finance, Labour, Social Welfare, Education, Industry, Transportation, Community Development, Agriculture and Rural Development.

Which of the direct interventions should be of first priority?

We cannot answer this question with our present knowledge but rather must analyse the various costs and benefits of each intervention. Nevertheless, in view of the seriousness of the problem, it is necessary to take acceptable risks and act in the face of insufficient information. Decision cannot be postponed even though experts hedge their findings with sentences like this: "but we need to know more" or "we cannot be absolutely certain". Once an intervention has been selected and implemented its nutritional results should be evaluated in parallel so as to be able to make the necessary modifications.

Given the need to indicate priorities, I offer the following enumeration of possible interventions based solely on my personal experience and without cost-benefit studies to support it with this limitation, I will suggest that greatest effort should be made in those interventions which are aimed at preventing protein-calorie malnutrition rather than those aimed at treatment.

As a second priority I would suggest intervention which are aimed at specific nutritional deficiencies: a) iron and folate deficiencies; b) iodine deficiency; c) Vitamin A deficiency; d) fluoride deficiency.

Finally, as a third priority interventions should be researched which aim at eliminating nutritional alterations caused by nutrient excess: Obesity, diabetes, arteriosclerosis.

a. Interventions which are aimed at preventing protein-calorie malnutrition.

a.1. Promotion of breast feeding. In recent years a rapid reduction in breast feeding has been observed in most Latinamerican countries. This has a direct impact on protein-calorie malnutrition during the first year of life. Interventions which prevent this reduction or stimulate breast feeding must be researched urgently. This will require prior applied research in order to avoid failure or poor results. The following stages of research might be suggested:

a.1.1. Estimation of the present situation and future tendencies which will provide a clear picture of the true urgency of the problem.

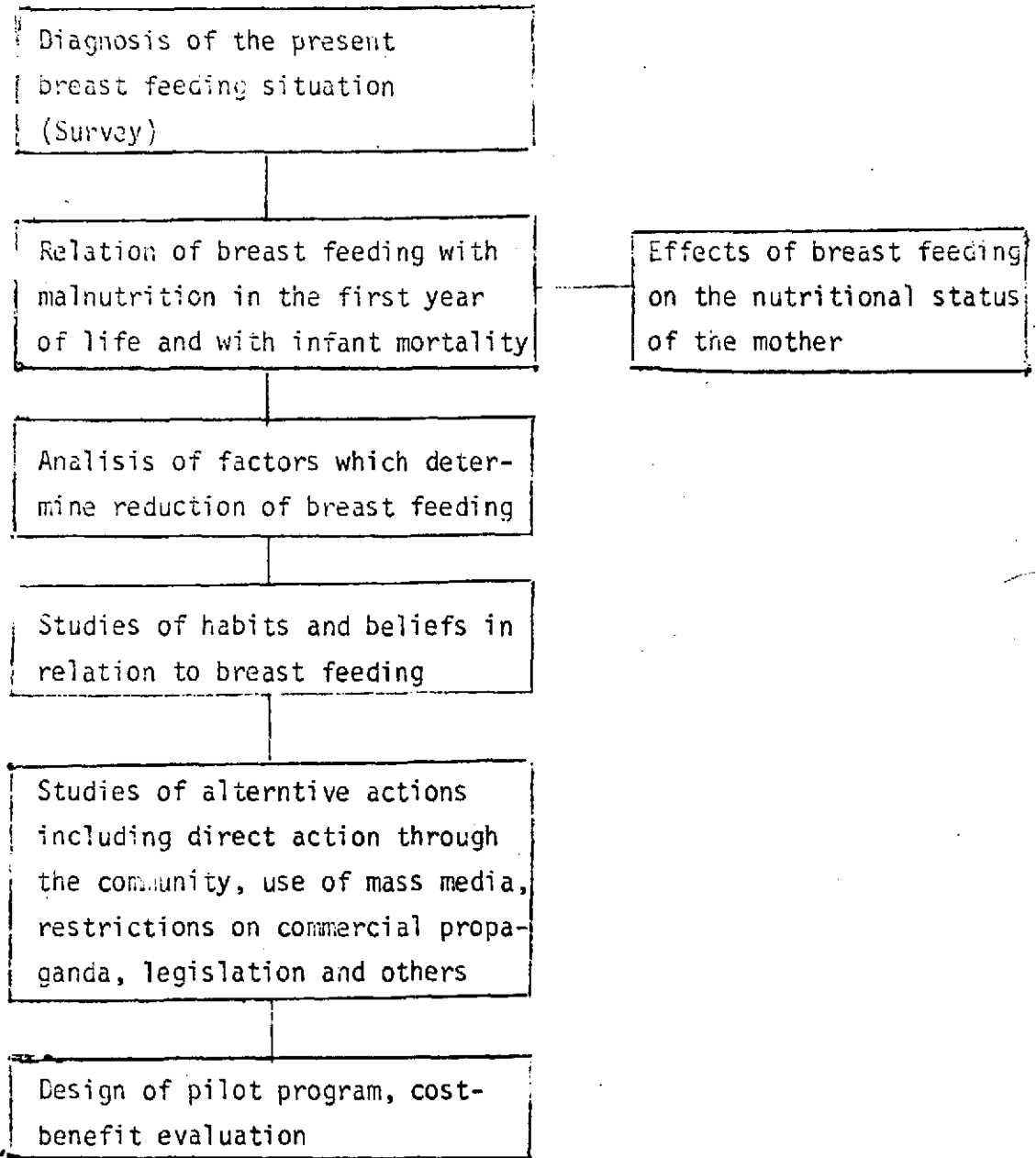
a.1.2. Relation between breast feeding and malnutrition in the first year of life. This will provide valuable background for convincing decision makers.

a.1.3. Study of factors which determine the reduction in breast feeding. This is necessary in order to develop an appropriate strategy.

a.1.4. Study of habits and beliefs in relation to breast feeding. This is important in order to develop programs which may correct mistaken beliefs and habits.

a.1.5. Studies of alternatives. With all of the preceding steps it will be possible to design a pilot program in order to select the most effective methods. This may include direct work with the community, use of mass media communications, restriction of commercial propaganda or legislation which permits and stimulates breastfeeding.

Stages of Research Necessary to Design a  
Breast Feeding Intervention.



a.2. Production and distribution of low-cost weaning food. It is almost a rule without exception that the greatest frequency and incidence of protein-calorie malnutrition is found in the first four years of life. A priority intervention therefore should be aimed at this specific age group. One of the possibilities for action is the production of a low-cost weaning food.

Almost every country has made efforts to develop low-cost weaning foods. In spite of this there are few countries where such a program has been successfully implemented and none where the nutritional results have been evaluated. Perhaps one of the most significant reasons for these situations has been that insufficient operational research was carried out prior to the implementation.

It is not enough to research the most appropriate formulation of weaning foods; the entire system which will ensure that the food is accepted and consumed by the child must also be studied. This requires research into a variety of aspects of the system such as follow:

- a.2.1. Research into raw materials which are already produced in the region or can be produced with minimum effort.
- a.2.2. Research into the biological value of the protein.
- a.2.3. Research into possible toxins which may be contained in the raw materials.
- a.2.4. Research into the biological value of the protein for the target group which will receive the mixture as its sole source of protein.
- a.2.5. Research into technological processes involved in production, considering the cost and digestibility of the product.

- a.2.6. Acceptability study among preschool children.
  - a.2.7. Studies of food habits among the target population in order to take advantage of those which will assure that the product is fully consumed by the child.
  - a.2.8. Studies of mothers attitudes in order to detect her desires for a weaning food and in order to develop an adequate marketing strategy.
  - a.2.9. Pilot market studies. Even though the product may be distributed free, it must demonstrate its viability in the market. The concept of "food for the poor" must be eliminated as a basic step in assuring its acceptability.
  - a.2.10. Pilot studies of the final product and system with the objective of testing logistics, acceptability and evaluating the nutritional impact.
- a.3. Integrated care program for preschool children in impoverished urban areas. Experience has shown that it is difficult to prevent malnutrition in population groups whose social, economic and cultural levels are very low, even though food may be distributed free for consumption by the children. On the other hand numerous studies have shown that poverty produces damage to the individual which reduces his physical as well as mental capacity. This sociogenic damage is produced not only by malnutrition but also by other conditions of poverty (lack of cultural stimulation, lack of affection, lack of security, reduction in self esteem). This damage is difficult to repair if action is directed only at children in elementary school. In Latinamerica only 20% of those children who begin primary school actually finished it. The main cause for this drop-out rate is the sociogenic damage

which limits the capacity of the child to respond to educational demands. From these considerations it is possible to conclude that sociogenic damage must be prevented in these children. In order to achieve this, it is necessary to study the possibility of developing a program of centers where education and psychomotor stimulation of preschool children can be provided together with adequate feeding and through which the impoverished environment of the child may be dealt with.

It is necessary to develop pilot programs which show the way to optimizing such a system, defining the curriculum, preparing the staff, and reducing costs. These centers should be located in places where the families can be attracted to participate. Finally, results should be evaluated with cost and benefits calculated for these and other, similar programs.

a.4. Treatment and recuperation of malnourished children.

While it is true that children with serious malnutrition are not numerically important (1 to 2%), nevertheless they constitute a serious load for the health-service. They require constant medical attention and often hospitalization with its attendant high cost. Risk of death in this group is particularly high, even in the hospital.

Everything seems to point to a solution to this problem through the development of an integrated treatment system, which provides feeding, affection and stimulation, and which takes into account the family group as well.

In order to achieve such a system the following steps of study must be undertaken:

a.4.1. Evaluation of the problem. Percentage of children with serious malnutrition, age incidence, socio-economic situation, education and cultural

level of the parents.

- a.4.2. Prognosis of children with severe malnutrition. Risk of death, possibilities of recuperation using conventional treatment.
- a.4.3. Determination of the actual cost of health services which are presently being provided to children with severe malnutrition.
- a.4.4. Design of alternative pilot projects which take an integrated approach to the problem and include the childrens families.

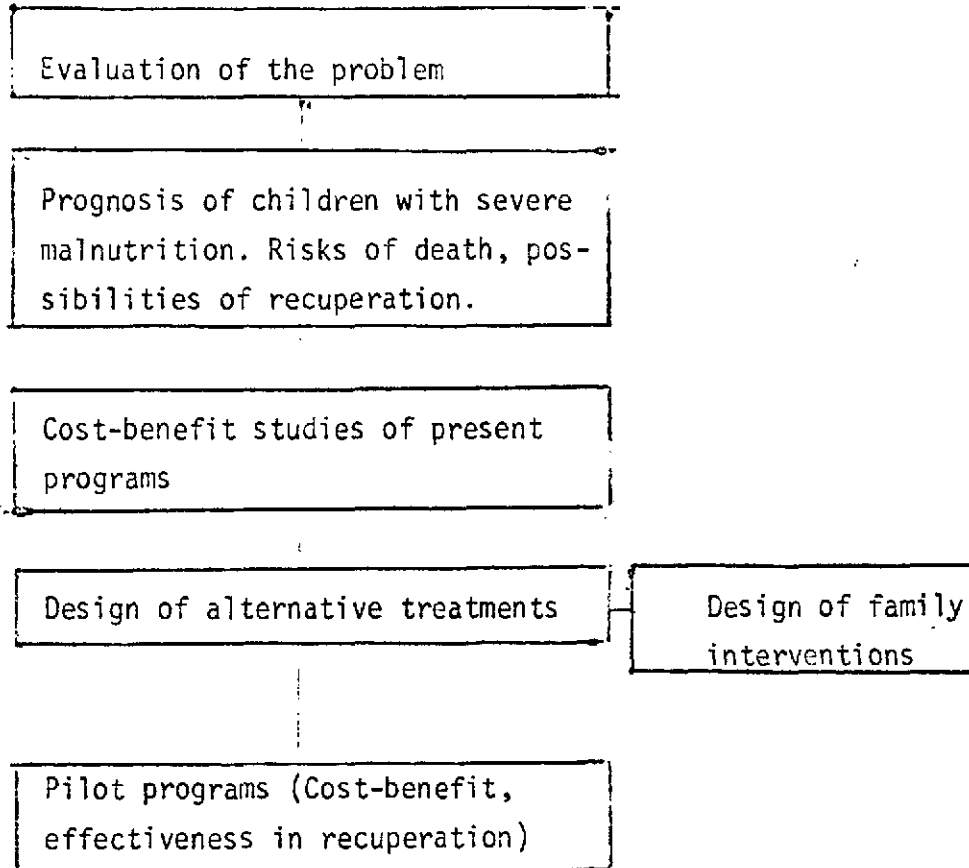
a.5. Programs of family planning.

Numerous studies have shown that in the lower socio-economic strata, there is a close relation between the number of children and their nutritional status. The same studies have shown that the younger children of large families in the lower socio-economic levels have the worst nutritional status and are at greater risk of death.

It is also apparent that excessive demographic growth has reduced development possibilities and therefore the well-being of these families. A doubling of population in 20 years can demand, for example, the doubling of investment in social services in the same period as well as the doubling of the food requirements which are only barely being met at the present.

Applied research must be undertaken which will lead to overcoming political or religious restrictions on family planning. Operational research programs at the pilot level are also indicated.

Research Stages in the Development of a Program  
for Recuperation of Severely Malnourished Children





a.6. Intervention programs which increase local food production, either in rural or urban settings.

One of the alternatives for improving nutrition is the optimization of subsistence agriculture by the small rural farmer or in marginal urban zones.

This strategy will require the development of new technologies which allow food to be produced utilizing intensive methods on small plots. It appears possible that production costs can be reduced through reduced fertilization (achieved by using composted garbage) or water, while at the same time achieving maximum production from presently underutilized labor.

It is also necessary to devise new techniques for increasing the receptivity of the community to these new ideas and to provide them with production incentives. Finally, the nutrition effects of such a production program must be estimated and its costs and benefits calculated.

b. Interventions aimed at correcting specific nutritional deficiencies.

As a second priority, applied research should be undertaken to eliminate specific nutritional deficiencies. The most frequent of these are iron, vitamin A, iodine, and fluoride.

Many of these deficiencies have been sufficiently studied by the international organizations and numerous recommendations have been made concerning them. Nevertheless, in the circumstances of underdevelopment, adaptations are required which make these recommendations operational.

b.1. Iron deficiency. Various studies have demonstrated the high frequency of iron deficiency (80%) or nutritional anemias. It has been shown that iron deficiency can produce not only anemia but also interfere in diverse

metabolic processes which may affect immunological status and perhaps even intellectual capacity.

Elimination of these deficiencies requires applied research. It is known that the degree of absorption of iron is low and that this interferes with its successful oral administration. Many factors influence iron absorption which should make it possible to develop new compounds which make absorption more efficient. This requires applied research.

Iron could be added to foods which are principally consumed by infants (such as milk) and thereby correct this deficiency. The addition will require both technological and operational studies. As a final step pilot studies must be carried out in selected population groups.

- b.2. Vitamin A deficiency. This deficiency contributes to a series of problems leading not only to blindness (keratomalacia), but also to alterations of the mucosal membranes and interference with normal growth. Enrichment of sugar with vitamin A has been recommended; nevertheless other alternatives should also be studied which might be more efficient.
- b.3. Iodine deficiency. Iodization of salt has been recommended as the preventive measure of choice. Nevertheless in some countries, in spite of the implementation of these measures, goiter has not been eradicated. This is probably due to the fact that salt is often consumed which is produced locally and therefore not iodized. Further research is necessary in order to identify other alternatives which are better adapted to local requirements.
- b.4. Fluoride enrichment. The addition of fluoride to potable water has been widely recommended. Nevertheless, in underdeveloped countries only a small percentage of the population has access to potable water. Further-

more, only a small fraction of potable water actually enters the human body thus reducing the efficiency of this intervention. Additional alternatives should be investigated which take these questions into consideration.

The programs of direct nutritional interventions which have been discussed here are certainly not exhaustive. I have merely enumerated them as examples of possible programs for applied and operational research in support of food and nutrition planning.