HEALTH RESEARCH

NUTRITION RESEARCH
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1. INTRODUCTION

In October 1988, the Advisory Committee on Health Research (ACHR) of WHO was asked to help to answer two fundamental questions in support of the attainment by WHO and its Member States of the goal of health for all:

- how can research contribute to the promotion of healthy nutrition and to the prevention and control of malnutrition?
- how can WHO's health research strategy promote those lines of inquiry that will best address the priority nutrition issues of its Member States? ¹

In fact the Subcommittee on Health Research Strategy had made recommendations to the ACHR based on the views expressed by the late Pr Mc Keown "on the necessity to accord top priority to research on nutrition, immunization and water and sanitation, among the elements of primary health care. In view of the recent improvement in water supply and sanitation and in immunized coverage thanks to large-scale world wide efforts, the Subcommittee recommended that ACHR should support the expansion of research activities in nutrition, as an important strategy for achieving maximal effectiveness in primary health care. Research in nutrition has great potential for the promotion of health and for the control and prevention of communicable and non communicable diseases in all professions and at all ages". This recommendation was endorsed by the ACHR ². It was agreed among other considerations that a nutrition research strategy would have to take into account:

- the guidelines to be provided by WHO in encouraging appropriate research on food policies, diet and health;
- the identification of critical orientations and influences in nutrition research;
- an assessment of regional nutrition research priorities; and
- a realistic evaluation of the resources required to carry out the research.

The general objective of this document is not to present a global strategy for nutrition research for WHO but rather to lay the floor for the identification of elements of strategies which may be more specifically elaborated in relation to countries and regions. The purpose is to provide sufficient information to stimulate the debates during the Technical Discussions which will permit later on to develop a framework for nutrition research.

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Readers should be reminded that it is in relation to the Strategy for Health for All by the Year 200 through primary health care that research should be looked at. Even if detailed investigations of a biochemical dietary and behavioural kind are likely to be needed, broader efforts should be allowed to the strengthening of national research capability.

2. THE NUTRITION PROGRAMME OF THE WORLD HEALTH ORGANIZATION

2.1 Introduction

The term malnutrition describes a number of conditions, each with a specific etiology derived from an imbalance at cellular level between the supply of one or more nutrients, and the body's need for them to ensure maintenance, function, growth and reproduction. The body's immediate response to an imbalance is adaptation through physiological mechanisms that decrease need or storage or elimination in case of excess. If an imbalance is severe or prolonged, the adaptation mechanisms fail and signs of nutritional deficit or excess begin to appear.

Nutritional status is the mirror image of health and one of its most accurate indicators, while diet is one of its prime determinants. The factors that determine health and nutritional status are not only present within the individual; they are also reflected in the social, geographic, political and economic environment. Thus, indicators of the nutritional status of certain population groups collectively are an index of the health and welfare of communities and countries as a whole.

Some factors facilitate or limit the flow of nutrients from production to its final utilization. They are present in a wide range of levels from the international to the specific tissue component; from the society as a whole to the individual characteristics. Among them are:

(a) National food availability. Exports and imports of food, the economic capacity of the country influencing its capacity to trade.

(b) Family food availability. In the presence of sufficient quantity and variety of foods purchasing power and food habits are the principal responsibilities at the family level.

(c) Individual food availability. Food distribution within the family is determined by individual choice and, in the case of children and the infirm, by the caretaker's judgement. Time available for those in care becomes a critical factor as does convenience according to a family's specific circumstances.
(d) **Food consumption.** In addition to the above points, an excess or deficit in the quantity and mix of foods can be influenced by individual decision, habits and practices. Diseases in general, and infectious diseases in particular, have a profound impact on the appetite as does the immediate psychosocial environment. Exclusive intake of some foods, as well as the elimination of others, generate significant limitations in dietary quality.

(e) **Food digestion and nutrient absorption.** The integrity of the digestive tract, anatomically and functionally, determines the fate of ingested food, together with the interaction for some nutrients with the quantity of that nutrient already stored in the body.

(f) **Nutrient losses or increased requirements.** Abnormal losses can occur in renal, hepatic and gastrointestinal pathology. Infection and fever can produce abnormal metabolic responses and increase energy and nutrient needs. Cold and exercise increase the need for energy and certain nutrients. By the same token, exercise also contributes to the integrity of certain bodily tissues.

(g) **Physiological processes.** Pregnancy, growth and ageing produce changes in the metabolic processes leading to either a reduction or an increase in needs. Genetic or acquired metabolic diseases can lead to nutrient imbalances.

Anthropometric indicators of body mass and children's growth, which are commonly used to assess nutritional status, are able to detect an imbalance of energy and nutrients in relation to need. They are unable to show, however, which factor or combination of factors are responsible for changes in body mass among individuals or in the population as a whole. Only by assessing the possible causal factors and the feasibility of different intervention options will it be possible to determine what actions it is necessary to take and in what sequence.

Growth retardation and changes in body mass are a reflection of the health status of individuals and communities. Environmental factors - social, economic, political, fiscal - influence lifestyles, diet and morbidity rate, which are the immediate causes of body mass or growth fluctuations.

### 2.2 The Nutrition Situation in the world

Significant improvements in human development have taken place worldwide since 1960. However, this global picture hides the fact that conditions in some countries, or among population groups within countries, have improved at a much slower pace than in others or not at all. Global improvements can be documented in:
(a) **Food availability.** Whereas around half the world's population in 1960 had fewer than 1900 calories per caput per day, today more than 90% of the total population has more than 1900 calories. In contrast to population figures, the trend for a number of countries indicates a slower rate of increase for food.

(b) **Literacy.** The literate population has more than doubled since 1960 for both sexes, from an average global figure of 50% in the 1960s to around 70% in 1985 (UNESCO). Primary school enrolment is close to 100% in most of the world with the exception of some countries, particularly in Africa and a few in Asia.

(c) **GNP.** Global trends in GNP show large increases. However, when the changes are evaluated by region, most of the gain has been made in industrialized countries and the Middle East.

(d) **Water supply and sanitation.** Most of the improvement has occurred in urban agglomerations that have expanded their systems to meet the needs of growing populations. Rural coverage has improved largely in Asia, Latin America and the Middle East. For the world as a whole, the population with access to water supply and sanitation has more than doubled since 1960.

(e) **Causes of death.** Whereas the primary cause of death in the 1960s was infectious disease, mortality trends now reflect a significant increase in diet-related health problems.

(f) **Death by age group.** As a result of these improvements, mortality has significantly decreased for the world as a whole in all age groups, thus fueling the population explosion. Family planning acceptance has been steadily increasing, however, with the result that some of the projected population increase has not occurred.

In addition to the general improvement in human welfare, physical growth and body mass have undergone significant changes:

(a) **Weight deficit.** The distribution of children's weight during the 1960s showed an average of 24% (3.5-81.7) of weights falling below -2.5 Standard Deviations (S.D.) from the mean. Some reports demonstrate that the mean was around the 15th percentile of the Harvard reference. Today, the bulk of reports show a distribution where 14% (0.5-28%) of the weights are between -2 and -3 S.D. The majority are nevertheless stunted children, who nevertheless have appropriate weight-for-height.

The proportion of children with a weight-for-height deficit of between -2 and -3 S.D. (expected proportion: 2.4%) and low birth weight (<2500 g) is less than 10% for the world as a whole. In a few countries in Africa, 10-20% of children are in this category.
A proportion of more than 20% is found in parts of South-East Asia and in some countries in Africa.

(b) **Stunting.** Incidence of short stature remains widespread throughout most of the world, although some positive trends are documented in countries with very large populations.

(c) **Obesity.** The combined effects of the improved overall health situation, education and increased food availability, associated in time with short stature, are generating conditions for excess weight among populations in both industrialized and traditional societies. This tendency, coupled with more sedentary and high-risk lifestyles, is modifying the causes of mortality and resulting in increased premature disability and death.

(d) **Specific nutrient deficiencies.** Iodine deficiency disorders were prevalent in all regions of the world in 1950. Today, this deficiency is controlled in Europe, most of the Americas and most of the Western Pacific. Increased attention has been given to this problem in Africa and South-East Asia in the last five years. Deficiencies in vitamins B₁, D, and C have been controlled in most parts of the world.

Where Vitamin A is concerned, a significant effort is being made at present, and signs of a decline in this deficiency have been documented in some countries.

The global strategies for accomplishing these goals are complicated, as implied by the situation and trends described above. It is clear that, for some deficiencies, supplementation and enrichment strategies are extremely effective when the food distribution or health service infrastructure are sufficient to bring the supplementation to the entire population, for example through salt iodization.

By far the most effective health service strategies for the prevention of malnutrition are the prevention and case-finding of infectious diseases, the improvement of environmental hygiene, family planning and the increasing of awareness of the health risk for unbalanced diets and certain lifestyles.

2.3 **Nutrition in the context of WHO’s general programme of work**

The nutrition policy of the World Health Organization must be seen in the light of its mandate: the two overriding concepts that govern the work of the Organization (HFA 2000 and PHC), the capacity of its Member States, and the nature of the problem. A basic policy premise is that the health sector, while not able to cope with all the causes and contributing factors of malnutrition, has a vital direct and indirect role in its prevention and management.
WHO seeks to protect and promote healthy nutrition - from conception, through adolescence and into adulthood - by increasing awareness of the main types and causes of malnutrition, their effects on the human organism, and means to overcome them; and by supporting countries to improve their technical and managerial capacities to prevent, detect and manage malnutrition. It accomplishes this chiefly by helping them to:

(a) prevent disease and other conditions that diminish appetite and interfere with nutrient absorption and use;

(b) prevent health problems arising from dietary excess and inappropriate lifestyles;

(c) prevent deficiencies of specific nutrients including vitamins, minerals and trace elements;

(d) detect early, and manage effectively, health problems that are associated with dietary imbalance and poor growth performance;

(e) encourage sectoral approaches - and intersectoral cooperation - to prevent and manage the many health and non-health factors that determine nutritional status;

(f) contribute to food security by maintaining a population stability through family planning, by minimizing food wastage caused by infectious diseases and obesity and losses through food spoilage and contamination, and by increasing the use of available foods such as breast milk and the rationalization of food distribution to those in need through food aid programmes.

WHO's targets for nutritional indicators are based on the assumption that the progress achieved in non-health areas such as education, food production and availability, and improvements in income and infrastructure, will continue; that trends in the improvement of environmental sanitation and prevention and management of health problems will continue at least at the same level; and that the emergent diet and high-risk lifestyles can be prevented.

Some of the activities of WHO's many health science and technology programmes that contribute to healthy nutrition are summarized in Table 1. To these must be added the work of several other WHO programmes, which also have a direct impact on nutritional status by virtue of their contribution to a healthy environment or to prevention and control of communicable disease. These latter programmes include community water supply and sanitation, environmental health in rural and urban housing, control of environmental health hazards, immunization, malaria, parasitic diseases, and acute respiratory infections.
3. NUTRITION RESEARCH

3.1 The developmental context of trends in nutrition research

The history of attempts to cope with malnutrition during the last fifty years ranges from an essentially medical/clinical approach to today's more common intersectoral development orientation. While the former stressed detection and management of malnourished individuals, the latter relies on a combination of factors to prevent and control malnutrition in entire populations. These include a more equitable distribution of resources, especially food, within and between families, communities and countries; expanded purchasing power and production possibilities; increased availability of relevant information, education and training; and improved access to health and other social services.

No single sector has the capacity to act fully and effectively on more than one or two of the factors that, collectively, determine nutritional status. An intersectoral strategy thus emphasizes the interdependence of a variety of actions to prevent and manage malnutrition and the importance of a holistic approach to developing national food and nutrition policy. The Green Revolution, for example, demonstrates that adequate total food production is, by itself, no guarantee that sufficient food will be available for all. An approach to food distribution based on equity, combined with poverty-alleviation programmes that are themselves linked to balanced rural development, are vital additional components of national food and nutrition policies everywhere. Similarly, measures designed to generate income on behalf of persons living at or near the poverty level will not automatically provide maximum nutritional benefit if nothing is done, say, through health education to influence the way in which increments in disposable income are used.

Fashions in nutrition research, not surprisingly, have tended to mirror closely the evolution in operational approaches to the prevention and control of malnutrition. Thus, some four or five decades ago clinical, pathological and biochemical studies dominated the scene given the need to know and understand what happens when people are undernourished. For example, the numerous studies undertaken on such deficiency disorders as beriberi, scurvy and keratomalacia testify to a pattern of research that was linked to the single-cause/single-effect concept of malnutrition detection and management then in vogue. Later research was designed to improve understanding of the epidemiology and development of malnutrition, the control of this condition being its ultimate objective.

Applied research very slowly gained prominence over the years as momentum built for the practical use of knowledge, old and new, through appropriate programmes for the prevention and control of malnutrition. This evolution occurred almost exclusively in industrialized countries, however, and then primarily in a clinical context, where conditions provided a favourable base from which to
conduct applied research and to evaluate its efficiency and effectiveness. This is not surprising given that the most prestigious research institutions and, consequently, influential priority-setting and peer-review bodies, authoritative journals and financial backing were all heavily concentrated in this same group of countries.

3.2 Definition

In order to develop any relevant research policy congruent with a national health policy a consensus should be reached on a clear definition of the research concept. If we refer for instance to the definition proposed by the NIH \(^1\) of nutrition research, emphasis is put more on individuals than on collectivity and that is understandable given the needs for basic or fundamental research in highly developed countries. NIH's definition of nutrition research reads as follows: "The term nutrition research includes studies designed to assess the consequences of food and nutrient intake and utilization in the intact organism, including humans and the metabolic and behavioural mechanisms involved. These studies encompass investigation of nutrient variables at the cellular and subcellular level. This definition also includes:

- Research designed to understand the metabolic role or function of nutrients in both animal models and humans.
- All studies concerned with genetic-nutrient environmental interaction where a nutrient is a variable.
- Dietary studies expected to produce significant changes in health status including the maintenance of health and the treatment in humans. Such studies might include clinical trials, epidemiological studies, surveillance and nutritional status monitoring studies".

From a public health point of view, which is not contradictory to the above definition particularly in its last paragraph, the basic justification for nutrition research is to be found in its contribution - past and potential - to the control of diseases and the promotion of health. There is increasing evidence both from developing and industrialized countries that a good diet is a prerequisite to good health. Understanding this role and finding means to enhance it necessarily require additional knowledge to be created by scientific research in many disciplines - including the discipline of nutrition itself. Nutrition research is needed among other reasons:

- for answering practical problems: basically for providing elements for decision making relation to programmes and projects (choice of the most appropriate course of action, allocation of resources, evaluation etc). Examples: rural

development, PHC, control of specific deficiencies diseases, educational programmes;
- for policy formulation;
- as a contribution to health systems research: it adds to it an often neglected and basic dimension;
- for assessing nutrient and diet related problems and understanding their main causes and contributing factors;
- for validating the use of nutrition as an indicator of well being and social progress: the meaning and implications of its use as an indicator may vary widely between places and types of societies (ex: the use of growth monitoring and/or anthropometry in assessing the effects of readjustment policies);
- for the strengthening of higher education, including the promotion and implementation of the interdisciplinary approach in research and teaching.

3.3 General constraints

It must be recognized that there are a series of constraints that interfere with, or limit the capabilities to perform nutrition research, and this applies also to other forms of research. These are more common in developing countries, but some constraints also apply to developed countries. They include the following:

- Insufficient human resources with scientific knowledge and technical skills to generate and execute research projects. This is largely due to inappropriate training and inadequate motivation in terms of recognition, job security and economic incentives.

- Insufficient financial and technical support.

- Lack of consistency and continuity in pursuing a line of research. This is often a consequence of insufficient local scientific manpower and insufficient financial resources.

- Inaccessibility of background information (bibliography, technical documentation, knowledge of available instruments and their specification).
- Technological constraints due to lack of equipment, special supplies or physical facilities.

- Imperfect technologies that do not allow precise measurements or that cannot be used under field conditions.

- Lack or inadequacy of nutrition research policies at different levels. More specifically, in absence of coordination, the interdisciplinary nature of nutrition produces a diluting effect on research activities within other programmes, and it decreases its visibility.
- Difficulties in disseminating the results of research. This could be due to editorial biases in some journals or to inadequate description of the research.

- Vested economic and political interests that hinder specific research areas or topics.

- Lack of coordination between different sectors or researchers that otherwise would allow the pooling of resources and facilitate the investigating topics of common interest.

Taking into account the needs and importance of nutrition research in both developed and developing countries, and the limitations that must and can be overcome, it is evident that WHO can play an important role to promote and facilitate the execution, interpretation and application of nutrition research.

3.4 Major influences on nutrition research in developing countries

There are two distinct, if conflicting, trends in contemporary nutrition research as regards developing countries. The first is a marked shift away from merely repeating what has been done elsewhere in favour of achieving greater national "relevance" by striking out in new directions. At the same time, however, traditional research institutions in developing countries too often pursue lines of inquiry that are more relevant to assumed needs, as seen from the vantage point of cooperating counterpart institutions in industrialized countries, than to real needs as determined in the countries themselves. This diversion of scarce research expertise is but one of a number of negative aspects of the continuing ascendancy of nutritionists and their institutions in the latter group of countries over researchers and their "product" in the former.

3.4.1 Technical orientation

Most nutrition researchers in developing countries, including those receiving support from organizations and bodies of the United Nations system, have had their basic or advanced training in industrialized countries. These researchers are typically engaged in work that is most directly relevant to the countries in which they have been trained. Meanwhile, the skills they have developed and the methods and equipment they are using are often too complex or costly for application in their own countries.

After returning home, it is understandable that these researchers continue to work in the subject areas in which they have been trained. They thereby ensure institutional affiliation with their peers in industrialized countries, opportunities to participate in periodic refresher courses there, and, in some cases, access to direct technical and financial support. Having worked on such topics as the latest techniques of bioenergetics, the enzymatic role of
B-complex vitamins, or the physiological and biochemical role of dietary fibres in regulating lipid metabolism, it is not surprising that researchers from developing countries eschew work on fundamental, but decidedly less glamorous, problems of pressing national importance. Though continuing to reside in their own countries, they are no less a part of the classic brain-drain phenomenon than trained compatriots in other fields who have physically moved away.

3.4.2 Financial implications

Funding agencies, whether governmental, private or semi-private, wield considerable power by virtue of their readiness to support certain types of research and not others. The advisers to these agencies are generally themselves affiliated to a limited number of prestigious institutions. The scarcity of other sources of funds in developing countries combined with a lack of related career opportunities, provide additional external leverage for influencing research priority selection. In effect researchers are encouraged to look elsewhere for a definition of problems and research methods that often are only marginally, if at all, relevant to situations in their own countries.

3.4.3 Role of the peer group

Prestigious international nutrition research bodies, in many cases established with the active support of organizations and bodies of the United Nations system, are another source of influence on both the setting of nutrition research priorities and the flow of funds for their pursuit. Such bodies play an important role, for example in moulding the research funding policies of major bilateral development agencies. Unfortunately, however, the technical bias within these groups is often at variance with what governments in developing countries perceive to be their priority nutrition research needs. The prospects of innovating through them in nutrition research priority setting are thus not particularly promising given their influence on researchers in developing countries, particularly those who have trained abroad.

3.4.4 Impact of the publishing media

With rare exceptions, influential journals engaged in publishing the results of nutrition research are based in industrialized countries; each has its own priority subject areas and distinctive traditions and technical orientation. There is an understandable tendency among researchers to choose their topics of inquiry carefully, bearing in mind those areas most favoured by these journals in order to maximize the chances of seeing their results published. In the case of developing countries, many of the same problems described above in relation to priorities imposed from the outside versus those decided from within repeat themselves here in a variation on the traditional publish-or-perish theme.
Despite the focalization of research capacity in industrialized countries, a curious irony is that more of the work being undertaken there concerns meeting the purported basic nutrition research needs of developing countries than solving indigenous problems. This is not to suggest that the problems of developing countries merit less attention; rather, it is to say that the critical basic nutrition issues in industrialized countries themselves are very often not receiving the scrutiny that they deserve. The available information in this regard is too often a by-product of work done by noncommunicable-disease investigators, with little or no direct contribution from the professional nutrition research community.

To illustrate this point one has only to refer to the proceedings of the last half-dozen world nutrition congresses and the technical themes discussed there. With a few notable exceptions, the vast majority deal either with the general nutrition problems of developing countries or with basic metabolic, biochemical or pathological concerns. The latter are important, of course, but certainly not to the exclusion of a wider investigation of the links, say, between diet and the pathophysiology of chronic diseases.

3.5 Recent WHO experience in Nutrition Research

The overall objective of WHO’s nutrition programme is to promote, strengthen and support its Member States’ capabilities for:

(a) assessing nutrient- and diet-related problems and their main causes and contributing factors;

(b) developing sound food and nutrition policies and strategies for dealing with malnutrition that are compatible with prevailing socioeconomic conditions;

(c) applying these strategies, and evaluating their effectiveness, for preventing, detecting and managing malnutrition.

Research and training are traditional twin pillars of this programme, and WHO action in this regard follows the same basic approach as the overall objective just described.

WHO’s regional structure permits it to provide direct, country-specific technical and managerial support for nutrition research. This includes support in assessing overall nutritional situations and the status of individual population groups; identification of problems and design of solutions; and the conduct of operational research to plan, implement, monitor and evaluate nutrition programmes. WHO’s global nutrition programme, on the other hand, concentrates on facilitating the generation and testing of related basic principles, concepts and information that have the widest possible general application, for example new technologies to prevent and control specific nutritional deficiencies, methodologies for
nutritional status surveillance, and new approaches to nutrition training.

WHO's first attempt to develop a truly comprehensive nutrition research strategy dates from 1979 and the establishment of an action-oriented research and development programme. The programme's declared purpose was to identify specific community nutrition problems, translate them into a form suitable for scientific inquiry, promote their investigation, and encourage the direct application of findings. It was thus designed to ensure that the scope of research included not only the identification of a problem and an investigation of why it existed, but also, more importantly, how it could be remedied and how any new insights gained could be immediately applied.

The programme's implementation began with limited external funding from SIDA/SAREC 1 following its approval in 1979 by the global Advisory Committee on Medical Research (ACMR); 2 each participating WHO region identified and ranked its specific priority subject areas. It elicited considerable enthusiasm among governments and the nutrition research community alike. The general view was that the programme not only corresponded faithfully to WHO's number-one priority - strengthening national capabilities - but that it also capitalized fully on the Organization's limited catalytic resources. Abundant encouragement and technical support, combined with small seed grants provided on behalf of national nutrition programmes and specific work commissioned at individual research institutes, generated a great deal of useful information. More important in practical terms, this effort was instrumental in changing the orientation and strengthening the nutrition content of a number of national primary health care programmes.

Considerable research was undertaken as part of this programme in nearly all regions. Differences in the availability of trained manpower and related research infrastructure help to explain variations in emphasis between and within regions and countries. Thus, for example, while the need to develop and strengthen research capabilities was stressed in the African and Eastern Mediterranean Regions, training and the improvement of existing nutrition activities within the health care system were emphasized in the Western Pacific Region. The Region of the Americas, on the other hand, decided to concentrate on investigating the behavioural aspects of infant and young child feeding and rearing practices, and related projects got underway in several countries. In the South-East Asia Region,

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1 Swedish International Development Authority/Swedish Agency for Research Coordination with Developing Countries.
2 The Advisory Committee on Medical Research, which was established in May 1959 by the Twelfth World Health Assembly "in order to provide the Director-General with the necessary scientific advice in relation to the research programme", was renamed the Advisory Committee on Health Research by the Thirty-ninth World Health Assembly in May 1986.
meanwhile, a number of intercountry studies were conducted on such topics as nutrition in primary health care, nutrition surveillance, and development of low-cost weaning foods.

New directions in nutrition research

Experience gained in implementing the comprehensive research programme begun in 1979, together with knowledge acquired earlier in sponsoring basic and applied nutrition research, has led to the identification of two broad research priorities by all WHO regions: the nutritional impact of large-scale public health and other interventions, and the behavioural determinants of nutritional status. A parallel global and regional concern, as a result of accumulating knowledge of the relationship between health and the feeding of infants and young children, was understanding patterns of breastfeeding among specific social groups.

Evaluating large-scale interventions

A conceptual jargon has evolved that facilitates the discussion of a number of interrelated questions about evaluating large-scale interventions that are intended to have a positive impact on nutritional status. Among the most frequently considered is an intervention's biological impact (What is the change in the nutritional well-being of a target population that is directly or indirectly attributable to a given intervention?). Other questions often asked concern relevance (Is the intervention addressing a priority problem in a way that is consistent with both the anticipated biological impact and the socioeconomic context of the target population?); efficiency (Is the intervention using available resources in the best possible way?); effectiveness (To what extent is the intervention accomplishing what was intended?); and adequacy (Is the scale of the intervention appropriate to actual need?).

It is useful for discussion purposes to divide biological impact evaluation into three phases: clinical trial, pilot project implementation, and large-scale intervention. Clinical trials concern the carefully controlled testing of specific hypotheses, for example the need for given nutrients or the effectiveness of the biological mechanism by which they are delivered. The application of the principles of rigorous experimentation is essential during this phase.

In like fashion, the pilot project is generally a carefully monitored, well regulated effort to verify whether the biological impact observed in a clinical environment can be reproduced in a field setting. Although there are still many uncontrollable factors present, a greater level of resources than would normally be available outside the pilot area are usually invested to ensure the project's success.
Finally, the large-scale intervention phase is an attempt to move successfully from what has been shown to be both scientifically correct and technically feasible in controlled environments to broad application in the "real" world. Supervision and control of the delivery mechanism is far more difficult under these circumstances, and the intervention may in fact fail, partially or completely, to generate the anticipated result.

Systematically applied evaluation techniques have the potential not only to improve existing nutrition interventions but also to identify new ones, both in-and outside the health sector. Programme evaluation can relate directly to the delivery of specific nutrition interventions or to other interventions having an impact on nutritional status. There is a pressing need to improve evaluation techniques for both, particularly where the effects of large-scale activities are concerned.

There are many areas where applied research is needed on the use of evaluation techniques for assessing the nutritional impact of public health and other interventions, including:

- comparisons of biological impact and feasibility under varying socioeconomic circumstances;
- development and testing of independent cost-effective delivery systems;
- strengthening of delivery through health systems that are based on principles of primary health care.

**Behavioural determinants of nutritional status**

As noted earlier, often a major obstacle to obtaining full benefit from whatever food is consumed is the presence of infection and disease. There is considerable scope here for action by the community and its individual members in terms of behavioural change and improvements in the immediate physical surroundings that have direct implications for individual nutritional status and health. Foremost among these are maintaining a sanitary household environment, adopting elementary rules of personal hygiene, and ensuring that all food that is consumed is safe and therefore contributes optimally to meeting bodily needs. Each of these steps, in turn, implies a minimum level of awareness and commitment on the part of individuals, families and communities to a given set of behavioural patterns. The validity

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1 It is worthwhile to recall the meaning of the term "health system" in WHO parlance. It refers to the "complex of interrelated elements that contribute to health in homes, educational institutions, workplaces, public places, and communities, as well as in the physical and psychosocial environment and the health and related sectors" (emphasis added). See Glossary of terms used in the "Health for All" Series, No 1-8, Geneva, World Health Organization, 1984 ("Health for All Series", No. 9).
of these actions underscores the importance of developing research methodologies for pinpointing the sociocultural factors responsible for malnutrition. More must be learned about the determinants of nutritional status and how populations might be motivated to modify accepted standards of conduct.

Similarly, food choice, preparation and consumption patterns, together with child-rearing practices, have a direct impact on child nutritional status and morbidity. Despite the fact that the weaning period, which is characterized by important changes in feeding behaviour, is commonly considered the most critical for child health, relatively little information is available on the multiple factors that determine related infant-feeding practices and care. These factors affect family and community decisions about the amount and quality of attention given to infants and young children. Without more precise indications health planners will be hard pressed to formulate appropriate strategies to protect and improve the nutritional status of this vulnerable group.

Malnutrition resulting from a continuing over-supply of nutrients and energy is no less threatening to health than chronic marginal food intake. And yet relatively little is known about the links between faulty dietary habits and inappropriate lifestyles, communicable diseases in general, and such specific noncommunicable diseases as hypertension, coronary heart disease, diabetes and cirrhosis. As a basis for sound nutrition policy and programme development, it is necessary to identify the main social, cultural and behavioural influences governing the choice, preparation and consumption of food. Furthermore, it is important to examine the effects of economic, occupational and disease factors on the relationships studied.

Starting with infant and young child feeding and continuing with dietary practices among adolescents and adults of all ages, a combined social science/public health approach has the potential to push back the frontiers of knowledge and understanding of the cause/effect relationships between human behaviour and nutritional status. As part of the Joint WHO/UNICEF Nutrition Support Programme, WHO has initiated a global programme of research and research-policy promotion that seeks to identify, describe and measure those factors that are most directly responsible for determining infant and young child feeding and rearing practices. In addition, the Organization is directly supporting related research in countries in the Region of the Americas and the South-East Asia and European Regions, and has established effective links with similar activities sponsored in a number of developing and industrialized countries, for example in India under the aegis of the Indian Council of Medical Research and in Sweden by the University of Uppsala.
4. REGIONAL NUTRITION RESEARCH PRIORITIES FOR THE 1990S

4.1 The African Region

In the past 4 years it was considered that nutrition was a priority field for health research in the Region, since malnutrition is estimated to be an underlying factor, along with communicable diseases and environmental health, underlying most of the morbidity and mortality, especially among children under 5 years. Undernutrition is widespread in the Region and probably increasing in prevalence. The causes are multifactorial and while they are known in a general way, they vary considerably according to time and place. Few complete studies have been done on the prevalence of malnutrition, and even fewer on the causes. Operational research is also much needed in relation to the key activities to be developed for nutritional improvement such as:

- food and nutrition surveillance, especially at community level;
- nutrition education: methods and effectiveness;
- modalities of control of specific nutritional disorders at the local level, eg. dosage and periodicity of large supplements of vitamin A and iodized oil.

Ten years ago a regional expert group was convened on the subject of nutrition research and training. A network of collaborating centres was set up. Priority was put on community based research. A number of research projects were started. Some were concluded, usually after long delay, with more or less success. Several foundered because of practical difficulties of implementaiton. One weakness identified was in protocol-writing, in most countries of the Region. The overall benefits of the efforts of the past decade in this direction were therefore meagre. The results of research were also noted to be very little disseminated or utilized. African researchers are also severely hampered by inadequate facilities, funds and recognition.

Reviewing this experience it was felt that more effort must be put into developing national capacities for nutrition research formulation, implementation, dissemination and utilization of the results. Also, there should be more emphasis on problem-oriented research at the local level, with emphasis on district and community-level research in the framework of the three-phase scenario for health development, now being implemented in the African Region.

It was agreed to propose one workshop initially, and eventually more, to try to strengthen national capacities along the lines indicated above. The first workshop on this approach was organized by WHO and IDRC in Lagos, 17-29 July 1989. This workshop for the five Anglophone countries of West Africa proved to be a very stimulating experience.
The conclusions reached on the main themes of the workshop may be summarized as follows:

* Themes selected for research should be oriented towards food and nutrition problems at the local level (district, village and household). They should also be action-oriented and programme-oriented or operational research, to facilitate the application of its results.

* Research protocol-writing can be improved by careful definition of the problem and the general and specific objectives, the indicators, sources of data, methodology including data analysis, end-users and expected dissemination and utilization of the results. A plan of action and chronogram should be drawn up, and a careful and realistic budgetisation done, covering all the costs, including sometimes those of preliminary application of the results.

* Research implementation could be improved by adequate selection and training of researchers and personal attributes of researchers such as methodical hard work, honesty, sensitivity, good manners and leadership qualities.

* Research reports should be widely distributed to relevant persons and institutions at the local and national level as well as internationally (where relevant) and follow-up should be made to ensure immediate utilization.

* National strategies for improving research activities include the setting up of national-level mechanisms, e.g. food and nutrition research councils, for review of project proposals and mobilization of resources, in collaboration with national research bodies and national food and nutrition committees. There should be more emphasis on organization among researchers themselves, and the involvement of local communities, leaders and resources.

* It was recommended to set up a Regional Food and Nutrition Research Council for West Africa. Priority problems to be tackled include the following:
  - Nutrition disorders: protein-energy malnutrition, vitamin A and iodine deficiencies, and anaemias;
  - Low food production;
  - Post-harvest food losses;
  - Nutritional factors related to high maternal and child mortality;
  - Low birth-weight;
  - Community-based nutritional surveillance;
  - Water and sanitation;
  - Nutrition and diarrhoea;
  - Effective organization of food and nutrition systems and programmes, at national and regional levels.
As follow-up to the workshop, some recommendations were that:

* similar national workshops be arranged
* intersectoral national nutrition research bodies be set up
* a regional food and nutrition research body be set up
* participants in the workshop maintain contact with each other
* a consultant follow up the projects being implemented, after about a year
* follow-up workshops be organized every 2 years.

It is hoped to conduct such workshops in future years, in different subregions and linguistic groups. While the basic approach would be the same, it is felt desirable to put even more emphasis on programme-linked or operational research. In preparation for the Lagos workshop the participants made an analysis for food and nutrition research carried out in the last 10 years in their countries. Most of it was found to be relevant, problem-oriented research, but what was striking was how little use was made of the results. This calls for more involvement of the communities themselves and of the decision-makers, especially in Ministries, in the design of the research and selection of themes. Very often, good research was done, sometimes with strong support from external institutions. However, it was often not linked to ongoing programmes or priority activities of the Government. Therefore the system had little possibility of reacting to and making use of the results. It would be preferable to envisage trial application of the results of the first phase of a research, during a second phase.

Therefore, it is felt that the approach of holding workshops on problem-oriented food and nutrition research for small groups of countries (5 or 6) and persons (maximum 20) was very useful and should be pursued with more emphasis on programme-oriented or action-oriented research. The intercountry workshop should also be followed up by organizing national workshops at least in larger countries, so as to involve a wider network of researchers, both from academic institutions and from Ministries. It is hoped to pursue this programme vigorously in the next medium-term programme period with support from IDRC and, hopefully, other organizations, and to revive the network of collaborating centres in nutrition research.

4.2 Region of the Americas

WHO/PAHO's Regional Food and Nutrition Programme, which includes the Institute of Nutrition of Central America and Panama (INCAP) and the Caribbean Food and Nutrition Institute (CFNI), promotes and supports action aimed at identifying and solving Member States' priority food and nutrition problems. Its technical cooperation strategy includes as fundamental elements the coordination and promotion of biomedical, socio-epidemiological and operational research.
With specific regard to operational research, particular emphasis is placed on evaluating broad-based national programmes that are aimed at improving the diet of low-income populations and those at biological or social risk. To this end, WHO/PAHO is promoting the establishment of a regional operational network of food and nutrition institutions (RORIAN) to support the selection and training of specialized personnel, the development of collaborative research projects, and the dissemination of information.

The economic and social situation of Latin America and the Caribbean require that research be carried out using new operational approaches and priorities. There is a fundamental need to increase understanding of the sociocultural realities that cause or contribute to malnutrition due to deficiency (protein-energy malnutrition) or due to excess (overweight and diet-related chronic diseases). This concerns food normally consumed within the family as well as during periods of illness, for example diarrhoea and acute respiratory infections. Accordingly, WHO/PAHO has proposed that emphasis be placed on the following areas of research:

- food and nutrition surveillance;
- feeding of mothers and children;
- food and nutrition policies and programmes;
- nutrition of adolescents and the elderly;
- specific nutritional deficiencies.

During its discussion of the topic Dietary policies: nutrition and health - reflections on research priorities, the twenty-sixth meeting of the regional ACHR (Rio de Janeiro, 3-6 August 1987) stressed the difficulties involved in analysing the nutritional status of populations in the absence of simple measuring devices that had been validated in the community, and an evaluation of intervention programmes. The latter point was considered to be one of the most serious technical drawbacks in assessing nutritional status.

Although modern technology had an important role to play in the search for and production of new food sources, the contribution of the social sciences was essential for finding solutions to the Region's food and nutrition problems. The technical and scientific aspects of these problems were in fact secondary to the more dramatic political and economic difficulties that the Region was facing, for example the repercussions of external indebtedness that were compromising nutritional status in general, and that of children in particular.

The ACHR recommended that WHO/PAHO assign maximum priority to nutrition research, and that it strengthen the mechanisms for institutional support and coordination (RORIAN) in keeping with the Regional Food and Nutrition Programme's proposed priorities.
Regional Food and Nutrition Programme’s proposed priorities. Attention was called to the need to strengthen the capacity of national and sub-regional institutions, including INCAP and CFNI, to carry out operational research in food and nutrition.

4.3. The Eastern Mediterranean Region

WHO has traditionally had only limited involvement with nutrition research in the Region. This is due, in part, to a lack of research capabilities in most countries, but is also a reflection of nutrition promotion’s having attracted little attention until only just recently. With increasing advocacy, however, the number of nutrition programmes has significantly increased to a total for the 1988-1989 biennium of 12 out of 23 countries. This positive trend is both the cause and the effect of increasing awareness of the importance of research for identifying priority nutrition problems and their underlying causes, and for facilitating relevant programme planning, implementation and evaluation.

The countries of the Region, with a total population of around 350 million, are extremely diverse in terms of geography, population density, climate, economy, and health and nutritional status. For example, there are very small countries with fewer than one million people each (Bahrain, Cyprus, Djibouti and Qatar); one with almost 100 million (Pakistan); and two others (Saudi Arabia and Sudan) with vast unpopulated areas. There are countries whose food needs are met almost entirely through imports (Bahrain and Kuwait), while others struggle to meet demand through domestic production (Sudan and Somalia). Expressed in terms of GNP per capita, the Region has some of the most affluent (Kuwait and Saudi Arabia) and least affluent (Djibouti and Somalia) countries in the world. There are high mountainous regions (in Afghanistan and Pakistan), vast deserts (in the Libyan Arab Jamahiriya, Saudi Arabia and Sudan), and small islands (Bahrain and Cyprus). Not surprisingly, then, country nutrition profiles and corresponding research needs are also extremely varied.

There are only a few countries that are capable of undertaking basic nutrition research, and they are being encouraged to explore relevant topics whose results can be applied directly. The development of national nutrition strategies requires reliable answers to a number of elementary questions: who is suffering from what type of malnutrition, where and why? These and other questions can only be answered through field study, which should be seen as a stepping stone for developing needs-based national nutrition research programmes. Most countries are in the process of developing such programmes and, in the absence of a formal research establishment, are relying on nutrition units in the health sector in collaboration with other health programme areas such as primary health care, maternal and child health, immunization, and diarrhoeal diseases control. At the same time, operational research is being promoted and supported in some countries to facilitate programme implementation.
Priority areas for nutrition research

Nutrition research has yet to be meaningfully established in the Region, and thus the first step is to identify research priorities in the context of national nutrition strategies, for example:

(a) Nutrition surveillance. What is needed in most countries is a system that uses existing health infrastructure and personnel as part of the overall health information system that most countries are now developing. The Islamic Republic of Iran, Somalia and Sudan, for example, are conducting studies to this end, and an intercountry consultation in September 1988 took stock of these and other efforts, and discussed how WHO might support them.

(b) Nutrition through primary health care. This is the basic theoretical thrust of most collaborative programmes, and an emphasis on expanded coverage, integrated service delivery, and intersectoral collaboration are precisely the requirements needed to promote community nutrition. These programmes' full potential is unfortunately not being achieved, including the activities of the highly integrated Joint WHO/UNICEF Nutrition Support Programme. Studies of the nutrition content of primary health care systems are urgently needed to answer a host of interrelated questions for planning appropriate interventions.

(c) Food and nutrition policy. A number of countries, both food producers and importers, are making serious efforts to develop food and nutrition policies that have the same purpose: to ensure that all citizens meet their minimum dietary requirements and enjoy an environment in which optimum benefit can be taken from whatever food they consume. There are many areas of needed research, which concern both extremes of poverty and plenty.

(d) Control of specific nutritional deficiencies. Iodine-deficiency disorders and nutritional anaemia reach levels of public health significance in a number of countries. While the distribution of prophylactic doses of iron/folate tablets has been adopted as a routine procedure in MCH services in many countries, not one has thus far conducted a national survey to assess the actual prevalence of IDD. Similarly, despite the minor impact of nutritional anaemia control programmes, no country has ever undertaken a nationwide evaluation of this common intervention to pinpoint problems.

(e) Towards a regional nutrition research strategy. Many countries are engaged in developing nutrition promotion programmes, and thus the need for a WHO regional nutrition research strategy to support them should be obvious. Ideally, it would include a network of nutrition research centres to serve as collaborating institutions for training purposes;
a subregional training course in nutrition research which, with the help of the network, would train researchers in identifying national priorities and conducting relevant research; and intercountry consultations on nutrition research with experienced researchers to identify areas relevant to country needs and to develop protocols and methodologies for adaptation and use there.

4.4 The European Region

The report\(^1\) of the Advisory Group of the European Region, which met in Oslo in January 1986, outlined the following research priorities in public health nutrition.

Obesity

65. A growing body of knowledge suggests that obesity is not one single condition and that fat distribution, as well as its relation to both age and sex, may be important. Such considerations must be included in any discussion of the importance of obesity as a public health issue.

Other diet-related diseases of public health importance

Atherosclerosis

Hypertension: diet and hypertension

Many dietary factors have been suggested as being related to the development of hypertension including sodium, potassium, calcium, fat and alcohol. Controlled studies of pharmacological versus non-pharmacological (dietary) treatment of mild hypertension should be organized using a multi-centre approach. Studies should be aimed at understanding the effects both of single factors, for example salt, and combinations of factors.

Diet and cancer

Several epidemiological studies suggest some correlation between dietary factors and certain types of cancer. For example, obesity and excessive fat intake have been shown to be closely correlated to endometrial, breast and colon cancer. It is also suggested that certain factors have a protective role, for example beta-carotene/vitamin A, fibre and ascorbic acid. This information has been derived mainly from cross-sectional studies, however, and thus longitudinal studies, with better standardized methods for measuring dietary intake, are required.

Diabetes

There has been an increase in the incidence of insulin-dependent diabetes over the last twenty years in some countries of the Region. There is also a large variation in incidence between populations, which suggests that environmental factors, including diet, may play a role. Possible dietary factors in the development of insulin-dependent diabetes, especially its juvenile onset, should be studied.

Osteoporosis

An age-corrected increase in the incidence of hip fracture has been observed in several industrialized countries. It is possible that environmental factors such as physical activity, obesity, smoking, alcohol and diet influence the outcome of osteoporosis. More studies are needed to identify the role of such factors and the preventive potential of dietary measures. Measurement of bone density and registration of hip-fracture incidence should be undertaken in different populations with varying lifestyles and dietary habits. Longitudinal studies are best suited for identifying risk factors for hip fractures.

Social epidemiology and public health risks

Consumption patterns and nutritional risk

Alcohol and sugar
Alcohol
Sugar
Meal patterns
Vitamin/mineral supplements
Health effects of marginally deficient nutrient intakes
Targeted interventions for high-risk sub-groups
Nutritional status of hospital patients including persons needing home care.

4.5 South-East Asia Region

In the South-East Asia Region nutritional research has not yet played its full part in the implementation of programmes to improve nutrition status and thus the health of the people. Rigorous nutrition research is not yet commonly carried out, or initiated by operational units in ministries. Nutritional researchers are often frustrated that their expertise is not sought after and their results often not acted upon.

If HFA/2000 are to become a reality, nutrition research needs to become more integral to operations.

The Fourteenth SEA/Advisory Committee on Health Research in 1988 discussed research related to nutrition, and made the following
recommendations regarding the WHO regional nutrition research programme:

(1) The Regional Office should pursue the policies and the broad scope of regional and national-level approaches and activities as outlined in the nutrition research programme presented to and endorsed by the Committee.

(2) The aim of the programme should be directed towards the strengthening of national nutrition research programmes and capabilities, supporting research on critical issues and mobilizing increased support, as indicated in the five objectives of the proposed programme.

(3) In pursuance of the aim to strengthen national capabilities for nutritional research, collaborative linkages between nutrition services in government organizations and nutrition research institutes should be strengthened in order to facilitate the identification, generation, and implementation of priority nutritional research and make effective use of the research findings.

(4) The priority issues for nutritional research, as identified in the proposed WHO nutrition research programme, within the three broad categories of (a) nutrition-related health system research, (b) community/social/behavioural nutrition research, and (c) biology and technology-oriented nutrition research, should be broadened to include some aspects of basic biological research relating to energy and nutrition requirements, specific nutrients deficiencies, nutritional indicators and standards and family nutrition studies.

The five objectives of the programme referred to in recommendation are to:

(a) strengthen nutritional research capabilities;
(b) develop effective national nutrition research programmes;
(c) commission research of critically important issues;
(d) stimulate the mobilization of other resources for nutritional research and
(e) increase the exchange of information and technologies related to nutrition research

The nutrition research supported by WHO at the regional level and Headquarters together make up an integrated and mutually comprehensive programme.

The nutritional disorders agreed for the Region as priorities over the next few years are protein-energy malnutrition, iodine deficiency disorders, vitamin A deficiency and anaemias. There are other nutritional disorders in the Region, but these are the priorities and WHO must concentrate on the priorities.
The solutions to these four sets of problems involve, on the whole, applying known technologies. We know, for example, the importance of a good energy balance during and after pregnancy; the main problem is in applying this knowledge. We know the nutritional requirements during the weaning period, of what mixtures of foodstuffs can satisfy them and how energy density can be increased in theory. Many questions remain on how to help mothers improve their children's weaning practices and how to apply the knowledge. WHO sponsored research needs to concentrate on such application. This may involve a combination of biological research techniques with those derived from the social sciences, epidemiology, management sciences and from, for example, market research. Can the nutritional research institutes and the nutritional service bodies rise to the challenge of such an interdisciplinary undertaking?

4.6 The Western Pacific Region

The Regional Committee in its September 1989 meeting agreed that WHO's research priorities in the area of nutrition should concentrate on nutrition of the young child and mother with emphasis on infant feeding practices, improvement of nutritional status of the pregnant and lactating mother and nutrition education. The Regional Committee noted that the strategies for nutrition research should be clearer and hoped for more focused guidelines.

5. IMPROVING GLOBAL SUPPORT FOR NUTRITION RESEARCH

WHO's ability to influence the direction of nutrition research is inherently limited given that it neither conducts research itself nor has the financial resources to sponsor it on any meaningful scale. Nevertheless, the Organization is well placed to play an important catalytic and sensitizing role, both by promoting and supporting research within its Member States, and by encouraging multilateral and bilateral agencies to increase their allocation of development resources on its behalf. As part of its wider responsibilities, WHO is also in a position to encourage other sectors to investigate the multiple implications for nutritional status of the non-health interventions for which they are responsible. Where the health sector is concerned, WHO is emphasizing action in a number of key areas to strengthen national capabilities for undertaking nutrition research and making full and direct use of its results.

5.1 Training in nutrition research

For most countries the first priority in nutrition research is to obtain an accurate definition of the situation according to region, population group, types of malnutrition, and main related socioeconomic and cultural factors. The key to supporting successful nutrition programme implementation, therefore, is to ensure that training in nutrition research covers not only general methodology but
also applied techniques, including the drawing up and review of relevant protocols.

As discussed earlier, the results of equipping nutritionists from developing countries with orientations and methodologies designed for use primarily in industrialized-country environments are predictable and generally run counter to meeting the former group's elementary research needs. While opportunities for providing research training in industrialized countries for nutritionists from developing countries should not be entirely ruled out, emphasis should be on using, and strengthening where necessary, existing training facilities in developing countries themselves.

Organizations and bodies of the United Nations system, especially FAO, UNICEF and WHO, need to take a critical look at their training support policies in this regard. For example, WHO's own standing instructions that candidates from developing countries receive their training in like environments are often not followed. A distinction must of course be made between training in basic research and specialized techniques, the latter often being possible only in industrialized countries. Such exceptions are just that, however, and the standard should remain in favour of training taking place in developing countries.

Training in research is an integral part of any course of advanced nutrition study. At this level all members of the teaching staff, by definition, are themselves researchers. The strengthening of national capabilities in nutrition research should not take place at their expense nor in ignorance of the skill inventory they represent. For its part, WHO is encouraging the establishment of collaborative networks of advanced nutrition research and training institutions that are applying the Organization's educational methodology, which is compatible with the requirements of scientific research. These networks have begun to function interregionally in a balanced, collegial fashion, irrespective of the different stages of economic development in the countries in question. For example, nutrition research centres in Mali and Norway are jointly conducting operational research on the introduction of a nutrition dimension to overall development programmes.

A final point concerns the implications for training of the role of senior research scientists who, individually and in groups, exert a powerful influence on the type of nutrition research that is conducted. Efforts to make these scientists and others more aware of unmet research, and therefore training, needs in different environments should serve to reinforce the positive influence that is desirable from these circles. WHO is in a position to help by providing international nutrition research bodies with an up-to-date assessment of these needs.
5.2 **Strengthening regional nutrition forums**

Nutrition research cannot be undertaken in a vacuum; those responsible for conducting it need both a forum in which to interact with peers and a platform from which to launch ideas and subject results to objective technical scrutiny. These indispensable functions are discharged to an extent by nutrition societies, regional nutrition committees and federations, and professional journals and other publications. Unfortunately, however, the same technical biases that were discussed earlier about priority research issues too often repeat themselves in this same organizational and media context.

The recently established African Council of Food and Nutrition Sciences is a good example of a promising set up for nutrition research in Africa.

The establishment or reinforcement of competent regional forums and journals that focus on the unmet nutrition research needs of both developing and industrialized countries would be a decisive step towards upgrading the quality, scope and relevance of the research that is being done today. In some cases existing national groups or journals could be appropriately converted to a regional perspective; in others, work would have to begin from scratch. WHO is in a position to participate in such an enterprise by providing technical support and, possibly, by serving as a channel for the necessary financial backing from other multilateral or bilateral sources that might be required.

5.3 **Identifying new collaborating centres**

Institutions in any part of the world that have the necessary expertise and facilities may be called upon to participate in WHO's programme of activities. Both institutions that show a capacity to fulfil a function or functions related to the programme, and institutions of high scientific and technical standing that have already attained international recognition, may qualify for the designation "WHO collaborating centre".

The collaborating-centre designation is independent of any financial support that WHO may give, which is generally not an obstacle in the case of nutrition research institutions in North America and Western Europe. However, the main thrust of WHO's nutrition programme - strengthening national capabilities - suggests the need to do everything possible to identify research institutions in developing countries having either the requisite expertise to be designated collaborating centres or the clear potential for attaining it in due course with appropriate support.

On the whole, because of financial constraints, attempts to enlist the collaboration of research institutions in developing countries having either a national or regional perspective have met with little success. If nutrition problems in these countries are to
be properly identified and solutions to them appropriately sought through basic and applied research, it will be thanks to the gains achieved most directly by local institutions. Strengthening WHO's technical and financial support to research groups in developing countries will hasten the day when full collaborating centre-status can be established with additional institutions.

5.4 Promoting operational and epidemiological research

Broadly speaking, governments are able to protect and promote the nutritional status of their citizens by developing general policies having a positive impact on this status, and by including appropriate nutrition goals and targets among the specific objectives of the various socioeconomic sectors through which they implement their policies. Success in this regard depends in large measure on a government's ability to assess accurately the type, magnitude and distribution of malnutrition, and on its having a suitable infrastructure - the combined human resources and institutional capacity in the relevant sectors - to translate this assessment into effective preventive and remedial interventions.

Governments, however, often experience difficulties in assessing their nutrition situations and formulating appropriate responses. Developing countries in particular also face a considerable challenge in attracting external resources to invest in their social sectors and in overcoming managerial problems related to their use. Moreover, problems associated with a country's absorptive capacity for external support, in a circular reinforcing fashion, place still more limits on the availability of additional resources despite increasing need.

To help governments assess their nutrition situation and formulate an appropriate response, WHO proposes an approach to strengthening national capabilities. It is a framework for developing programme proposals of an unconventional type that have no beginning or end as such. Rather, they are intended to serve as a guide for organizing all available resources for improving nutritional status according to priorities that countries themselves have identified. The framework's main components include the preparation of a nutrition situation analysis and an inventory of all activities which might have an impact on nutritional status; identifying other essential aspects for improving nutritional status not covered in the inventory; and formulating, on this basis, a complete programme involving all of the various sectors which, collectively, help to determine nutritional status. A detailed description of the proposed framework appears in Annex 1.
5.5 **Women, health and development issues in nutrition research**

The report by the Director-General\(^1\) to the Thirty-eighth World Health Assembly in May 1985 on women, health and development included a number of proposals for integrated health development strategies that ensure that adequate attention is paid to women's issues in the planning and execution of health programmes. Where nutrition and related applied research are concerned, this includes increasing awareness of the special nutritional needs of women, especially during pregnancy and lactation and developing indicators for assessing their nutritional status; reducing the prevalence of nutritional anaemias; facilitating women's access to and control over sufficient income to enable them to provide adequately for their dietary needs and those of their children; changing discriminatory attitudes affecting intra-family food distribution patterns to the detriment of girls and women; and educating women about appropriate family - and especially infant and young child - feeding practices.

5.6 **Related research priorities of other WHO programmes**

As noted in chapter 2, both the content of WHO's nutrition programme and the means for implementing it are reflected throughout the Organization's programme of work. The achievement of its nutrition policy objectives depends, therefore, on the effective implementation of a variety of health science and technology programmes. Seen in this light, elements of WHO's nutrition policy can be as readily identified in the decisions of the World Health Assembly concerning communicable and noncommunicable disease prevention and control, environmental health promotion, and intersectoral cooperation in implementing health for all strategies, as in its more directly nutrient- and diet-related resolutions about feeding and specific nutritional deficiencies.

For this same reason, improving support for nutrition research extends well beyond action by WHO's formally designated "nutrition programme". Several of the Organization's other programmes that, collectively, are also responsible for achieving its nutrition policy objectives have developed significant related research components, which should be taken into account in developing an overall WHO nutrition research strategy. Relevant aspects of the oral health, maternal and child health (including family planning), human reproduction and research, health of the elderly, food safety, diarrhoeal diseases, cancer, cardiovascular diseases, and other noncommunicable disease prevention and control programmes have been summarized in Annex 2.

\(^{1}\) Subsequently published as WHO Offset Publication No. 90.
6. CONCLUSION

As noted in the global ACHR's report on health research strategy, disease is not an inescapable attribute of the human condition; except when determined at or soon after fertilization, it results essentially from unhealthy ways of living and can be prevented if these ways can be changed. All in all this observation is quietly reassuring, yet boldly challenging given collective experience with successfully identifying motivation and modifying behaviour. Nevertheless, it is because promoting healthy nutrition and preventing and managing malnutrition offer one of the most direct and effective means of improving the duration and quality of life that research into the interrelationships between food policies, diet and health has so much to recommend it. Given the success realized in some countries, and the still untapped, though no less promising, potential in many others, nutrition research fully merits recognition as an essential component of every national nutrition strategy.

WHO's involvement in nutrition research should be viewed as a continuum. Thus various aspects of a nutrition research strategy have always existed from the Organization's earliest days, either as part of its overall health research strategy, or parallel to it in relevant health science and technology programmes. Until now, however, such a policy has not been formally codified. The global ACHR can bear witness to Member States' heightened interest over the last decade in making better use of nutrition research as a dynamic tool for achieving health for all. It remains for WHO to decide how best to cultivate and support this interest by explicitly defining the approach to nutrition research that the Organization will take for the remainder of this century and on into the next. This document seeks to provide a factual and technical basis on which to build a strategy.

Ideally, such a nutrition research strategy would have a number of key attributes, for example:

(a) it would deal as a matter of priority with how WHO should encourage countries to undertake the most appropriate lines of inquiry concerning food policies, diet and health;

(b) it would logically begin with an evaluation of past and present experiences with nutrition research in order to identify key influences;

(c) it would include an assessment of regional nutrition research priorities and the corresponding support required at national, regional and global levels from all relevant WHO programmes;

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(d) it would attempt to look beyond immediate technical, socioeconomic and cultural concerns by speculating creatively on the relevance of today's research for solving tomorrow's nutrition problems;

(e) it would include as a matter of practical necessity careful consideration of how to identify the resources that are necessary if appropriate nutrition research is to be undertaken when and where it is needed.
Annex 1

STRENGTHENING NATIONAL CAPABILITIES FOR PLANNING, IMPLEMENTING AND EVALUATING NUTRITION PROGRAMMES

An operational research proposal prepared by the World Health Organization

INTRODUCTION

1. In most developing countries there are a variety of interventions claiming nutritional objectives. Although the interventions are carried out in parallel, they are often directed and funded from different sources and thus tend to operate at cross purposes. Even when there is an attempt at coordination, unreasonable demands are frequently made on the same limited government resources in ways that prevent any of the interventions from achieving their full success potential.

2. Multilateral and bilateral development agencies often see the projects they support fail under such circumstances. The solution usually invoked is better "coordination" even though, in practice, ways of achieving this continue to fall short. Given the degree to which government services in developing countries are understaffed and overburdened and the highly competitive nature of development agencies, problems resulting from a mix of inconsistent projects are likely to continue.

3. WHO believes that the key to better coordination among interventions having improvement of nutritional status as a common objective lies not with bilateral or multilateral development agencies but with governments themselves. When a government defines a coherent nutrition programme that is commensurate with the staff available to execute it, development agencies can more easily select those aspects of it to support that are compatible with their own interests. In this way both the government's programme and the activities within it supported from the outside are more likely to succeed.

4. There are many obstacles to defining an internally consistent national programme for improving nutritional status. Historically, the much-heralded approach has been national nutrition planning, the argument being that the development of a national plan results in activities that are consistent with it and, therefore, with each other. Success in this area has been rather limited, however. The present framework proposes the exploration of a practical alternative to traditional means of arriving at internally consistent country programmes with sound nutritional objectives. The final "product" would probably consist of an assortment of actions in the various sectors which, collectively, determine nutritional status.
THE PROBLEM

5. Broadly speaking, governments are able to protect and promote the nutritional status of their citizens by developing general policies having a positive impact on this status, and by including appropriate nutrition goals and targets among the specific objectives of the various socioeconomic sectors, including health, through which they implement their policies. Success in this regard depends in large measure on a government's ability to assess accurately the type, magnitude and distribution of malnutrition, and on the availability of a suitable infrastructure - the combined human resources and institutional capacity in the relevant sectors - to translate this assessment into effective preventive and remedial interventions.

6. Governments, however, often experience difficulties in assessing their nutritional situations and in formulating appropriate responses. Developing countries in particular also face a considerable challenge in attracting external resources to invest in their social sectors and in overcoming managerial problems related to their use. Moreover, problems associated with a country's absorptive capacity for external support, in a circular reinforcing fashion, place still more limits on the availability of resources despite increasing needs.

THE APPROACH

7. WHO is enlisting the cooperation of multilateral and bilateral agencies in approaching support to governments for the development of national nutrition programmes, at a pace that is consistent with their capabilities, and in a way that is most likely to strengthen them in the long run. WHO proposes to work with countries in the preparation of their national nutrition programmes so that they will be able to:

(a) guide the use of all existing resources for promoting improvements in nutritional status;

(b) promote the generation of additional resources for other activities that are considered important for improving nutritional status;

(c) re-orient activities that are not normally associated with an impact on nutritional status to ensure that they contribute to the achievement of national nutrition objectives.

8. The principles underlying this support to national nutrition programmes are essentially the same as those which have guided the Joint WHO/UNICEF Nutrition Support Programme since 1982. That is, they are based on the primary health care approach and emphasize developing mechanisms for full community involvement at all stages of national nutrition programme development including planning, implementation and evaluation. Intersectoral action will be promoted based on a thorough analysis of the underlying factors that contribute to malnutrition in a given environment.
9. The primary difference between traditional programmes and the type of support envisaged is the lack of direct linkage between programme components and available funds. That is, instead of defining a "country project" to match the amount of money offered from an external source, each country will be encouraged to begin with the conceptual development of a comprehensive, long-term approach to improving nutritional status. Efforts to identify the funds required for implementing programme components will begin only after the conceptual basis for their use has been well defined.

10. The basis for the programme will be an analysis of existing information regarding those factors that influence nutritional status in a given country. It is anticipated that some components of the programme will already be in place, others will be evolving, and still others will not yet exist at all. It is likely that a number of the existing or evolving components will have been conceived independently of nutrition concerns and, in these cases, the introduction of such concerns will become a priority as part of the resulting national nutrition programme.

11. The following steps will be taken in countries:

(a) An appropriate government department or institution will be identified to assume the leadership role in defining and carrying out a long-term national nutrition programme.

(b) A nutrition situation analysis will be prepared drawing on existing information and taking into account national experiences in implementing different nutrition interventions.

(c) An inventory will be drawn up of current projects and programmes which might have an impact, whether favourable or unfavourable, on nutritional status.

(d) Essential elements for improving nutritional status not yet covered in the inventory will be identified and priorities set as to their relative importance.

(e) Based on steps (b) and (d), a national nutrition programme will be formulated. At this stage, the programme will be a set of hypotheses regarding the minimal conditions to be met in the country to bring about an improvement in nutritional status.

(f) An evaluation plan will be devised for the programme. Criteria for assessing the validity of each hypothesis will be established and estimates of the resources required to apply those criteria will be made.

(g) Finally, a programme implementation strategy will be developed. The strategy could include indications of how funds will be raised for each programme component, and a plan
indicating how the country will move from its starting point to full implementation.

12. The result will be a programme proposal of an unconventional type in that it will not be a "package" to be started and stopped according to a pre-defined calendar. Funding will be sought for various components as they become necessary within the overall programme plan. Donors might "buy" selected projects within it, but the programme itself will "belong" to the government and not to any donor or group of donors. Countries will be encouraged to accept funding only for activities or projects which are consistent with the programme and to withstand pressure from individual donors to re-define projects according to external criteria. The programme will thus have no beginning and no end as such. Rather, it will serve as a guide for organizing the use of available resources for improving nutritional status according to priorities that have been identified by the country and in a manner that is internally consistent with these priorities over time.

THE ROLE OF WHO

13. WHO sees its role as a catalyst for promoting nutrition programming according to the model described above, and as the agency responsible for organizing the technical inputs required to enable a country to plan in this comprehensive way. It is foreseen that this role will evolve in stages.

14. Initially WHO staff will be involved in the planning process in a few countries, say four. The specific approach to be followed, for example long-term support provided by one person or the more probable formation of planning teams, will be decided on a country-by-country basis. In either case, the responsible parties in government will be clearly identified and the role of any and all consultants will be carefully defined so as to ensure that the programme designed is truly the government's.

15. Consistent with WHO's approach of developing global methodologies for subsequent dissemination, adaptation and use in regions, staff working on this phase of the programme will be based at headquarters. A support team composed of persons drawn from inside and outside the Organization, according to skill needs and availability, will be identified to provide technical inputs to participating countries.

16. If the process proves successful, it will be introduced in a second group of countries. During this phase, the role of WHO headquarters will shift and its direct involvement in country planning diminish. Instead, increased emphasis will be given to documenting the experience and to preparing guidelines for other countries interested in applying the model for programming their nutrition activities. WHO headquarters will also continue to play a role in matching experienced planners with countries as the need arises. Finally, headquarters staff will develop an approach to training
others in the application of this comprehensive planning methodology. Responsibility for working directly with countries will shift, in the second phase, to WHO regional offices.
Annex 2

Related research priorities identified through WHO health science and technology programmes other than nutrition

8.2 ORAL HEALTH

Epidemiologic and experimental investigations have clearly demonstrated that refined sugars and consumption patterns play an important role in dental caries etiology. In some developing countries where protein-calorie-deficient diets are prevalent, acute necrotizing ulcerative gingivitis and severe periodontal diseases have been observed. Sucrose has not been implicated as the primary cause, although its role in plaque formation, which is a key element in gingival conditions, is well known. There is insufficient evidence to justify periodontal treatment on a nutritional therapy basis, and well controlled studies are therefore needed to clarify the relationship between nutritional status and inflammatory periodontal disease including:

(1) development of better methods to assess safe and cariogenic foods, with emphasis on finding simple methods for screening foods in relation to their cariogenic characteristics;

(2) availability of reliable data on sugar intake by age and information on the frequency and form in which the sugar is ingested;

(3) the effect of diet on geriatric oral health problems such as root dental caries, periodontitis, cheilitis glossitis, alveolar osteoporosis, and loss of taste;

(4) the influence of diet and nutrition on the physiology of the salivary glands and on the composition and properties of saliva;

(5) the role of nutritional status in fluoride metabolism.

9.1 MATERNAL AND CHILD HEALTH, INCLUDING FAMILY PLANNING

Evaluation of local versions of a home-based maternal record at 17 centres in 12 countries has demonstrated its value for determining the women at risk of complications during pregnancy and delivery, increasing their awareness and their use of referral services, and serving as an adjunct in health education for breast-feeding and family planning.

1 Programme numerical designations correspond to those used in the Classified List of Programmes for the period of the Seventh General Programme of Work, 1984-1989.
Other technology undergoing field trial includes a simple and inexpensive device for the direct measurement of haemoglobin and a highly reliable and inexpensive solar-powered scale for weighing infants, children and pregnant women. Weighing scales and weighing procedures are among the subjects being addressed by the WHO/UNICEF working group on appropriate technology in maternal and child health/family planning.

To ensure that newborn infants have a healthy start in life, support is being directed to preventing and managing the risk factors for low birth weight and premature birth, ensuring a clean environment for birth, maintaining thermal control and respiratory support, and initiating breast-feeding immediately after birth. Studies in 22 countries demonstrate that chest circumference measurement is a reliable substitute for scale-measured weight in distinguishing low-birth-weight infants.

Support is being given to the adaptation of technology to reflect the social and cultural context of child-rearing and child-feeding practices, including breast-feeding and weaning, and to take into account local patterns of fertility, infectious disease and malnutrition. Reference values for psychosocial development of children have been formulated by a network of WHO collaborating centres, which provides an international forum for devising common methodology and organizing training courses for the trainers of health workers engaged in monitoring growth and development.

A study on techniques for monitoring physical growth and psychosocial development in primary health care has been initiated in nine centres in six countries. A software package, prepared to ensure analytical comparability, has been modified for wide application as a programme capable of analysing other sets of data, including longitudinal data, for generating and comparing percentile curves and growth velocity. A programme framework for promoting child health, nutrition and development through various types of day-care arrangements has also been prepared.

9.2 HUMAN REPRODUCTION RESEARCH

Within this programme, the WHO Task Force on Methods for the Natural Regulation of Fertility promotes and supports biomedical research on existing and new approaches to human fertility regulation by natural means. The current research activities of the Task Force include: (a) study of the determinants and mechanisms that control lactational amenorrhoea, and consequent infertility, including the impact of maternal nutritional status on this process; (b) development of simple, inexpensive techniques for identifying the fertile period during the menstrual cycle; (c) and assessment of methods of fertility control that do not require the use of drugs or devices.
9.4 HEALTH OF THE ELDERLY

In June 1987 - on the recommendation of the Advisory Committee on Health Research - a special programme for research on aging was established at the United States National Institute on Aging. Steering committees in the areas of epidemiology, mental health, osteoporosis and immune function are drafting a five-year programme. Surveys of the needs of the elderly will form the regional contributions to the special programme. At the global level, technical guidance relating to the elderly in the areas of lifestyle, nutrition, accident prevention, prevention and treatment of mental and neurological disorders, cardiovascular diseases and blindness are being updated.

11.4 FOOD SAFETY

Efforts are being made to integrate food safety into primary health care, including, for example, through studies on domestic and small-scale commercial food processing, using the Hazard Analysis Critical Control Point approach that are being sponsored jointly by WHO, food and related industries, and other groups.

13.6 DIARRHOEAL DISEASES

Dietary management of diarrhoea

Research has shown that weight loss due to diarrhoea can be minimized by providing optimal nutritional support during and after illness. Readily available, culturally acceptable foods, which are inexpensive and have adequate caloric, protein, vitamin and mineral content, should be used for feeding during diarrhoea. However, further studies are required: (a) to determine the beneficial effects of certain foods that are widely used in some regions on the clinical course and the nutritional response of children with acute diarrhoea; and (b) to demonstrate that oil can be safely and effectively used to enrich low-calorie diets traditionally given to children with diarrhoea and thereby ensure adequate caloric intake.

Clinical trials of selected diets should be carried out in hospitalized patients, outpatients and patients treated at home, and should include patients with both acute and watery diarrhoea and dysentery. Feeding schedules should provide extra caloric intake during diarrhoea and for 2-3 weeks of convalescence to maximize the recovery of lost weight or growth.

Anorexia is often an important obstacle for efforts to provide adequate nutritional intake during diarrhoea or dysentery. Research is required to define the pathophysiological determinants of anorexia in these conditions. Based on the findings of these studies, specific treatment designed to reduce anorexia and facilitate early feeding should be evaluated in controlled trials.
Persistent diarrhoea

A proportion of episodes of acute diarrhoea become persistent, i.e. last for more than 14 days. These result in progressive weight loss and malnutrition, and have a substantially increased risk of death. Major research priorities\(^1\) are to determine the incidence of, and risk factors for, persistent diarrhoea, determine its causative mechanisms, and develop practical methods for its prevention and treatment.

Intervention studies should be carried out in patients with persistent diarrhoea to evaluate the efficacy of specific treatments, including both drugs and selected antibiotics, that might interrupt important pathogenic mechanisms. Other studies could include treatment with carefully defined dietary regimes. Such studies should be controlled and, if possible, double blind; the objective should be to modify existing regimes so that they are more effective, more practical, or both. Outcome measurements should include stool losses, duration of diarrhoea and gain in weight and height.

Research priorities relating to improving infant feeding practices to prevent diarrhoea or reduce its severity

A meeting\(^2\) organized by Johns Hopkins University, with financial support from WHO, identified the following research priorities, which have been adopted by the Diarrhoeal Diseases Control Programme:

1. Research is needed to assess the role of non-food supplements (teas, water, etc.) in the transmission of diarrhoeal diseases in the first months of life. Of highest priority are trials to measure the impact of interventions which aim to discourage the use of non-food supplements in exclusively breast-fed infants. These trials should document the impact on behaviour, as well as on lactation performance and child growth and diarrhoeal morbidity.

2. Intervention studies should be conducted to evaluate approaches to promote the successful initiation and maintenance of breast-feeding among low-birth-weight infants. These studies might also consider the impact of the intervention on growth and diarrhoeal and respiratory morbidity.

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1. Adapted from Biomedical and epidemiological research priorities of global scientific working groups, WHO Diarrhoeal Diseases Control Programme, document WHO/CDD/RES/86.6 Rev.1 (1987).

2. Improving infant feeding practices to prevent diarrhoea or reduce its severity/research issues. Johns Hopkins University, Baltimore, Maryland, 23-26 April 1988.
(3) Further evaluation is required of approaches to the promotion of improved breast-feeding practices in the context of public health programmes. Of particular interest is the study of interventions to facilitate the establishing of lactation and the maintenance of exclusive breast-feeding during the first 4-6 months of life.

(4) Intervention studies are required to further elucidate the "weanling's dilemma". These studies should investigate the impact of interventions which aim to modify the timing of the introduction of food supplements in exclusively breast-fed infants. The impact on behaviour, as well as on growth and diarrhoeal morbidity, should be determined in various socioeconomic and environmental conditions.

(5) The protective role of micronutrients against childhood diarrhoea, especially of a persistent or severe nature, warrants further investigation. Double-blind, randomized, placebo-controlled community-based trials are needed to measure the impact of micronutrients, e.g. vitamin A, iron, zinc, vitamin B₁₂ and folate, alone or in combination, on diarrhoeal morbidity.

(6) Research is needed to clarify the role of food preparation, processing and storage techniques and feeding methods in the transmission of diarrhoeal diseases. In particular, the impact of promoting specific changes in weaning practices which aim to reduce the fecal contamination of foods should be determined. It might also be appropriate in some settings to include measures to enhance nutrient intake. Intervention studies should measure the impact on behaviour, as well as on growth and diarrhoeal morbidity, and should be conducted in various cultural, socioeconomic and environmental settings.

13.15 CANCER

Diet has been linked to the most common global causes of mortality: cardiovascular diseases and cancer. There is therefore a need to develop a consensus in this field, formulate a coherent nutrition policy and recommendations for its application in both developed and developing countries, and promote coordinated national disease-prevention programmes. These are the objectives of a study group on diet, nutrition and the prevention of noncommunicable diseases that WHO is convening from 6-13 March 1989 to review current scientific knowledge on the association between nutrition and noncommunicable diseases. On this basis, the meeting will make recommendations to WHO and governments on diet as it relates to the prevention of noncommunicable diseases including cardiovascular disease, cancer, diabetes, and oral diseases.
International Agency for Research on Cancer (IARC)

For the period 1988-1991, IARC has identified a number of relevant research activities including:

(1) an examination of the relationship between diet-related biological indicators, hormonal patterns and the risk of cancers at several sites;

(2) an investigation of the role of dietary lipids in experimental carcinogenesis and a search for noninvasive biochemical predictors of cancer susceptibility as a consequence of oxidative damage;

(3) immunological, biochemical and analytical methods to detect exposure to carcinogens including studies on the relationship between intake of food contaminated with aflatoxins and their excretion in urine and milk; determination of excretion pattern of aflatoxin metabolites among chronic carriers of hepatitis B virus with chronic active hepatitis; monitoring aflatoxin exposure in parallel with the hepatitis B virus vaccination programme in the Gambia; and studies in experimental animals and humans on the interaction between hepatitis B virus and aflatoxin in the induction of liver cancer.

13.16 CARDIOVASCULAR DISEASES

Prevention of coronary heart disease

(1) The implementation of projects on the primordial prevention of CHD should be promoted in developing countries in collaboration with WHO. The newly established pilot areas for primary health care in several countries might be invited to cooperate in such an effort.

(2) There is an urgent need for research into the primary prevention of arterial hypertension along several promising lines, including eating and activity patterns in populations.

(3) Research and demonstrations in specific areas that are not yet well developed - particularly in respect of eating patterns and physical activity programmes - should be promoted and the findings tested.

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Primary prevention of essential hypertension

(1) Further research is required to define more precisely the factors causing sustained elevation of blood pressure. In particular, there is a need for new knowledge in inter alia the effects of environmental factors, in particular dietary influences on blood pressure.

(2) Suitable studies will involve the application of preventive measures to discrete populations. In order to develop methods of intervention in individuals and populations, studies need to be initiated to evaluate techniques for, and the effects of, alterations in, inter alia:

(a) dietary sodium and other cations, total energy intake, dietary proteins and lipids, and alcohol intake;
(b) excess body weight;
(c) behaviour;
(d) physical exercise.

Blood pressure studies in children

(1) The relationships between blood pressure and the following dietary elements need more extensive investigation:

(a) dietary electrolytes (sodium, potassium, calcium);
(b) dietary proteins, lipids, and fibre;
(c) alcohol;
(d) total energy.

(2) Further research is needed to evaluate the effects on the level and evolution of blood pressure in children of alterations in the following variables:

(a) dietary intake of electrolytes, proteins, lipids, alcohol;

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(b) body weight;
(c) physical activity;
(d) smoking habits.

Community prevention and control of cardiovascular diseases

It is recommended inter alia that the World Health Organization encourage international cooperative research on dietary approaches to the primary prevention of hypertension.

Development of a methodology for the prevention and control of hypertension in developing countries

A meeting on this topic, which took place in Geneva from 6-9 June 1988, concluded that basic instruments are needed, in particular to detect and treat hypertension, which is now at an epidemic stage in many developing countries. It noted the increasing evidence that such environmental influences as excessive energy intake, dietary salt and saturated fats, obesity, high alcohol intake, low fibre intake and low levels of physical activity are major determinants of high blood pressure in addition to being risk factors for atherosclerosis and, in some cases, for diabetes and cancer.

The meeting recommended inter alia that more research into hypertension in developing countries be designed and conducted according to local needs. Standardized procedures should be used and health personnel trained accordingly. WHO should take a major responsibility for promoting and supporting research related to epidemiology, prevention and control of hypertension in developing countries, and for facilitating an exchange between countries of information about the outcome of such research. WHO should assign specific tasks to its collaborating centres, which should serve as a resource for research and training to help countries develop, implement and evaluate effective programmes. A large clinical trial of the effects of treatment of hypertension in developing countries should be considered in order to demonstrate the benefits of effective management of hypertension in this environment.

Prevention of cardiovascular diseases among the elderly

In discussing priority intervention studies for changing risk factors in the elderly, a WHO meeting concluded inter alia that in current studies of community prevention, risk factor changes in the elderly should be analyzed separately; and, as regards dietary change

and lipoproteins, responses of plasma lipoprotein levels to dietary interventions in the elderly should be studied in short-term controlled trials.

13.17 OTHER NONCOMMUNICABLE DISEASE PREVENTION AND CONTROL ACTIVITIES

The recommendations of a study group on diabetes mellitus\(^1\) included the following:

(1) Health systems planning for, and research into, diabetes must be adaptable to the wide variation in social, economic, and medical conditions and structures.

(2) Special centres should be established in developing countries that are concerned inter alia with initiating research into the epidemiology and prevention of diabetes that is appropriate for local conditions.

(3) Since it seems likely that certain common types of diabetes can be prevented by the avoidance of obesity and the promotion of physical activity, information on such preventive measures should be widely disseminated through health care agencies and the mass media. The growth of knowledge relevant to the prevention of other types of diabetes (e.g. insulin-dependent and malnutrition-related types) makes it timely for a group of experts to review the whole field of primordial and primary prevention of diabetes.

(4) Health care planning and diabetes prevention both require accurate information on the distribution of diabetes within populations and on its environmental and genetic associations. Further population-based studies of the epidemiology of diabetes are necessary, and are of particular importance in the case of malnutrition-related diabetes. Surveys to establish the true prevalence of malnutrition-related diabetes, its environmental and nutritional background, and its clinical course should be organized, perhaps through a multidisciplinary, internationally based task force.

Diabetes mellitus and glucose intolerance

The WHO meeting\(^2\) on prevention of cardiovascular diseases among the elderly discussed inter alia the prevalence of diabetes mellitus and glucose intolerance levels among the elderly, which should be ascertained using standard criteria now available. The role of these conditions in relation to cardiovascular diseases should be clarified


in cohort studies among different populations. Depending on the results of observational studies, trials of prevention with appropriate hygienic-dietetic means (physical activity, weight control, diet) should be organized.