WEST AFRICAN CONFERENCE ON VITAMIN A DEFICIENCY

ACCRA, GHANA

9 - 11 August 1993

USAID

US Agency for
International Development

THE MICRONUTRIENT
INITIATIVE

Research and Programme Experience in the Control of Vitamin A Deficiency in the West African Subregion: Toward Development of Policy and Strategies

Report of a meeting held in Accra, Ghana
9 - 11 August 1993

Funded by:

International Development Research Centre (IDRC, Canada)
Micronutrient Initiative (Canada)
Overseas Development Administration (UK)
UNICEF
USAID (Office of Nutrition)

Hosted by:

Ministry of Health, Ghana

In collaboration with:

Maternal and Child Epidemiology Unit,
London School of Hygiene and Tropical Medicine

ACKNOWLEDGMENTS

The Conference Planning Group wishes to acknowledge the support and contribution of the following:

Dr. Moses Adibo, Director of Medical Services of the Ministry of Health (Ghana), and the Minister of Health for agreeing to host the conference;

IDRC, Micronutrient Initiative, The ODA, UNICEF (Ghana), USAID Office of Nutrition (Washington) and USAID (Ghana) for funding the conference;

Dr. Frances Davidson, Deputy Director, Office of Nutrition (USAID, Washington) and the group at VITAL for technical support, particularly in the preparation of this report; Ms. Jenny Cervinskas and the group at Micronutrient Initiative for their input in developing the structure and content of the conference and the report; Dr. Barbara Underwood (WHO Nutrition, Geneva) for her support and valuable advice throughout; Ms. Betty Kirkwood and Dr. David Ross at The London School of Hygiene and Tropical Medicine for their assistance in developing the whole conference.

In addition, we would like to acknowledge the contribution and participation of FAO and HKI, and the many others who contributed to the success of the conference.

The preparation and production of this report was made possible by additional funds from USAID (Office of Nutrition), Micronutrient Initiative and IDRC.

Conference Planning Group
December 1993

FOREWORD

Commodore (Rtd) Steve Obimpeh
Minister for Health
Ghana

Mr. Ibrahim Adam
Minister for Food and Agriculture
Ghana

Despite the growth and development of agriculture in the last decade, access to food and good nutrition is still not universal in many developing countries.

Governments continue to make strenuous efforts in providing resources for nutrition and agricultural programmes. It requires, however, a healthy collaboration between research scientists, policy makers and programme persons to achieve sustainable programmes that will be able to uplift the health and nutritional status of populations.

This conference presented a timely opportunity for review of ongoing programmes and discussion of future directions. The individuals and groups that participated form the vehicle for translating the recommendations captured in this report to the benefit of the population in the subregion.

FOREWORD

Dr. Richard Seifman
Director, USAID Office of Nutrition
Washington, D.C.

We live in remarkable times. The pace of scientific knowledge and technological breakthroughs occurs at an astounding rate. At the same time, the difficulties in systematically applying these advances to real-life situations has not abated despite the best intentions of dedicated men and women who seek improvements in nutritional and health status not only for survival but also for greater prosperity and better lives for the future.

The story of vitamin A is very much a microcosm of this fundamental and confounding development dilemma. Almost weekly, we learn of new dimensions of the role vitamin A plays in reducing morbidity and mortality. The Ghana VAST studies are an example of the advancement in global scientific understanding of vitamin A functions. Technological efforts are also underway to improve the assessment of vitamin A status at the clinical level and to develop simplified assessment techniques. Improved ways of communicating the importance of vitamin A to communities and ways to provide vitamin A, whether through supplementation, fortification, or diet diversification, are in all train.

Despite what we know or will know in "theory," in the "clinic," in the "available literature," none of it is easily applied and sustained in real-life settings. This is true in the most advanced countries as well as elsewhere. What is clear is that the interchange between the scientist and the operational professional and between countries sharing failures as well as successes is a crucial element if we are all to make progress in virtually eliminating vitamin A deficiency by the year 2000. President John F. Kennedy would say that "a rising tide lifts all boats." The countries participating in this regional workshop need to maintain the "rising tide" begun in Accra in August 1993.

FOREWORD

Stephen Simon, M.D.
Executive Director, Micronutrient Initiative
Ottawa, Canada

In his remarks to the "Project on Governing in an Information Society," Daniel P. Keating described the chronology of the evolution of modern communications technology in the following analogy. He said that, "If we were to take 100,000 years as [a low] estimate of the time elapsed since the emergence of fully modern humans (Homo sapiens), and place it on the scale of a single year, we would note that our species first moved into small urban centres supported by agriculture, about the end of November, started an industrial revolution on the afternoon of New Year's Eve, and, a few hours later, began experiments in instantaneous global communication, information technology, and multicultural metropolism." Placed on the same scale, awareness of the mortality-reduction effects of vitamin A would also have occurred within hours of the Industrial Revolution.

The pledge undertaken by Heads of State and Government at the World Summit for Children, enjoins us to eliminate vitamin A deficiency by the year 2000--a commitment which, if fulfilled, would be measured in minutes from the point of scientific discovery.

This Conference has provided insights into the nature of vitamin A malnutrition in West Africa and into promising local initiatives for its elimination. It has also elucidated significant gaps in knowledge considered by some to be essential for sustainable control of this deficiency; but, in many cases, the tools and the science are available for immediate, short-term remedial action.

We simply do not have the luxury of hours.

ACRONYMS

ACC/SCN	The Subcommittee on Nutrition of the United Nations' Administrative Committee on Coordination
AED	Academy for Educational Development
ARI	Acute Respiratory Illness
CI	Consumption Index
CIC	Conjunctival impression cytology
CIDA	Canadian International Development Association
DHS	Demographic and Health Surveys
EPI	Expanded Programme of Immunizations
FAO	Food & Agriculture Organization
FAO/FACT	FAO Food Composition Table
FDA	Food & Drug Administration
HKI	Helen Keller International
ICT	Impression cytology with transfer
ICN	International Congress of Nutrition
IDRC	International Development Research Center
IEC	Information, education and communication
IVACG	International Vitamin A Consultative Group
KAP	Knowledge, Attitudes and Practices
MCH	Maternal and child health
MI	Micronutrient Initiative
MRDR	Modified Relative Dose Response
NCHS	National Centre for Health Statistics
NGO	Nongovernmental Organization
ODA	Overseas Development Administration (UK)
PEM	Protein energy malnutrition
PHC	Primary health care
RDA	Recommended Daily Allowance
RE	Retinol Equivalent
TSH	Thyroid stimulating hormone
UNICEF	United Nations Children's Fund
UPFC	Usual Pattern of Food Consumption Index
USAID	United States Agency for International Development
VAD	Vitamin A Deficiency
VITAL	Vitamin A Field Support Project
WHO	World Health Organization
WHO/MDIS	WHO Micronutrient Deficiency Information System

CONTENTS

EXECUTIVE SUMMARY

The first West African Conference on Vitamin A deficiency was held in Accra, Ghana, on August 9-11, 1993. It was convened by the Ministry of Health (Ghana) in collaboration with the Maternal and Child Epidemiology Unit of the London School of Hygiene and Tropical Medicine, with joint funding from USAID (Office of Nutrition), Micronutrient Initiative, IDRC, UNICEF, and ODA. Attending the conference were 76 participants representing 13 countries in the region; 24 international participants from FAO, Micronutrient Initiative, UNICEF, USAID, WHO, and the World Bank; and over 20 observers from nongovernmental organizations and research institutions within Ghana.

Objectives

The main objectives of the conference were to identify feasible programme options for the prevention and control of vitamin A deficiency in the subregion and to discuss the key policy issues for catalyzing the implementation of country plans of action for micronutrient deficiency control. The conference also identified the research, training, and institutional requirements for achieving vitamin A deficiency control policies and programmes, and provided a forum for promoting intergovernmental, programme and institutional linkages for micronutrient deficiency control in the subregion. The conference objectives were achieved through discussion of issues raised in key presentations, working group assignments, and presentations on ongoing projects.

The main issues covered are summarized below.

Situation Assessment

Of the 34 countries in Africa that have vitamin A deficiency problems of public health significance, 18 are located in the West African subregion. With a paucity of information on the magnitude and distribution of the problem in the subregion, there is an urgent need to improve upon the level of knowledge regarding the prevalence and distribution of VAD in West Africa. Except for Nigeria whose national survey is in progress, no national prevalence surveys have been undertaken in the subregion.

Information available from health service returns, field projects, field studies, and some microsurveys indicates a high prevalence of vitamin A deficiency in the subregion. The prevalence of xerophthalmia is high in the Sahelian belt, where vitamin A-rich foods are scarce. Further indications suggest the possibility that there may be a high prevalence of subclinical deficiency even in areas where vitamin A-rich foods abound. Large variations exist in the magnitude of the problem between countries and within countries.

Similarly, little information is available on the type and status of vitamin A projects, although several are being carried out in the subregion. WHO has set up a Micronutrient Deficiency Information System, but the database does not yet contain information on all the countries in the subregion; thus, a complete picture of vitamin A deficiency (VAD) is still not available for the subregion. Suggestions for revisions to the MDIS questionnaire were made, and the country teams present at the meeting agreed to return the requested information to WHO.

Developing and Implementing National Policy

The development of a specific national policy for micronutrient deficiencies may not be needed. Rather, it is important to examine and build upon the various policies already in existence that affect food availability and nutrition. The need to integrate micronutrient deficiency control and overall nutrition programmes makes both intuitive and economic sense and provides more sustainable long-term approaches to overcoming VAD.

Key sectors that must be involved in developing national policy include health, agriculture, education, information, industry, social welfare, academia, and research institutes. The conference highlighted a number of enabling factors

for policy development, including consensus building among the various sectors; the use of an explicit framework detailing the several causes of nutritional deficiency to stimulate problem analysis; and the establishment of a multisectoral consultative group for policy formulation. Conference participants also suggested that the formation of intersectoral working groups for monitoring nutrient-oriented actions may be helpful. The dynamic nature of programmes was stressed. Continuous review is important to enable evolution and adjustment when indicated.

Information for Programme Development

As a prelude to programme development, it is necessary to review information on the magnitude and distribution of the vitamin A deficiency problem. While information on the direct causes of VAD should be sought, related and deeper causes also need to be identified. Even though each assessment must be country-specific, extensive field studies may not necessarily be required. In fact, it may be possible to collate the required information from already available data.

Priorities must be based on a detailed assessment of the problem. Although information might be available from external experience (for example, from neighboring country surveys), local information such as the vitamin A profile of the population and factors related to the deficiency state is required for national policy development and programme planning.

It was noted that a low prevalence of clinical indicators might result in the misclassification of VAD problem areas as non-problem areas. In those settings where clinical and biological data on the prevalence of VAD are lacking, it may be appropriate to make planning decisions based on assessments that take into account dietary and ecological indicators. Conference participants stressed the utility of dietary intake assessment methods. Examination of habitual intake, although not strictly a status indicator, can help identify high-risk groups and thus is useful in developing programmes targeted at specific risk groups, as well as in providing baseline data for programme planning, monitoring, and evaluation.

Programme Strategies and Programme Development

The magnitude of the vitamin A deficiency problem and the interaction of factors contributing to it vary between the different parts of the subregion; thus, no specific package of interventions can be recommended for the subregion as a whole. Important note was made of the need to consider a mix of interventions phased in over time according to programme objectives. Where there are significant in-country differences in the level of vitamin A deficiency, different policies and packages may be applicable even in different parts of the same country. The most feasible programme options appear to be horticultural interventions, supplementation, and communications/education programmes. Food fortification appears to be the least appropriate option for vitamin A deficiency control in the subregion.

There should be a balance between programmes that encourage the production of vitamin A-rich foods and programmes that sensitize people to the importance of consuming these foods. Vegetable production projects should not only be aimed at alleviating vitamin A deficiency through consumption of produce but should also be designed to yield enough produce for sale to generate income. Apart from providing a source of funding for projects, income generation may itself be the main incentive for the acceptance of such projects.

Food preservation through solar drying has not been widely used in the region but appears to be a viable option for increasing the availability of β-carotene-rich foods in the off-season months, at least in areas that experience a seasonal glut of such foods. Ways need to be found to incorporate such foods into children's diets, particularly into weaning foods. However, the introduction of solar drying requires field development work to identify the appropriate dryer technology and dryer construction materials and to determine the acceptability of the dried product. Programme target populations need to be involved in the development of programme technologies such as the design and construction of solar dryers. When local technology-based industries are created, they become part of the culture of the people.

Fortification does not appear to be a feasible programme option because few foods in the subregion are centrally processed. Potential food vehicles such as rice may not be accessible to the poorer segments of the population and fortified foods will likely be consumed only by those who already eat sufficient quantities of vitamin A-rich foods. However, immediate policy on fortification could be formulated with respect to both import restrictions on nonfortified vegetable oil and fat used in supplementary feeding programmes, and the inclusion of vitamin A-fortified foods in emergency relief packages.

Programme Implementation

The most sustainable programmes are those whose programme initiative is country-generated. Where a country's capacity to develop and implement programmes is low, it may be necessary to seek external assistance. In such situations, however, action plans must take into account the host country's capacity and might therefore sometimes imply a slower-paced programme than that desired by donors.

Institutions in charge of nutrition and public health such as ministries of health and agriculture are recognized as the appropriate lead institutions for vitamin A deficiency prevention and control activities. The problem of malnutrition, however, requires the involvement of several national and private sector organizations as well as the participation of subregional, regional, and international organizations. To coordinate activities between different organizations effectively, it is necessary to put in place a well-articulated national programme that outlines overall policies, strategies, and specific programme activities and defines roles and mandates for the various organizations involved in vitamin A deficiency control activities. The structure for coordination should extend from the national level down to the district and local levels, which is where most programme activities are implemented.

A coordinated approach with inputs from different sectors is essential to sustainability. It is important that the coordinating group not be perceived as a unit of any one ministry, as other ministries and agencies may not want to contribute to a programme that does not seem to benefit their own activities directly. Further, given that several external donors usually pursue similar programmes in a given country, appropriate structures must be put in place to coordinate external donor support as well as to share information between donors. While it is difficult to operate across different sectors, regular donor meetings offer a means to achieve cooperation.

Communications is an important support component for all programmes. Institutions in charge of communications and social marketing, training, and education need to be involved in information dissemination. To achieve a greater impact, social communications projects on nutrition in general and vitamin A in particular should be linked to other ongoing development projects thereby ensuring that the enabling factors for the prescribed change are available and that resources (personnel, training, management, and supervision) will be shared. Traditional, religious, and other opinion leaders need to play active roles in communications programmes. Their participation can be achieved by organizing training appropriate for them.

It is important to monitor progress in programme implementation. Process indicators that might be used for monitoring progress include capsule distribution coverage rates, the per capita volume production of fortified foods, and the per capita consumption index of vitamin A-rich foods, all of which can be obtained from routine programme returns or special surveys.

Financing

Different funding options exist for various programme components. As a general rule, core funding or seed money for programmes should be sought from national budgets. Universities and research institutions should be able to provide data to stimulate government interest and funding for assessments. External donor money for situation assessment should be sought only when seed money is not available or in-country resources for high-cost assessments are insufficient.

Whenever possible, it is important to develop cost recovery schemes for programmes. Cost recovery is possible for such programmes as fortification, supplementation structured around the mechanisms of the Essential Drug Programme, and vegetable production that encourages yields in excess of the family's nutrient needs so that the surplus can be sold in local markets. Furthermore, cost-benefit comparisons for vitamin A programmes need to take into account cost savings in health care that result from the impact of vitamin A programmes. This concept needs to be strongly advocated to governments.

Research Needs

Conference participants identified the following research needs:

- identifying the constraints that prevent the translation of policies into programmes;
- determining the perceptions of decision makers on nutrition issues and the nutrition information needs of policy makers;
- developing alternative models for vitamin A deficiency control that incorporate cost-effectiveness and benefit analyses, particularly as the analyses relate to long-term productive contributions to economy;
- improved systems for marketing produce to encourage the production of vitamin A-rich foods;
- an inventory of existing traditional methods of food preservation, an assessment of the effect of processing on the β-carotene content of foods, and the conduct of applied research to improve various processing methods in terms of energy efficiency, conservation of β-carotene content, and the hygienic quality of foods;
- development work for specifying appropriate solar dryer technology and identifying dryer construction materials;
- the acceptance of solar-dried foods, particularly with respect to weaning diets; and
- initiatives targeted to the production of concentrated palm oil in capsules or other forms that populations could be encouraged to consume.

Finally, there was a consensus on the need to hold a similar meeting in the future to evaluate individual country progress toward the elimination of vitamin A deficiency in the sub-region.

INTRODUCTION

This report summarizes the proceedings from the first West African Conference on Vitamin A Deficiency. Held in Accra, Ghana, from August 9-11, 1993, the conference was convened by the Ghanaian Ministry of Health, in collaboration with the Maternal and Child Epidemiology Unit of the London School of Hygiene and Tropical Medicine, with joint funding from USAID (Office of Nutrition), Micronutrient Initiative, IDRC, UNICEF, and ODA. Some 76 participants representing 13 countries in the region; 24 international participants from organizations such as FAO, Micronutrient Initiative, UNICEF, USAID, WHO and the World Bank; and over 20 observers from nongovernmental organizations and research institutions within Ghana attended the conference.

Conference Objectives

- To document the vitamin A situation in the subregion and the appropriate methods for determining the prevalence of vitamin A deficiency, and to collate information on the status of existing programmes in the subregion.
- To identify feasible programme options for the prevention and control of vitamin A deficiency in the subregion.
- To identify priority policy issues for catalyzing the implementation of country plans of action for micronutrient deficiency control per the ICN.
- To identify the research, training, and institutional requirements for developing vitamin A deficiency control policies and programmes.
- To establish intergovernmental, programme, and institutional linkages for micronutrient deficiency control in the subregion.

Structure of the Conference

The conference was organized into six business sessions. For each session, specific objectives were stated; implicit in these objectives were the expected outputs for the various sessions. The outputs are summarized in the introduction of the appropriate sections of this report.

The conference consisted of three main parts. First, a short background session summarized the child health and survival consequences of vitamin A deficiency and the status of the vitamin A deficiency problem in the subregion. The second part formed the main body of the conference and included two mini-workshops. The first examined issues relating to programme development and implementation. The second focused on issues relating to policy formulation. Each mini-workshop began with key presentations that highlighted discussion issues. The issues were then assigned to working groups for detailed discussion. The conclusions reached by the groups were presented in plenary sessions and constitute the conference conclusions.

Other sessions in the second part of the conference focussed on the information needs for the development and monitoring of programmes and the implementation of a vitamin A policy in the treatment of measles. The third part of the conference provided a forum for sharing research findings and project experiences through short presentations on selected projects in the subregion.

The Conference Report

This report summarizes the presentations and discussions as well as the conclusions presented by the working groups to the plenary sessions. Section 1 covers the first part of the conference while the main body of the conference is summarized in Sections 2 and 3. Section 4 also summarizes the presentations made in the research forum. In response to requests from participants for copies of presentations made at the conference, selected key presentations have been reproduced in full text in the appendix. The appendix also includes some significant statements/declarations from international meetings that have addressed the problems of micronutrient malnutrition. In addition, the appendix contains a bibliography of selected resources for addressing the goal of the virtual elimination of vitamin A deficiency and its consequences. The bibliography is annotated and provides addresses from which material may be obtained.

OPENING CEREMONY

Dr. Moses Adibo, Director of Medical Services for Ghana's Ministry of Health, chaired the opening ceremony, which was attended by ministers of state for health and agriculture, and representatives of FAO, Micronutrient Initiative, UNICEF, USAID, WHO, and the World Bank.

Opening Remarks
Dr. Moses Adibo, Director of Medical Services, Ghana

In his opening remarks, Dr. Adibo stated that the eradication of malnutrition among vulnerable groups and improvements in the nutrition and diets of all individuals are fundamental policy objectives of governments in the subregion. He pointed out that as a concrete expression of this policy objective, the government of Ghana, within the context of its national plan of action developed after the World Summit on Children, has declared its intent to reduce severe malnutrition among children under five years from 8 percent to 4 percent and to reduce the prevalence of moderate malnutrition from 40 percent to 20 percent within the next 10 years. Dr. Adibo noted the recently completed national prevalence surveys on iodine deficiency disorders as well as the vitamin A studies in northern Ghana and drew attention to the policy relevance of these studies. The vitamin A studies confirmed the association between vitamin A deficiency and childhood morbidity and mortality. Regarding the development of intervention strategies, Dr. Adibo stressed the fact that the subregion abounds in vitamin A-rich foods such as green leafy vegetables and red palm oil and suggested that efforts need to be made to ensure production and consumption of such foods. He noted the timely nature of the conference and expressed the government of Ghana's gratitude to international organizations and agencies for their role in the fight to eliminate vitamin A deficiency.

Agency Presentations

Representatives from donor organizations that funded the conference made brief presentations about their expectations of the conference. Mr. Joseph Goodwin, Director of the A.I.D. Mission to Ghana, observed that vitamin A deficiency is still one of the world's major nutrition problems in that it affects the most vulnerable in society. He recalled the agency's position as a world leader in vitamin A deficiency control and research and pointed to the activities of the Office of Nutrition. He referred to A.I.D.'s launching of a 10-year $50 million effort at the ICN to assist in the control of micronutrient deficiencies. The programme is wide in scope, ranging from situation assessment to the development of intervention approaches. Mr. Goodwin noted both A.I.D.'s support to nutrition programmes implemented by the government of Ghana and the agency's contribution to the conference. He expressed the hope that the conference would provide opportunities for effective networking of researchers and programme managers to facilitate information dissemination and improvements in vitamin A programmes in the subregion. He suggested pertinent issues for inclusion on the conference agenda such as identifying and defining the extent and severity of vitamin A and other micronutrient deficiencies; discussing culturally appropriate, technically sound, and economically sensible programmes for the subregion; and examining practical indicators for the monitoring and evaluation of these programmes.

Mr. Fiekre Mienke represented UNICEF/Ghana and described the conference as most timely and noted that it could be instrumental for translating political commitments into programmes and actions in the subregion. He reminded participants of the declaration of the 1990 World Summit on Children and its commitment to eliminate vitamin A deficiency and of the subsequent pledge by all African countries in Dakar in November 1992 to attain this goal. He observed that while the political commitment and resources needed to eradicate vitamin A deficiency are in place, constraints exist in the form of determining the magnitude and gravity of vitamin A deficiency, the absence of a consensus on the public health significance of vitamin A deficiency in individual countries, and the challenge of identifying policy issues, strategies and actions that should be considered in light of various country-specific opportunities and problems. He suggested that the conference discussions focus on how to overcome these constraints. Mr. Mienke called for policies, strategies, and actions that go beyond supplementation as part of a minimum health package that includes incorporation of food fortification and promotion of vitamin A-rich foods into

control programmes. These policies, strategies, and actions should ultimately focus on equipping families and communities with knowledge of what constitutes an adequate diet, while enabling them to achieve year-round food security. UNICEF observed that attaining these objectives will require the institution of an information mechanism by which communities can play significant roles in assessing, analyzing, and acting on their situations.

Ms. Jenny Cervinskas of Micronutrient Initiative recalled the key questions MI asked when reviewing the request for support for the conference: whether the conference would contribute to preventing and/or overcoming vitamin A deficiency in the participating countries and whether it would help the participating countries achieve the operational targets recommended for overcoming micronutrient malnutrition. She reminded the group of global commitments made toward micronutrient deficiency control: by the end of 1993, all countries should have at least completed an assessment of micronutrient malnutrition sufficient to launch an action programme if needed; and all countries should have established a national group or mechanism for overcoming micronutrient malnutrition. Furthermore, by 1995, each country should aim to establish and implement an action plan for each micronutrient malnutrition problem. Ms. Cervinskas congratulated the Conference Planning Group for planning a potentially stimulating and action-oriented conference and noted that the overall meeting goals reassured MI that the meeting could indeed be pivotal in achieving vitamin A deficiency control in the subregion. She stressed that the conference provided each participant with the opportunity and responsibility to learn and to establish or strengthen linkages that would forge collaboration at the subregional level. Ms. Cervinskas expressed hope that the conference would encourage the growth of a West African vitamin A movement to help accelerate and strengthen national movements aimed at developing a policy on vitamin A deficiency. As for the donor agencies, it was suggested that their responsibility was to learn to assist where possible and that such responsibilities would sometimes entail a review of internal policies.

Keynote Address

His Excellency K. N. Arkaa, Vice President of Ghana

A keynote address read by the Honorable Minister for Health Commodore Steve Obimpeh (Rtd.) on behalf of His Excellency Vice President K. N. Arkaa restated Ghana's commitment to the elimination of micronutrient malnutrition. Further, the government pledged to provide every support for that purpose. The address highlighted the effects of micronutrient malnutrition on millions of people worldwide and acknowledged the magnitude of the problem in the West African subregion. Commodore Obimpeh (Rtd.) observed that most countries in the subregion have yet to map out geographic locations where vitamin A deficiency is prevalent and embark on a nationwide programme of control. He asked participants to note the findings of the field studies conducted in northern Ghana. The studies demonstrated the benefits of programmes aimed at improving the vitamin A status of children. In conclusion, Commodore Obimpeh (Rtd.) referred to the 1990 World Summit for Children and to the Montreal "Ending Hidden Hunger" conference, noting that the international community is highly aware of the problem of micronutrient malnutrition and has amply demonstrated its commitment to dealing with it. Expressing satisfaction that the conference provided the forum for addressing vitamin A deficiency in the subregion, Commodore Obimpeh (Rtd.) congratulated the donors who made the meeting possible.

Section 1: BACKGROUND

1.1 Vitamin A Deficiency, Child Health, and Survival

This introductory session reviewed the child health and survival consequences of vitamin A deficiency and discussed two field trials carried out in Africa (Sudan and Ghana). A key presentation by Dr. Bruno de Benoist (WHO-AFRO) provided an overview of the magnitude and distribution of vitamin A deficiency in the West African subregion and was supported by country presentations from Nigeria and Mali that provided descriptions of the situation in those countries.

1.1.1 The Health and Survival Consequences of Vitamin A Deficiency: An Historical Overview

Dr. Barbara Underwood, WHO-Nutrition, Geneva

Dr. Underwood's overview of the relationship between vitamin A deficiency and child morbidity and mortality summarized the observations from laboratory, pathological, clinical, and field studies. The earliest evidence of a causal relationship came from incidental findings of low survival of vitamin A-deficient laboratory animals. Histological changes observed in epithelial tissues, along with evidence of compromised immune systems, suggested a predisposition to infection. Despite similar observations in human studies, it has been difficult to describe the precise relationship because of the complex interactions between nutrition and infection. Now, however, the evidence is conclusive that vitamin A-deficient children suffer from an increased risk of morbidity and mortality. The first such observations came from pioneering field studies in Southeast Asia and India in the late 1970s and early 1980s. The emerging hypotheses from these observational studies held that improving the vitamin status of populations would lead to reductions in morbidity and mortality risk. A series of field trials have subsequently tested the hypotheses. More than 10 large-scale field studies and several clinical studies have been conducted in populations with variable vitamin A profiles in Indonesia, India, Tanzania, Nepal, South Africa, Sudan, Haiti, Ghana, Brazil, the Philippines, and China. The conclusion from these studies is that improving the vitamin A status of children in vitamin A-deficient regions substantially reduces the severity of illnesses and can be expected to reduce mortality rates by at least 20 percent.

1.1.2 Vitamin A Field Trials in Africa

The design and results of two vitamin A supplementation field trials in Africa were presented. Both studies were randomized placebo-controlled trials carried out between 1988 and 1991.

The Sudan Study

Dr. Wafaie Fawzi, Harvard University

This study investigated the impact of vitamin A intake on the risk of mortality and xerophthalmia in northern Sudan. The study involved nearly 30,000 children aged nine months to 72 months residing in an area where vitamin A deficiency is endemic. Approximately one-half of the children received 200,000 IU doses of vitamin A every six months while the remaining one-half received a placebo preparation. Mortality was monitored for both groups over an 18-month period. With no difference in mortality rates noted between the two groups of children, the results showed that large, semiannual doses of vitamin A did not reduce the risk of mortality. On the other hand, total dietary vitamin A intake was strongly and inversely associated with the risk of mortality. Furthermore, dietary vitamin A intake was especially protective among children who were wasted and stunted or who had diarrhea or cough, i.e., children who were at risk of severe deficiency.

The discussion highlighted the discrepancy between the results of this trial and several of the other field trials to date, including the only other trial in Africa (see below), and offered several suggestions for the apparent lack of effect. The lack of effect might, for example, have been attributable to the six-month supplementation interval or the presence of other factors that modify the effect of vitamin A supplements.

The Ghana Study
Drs. Paul Arthur and David Ross, Ghana VAST Study Team

Two trials were carried out on adjacent populations in northern Ghana to examine the impact of oral doses of vitamin A administered at four-month intervals on the incidence and severity of illnesses (the Health Study) and on mortality (the Survival Study). The trials were carried out in a known vitamin A-deficient area; nearly 75 percent of the children had low serum retinol levels, although the prevalence of xerophthalmia was only about 1 percent. The Health Study involved about 1,500 children aged six months to 59 months; they were closely monitored over a 12-month period. The Survival Study involved about 22,000 children aged six months to 90 months; they were monitored for up to 26 months. The Health Study demonstrated that vitamin A supplementation reduced the frequency of severe and fatal illnesses without decreasing the frequency of less severe illnesses. A substantial reduction in clinic attendance rates (18 percent) and hospital admission rates (38 percent) was noted in children receiving vitamin A. The Survival Study, unlike the Sudan study, showed a 19 percent reduction in all-cause mortality, with the greatest impact on diarrhea-related mortality.

The Ghana study is noteworthy as the first study to note the impact of supplementation on severe morbidity and to provide a possible explanation for the mechanism of vitamin A in reducing child mortality. At the same time, it demonstrated substantial benefits in terms of reductions in the burden on health services, a consideration that should be factored into any cost-benefit evaluation of vitamin A programmes. Given that the subregion shares many ecological and cultural similarities, it is expected that the findings from northern Ghana will be applicable in similar parts of the subregion.

1.2 Vitamin A Deficiency in West Africa: Magnitude of the Problem

Dr. Bruno de Benoist, WHO-Nutrition, AFRO

The review described the magnitude of the problem as of May 1993 as documented in the WHO database on VAD. In all, 34 countries in the WHO Africa region are classified as exhibiting vitamin A deficiency prevalence levels that constitute a problem of public health importance; of these, 18 are located in the West African subregion. These countries have been categorized into three main groups based on the degree of severity of vitamin A deficiency and xerophthalmia. With an obvious paucity of information on the region, the current picture is based on food availability, health service returns on xerophthalmia, and data collected from projects.

In the absence of national surveys in the subregion, no detailed country maps of VAD exist. The available information suggests, however, a high prevalence of xerophthalmia in the subregion's savannah and Sahelian belts, where vitamin A-rich foods are scarce. Information from small surveys also indicates that even where vitamin A-rich foods abound, a high prevalence of subclinical deficiency might exist. There is observed seasonality in the prevalence of vitamin A deficiency along with in-country differences.

The Nigeria and Mali country presentations pointed out the lack of hard data on the extent and distribution of the VAD problem. Even though the recent Demographic and Health Survey in Nigeria included a nutrition status component, it did not provide information on micronutrient deficiency. Studies conducted in Nigeria in 1959 and a national nutrition survey in 1965 showed that vitamin A deficiency was a problem in parts of the country. Corneal ulceration is frequently observed in young children in the Guinea savannah ecological zone, and in malnourished children and children with measles in the southern forest belt, where vitamin A-rich foods abound. Vitamin A deficiency has been recognized as the most important cause of childhood blindness in Nigeria. Information on serum retinol levels in Nigeria is available from scattered small prevalence surveys. In one survey in a rural community in the southeast, 9.2 percent of the children examined had serum retinol levels below 10µg/dl; 16 percent had levels below 20µg/dl. Marginal deficiency (serum retinol 20-29µg/dl) has been reported in 60 percent of women in a recent hospital-based survey. The prevalence of subclinical deficiency in children in the same population is likely to be much higher. A complete picture of the vitamin A deficiency situation in Nigeria should soon be available; a national prevalence survey on micronutrient deficiencies is currently near completion, with results expected early in 1994.

Section 2: Prevention and Control of Vitamin A Deficiency in West Africa: Strategies, Programmatic Issues, and Project Experiences

The first mini-workshop considered issues related to the design and successful implementation of vitamin A deficiency control programmes in the subregion. The objectives were to discuss the potential strategies for vitamin A deficiency control based on the experience of projects in the region, to identify the constraints to successful programme implementation and to examine potential solutions. The workshop began with a panel presentation on traditional strategies for VAD prevention and control and followed by presentations on selected projects. Working groups then explored the pertinent issues relating to programme design and implementation. The conclusions were presented in a plenary session.

2.1 Strategies for Vitamin A Deficiency Prevention and Control

2.1.1 Production and Consumption of Vitamin A-Rich Foods

Dr. Arsike Barry, SEGOU, Mali

Home gardens can play a vital role in household food supply, especially in the provision of essential nutrients such as vitamin A. Several varieties of leafy vegetables rich in vitamin A grow in West Africa. Traditionally, they are part of the diet even though they may not be available all year round in the savannah and Sahelian belt. Improving the production of β-carotene-rich foods therefore provides a potential long-term solution to the vitamin A deficiency problem in the subregion. Several issues need to be addressed in the development of vegetable garden projects, including access to land. While plots for vegetables are usually viewed as belonging to women (who typically work the plots), it is the men who control the land in areas with scarce land resources. Therefore women must negotiate with men to cede some land area otherwise used for the production of staple or cash crops. Additional issues include water availability and the added time burden on women. The motivation for home gardens is thus greatly increased if potential gardeners perceive financial incentives from the sale of excess produce. At the same time that garden projects are initiated, it is also important to promote the consumption of vitamin A-rich foods through education and the demonstration of the impact of vitamin A dietary intake on children's health and nutritional status.

2.1.2 Processing and Preservation of Vitamin A-Rich Foods

Ms. Mary Linehan, VITAL

This presentation focused on the use of indirect solar drying as a means of preserving such vitamin A-rich foods as mango, papaya, pumpkin, sweet potato, carrots, and green leaves, all of which are seasonal. Many cultures have traditionally used direct sun drying techniques to preserve foods. Community-level solar drying projects have been successfully implemented in such countries as Haiti, the Dominican Republic, Tanzania, the Gambia, Senegal, and Mali. Solar drying minimizes postharvest loss, improves household vitamin A food security, and has been found to achieve a 50 percent to 80 percent retention of β-carotene. Solar-dried products also have a long shelf life when properly stored.

The following requirements of the process were discussed: at least six hours of direct sun per day; clean water for washing; a site free from dust and shade for locating dryers; and a clean, dark, and dry place for storing dried products. The technology is simple and inexpensive, relies on free energy sources, and is easily transferable. Building on existing knowledge and traditional drying practices have been noted to enhance community acceptance, motivation and sustainability. An added incentive is income generation from commercial production of dried foods. In the West African subregion solar drying is an important vitamin A food preservation technology, however, development work is still required to find ways to incorporate dried foods into children's diets, the development of weaning foods that use dried products, improve marketing strategies, and to monitor consumption of the dried foods.

2.1.3 Food Fortification

Dr. Susan Burger, HKI

Fortifying foods with micronutrients is a proven method of eliminating micronutrient deficiencies and has been practiced extensively in developed countries. In some developing countries, vitamin A has been added to sugar, monosodium glutamate, whole wheat, rice, tea, noodles, and margarine in field and pilot programmes. On a nationwide basis, Guatemala, Honduras, and El Salvador have fortified sugar with vitamin A. In Central America, the result has been improved vitamin A status among children and increased vitamin A content in breast milk. The economic gain in productivity from vitamin A fortification has been estimated to exceed programme costs.

The presentation summarized the prerequisites for successful implementation of fortification programmes as summarized at the Montreal "Ending Hidden Hunger" conference. The fortified food must be affordable, widely consumed in fairly constant amounts so that fortification levels can be accurately calculated and not altered in taste and color by the process. In addition, the presentation noted other factors that need to be taken into account when planning national fortification programmes, including the acceptance and cooperation of government, manufacturers, and consumers, and the coordination of the combined efforts of technicians, manufacturers, economists, and the media information sector. The presentation underscored the essential research that is required for identifying potential food vehicles, partners that can implement available technologies, and gaps in technical capacities that must be addressed before sustainable in-country production of fortified foods can be achieved.

Specific issues that might mitigate against successful implementation of fortification programmes in West Africa include the limited number of centrally processed foods in the subregion, which are often not accessible to the poorer segments of the population, and the likelihood that fortified foods will be consumed only by those who already eat sufficient quantities of vitamin A-rich foods. Another issue relates to whether the food industry can expand to cope with an increased demand for the fortified product and whether the cost of the fortified products and other programme costs, including expansion of the market for processed food, would detract from other high priority interventions that could be implemented immediately. These issues require resolution before fortification programmes can be developed. However, immediate policy on fortification could be formulated with respect to both import restrictions on nonfortified vegetable oil and fat used in supplementary feeding programmes, and the inclusion of vitamin A-fortified foods in emergency relief packages.

2.1.4 Options for Supplementation

Dr. David Ross, LSHTM, London

Many countries have relied on the administration of periodic doses of vitamin A in pharmacological preparations as an intervention strategy, particularly in programmes aimed at the control of xerophthalmia. Apart from being relatively low cost and simple to deliver, supplementation can potentially be targeted to the most at-risk groups. The ability to demonstrate benefits within a short time is an attraction to donors, politicians, and the target population. Supplementation requires no behavioral adaptation by the target population if it is delivered through already existing health service contacts. However, the lack of behavioral change is also a fundamental disadvantage; periodic doses of vitamin A cannot be a long-term strategy for the control of vitamin A deficiency in developing countries because they do not tackle the causes of the deficiency. Another disadvantage is related to the long-term financial sustainability of supplementation programmes. As with other drugs, the importation of supplements might be constrained by the lack of hard currency. Therefore, supplementation must be used as a springboard for the implementation of longer-term improvements in the dietary intake of young children.

2.1.5 Communications Support to Programmes: An Example from Niger

Dr. Hugues Kone, CERCOM, Cote d'Ivoire

This presentation was based on experiences from a communications project conducted in Niger in 1991 and 1992. As a collaborative effort among the Niger Ministry of Health, HKI, and the Nutritional Communication Project of the Academy for Educational Development (AED), the project tested an appropriate communications strategy and

managerial structure capable of bringing about an increase in the consumption of vitamin A-rich foods by children under five years of age, lactating mothers, and pregnant women. The project took place in 16 large villages in the Burni-Koni region. The sites were selected for the availability of water and the existence of legume gardens during the dry season. The villages were categorized into three groups: those with a dispensary and gardens, those without a dispensary but with gardens, and those without a dispensary or gardens.

The communications effort was organized into two main components. The first called for preliminary research in the form of a market survey to identify the availability of vitamin A-rich foods and to determine the availability and sale price according to the seasons; a training needs assessment for health personnel, school teachers, agricultural officers, and first-aid workers; and, finally, a selective in-depth study of knowledge, attitudes, and practices (KAP) of the population to understand the identified behaviors and to determine the existing communications channels in the project area. The second component determined the IEC strategy and the content of the messages and developed three groups of messages. The first group of messages promoted specific actions to increase the consumption of liver, green leafy vegetables, and sweet potatoes and was targeted to pregnant women and lactating mothers. The second group of messages encouraged gardeners to increase the cultivation of moringa trees and red sorrel, both of which are traditional sources of vitamin A. The third set of messages incited influential community leaders to sustain the project. All messages were linked to the seasons to correspond to the availability of vitamin A-rich foods.

With regard to the communications channels, the project took advantage of multimedia options made possible by community-based events, village animation committees, and local trainers/supervisors. Role plays and drama stimulated the participation of the villagers in nutrition education while the village animation committees used drama games to convey some ideas on nutrition and vitamin A.

An evaluation of the project revealed an increase in the proportion of women who know that fresh green leaves are essential to good health, an increase in the proportion of families (including children) that produce and eat liver and green leaves, and an increase in contact with the nutrition messages. The villagers perceived drama as a good source of education and information. In fact, the activities of the village animation committees continued without external support after the end of the project period. The programme revealed that the availability of vitamin A-rich foods is a major factor in influencing the consumption of such foods. Villages with gardens consumed more green leaves than villages without gardens.

The programme evaluation gave rise to several recommendations for improving programme impact. Some of the recommendations follow:

- To produce a greater impact, a social communications project on nutrition in general and vitamin A in particular should be linked to other ongoing development projects in the region, thereby ensuring the presence of enabling factors for the prescribed change and permitting resources (personnel, training, management, and supervision) to be shared.

- Training and information should be delivered to traditional, religious, and other opinion leaders to ensure that they play active roles in communications programmes.

- Supervision at three levels is necessary. Central supervisors should visit the field at least every three months; the local coordinators, every 45 days; and the local animation agents, every two weeks if they live in the village, or every month if they do not live in the village.

- To reinforce the impact of drama, audio cassettes that combine messages, sketches, songs, and stories should be produced and distributed and the best role plays videotaped for public viewing.

Notes from the 1993 World Development Report
Dr. David Ross, LSHTM, London

Each year, the World Bank produces a World Development Report that highlights a key area of development. The 1993 report was entitled "Investing in Health" and was the first to address health issues. It attempted to estimate the global burden of disease from the major illness categories by using a measure called a Disability Adjusted Life Year (DALY), which is a combined estimate of the healthy years of life lost due to both morbidity and mortality. It is important to note, however, that no such measure will be universally accepted, and that the data on which the estimates were based were far from perfect. Nonetheless, the exercise has been extremely useful in focusing the attention of health planners and politicians on the diseases and conditions responsible for most of the burden of disease in different age groups and regions of the world. While the report gives only limited information on the cost-effectiveness of strategies to combat the various diseases, another World Bank publication addresses this subject.

The 1993 World Development Report confirms that vitamin A deficiency is one of the major contributors to the global burden of disease among young children in developing countries. Vitamin A deficiency's direct effects (i.e., via xerophthalmia) place VAD eighth in the burden of disease among children under five years. However, the disease burden due to VAD's indirect effects (i.e., via increasing the mortality and severe morbidity risk of infectious diseases) is even greater than that associated with VAD's direct effects and when taken into account, would probably place VAD in the top five burdens of disease. The report goes on to show that vitamin A supplementation is one of the most cost-effective of all health interventions in any age group at approximately US$2.00 per DALY averted. It also speculates that improving the dietary intake of vitamin A-rich foods or, where feasible, food fortification is likely to be even more cost-effective in the long term. It concludes that a combination of a high disease burden and cost-effectiveness should make vitamin A interventions some of the highest priorities of all public health interventions in areas where vitamin A deficiency is a public health problem.

2.2 Designing Education Interventions: An Anthropological Perspective

Dr. Nancy Keith, USAID, Niger

This presentation discussed the issues to be considered in planning vitamin A education interventions. The discussion emphasized that successful interventions must first recognize vitamin A deficiency as part of a larger nutrition problem and then acknowledge that the optimal solution lies in improving the target population's overall nutritional status. The design of communications interventions should address four main issues as follows:

- identifying the target groups at greatest risk;
- knowledge of the important factors contributing to the deficiency state, including the availability of vitamin A-rich foods, seasonality of supply, dietary pattern, and attitudes;
- identifying important production and consumption behaviors that require change; and,
- specifying the interventions that might be expected to achieve the desired behavior change.

The presentation identified the steps required in developing educational interventions. It noted the importance of first reviewing existing research on the problem, including production and marketing reports and consumption patterns. On occasion, new research may need to be carried out to provide the knowledge base for a programme. A review of existing research can identify issues that need to be explored in ethnographic studies for incorporation into programme strategy and message development. The presentation emphasized that although earlier ethnographic studies may have been carried out during the programme development stage, such studies do not necessarily guarantee the acceptability of the communications package. Further, messages need to be tested before final application in the programme.

The presentation outlined the framework for ethnographic studies directed at informing strategy and message development. To begin, it is essential to identify the desired behavior (the intervention) by reviewing current knowledge, attitudes, and practices regarding that behavior and identifying the factors that impede behavior change as well as those that could motivate change. The presentation described three commonly applied methods for ethnographic studies of nutritional deficiency: key informant interviews, focus group discussions, and in-depth interviews. Key informant interviews usually explore the broad parameters of the problem and sometimes expose additional questions that need to be considered. The interviews probe expert opinion on the problem and help to formulate questions for further exploration in focus group discussions and in-depth interviews. Commonly used key informants include agricultural agents, health workers, and village elders. Focus group discussions are ideal for eliciting group attitudes. If performed for a cross-section of subgroups, focus group discussions can yield valuable information on community attitudes. Groups to interview for nutrition studies of vitamin A include, for example, mothers as child care givers, fathers as household providers and decision makers, elderly women as members of opinion or pressure groups, vegetable farmers as producers, and street food vendors and market sellers as distributors.

Given that poor group dynamics may inhibit detailed focus group discussions, follow-up in-depth interviews are often required to explore what individuals within the target groups say, do, know, and think as well as the basis for their positions or actions. The in-depth interviews are usually conducted on a random sample of the groups covered in the focus group discussion. A list of some sample KAP questions ideal for inclusion in vitamin A studies is included in Appendix I. The list is extensive and includes knowledge and practice questions; questions about production, pricing, and marketing of potential target foods; and questions about the nutritional practices of such target groups as pregnant and lactating mothers.

The presentation concluded with remarks on some of the factors to be kept in mind in designing messages for vitamin A programmes, particularly those in the Sahel region. For example, it is important to recognize that fresh green leaves are available only during the short rainy season and that leafy vegetables, though eaten year round, are dried in the sun and thus lose up to 80 percent of their vitamin A content. In addition, vegetable production is driven more by profits than by a product's nutritional value. It has been observed that while vitamin A-rich foods are often viewed largely as snacks or luxury foods rather than as essential nourishment, dietary taboos may be less important than poverty and lack of variety. These issues, drawn mainly from a project conducted in Niger, are noted in Appendix I.

2.3 Working Groups on Programme Development and Implementation: Summary of Discussions

The specific issues relating to the design, implementation, and monitoring of control programmes that surfaced from the presentations were assigned to working groups for discussion. Detailed discussions were held by the groups on different sets of issues. The discussions were then summarized in a plenary session at the end of the workshop.

Working Group I

The following topics were assigned for discussion:

- selection of strategies for controlling VAD in the subregion;
- integration of chosen strategies into existing health programmes; and
- incorporation of traditional methods of food processing and preservation and of red palm oil into control programmes.

The group noted that the first step in determining programme strategies is to conduct a detailed examination of the causes of vitamin A deficiency in the region in question. The group stressed the importance of reviewing information on the magnitude and distribution of the problem and its direct, related, and deeper causes. While each assessment must be country-specific, extensive field studies may not be necessary; in many cases, it is possible to

collate the required information from already available data. The group also emphasized the need for advocacy to increase the subject population's awareness of the problem and thereby secure the political commitment of governments to create or strengthen the legislative and institutional framework for implementing programmes and mobilizing human, material, and financial resources at the national as well as international level.

Given the variable picture of the magnitude of the vitamin A deficiency problem, the complex interaction of factors contributing to the vitamin A deficiency problem, and variation in the relationships between these factors in different parts of the subregion, no specific package of interventions can be recommended for the subregion as a whole. The most feasible programme options, however, appeared to be horticultural interventions, supplementation, and communications programmes. Food preservation through solar drying has not been widely used in the region but is considered a viable option for increasing the availability of β-carotene-rich foods in the off-season months, at least in areas with a seasonal glut of vitamin A-rich foods. It was noted, though, that the introduction of solar drying would require intensive efforts to develop the appropriate dryer technology, to identify dryer construction materials, and to field test the acceptability of the product before application. Food fortification seems to be the least appropriate option for vitamin A deficiency control in the subregion. The group pointed to the need to consider a mix of interventions phased in time and perhaps changing over time according to programme objectives. Indeed different policies and packages within the same country might be appropriate.

The group offered several recommendations for incorporating traditional methods of processing and preserving vitamin A-rich foods into VAD programmes. First, participants called for an inventory of all existing traditional food processing and prevention methods and advocated applied research to improve the various methods in terms of energy efficiency and hygienic quality. Acceptability across different cultures needs to be considered when popularizing the most appropriate, improved methods of food processing and preservation.

Given the abundance of red palm oil in certain countries in the subregion, the group made specific recommendations regarding improvements in the production, marketing, and use of this product. Analysis of palm oil's potential must be based on whether a country produces it or not. In addition to acceptability, nonproducing countries need to examine the timing for the introduction of the product with respect to marketing, cost, and consumption. They also need to consider alternative uses for the traditional vegetable oils to be replaced by red palm oil. The group recommended the strengthening of research initiatives on the production of concentrated palm oil in capsules or other forms; populations could then be encouraged to use these products.

The group identified several national programmes into which vitamin A deficiency control programmes could be integrated. They include health programmes, for example, health education; agricultural programmes, for example, diversification of agricultural production; education programmes, both formal and informal nutrition education and school feeding programmes; programmes for the development of support networks to facilitate food supply; and international collaboration such as the activities of NGOs and other organizations.

Working Group II

The following topics were assigned for discussion:

- achieving intersectoral collaboration for vitamin A programmes; and
- devising mechanisms for programme coordination.

While the group recognized that institutions in charge of public health and nutrition are generally the lead institutions for vitamin A deficiency prevention and control activities, it noted that the problem of malnutrition requires the involvement of several national as well as subregional, regional, and international institutions. Thus, for food diversification, the involvement of institutions in charge of agriculture promotion and extension is required; agricultural research is required to recommend high-yield, high-resistance, and high β-carotene food varieties. The link needed between agricultural organizations and water authorities is particularly important in the drier parts of the

subregion. Communications was considered an essential support component to programmes. Consequently, institutions in charge of communications and social marketing, training, and education need to be involved in information dissemination. Women's associations were considered highly useful for such purposes.

To ensure effective coordination of activities among different organizations, it is necessary to have in place a well-articulated national programme that spells out overall policy and strategies as well as the specific programme activities to be implemented. A national programme should also define roles and mandates for the various organizations involved in vitamin A deficiency control activities. The structure for coordination should exist not only at the national level but should be clearly specified at the regional and local levels according to each country's decentralization plan. It is at these levels that most programme activities are implemented. As formal structures for coordinating activities undergo creation, informal networks could be developed at the local level in, for example, a district or local planning area, which is a geographically small area wherein programme personnel frequently interact.

The group identified inadequate communication among different bodies as the major obstacle to coordination. To redress the problem, the group recommended a stock taking of both programme activities implemented and gains achieved by individual organizations, especially NGOs. The group called for the various organizations' input into the development of a national programme through such mechanisms as national workshops and meetings. The proceedings from such events could be documented and widely disseminated. In addition, a newsletter could periodically collect and disseminate information. Similarly, occasional periodic review meetings could be organized. All these activities need to be carried out within a national coordination structure that involves communities as the primary agents for behavior change and improved nutritional status.

The group considered a coordinated approach to be central to sustainability. It is important that the coordinating group not be seen as a unit representing any one particular sectoral ministry; in such situations, the other ministries will not contribute to a programme they do not perceive as directly benefiting their own activities. While neutrality is essential, it also creates problems if responsibilities are not clearly defined. Examples of national coordinating committees include a coordinating committee directly under the office of the president or at the cabinet level, with representation from the ministries of health, agriculture, and education and the participation of universities. Another possible arrangement calls for vesting the planning or finance ministry with primary coordination responsibility. For example, Ghana has formed such a committee for eye care that includes representatives from the ministries of social welfare and education and from teaching hospitals. Another example is food and drug administrations (FDA) that convene subcommittees in each area of importance. Even though an FDA is often seen as a purely regulatory agency, it is involved in implementation before legislation is enacted. The group stressed the need to use existing structures to the degree possible rather than creating new structures.

Working Group III

The following topic was assigned for discussion:

- programme financing options and sustainability.

The group identified the key components of programmes to determine the necessary inputs to these components and to identify the most appropriate funding sources. The key components include creation of problem awareness as a consequence of situation analysis, programme interventions such as promotion of production or consumption of vitamin A-rich foods, and monitoring and evaluation.

While different funding options exist for these key components, the discussion focused on sources of funding for situation assessment, the information from which can be used to generate further funding for vitamin A deficiency control activities. As a general rule, the group advised programme planners to seek core funding or seed money for situation assessment from national budgets. For example, government ministries generally control human resources and transportation budgets that can be allocated to the conduct of a situation assessment. Government funding, however, usually involves a long lead time that often corresponds to the annual budget cycle; this lead time needs

to be taken into account when planning assessments. Universities and research institutions might be able to provide the data needed to stimulate government interest and funding for assessments. Accordingly, collaboration between universities and governments is important; universities can sell the importance of vitamin A interventions to governments that have the ability to conduct needed programmes. The availability of funds for universities, however, is often limited; indeed, universities sometimes rely on the government for research grants and must therefore limit their research agenda to the areas for which funds are available. The group concluded that universities' main contribution is their technical expertise in conducting assessments.

The group noted that external funding for situation assessment should be considered only when seed money is unavailable, or high-cost assessments exceed in-country resources. High cost assessments might call for equipment and supplies for biochemical analyses or training of technicians. To foster intercountry linkages, that training and capacity building should preferably use the expertise available within the subregion whenever such expertise exists. The group concluded that external funds are more likely to be needed for full assessments rather than for initial assessments.

In terms of optimizing the implementation of interventions, the group suggested that new interventions for vitamin A deficiency should be built around existing systems. For example, vitamin A capsule distribution might be included within an existing immunization programme, thereby reducing programme start-up costs.

The multilateral agencies identified as important for support are UNICEF for its interest in supporting programmes for children, FAO for its expertise in dietary diversification, and WHO for its technical expertise in health. Bilateral agencies such as USAID, CIDA, IDRC, and Micronutrient Initiative were cited as sources of financial and technical support as were NGOs such as HKI.

The group also discussed cost recovery schemes. The various strategies for vitamin A deficiency control lend themselves to different degrees of potential cost recovery. As with most public health programmes, it is difficult to implement cost recovery schemes for some vitamin A control activities. Cost recovery is, however, possible for programmes such as supplementation by relying on the mechanism of the Essential Drug Scheme, which already includes vitamin A capsules among the essential drugs. Fortification also offers the potential for cost recovery, although the cost differential between the fortified and unfortified food might pose problems for consumers. For dietary diversification, the group noted the possibilities of cost recovery for seeds to increase production of vitamin A-rich foods. Such recovery, however, is feasible only if production is encouraged in excess of the family's nutrient needs so that any surplus can be sold on the market. The group also stressed that the cost savings in health care as a consequence of vitamin A interventions should be taken into account in computing programme cost recovery and then vigorously promoted to governments.

It was noted that the ideal situation for sustainability is a programme that operates with perhaps some external support at the outset and makes provisions for eventually phasing out such support. This approach, though possible when a programme initiative is country-generated and based on action plans that take into account the host country's capacity, sometimes implies a slower-paced programme than is desirable. Given that many external donors usually pursue similar programmes in a particular country, an appropriate organizational structure must be in place to coordinate external donor support. While it is easy to set up a structure within an individual ministry, it is more difficult to operate across different sectors. Perhaps the best way is to conduct regular donor meetings. A micronutrient coordinating committee could look at a country-generated action plan to determine which organizations and institutions can provide needed inputs. This coordinated approach could be used to define roles for nongovernmental organizations, international and bilateral donors, and government organizations down to the local level.

Working Group IV

The following topic was assigned for discussion:

- issues to be considered in developing appropriate communications strategies in support of VAD control programmes.

The group noted the need for basic research to identify the cause of the problem, available channels of communications, and locally available crops or foods to be promoted in nutrition messages. Another central need is technical support to ensure that the information conveyed by the messages is correct and not in conflict with other health messages. Still another central need is a technical team comprised of nutritionists, communicators, educators, and agriculturists. The team needs to follow all the prescribed stages of message development, dissemination, and evaluation. Given that most of the population in the subregion is nonliterate, all messages conveyed by the programme need to be transmitted in local dialects.

The group suggested several communications channels for use in different combinations in a single package. The channels must vary with the local context in terms of the target audience, the strategy to be promoted, and the stage of the programme. For example, a different mode may be required for initiating a programme versus reinforcing a message. Within the subregion, the performance media and such participatory activities as songs, drama, role plays, etc., are more effective than the less interactive traditional health education tools such as wall posters and publications. The group, however, noted the cost of delivering such programmes in terms of personnel time, money, and materials. The health facility setting was not considered conducive to nutrition communications, which are perhaps better delivered on more public platforms such as religious and other social meetings or meetings of local organizations.

Vitamin A communications programmes can take advantage of all sources of information directed to the target groups as long as the communications channels convey correct and consistent messages. In addition, nutrition communications can be integrated into formal education curricula. Messages can be incorporated into school radio programmes and other school activities such as gardening and school meals programmes. Nutrition as a subject should be introduced into primary schools and taught through to the tertiary level. Nutrition should also be taught in the informal education sector.

2.4 Experiences in West Africa: Pilot Projects

Four vitamin A deficiency control projects in Benin, Burkina Faso, and Niger were presented for discussion in this session. Except for the supplementation project in Burkina Faso, the projects employed a combination of strategies. The project in Benin involved capsule distribution, vegetable production, and the promotion of the consumption of vitamin A-rich foods. The other projects, conducted in Niger, involved social communications and the promotion of the production and consumption of vitamin A-rich foods.

Evaluation of a Pilot Project for Vitamin A Deficiency Control (Burkina Faso)

Emmanuel Ilboudo, Burkina Faso

Following a 1984 nutritional study that revealed a high rate of xerophthalmia in the provinces of Bam, Namentenga, and Yatenga, a pilot project funded by HKI and UNICEF was launched in October 1986 to eliminate vitamin A deficiency in the affected provinces. One of the specific objectives was to implement activities aimed at the detection, prevention, and treatment of xerophthalmia through the provinces' health establishments. After completion of the awareness and training activities, community health agents distributed vitamin A capsules at the village level every four months to all children between birth and 10 years of age and to breastfeeding mothers who had just given birth. This strategy covered 59.5 percent of children between birth and 10 years. The impressive coverage has encouraged the national programme to use community health agents for the prophylactic distribution of vitamin A

capsules. The prevalence of night blindness in children between two and five years of age at Yatenga dropped from 2.2 percent to 0.32 percent after the intervention.

Vitamin A Deficiency Control Project (Northern Benin)
Falilou Akadiri, Benin

This project is based in Atacora (northwest Benin), a district with a population of 650,0000 and an estimated prevalence rate of 20 percent for chronic vitamin A deficiency. Xerophthalmia surveys yielded a prevalence among preschool age children of 3.4 percent for night blindness and 4.9 percent for Bitot's spots, signifying a problem of public health importance. The project relied on two strategies for vitamin A deficiency control: systematic distribution of vitamin A capsules to those at risk and a preventive approach involving horticultural intervention and nutrition education. Vegetable production was encouraged by nursing and distributing seedlings of locally available vitamin A-rich foods. Training courses on vegetable gardening were organized for youth in the rural areas, and mothers were educated on micronutrient-rich foods and on how to make local vegetables part of the diet. Even though the project is reported to have aroused the interest of the targeted villagers, it has encountered difficulties related to financial sustainability.

Vitamin A Social Communications Project (Niger)
Mme. Aissa Mamadoultaibou, Niger

This project was conducted under the auspices of the Niger Ministry of Health. The first phase, which lasted 18 months, promoted the consumption of vitamin A-rich foods. Target groups were pregnant women, nursing mothers, and children in 16 villages near Niamey in the Burni-Koni region. The objective was to develop an approach for vitamin A communications. The planning phase involved a review of the available data on vitamin A deficiency and the training of helpers and teachers in communications methods. The intervention activity took the form of role plays acted by village committees that had been trained by the trained teachers. The plays featured three foods -- liver, pumpkin, and guinea corn. The village committees showed the audience how to incorporate the foods into the local diet. Other activities included a festival on the consumption of liver and pumpkin and the issuance of certificates to all participants. Plans are being developed for the second phase, during which the project will be expanded to cover 80 villages.

Promotion of the Production and Consumption of Vitamin A-Rich Foods (Niger)
Runesha Muderhwa, Niger

This project aims at improving the availability and consumption of vitamin A-rich foods among the target population. It is supported by activities based on community participation through women's groups. The production strategy requires the participation of women as main production agents. Village heads participated in selecting the women's groups and identifying the groups' leaders. The villages provided land for community gardens but permit the land to be used only during the dry season, when no traditional farming activities take place. The gardens are irrigated with water obtained from traditional wells. In addition to these larger plots, the development of four-square-meter backyard gardens is encouraged for both dry and wet season cropping. By August 1993, 240 backyard gardens were expected to be developed. The promotion of production involved the selection of foods (moringa, pumpkin, and pawpaw) in consultation with nutritionists and the provision of agricultural inputs. Excess harvest is sold to create a revolving fund for obtaining additional inputs. Village communication committees headed by trained teachers have been set up, with nutrition education provided through plays and songs. In addition, solar drying techniques are being promoted for the preservation of fruits. Three dryers have been developed for use--the clay type, calabash, and hen's coop--the last two of which are promoted in the villages.

Discussion

The discussion emphasized the need for involving the target population in the development of such technologies as solar dryers. In the Niger project, contacts were initially made with the women's groups and villages to explain the

modalities and importance of adopting the dryers. The community supplied the bricks for the construction of the dryers while the project provided technical assistance for construction. One important consideration is that the vegetable production projects should aim not only at alleviating vitamin A deficiency through the consumption of all locally grown produce, but should also be designed to yield a surplus for sale to generate family income. Apart from providing a source of funding for projects, income generation may in itself be the main incentive for project acceptance. Another important consideration is to ensure the sustainability of projects through the training and use of local technical and material resources. When small-scale local industries such as the solar drying of produce are created, they are valued for their contribution to the local economy and can become part of the culture of the people.

Section 3: Developing and Implementing National Policies

3.1 Situation Assessment

This session discussed selected indicators of vitamin A status based on lessons learned from surveys in the subregion and implications for the design, scope, cost, and implementation of assessment surveys. The session began with a brief update on a joint WHO/UNICEF consultation on indicators of vitamin A deficiency that was convened in Geneva in November 1992. A presentation on the planning and implementation of the Nigerian Micronutrient Survey and dietary assessment surveys followed. A general discussion at the end of the presentation focused on the need for and content of such surveys and the use of survey results for national planning. The discussion also considered the quality of the information already available from existing programmes and projects and how such information might be collated to provide baseline planning data. There was also a presentation on experiences from dietary assessment surveys. Finally, feedback was obtained from the country teams on their experiences with the WHO MDIS questionnaire on vitamin A.

3.1.1 Indicators of Vitamin A Status: 1992 WHO/UNICEF Consultation on Indicators of Vitamin A Deficiency

Dr. Barbara Underwood, WHO-Nutrition, Geneva

The report of the consultation identified the different objectives and scenarios within which surveillance for vitamin A deficiency might be established. It also discussed surveillance systems and the set of indicators that could be used to satisfy the needs of different contexts. The specific objectives identified for surveillance include assessment of the magnitude, severity, and distribution of vitamin A deficiency; identification of risk factors and high-risk populations; monitoring and evaluation of control programme activities; and tracking of progress toward long-term goals. The report noted the importance of considering not only the technical and financial constraints associated with survey design but also the need to respect the demographic and cultural contexts in which surveys are developed and administered.

An assessment of the prevalence of vitamin A deficiency provides a description of the problem and the basis for advocacy to stimulate programme action. Clinical and biological indicators were considered best suited to such assessments and include the prevalence of specific signs of xerophthalmia in the population, the distribution of breast milk and plasma retinol values, dose response test ratios or functional indicators such as CIC/ICT, and night blindness. WHO and IVACG have standard prevalence cut-offs above which a deficiency problem is defined. A problem of public health significance is indicated if two or more of the indicators have a prevalence higher than the cut-off or if one biological indicator coexists with a composite of ecological risk factors. Incorporating ecological indicators increases the sensitivity of the definition and permits the classification of populations for which clinical and biological data are unavailable.

The meeting noted the need to extend evaluation to the effectiveness of programme implementation and identified several process indicators for so doing. These indicators include capsule distribution coverage rates, the per capita volume production of fortified foods, a per capita consumption index of vitamin A-rich foods, etc., all of which are

obtainable from routine programme returns or special surveys. The final set of indicators pertain to monitoring progress toward the long-term objectives that were stated as part of the World Summit goals and the ICN declaration. These indicators include the prevalence of night blindness and serum and breast milk vitamin A levels.

The discussion focused on the basis and validity of breast milk vitamin A as a status indicator and the potential for misclassification of populations if only one core indicator is used. Breast milk vitamin A has been included because it is simpler to collect than blood, is more culturally acceptable in most places, and is easier to interpret on a population basis. Further, the timing of sample collection is not critical, and it is not necessary to standardize for the fat content. In addition, it makes sense intuitively that children of vitamin A-deficient mothers with low breast milk vitamin A do not receive the recommended intake. Research shows that such children are at high risk of vitamin A deficiency.

The tendency to exclude areas where vitamin A deficiency is a problem if one of the core indicators reveals a low prevalence was also discussed. As a specific example, northern Ghana was cited as an area in which a low prevalence of night blindness was observed despite an extremely high prevalence of subclinical deficiency. This finding calls into question the adoption of universal cut-off points and raises the issue of correlation between different indicators for which little data are available. The refined definition of what constitutes a public health problem based on composite indicators is, however, expected to address some of these issues. In those settings where clinical and biological data on the prevalence of VAD are lacking, it may be appropriate to make planning decisions on the basis of assessments that incorporate at least one biological indicator along with demographic or ecological indicators.

3.1.2 Dietary Assessment Methods: IVACG Simplified Dietary Assessment Method.

Dr. Mohamed Mansour, VITAL

The discussion paid special attention to the dietary intake assessment method as a rapid assessment tool, the scope and planning of dietary surveys, and some anthropological perspectives to such surveys. Although not strictly a vitamin A status indicator, the examination of habitual intake identifies high-risk groups. Such studies are necessary for developing programmes targeted to specific risk groups and for providing baseline data for planning, monitoring, and evaluating programmes.

Methodological, logistical, and financial constraints have prevented the application of dietary assessments to large-scale population surveys. For example, no universal food intake questionnaires exist. As a result, survey instruments must be painstakingly tailored to the specific diversity of a given population's food sources and food habits and to the specific seasonal availability of various foods. IVACG, however, has developed a simplified method for identifying dietary risk groups as described in the Guidelines for the Development of a Simplified Dietary Assessment to Identify Groups at Risk for Inadequate Intake of Vitamin A. This highly focused, semi-quantitative method is applicable to vitamin A nutrition in children. It uses portion sizes instead of weighed intake, and intake scores instead of physical vitamin A units for risk assessment and monitoring and evaluation of dietary interventions. It can be rapidly applied in field surveys and, unlike other methods, provides rapid feedback. The questionnaire is highly culture- and area-specific and requires a lengthy process of development but is easy and rapidly administered once developed. The data obtained by the method are easy to manage and analyze.
The development process involves identifying major vitamin A food sources, determining common preparations for preschool-age children based on information gained from focus group discussions, conducting individual interviews and food demonstrations, specifying portion sizes that use standard available household measures as determined by participant observation, in-depth interviews, and weighing of household measures. Foods then need to be classified into high, medium, and low vitamin A groups, taking into account standard portion sizes.

The information is used to develop a precoded and prescored questionnaire that combines a 24-hour recall and habitual intake frequency. Adjustment is required for breastfed children. Data from the 24-hour recall are used to devise a consumption index (CI). Data from the habitual food frequency are compiled into a usual pattern of food consumption index (UPFC). The assignment of risk category is based on the FAO/WHO recommended daily intake by using set cut-off points for the CI and UPFC.

The IVACG approach has found extensive application in the field in Cameroon, Niger, and Nigeria. In response to many limitations encountered in its application, the method has been modified to yield an approach that is simpler, easier to apply and analyze, more user friendly, and more quantitative. The simplified approach is recommended for the rapid assessment of dietary risk groups.

3.1.3 National Surveys: Micronutrient Survey in Nigeria

Drs. Tola Atinmo and Lola Dare

Two presentations described the context, design, preparation, and implementation of the Nigerian Micronutrient Survey. A Nigerian team based at the University of Ibadan is implementing the survey with technical assistance from the USAID Office of Nutrition's VITAL project. Initiated as a problem assessment exercise in response to calls for a national food and nutrition policy, the survey is funded by the USAID Office of Nutrition. Nigeria's Ministry of Health is collaborating with 12 medical schools that serve as the coordinating centers of the 12 survey subzones. Survey activities such as mapping and enumeration, organizing logistical support for field and laboratory operations, and data collection are carried out by the teams on a subzonal basis.

The survey objectives are to assess the national magnitude and distribution of micronutrient deficiency; to identify groups at risk of micronutrient deficiency; to describe the demographic, cultural, and social determinants of micronutrient deficiency; and to identify available resources for intervention programmes. The survey findings will provide information for the development of policy and action on micronutrient deficiency control. An additional objective is to adapt and refine the IVACG Simplified Dietary Assessment method for local use and to strengthen the capacity of local institutions to monitor micronutrient deficiency. The objectives will be achieved through a cross-sectional population survey that uses a cluster sampling scheme similar to that employed for immunization coverage assessment surveys. The survey will include 4,200 children and their mothers in 120 enumeration areas (out of 2,520) across the entire country. The information to be collected will include serum retinol; MRDR (on a subsample); CIC; hemoglobin; ferritin and TSH levels; and anthropometry. Dietary intake and the prevalence of xerophthalmia will also be measured.

The survey procedures and data collection instruments were pretested during an operations research phase of the survey to determine the logistical systems required to support the survey, to evaluate optimal team size and composition for maximum efficiency, to pilot test data collection instruments and the data management systems, and to identify training needs and help develop a protocol for field work. The survey is being implemented in two phases. The first phase began in June 1993 and was completed in July 1993. A review of this phase was held and implementation for the second phase is planned for August. Field work was scheduled for completion in September 1993.

The main questions examined by the survey are whether variations exist in the levels of marginal micronutrient deficiency between the different regions in the country and whether these differences can be explained by the variability in food consumption. The survey will also identify locally available food options for children over six months and examine the feasibility of promoting such foods. The validity of dietary risk assessment levels will be evaluated along with the correlation between the different status indicators.

The main issues raised for discussion were the cost of the survey (time and personnel); the amount of time expended in survey preparation, data collection, and analysis; and whether programme development could be based on existing data or information gathered from elsewhere. While it was agreed that enough information was available from external experience to design intervention programmes in known problem areas, the Nigerian team concluded that more extensive detailed local information is required for national programme planning.

3.1.4 The WHO Micronutrient Deficiency Information System

Dr. Barbara Underwood, WHO-Nutrition, Geneva

In response to the mandate issued to WHO by the World Health Assembly to monitor the elimination of micronutrient malnutrition, the Micronutrient Deficiency Information System (MDIS) was established in 1991. The general objective of the MDIS is to provide up-to-date information on the worldwide prevalence and magnitude of vitamin A deficiency, iodine deficiency disorders, and iron deficiency anemia and to track development and progress in control programmes.

Two main categories of information are required to fulfill WHO's mandate: deficiency prevalence data and information on the status of national control efforts. The following three interlinked databases constitute the main components of the MDIS: prevalence data based on various clinical, biochemical, and dietary indicators; control programme data that describe control programmes' planned and implemented activities (for example, coverage, constraints, and mechanisms for monitoring impact); and reference data that provide comprehensive bibliographies on the sources of both prevalence and programme data that have been incorporated into the MDIS.

At the country level, information on the magnitude of micronutrient deficiency and control programmes in West Africa, as well as in countries throughout the world, can help inform the planning, implementation, monitoring, and evaluation of control programmes. At the global level, such information can be useful in advocacy efforts to highlight the need for support and to provide information urgently needed to measure progress toward the goals of the World Summit for Children.

Over the past two years, WHO has undertaken considerable work on the MDIS, in collaboration with the Department of International Health at the University of Michigan. By the end of July 1993, a critical mass of prevalence data had been entered for iodine deficiency, vitamin A deficiency and iron deficiency anemia. It is expected that documents on the global prevalence of these deficiencies will be published by the end of 1993 as offset WHO publications for limited distribution.

A current priority and concern for WHO is the development of appropriate mechanisms to maintain and update the prevalence databases, disseminate the data, and increase access to the information. A draft prototype of data presentation software, which will compile information at three different levels—national, WHO regional, and global—is at an early development stage. Further work is needed to develop standardized monitoring systems to track the status of worldwide micronutrient malnutrition and control programmes.

While efforts thus far have focused successfully on developing databases on prevalence and reference sources, the databases for control programmes need considerable attention. Over the past six months, the MDIS has initiated efforts to gather information on the status of micronutrient control activities. Specifically, it has created situational assessment forms to collect data on the status of micronutrient control programmes for all three micronutrients. The initial focus was on IDD, and, as of August 1993, the MDIS had received and entered into the computer databases IDD programme information for 42 countries.

For the assessment of vitamin A programmes, final development of draft forms was completed in July 1993. As an initial data gathering effort on vitamin A control programmes the forms were distributed and discussed at the Ghana meeting. The aim was to develop standardized protocols to assess the status of micronutrient control programmes in each country. The forms for each nation-specific MDIS can then be adapted according to the various circumstances of each country. From the information assembled in each national MDIS, the relevant data (both prevalence and programme) can be extracted and entered into the global MDIS.

WHO was pleased that time was allocated during the conference to permit a discussion of the MDIS on vitamin A. Some of the discussion outcomes follow:

- A person from each of the participating West African countries volunteered to serve as the liaison to ensure that the draft forms were taken back to his or her home country for completion and return to WHO. The data will then be entered into the MDIS database on vitamin A deficiency.

- Comments offered at the conference will be useful in further modifying the forms before they are distributed globally and in establishing a smoother procedure for the accurate completion and timely return of the forms. The feedback should also prove helpful in improving the quality of the data in the VAD database and providing concrete ideas concerning the information needs of country programme managers and others involved in specific intervention activities. Further, the feedback will help in refining the standardized protocol for collecting data on control programmes and developing a country-level MDIS as a programme management tool.

Once all the vitamin A situation assessment forms are returned to WHO and entered into the MDIS, the existing database on vitamin A in the region is expected to undergo significant improvement.

3.2 Developing National Policy on Micronutrient Deficiencies

The conference's second mini workshop focused on the process for formulating, articulating, and implementing national policies on micronutrient deficiency control. The specific objectives were to identify the priority policy issues for developing and implementing country plans of action and to specify the essential conditions for integrating micronutrient deficiency control programmes. One key presentation was devoted to each of the above objectives. In the first presentation, Dr. Festo Kavishe described the Tanzanian experience as a case study of developing a national plan for vitamin A deficiency control. In the second presentation, Dr. Franz Simmersbach discussed issues related to integration of micronutrient deficiency control programmes. The issues raised in the presentations were then assigned to working groups for discussion. The groups reported their deliberations in the plenary session.

3.2.1 Tanzania: A Country Case Study

Dr. Festo Kavishe, Tanzania

Tanzania is a poor country that has been successfully implementing a vitamin A deficiency control programme since 1981. Several important preconditions for the policy development process have contributed to the success of the programme. The first precondition was creating awareness of the vitamin A deficiency problem and its consequences as an important public health problem through consensus building among major national groups. Research, a literature review and surveys, and the wide dissemination of assessment results through such channels as meetings, workshops, and publications built the necessary consensus. The problem was then analyzed through multisectoral dialogue and action that relied on an explicit integrated framework. At this stage, the process identified the need for a multisectoral national vitamin A consultative group for policy formulation. The group, in turn, developed a comprehensive national programme. Dr. Kavishe cautioned against stagnating policies. In Tanzania, a continuous process of review permits the programme to accommodate new scientific developments and other national and international consensus approaches.

A prominent feature of the Tanzania programme is that it was country-initiated and therefore not perceived as a donor programme. It is important that donor organizations recognize the importance of country-initiated programmes. Sometimes it is necessary to stimulate a country to take action on its own behalf through capacity building and empowerment, although such an approach may in the short run delay the achievement of donor goals. National programme leaders need to be open to new ideas and must appreciate the urgency of the need to eliminate vitamin A deficiency if effective capacity is to be built. In the Tanzania programme, human resource development received priority attention. Further, local planners and researchers worked in collaboration with their external counterparts to demystify the planning process and to reinforce national feeling about the adequacy of their own capabilities. Sectoral rivalry, which often results from resource competition, was replaced by a more positive attitude toward goal achievement. A spirit of cooperation has contributed to the team effort for the control of vitamin A deficiency in Tanzania.

Tanzania is currently in its second five-year national comprehensive programme for vitamin A deficiency control. It uses a mix of approaches, including breastfeeding, dietary diversification, targeted supplementation, and other public health measures for the control of measles, diarrhea, and PEM. Feasibility studies for fortification are currently being conducted, and there is strong IEC support for all the approaches. Tanzania seeks to maximize the benefits of several approaches applied concurrently in a single long-term programme until such time that specific components can be phased out.

3.2.2 Integrating Micronutrient Deficiency Control Programmes

Dr. Franz Simmersbach, FAO, Rome

This presentation focused on vitamin A, iron, and iodine deficiency control and discussed issues relating to policy making, integration of programme implementation, and constraints to integration. Foremost among the policy-making issues was the need for policy makers to avoid the development of a specific national policy for micronutrient deficiencies. Instead, policy makers should recognize that nutrition problems and their resolution should be reflected in various sectoral policies that affect food availability and nutrition. Such policies demand action from both the technical sectors of government and the private sector. Further, policy objectives must be based on quantifiable information about the magnitude of micronutrient deficiencies as a public health problem and on judgments about the precision of deficiency estimates as viewed against actual programme needs and costs. After setting policy, policy makers must translate objectives into national plans of action that draw on the broad outlines adopted in the Plan of Action for nutrition at the ICN in December 1992. The Plan of Action emphasizes the promotion of food-based approaches in preventing specific micronutrient deficiencies.

Issues related to integration include the simultaneous application of the three approaches used to combat micronutrient deficiencies, namely, supplementation (short term), fortification (medium term), and food-based actions (long term). These approaches need to be pursued concurrently with other efforts to improve overall nutritional status. For example, the commonalities in the population groups at risk and the technical services and institutions responsible for actions provide an obvious rationale for integration, e.g., linking the distribution of vitamin A capsules with EPI. Particular note was made of the case of iodine deficiency control programmes. Such programmes have often tended to be considered separately from other nutrition programmes. In fact, these programmes also require intersectoral coordination between, for example, the health and social sectors and industry and trade.

The following conditions were noted for their importance in facilitating integrated implementation of programmes: an intersectoral national planning group to develop a national action plan for nutrition, intersectoral technical working groups for elaborating and monitoring specific nutrient-oriented actions, clearly defined and realistic goals that allow for balanced fund allocation, and the identification of the requirements for and availability of institutional capacity, manpower and training, resources, research, monitoring, and evaluation. One specific constraint to integration is the tendency to perceive nutrition problems as health problems. As a result, solutions are too often limited to the health sector. The perception is reinforced by the fact that past investments in nutrition by other sectors such as agriculture, education, and communications have been minimal. Another constraint is the internal resistance to integration or the perceived threat that the integration of programmes requiring realistic, balanced approaches will challenge the validity of established sectoral programme priorities. Despite these barriers, it is clear that the integration of micronutrient deficiency control programmes into overall nutrition programmes makes both intuitive and economic sense and provides a strategy for sustainable, long-term approaches to undernutrition.

3.2.3 Working Groups: Summary of Discussions

The specific issues raised in the presentations were assigned to working groups for detailed discussions, that were summarized in a plenary session following the workshop.

Working Group I

The following topic was assigned for discussion:

- setting objectives and targets for national programmes.

The discussants concluded that the setting of priorities for specific interventions should be based on knowledge of the magnitude, severity, and distribution of specific micronutrient deficiencies and on data on the risk factors underlying the deficiency state. Developing the needed information requires the collection of data from the existing literature, routine returns from projects and various sector ministries, and, in some cases, complementary field surveys. In the case of vitamin A deficiency control, the group identified the affected populations in terms of those receiving the intervention (young children, pregnant and lactating mothers) and those sectors executing the programmes (agriculture, education, and health sectors, political authorities, communities, etc.). The group noted that while money and material are often sought for programmes, little provision is made for the development of the required manpower for the efficient management of these resources. In addition, the infrastructure and logistical systems needed for delivering essential materials to programmes in the field often do not exist, thereby resulting in efforts that begin to fail almost as soon as they are initiated. The group emphasized that programme objectives and targets must be tailored to the existing support infrastructure. If not, the investment required to build the needed infrastructure must be made part of programme development.

Working Group II

The following topic was assigned for discussion:

- developing the human resource base for programmes.

Discussants identified the key persons for vitamin A deficiency control programmes and considered the training needs of such persons in the following sectors: health, agriculture, education, information, industry, social welfare, academia, and research institutes. The group noted that training must be tailored to the functions to be performed at the various administrative levels of the programme; for example, assessment/advocacy at the national level, implementation at the district and community levels, and monitoring and evaluation at the regional level. Key persons must be appropriately trained, with equal emphasis on pre-service and in-service training. The key disciplines and their magnitude of need at the various administrative levels are shown in the table below.

Disciplines	Levels			
	National	Regional	District	Community
Medicine	+	++	+++	+++
Epidemiology	+++	+++	+	-
Nutrition	+	+	+++	+++
Education	+	++	+++	+++
Laboratory Technology	+++	+++	+	+
Crop Science	+	+	+++	+++
Animal Science	+	+	+++	+++
Social Science	+	+	+++	+++
Social Work	+	+	+++	+++
Communication	+	+	+++	+++

The group recognized the need to integrate nutrition training into the core curricula for training programmes for all the disciplines identified above; to revise course syllabi to include or emphasize nutrition (micronutrient deficiencies) at the primary level; and to develop a core course on nutrition at the higher levels of education. Modules on priority nutrition (micronutrient) problems in the respective countries also need to be developed. Periodic curricula reviews should be conducted to ensure emphasis on current issues nutrition and life-threatening problems. In stressing the importance of in-service training, the group recommended the development of training manuals and called for training to be integrated into and linked to implementation in the field. Finally, the group noted that key persons at the community level can be identified and trained as information resources.

Working Group III

The following topic was assigned for discussion:

- required research for policy and programme development.

The group pointed to the need for culture-specific studies that would provide baseline information for the development of programmes. The studies would investigate food production and dietary consumption patterns and other underlying causes of vitamin A deficiency. The group recommended specific biochemical analyses for compilation into a database for the subregion. The database would include the common foods of the subregion, the vitamin A content of cooked dishes, and the effect of processing and preservation methods on vitamin A and food quality. Other areas recommended for study include the seasonal variation in serum retinol levels in relation to such factors as infections and food availability, and the effect of intrahousehold food distribution on the vitamin A needs of vulnerable groups in the household. Policy makers and the policy-making process were specifically noted as subjects for study to determine decision makers' perception of nutrition issues and to identify how to meet their information needs. The group also stressed the need for research on how to encourage food production and availability. Examples include the identification of ways to "free" food crops such as palm oil from the competition for industrial use for application to nutritional purposes and research into innovative techniques that can improve product marketing and distribution, and thus encourage increased production.

3.3 Measles and Vitamin A: Time for Policy and Programme Action

This session reviewed the epidemiological evidence that provides the basis for the existing WHO/UNICEF recommendations on the use of vitamin A during measles. Based on data from an existing programme in Cape Town, South Africa, the session described the impact of vitamin A in the case management of measles. Finally, the session discussed how to ensure that vitamin A interventions are included in national policies and programmes.

Epidemiological Overview
Dr. Greg Hussey, University of Cape Town, South Africa

The presentation noted that measles is still one of the leading causes of childhood morbidity and mortality. According to WHO, 45 million cases of measles occur annually and account for 1.2 million deaths in developing countries. Data cited from Malawi and Ethiopia show that measles is a major risk factor for xerophthalmia development. Studies in Nigeria, Thailand, South Africa, and the United States have demonstrated significantly low serum vitamin A levels during the acute phase of measles, with levels returning to normal during convalescence even without any supplementation. The results of clinical trials show that introducing vitamin A into the management of measles dramatically reduces the duration of fever, the frequency of hospitalization, and other indicators of severity. A meta-analysis of these studies showed a 67 percent reduction in mortality, which is similar to the reductions in measles-related mortality observed in three large-scale community intervention trials in southern India and Nepal.

Two studies in South Africa have clearly demonstrated the benefits of introducing vitamin A into measles treatment. Treated children experienced a short duration of hospital stay (10.5 days as compared to 15.2 days for controls) and

recovered more rapidly from pneumonia, diarrhea, and fever than the controls. In addition, fewer children developed croup, pneumonia, and persistent diarrhea. Evaluation data from the routine case management of children hospitalized in Cape Town confirmed the beneficial effects of vitamin A therapy. Morbidity (hospital stay and intensive care admission) and mortality in hospitalized children was significantly reduced following the introduction of vitamin A into case management. It was noted that vitamin A therapy was cost-effective at about US$0.02 per dose.

Implementation and Monitoring for Impact
Dr. Festo Kavishe, Tanzania

With the debate on the need for vitamin A supplementation during measles settled, it is imperative to develop national policies and programmes that offer vulnerable children the best opportunity for protection. The session called for incorporating policies related to vitamin A and measles into relevant national policies, particularly those dealing with PHC, food and nutrition, EPI, MCH, child survival and development, and IEC. The session also noted that it is important to use existing infrastructure for implementation; in fact, many countries have already developed a primary health care infrastructure that reaches a substantial proportion of the target group for vitamin A and measles programmes. Acknowledging the cost and difficulties inherent in measuring impact indicators, the discussion emphasized the monitoring of process rather than impact. The data required for process monitoring can be easily integrated into existing health information systems. For example, vitamin A administration should be recorded on the health cards of children attending MCH clinics. Returns can be obtained on the number of doses dispensed compared to the number of cases expected or seen.

Given that the recommended treatment dose during measles is 200 times higher than the daily requirement, the discussion raised fears over toxicity. It was noted, however, that no significant adverse effects have been observed thus far; further, the evidence to date suggests that we are being overly cautious with respect to toxicity. Another question concerned abuse and risk of accident with overuse. Discussants agreed on the need for control and the development and use of strict protocols as applied in South Africa. The use of such protocols by prescribers would help ensure proper dosage control.

Section 4: Research Forum

This session provided a forum for sharing practical experience and recent lessons learned from a wide range of research and intervention projects in the region and for discussing their related policy, programme, and research implications. The presentations covered a variety of programme issues, including situation assessment, evaluation of interventions, and review of policy.

MANGOCOM: A Nutrition Social Marketing Intervention for Reducing Risks of Vitamin A Deficiency in the Sahel during the Dry Season
Dr. Jenice Rankins, MANGOCOM Project, Senegal

The project involved the use of solar-dried mango for consumption by weaning-age children in Senegal. Vitamin A deficiency is a public health problem in the Sahelian region of Linguere, where 7.4 percent of toddlers have serum retinol values less than 0.35μmol/L. Six villages participated in a feeding trial to investigate the feasibility of using dried mangoes (mango perental) to improve vitamin A status. Radio was used as the communications channel to promote dried mango consumption and was targeted to the caretakers of the children. Weekly portions of the dried product were fed to children in the intervention group during the dry season. The observed decline in their serum β-carotene levels in the off-season months was 50 percent less than the decline that occurred in the controls. Similar trials using other preserved indigenous sources of β-carotene need to be carried out with confirmed vitamin A-deficient toddlers to assess the foods' impact on vitamin A status.

Food Preservation Using Solar Drying in the Gambia
Ms. Isatou Jobe-Sise, Gambia

This study assessed the efficiency of three types of solar dryers -- chimney, tent, and cabinet -- for the drying of mangoes. The chimney dryer performed the most satisfactorily with respect to the time needed for drying and the quality of the product in terms of texture, flavor, and appearance. The study emphasized the need for the pretreatment of mangoes to reduce browning. Preparation methods included blanching with hot water and lime or treating with sugar.

While the study in Senegal demonstrates the potential for using solar-dried products to prevent the seasonal fluctuations in the prevalence of vitamin A deficiency, the Gambian project represents an important effort to adapt the technology to the local environment. There are, however, various other essential components of such projects, including the identification of ways of improving the acceptability of the solar-dried products, incorporation of the product into diets (especially into weaning foods), and monitoring the products' consumption by the vulnerable age groups.

Effects of Supplementing the Vitamin A Intake of Malnourished Children in the Ivorian Savannah Area
Ambroise Tebi, Cote d'Ivoire

In this study, which evaluated the impact of vitamin A supplementation on malnourished children, 115 mildly malnourished children (W/H >=80 percent and <90 percent of the NCHS standard) aged 12 months to 47 months were randomly assigned to receive 100,000 IU vitamin A or a placebo over a three-month period. No cases of xerophthalmia occurred in either group, and there was no difference in anthropometric status at the end of the period. There was, however, about a 50 percent reduction in the reports of fever in the children who received vitamin A.

Household Food Security in a Subsahelian Region of Ghana: Micronutrient Quality of Diet of Preschool Children
Dr. Margaret Armar-Klemesu, Ghana

Household and preschool child food and nutrient intake were evaluated by the three-day weighing method during the pre- and postharvest seasons in northern Ghana. The study identified three categories of household food security: 40 percent of households were food-secure during both seasons; 30 percent were seasonally food-secure, that is, in the postharvest season only; and 30 percent were chronically food-insecure. The study revealed that nutrient intakes generally increased during the postharvest season, particularly for energy, protein, and iron but not for vitamins A and C. While energy and protein intakes were significantly correlated with household food security status, no such association was observed for micronutrients. These findings suggest that adequate household food stock in the postharvest period does not necessarily imply adequate dietary quality.

Similar results regarding the non-correlation between micronutrient intake and household food stock have been observed in Niger and in rural villages in southern Ghana. Although the men are responsible for feeding the family, they usually provide staples only. Therefore, it is important to address means of meeting micronutrient requirements, perhaps through nutrition education and by motivating women to grow micronutrient-rich food.

Vitamin A deficiency in Mali: Results of Six Prevalence Surveys
Dr. Sophie Farbos, IOTA, Mali

This review presented the results of six studies (conducted between 1990 and 1993) based on representative samples of both rural and urban preschool children in different regions of Mali. All the studies were based on clinical signs of xerophthalmia. Three included anthropometric examination and conjunctival impression cytology with transfer. The results showed that vitamin A deficiency posed a public health problem in certain regions. Important variations were noted both according to season and from one year to another.

The Koutiala Circle Project, Mali
Mohamed Bendechi

This presentation discussed the results of a cross-sectional study undertaken during the dry season as part of a larger Koutiala Circle Project. In December 1991, a random sample of 2,631 children from six months to seven years of age was drawn from a group survey of children in a region that is relatively well endowed in terms of food production. The prevalence of clinical signs of xerophthalmia was 2.5 percent, 2.0 percent for night blindness, 0.3 percent for Bitot's spots, and 0.2 percent for corneal scars. Night blindness was more widespread in children above the age of three years. In the dietary survey, only 3.3 percent of the children had less than seven days' consumption of vitamin A-rich foods in a week; 2.7 percent did not consume any vitamin A-rich foods. The study revealed neither a difference in consumption according to age nor a systematic correspondence between consumption and xerophthalmia cases. Moderate deficiency in a population is indicated when at least 15 percent of children do not attain seven days of consumption. By that measure, the study area does not qualify as a region with a vitamin A deficiency problem. However, this finding is not consistent with the results of the clinical survey. Further, the level of consumption during the dry period which is considered the most difficult season of the year, appears less significant in this assessment. Such results are used to establish the extent of deficiency and provide the basis for evaluation but are unsatisfactory for determining programme strategy. Simple and low-cost epidemiological methods such as case studies are underused in developing countries. In fact, they can be applied to develop a fuller picture of social, cultural, and biological risk factors and thus permit the proper targeting of interventions.

Ghanaian Food Culture and Habits in Relation to Vitamin A Deficiency
Dr. Sodah Ayernor, Ghana

The presentation focused on a critical review of the food culture of the people as a foundation for group and individual food habits. Specifically, the discussion highlighted the major food resources in relation to Ghana's ecological factors and in-country commercial distribution patterns. The forest belt is noted for the production of plantains, bananas, and oil palm; the northern and upper regions, for cereals such as millet and sorghum. Maize and cassava are grown across the ecological zones. The major staples, roots/tubers and cereals, contribute little to the vitamin A content of the diet. Traditionally, weaning foods are parts and portions of adult food preparations, which are cereal and root/tuber-based. A survey of the use of green leafy vegetables in Ghana shows that Ghanaians generally restrict their choice and consumption of leafy green vegetables. In the forest zone, cocoyam leaf is preferred; in the northern savannah zone and the southern part of the Volta region, the people are amenable to a wider variety of green leaves. Boiling and frying constitute the main methods of cooking. Given the prevalence of vitamin A deficiency in the northern and upper regions, the effective production and distribution of palm oil in conjunction with nutrition education to promote palm oil's integration into the diet is essential. Several traditional methods of fortification were suggested, including the addition of red palm oil to gari during processing, the addition of carrots to cassava during grating for gari, or the addition of red palm oil to commercially prepared street foods such as kenkey. The use of yellow maize for kenkey could also be encouraged.

Historical Review of Government Policy on Vitamin A Deficiency Control in Nigeria
Dr. Mo Yoloye, Nigeria

This review noted the gradual evolution of nationally coordinated vitamin A deficiency control efforts. Initiated as a spontaneous response to a specific health problem, nutrient deficiency control attracted attention under the second and the third National Development Plans (1970-1974 and 1975-1980, respectively) but emphasized the provision of community-based infrastructure and manpower development at both the research and intermediate levels. The Primary Health Care System, which formed the bedrock of the National Nutrition Policy, came into force in 1986 and stresses a multi- - disciplinary approach to vitamin A deficiency control. It focuses on nutrition education through community health workers, basic health units, and mass campaigns against taboos, superstitions, and norms that tend to encourage poor dietary habits. Emphasis has also been placed on monitoring and evaluation for the assessment and redesign of existing policies.

Summary of Posters
Dr. Mohamed Mansour, VITAL

Seven posters were displayed, which can be classified into four groups: dietary assessment of vitamin A intake (three), prevalence of vitamin A deficiency or xerophthalmia (one), programme interventions in the form of vitamin A capsule distribution (two), and research on seasonal variation of serum retinol and β-carotene (one).

1. Dietary Assessment of Vitamin A Intake

As part of the National Micronutrient Survey, a study from Nigeria reported on the development of a simplified dietary assessment questionnaire that used the IVACG methodology. The questionnaire evaluated the retinol equivalent (RE) of 20 composite foods and 10 simple foods suspected to contain appreciable amounts of vitamin A. The evaluation was based on calorimetric analyses and theoretical calculations that used the FAO Food Composition Table (FACT). The results revealed that the vitamin A content per 100g of edible portions ranged from 20 to 1955 RE. There was a significantly positive correlation between both methods. The important message of the study is that the semi-quantitative assessment method works in Africa and allows for dietary assessment on large samples, though the method's application is time-consuming. A second study from Benin validated the IVACG dietary assessment methodology against a precise food-weighing method carried out on 49 lactating mothers during three consecutive days. The results showed no significant difference in the mean intake of vitamin A as measured by both methods. Thus, the IVACG method is valid for the assessment of vitamin A intake of women. A third study from Ghana reported on the assessment of the vitamin A intake of some rural Ghanaian households. It relied on a food-weighing method over a seven-day period. The average daily intake of energy, protein, carbohydrate, vitamin A, and fat was calculated and compared to the FAO/WHO average RDA for these nutrients. The result showed weak associations between vitamin A intake and energy protein, and carbohydrate intake but a slightly strong association with fat. Furthermore, 38 percent of the 63 surveyed households met more than 100 percent of their RDA for vitamin A, but 55 percent had unacceptable intake levels of 80 percent or less of their RDA.

2. Xerophthalmia Prevalence Study

This 1992 Togo study reported on the prevalence assessment of xerophthalmia conducted in four out of five of the country's regions. A total of 10,505 children between the ages of six months and five years were examined. The sample was stratified into two geographic and ecological zones: the savannah and Kara regions in the north and the central and plateau regions. No dietary assessments were performed. The results show that the prevalence rates of night blindness and Bitot's spots do not exceed the WHO criteria for establishing a problem of public health significance in either stratum, although the prevalence rates for corneal xerosis and corneal scars exceed the criteria in both zones. The conclusion is that vitamin A deficiency is not a significant health problem in Togo except in the country's extreme northern region.

3. Programme Interventions: Vitamin A Capsule Distribution

A report from Mauritania described the country's vitamin A capsule distribution programme that was established in 1988. The programme distributes high-dose capsules twice a year to preschool and school-age children through two programme options: a preventive programme and a curative programme. The capsules are distributed through EPI and regional ophthalmic units. Health personnel, school teachers, and community health workers received the training necessary to implement the programme. UNICEF provided vitamin A capsules as part of the Essential Drugs Programme. Coverage is estimated at 86 percent for mothers and 34 percent for infants and children.

A report from Burkina Faso described the extension of a vitamin A deficiency control project to a total of eight provinces. The pilot project, initially limited to four provinces, received UNICEF/HKI funding and achieved a significant drop in vitamin A deficiency prevalence from 1987 to 1989. The present project is similar in design to the pilot and is aimed at distributing vitamin A capsules to 40 percent of children aged six months to 10 years, 40 percent of mothers within two months of delivery, and 90 percent of children with PEM, measles, ARI, chronic

diarrhea, and xerophthalmia. It is also aimed at increasing by 20 percent the number of children consuming vitamin A-rich foods. Strategies include integrating the detection, prevention, and treatment of vitamin A deficiency problems into the PHC system; training health workers at all levels; keeping records of capsule administration on children's health cards; developing IEC materials and activities; promoting the consumption of vitamin A-rich foods through nutrition education; and supporting home gardening in two villages. At present, the project is involved in analyzing already collected KAP and quantitative data, assessing the training needs of health and other field personnel, reviewing training manuals and curricula, and developing educational and visual aid materials.

4. Research on Seasonal Variation of Serum Retinol and β-Carotene Levels

This study in Senegal reported on the seasonal variation in serum retinol and β-carotene levels in preschool children in the department of Linguere, Louga Region of Senegal. It is part of a larger study carried out on 271 children in July 1991 during the rainy season. In March 1992, 48 of the children were surveyed for serum retinol and β-carotene levels to determine variation during the dry season. The results showed that the number of children at risk of vitamin A deficiency increased from five to eight between July and March and that serum retinol and β-carotene levels decreased by nearly 50 percent during the same period. The outcome suggests that the maintenance of rainy season serum retinol and β-carotene levels among preschool children in Linguere may reduce the risks of vitamin A deficiency during the dry season.

Section 5: Closing Ceremony

The closing ceremony was chaired by Dr. Moses Adibo, Director of Medical Services of the Ministry of Health, Ghana, and Mr. Ibrahim Adam, the Honourable Minister for Food and Agriculture, Ghana. Before the closing address, the participating representatives of international agencies were given the opportunity to remark on their observations from the deliberations and to comment on future policy directions with respect to vitamin A and other micronutrient deficiency control in the subregion.

Speaking for A.I.D., Mr. Richard Seifman, Director of the Office of Nutrition, noted the unique blend of research scientists and field practitioners present at the conference as well as the healthy interaction between the two groups. In calling attention to the dynamic tension between those who argue for science-based programmes and those who maintain that we cannot wait for science, Mr. Seifman pointed out that the conference had managed to maintain an equilibrium between the two perspectives. Given the presence and participation of practitioners from the region, it was possible to maintain a dual focus in terms of the region's problems and solutions.
Mr. Seifman noted several common concerns and factors that seemed to emerge from the deliberations. To capsulize the concerns of decision makers embarking on a vitamin A deficiency programme, he offered a short checklist: first, the perception that a potential public health problem exists and likelihood of political commitment to address the problem; second, an assessment of the magnitude of the deficiency and heightened awareness of it among decision makers and the general population; third, the reasonable availability of research support and resources, both human and financial, to carry out selected interventions and the reasonable availability of technical competence and confidence at appropriate levels to implement a programme; and fourth, indicators of progress in pursuing the vitamin A deficiency reduction programme. Mr. Seifman recalled A.I.D.'s long commitment to vitamin A deficiency control as recently exemplified by both its assisting with the preparation for the International Conference on Nutrition and its role at the conference itself. Finally, he described his perception of the meeting in Accra as part of a process--countries needed to decide how they should move from discussion to action. Further, the regional network that has been created needs to be maintained.

Dr. Benoist, the Regional Nutrition Adviser (WHO-AFRO), stressed the fact that vitamin A deficiency is a significant problem and voiced hope that countries in the subregion would develop action plans to deal with it and other micronutrient deficiencies. WHO has established regional information resources that will be highly beneficial in the creation of collaborative structures. WHO encouraged countries to contribute data to the resource base to ensure its usefulness. Finally, WHO expressed satisfaction with the entire meeting and noted a willingness to support any

country that is committed to controlling micronutrient deficiencies. UNICEF likewise pointed out that the vitamin A deficiency problem is an important issue. The organization is committed to eliminating the problem and urged governments in the subregion to redirect resources toward the control of micronutrient deficiencies.

Dr. Franz Simmersbach, Food Policy and Nutrition Division, FAO, remarked that the issue of micronutrient deficiency is more than a health problem; thus, all sectors need to participate in its control. FAO policy in support of governments deals with food-based approaches and thereby encourages the promotion of agriculture along with other interventions in the control of micronutrient deficiencies. FAO re-emphasized its commitment to long-term food-based solutions to ensure both access to food and increased consumption by at-risk populations. Food-based activities require coordination and integration between health measures and food and agricultural activities as reflected in necessary resource allocation. Dr. Simmersbach reminded participants that FAO is providing technical assistance to governments for the preparation of national plans of action following the ICN in December 1992 and supports specific programmes that address micronutrient deficiency through food production, processing, and preservation. FAO's technical resources are available not only through FAO headquarters in Rome but also through the regional office for Africa, which is based in Accra, Ghana.

Ms. Jenny Cervinskas of Micronutrient Initiative expressed her satisfaction with the meeting and hoped that the conference would indeed lead to follow-up actions in each of the participating countries. She stressed the usefulness of the presentations and discussions, and felt confident that many of the ideas generated by the meeting would be valuable as MI develops its own plan of activities to support the goal of eliminating vitamin A deficiency and its consequences. the World Bank representative, commented that he came to the meeting to affirm the World Bank's stand on micronutrient deficiency control. The Bank considers the control of micronutrient deficiencies, particularly in the form of vitamin A supplementation as a cost-effective intervention. Dr. Radel noted a large increase in bank support to nutrition activities in recent years. Currently, the Bank offers support to 53 countries through its child development programmes, agriculture programmes, and programmes related to broad health problems. Furthermore, the Bank's Sahelian Department has recently added a nutritionist to its staff and has created a social fund from which NGOs and other groups can obtain support for projects.

In his closing address, Mr. Ibrahim Adam Minister for Food and Agriculture, Ghana, congratulated all parties involved for promoting a forum that brought together multidisciplinary experts to address the important yet often ignored problem of micronutrient deficiency. He emphasized that the time has come for nutrition problems to be seen not only as health problems but also as socioeconomic development problems. In this way, efforts directed at control will become the province of all related sectors -- health, agriculture, education, finance and economic planning, social welfare, etc. He urged participants and donor agencies to continue to raise governments' awareness of micronutrient deficiency problems and to insist on multisectoral collaboration at all levels of government in planning and implementing control programmes.

Mr. Adam noted the irony in vitamin A deficiency problems that coexist with the large in-country production of traditional, vitamin A-rich agricultural products. He called on countries in the region to promote the production and consumption of local, vitamin A-rich agricultural products as a long-term measure to control micronutrient deficiencies. He further urged participants and donors to invest in multisectoral research projects to identify feasible means of promoting and implementing the available interventions to help reduce the burden of micronutrient deficiencies in Africa. Finally, he expressed the commitment of the government of Ghana to mobilize all available resources to deal with vitamin A deficiency and other micronutrient deficiency problems in the country.

APPENDICES

APPENDIX I

CONFERENCE PARTICIPANTS

CONFERENCE PARTICIPANTS

1. Conference Planning Group

Ms. Florence Addo
TCRD (Nutrition)
Ministry of Health
PO Box M78, Accra

Dr. Sam Adjei
TCRD (Health Research Unit)
Ministry of Health
PO Box 184, Accra

Ms. Rosanna Agble
TCRD (Nutrition)
Ministry of Health
PO Box M78, Accra

Dr. Kofi Ahmed
TCRD (Epidemiology)
Ministry of Health
PO Box M44, Accra.

Ms. Miriam Amissah
TCRD (Health Education)
Ministry of Health
PO Box 753, Accra

Dr. Margaret Armar-Klemesu
Noguchi Mem. Institute for
Medical Research
Legon

Ms. Victoria Assan
TCRD (Maternal and Child Health)
Ministry of Health
PO Box M44 Accra

Kofi Awadzi
Protocol
Ministry of Health
PO Box M44, Accra

Dr. Ernest Collison
Dept of Nutrition and Food
Science
University of Ghana, Legon.

Dr. Maria Hagan
Ophthalmology Unit.
Dept of surgery.
Korle Bu. Accra

Ms. Phoebe Lokko
Food Research Institute
Council for Scientifc and
Industrial Research. Accra

Ms. Eleanor Swatson
Dept of Crops Services
Ministry of Food and Agriculture
Accra.

Ms. Edith Wellington
TCRD (Health Research Unit)
Ministry of Health
PO Box 184, Accra

Dr. H Odoi-Agyarko
TCRD (Maternal and Child Health)
Ministry of Health
PO Box M44 Accra

Conference coordinators:

Dr. Paul Arthur
Ministry of Health, Ghana
currently:
Maternal and Child Epidemiology
Unit, LSHTM. Keppel Str.,
London.
Fax: (44) 71 637 1173

Ms. Kate Quist
TCRD (Nutrition)
Ministry of Health
PO Box M78,
Accra

Conference rapporteurs:

Dr. Paul Arthur
Ministry of Health, Ghana.

Dr Ernest Collison
University of Ghana, Legon.

Dr Eugene Nyarko
Ministry of Health, Ghana.

2. WEST AFRICAN PARTICIPANTS

BENIN

Falilou Akadiri
Ministry of Rural Development
Porto-Novo

Dr. Eric-Alain Ategbo
P O Box 526
Cotonou

Moutairou Egounlety
Faculte Des Sciences
Agronomiques
B P 526. Cotonou

Dr. Cyriaque Gningtoungbe
MCH Programme Coordinator
Ministry of Health. Cotonou

Dr. Cisse Mohamed
Chief of Health Section
UNICEF. Benin

Dr. Mathurin Nago
Dept of Nutrition & Sciences
Agro-Alimentation Faculte de
Sciences Agronomigues
Universite National de Benin
BP 526 Cotonou.

BURKINA FASO

Emmanuel Ilbuodo
DSF. 03 BP 7247
Ougadougou 03
Fax: (226) 30 67 67

Dr. Lazare Ilboudo
Centre National de Lutte Contre
la CECITE
B P 7009. Ouagadougou

Dr. Tetevi Logovi
Country Director. HKI
B P 5658, Ouagadougou
Fax (226) 30 67 67

Dr. Tiebelesse Lougousse
DSF 03 B P 7247
Ouagadougou 03

Dr. Daumba Jean Parfait
DSF Service Nutrition
03 BP 7247 Ougadougou 03
Fax: (226) 30 67 67

Sangouan Leon Sanon
DSF Service Nutrition
Ouagadougou 03, BP 7247
Fax (226) 30 67 67 / 30 68 64

Dr. Gaston Sorgho
Health Coordinator
PLAN International
Ougadougou.

Dr. Frank Tankoamo
PLAN International
Ouagadougou

CAMEROON

Dr. Daniel Lantum
University Centre for Health
Sciences, University of Yaounde
Yaounde.
Fax (237) 31 12 24

Dr. Francis J Louis
Chef de Laboratories
OCEAC BP 288. Yaounde.
Fax: (237) 23 00 61

Dr. Flavien Tiokou Ndonko
Pan African Association of
Anthropologists
BP 1862 Messa Yaounde.

John Yiva Segba
National Health Officer
UNICEF. Yaounde

COTE D'IVOIRE

Alowa Telli Diallo

Prof. Alimata Diarra

Dr. Hugues Kone
Director, CERCOM
Universite Nationale de
Cote d'Ivoire
BP 34 Abidjan.

Ibrahim Toure
BP 759 Abidjan 05
Cote D'Ivoire

Ambroise Tebi
Nutrition Division, INSP
BP V47. Abidjan.

GAMBIA

Mr Amat Bah
Nutritionist, Nutrition Unit
Medical and Health Department
Banjul, Gambia

Dr. Jereh Sanyang
Head, Eye Care Unit
Royal Victoria Hospital
Banjul, Gambia.

Ms. Isatou Jobe-Sise
Food and Nutrition Unit
Dept of Agricultural Services
Ministry of Agriculture.
The Gambia
Fax: (220) 26 739

GHANA

Prof. Hutton Addy
Dept of Community Health
School of Medical Sciences
University of Science and
Technology. Kumasi.

Dr. Asibey Berko
Department of Nutrition and Food
Science
University of Ghana
Legon, Accra.

Ms. Dorothy Afoakwa
Regional Nutrition Officer
Ministry of Health
Tamale. Northern Region

Dr. Fred Binka
Navrongo Health Research Centre
Ministry of Health
P O Box 114
Navrongo. Upper East Region

Mr Jacob Gabriel A Armah
Regional Nutrition Officer
Ministry of Health,
Greater Accra Region. Accra

Dr. Peprah Kodua
Ministry of Health
Ghana

James Asedem
Regional Nutrition Officer
Ministry of Health, Bolgatanga
Upper East Region.

Ms. Anna Lartey
Department of Nutrition and Food
Science. University of Ghana
Legon, Accra.

Dr Sodah Ayernor
Department of Nutrition and Food
Science. University of Ghana
Legon, Accra

Mahama Saaka
Regional Nutrition Officer
Ministry of Health, Wa
Upper West Region.

Agnes Beecham
Programme Director
Centre for Prevention of

Ms Rosetta Tetebo
Ministry of Agriculture
Accra

GUINEA

Dr. Amadou Oury Barry
B P 2106
Conakry II
Tel 46 29 17

MALI

Zoumana Bamba
TCP/RAF/0163 INSAH
BP 1530. Bamako.
Fax: (233) 22 23 37

Dr. Arsike Barry
Directeur de L'Agriculture a Segou
BP 120. Mali

Mohamed Bendech
Institut National de Reserche en Sante Publique (INRSP)
BP 1771 Bamako, Mali

Dr. Fode Doumbla
Ministrie de la Sante de la Solidarite et Personnes Agees.
Bamako

Dr. Djibril Semega
Nutritionist, Nutrition Unit
Ministry of Health. Bamako.

Mme Rokia Ba Toure
Regional Coordinator
TCP/RAF/0163 INSAH
BP 1530, Bamako.
Fax (233) 22 23 37

MAURITANIA

Sall Aliou Mamadou
BP 334 Mauritania.

NIGER

Dr. Ferdous Brah
Vitamin A Project Coordinator
Helen Keller International
BP 11728. Niamey.
Fax: (227) 73 50 26

Issah Camara Boubacar
Charge de Programmes
Hellen Keller International
B P 11728, Niamey
Fax (227) 73 50 26

Dr. Aissata Guimba
Directrille de la Sante Maternelle et Infantile
Ministere de la Sante Publique
Niamey BP 623

Mme Aissa Mamadoultaibou
Ministry of Public Health
General Secretairait
Niger
Fax: (227) 73 29 63

Runesha Muderhwa
Coordinator
FAO Community Gardening Project
B P 1126 Niamey
Fax (227) 73 49 62

NIGERIA:

Prof. Tola Atinmo
College of Medicine
Dept of Human Nutrition
University of Ibadan
PO Box 21633. Ibadan
Fax (234 22 41 58 35)

Ms. Lina Mahy
Zonal Nutrition Officer
Bauchi Zone. UNICEF.
Nigeria

Dr. Lola Dare
CHESTRAD
College of Medicine, Ibadan.
Fax: (234) 22 411 318

Dr. Olawumi Obagaye
Dept of Biochemistry
Ahmadu Bello University
Zaria, Nigeria.

Dr. John Egbuta
Bauchi Zone
UNICEF, Nigeria

Dr. Mo Yoloye
Garki Hospital
Abuja Federal Capital Territory
Abuja

TOGO

Kousanta Amouzou
BP 7980, Lome.
Fax: (228) 21 85 95

Dr. Latifou Salami
UNICEF. Lome

Prof. Ananivi Doh
CRANIOCCGE
BP 7980. Lome

3. INTERNATIONAL PARTICIPANTS

Dr. Bruno de Benoist
Regional Nutrition Advisor,
WHO-AFRO
PO Box 6. Brazzaville.
Fax: (242) 83 18 79

Ms. Sylvia Etian
Technical Advisor
Child Survival Programme
CDC/USAID, Niamey.
Fax: (227) 73 29 63

Dr. Susan Burger
Programme Manager
Vitamin A Programme
HKI. 15 West 16th St.
New York, NY 10011, USA
Fax: (212) 943 1220

Dr. Sophie Farbos
IOTA. BP 248 Bamako. Mali
Fax: (223) 22 51 86

Ms. Jenny Cervinskas
Micronutrient Initiative
250 Albert St.
PO Box 8500 OTTAWA
CANADA K1G 3H9
Fax: (613) 238 7230

Karel W G Callens
Food and Nutrition
FAO Regional Office for Africa
P O Box 1628. Accra, Ghana
Fax: 41-(22) 791-0746

Dr. Rien Gotink
Programme Officer
Health and Nutrition
UNICEF. Ghana.

Dr. Greg D Hussey
Infectious Diseases Unit
Dept of Pediatrics and Child
Health. University of Cape Town.
Green Point 8051. South Africa.
Fax: (27) 21 689 1287

Dr. Festo P Kavishe, Director
Tanzania Food and Nutrition
Centre
SLP 977 Dar es Salaam.
TANZANIA
Fax: 255-51-28951

Dr. Nancy Keith
Coordinator, Measles Initiative.
USAID/Niamey
BP 13300 Niamey

Ms. Betty Kirkwood
Head. MCEU
London School of Hygiene and
Tropical Medicine
Keppel Street. London. WC1E 7HT
Fax: (44) 71 637 1173

Ms. Mary Linehan.
Assistant Director, VITAL
1616 N. Fort Myer Dr., Suite
1240
Arlington, VA 22209
Fax: (703) 841 1597

Dr. Mohamed Mansour
Nutrition Advisor for Africa
VITAL.
1616 N. Fort Myer Dr., Suite
1240
Arlington, VA 22209
Fax: (703) 841 1597

Saul S Morris
MCEU
London School of Hygiene and
Tropical Medicine
Keppel Street. London. WC1E 7HT

Dr. Cheikh Ndiaye
Regional Food & Nutrition
Officer. Regional Bureau FAO
BP 1628. Accra. Ghana.

Dr. Melissa Parker
MCEU. London School of Hygiene
and Tropical Medicine
Keppel St. London WCIE 7HT
England

Dr. David J Radel
Snr Population and Health
Specialist. Western Africa Dept.
The World Bank. 1818 H Str., NW
Washington DC. 20433
Fax: (202) 473 6065

Dr. Jenice Rankins
College of Human Sciences
Dept of Nutrition, Food and
Movement Sciences
Florida State University.
Florida 32306-2033
Fax: (904) 644-0700

Dr. David Ross
MCEU. London School of Hygiene
and Tropical Medicine
Keppel Street. London. WC1E 7HT
Fax: (44) 71 637 1173

Dr. Richard Seifman, Director.
Office of Nutrition
Bureau for Research and
Development
USAID 411, SA-18
N.W. Washington, DC. 20523-1808
Fax: (703) 875 7483

Dr. Franz Simmersbach
Nutrition Programmes Service
Food Policy and Nutrition
Division, FAO
Rome. Italy.
Fax: (396) 5795 3152

Dr. Barbara A. Underwood.
Special Advisor on Vitamin A
Programme,
Nutrition Unit WHO
CH-1211 Geneva 27. Switzerland.

4. OBSERVERS

ENGLAND

Mr Timothy Allen
Open University
Milton Keynes
MK6 BH. UK

GHANA

Mrs. Bernice Ankra-Badu
World Vision International
Private Mail Bag
Accra North.

Mr Martin Adjuik
Navrongo Health Research Centre
P O Box 114
Navrongo UER

Mr Kodjo Senah
Dept. of Sociology
University of Ghana
Legon

Dr. John Dei-Tutu
Food Research Inst.
P O Box M 20. Accra

Ms. Margaret Gyapong
Research Officer
Navrongo Health Research Centre
P O Box 114. Navrongo.

Dr. Toru Rikimaru
Noguchi Memorial Institute for
Medical Research
P O Box 25. Legon

Prof. Oladido Onayemi
Association of African
Universities
P O Box 5744. Accra

Natat Barreau
Consultant FAO
c/o FAO Regional Office of
Africa
P O Box 1628. Accra

NIGERIA

Mrs. Victoria Nnatuanya
National PHC Development
Agency Medical Library Compound
PMB 1009. Yaba - Lagos.

Dr. Olaronke Fatimolu
CHESTRAD
P O Box 10793
IKEJA. Lagos

USA

Leslie Lewinter-Suskind
Dept of Psychiatry
LSU School of Medicine
1542 Tulane Avenue
New Orleans, LA 70112. USA

Prof. Robert Suskind
Dept. of Paediatrics
LSU School of Medicine
1542 Tulane Avenue
New Orleans

APPENDIX II

CONFERENCE PROGRAMME

Monday 9th August

SESSION 1:
OPENING CEREMONY

0900hrs:

Chair: Hon. Minister for Health, Commodore S. Obimpeh (Rtd.)

Welcome address	Rosana Agble Planning Group
Chairman's opening remarks	Cdr. Obimpeh (Rtd)
Statement of conference objectives	Kofi Ahmed Planning Group
Remarks: USAID; UNICEF; Micronut Initiative; IDRC	
Keynote address	His Excellency K.N. Arkaa, Vice President of Ghana

1000hrs: **BREAK**

SESSION 2:
VITAMIN A DEFICIENCY, CHILD HEALTH AND SURVIVAL

1030hrs

Chair: Betty Kirkwood

Session objectives:

Describe the magnitude and distribution of vitamin A deficiency in the region.
Examine the evidence for the presence of high risk groups and the implications for targeting of programmes.

1030hrs:	Historical overview	Barbara Underwood
	Vitamin A Field Trials in Africa:	

1050hrs:	The Sudan study	Guilermo Herrera
1100hrs:	The Ghana studies	Paul Arthur David Ross
	Vitamin A deficiency in the West African sub-region:	
1120hrs:	Overview	Bruno de Benoist
1135hrs:	Country presentations:	
	Nigeria	Patrick Okungbowa
	Mali	Djibril Semega
	DISCUSSION	

SESSION 3
WORKSHOP I: STRATEGIES FOR VITAMIN A DEFICIENCY CONTROL IN WEST AFRICA

Chair: Barbara Underwood (WHO)/Franz Simmersbach (FAO)

Session objectives:

Present and discuss possible long and short term intervention strategies for VAD prevention and control, and their application to the particular situation in the region.

Identify the important issues to be considered in the cl .ice of programme strategies.

Identify the constraints to successful implementation of programmes and examine potential solutions to these.

	Panel presentation:	
1200hrs:	Improved Production and Consumption of Vitamin A Rich Foods	Arsike Barry
1215hrs:	Vitamin A Food Preservation and Processing	Mary Linehan
1230hrs:	Food fortification	Susan Burger
1245hrs:	Options for supplementation	David Ross
1300hrs:	Conclusions from international meetings/reviews:	
	World Bank: World Development Report (1993)	David Ross
	Ottawa meeting: Programme strategies	Barbara Underwood

1315hrs:	**LUNCH**	
1430hrs:	Communications support for programmes	Hughes Koné
	Project experiences in West Africa:	
1450hrs:	Vitamin A Deficiency Control Project, Northern Benin	Falilou Akadiri
1500hrs:	Promotion of the Production and Consumption of Vitamin A Rich Foods in Niger	Runesha Muderhwa
1510hrs:	Vitamin A Social Communications Project, Niger	Aissa Mamadoultaibou
1520hrs:	Evaluation of a Pilot Project for Vitamin A Deficiency Control, Burkina Faso	Emmanuel Ilbuodo
1530hrs:	**BREAK**	
	Working group session:	
1545hrs:	Introduction of session objectives Group work	Rosana Agble
1650hrs:	Plenary: Workshop I group reports	
1900hrs:	COCKTAIL	

Tuesday 10th August

SESSION 4:
INFORMATION FOR PROGRAMME DEVELOPMENT AND MONITORING

0900hrs:

Chairs: Barbara Underwood and Betty Kirkwood

Session objectives:

Discuss and recommend selected indicators for the assessment of vitamin A status based on lessons learnt from surveys in the sub-region, and their implications for the design, scope, cost and implementation of assessment surveys.

Obtain feedback from country teams on experiences with the WHO Micronutrient Deficiency Information System questionnaire. Discuss suggestions on additional useful information for the data base, and identify the best sources for obtaining the information requested.

0900hrs:	Indicators of vitamin A status: report of a meeting	Barbara Underwood
0910hrs:	National surveys: The Nigerian Experience	Tola Atinmo Lola Dare
	Dietary studies:	
0940hrs:	Dietary assessment methods	Mohamed Mansour
0955hrs:	Anthropological perspectives	Nancy Keith
1015hrs:	**DISCUSSION**	
1030hrs:	**BREAK**	
	POSTER SESSION	
1100hrs:	WHO Micronutrient Deficiency Information System: Structure and status Evaluation of MDIS instrument	
1230hrs:	**LUNCH**	

SESSION 5:
WORKSHOP II: ISSUES IN DEVELOPING AND IMPLEMENTING NATIONAL POLICY

1400hrs

Chair: Sam Adjei

Session objectives:

Identify priority policy issues for the implementation of country plans of action, and how these might be addressed in accordance with country objectives and targets within the ICN recommendations.

Identify the essential conditions for integrating micronutrient deficiency control programmes.

1400hrs:	Country case study: Tanzania	Festo Kavishe
1430hrs:	Integrating micronutrient deficiency control programmes: vitamin A, iron and iodine.	Franz Simmersbach
	Working group session:	
1500hrs:	Introduction of session objectives	M. Armar-Klemesu
1505hrs:	**BREAK**	
1520hrs:	Group work	
1630hrs:	Plenary: Workshop II group reports	

SESSION 6:
VITAMIN A IN THE MANAGEMENT OF MEASLES

0900hrs:

Chair: Hutton Addy

Session objectives:

Share experience of the impact of vitamin A in the case management of measles based on data from existing programmes, and discuss how to ensure its inclusion into national policy and programmes.

0900hrs:	Overview: Epidemiological studies	Greg Hussey
0925hrs:	Policy, implementation and monitoring for impact	Festo Kavishe
0945hrs:	DISCUSSION	
1005hrs:	**BREAK**	
	POSTER SESSION	

SESSION 7:
RESEARCH FORUM

1045hrs:

Chair: David Ross

Session objectives:

Share practical experience and new lessons learned on a wide range of issues from research and intervention projects in the region, and examine the policy, programme and further research implications of these findings.

1045hrs:	Koutiala Circle Project, Mali: Methods Used in the Evaluation of Vitamin A Status and Choice of Interventions.	Mohamed Bendech
1100hrs:	Effects of Vitamin A Supplementation in Malnourished children in the Ivorian Savannah Area.	Ambroise Tebi
1115hrs:	Historical Review of Government Policies on Vitamin A Deficiency Control in Nigeria.	Mo Yoloye
1130hrs:	Ghanaian Food culture and Habits in Relation to Vitamin A Deficiency.	Sodah Ayernor
1145hrs:	The MANGOCOM Project: A Nutrition Social Marketing Intervention for Reducing Risks of Vitamin A Deficiency in the Sahel Region During the Dry Season.	Jenice Rankins
1200hrs:	Food Preservation Using Solar Drying in the Gambia.	Isatou Jobe-Sise
1215hrs:	Vitamin A Deficiency in Mali: Results of six prevalence surveys.	Sophie Farbos
1230hrs:	Household food security in a sub-sahelian region of Ghana: Micronutrient quality of diet of pre-school children.	M. Armar-Klemesu
1245hrs:	Summary of poster display	Mohamed Mansour
1300hrs:	**LUNCH**	

Wednesday 10th. August

SESSION 8:
CONCLUSIONS and CLOSING

Chair: Dr Moses Adibo
Director of Medical Services, Ghana

Session objectives:

Identify the essential operational research questions arising out of discussions in the meeting, and propose strategies for addressing these.

Obtain insight into the future policy direction of donor groups with respect to vitamin A and other micronutrient deficiency control in the sub-region.

1430hrs:	Future research implications	Betty Kirkwood
1450hrs:	Meeting summary and conclusions	Paul Arthur
1510hrs:	Agency presentations: WHO; UNICEF; USAID; FAO; ODA Micronutrient Initiative; IDRC	
1600hrs:	Closing address: Mr Ibrahim Adam, Hon. Minister for Agriculture	
1620hrs:	Vote of thanks	M. Armar-Klemesu

APPENDIX III

SELECTED KEY PRESENTATIONS

Solar Drying for Vitamin A

Mary Linehan, Assistant Director. Vitamin A Field Support Project (VITAL). Arlington, VA.

Most of the world's population relies on plant sources for its vitamin A. Availability of vitamin A food sources is a problem in many parts of the world, especially where these food sources are only available in certain seasons. Solar drying is an appropriate technology for preserving foods rich in vitamin A, such as mangos, papayas, sweet potatoes, carrots and green leaves. In areas where vitamin A-rich foods are seasonally available or expensive, small-scale gardening and simple food preservation can assure the important foods are available year round.

Community level solar drying activities have been successfully implemented by the USAID Office of Nutrition's Vitamin A Field Support Project in Haiti, the Dominican Republic and Tanzania. The technology is inexpensive and easily transferred. Solar drying builds on traditional drying methods practiced worldwide, and is therefore easily accepted at the community level. VITAL has worked with women's groups in solar drying construction, training on drying techniques, recipe development for the dried foods, nutrition education and marketing of the dried products.

Solar drying is an important method for minimizing post-harvest loss. In many areas, foods such as mangos are especially abundant during a brief growing season. In Haiti, the Dominican Republic and West Africa mangos are an important source of vitamin A. During the mango season children eat them fresh off the trees. Because they are so abundant many ripe mangos are not consumed but lie on the ground and rot. And because the mangos ripen quickly large quantities of the fruit are lost due to lack of transport or preservation methods. Solar drying allows the fruit to be preserved at low cost, reducing waste and improving availability of this important vitamin A source.

Solar drying allows the products to retain 50-80% of the carotenes converted to vitamin A by the body. Efficient dryers protect from direct rays of the sun and speed the drying process. Dried products can be safely stored for 8 months, retaining significant levels of vitamin A activity. This means that a household can store vitamin A foods for the off season. The dried product is easily transported to other parts of the country, allowing the producer to sell the product at favorable market prices.

There are many different kinds of solar dryers, designed for different climates, varying hours of sunlight, different food products and different producers. Commercial dryers can be quite large and sophisticated, using indirect solar energy. A very inexpensive box-type dryer can be constructed of local materials for a few dollars. Even an inexpensive household dryer produces better quality dried foods than direct sun drying, by protecting the products from contamination by insects and dust, decreasing the drying time, and retaining higher levels of vitamin A activity.

Women's groups we have worked with have expressed particular interest in the income generation aspect of the activity. Recognizing that income generation is essential for sustaining the activity, instruction in financial management and simple accounting has been included in the training in solar drying techniques. Efforts to market the dried products, identify buyers and market sites and develop recipes using dried or rehydrated foods have also been part of the program.

The opportunity to generate income is a great motivator, nevertheless, given that our principal objective is to improve the vitamin A status of children in the community, a strong nutrition education component is necessary. Women are educated about the importance of vitamin A for their children's health, and they are encouraged not only to give the dried foods to their children, but to maintain sufficient quantity for consumption in the off-season. If the producer is marketing products, they can identify children as the primary target: dried fruits can be sold as snacks for children or as part of the ingredients of a weaning food.

In Haiti and the Dominican Republic, the women have easily mastered the technology and have begun to experiment with a variety of foods that can be dried throughout the year. Dried soup mixes using green leaves, sweet potato,

carrots and pumpkin have been developed. Tomatoes, pineapple and mixed fruit leathers are also dried. The women are training other women's groups in construction of dryers and solar drying for vitamin A. The dried products have been very popular, especially among children.

Solar drying is an important technology for use in a variety of settings. However, several things are required to successfully implement a project:

1. At least 6 hours of sun per day during the drying season. Foods should dry in one or two days to assure nutrient values and good quality.
2. An excess supply of the appropriate foods is necessary. It is usually not cost effective to purchase foods for drying, since the added labor increases the cost of the food.
3. A clean water source is necessary for washing and preparation of the foods.
4. A site for the dryers is necessary, free from shade and dust, as well as a secur · .ace to store equipment.
5. A work area is required for food preparation.
6. Dried products must be stored in a dark, dry place to retain their nutrient content.

For vitamin A nutrition, some of the best foods to dry are mango, pumpkin, sweet potato, papaya, green leaves and carrots.

In summary, solar drying is a sustainable activity which can generate community awareness and local solutions to vitamin A deficiency. The technology is inexpensive and easily transferred. It relies on free energy sources: sun and wind. Solar drying builds on existing knowledge and traditional practices. Commercial production allows income generation, and the dried products are desirable and marketable.

Lessons Learned:

Solar drying technology is not new and has been adapted and modified for optimal operation in a variety of environments. We have found that the technology is easily transferred, highly acceptable at the community level and that there is a demand for the training in construction and processing techniques. However, dried foods are not always easily incorporated into the diet. Where dried foods are not traditionally consumed, they may appear odd, sometimes inedible. A great deal of nutrition education, and development of recipes is required to find ways to assure that the dried foods are consumed by the target population.

On the other hand, we have sometimes found that dried mangos are so popular with adults that they are not made available to children. Increasing supply may provide one solution to this problem. Monitoring of consumption is necessary to determine if foods are being consumed by the target population.

Income generation is an important motivator at the village and household level for conducting solar drying activities. This should be incorporated into program design. Families should be encouraged to store enough for their own consumption before selling the excess, and marketing strategies should target children.

Storage conditions may be problematic in some communities. Plastic bags are a reliable method for storing products, but have to be purchased. Other dry, airtight containers are often difficult to find. In addition, dried foods must be protected from light to protect the vitamin A activity.

More work is needed in the following areas:

Finding ways to incorporate dried foods into diet
Development of weaning foods using dried products
Finding ways to monitor consumption to assure impact
Developing marketing strategies to encouraged sustained production, and access by non-producers.

Food Fortification to combat vitamin A deficiency in West Africa: How can we make it effective?

Dr Susan Burger. Manager, Vitamin A Program. Helen Keller International. New York.

Fortification is a proven method of eliminating nutrient deficiencies. In developed countries such as the United States, fortification, supplements, and a rich variety of foods have all contributed to the elimination of many nutrient deficiencies, including vitamin A deficiency. A wealth of cereals, flours, beverages, milk, margarine, and snack foods often voluntarily fortified by the food industry in the United States (1) demonstrate that fortification is feasible. The decline in goiter and cretinism in the Midwestern United States after salt was iodized in the 1920s (1), the sharp reduction in deaths from pellagra in the Southern United States when breads and flour were enriched with niacin during World War II, (1,2) and the drop in xerophthalmia in Denmark when fish liver oil was added to margarine after World War I (2) confirm that fortification can successfully eliminate nutrient deficiencies nationwide.

In developing countries, vitamin A has been added to sugar, monosodium glutamate (MSG), whole wheat, rice, tea (3) noodles and margarine in field trials and pilot programmes. On a nationwide basis, Guatemala, Honduras and El Salvador have fortified sugar with vitamin A (3). After fortification of sugar with vitamin A in Central America, vitamin A and iron status improved among children and the content of vitamin A in breast milk increased (4,5). A pilot programme established in Indonesia to fortify MSG with vitamin A revealed that improved survival and growth among children (6) may also be a benefit of vitamin A fortification programme. In fact, the economic gain in productivity from fortification with vitamin A has been estimated to exceed the cost of programmes (7).

Public Health experts often concentrate on fulfilling the technical aspects of food fortification programmes. Some of the important technical considerations, summarized recently at the "Ending Hidden Hunger" conference in Montreal, are that the fortified food should (8):

- be consumed by a sizable proportion of the population;
- be affordable for the poor, who are often the most vulnerable to deficiency;
- not alter the taste, appearance, or colour of the unfortified food, and
- be consumed in fairly constant amounts so that fortification levels can be accurately calculated

Although the technical considerations are important, they are not the only factors to consider when planning national fortification programmes. Three examples from Helen Keller International's (HKI's) experience illustrate that beneficial conditions for national fortification programmes also include:

- acceptance and cooperation of the government, consumers, and manufacturers and
- coordination of the combined efforts of technicians, manufacturers, economists, advertisers and others crucial to fortification programmes.

In Bangladesh, whole wheat was provided through public food distribution programmes. Technological feasibility studies were conducted first. Fortification of whole wheat flour fulfilled many of the technological criteria. The political feasibility was considered next. The government expressed concern about issues such as long-term security, dependency on outside food donations, and the need for fortification (9). Consequently, the fortification of whole wheat, although technologically feasible, has not received the approval of the government. This indicates that political exigencies can inhibit the progress of technological feasible programmes.
In Indonesia, MSG is consumed in fairly constant amounts by most of the population, but consumer groups objected to fortifying a food that was thought to be harmful. By fortifying MSG consumer groups felt that fortification of MSG had advertised the white color of MSG as a sign of purity and would only agree to market fortified MSG on the condition that the fortified MSG retain its whiteness. In order to make the programme work HKI built coalitions to resolve conflicts and develop partnerships between consumer groups, manufacturers, researchers and the government and coordinated various groups that were conducting marketing, bioavailability, compatibility, and impact studies to develop the product. Therefore, to address the political concerns, both a political solution (conflict resolution and coalition, building) and a technological solution (further product development) were implemented.

In the Philippines, Procter and Gamble began to modify an existing product due to enthusiasm first generated from a conversation with an HKI medical advisor. Star margarine has a long shelf-life, is sold in small affordable packets and is purchased by very low income groups. The margarine is fortified with both beta-carotene which yellows the margarine, and with retinol. The yellow colour is seen by consumers as a benefit, the more yellow the margarine, the more they like it. In this instance, the manufacturer took the lead in product development by funding studies of bioavailability and distribution. They also formed coalitions. This illustrates how substantially the private sector can contribute to fortification when fortification can be carried out profitably.

Since we know that the Bangladesh example illustrates how governmental concerns can stymie technically feasible fortification programmes, we must also acknowledge that unless solutions to political concerns are developed the programme will remain stalled. For instance, providing the technology development to fortify whole wheat *within* Bangladesh might have stimulated consumer demand and income earning for Bangladeshi industry while alleviating governmental fears of dependency. It is precisely this type of approach to solving the problems of fortification that we need to apply to explore the potential of fortification fully.

Of the other two examples, the incentives to the manufacturers were greater in the Philippines than in Indonesia. The product was already in the market and enjoyed consumer acceptance. The color produced by fortification is seen as a benefit and can be advertised, potentially enhancing that acceptance. Thus, the development costs have been readily assumed by the manufacturer. This situation exemplifies an advantageous set of conditions for the rapid development of successful fortification programmes.

One of the challenges for fortification is to mobilize the food industry to recruit them as allies, not antagonists. In addition to identifying whether the technological conditions are appropriate for fortification, this will require identifying the best incentives to engage the food industry in actively contributing to elimination of vitamin A deficiency. Historically, the incentive that has been successfully used in iodization of salt has been to subsidize the costs of fortification in the initial phases of introducing the fortified product. Other options, however, might also work.

One option suggested by Richard Manoff (10, is to promote collaboration between governments and businesses using the "Provita Plan". The government can develop a brand name as a seal of approval to endorse fortified products that meet standards for fortification. Manufacturers that meet those standards would be permitted to use the government brand name along with their own brand name. The government would then finance advertising to promote brand name recognition. The manufacturer would benefit from the association of their brand name with the government's brand name.

A different approach might be to permit manufacturers to make valid health claims about the product as part of their own advertising campaigns with government endorsement when they comply with government standards. For example, in 1984, United States cereal manufacturers started advertising, their products successfully by using the link between fiber in the diet and reduced risk of cancer. Manufacturer health claims not only led to an increase in fiber cereal consumption, but also to an increase in consumer knowledge (11). In this case, the manufacturer's advertising was far more successful than previous government efforts.

Coalitions of various groups involved in fortification, such as those facilitated by Helen Keller International, have proven useful to address both political and technological concerns. The pace of product development undertaken by various members of these coalitions might be quickened by shifting more towards overlapping development phases and less towards sequential development phases (12). For example, had political and technological feasibility studies been conducted simultaneously in Bangladesh, earlier recognition of the governmental objection to donated foods might eliminate the time and effort spent on product development. Other options could have been explored sooner.

In summary, fortification involves several key activities that can be implemented simultaneously. One activity is to analyze potential food vehicles according to the four commandments of Mannar mentioned previously. Another

activity is to identify partners that can implement available technologies on a nationally meaningful scale. Partnerships among government, industry and consumers should be developed. Organizations such HKI can play a valuable role in these partnerships by advocating them and by acting as an independent broker and technical advisor. Additionally, gaps in technical capabilities should be identified to develop sustainable in-country capacity through, for instance, training by organizations like HKI.

One might argue that you should not or cannot fortify foods in West Africa. The argument usually runs along these lines:

- there are few processed foods in West Africa
- foods are not centrally processed in West Africa
- Processed foods are eaten only by the rich in West Africa
- governments in West Africa can afford only to control vitamin A deficiency among the poorest;
- resources are so limited in West Africa that one intervention must be chosen as a priority; and,
- planning for any projected rural to urban migration or expansion in the market for processed foods would detract from high priority interventions that need to be implemented now.

While it is possible that some or all of these arguments are correct, the objections themselves beg the following questions:

- A processed food in West Africa only eaten by those who already each enough vitamin A?
- Is consumption of processed foods changing in West Africa due to migration of populations?
- Will the market for processed foods remain the same in West Africa?
- Will the West African food industry expand?
- Are some of the new small-scale pilot fortification technologies applicable in West Africa?
- Are foods imported from countries outside of West Africa fortified with vitamin A?
- Will food emergencies ever arise in West Africa due to natural or man made disasters?
- Are food donations given from countries outside of West Africa and if so are these foods fortified with vitamin A?
- Do regulations exist for nutrient content of imported and donated foods?
- How can mutually beneficial partnerships be developed with food industries in West Africa?

In June of 1993, Helen Keller International sponsored the 6th Annual Martin J Forman Memorial lecture, where Richard Manoff presented a lecture entitled " Have we Become Surrogates for Failure? Proposing a "New Nutrition Education". He stated that the challenge we face is "to go beyond ceremony, beyond the well-worked forms our last experience; to look at the new task ahead, the new end to be achieved and ask how to determine the necessary creative inputs" (10) which applies to our discussion of the means available to improve vitamin A status including fortification. So, while reviewing, what the experts in fortification have written, I have tried to keep this challenge in mind.

The current situation provides a wonderful opportunity for us to reevaluate our methods and attitudes, and to focus on cooperative and collaborative strategies for successful food fortification programmes. Fortification is a sustainable and cost-effective intervention to eliminate nutrient deficiencies. It shifts attention away from medical to food-based solutions. Fortification can be implemented along with supplement and dietary modification. The challenge is before us, and what remains to be decided is whether we will meet it successfully or opt for a "safe" - and often less effective -- solution.

Acknowledgments:
The author would like to acknowledge the editorial assistance of Christopher Caiazza and Krisann Karaviotis of Helen Keller International and the technical assistance of Frits van der Haar, Ph.D, Operations Director, Programme Against Micronutrient Malnutrition. Any errors are the author's own.

References

1. Quick, J A and E W Murphy, 1982. The fortification of Foods: A Review. United States Department of Agriculture. Food Safety and Inspection Service. *Agriculture Handbook No 598*

2. Lachance, P A and J C Bauernfeind. 1991. Concepts and practices of nutrifying foods. In: *Nutrient Additions to Food: Nutritional, Technological and Regulatory Aspects.* Bauernfeind J C and P A Lachance (eds). Food and Nutrition Press, Inc., Tumbull, Conn. USA; 19-86

3. Nestel, P. 1993. *Food Fortification in Developing Countries.* United States Agency for International Development. VITAL.

4. Arroyave, F, L A Mejia, and J R Aguilar. 1981. The effect of vitamin A fortification of sugar on the serum levels of preschool Guatemalan children: a longitudinal evaluation. *American Journal of Clinical Nutrition.* 34:41-49

5. Mejia, LA and G Arroyave. 1982. The effect of vitamin A fortification of sugar on iron mebolism in preschool children in Guatemala. *American Journal of Clinical Nutrition.* 36: 87 - 93.

6. Muhilal, D Permeisih, Y R Idjradinata, Muherdiyantingsih, and D Karyadi. 1988. Vitamin A fortified monosodium glutamate and health, growth, and survival of children: a controlled field trial. *American Journal of Clinical Nutrition.* 48: 1271-1276

7. Levin, H M, E Pollit, R Galloway R and J McGuie 1991. Micronutrient deficiency disorders. In: Jamison D T and Mosley W H (ed.) *Disease control priorities in developing countries.* Oxford University Press, New York.

8. Mannar, V. Oct. 20 - 12, 1991. Fortification of Foods to combat Micronutrient Deficiencies In: *Proceedings of Ending Hidden Hunger (A Policy Conference on Micronutrient Malnutrition).* Montreal, Québec, Canada. pp. 35-47.

9. Darnton-Hill, I. Nov. 3-5, 1988. *Vitamin A Fortification of wheat: Bangladesh Experience.* Hellen Keller International, Bangladesh. Paper presented at the Regional Vitamin A Meeting, organized by the Nutrition Research and Development Centre in Bogor, and Indonesian Ministry of Health, Jakarta.

10. Manoff, R K, Draft, July, 1993. *Have We Become Surrogates for Failure? Proposing a New Nutrition Education.* 6th Annual Martin J Forman Memorial Lecture. Presented June 21, 1993, National Council for International Health Conference, Arlington VA. Sponsored by Helen Keller International, NY.

11. Ippolito, P M and A D Mathios, 1991. Heatlh claims in food marketing: Evidence on knowledge and behaviour in the cereal market. *Journal of Public Policy and Marketing.* Vol. 10, No. 1, pp 15-32.

12. Takeuchi, H and I Nonaka, Jan.-Feb. 1986. The new product development game: Stop running the relay race and take up rugby. *Harvard Business Review.* pp 137-146.

Alternative Strategies for the Prevention of Vitamin A Deficiency: Supplementation

David A. Ross, Dept. of Epidemiology & Population Sciences,
London School of Hygiene & Tropical Medicine

1. Definition.

Vitamin A supplementation is the administration of periodic doses of vitamin A in pharmological preparations. Although previously injections have sometimes been used, nowadays supplements are almost exclusively given via oral preparations, either in the form of capsules or as liquid.

2. Advantages.

Vitamin A supplementation has the attraction of being a strategy whereby substantial and almost immediate benefits can be brought to the most at risk groups in vitamin A deficient populations at relatively low cost. Supplementation programmes are relatively simple to plan and deliver, since doses of vitamin A are relatively stable, not requiring refridgeration, for example, and they can be delivered at existing health service contacts or via schools.

The dosing interval can be long, with high doses only needing to be taken every four months, because the vitamin is relatively non-toxic and is stored in the liver. This contrasts with iron or zinc supplements which must be taken every day, or at least weekly. Supplements are palatable and have very few side effects if taken at the recommended doses (Table 1). Furthermore, they are cheap, costing about 0.02 US dollars per dose.

Another programmatic advantage of vitamin a supplementation is that it does not depend upon the setting up of a new delivery system, since health services are already focussing many of their activities on the main target group of young children and women of childbearing age, and in many countries achieve reasonably high contact rates with these groups. Furthermore, school children are a potential "captive" population, who could potentially be given supplements.

But perhaps the main reason for the popularity of supplementation programmes is their immediacy. Political leaders are decreasingly given their job for life, and so they need programmes, preferably highly visible and easily understood programmes, which bring results within a short time scale. Donors also tend to favour projects which can demonstrate proven benefits within a period of 3-5 years, and vitamin A supplementation programmes can do this. They can do this largely because they do not require substantial behavioural change by the population.

3. Disadvantages.

However, it is this "advantage" of not requiring behavioural change which is at the heart of the main disadvantage of vitamin A supplementation as a long-term solution to vitamin A deficiency, because it does not tackle the root causes of the deficiency, but is merely a palliative treatment for it. If the supplementation programme stops, future generations will still be exposed to vitamin a deficiency as their basic dietary intake is inadequate. This means that unless the supplemetation programme is used as a springboard for the implementation of interventions to improve the dietary intake of the population, particularly young children and women, it will have to continue indefinitely. Taking the long-term view, therefore, unless supplementation programmes are combined with programmes to increase the dietary consumption of vitamin A-rich foods, whether these are naturally rich in the vitamin or fortified with it, they will lead to indefinite dependence on the supplementation programme. Furthermore, pharmacological preparations of vitamin A are manufactured in very few developing countries, so supplementation programmes require precious foreign exchange.

All these issues mean that the ability to sustain vitamin A supplementation programmes long-term is a key problem - on a par with the problems inherent in the long-term sustainability of immunization programmes where interruption

of disease transmission is not achieved.

4. Potential supplementation strategies.

There are three main target groups who can benefit substantially from vitamin A supplementation: young children, older children and adolescents, and women of childbearing age. The strategies for vitamin A supplementation programmes targetted at each of these groups are somewhat different.

4.1 Young Children -- Young children are the group who have been the main focus in most vitamin a supllementation programmes, because they are the most seriously affected group, both in terms of the eye disease, xerophthalmia, and in terms of the increased mortality and severe morbidity associated with vitamin A deficiency. Here there are four main potential strategies for delivery of vitamin A supplements:

4.1.1 Special delivery of high doses every 4 months, as has been done in most of the trials of the effects of vitamin A supplementation on child mortality or morbidity, including the two trials conducted in Ghana[1]. Because of the very high costs of setting up such a special delivery system, this approach can only be feasible within the context of a regular home visiting programme. Very few such programmes exist within West Africa, so this strategy will not often be an option here.

4.1.2 High doses at health service contacts between 6 months and five years of age with a minimum interval of 4 months has the major advantages that this strategy has proven safety[2] and efficacy[3], makes use of all health service contacts in 6-59 mth age group, does not include infants below 6 mths, in whom benefit has not been proven[3,4], and has minimal marginal costs - only those associated with the provision of the vitamin A capsules or liquid itself[5]. It is probably currently the strategy of choice in this age group.

4.1.3 Moderate doses linked to immunization contacts has been suggested[6], with a dose of 25,000 IU given with each dose of polio/DPT and with measles vaccine. This strategy has the potential advantages that it would include young infants, who have the highest mortality rate of any age group, and also the highest rate of contact with the health services. It can be argued that this strategy should increase reserves of vitamin A before the child enters the critical period when breast milk is not enough to sustain the child's vitamin A status. Also it capitalises on high profile, well-funded immunization programmes, and could be additional to the strategy of giving high doses with other health service contacts.

However, it has the serious current disadvantage that vitamin A supplementation below 6 months of age, especially when given at the same time as immunizations has not been proven to be either safe or effective, though several studies of this are either planned or underway at this time. In fact, the only two field trials of supplementation below six months, both of which were carried out in Nepal, have shown no evidence of mortality reduction[4,7]. Also, there has been a worrying report from a trial in Bangladesh that 50,000 IU given alongside polio/DPT and measles vaccines given at the minimum recommended ages for each dose significantly increased the risk of transient bulging fontanelle in young infants[8]. Proof of the safety and efficacy of 25,000 IU vitamin A given alongside the infant vaccinations is essential both for ethical and for public health reasons. It is also essential since this strategy would divert attention and resources from strategies of proven safety and benefit, such as effective fortification programmes[9] or periodic high dose supplementation above 6 months of age[3]. Until such evidence is available, this strategy cannot be recommended.

4.1.4 High dose supplements as part of the case management of sick children. Vitamin A deficency has now been shown to be causally associated with increased risks of mortality and severe morbidity in older infants and young children, especially from diarrhoea and measles, it is logical to hope that high dose vitamin A supplementation of children with severe illnesses may decrease the severity or duration of their illness and hence reduce their mortality risk, at least in populations where vitamin A deficiency is a common problem. Vitamin A supplementation has been shown to reduce both mortality and complications from severe measles in the series of studies from Tanzania and South Africa reviewed by Hussey in this report. The efficacy of such case-management approaches

for diarrhoea, acute respiratory infections and other severe illnesses is currently being studied in field trials. Furthermore, it is likely that vitamin A supplementation of moderately and severely wasted children will also be protective, if given alongside adequate food intake.

4.2 School Children

Several of the community trials of vitamin A supplementation and mortality have included children in the age range 5-7 years, and there was no evidence that vitamin A was any less protective in this age range than in the younger children. However, the absolute risk of death is, of course, much lower in school age children than at younger ages. Trials of the efficacy of high dose vitamin A supplements, carried out in schools in areas with known vitamin A deficiency, are therefore needed to evaluate the likely cost-effectiveness of this potential strategy.

4.3 Women of childbearing age

High dose vitamin A supplements are potentially dangerous in pregnancy, especially during the first weeks after conception[10]. Since it is unfeasible to pregnancy test all women to be certain that they are not pregnant, the only real option is to use low dose (5,000 IU), daily supplements. Such untargetted interventions for all women are unlikely to be cost-effective.

4.3.1 Supplementation of lactating women, on the other hand, with high doses of vitamin A given within one month of delivery (to be certain that the woman is not pregnant again) has been shown to be effective in both raising the woman's own serum retinol level, and that of her breast feeding infant at least up to the age of 6 months[11]. This strategy is likely to be highly effective in improving the vitamin A status of infants in West Africa, where a very high proportion of infants are breast fed for prolonged periods, but programmes will be limited to those mothers of neonates who have at least one contact with the health services either at delivery or during the first month after that. Vitamin A capsules should be given to all women delivering in health facilities in areas where vitamin A deficiency is prevalent, and the possibility of including vitamin A capsules in the delivery packs given to trained traditional birth attendants should also be considered, though this will require careful training, monitoring and supervision to ensure that TBAs do not give capsules either to pregnant women or to women more than one month after delivery. After this, only low (5,000 IU) daily doses should ever be given.

5. Conclusion

Vitamin A supplementation programmes in areas where vitamin A deficiency is prevalent (above one percent in children aged 1-6 years) using high dose oral preparations given to older infants (6 months and above) and young children are likely to be highly cost-effective in reducing both xerophthalmia, other severe morbidity from at least diarrhoea and measles, and overall mortality rates. They should be linked to all health service contacts with a minimum interval of four months between doses. This is currently the supplementation strategy of choice, though additional supplementation of lactating mothers within one month of delivery is worth considering, especially in populations where a high proportion of deliveries take place in health facilities or where a high proportion of mothers attend a health facility post-natally. Children with measles should also be given high dose supplements. Other potential supplementation strategies (such as linking moderate dose supplements to infant vaccinations and including vitamin A in the case management of children with severe diarrhoea or pneumonia) are still under investigation. However, all types of supplementation programmes will need to be continued indefinitely unless they are used as the springboard for the launching of programmes aimed at improving the dietary intake of vitamin A by the high risk groups in the population.

TABLE 1. VITAMIN A SUPPLEMENTATION DOSAGES:

a). Children under 5 years:

DOSAGE (IU)	MINIMUM INTERVAL	AGE			
		<1 mth	1-5 mth	6-11 mth	12-59 mth
High	4 mths	50,000	50-100,000	100,000	200,000
Moderate	1 mth	10-25,000	25,000	25-50,000	50,000
Low	1 wk	1,000	2,000	2-5,000	5,000

b). School age children and adults:

High: 200-300,000 IU
Moderate: 50,000 IU
Low : 5,000 IU

References

1. Ghana VAST Study Team. Vitamin A supplementation in northern Ghana: effects on clinic attendances, hospital admissions, and child mortality. Lancet 1993;342:7-12.

2. Bauernfeind JC. The safe use of vitamin A. Washington DC, International Vitamin A Consultative Group (IVACG), 1980.

3. Beaton GH, Martorell R, L'Abbe KA, Edmonston B, McCabe G, Ross AC, Harvey B. Effectiveness of vitamin A supplementation in the control of young child morbidity and mortality in developing countries. Toronto, Univ of Toronto, 1992.

4. West KP, Katz J, Shrestha SR, et al. Abstract: Impact of periodic vitamin A supplementation on early infant mortality in Nepal. In: Washington DC, IVACG 1993. Towards comprehensive programs to reduce vitamin A deficiency: a report of the XV International vitamin A Consultative Group Meeting, 8-12 March 1993, Arusha, Tanzania.

5. Arhin DC, Ross DA, Kufour F. Costs of vitamin A supplementation: the opportunity for integration with immunization in Ghana. Health Policy & Planning 1993; 8: (in press).

6. World Health Organization. Using immunization contacts to combat vitamin A deficiency. Document prepared for the 15th Meeting opf the Global Advisory Group of the Expanded Programme on Immunization, Jakarta, Indonesia, 12-16 October 1992. Geneva, World Health Organization, 1992.

7. Daulaire NMP, Starbuck ES, Houston RM, Church MS, Stukel TA, Pandey MR. Childhood mortality after a high dose of vitamin A in a high risk population. BMJ 1992; 304: 207-10.

8. de Francisco A, Chakraborty J, Chowdhury HR, Yunus M, Baqui AH, Siddique AK, Sack RB. Acute toxicity of vitamin A given with vaccines in infancy. Lancet 1992; 342: 526-7.

9. Muhilal, Permeisih D, Idjradinata YR, Muherdiyantiningsih, Karyadi D. Vitamin A fortified monosodium glutamate and health, growth, and survival of children: a controlled field trial. Am J Clin Nutr 1988; **48**: 1271-6.

10. Underwood BA. The safe use of vitamin A by women during the reproductive years. Washington DC, International Vitamin A Consultative Group (IVACG), 1986.

11. Stoltzfus RJ, Hakimi M, Miller KW, Rasmussen KM, Dawiesah S, Habicht J-P, Dibley MJ. High dose vitamin A supplementation of breast-feeding Indonesian mothers: effects on the vitamin A status of mother and infant. J Nutr 1993; **123**: 666-75.

Developing and Implementing National Policy on Vitamin A Deficiency: Tanzania -- A Country Case Study

Festo P Kavishe. Tanzania Food and Nutrition Centre, Tanzania.

Introduction

A policy is normally a reflection of a consensus about the existence of a problem, its causes and what actions need to be taken to solve the problem. A national policy on vitamin A would thus provide an overall framework about three types of issues. First it accepts that the problem of vitamin A deficiency and its consequences is of public health significance even if it is only in some parts of the country; which means that it directs public action and allocation of resources. Secondly it provides the direction for strategies to be used and often may allocate sectoral responsibilities for action. Thirdly it accepts the improvement of the vitamin A status of the vulnerable groups, children and women, as a goal to be achieved and thus paving the way for monitoring. Thus a national policy on eliminating vitamin A deficiency becomes part of a sound comprehensive national vitamin A programme. It indicates what should be done (an ethical position) by whom (accountability position) and marries what could be done (a scientific position) with what is doable so that theory can follow practice. This paper briefly analyses the issues in developing and implementing vitamin A national policy using Tanzania as an example.

The vitamin A programme in Tanzania

The programme was initiated in 1981 with the first five year national comprehensive programme put in place by 1985, making Tanzania the first country in Africa to have a national comprehensive programme. Following an evaluation in 1989, a second five year programme was put in place in 1990. The 1989 evaluation showed considerable improvement in both process and impact indicators. The programmes were in response to the problem of vitamin A deficiency which was shown to be of public health significance during the early 1980s. Both clinical and sub-clinical vitamin A was estimated to affect about 6% of the general population of whom about 98% were children 6 months to six years. The proportion of children under-five years of age affected was estimated to be about 30%. The second programme is planned to be evaluated in 1994 and a third five year programme is likely to be proposed as a final onslaught of the problem as we go towards the year 2,000.

The Tanzania programme is essentially long-term with a mixture of approaches -breast-feeding, dietary diversification (in combination with iron deficiency programme); targeted vitamin A supplementation to those with clinical signs, severe under-nutrition, measles, diarrhoea lasting for more than seven days, and acute and chronic respiratory infections (ARI and pulmonary TB); public health measures (e.g. control of measles, diarrhoea, PEM, ARI) and recently there are feasibility studies which are being initiated for fortification. IEC is seen as a supportive strategy to all approaches. Supplementation is viewed as long term because unless the targeted diseases are eliminated, which we think will take a long time, targeted supplementation will need to continue. Although fortification is normally seen as a medium-term approach, the question we have asked ourselves is how medium-term have been the fortification programmes in the industrialized countries especially taking into account that increasing urbanization will lead to greater reliance even by the poor or processed foods? The truth is that they are long term! Thus the lesson we have learnt in the Tanzanian programme is that we need to maximize the benefits of the various approaches rather than argue about which one we should take as long term and which as short term. All the approaches have a role to play in the efforts to eliminate vitamin A deficiency as a public health problem. I will now briefly discuss the major policy issues which were considered in the development of the programme.

Building consensus

The first step in developing a national policy on vitamin A is to agree on the existence of the problem and its causes. Unless this is done it will be difficult to agree on what actions need to be taken to ameliorate the situation. This West African Workshop (not conference) on vitamin A will hopefully be a milestone in building a consensus about the existence of vitamin A deficiency in the individual countries in the region, the causes of the problem and above all what actions should be taken to virtually eliminate vitamin A deficiency.

While the existence of the problem should be done through country assessments through rapid epidemiological assessments, the causes of the problem and actions to be taken can be adopted from results of research and experience from other countries since it is not necessary nor indeed desirable for each country to re-invent the wheel.

Three methods were used to build consensus in Tanzania. The first was the assessment of the problem through research, literature review and surveys. The survey and research were both hospital based (as a high yield source) and community based. Results from these sources of information were discussed in meetings workshops and some were published. In this process, recommendations were made on the next steps to be taken and a lead agency, the Tanzania Food and Nutrition Centre was given the mandate to make effective follow up of the recommendations for implementation. Thus information exchange was a very important aspect in building consensus.

The third and perhaps the most important method used to build consensus was the use of an explicit integrated framework for analysing the problem of vitamin A deficiency. The framework which merely described reality is not predictive, but allows the initiation of multi-sectoral dialogue and action. The framework sees vitamin A deficiency as a manifestation of a biological and social process in society rather than an isolated medical problem. Thus although the manifestation is bio-medical, its solution lies in identifying the immediate, underlying and basic causes of the problem which to a very large extent lie outside the medical field.

From scientific research, survey and conventional wisdom, the immediate causes are related to poor dietary intake of the vitamin especially those containing the nutrient and the enhancing fats and food in general; low frequency and sometimes inappropriate feeding; frequent diseases like measles, ARI, diarrhoea and parasitic infestations which may increase the body's demand for the vitamin. Underlying causes are related to the insecurity of vitamin A rich foods related to poor availability, seasonality and social and economic accessibility; inadequate caring capacity including early stoppage of breastfeeding, women's heavy workload which may hinder appropriate health response like sending a child to the clinic; and inadequacies in the provision of essential services like health, education, water and sanitation. Basic causes are related to poverty and in some areas political strife and social cultural factors (like fear to breastfeed colostrum). This type of analysis indicates how several sectors and disciplines can be involved not only in the analysis of the problem, but also in what actions each could take in solving the problem. A continuous policy on assessment, analysis and action (triple A cycle) is required for sustainability of the programme.

Development of a comprehensive national programme

The process of consensus building answered important questions which were being posed by decision makers i.e. "is the problem of vitamin A deficiency really of public health significance to warrant allocation of scarce resources with competing priorities? If yes, is there something that can be done cheaply? How can it be done?

The process laid down the foundation for multi-sectoral collaboration leading to the formation of a national vitamin A consultative group (NVACG) for policy formulation and inter-sectoral steering with TFNC. the lead agency as the secretariat but with the chairman coming from the Ministry of Agriculture.

The development of the Tanzanian programme started at a time when the only major international voices for programme approach was being propagated by only a few organizations, mainly UNICEF, WHO, FAO and IVACG without adequate support from other collaborators in the international community. That is why the first five year programme of 1985 received only minimum support, but the 1990 received much more support because the health and economic investments in eliminating vitamin A deficiency and its consequences had been more defined.

Policy must evolve

An important lesson from the Tanzanian programme is that like all other good policies, national vitamin A policies need to evolve in order to accommodate new scientific developments and other national and international consensus approaches. This is why the Tanzanian programme was able to absorb the spate of new scientific knowledge emerging from the studies of the last five years and the international consensus of the World Summit for Children

on the elimination of vitamin A deficiency, which was adopted also by the International Conference on Nutrition. Thus vitamin A policies should not be seen as static statements of intent but as a dynamic process of a policy and programmatic response to a serious nutritional problem.

Capacity building and empowerment

Capacity building in terms of human resource development, programme management, vitamin A assessment and monitoring should be seen as an important aspect of institutional capacity building and empowerment if sustainability is to be assured. It should be a deliberate part of policy and strategy development. Thus a national vitamin A programme should not belong to UNICEF, WHO, FAO, USAID or any other donor, but must be seen by the country as belonging to them but with support from these and any other institutions. Donors should feel embarrassed and respond appropriately when a country says that they are implementing the donors programme. To avoid such an embarrassment, donors should be prepared to support the building of capacity, even though it may in the short run delay the achievement of donor goals. This is important if we want to eliminate vitamin A deficiency not only by the year 2,000 but to maintain elimination in the years beyond. Capacity building includes the empowerment of a wide spectrum of nationals in the conceptualization and analysis of the problem and not only involvement in implementation. This will increase the capacity for effective dialogue and negotiation. At the same time, national leaders concerned with the problem of vitamin A deficiency must be open to new ideas and appreciate the urgency of the need to eliminate vitamin A deficiency if effective capacity is to be built. Sectoral rivalries which in most cases is a result of resource competition should be replaced by a more positive attitude of goal achievement. The fact is that if a goal is vigorously pursued resources will normally be made available through effective resource mobilization which should be part of strategy development. An all encompassing capacity building effort has been one of the major factors responsible for the success of the Tanzanian programme.

Finally

The setting of the goal for the elimination of vitamin A deficiency and its consequences by the year 2,000 by the World Summit for Children and its adoption by the International Conference on Nutrition and national governments is perhaps the most important and far reaching policy statement on vitamin A of the 20th century. This and the other health and nutritional goals are political commitments which give the ethical position of the international community and national governments of the imperative of addressing once and for all the embarrassing problem of malnutrition which the world has the capacity and technology to address. This Western African meeting on vitamin A will be seen as a historical milestone in achieving the goal only if it is followed by national action. It is my hope that the success of the Tanzanian programme will inspire other countries to know that even the poorest countries cannot be too poor to start action. Thus vitamin A policies and actions need to be included in the integrated national plans of action following the World summit for Children and the International conference on Nutrition. They need to be incorporated into food and nutritional policies, PHC policies (eg. EPI, EDP, MCH) and within the general development framework.

The establishment of lead agency in nutrition can have a major catalytic and facilitative effect. for example, one of the major factors responsible for the success of the Tanzanian vitamin A programme is the creation by the government of an autonomous food and nutrition institute --the Tanzania Food and Nutrition Centre (TFNC)--by an Act of Parliament in 1973 which was given a broad mandate to tackle the problem of malnutrition from a multisectoral national and international perspective. Some other countries like Ethiopia, Zambia and recently Malawi have created such autonomous bodies. While such institutions cannot be claimed as a pre-requisite for the initiation of food and nutrition policies and programmes, their presence would act as a catalyst for action and keep institutional memory. Most of these institutes are placed under the ministry of health, and there have been strong suggestions to place them under the ministry responsible for planning. Whatever their placement, their effectiveness depends on their institutional capacity to collaborate with all relevant sectors and to programmatically respond to the prevalent nutrition preblems especially at the community level through catalyzing service delivery, grassroots capacity building, and sustained empowerment fro active community participation.

Integrating Micronutrient Deficiency Control Programmes: Vitamin A, Iron and Iodine.

Franz Simmersbach. Officer-in-charge, Nutrition Programmes Service. FAO Food Policy and Nutrition Division, Rome.

As part of Workshop II on issued in developing and implementing national policy, this presentation raises general issues on policy formulation, how such policies can be translated into national plans, several issues on integration and the constraints commonly encountered for integration. The issues raised are neither comprehensive nor given in order of priority, but should provide a broad view of issues for discussion in the working groups.

I. Issues for policy setting

1. Micronutrient deficiencies are only one category of, and not necessarily the major nutritional problem in many countries. As such, no specific national policy need be developed for micronutrient deficiencies, but the problems and their resolution should be reflected in various policies which affect food availability and nutrition.

2. The prevention and control of micronutrient deficiencies calls for action from various technical sectors of government as well as the private sector. Therefore, it will be necessary to review national and sectoral policies (e.g. those related to economic development, agricultural production, and food processing, preservation and marketing) to ensure that they contribute to achieve international and/or national objectives for overall nutrition improvement, including micronutrient deficiencies.

3. The setting of policy objectives (and subsequently programme objectives) benefits from quantified information about specific problems, in this case of the magnitude of micronutrient deficiencies and their level as a public health problem so as to qualify as policy priorities. Such information does not exist in all countries and it will need to be obtained (for use also as baseline data and for monitoring progress); however, the levels of precision of these estimates need to be judged against actual programme needs and costs.

4. While explicit or implicit policies may exist to address micronutrient problems in a country, they need to be translated into national action plans. The broad outlines for these already exist since December 1992 when 159 governments adopted the **Plan of Action for Nutrition** as a result of the **International Conference on Nutrition. This plan emphasizes that the** food-based approach be given priority in the prevention of specific micronutrient deficiencies. The FAO guidelines for developing national plans for action for nutrition include a full section on how to identify activities to control micronutrient deficiencies.

II. Issues for integration

1. Three approaches are usually considered in addressing a specific micronutrient deficiency problem, e.g. Vitamin A: Short-term (supplementation); Medium-term (fortification); Long-term (food-based actions) It is now widely accepted that all three may have to be undertaken concomitantly as well as in connection with other efforts to improve overall nutrition status. This calls for integration of different sectors.

2. The population groups at risk, or in need of assistance, are often the same for a specific nutrient and so are often the technical services and institutions responsible for actions. Again, this calls for integration. Examples are the linkage (integration) of distribution of vitamin A capsules with the EPI programme; or the integration of traditional food crops for local consumption in horticultural production programmes for commercial expansion. Both are integrated within one sector.

3. Integration is also done among the different micronutrients. Vitamin A and carotene-rich foods and diets provide iron and often vitamin C and fats to facilitate absorption. Double fortification of two nutrients with

a specific food carrier is also tried, e.g. vitamin A and iron. Special blended foods used by food aid programmes, e.g. Cornsoyamix (CSM) are fortified with several vitamins and minerals. Food-based interventions are thus a clear advantage for sustainable integration.

4. Iodine programmes often tend to stand separate from other nutrition programmes due to the unique nature of the deficiency. Nevertheless, inter-sectoral coordination is also needed here between the health sector (assessment, inspection, monitoring); the social sector (care); and industry and trade (fortification, quality control and legislation).

III. Integration of implementation programmes

The existence of the following conditions facilitates integrated programmes:

1. An intersectoral group which recognizes the need to address micronutrient deficiencies as well as the contributions that each sector can make. In many cases the national focal group preparing the National Plan of Action for Nutrition as part of the follow-up to the International Conference on Nutrition can fulfil this role.

2. Intersectoral technical working groups responsible for elaborating and monitoring specific nutrient-oriented actions.

3. Clearly defined realistic goals with actions for each specific nutrient, allowing policy makers to allocate funds in a balanced way.

4. Identification of the requirements for, and availability of institutional capacity, manpower and training, resources, research, monitoring and evaluation.

On the basis of these, a mechanism for ensuring continuing intersectoral political commitment can be formulated. A mechanism can be established to secure coordination of resources provided by external assistance.

IV. Constraints for integration

1. Nutrition programmes are falsely considered to be health problems and thus their resolution must rest only in the domain of the health sector. We need other sectors to participate.

2. Past investment in nutrition in sectors of agriculture, education, communication and others is low, and thus their contribution has so far been limited.

External assistance of an often significant magnitude is operating outside established national food, health and nutrition programmes.

Quick, yet unsustainable, results in one sector or for one nutrient may be obtained faster when not linked with the programmes of others.

Integration of programmes requiring a realistic, balanced approach may challenge the validity of established sectoral programme priorities.

Lack of data in one sector of a micronutrient programme (e.g carotene content of locally consumed food) or in one micronutrient programme (e.g no national data on nutritional anaemia)

Insufficient numbers of trained technical staff in different sectors.

In conclusion it must be recognized that many development programmes which contribute significantly to overcome micronutrient problems are already on-going. The implementation of specific actions does not need to await the formulation of new policies. Also, many policies which affect the ability of poor populations to acquire and utilize adequate sources of micronutrients are already in place. In many cases it will be profitable to ensure that these policies are better directed towards the prevention of micronutrient deficiencies.

Vitamin A Therapy in the Case Management of Measles.

Greg Hussey, Department of Paediatrics, University of Cape Town, South Africa.

Measles, an acute epidemic disease of childhood, remains a worldwide problem even though a safe and effective vaccine has been available for over 30 years. It is still one of the leading causes of childhood mortality and morbidity. Recent estimates from WHO are that over 45 million cases and 1.2 million deaths occur annually in developing countries. Measles is also a major cause of long term childhood morbidity i.e chronic lung disease, blindness, failure to thrive and recurrent infections. Risk factors for severe measles include young age, undernutrition, viral dose and immune suppression. Recently it has been found that vitamin A status is an important determinant of outcome in children with measles, and that vitamin A therapy has a decisive impact on morbidity and mortality. The WHO and UNICEF have recommended that high dose vitamin A therapy be part of the routine case management of measles. It has however become apparent that this directive is not being implemented, in that few countries have instituted national policies. The purpose of this paper is to review the epidemiological data supporting this recommendation.

1. Relationship between measles and xerophthalmia

The relationship between infections and xerophthalmia is a well recognized observation and dates back to the late 19th century. Of all the infections measles is the one where this synergism is most striking. Oomen in a global review of xerophthalmia stated that "there appears to be a universal relationship between infectious diseases and xerophthalmia. This relates especially to measles...." More recently a number of cross-sectional and case controlled studies have reported measles to be a significant risk factor for the development of xerophthalmia. In two studies from Malawi and Ethiopia the relative risk was 1.6 and 4.6 respectively.

2. Serum retinol levels in measles

Case controlled studies from India, Thailand, Nigeria, South Africa and the USA have reported significantly low serum vitamin A levels during the acute phase. During convalescence levels returned to that of controls without any supplementation. Retinol binding protein levels tend to parallel that of retinol. A longitudinal study of 32 patients in India found that retinol levels declined by 33% during an attack of measles (P, 0.02) and eight weeks later, without any supplements, the levels were similar to that prior to the onset of measles.

The association between serum retinol levels and measles case fatality has been studied in Zaire. Children <24 months of age with a vitamin A level <5ug/dl had a 3 fold greater risk of dying compared to those with higher levels. Two recent studies from the USA have reported that poor vitamin A status was significantly associated with higher and prolonged fever, increased frequency of hospitalization and disease severity.

3. The effect of vitamin A supplementation on morbidity and mortality in measles--results of clinical trials

Four clinical trials, (UK 1932, Tanzania 1987, RSA 1990 and 1991) have evaluated the effect of vitamin A supplementation on morbidity and mortality. In Cape Town (RSA) and Tanzania the children received 200000iu on 2 successive days, while in Durban (RSA) they received 100000iu (<1 year of age) or 200000iu (>1 year) on day 1,2 and 8. The children in the UK study received approximately 2000000iu daily for 1-3 weeks (140000-400000iu altogether).

Influence of vitamin A on mortality

In the 1932 trial 300 children received vitamin A and 300 received no vitamin A. The case fatality rate in the treated group was 8.7% compared to 3.7% in the untreated group. The relative risk (RR) of drying from measles following supplementation with vitamin A was 0.46 (0.26-0.81; P = 0.018) compared to those not supplemented. The effect

was most noticeable with respect to deaths due to pneumonia, RR 0.46 (0.26, 0.81). In the Tanzanian open randomized clinical trial 6 (7%) of the 88 vitamin A supplemented children who were admitted to a rural hospital died, while there were 12/92 (13%) deaths in the control group. Although there were twice as many deaths in the placebo group, the difference was not significant, (RR 0.52. 0.21-1.33; P = 0.25). There was however a significant difference in mortality in children less than 2 years, RR 0.15 (P = 0.03) and for the case who were complicated by croup. In the Cape Town study, a prospective double blind placebo controlled trial done on children with severe measles who were admitted to an urban regional hospital, vitamin A therapy had a significant effect on mortality with 10/97 (10%) deaths occurring in the placebo group and only 2/92 (2%) deaths in the vitamin A treated group (RR 0.21, 0.05 - 0.94; P-0.046). The Durban study consisted of a small sample size (n=60) and only 1 death was reported in the placebo group. A recent meta-analysis of these four studies showed that vitamin A therapy reduced mortality by 67% (P=0.004)

Three large scale community intervention trials, one in S India and two in Nepal have evaluated the effect of vitamin A supplements on childhood mortality and have included in their analysis the effect on measles related mortality. A meta-analysis of these studies showed a 54% reduction in mortality with a RR 0.46, 0.22 - 0.98 p =0.043. These findings are consistent with those from the hospital based studies.

Influences of vitamin A on morbidity

The two South African trials specifically studied the impact of vitamin A on morbidity. In Cape Town the treated children had a significantly shorter hospital stay, recovered more rapidly from pneumonia and diarrhoea, and fewer children developed croup, persistent pneumonia and persistent diarrhoea. In Durban the vitamin A treated children also recovered more rapidly overally and specifically from pneumonia. In addition the integrated morbidity scores (determined by clinical findings and chest radiograph) at 1, 6 and 26 weeks following infection were reduced by 82%, 61% and 85% respectively in the supplemented group. In both the SA studies vitamin A levels were below 20ug/dl in 90% of the patients. These findings are important since vitamin A deficiency in both areas are not public health problems at all.

The beneficial effects of vitamin A therapy reported in the above mentioned clinical trials has been confirmed in an evaluation of a vitamin A supplementation programme implemented as part of the routine case management of all children hospitalized with measles in Cape Town. The morbidity (hospital stay and intensive care admissions) and mortality in children hospitalized during 1989 and 1990, after the implementation of the programme was significantly less than that in the children admitted during 1985 and 1986., the period prior to the implementation of vitamin A therapy. The vitamin A treated children had a significantly shorter hospital stay (mean 10 vs 13 days; P<0.001), fewer intensive care admissions (4.3% vs 10.5%; P<0.001), and less deaths (1.6% vs 5%; P<0.001), and less and children. The significance of these findings are that vitamin A therapy works in everyday hospital practice.

DISCUSSION

The data reviewed strongly support an interaction between measles and vitamin A status. Measles induces a transient hyporetinaemia and frequently precipitates xerophthalmia, especially in situations where pre-existing retinol stores are marginal, as may be the case in malnourished children. Low vitamin A levels are associated with significant morbidity and mortality and vitamin A supplementation in high doses reduces the rate of complications and death. However the mechanisms of this interaction are not well defined.

The low retinol levels in acute measles may be related to increased utilization of marginal hepatic stores, impairment of retinol release from the liver as a consequence of decreased mobilization of retinol binding protein or redistribution of retinol into the extracellular compartment during the acute illness. The fact that the low retinol levels return to normal during convalescence suggests that hepatic stores are adequate.

Both the measles infection and vitamin A deficiency have adverse effects on the immune system and epithelial integrity. The consequence of this impairment of host defence mechanisms and increased susceptibility to secondary

infections. The efficacy of vitamin A therapy is probably mediated via its action as an immunostimulant and through restoration of epithelial integrity. This is supported by studies which have demonstrated impairment of measles specific antibody production in children with sub-optimal vitamin A status, and an increase in total lymphocytes and measles IgG antibodies in children with measles who were treated with high dose vitamin A . Low measles antibody titres and lymphocyte counts have previously been shown to be significant risk factors for a poor outcome following measles.

The dose of vitamin A recommended is a safe one, in that no side effects have been reported in any of the studies. In addition it is a highly cost effective form of treatment (± $0.20 per dose), with a benefit to cost ratio of 580:1, and this applies only to the cost of hospitalization. The ratio will be much higher if one includes the costs of long term morbidity and other indirect costs associated with mortality. This has important financial implications for health services in developing countries, many of whom are suffering severe financial constraints.

In conclusion, it is clear that the vitamin A status is an important predictor of severity of measles and that vitamin A therapy impacts significantly on the outcome of the disease. The recommendations of WHO and UNICEF that vitamin A be part of the standard case management of measles must be affirmed. It should however not be forgotten that measles is a preventable disease through immunization.

Vitamin A in the Management of Measles: Policy, Implementation and Monitoring for Impact.

Festo P Kavishe. Tanzania Food and Nutrition Centre, Tanzania.

1.0 Introduction

Outside Africa, the blinding propensity of measles is generally low. The severity of measles infection in Africa which is aptly described in Western African proverb: "count your children after they have had measles" led some researches to postulate some few years ago that the African measles virus might be more virulent than the virus in the other continents. The face-fatality rate usually exceeds the 1% normally quoted for developing countries as a whole, with a range of 4 to 8% in those under two years of age and up to 10% when accompanied by diarrhoea lasting seven days or longer [1]. It is now accepted that the measles virus is the same in all continents. The severity of measles in Africa seem to be related to the high rates of under-nutrition especially of vitamin A, the young age of infection and the general lack of health services. At the same time in Africa, measles is the commonest cause of vitamin A deficiency [2]. Measles is associated with persistent high fever which increase the utilization of vitamin A and other nutrients by the body. The complications of measles like reduced appetite especially for fatty foods, pneumonia, vomiting and diarrhoea reduce the dietary intake of the vitamin. Measles reduces the child's appetite even for the breast. The combined effect of increased demand and low intake conspire to tip the balance in a child who already has marginal liver stores of vitamin A. The result is that the child will rapidly develop corneal ulceration which may often be bilateral and lead to corneal scarring and consequently blindness soon after the measles episode - thus the term post-measles blindness. This paper discusses the role of vitamin A in the management of measles from a public health point of view paying particular attention to the inclusion of such management issues into national policy and programmes. Monitoring for impact is also discussed.

2.0 Vitamin A and measles: a sinister connection

The dimension of the post-measles problem in African in the past decade has been considerable Studies in the schools for the blind in East Africa and the Sahel area of West Africa have shown that about 70% of the blindness is due to vitamin A deficiency associated corneal scaring half of which is related to a history of measles immediately preceding the blinding episode [2]. In some places in Africa the rate of corneal damage related to measles can reach as much as 4 percent making post-measles cornea scarring and thus vitamin A deficiency the commonest cause of preventabic childhood blindness. Due to increased utilization, measles depletes vitamin A stores markedly and can rapidly lead to corneal ulceration and blindness especially in situations where children have already low vitamin A stores in the liver.

The results of several randomized and controlled hospital-based and community studies show that vitamin A supplementation improves the outcome of measles, both in terms of reducing mortality, the incidence and severity of the complications related to measles [4-6] even in situations where vitamin A deficiency is not clinically manifest [7-9]. These conclusions have two important implications for policy and programming. The first is that "improving the vitamin A status of children and treating all cases of measles with vitamin A, even in populations in which xerophthalmia is rare, can substantially reduce childhood disease and mortality [3]." The second is that improving the vitamin A status before the onset of measles by prophylaxis or preserving the vitamin A status through measles immunization programmes will markedly reduce the severity of complications and associated measles mortality [3].

3.0 Beyond measles: vitamin A and child mortality

The mortality reduction of vitamin A supplementation goes beyond measles, as indicated by the recent pooling of a series of controlled community-based prophylactic trials using meta-analytical methods which showed that on average, improving the vitamin A status in situations where vitamin A deficiency is prevalent can reduce child mortality (6-59 months) by as much as 23% [10]. A previous meta-analysis of six of the early trials had shown a mortality reduction of as much as 34% [3]. An examination of the cause-specific mortality in three of the trials show that dramatic reductions in deaths on vitamin A supplementation were associated with diarrhoea and measles.

Although the mortality studies have to-date not demonstrated an impact of supplementation on the incidence and duration of morbidity even in the presence of a large impact on mortality, they have demonstrated impact on reducing the severity of illness, and the burden on health facilities.

The mechanisms by which the powerful, pervasive effects of vitamin A are mediated are not completely understood. However it is known that vitamin A directly affects the expression of at least 300 different genes-prompting the New York Times of 20th March 1990 to call vitamin A "one of those crucial impresario molecules of life [11]. Apart from enhancing mechanical body defences by strengthening the integrity of epithelia, the anti-infective vitamin A also improves the body's immune system. children with good vitamin A status have been shown to have a better antibody response to measles vaccine, although children with poor vitamin A status still mount adequate antibody response.

The mortality reducing effect of vitamin A was shown to be a biological rather than a pharmaceutical phenomenon; that is to say that it is a function of vitamin A status rather than how the vitamin A was administered. The policy implications are that any action which would lead to improvement of vitamin A status like breast-feeding, dietary diversification, pharmaceutical supplementation, measles immunization, diarrhoea control, positive behavioural change with regard to vitamin A intake etc. would probably lead to a morbidity and mortality reducing effect.

Although with the exception of supplementation in measles and diarrhoea, the relative merits and impact of the different measures for improving vitamin A status and the criteria for choosing a vitamin A intervention as a means of reducing mortality and the severity of morbidity is not fully understood, the importance of improving the vitamin A status of children cannot be denied. The policy and programmatic implication is that improving the vitamin A intake of deficient children is an important component of a comprehensive child survival strategy where measles and diarrhoea are the dominant cause of death, as it is in Africa.

4.0 Vitamin A and measles policies and programmes

For purposes of policy and programmes it may be useful to consider the choices of vitamin A intervention in measles in relation to the life period surrounding the occurrence of measles both in terms of risk and the appropriateness of intervention. The objective is to ensure that during the at risk period, children are in good vitamin A status and are protected against measles. If this has not happened, then if the child gets measles the possibility for rapidly improving the vitamin A status through supplementation should be available.

Policies related to vitamin A and measles need to be incorporated into relevant national policies e.g. those dealing with PHC, food and nutrition, EPI, MCH, Child survival and development and IEC. It is through such policies that political support and commitment is engrained. It is important that available infrastructure be used for implementation, and complementarity be established with existing various programmes. Complementarity implementation is briefly discussed below.

4.1 Breast-feeding: negotiates with measles from a position of strength

Although measles occurs normally after 6 months, the status of vitamin A in which infants enter the at risk period becomes critical. Between 0-6 months, the vitamin A status of children will depend on the vitamin A status of the mother and the breast-feeding practices. If children are not breast fed they have a much higher chance of developing deficiency than those breast-fed: in some studies in Bangladesh and Indonesia the risk is six to eight times higher. Because of their low vitamin A reserves, children who are born with low birth weight are an added risk group. Thus, improving the vitamin A status of infants before the age of six months who are not breast-fed or those born with low birth weight is of major policy and programmatic relevance. This could be done through promotion of exclusive breast-feeding including the use of colostrum. The potential also exists for direct supplementation as EPI Plus described below.

4.2 Measles immunization: removing a major risk factor

Children between 6-12 months in areas where vitamin A deficiency and xerophthalmia prevalence is high are at particular risk. This is because it is the period when measles sets in, and the weaning food mixtures may not be containing enough amounts of vitamin A. Measles immunization, social marketing for promoting adequate vitamin A and fat content of local weaning food mixtures and vitamin A fortification of commercially produced weaning foods used by the high at risk groups should be considered. Continuation of breast-feeding during this period should continue to be promoted.

But the first and most important step in the prevention of post-measles blindness in this age group is immunization against measles. Measles and its associated morbidity (including blindness) and mortality can be prevented by vaccination which gives effective and long-term protection. The Expanded Programmes of Immunization (EPI) and the Universal Child Immunization (UCI) campaigns have increased measles vaccination coverage rates to 70-80% and is climbing in some countries, but consistent and adequate coverage is still a problem in some countries [1]. These high coverage rates must have considerably impacted on the previously globally estimated 1.5 million deaths annually caused by measles which accounted for 11% of all under-five deaths. The changing measles scene caused by vaccination is exemplified by the Tanzanian situation [12].

Until very recently, measles was one of the three major killers of children in Tanzania, estimated to account, with its complications of diarrhoea, pneumonia, and malnutrition, for about 10% of under-five year child deaths. However, following the successful Universal Child Immunization (UCI), both measles related mortality and morbidity substantially declined. In 1990, the frequency of measles as a cause of under-five child deaths was 4%, still very high; but 60% less than the pre-UCI period of 10%. The reported cases of measles have gone down in the share of morbidity from 0.8 percent to 0.2 percent between 1984 and 1988. The absolute number of measles cases reported were over 11,000 annually for the three year period 1985 - 1988 and were down to 4,405 cases in 1989. The decline of measles cases coincided with the increase in measles immunization coverage for one year olds which went up from 76 per cent in 1986 to 83 percent in 1988. Data from 42 sample health units show a dramatic decrease in reported case numbers from 700 new cases per month in 1981 to 220 in 1986. The universal child immunization (UCI) programme initiated in 1986 significantly decreased the magnitude of measles as a cause of mortality and morbidity. For example, in 1984 a survey in Iringa reported 20 percent of deaths of children under five to be due to measles. By 1987 after immunization rates had been increased, under 7 percent of mortality of children under-five years were reported to be due to measles.

A similar or even better scenario could be described from some other countries in Africa. The challenge now is to maintain the high rates of measles vaccination achieved. A policy and programmatic question which may the arise is if the rising trends of measles immunization are associated with decreasing levels of vitamin A deficiency what considerations should be given to deciding on the types of vitamin A interventions in future? This is a question that need to be discussed for the future, but at the present time, vitamin A supplementation should be given to all those children with measles or who are at risk of developing vitamin A deficiency and/or measles.

4.3 Vitamin A supplementation in measles: no longer a debatable issue

Routine vitamin A pharmaceutical therapy for children with measles is recommended by both WhO and UNICEF in areas where vitamin A deficiency has been designated as a public health problem [13]. In view of the conclusive evidence on the therapeutic benefits of vitamin A in reducing both mortality and the severity of morbidity in measles, withholding vitamin A in children with measles in areas where vitamin A is of public health significance is unethical. Thus there is no debate on the case-management of measles with vitamin A therapy in such areas. Such targeting should also be done to those children with diarrhoea lasting for more than seven days, ARI, and those with severe malnutrition.

However, improving the vitamin A status through vitamin A supplementation before the onset of measles has in the past been a subject of intense one sided debate favouring dietary approach as the ideal action against vitamin A

deficiency without consideration to supplementation. The debate was one sided and unnecessary because I did not hear anyone opposing the view that increasing dietary vitamin A is the long-term approach to the elimination of vitamin A deficiency. It was a debate simply because those who held strong views about the dietary diversification approach were not listening to the pragmatics who were saying that in addition to the approach, there are situations where pharmaceutical supplementation must be considered. My own understanding is that supplementation can be in form of good or a drug. This distinction needs to be made because we need to supplement with vitamin A rich foods those children whose traditional foods do not contain adequate amounts of vitamin A. There now seems to be consensus that if dietary vitamin A sources are not readily available, intervention activities should include improving the availability of such foods, as well as ensuring vitamin A intake through supplementation and where appropriate fortification. In the industrialized countries, vitamin A deficiency was eliminated through fortification, and the technology is available.

Thus at the public health level all feasible interventions which can lead to improving the vitamin A status of the vulnerable groups have a role to play. Experience in the vitamin A programme in Tanzania clearly indicates that it is not a question of either or, but a question of how best to programme the different approaches in order to maximize impact. Because of the vitamin A food insecurity in many areas in Africa caused by an overall problem of food insecurity, high prevalence of vitamin A depleting communicable diseases which includes measles, a high prevalence of general under-nutrition, negative traditions like non-use of colostrum, non-liking of vitamin A rich vegetables, there is a strong case for pharmaceutical vitamin A prophylaxis in high risk children 6 months to 6 years. Three conditions strengthen the case. The first is that the vitamin A pharmaceutical preparations are low cost. The second is that there is already a PHC infrastructure in many countries to reach a substantial proportion of those at risk. The third is that all the feasible interventions can be integrated. When understood in the overall context of child survival, targeted prophylactic supplementation could be integrated into community-based health services, medical-targeting for children presenting in clinics with specific diseases or the EPI.

4.4 EPI plus vitamin A

Vitamin A could be made one of the major pluses of EPI. In taking advantage of the EPI infrastructure, a number of countries in Eastern and Southern Africa, like Ethiopia, Tanzania, Uganda and Zambia are considering the inclusion of vitamin A in the vaccination schedule. The schedule which has been proposed is to give vitamin A to the mother or child in addition to the specific vaccinations, thus the acronym EPI Plus. The proposal is that the mother is given 200,000 IU of vitamin A when the child is given BCG or within four weeks of delivery; the child is given 100,000 IU of vitamin A at the time of measles vaccination. Opportunity could also be taken to distribute vitamin A during health days in those areas where community-based child survival protection and development (CSPD) programmes are being implemented.

Recent information suggests that in areas where vitamin A deficiency is prevalent and breastfeeding is low the inclusion of 50,000IU dose for non-breast-fed children per EPI contact may be useful. It appears that neither the issue of safety or mortality effect of improved vitamin A status during the period under 6 months is a significant deterrent for supplementation.

4.5 Reaching the unreachable

If the mid-term decade goal of eliminating vitamin A deficiency is to be reached, then innovative ways need to be found to cover children between 1-3 years who because they have finished their vaccinations and have started to become a bit too heavy for the mothers, are not sent to the MCH clinic as we would have expected. What about giving them a capsule as a Christmas gift? On health days? etc. Countries may have other innovative ideas on how this could be done.

5.0 Impact monitoring

An important pre-condition for impact monitoring is the setting of measurable objectives. Luckily the internationally agreed objective of eliminating vitamin A deficiency by the year 2000 has been adopted by many countries in their National Plans of Action (NPAs) of the World Summit for children (WSC). Some monitoring objectives are discussed below.

5.1 Vitamin A Assessment

Monitoring can only be done properly when the initial situation is known. How can vitamin A assessment be done in a cheap and cost-effective way? Two methods could be used. One is the direct method where the vitamin A status of the vulnerable group is measured using either the clinical criteria (eg. xerophthalmia) or biochemical measurements using serum retinol levels or dose response tests. The second type are the indirect methods like dietary intake, or the high presence of risk factors, like low levels of breast-feeding, high prevalence of diarrhoea, measles etc. Both methods could be used in an epidemiological approach which should be practical and leading to action.

5.2 Reducing vitamin A deficiency

Because of the problems of measurement of mortality and morbidity, it is advised that the goal of vitamin A intervention even during measures remains that of reducing vitamin A deficiency rather than mortality and morbidity with the assumption that the intervention will lead to reduced mortality and morbidity.

5.3 Tracking xerophthalmia

In Tanzania a sentinel hospital based xerophthalmia surveillance system started in 1982 as a method for assessing the presence of vitamin A deficiency was continued as a means for impact monitoring. In areas where the community-based child survival, protection and development (CSPD) programmes are operating, it may be possible to attempt to measure the impact of vitamin A intervention on xerophthalmia prevalence through a community-based monitoring systems.

5.4 Process indicators to be given priority

Given the difficulties inherent in measuring impact indicators, and the fact that you can only expect impact if the interventions have led to either an improved vitamin A intake or a decrease in the factors which increase vitamin A utilization, it make better logic to measure performance indicators linked with the vitamin A intervention operations before measuring impact indicators. Thus in monitoring stress should be put on process rather than impact indicators. In other words issues of measles immunization coverage, breast-feeding, supplementation etc. should be given more priority in monitoring than vitamin A assessment surveys which can be done over a longer cycle period. The collection of the process indicators could simply be integrated with the health information system and also recorded on the MCH card of children attending clinics. Thus a review of the cards will be needed to include for example a space for recording vitamin A supplementation.

5.5 Research and periodic evaluations

Linking research to interventions is important not only in initiating programmes, but also in maintaining them. Research is important to support both process and impact monitoring. Periodic evaluations would normally address both process and impact so that strategic adjustment could be made on the basis of population responses to the interventions being applied. The question that evaluations need to address is " are the vitamin A goals being achieved?"

6.0 Conclusion

In conclusion, the debate on whether or not to improve the vitamin A status of children with measles or who are at risk of developing measles has now been concluded. What is now needed are national policies and programmes which offer the best possibility for such children to be protected against vitamin A deficiency and measles and receive therapeutic vitamin A when they get measles. Breast-feeding, supplementation, dietary diversification, measles immunization accompanied by IEC should be part of national policies and programmes. Monitoring for performance and impact should be integrated into existing health and nutrition information systems. Above all, vitamin A policies and programmes should not be formulated in isolation. They should be linked to policies for overall health and nutrition improvement. The constant association between vitamin A deficiency and poverty means that the elimination of vitamin A deficiency should be integral to poverty alleviation policies and programmes.

References:

1. Northrup R and Rohde J: The state of child health: The context in which vitamin A deficiency occurs, In HKI, Proceedings of the Bellagio meeting on vitamin A deficiency and child mortality, "Public health significance of vitamin A deficiency and its control" Bellagio Study and Conference Centre of the Rockfeller Foundation, February 3-7, 1992. Helen Keler International, 1993, p 13-17.

2. WHO Prevention of child hood blindness, WHO Geneva 1992.

3. HKI Beliagio Brief - Vitamin A deficiency and child mortality, "Public health significance of vitamin A deficiency and its control" Bellagio Study and Conference Center of the Rockfeller Foundation February 3-7, 1992. Helen Keler International, 1993, p1-6.

4. Ellison JB. Intensive vitamin A therapy in measles. Br Med J 1932; 2:708-711.

5. Barclay AJG Foster A, Sommer A Vitamin A supplementation and mortality related to measles: a randomized clinical trial. Br. Med J 1987; 294:294-296.

6. Arthur P, Kirkwood B, Ross D et al: Impact of vitamin A supplementation on childhood morbidity in northern Ghana. Lancet 1992, 339: 361-362.

7. Hussey GD, Klein M . A randomized, controlled trial of vitamin A in children with severe measles N Eng. J Med. 1990; 323: 160-164.

8. Butler JC, Havens PL, Sowell AL et al. Measles everityand serum retinol (vitamin A) concentration among children in the United States. Paediatrics vol. 91 no. 6 June 1993; 1176-1181.

9. Frieden TR, Sowell AL, Henning KJ et al. Vitamin A levels and severity of measles, New York City. AJDC vol. 146, February 1992;182-186.

10. Beaton GH, Martorell R. L'Abbe R et al: Effectiveness of vitamin A supplementation in the control of young child morbidity and mortality in developing countries. Final Repor o CIDA, 1992.

11. ACC/SCN. Vitamin A- Impresario of life: SCN News Volume 5, Early 1990; 32-33.

12. Kavishe FP and Mushi SS. Nutrition-relevant actions in Tanzania. TFNC Monograph series No. 1. An ACC/SCN country case study supported by UNICEF for the XV Congress of the International Union of Nutrition Sciences, September 26 to October 1, 1993, Adelaide.

13. Joint WHO/UNICEF Statement: Vitamin A for measles, 1987.

14. Storms D and Quinley J (eds), A field guide for adding vitamin A interventions to PVO Child Survival projects. Report of a special PVO Child Survival Task Force on Vitamin A, Baltimore, Maryland 1988.

Some Examples of KAP Questions for Anthropological Studies

Nancy Keith. Coordinator, Measles Initiative. USAID/Niamey.

1. Knowledge question: What should one do to prevent night blindness?

2. Attitude question: Who should eat liver? When? Why?

3. Practice: How long since you last ate liver?
   Who paid for it? How much?

Questions about target foods (Liver, Leaves, Squash etc.)

1. Who eats it? When? Where? Why?

2. Who pays for it? Would they be willing to buy more?
   Under what circumstances?

3. How is this food viewed in relation to the body and health?
   What values are attached to it?
   What are the restrictions and taboos?
   How is it viewed - a staple? a snack? a luxury?

4. Who grows/harvests this food?
   Would they be willing to grow/harvest more?
   Under what circumstances?
   If they are selling most of it, under what circumstances?
   Would they be willing to set aside more for family consumption?
   How is it stored?
   Could storage be increased/improved?

5. Who decides the menu in the family?
   Who distributes food within the family?
   What is the distribution?

Questions about target group nutritional practices

1. What do pregnant and nursing women think they should eat?
   How much? How often? Why?

2. What do caregivers think children should eat?
   How much? How often? Why?

3. What are the traditional practices related to:
   Breastfeeding?
   Supplementary feeding?
   Weaning foods?
   Snacks?
   Foods when ill?

SOME VITAMIN A RELATED ISSUES IN THE SAHEL

Nancy Keith. Coordinator, Measles Initiative. USAID/N.. y.

LEAVES, FRUITS AND VEGETABLES:

- leaf consumption cannot be increased without increased production
- production cannot be increased without extending the growing season
- gardeners/agricultural agents may be more concerned with profits than with the nutritional value of produce: need to increase demand for leaves
- fresh green leaves are only available during the rainy season (four months)
- many areas/villages do not have the water resources to support gardens
- leaves, although eaten year round, are dried in the sun, destroying up to 80% of Vitamin A
- mango season is short and mangoes are expensive.
  squash is difficult to store: exported to cities

LIVER:

- liver availability depends upon the cash flow of the community; small villages do not butcher enough animals to meet needs
- during the dry season animals' stocks of Vitamin A in liver decrease since their fodder is stored in full sun.

THE DIET:

- men are responsible to "feed" the family but this may refer to the staples only
- the staple foods may be very limited in variety
- vitamin A-rich foods may be viewed as snacks or luxury foods
- dietary taboos may be less important than poverty and the lack of variety
- vitamin A deficiency is part of larger nutritional problem; cannot give vitamin A messages alone

FEEDING PRACTICES:

- breastfeeding may be delayed to avoid giving colostrum
- water and other liquids are given under 6 months in addition to breast milk
- young children may be allowed not to eat when ill or tired
- filling the stomach more important than nutritional value
- young children are expected to eat adult foods

PREGNANT AND NURSING MOTHERS:

- extra food may be available to pregnant and nursing women;
  women may not feel they can demand extra food

- although exempted from fasting by the Koran, in many areas pregnant and nursing women fast during Ramadan.

APPENDIX IV

STATEMENTS/DECLARATIONS FROM INTERNATIONAL MEETINGS

GOALS FOR CHILDREN AND DEVELOPMENT IN THE 1990s

I. MAJOR GOALS FOR CHILD SURVIVAL, DEVELOPMENT AND PROTECTION

(a) Between 1990 and the year 2000, reduction of infant and under-5 child mortality rate by one third or to 50 and 70 per 1,000 live births respectively, whichever is less;
(b) Between 1990 and the year 2000, reduction of maternal mortality rate by half;
(c) Between 1990 and the year 2000, reduction of severe and moderate malnutrition among under-5 children by half;
(d) Universal access to safe drinking water and to sanitary means of excreta disposal;
(e) By the year 2000, universal access to basic education and completion of primary education by at least 80 per cent of primary school-age children;
(f) Reduction of the adult illiteracy rate (the appropriate age group to be determined in each country) to at least half its 1990 level with emphasis on female literacy;
(g) Improved protection of children especially difficult circumstances.

II. SUPPORTING/SECTORAL GOALS

A. Women's health and education

(i) Special attention to the health and nutrition of the female child and to pregnant and lactating women;
(ii) Access by all couples to information and services to prevent pregnancies that are too early, too closely spaced, too late or too many;
(iii) Access by all pregnant women to pre-natal care, trained attendants during childbirth and referral facilities for high-risk pregnancies and obstetric emergencies;
(iv) Universal access to primary education with special emphasis for girls and accelerated literacy programs for women.

B. Nutrition

(i) Reduction in severe as well as moderate malnutrition among under-5 children by half of 1990 levels;
(ii) Reduction of the rate of low birth weight (2.5 kg or less) to less than 10 per cent;
(iii) Reduction of iron deficiency anaemia in women by one third of the 1990 levels;
(iv) Virtual elimination of iodine deficiency disorders;
(v) Virtual elimination of vitamin A deficiency and its consequences, including blindness;
(vi) Empowerment of all women to breast-feed their children exclusively for four to six months and to continue breast-feeding, with complementary food, well into the second year;
(vii) Growth promotion and its regular monitoring to be institutionalized in all countries by the end of the 1990s.
(viii) Dissemination of knowledge and supporting services to increase food production to ensure household food security.

C. Child health

(i) Global eradication of poliomyelitis by the year 2000;
(ii) Elimination of neonatal tetanus by 1995;
(iii) Reduction by 95 per cent in measles deaths and reduction by 90 per cent of measles cases compared to pre-immunization levels by 1995, as a major step to the global eradication of measles in the longer run;

(iv) Maintenance of a high level of immunization coverage (at least 90 per cent of children under one year of age by the year 2000) against diphtheria, pertussis, tetanus, measles, polio-myelitis, tuberculosis and against tetanus for women of childbearing age;

(v) Reduction by 50 per cent in the deaths due to diarrhoea in children under the age of five years and 25 per cent reduction in the diarrhoea incidence rate;

(vi) Reduction by one third in the deaths due to acute respiratory infections in children under five years.

D. Water and sanitation

(i) Universal access to safe drinking water;

(ii) Universal access to sanitary means of excreta disposal;

(iii) Elimination of guinea-worm disease (dracunculiasis) by the year 2000.

E. Basic education

(i) Expansion of early childhood development activities, including appropriate low-cost family and community-based interventions;

(ii) Universal access to basic education, and achievement of primary education by at least 80 per cent of primary school-age children through formal schooling or non-formal education of comparable learning standard, with emphasis on reducing the current disparities between boys and girls;

(iii) Reduction of the adult illiteracy rate (the appropriate age group to be determined in each country_ to at least half its 1990 level, with emphasis on female literacy;

(iv) Increased acquisition by individuals and families of the knowledge, skills and values required for better living, make available through all education channels, including the mass media, other forms of modern and traditional communication and social action, with effectiveness measured in terms of behavioral change.

F. Children in difficult circumstances

Provide improved protection of children in especially difficult circumstances and tackle the root causes leading to such situations.

(Source: World Declaration and Plan of Action, World Summit for Children, United Nations, New York. 30 September 1990)

THE CONTROL OF VITAMIN A DEFICIENCY

The following statement has been agreed upon by participants of the ACC/SCN Consultative Group Meeting on Strategies for the Control of Vitamin A Deficiency, supported by CIDA and the Micronutrient Initiative and held at the Micronutrient Initiative, Ottawa, 28-30 July 1993.

The elimination of vitamin A deficiency as a public health problem has been identified as a high priority in international nutrition and health by the International Conference on Nutrition, the World Summit for Children and the World Health Assembly. Control of vitamin A deficiency in many areas of the world will lead to substantial and lasting improvement in childhood survival as well as preventing the scandal of irreversible blindness due to malnutrition.

The cause of vitamin A deficiency is a lack of pre-formed vitamin A, carotene and sometimes fat and oil in the diet. The year round availability and adequate consumption of vitamin A/carotene-rich foods and dietary fat will be required to eradicate the deficiency. Because prevention of vitamin A deficiency is an integral part of the overall strategy to improve nutritional well-being and child health, and to conserve limited resources, vitamin A programs should be integrated with other programs concerned with health and development. Efforts to identify, advocate, plan, implement, evaluate, and monitor the control of vitamin A deficiency should as far as possible be combined with the control of other co-existing nutritional deficiencies. The following specific points concerning vitamin A deficiency control were agreed:

1. A combination of interventions is usually needed to prevent vitamin A deficiency; these include dietary modification (including the production, processing, marketing and consumption of vitamin A/carotene-rich foods), breastfeeding promotion, food fortification, and supplementation. The appropriate combination of interventions may change over time, depending on trends in the level of deficiency, program outreach to vulnerable population groups, availability of technical inputs, and administrative and political priorities.

2. Periodic situation analyses and the evaluation of program cost-effectiveness provide a basis for adjusting strategies, especially in relation to population responses to intervention activities, and provide the opportunity for phasing out program components, as appropriate.

3. In all circumstances, the promotion and protection of breastfeeding is a fundamental aspect of preventing deficiency of vitamin A. Promotion should include attention to initiation, optimal breastfeeding practices, and duration, as required by local situations. Enhancing the nutritional status of the mother is a valuable component of such breastfeeding promotion activities.

4. Nutrition education is and essential component of programs aimed at preventing vitamin A deficiency. Dietary modification can also be supported by other means, such as social marketing and promotion of home production.

5. If dietary sources of vitamin A are not readily available to those at risk of deficiency, intervention activities should include improving their availability. Efforts may be needed to improve the production, processing, preservation, pricing and marketing of such foods. Bioavailability of the vitamin A should be increased by ensuring that diets contain sufficient fat and that intestinal parasites are controlled.

6. Dietary modifications that increase vitamin A intake will often improve the status of other micronutrients, particularly iron and vitamin C. For example, many foods that promote iron absorption (especially green leafy vegetables, animal products and some fruits) are also good sources of vitamin A. Furthermore, improving vitamin A status can also improve iron status

through an interaction between these two nutrients. Therefore, a combined food-based approach to deficiencies of vitamin A and of iron should be pursued.

7. Where feasible, food fortification is a highly recommended intervention for the prevention of vitamin A deficiency. Consumption of processed foods by the target population, food technology expertise, and multisectoral commitment are requisites for successful food fortification programs. Social marketing may also have an important role in increasing awareness of the problem and creating demand for action. Early participation of the food industry in this process and an effective food control system, are essential.

8. In situations where vitamin A deficiency is endemic in the population, certain opportunities may be taken to provide high-dose preparations of vitamin A. The first of these is with immunization contacts from 6 months of age, especially the 9 months measles contact.[1] Secondly, if the mother is in contact with health services (e.g. attended delivery or postnatal visit), provision of a single large dose of vitamin A within the first 4 weeds after birth can improve the vitamin A content of breast milk and hence offer protection of the breastfed infant. Thirdly, for children between 1-5 years, other contacts with health services may also be appropriate for providing supplements; in this case adequate record-keeping is necessary to reduce the dangers of excess supplementation and to ensure that potency of preparations is maintained by regular turnover of stocks.

9. Case management of measles and of severe protein- energy malnutrition requires the therapeutic use of high-dose preparations of vitamin A where there is a risk of sub-clinical deficiency; this use should not be limited to children with clinical vitamin A deficiency. The goal here is an immediate effect on the course of morbidity and on reduction of case fatality rates. Such case management is complementary and additional to approaches for controlling vitamin A deficiency at a population level.

10. Political support and sustained allocation of government resources are needed for the development, implementation and maintenance of vitamin A programs. Support from international organizations (multilateral, bilateral, and non-governmental) is important in fostering political commitment, and often in providing financial support in line with local priorities.

11. Linking research and human resource development with intervention activities continues to be important in initiating, maintaining and building on vitamin A interventions.

12. Effective management is essential to the success of any type of vitamin A program. Experience has shown that the success of vitamin A programs is limited more by management problems than by lack of appropriate intervention technologies. Development of an effective management system will usually require as much attention as the choice of intervention. Similarly, evaluation of vitamin A programs should involve management aspects as well as impact.

14 September 1993

1. Opportunities for administration of vitamin A supplements to children under 6 months of age have been discussed in a recent WHO publication "Using Immunization Contacts to Combat Vitamin A Deficiency" but are not as yet reflected in WHO policy.

APPENDIX V

SELECTED RESOURCES FOR ACHIEVING THE GOAL "THE VIRTUAL ELIMINATION OF VITAMIN A DEFICIENCY AND ITS CONSEQUENCES BY THE YEAR 2000"

Compiled by J. Cervinskas and M. Lotfi, MI Secretariat

with assistance from:
J. Akre (WHO), L.L. Aomari (IVACG) and T. Guay (MI)

October 1993

DECLARATIONS/INTERNATIONAL MEETINGS

♦ Bellagio Meeting on Vitamin A Deficiency and Childhood Mortality. These complete proceedings of the meeting held in February 1992 serve as a state-of-the art review of the body of knowledge existing on vitamin A deficiency. 74 pages with references. English. Available from Helen Keller International (HKI). $14.50 USD.

♦ Cairo Declaration (1989). Was adopted by World Food Council (WFC) at its 15th ministerial session in 1989, in which member nations of the WFC committed themselves to put into place effective policies and programmes to reduce hunger and malnutrition in their countries and at global level. The elimination of major nutritional deficiency diseases is one of the four broad hunger-alleviation goals to reach in the 1990s. Available from the World Food Council, Via Terme di Caracalla, 00100 Roma, Italy. Fax 396 5745091. Liaison Office: United Nations, New York, UN Plaza NY 10017 USA. Tel: 212 754 5693.

♦ First Call for Children, "World Declaration and Plan of Action" from the World Summit for Children (WSC), held in New York, 29-30 September 1990. Declaration on the Survival, Protection and Development of Children in the 1990s. Available in English, French and Spanish at the cost of US$1.00 per copy from UNICEF Division of Information. Direct fax: 212 326-7768.

♦ FAO/WHO (1992). World Declaration and Plan of Action for Nutrition from the International Conference on Nutrition (ICN), Food and Agriculture Organization, Rome. Available in English, French and Spanish. The Final Report of the ICN (which also includes the World Declaration and Plan of Action for Nutrition) is available from FAO[1] or WHO in Arabic, Chinese, English, French, Russian and Spanish languages.

♦ FAO/WHO (1992). Major Issues for Nutrition Strategies. Theme paper No.6: Preventing specific micronutrient deficiencies. Prepared for the International Conference on Nutrition (ICN). 33p. Available from FAO and WHO in English, French and Spanish.

♦ FAO (1993). Guidelines for Developing National Plans of Action for Nutrition. Food and Agriculture Organization, Rome. English and French. Available free of charge from FAO.

♦ WHO/UNICEF et al (1991). Proceedings of "Ending Hidden Hunger" -- A Policy Conference on Micronutrient Malnutrition, Montreal, 10-12 October 1991. Funded by WHO, UNICEF, World Bank, CIDA, USAID, FAO and UNDP. Limited copies of the Proceedings are available from the MI Secretariat free of charge. 250 pages with participants list.

♦ WHO/UNICEF (1990). Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding. Was produced and adopted by the participants at the WHO/UNICEF policy makers' meeting on "Breastfeeding in the 1990s: A Global Initiative", held at the Spedale degli Innocenti, Florence, Italy, on 30 July-1 August 1990. Available from UNICEF.

GENERAL READINGS ON VAD

---

[1] Regarding FAO publications, requests for single copies of a document will be sent free of charge, while a cost might be specified for large orders from countries. For ordering information contact: Food Policy and Nutrition Division, Food and Agricultur Organization of the United Nations (FAO), Viale delle Terme di Caracalla, 00100 Rome, Italy. Tel.: (39 6) 5797[illegible]. FAX: (39 6) 57973152.

For WHO publications contact: the Nutrition Division, World Health Organization, Avenue Appia, CH-Geneva 27, Switzerland.

This selected bibliography represents only a small fraction of the hundreds of articles and publications available on vitamin A. They have been selected either because they provide comprehensive information about vitamin A as it relates to childhood morbidity and mortality, or else because they comprehensively cover aspects related to vitamin A programmes. All of the selections have extensive bibliographies for those wishing further information.

ACC/SCN (1992). Second report on the world nutrition situation. Volume 1, Global and regional results. Chapter 3: Micronutrients. ACC/SCN, October 1992. Available free of charge to requests from developing countries from the ACC/SCN, c/o WHO, Avenue Appia, Geneva, Switzerland.

Bauerfeind, J.C. (1983). Vitamin A: Technology and applications. In World Review of Nutrition and Dietetics. Vol. 41. G.H. Bourne, ed. Karger: Basel, Switzerland. pp.110-199.

Bauerfeind, J.C. ed., (1986). Vitamin A deficiency and its control. London: Academic Press. A multi-author comprehensive book on relevant applied issues.

Eastman, S.J. (1987). Vitamin A deficiency and xerophthalmia: Recent findings and some program implications. In: Assignment Children, UNICEF: New York. 84p. (Reprinted 1988).

Helen Keller International (HKI). 1993. Controlling vitamin A deficiency: A practical guide. This guidebook provides an overview of the importance of vitamin A for child survival and health, and gives examples of interventions for preventing vitamin A deficiency. Available from HKI. Free to developing countries, and USD $10.00 for others.

Mamdani, M. and Ross, D. Winter. 1988. Vitamin A supplementation and child survival: Magic bullet or false hope? A review and selected annotated bibliography. Evaluation and Planning Centre (EPC) for Health Care, Publication No. 19. London: London School of Hygiene and Tropical Medicine.

Ramalingaswami, C. (1992). Challenges and opportunities--one vitamin, two minerals. World Health Forum, Vol. 13:222-231.

Sommer, A. (1989). Nutritional blindness, xerophthalmia and keratomalacia. Duane TD ed., Harper and Row, Philadelphia. Clinical Ophthalmology, 5: 1-11.

Storms, D. and Quinley, J. 1989. A field guide for adding vitamin A intervention to Private Voluntary Organizations'(PVOs) Child Survival Projects. Recommendations for child survival project managers. Johns Hopkins University, Baltimore, Maryland, pp 39.
This guide book is the result of a special task force on vitamin A which was convened in September 1988 in Baltimore, Maryland, to develop guidelines for child survival project managers in the assessment of need, design, operation, management, and evaluation of vitamin A intervention activities. Copies from the Johns Hopkins University, Institute for International Programs, 103 East Mt. Royal Ave., Baltimore, MD 21202.

Tomkins, A. and Watson, F. (1989). Malnutrition and infection. in: UN Administrative Committee on Coordination/ Sub-committee on Nutrition (ACC/SCN) state-of-the-art series. Nutrition Policy Discussion Paper No. 5. Food Policy and Nutrition Division, Food and Agriculture Organization, Rome. 136p.

Underwood, B.A. 1990. Vitamin A prophylaxis programs in developing countries: Past experiences and future prospects. Nutr. Rev. 48, 265-74.

VITAL training module--A slide set (18 slides and accompanying script) on "Vitamin A Deficiency: An Update" as been produced by VITAL that provides a brief overview of significance of vitamin A for child health and survival, risk factors for VAD, and possible interventions. A useful resource for introductory presentations on the problem of VAD and possible solutions available in English French and Spanish. Order from VITAL;

address given under "Organizations".

Wellstart International. Vitamin A and Breastfeeding: a Comparison of Data from Developed and Developing Countries. 112p.

West, K. and Sommer, A. June (1987). Delivery of oral doses of vitamin A to prevent vitamin A deficiency and nutritional blindness: A state-of-the-art review. In: UN Administrative Committee on Coordination/Sub-Committee on Nutrition (ACC/SCN) state-of-the-art series. Nutrition Policy Discussion paper No. 2. Food Policy and Nutrition Division, Food and Agricultural Organization, Rome.

WHO. Indicators of vitamin A deficiency. Report of a joint WHO/UNICEF consultation, held in Geneva, Switzerland, 9-11 November 1992. In preparation by the Nutrition Unit, WHO.

EFFECTS OF VAD ON MORTALITY AND MORBIDITY

Bauernfeind, J.C. (1980). The safe use of vitamin A. Report of the International Vitamin A Consultative Group (IVACG). Washington, D.C.: The Nutrition Foundation, Inc. 44p. Available in English and French.

Beaton, G.H., et al. (1992). Effectiveness of vitamin A supplementation in the control of young child morbidity and mortality in developing countries. A summary report to CIDA. University of Toronto, Toronto, Canada. 11p. Limited copies available from Dr. Sonya Rabeneck, CIDA, Place du Centre, 200 Promenade du Portage, Hull, Quebec K1A 0G4. Tel.: (819) 994-3904. FAX: (819) 953-3348.

Beaton, G.H. et al. 1992. Effectiveness of vitamin A supplementation in the control of young child morbidity and mortality in developing countries. Final report to CIDA. This final report to CIDA presents conclusive evidence that improving the vitamin A status of young children reduced mortality rates by about 23%. This conclusion is based on a meta-analysis of 10 controlled mortality trials which were identified and reviewed by an eight member team led by Dr. Beaton. 107 p. including an extensive reference list. A 48 page Annex that provides the technical background that is the basis for the analyses presented in the report is also included. Limited copies available from Dr. Sonya Rabeneck, CIDA, address as above

Bellagio Brief: Vitamin A deficiency and childhood mortality (1992). This is a concise summary of the conclusions and underlying scientific rationale of the Bellagio meeting on VAD. 8 pages with references. English, French and Spanish. Available free from HKI.

Humphrey, J. H. and West, K.P. Jr. 1991. Vitamin A deficiency: Role in childhood infection and mortality. In: Bendich, A. and Betterworth, C.E. Jr. (eds.) Micronutrients in health and disease prevention. New York: Marcel Dekker.

Underwood, B. (1986). The safe use of vitamin A by women during the reproductive years. Report of the International Vitamin A Consultative Group (IVACG). The Nutrition Foundation, Inc.: Washington, D.C. 4p. Order from IVACG.

VITAMIN A AND MEASLES

Cristie, A.B. 1980. Measles. In: Infectious diseases, epidemiology and clinical practice. Cristie, AB ed., 3rd edition, Churchill Livingstone, London, 357-386.

Hussey, G. and Klein, M. 1990. A randomized controlled trial of vitamin A in children with severe measles. New England Medical Journal, 323: 160-164.

Sanghvi, T. G. 1992. Vitamin A treatment for measles. Guiding primary health care programs. Vital News,

Volume 3, no.1: p.3.

VITAL training module-- Measles Case Management and Vitamin A. This module is a guide for primary health care programmes, and contains information on measles case management, reprints of some relevant publications on vitamin A supplementation and measles, and an annotated bibliography of the scientific basis for using vitamin A in measles. 20 training slides and an accompanying text are also included. Available in English, French and Spanish. Order from VITAL.

WHO/UNICEF (1987). Joint statement on vitamin A for measles. Weekly Epidemiological Record, 19: 133-134, 8 May 1987.

ASSESSMENT OF VITAMIN A STATUS

Arroyave, G. et al. (1982). Biochemical methodology for the assessment of vitamin A status. Report of the International Vitamin A Consultative Group (IVACG). The Nutrition Foundation: Washington, D.C. 92p. Order from IVACG.

Arroyave, G. et al. (1989). Methodologies for monitoring and evaluating vitamin A deficiency intervention programs. A report of the International Vitamin A Consultative Group (IVACG). The Nutrition Foundation, Inc.: Washington, D.C. 66 pages. Order from IVACG.

FAO (1988). Requirements of vitamin A, iron, folate and vitamin B12. Report of a joint FAO/WHO Expert Consultation. FAO Food and Nutrition Series No.23, FAO, Rome, Italy.

Gibson, R. (1990). Principles of Nutrition Assessment. New York: Oxford University Press. 691p.

HKI. 1992. Conducting a Qualitative Assessment of Vitamin A Deficiency: a Field Guide for Program Managers. This field guide explains how to use secondary data sources, qualitative information, and small-scale consumption surveys to develop a community profile of vitamin A deficiency in a program area. Examples of survey questionnaires, discussion guidelines, and a case study are included. Provides an alternative to the IVACG guidelines for a simplified dietary assessment for the identification of groups at risk of inadequate vitamin A intake. Available from HKI. Free to developing country institutions, USD $10.00 otherwise. 55p.

Jelliffe, D.B. and Jelliffe, P. 1990. Community nutritional assessment with special reference to less technically developed countries. Oxford Medical Publications, Oxford University Press: Oxford. 650 p. About USD $85.00

Katz, J.; Tielsch, J. and Sommer, A. (1983). Sample size requirements for evaluating the impact of vitamin A intervention programs. Xero Club Bull, 27, 1-2.

Simpson, K. et al., (1987). Biochemical methodology for the assessment of carotenes. A report of the International Vitamin A Consultative Group (IVACG). The Nutrition Foundation, Inc.: Washington, D.C. 47p. Order from IVACG.

Sommer, A. et al., (1980). History of night blindness: a simple tool for xerophthalmia screening. Am J. Clin. Nutr., 33, 887-91.

Underwood, B. et al. (1989). Guidelines for the development of a simplified dietary assessment to identify groups at risk for inadequate intake of vitamin A. International Vitamin A Consultative Group (IVACG): Washington, D.C. 61p. Order from IVACG.

Underwood, B. and Olson, J. eds., (1993). A Brief Guide to Current Methods of Assessing Vitamin A Status. A Report of the International Vitamin A Consultative Group (IVACG). International Vitamin A Consultatiave

Group (IVACG): Washington, D.C. June 1993. 37p.

VITAMIN A CONTENT OF FOODS

The following references are valuable resources for those looking for information about the carotenoid and preformed vitamin A content of foods. In general, there is little information on the carotenoid content of African foods, a complete database for provitamin A and preformed vitamin A values for locally available food items is often lacking, and there is practically no data on the carotenoid composition of prepared foods.

Booth, S.L., Johns, T. and Kuhnlein, H. (1992). Natural food sources of vitamin A and provitamin A. Food and Nutrition Bulletin. Vol.14, No.1: pp.6-19. Contains 112 references

Helen Keller International (HKI). 1992. A guide to the vitamin A content of indigenous plants used for medicine and food. Available from HKI. Avaialable free to those in developing countries and for USD $5.00 for those requesting from developed countries.

Helen Keller International (HKI). Aliments riches en vitamin A/Foods rich in vitamin A: Niger. French. Available from HKI. Free to those from developing countries, and USD $5.00 for individuals from developed countries.

USDA-NCI Carotenoid Food Composition Data Base, version I, 1993. Department of Health and Human Services. The USDA Food Composition Laboratory has critically reviewed 180 papers and internal reports and developed this data base of analytical carotenoid values for fruits and vegetables consumed in the United States of America (USA). The data is available on diskette. For further information or to order a copy of the database, contact: Dr. Michele Forman or Ms. Joanne Holden at National Cancer Institute, National Institutes of Health,Bethesda, Maryland 20892 USA. Tel.: (301) 496-8559 or 504-8356.

Leung, T.W., Busson, F. and Jardin, C. (1968). Food composition table for use in Africa. Rome: Food and Agricultural Organization.

Mangels, A.R. et al. 1993. Carotenoid content of fruits and vegetables: An evaluation of analytical data. J. Amer. Diet. Assoc. Vol. 93, No.3: 284-296.

Paul, A.A. and Southgate, D.A.T. (1988). McCance and Widdowson's "The composition of foods." 4th edition. Amsterdam: Elsevier.

The Journal of Food Composition and Analysis. An official publication of the United Nations University, International Network of Food Data Systems.

West, C.E. and Poortvliet, E.J. The carotenoid content of foods with special reference to developing countries. A report prepared for the Office of Nutrition, USAID. In press. To be available in early 1994. This report presents a data base on carotenoid values for foods, with information on foods not included in the USDA publication cited above. 156 p.

INTERVENTION STRATEGIES TO COMBAT VITAMIN A DEFICIENCY:

A) VITAMIN A SUPPLEMENTATION

Ghana Vast Study Team. 1993. Vitamin A supplementation in northern Ghana: Effects on clinic attendance, hospital admissions, and child mortality. Lancet, vol 342, number 8862, 7-12, 3rd July 1993.

Nieburg, P. et al. 1988. Vitamin A supplementation for refugees and famine victims. Bull. World Health Organization, 66: 689-97. This review shows that relief rations are frequently quite inadequate in vitamin A content. Measures to remedy this are described.

IVACG (International Vitamin A Consultative Group) and DeMaeyer, E. (September 1988). Guidelines for the use of vitamin A in emergency and relief operations. IVACG Secretariat: Washington, D.C. 6p. Available from IVACG.

WHO/UNICEF/IVACG (1988). Vitamin A Supplements: A guide to their use in the treatment and prevention of vitamin A deficiency and xerophthalmia. Prepared by a WHO/UNICEF/IVACG Task Force. WHO: Geneva.

Available in English and French from IVACG, or from WHO for Sw. fr. 5.60. 24p.

WHO, Nutrition Unit (1993). Using immunization contacts to combat vitamin A deficiency. Report of an informal consultation, 30 June to 1 July 1992, World Health Organization, Nutrition Unit, Expanded Programme on Immunization, and IVACG. WHO/NUT/EPI/93.1. 17 pages.

B) FOOD FORTIFICATION

Arroyave, G.(1982). The program of fortification of sugar with vitamin A in Gualemala--Some factors bearing on its implementation and maintenance. In: Nutrition policy implementation: issues and experience. See above.

Mitsud, H. and Yamamoto, A. (1983). Vitamin fortification. Miloslav Rechcigl, Jr (ed.). CRC Handbook of nutritional supplements. Boca Raton, Fla. CRC Press. P 505-514, includes 15 references.

Muhilal, P.D. et al. (1988). Vitamin A fortified monosodium glutamate and health, growth, and survival of children: a controlled trial. Am J. Clin. Nutr. 46, 1271-6.

Vitamin A fortification of foods for developing countries: Final report (1989). USAID, Bureau of science and technology, Office of Nutrition, Washington, D.C.; Iowa State University of Science and Technology, World Food Institute, Ames, IA. U.S. Dept. of Agriculture, Office of International Cooperation and Development, Washington, D.C. 15 Sept. 1989. 17 p. +6 appendices (charts and statistical tables). This document is an attachment to PD-AAZ-992. The report is based on 194th American Chemical Society Meeting in New Orleans, Louisiana, 30 August to 4th September 1987. Write to: P. A. Murphy, Department of Food Technology, Iowa State University, Ames, Iowa 50011.

Nestel, P. 1993. Food Fortification in Developing Countries. A report prepared for USAID. Available from VITAL. Spanish and French versions available in late 1993.

Scrimshaw, N. and Wallerstein, M.B. editors (1982). Nutrition policy implementation: issues and experience. Plenum, New York. Some of the major factors that must be considered in designing food fortification interventions to enhance nutritional status and combat malnutrition. pp 61-71.

Solon, F.S. et al. (1979). Planning, implementation , and evaluation of a fortification program. J. Am. Dietetic Association.74: 112-118.

Solon, F.S. et al. (1985). Fortification of MSG with vitamin A: Philippine experience. Food Technology, 39: 71-77.

VITAL training module--slide presentation "Fortification of Foods with Vitamin A". A set of 20 slides providing an overview of fortification definitions, rationale, food vehicles, estimating fortificant level, as well as highlighting the components of a fortification program, how to get a program started and model legislation and required quality control/monitoring system. Also covered are costs involved and fortification limitations. Some of the experiences from Guatemala program and Indonesia are summarized. The set is available in English, French and Spanish languages from Vitamin A Field Support project (VITAL) of the USAID Office of Nutrition.

C) DIETARY DIVERSIFICATION, NUTRITION EDUCATION AND COMMUNICATIONS

Achterberg, C. (1992). Effective nutrition communication for behaviour change. A report of the sixth International Nutrition Planners Forum (INPF) Conference held in Paris, France, September 1991. Available in English, French and Spanish. 24 pages. Free of charge to developing countries, from the INPF c/o The Nutrition Foundation Incorporated (address same as for IVACG.)

African Training and Research Centre for Women (ATRCW). 1983. Traditional Palm Oil Processing: Women's Role and the Application of Appropriate Technology. ATRCW, UN Economic Commission for Africa (ECA), P.O. Box 3001, Addis Ababa, Ethiopa. Available free of charge.

Peduzzi, Carolyn S. (1990). Home and Community Gardens Assessment Program Implementation Experience: The Tip of the Iceberg. Report No. TA-2. June 1990. 45p.[2]

Social Marketing of Vitamin-A Rich Foods in Thailand: A model nutrition communication for behaviour change process. 1992. Mahidol University and UNICEF.

Soleri, D., Cleveland,D. and Wood, A. (1991). Vitamin A Nutrition and Gardens Bibliography. Prepared by the University of Arizona under a sub-contract agreement with VITAL (Task No. 702). Report No. IN-1. January 1991. 65p.

Soleri, D.,Cleveland,D. and Frankenberger, T. (1991). Gardens and Vitamin A: A review of recent literature. Prepared by the University of Arizona under a sub-contract agreement with VITAL (Task No.702). Report No. IN-2. 32p.

Solon, F. et al. (1992). Nutrition Communications in Vitamin A Programs: A resource book. IVACG: Washington, D.C. Contains a listing of 20 recommended readings. Available free of charge from IVACG to developing countries and for $3.50 USD to developed countries. 124p.

USAID/VITAL (1993). Solar Drying for Vitamin A. Implemented by the International Science and Technology Institute, Inc. (ISTI). 46p.

NEWSLETTERS

Community Eye Health is produced by Institute of Ophthalmology, International Centre for Eye Health, 27-29 Cayton Street, London EC1V 9EJ, Tel: (71) 387 9621; Fax: (71) 250 3207.

Garden to Kitchen Newsletter is a quarterly publication of the UNICEF Pacific Regional Family Food Production and Nutrition Project. The aim is to suggest simple, practical and low cost solutions to many farm problems and to encourage consumption of locally grown foods. Write to Family Food Production and Nutrition Project/UNICEF Pacific Operation, c/o UNDP, Private Mail Bag, Suva, Fiji. Tel:300 439; Telex: FJ 2227.

IAPB News, the newsletter of the International Agency for the Prevention of Blindness, is published twice a year and has a wide circulation. Contact Mr. Terrence Gillen, c/o National Eye Institute, National Institute of Health, Building 31, Room 6A03, Bethesda, Maryland 20892, USA.

PAMM Newsletter, produced periodically by the Program against Micronutrient Malnutrition (PAMM), updates readers about global efforts to overcome micronutrient malnutrition. Articles focus on reports of progress, problems and plans in countries which have received support from PAMM, updates on PAMM laboratory's research and development efforts, and information about PAMM's planned activities. To submit items of interest to the PAMM newsletter or to be placed on the mailing list contact: Dr. Frits van der Haar, Director of Operations, PAMM. Address given under "Organizations."

---

[2] These VITAL publications on nutrition and gardens can be ordered from VITAL (see under "Organizations": VITAL).

Sight and Life newsletter is available from the Sight and Life Task Force (see "Organizations" for address).

The Vitamin A+ Sieve is produced semi-annually by Prevention magazine and the Rodale Institute. Subscription is free of charge. Write to Janet Glassman, Rodale Free Information Services, 33 E. Minor Street, Emmaus, PA 18098, USA.

VITAL News is a publication of the USAID's Vitamin A Field Support Project (VITAL) managed by the International Science and Technology Institute, Inc. (ISTI). The newsletter is published three times a year and is available free of charge. For subscriptions, inquiries and comments, contact: Robert G. Pratt, VITAL, 1616 N. Fort Myer Drive, Suite 1240, Arlington, Virginia 22209, USA. Tel: (703) 841-0652. Fax: (703) 841-1597.

Vitamin A News Notes is a publication of the Vitamin A Technical Assistance Program, of the US non-governmental organization Helen Keller International (HKI). The newsletter is published twice a year, in English, French and Spanish. Available free of charge from HKI.

Xerophthalmia Club Bulletin is a publication of Sight Savers and International Vitamin Consultative Group (IVACG). Available free of charge from: Dr. D. S. McLaren, International Centre for Eye Health, 27-29 Cayton Street, London, EC1V 9EJ, UK. Fax: (903) 206770

VIDEOS

"Ending Hidden Hunger" (1992). This 20 minute video is produced by the United Nations Children's Fund (UNICEF)/World Health Organization (WHO). Bedford Productions. Available in English, French and Spanish, for PAL, NTSC, and SECAM systems. To obtain a copy at US$10 (exclusive of postage and handling) contact: Bedford Productions Ltd., 6th floor, 6 Vigo Street, London W1X 1AH, UK. Tel: (71) 287 9928; Fax: (71) 287 9870.

"Darkness into Light". Produced by Hoffmann LaRoche; Worldview (Bangladesh)

"The Battle against Nutritional Blindness" is a video produced by the Sight and Life Task Force. Available in English, French, Spanish or German, on the PAL, NTSC or SECAM systems.

TRAINING COURSES

The Second International Postgraduate Course on the Production and Use of food Composition Data in Nutrition will be held in Wageningen, The Netherlands, October 3-21, 1994. Restricted to 20 participants. For further information contact Mrs. L. Duym, Secretariat Food Composition Data Course, the Department of Human Nutrition, Wageningen Agricultural University, P.O. Box 8129, 6700 EV Wageningen, The Netherlands. Tel.:(31) 8370 82589 or 8370 89111. Telex: NL 45015. FAX: (31) 8370 83342.

PAMM. See PAMM under "Organizations".

Africa Regional Vitamin A Information and Collection Centres

- L'Institut du Sahel (INSAH)--Francophone Africa Vitamin A Information Collection and Dissemination Centre.

This regional vitamin A information collection and dissemination centre serves Francophone African countries, including Benin, Burkina Faso, Chad, Gabon, Ivory Coast, Mali, Niger, and Senegal. Activities are similar to those listed for the Information Centre at TDRC. For information contact: Mr. Zoumana Bamba, Project Documentalist, Institut du Sahel, Boulevard de l'Independance, B.P. 15, Bamako, Mali. Tel.: (223) 22.51.11/

Fax: (223) 22.23.37.

- Organisme de recherches sur l'alimentation et la nutrition africaines (ORANA).

ORANA houses the ORANA Information Centre on Child Survival, a regional information centre which responds to the information needs of Francophone African countries in three subject categories: diarrhoeal disease, nutrition, and vitamin A. Participating countries are Benin, Burkina Faso, Mali, Mauritania, Niger, Senegal, Togo, and Ivory Coast. ORANA's staff gather, catalogue, and disseminate documents from a variety of sources; by mid 1992, 632 documents on vitamin A were in their collection, and six acquisition lists had been prepared and distributed to those on their mailing list. A bibliography was prepared in 1991 which focused on vitamin A documents written by Africans or about vitamin A in Africa, an African supplement to the newsletter "Dialogue on Diarrhoea" is produced, and information requests have been handled. The Information Centre has a mailing list of over 800 readers, and readers are encouraged to request copies of articles or documents which interest them. Contact: Dr. A.M. Ndiaye, ORANA, 39, Avenue Pasteur, B.P. 2089, Dakar, Senegal, Tel.: 22-58-92.

- The Tropical Disease Research Centre (TDRC).

A Vitamin A Information Collection and Dissemination Centre has been established at TFNC to serve Anglophone Africa, including Botswana, The Gambia, Ghana, Kenya, Lesotho, Liberia, Malawi, Namibia, Nigeria, Sierra Leone, Somalia, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe. Major information activities undertaken include the dissemination of key articles to all participants, press releases on the problem of vitamin A deficiency, developing and maintaining a list of all vitamin A projects in the region, and the compilation of relevant workshops and conferences. For information contact: Mr. Justin Chisanga, Project Coordinator, Tropical Diseases Research Centre, P.O. Box 71769, Ndola, Zambia. Tel.: 260-2-610961. FAX.: 260-2-612837.

AFRICAN-BASED REGIONAL CENTRES/ASSOCIATIONS

- African Training and Research Centre for Women.

Contact: UN Economic Commission for Africa, Box 3001, Addis Ababa, Ethiopia.

- Centre d'études économiques et sociales de l'Afrique occidentale (CESAO).

CESEO aims to promote comprehensive participatory development through primary research and related activities, primarily in the Francophone countries of West Africa. Also provides technical training and supports integrated, participatory development projects. B.P. 305, Robo-Dioulasso, Burkina Faso.

- International Institute of Tropical Agriculture (IITA).

IITA, established in 1960, aims to contribute to sustainable and increasing food production in the humid and subhumid tropics by conducting international agricultural research and outreach activities in partnership with African national agricultural research systems, particularly on maize, cassava, cowpea, plantain, soybean and yam. For more information write to: IITA, Box 5320, Ibadan, Nigeria. Tel.: 41 32 49. Telex: 31417 TROPIB NG. Cable: TROPFOUND IKEJA. Also, Alley Farming Network for Tropical Africa (AFNETA) was founded in November 1988, following a workshop organized by IITA and International Livestock Centre for Africa (ILCA) as a research and development network. The aims are promoting basic and apply research on alley farming -food biased agroforestry -and in testing relevant technology and use of the concept in the diverse environments of tropical Africa among National Agricultural Research Systems (NARS) and the applicability of the system for smallholder farmers of the tropics; coordinated such research by international and national agricultural research institutions. Contact address c/o IITA at address above. Tel: 234 22 4003 00; Telex: TDS

IBA NG 20311 (Box 015) -TROPIB NG 31417.

- IOTA (Institut d'Ophthamologie tropicale de l'Afrique).

IOTA was established in 1952, Bamako. Addresses problems of blinding diseases in West Africa. Carries out studies on: ophthalmology and public health; epidemiology. Offers high level surgical expertise and provides training in ophthalmology. It is WHO collaborating Centre for prevention in Blindness. Currently incorporated in Coordination and Cooperation Organization for the Control of the Major Endemic Diseases. Member countries in Africa are: Benin, Burkina Faso, Cote d'Ivoire, Mali, Mauritania, Niger, Senegal, Togo, and in Europe: France. Contact: Director: Dr. Serge Resnikoff, P.O. Box 248, Bamako, Mali. Tel: (223) 22 27 22. Fax: 22 51 86.

- WHO Regional Offices for Africa and the Eastern Mediterranean.

See under "Organizations": World Health Organization.

OTHER ORGANIZATIONS

- Academy for Education Development (AED).

The AED is an independent, nonprofit service organization committed to addressing human development needs through education, communication and information. Working with governments and international agencies, AED in 1991 provided services in 77 countries, including operation of 30 project field offices in 23 countries. Initiatives focused on basic education, human resource development and social marketing. Headquarters: AED, Inc., 1255 Twenty-Third St., N.W., Washington, D.C. 20037. Tel.: (202) 862-1900. Telex: 197601 ACADED WSH. FAX: (202) 862-1947.

- Appropriate Health Resources and Technologies Action Group (AHRTAG).

AHRTAG, founded in 1977, supports the goal of health for all by promoting primary health care. AHRTAG provides technical support, training and resources to organizations in developing countries to enable them to manage their own information services, expand their publishing activities, and improve access to locally relevant materials. African partners include Egypt, Mozambique, Senegal, and Tanzania. AHRTAG has special interests in diarrhoeal diseases, primary health care management, training, and health education, and publishes and distributes its own newsletters (eg., Dialogue on Diarrhoea, AIDS Action, and ARI News--all available in English and French.) AHRTAG has compiled an International Breastfeeding Resource Kit that lists organizations involved in promoting breastfeeding, with a section on publications and audio-visual materials. Free to readers in developing countries. Contact: AHGTAG, Three Castles House, 1 London Bridge Street, London SE1 9SG, UK. Tel.: (44 71) 378 1403. FAX: (44 71) 403 6003. Telex: 912881 TXG E-mail: GEO2:AHRTAG

- Food and Agriculture Organization (FAO).

Established October 1945 as a major United Nations Agency to deal with the global food and agricultural issues. FAO activities are aimed at raising the levels of nutrition and standards of living of the people in the member countries, and to secure improvements in the efficiency of the production and distribution of all food and agricultural products. In 1984, FAO contributed to the United Nations Ten-Year Plan to Control and Prevent Vitamin A Deficiency, Xerophthalmia and Nutritional Blindness to increase production of vitamin A and carotene-rich foods and ensure their increased consumption. Safeguarding Sight is a 4-page pamphlet summarizing FAO actions against vitamin A deficiency. Contact Address: Vitamin A Program, Food Policy and Nutrition Division, Viale Terme di Caracalla, 00100 Rome. Tel: 396 5797 3330; Fax: 396 5797 3152.

- Helen Keller International (HKI).

HKI, a US-based NGO founded in 1915, provides technical assistance to strengthen existing vitamin A activities and expand vitamin A programmes. The services provided include the development of educational and training materials and the dissemination of current literature and information on vitamin A. A pamphlet describing low-cost "Selected publications and training materials for vitamin A deficiency control" is available from HKI; includes slide sets, reports, teaching aids, and pamphlets, many of these are provided free to developing country institutions by HKI. Contact address: 90 Washington Street, New York, New York 10006, USA. Tel.: (212) 943-0890. FAX: (212) 943-1220.

- International Baby Food Action Network (IBFAN).

IBFAN, P.O. Box 34308, Nairobi, Kenya; or IBFAN, c/o GIFA, CP 157, 1211 Geneva 19, Switzerland; or IBFAN, c/o Action, 3255 Hennepin Avenue South, Suite 230, Minneapolis, MN 55408 USA.

- International Development Research Centre (IDRC).

IDRC, founded in 1970, focuses on supporting research to identify long-term, practical solutions to pressing development problems, and on the development of science and technology capacity in developing countries. Priority themes of IDRC include food systems under stress, health and the environment, biodiversity, and information and communication for environment and development. Support is given directly to scientists working in universities, private enterprise, government, and non-profit organizations. IDRC is funded by the Government of Canada and is directed by an international Board of Governers. Head office: IDRC, P.O. Box 8500, Ottawa, Ontario, Canada K1G 3H9. Regional Office for West and Central Africa: IDRC, BP 11007, CD Annexe, Dakar, Senegal. Regional Office for Eastern and Southern Africa: IDRC, P.O. Box 62084, Nairobi, Kenya. There are also regional offices in Singapore, New Delhi, Cairo, Montevideo, and Johannesburg.

- INFOODS (International Network of Food Data Systems).

The INFOODS was established in 1983 under the aegis of the Food and Nutrition Programme for Human and Social Development, of the United Nations University (UNU) to promote global collaboration amongst those concerned with the (nutrient and non-nutrient) composition of foods. The goal of INFOODS is to improve the amount, quality and availability of food composition data; to develop standards and guidelines for the collection, compilation and reporting of food component data; and to establish regional organizations which can provide database support and services for the national needs, and permit data interchange among different regions of the world. Regional INFOODS associations have been formed throughout the world. An AFROFOODS initiative, to focus on food composition in Africa through a proposed regional network of food and nutrition organizations, plus one or more regional databases, is in the early stages of development. A directory of all available food composition tables and databases in the world has been compiled and distributed, and a revised edition is planned. Contact address: Food and Nutrition Programme for Human and Social Development, United Nations University, Charles Street Station, P.O. Box 500, Boston MA 02114-0500, USA. Tel.: (617) 227-8747. Fax: (617) 227-9405. Telex: 6503978146 MCI UN.

- International Eye Foundation.

This is a private, voluntary, non-profit international organization dedicated to the prevention and cure of blindness in developing countries. The Foundation works in the areas of food technology, nutrition education, food science, food product development, diet and disease prevention and health promotion. Operations provide training, equipment and medicines, clinical services, operational research, and development of community-based programs in 10 countries of Latin America, Caribbean, Africa, and Eastern Europe. The organization conducts research and program evaluation, produces audiovisual materials for professionals (fee), maintains a resource library and provised reference services. Annual reports of the Foundation are distributed free. Eye care in developing nations is $20. Contact: Laire Isaacson, 7801 Norfolk Avenue, Bethesda, MD 20814. Tel: (301) 986 1830; FAx: (301) 986 1876.

♠ International Food Policy Research Institute (IFPRI).

IFPRI was established to identify and analyze alternative national and international strategies and policies for meeting food needs in the world, with particular emphasis on low-income countries and poorer groups within these countries.IFPRI's research is conducted on the complex issues associated with food production, distribution, consumption and trade. IFPRI pays particular attention to Africa because of the urgent, complex and long-term nature of problems faced by this region. IFPRI's research in Africa mainly concerns the identification of improved technology policies, poverty alleviation and sustainable development strategies. In addition to Annual reports and various scientific documents, the Institute publishes IFPRI Report which is available free of charge from: International Food Policy Research Institute, 1776 Massachusetts Avenue, N.W. Washington, D.C. 20036, USA. Tel: 202 862 5600, Fax: 202 467 4439; Telex: 440054.

- International Vitamin A Consultative Group (IVACG).

The purpose of IVACG, established in 1975, is to guide international activities aimed at reducing vitamin A deficiency in the world. The group offers consultation and guidance to various operational and donor agencies that are seeking to reduce vitamin A deficiency. IVACG sponsors international meetings of experts in the field. A call for abstracts is distributed prior to each meeting. IVACG has a publication programme that has produced a number of valuable technical resources. Single copies of publications are available free to professionals in developing countries and for USD $3.50 to those in other nations. For information about IVACG meetings and publications contact: IVACG Secretariat, c/o The Nutrition Foundation, Incorporated, 1126 Sixteenth St., N.W., Washington, D.C. 20036 USA. Tel.: (202) 659-9024. FAX: 202 659 3617; Telex: 6814107 "NUFOUND" Cable: NUTRITION WASHINGTON DC.

- International Women's Tribune Centre (IWTC).

The IWTC has produced a number of resource materials on women and technology; many IWTC publications are free to people in the Third World. The *Tech and Tools Book: A guide to technologies women are using worldwide* (1986, 200 p., Order No.R5) has a useful Appendices wahich list appropriate technology centres, journals, and catalogues. *The Tribune*, IWTC's quarterly newsletter reporting on women and development issues, is free to groups in the Third WORLD. For ordering information write: IWTC, 777 United Nations Plaza, New York, New York 10017, USA.

- Micronutrient Initiative (MI).

MI was established in 1992 by CIDA, IDRC, UNDP, UNICEF, and the World Bank as a means of harmonizing the global efforts to fight micronutrient deficiencies, especially those of vitamin A, iron and iodine, by the year 2000 in keeping with the goals of the World Summit for Children. The Initiative seeks to speed up worldwide activities towards elimination and control of micronutrient malnutrition by identifying collaboratively and addressing through established capacities critical elements of sustainable global and national strategies for controlling micronutrient malnutrition. Contact address: Micronutrient Initiative Secretariat, c/o IDRC, P.O. Box 8500, Ottawa, Ontario, Canada. Tel: (613) 236 6163; Fax: (613) 567 4349.

- Program Against Micronutrient Malnutrition (PAMM).

PAMM is an international collaborative effort working towards the elimination of iodine, vitamin A and iron deficiencies by the year 2000. PAMM assists governments to develop the technical capability and management systems to achieve sustained elimination of micronutrient deficiencies through holding workshops and offering technical support and training in skills needed to implement control measures. Training is an important component of PAMM's programme, and each year select teams participate in training courses which vary from one week to three months in duration. Training is offered in advocacy, laboratory management, information management, communications, and interventions, with a focus on food fortification. The food fortification training module is a three month session held at the International Agricultural Centre in The Netherlands. Contact address: PAMM, Centre for International Health, Emory University, School of Public Health, 1599 Clifton Road, N.E. Atlanta, Georgia 30329 USA. Tel: (404) 727 5417 or 727 5416; Fax: (404) 727 4590.

- Sight and Life Task Force.

The Sight and Life Task Force was founded in 1986 by F. Hoffmann-La Roche Limited to help combat xerophthalmia among children living in countries where vitamin A deficiency is a public health problem. Since 1986, Sight and Life has provided assistance in the form of materials (e.g., high doses of vitamin A), finances or services to 93 intervention projects in 41 countries; 38 research projects in 16 countries; 26 projects in training and education; and has handled 11 requests for technical assistance from 4 countries. Sight and Life also

produces and annual report, a newsletter, special bulletins on selected topics, and educational materials such as training manuals, pamphlets, videos and books, some of which are available in a number of languages. For a listing of these and an order form, contact: Task Force "Sight and Life". P.O. Box 2116, Basel, Switzerland. Fax: (41 61) 688 1910.

- TALC (Teaching Aids at Low Cost).

This organization is dedicated to increasing access to educational materials on health and nutrition. TALC has an extensive listing of books and slide sets which it can provide at low cost. For example, the following slide sets (including scripts) are available: "Xerophthalmia: the diagnosis and prevention of nutritional blindness"; "Primary eye care"; "Foods of West Africa" (describes the preparation and nutritional value of foods commonly fed to children); and "A community workers' newsletter" which describes how a community health programme can produce its own newsletter to help isolated workers. TALC has compiled a listing of 42 free newsletters on various topics which affect health, and also offers two libraries containing a selected range of up-to-date medical information selected by experts. For more detailed information or for order forms, write: TALC, P.O. Box 49, St. Albans, Herts, AL1 4AX, United Kingdom. Tel.: (727) 53869. Telex: 266020 CORALP G. Ref.:TALC FAX: (727) 46852.

- UN Administrative Committee on Coordination/Sub-committee on Nutrition (ACC/SCN).

A focal point for harmonizing the policies and activities in nutrition of the United Nations system. Almost all UN and bilateral donor agencies concerned, directly or indirectly, with nutrition issues are members of the SCN. The SCN compiles and disseminates information on nutrition, reflecting the shared views of the agencies concerned. It sponsors working groups on inter-sectoral and sector-specific topics, and has launched Ten-year programmes to address two major micronutrient deficiencies, vitamin A and iodine. The major activities of SCN are: issuing regular reports on the world nutrition situation; holding symposia and workshops; producing a newsletter called SCN News; state-of-the-art papers to summarize current knowledge on selected topics; and assessment of the flows of external resources to address nutrition problems. The Secretariat is hosted by WHO in Geneva, Switzerland. Contact address: ACC/SCN, c/o WHO, Avenue Appia, 20, CH-1211 Geneva 21, Switzerland. Tel: (41 22) 791 0456; Fax: (41 22) 798 8891.

- United Nations Children's Fund (UNICEF).

A specialized agency of the United Nations which aids governments in their efforts to undertake long-range and far-reaching programmes benefiting women and children. In general, UNICEF's activities pursue two fundamental goals: to help developing countries meet some of the immediate needs of their young and to help them strenghthen their long-range services for children as essential parts of their overall development efforts. UNICEF has been the main advocate for "adjustment with a human face". UNICEF goals and strategies for the 1990s have focused on survival, development and protection of children. Some of the major goals for the year 2000 include: the reduction by a third the mortality rates for infants and young children and for mothers in childbirth by half; virtually eliminating severe malnutrition and reduction of moderate malnutrion by one half of 1990 levels; eradicating polio, eliminatin neonatal tetanus, and immunize at least 80% of young children against other diseases; reducing child deaths due to diarrhoea by 70% and cut ARI mortality by 25%; virtual eliminating blindness caused by vitamin A deficiency, eliminating IDD and reducing anemia by one third. UNICEF produces various publications and documents: UNICEF Annual Report in English, French and Spanish; Anual Progress Report of the Executive Director in English, French, Russian and Spanish; the State of the World's Children Report in Chinese, English, French, Russian and Spanish; UNICEF Video, Film and Redio Catalogue. In addition a variety of books, monographs, reports and serials about women and children in developing countries are produced by UNICEF. Contact address: your national UNICEF office, or UNICEF House, Three United Nations Plaza, New York, New York 10017 USA. Tel.: (212) 326-7000.

- UNIFEM (UN Development Fund for Women).

UNIFEM's mission is to enable the women of the developing world to achieve their objectives for economic and social development, and by so doing improve life for women and men alike. UNIFEM directly funds programmes and projects which enable women to enhance their economic and civic activities, and which ensure that the needs of both women and men receive consideration when large-scale assistance is given to developing countries, through involvement in programming and project design, monitoring and evaluation. In Africa, UNIFEM's recent support has focused on helping to improve the livelihood of some of the continent's poorest women farmers, especially those battling against environmental degradation, and on helping women in small scale commercial and trading activities. Created in 1976, UNIFEM works in autonomous association with the United Nations development Programme (UNDP). For further information on UNIFEM, its work, and its publications contact: Information Officer, UNIFEM, 304 East 45th St., Room 612, New York, New York 10017 USA. Tel.: (212) 906-6453. FAX: (212) 906-6705.

- USAID.

The US Agency for International Development, since 1960s, has played a major role in supporting research to develop a sound scientific foundation for action and implementing mechanisms for international coordination, consensus building and information sharing. To improve the prospects for child survival in developing world, USAID has focused efforts mainly to breastfeeding promotion, improved infant and child feeding practices, vitamin A and other interventions to address major micronutrient deficiencies, as well as supplementary feeding of mothers and children. To fight micronutrient deficiencies, USAID has established IVACG in 1975; INACG in 1977; Centre for Epidemiology and Preventive Ophthalmology at Johns Hopkins University; Vital project in 1989; and a new project "OMNI" with a funding of $50 million over the next 10 years. Through its various centres, USAID publishes various newsletters and information sheets. Contact address: Office of Nutrition, Bureau for Research and Development, USAID, Washington D.C. 20523-1808 USA. Tel.: (703) 875-4003. FAX: (703) 875-7483.

- Vitamin A Field Support Project (VITAL).

VITAL was established by USAID in 1989. The Project is managed by the International Science and Technology Institute, Inc.(ISTI). By the end of 1993, vitamin A activities were established in 24 countries through 64 projects. In Africa, VITAL collaborates with INSAH in Mali and TDRC in Zambia to collect and disseminate vitamin A information in Anglophone and Francophone countries. For information about VITAL and publications it has supported, and ordering information, contact: VITAL, 1616 North Fort Myer Drive, Suite 1240, Arlington, Virginia 22209, USA. Tel.: (703) 841 0652; FAX: (703) 841 1597. Documents produced by VITAL are available free of charge from the above address. But please note that from March 1994, the VITAL project will be replaced by the OMNI project. VITAL materials may still be obtained after this date from the above address, at Suite number 1100.

- World Health Organization (WHO).

WHO is a major UN agency charged to act as the world's directing and coordinating authority on questions of human health. WHO has developed a host of networks and mechanisms for generating data, applying facts to problems, and recommending solutions that will lead to sustained improvements in health. A "Nutrition publication catalogue" giving information on publications in the areas of nutrition is available from WHO. "Let there be sight" is a pamphlet produced by WHO on vitamin A containing useful information in the form of articles, poster and map. Contact address: B. Underwood, Nutrition Unit, Division of Food and Nutrition, WHO. Avenue Appia, 1211 Geneva 27, Switzerland. Tel: (41 22) 791 4146; Fax: (41 22) 791 4156. For WHO Regional Office for Africa contact: Regional Officer, Nutrition, Regional Office for Africa, P.O. Box 6, Brazzaville, Congo. Tel.: 242 83 18 79; 242 83 38 65. FAX: 242 83 18 79. For the Eastern Mediterranean Regional Office contact: Regional adviser for nutrition. P.O. Box 1517, Alexandria 21511, Egypt. Tel: 20 3 482 0223 and 0224; Fax: 20 3 483 8916.