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The Nutrition Foundation, Inc.



FINAL REPORT OF
COOPERATIVE AGREEMENT

DAN-5115-A-00-7114-00

1 October 1987 to 31 May 1994

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FINAL REPORT

COOPERATIVE AGREEMENT

DAN 5115-A-00-7114-00

1 October 1987 -- 31 May 1994

I. EXECUTIVE SUMMARY - ACCOMPLISHMENTS

The Nutrition Foundation, Inc. has been worked with the AID Office of Nutrition since the mid 1970s. This is a final report for a cooperative agreement, DAN 5115-A-00-7114-00, between the Nutrition Foundation, Inc. and the AID Office of Nutrition which covered a 6 year and 8 months period from 1 October 1987 until 31 May 1994. During that time the Nutrition Foundation provided secretariat support for six different entities.

These entities were:

The International Vitamin A Consultative group (IVACG) - To guide international activities for reducing vitamin A deficiency in the world, IVACG sponsors international meetings and scientific reviews. It convenes task forces to analyze and make recommendations related to the causes, treatment, and prevention of vitamin A deficiency in developing countries. The findings of these task forces, important to the establishment of public policy and action programs, are disseminated through a state-of-the-art monograph series circulated throughout the world.

The International Nutritional Anemia Consultative Group (INACG) - To guide international activities for reducing iron deficiencies and other nutritional anemias in the world, INACG sponsors international meetings and scientific reviews. It also convenes task forces to analyze and make recommendation related to the etiology, treatment, and prevention of nutritional anemias. The guidelines and strategies developed by these task forces, which are important to the establishment of public policy and action programs, are disseminated through a state-of-the-art monograph series circulated throughout the world.

The International Nutrition Planners Forum (INPF) - An informal organization of professionals from developing countries with expertise and responsibility for food and nutrition-related policies and programs, INPF provides opportunities and channels of communication between developing country experts and international organizations for discussion of common nutrition problems, and formulation of policy and technical recommendations.

The International Nutrition Network Exchange (INNE) - Through two-day convocations of individuals from all organizations participating in AID Office of Nutrition funded activities, INNE

foster information exchange and networking, strengthened nutrition programs, and identified areas for policy development.

Project SUSTAIN - A voluntary activity of the United States private food industry and AID, SUSTAIN facilitates the transfer of scientific knowledge and technical know-how residing in the U.S. companies to solve food problems in developing countries. The goals of SUSTAIN are to improve the quality, increase the quantity, and lower the cost of locally grown and processed foods in developing countries.

The Joint Micronutrient Consultative Group (JMCG) - An initiative to respond to the growing international focus using an integrated approach to micronutrient malnutrition interventions, the JMCG fostered dialog among the three micronutrient consultative groups, IVACG, INACG, and the International Council for Control of Iodine Deficiency Disorders (ICCIDD).

Of these six entities, only IVACG and INACG were covered for the entire period of this cooperative agreement. The total expenditures covered by this cooperative agreement were \$5,258,260.55 of which \$3,466,287.89 was provided by AID, \$1,429,131.56 was provided by the Nutrition Foundation, Inc. as in-kind contribution, and the remaining \$362,841.10 represents non-reimbursable expenditures.

The Nutrition Foundation, Inc. is proud of the progress made through this cooperative agreement with AID toward the mutual goal of improved nutrition, particularly micronutrient status, for people in developing countries. The accomplishments are many, but several deserve special recognition.

IVACG's activities over the course of this cooperative agreement were a significant factor in achieving international recognition of the role of vitamin A status in childhood health. IVACG provide a forum for debating scientific issues related to vitamin A deficiency. These debates, often heated, brought in more and more developing country participation and promoted development of consensus on issues such as reduced childhood mortality through vitamin A supplementation. As a result developing country policy officials are more responsive to international efforts aimed at meeting the goal of virtual elimination of vitamin A deficiency as a public health problem by the year 2000, a goal agreed to by the U.S. government at the World Summit for Children and reaffirmed at the International Conference on Nutrition.

INACG has initiated significant support for food fortification as the most feasible strategy for sustained prevention of iron deficiency anemia. It also provided clear guidance on the role of

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iron deficiency in maternal health. Together these accomplishments provide an increased awareness of the problem of iron deficiency anemia and cost-effective solutions available to developing countries.

The JMCG provided an innovative approach to micronutrient malnutrition by examining the feasibility of coordinated strategies across three micronutrients, vitamin A, iron, and iodine. Concrete guidance was made available to the Philippine government, much of which is transferable to other countries. This should result in increased efforts to implement a coordinated approach.

Project SUSTAIN provided direct problem solving expertise to developing countries in areas of food processing, food packaging, food safety and food marketing. This program, which is now directed by another cooperator, is a prime example of capacity building in developing countries.

INPF provided a unique hands-on experience for the development of effective nutrition communication programs so important for sustaining good nutrition habits. INNE accomplished its mission of fostering information exchange between AID Office of Nutrition cooperators.

Given these accomplishments, the AID Office of Nutrition should receive recognition for its sustained efforts in the area of vitamin A and iron and its innovative approaches to sharing food processing and nutrition communications expertise with developing countries.

II. ACTIVITIES BY ENTITY

IVACG Activities

Leadership and Steering Committee

Dr. Lester J. Teply, UNICEF, was chair of IVACG from October 1987 to December 1987. Throughout the course of this cooperative agreement Dr. Abraham Horwitz, FAHO, served as the Chairman of IVACG and Dr. Frances Davidson, USAID, served as IVACG Secretary. The Steering Committee met frequently (at least twice a year) and was expanded from five members to 10 members. The current membership includes the following individuals in addition to Drs. Horwitz and Davidson: Dr. Moses C. Chirambo, Malawi; Dr. Vinodini Reddy, India; Dr. Franz Simmersbach, FAO; Dr. Leonor Maria P. Santos, Brazil; Dr. Suttalak Smitasiri, Thailand, Dr. Alfred Sommer, USA; Dr. Barbara Underwood, WHO; and Dr. Keith West, USA.

Dr. Underwood chaired the IVACG Steering Committee from October 1987 until March 1993. Dr. Alfred Sommer was elected as the new chair in April 1994. At the request of the Steering Committee, Dr. Horwitz served as the interim chair between March 1993 and April 1994.

An administrative committee composed of the IVACG Chairman, IVACG Secretary, and IVACG Steering Committee Chairman guided the secretariat in carrying out specific tasks between steering committee meetings.

IVACG instituted a regional representatives program for Africa in FY88, appointing Dr. Moses Chirambo, Malawi; Dr. Joseph S. Diallo, Senegal; and Dr. Demissie Habte, Ethiopia, to represent IVACG in their respective regions of Africa. Dr. Pawlos Quana'a, Ethiopia, replaced Dr. Habte in FY90 and Dr. Festo Kavishe, Tanzania, took Dr. Chirambo's place in FY92 and served through FY94. The goal of this program was to provide extra contact to IVACG expertise in Africa. Each regional representative received financial support to carry out his mission.

Conferences and Workshops

1. FY88 - XII IVACG Meeting - Addis Ababa, Ethiopia - 7-12 December 1987.

Purpose: The focus of the meeting was development and use of integrated operational programs to combat vitamin A deficiency with particular emphasis on the African region.

Output: A national Ethiopian symposium on vitamin A took place immediately prior to the meeting. In all, 136 participants from 27 countries took part; 14 African countries were represented. A meeting report was produced and distributed to participants.

2. FY90 - XIII IVACG Meeting - Kathmandu, Nepal - 5-10 November 1989.

Purpose: To highlight the significance of vitamin A status to childhood mortality and morbidity and to foster participation of program managers. This was the first IVACG meeting to include poster presentations which allowed additional information exchange between meeting participants. This was also the first time IVACG used a call for abstracts procedure to solicit potential presentations. Both the posters and call for abstracts were so successful they have been continued for each subsequent meeting.

Output: IVACG cohosted the XIII IVACG Meeting and Nepal national symposium with the government of Nepal and the Nepal Prevention of Blindness Program (Nepal Netra Jyoti Sangh). The event attracted 270 participants from 33 countries. Data showing reduced childhood mortality following low-dose vitamin A supplementation in an Indian study were presented for the first time. Several private voluntary organizations (PVOs) participated in the meeting for the first time, including World Vision, CARE, African Medical and Research Foundation (AMREF), PLAN International, AFRICARE, and Adventist Development and Relief Agency. A meeting summary was published and distributed to all participants, and made generally available through IVACG's publications request list.

Based on the information presented at the meeting, the steering committee issued an interim statement in March 1990 summarizing the importance of vitamin A status to child health and survival. The statement was printed in a number of publications including *Tropical Doctor*, *Xerophthalmia Club Bulletin*, *IAPB News*, *Garden to Kitchen Newsletter*, *The Ark*, *VITAL News*, *Nutrition Research Newsletter*, *The Journal of Nutrition*, *Community Eye Health*, and *ARI News*.

3. FY91 - XIV IVACG Meeting - Guayaquil, Ecuador - 17-20 June 1991

Purpose: To explore the theme "Community-based Interventions" and to highlight the initiation of a vitamin A program in Ecuador.

Output: Representatives from 39 countries (193 individuals) participated in a 4-day IVACG program which included 85 oral and poster presentations. The secretariat published a meeting report which was distributed to the participants as well as other individuals and organizations internationally.

4. FY93 - XV IVACG Meeting - Arusha, Tanzania - 8-12 March 1993

Purpose: The theme for this meeting was "Toward Comprehensive Programs to Reduce Vitamin A Deficiency" which continued emphasis on the community-level approach of previous meetings.

Output: 293 individuals from 51 countries participated in meeting sessions. The Tanzanian Food and Nutrition Centre helped the secretariat organize the meeting and set-up a one-day national symposium. Dr. George Beaton, Canada, presented the results of a meta-analysis of all the completed vitamin A mortality trials which showed that vitamin A supplementation resulted in a reduction of childhood mortality of about 23 percent. A meeting summary was produced with the help of three rapporteurs and distributed to the participants and numerous organizations worldwide.

5. FY95 - XVI IVACG Meeting - Chiang Rai, Thailand - 24-28 October 1994

Purpose: The theme, "Two Decades of Progress: Linking Knowledge to Action," was selected by the steering committee for the XVI IVACG Meeting to mark IVACG's 20th anniversary. The meeting format will be altered to include a series of concurrent workshops and increased opportunities for discussion. The outcome of these workshops will be reported back to the full meeting in plenary sessions.

Task Forces

1. FY88-89 Methodology for the Monitoring and Evaluation of Vitamin A Deficiency Intervention Programs

Members: Dr. Guillermo Arroyave, USA, Chairman
Dr. Jane Baltazar
Dr. Jane Kusin, The Netherlands
Dr. James M. Lepkowski, USA
Dr. Roy C. Milton, USA
Dr. S.G. Srikantia, India

Output: At the request of WHO this group developed a monograph, *Methodologies for Monitoring and Evaluating Vitamin A Deficiency Intervention Programs*, describing the requirements and processes of monitoring and evaluation of intervention programs.

2. FY88-92 Communication/Education Task Force

Members: Dr. Florentino Solon, Philippines, Chairman
Mr. Anish Barua, Bangladesh
Dr. Saranya Reddy, India
Mr. Ashok Sethi, India
Dr. Franz Simmersbach, FAO
Mr. Martin Solow, USA

Output: This group gathered information on creative vitamin A communication and education programs from the field and with the help of professional writers and graphic artists published in *Nutrition Communications in Vitamin A Programs: A Resource Book*.

3. FY88 Organization and Management of Vitamin A Supplementation Programs

Members: Dr. E.M. DeMaeyer, WHO, Chairman
Dr. C.O. Chichester, USA
Dr. Nicholas Cohen, WHO
Dr. Frances R. Davidson, USA
Ms. Susan J. Eastman, USA
Dr. J. Peter Greaves, UNICEF
Dr. R. Leavell, USA
Dr. Donald S. McLaren, United Kingdom
Dr. Leonor H. Pacheco Santos, Brazil
Dr. Florentino Solon, Philippines
Dr. Alfred Sommer, USA

Dr. L.J. Teply, UNICEF
Dr. Barbara A. Underwood, USA
Dr. Keith P. West, Jr., USA

Output: This joint WHO/UNICEF/IVACG task force formed in 1986 at the request of WHO, developed a brief monograph *Vitamin A Supplements: A Guide to Their Use in the Treatment and Prevention of Vitamin A Deficiency and Xerophthalmia*, and published it in September 1988. WHO also made the publication available in French.

4. FY88-89 Dietary Assessment

Members: Dr. Barbara Underwood, USA, Chairman
Dr. Ritva Butrum, USA
Dr. Miriam Chavez, Mexico
Dr. Jean Hankin, USA
Dr. Jane Kusin, The Netherlands
Dr. Sue Ohata, USA
Dr. A. Omololu, Nigeria
Dr. Francesca Ronchi-Proja

Output: The task force tested a simplified dietary assessment procedure, developed in collaboration with FAO, in several countries including Benin, Mexico, and Bangladesh. Revisions were made based on these field tests and *Guidelines for the Development of a Simplified Dietary Assessment to Identify Groups at Risk for Inadequate Intake of Vitamin A* was published.

5. FY88 Vitamin A in Emergency and Relief Operations

Output: A draft paper on this topic was developed in 1985 by Dr. Rita Leavell and Ms. Victoria Sheffield. The paper was reviewed by the IVACG Steering Committee and finalized by Dr. Edouard M. DeMaeyer. The resulting brochure, *Guidelines for the Use of Vitamin A in Emergency and Relief Operations*, was published in September 1988.

6. FY88 Control of Vitamin A Deficiency through Primary Health Care

Members: Dr. Demissie Habte, Ethiopia
Dr. Donald McLaren, United Kingdom
Dr. William Darby, USA
Dr. Lester J. Teply, USA

Dr. Barbara Underwood, USA

Output: A paper, "Control of Vitamin A Deficiency through Primary Health Care" was completed for the Joint WHO/UNICEF Nutrition Support Program (JNSP) in February 1988.

7. FY88-93 Integration of Vitamin A Distribution Programs with the Expanded Program on Immunization

Members: Dr. Nicholas Cohen, WHO, Chairman
Dr. R.H. Henderson, WHO
Dr. Lauri Markowitz, USA
Dr. Raja Noordin, Malaysia
Dr. Agostino Paganini, UNICEF
Dr. Alfred Sommer, USA
Dr. Andrew Tomkins, United Kingdom
Dr. Barbara A. Underwood, USA

Output: The goal of this task force was a monograph to provide guidance for the integration of vitamin A supplement delivery into the existing WHO Expanded Programme on Immunization (EPI). The IVACG task force drafted its report "Using Immunization Contacts to Combat Vitamin A Deficiency" based on discussions at the initial task force meeting in January 1989. The manuscript was revised following an informal consultation co-sponsored by IVACG and WHO in the summer of 1992 to discuss concerns raised by WHO as to the safety of high dose supplements for infants under 1 year of age. This document was then presented to the EPI Global Advisory Group and approved. WHO circulated the finished document in FY93.

8. FY91-93 Assessment Methodology

Co-editors:
Dr. James Olson, USA
Dr. Barbara Underwood, WHO

Contributors:
Dr. Eric J. Van Agtmaal, The Netherlands
Dr. Olivier Amédée-Manesme, France
Dr. Cecile Carlier, France
Dr. Hernando Flores, Brazil
Dr. Harold C. Furr, USA
Dr. Deborah Keenum, USA
Dr. Jayant P. Shenai, USA

Dr. Alfred Sommer, USA
Mrs. Sherry A. Tanumihardjo, USA
Dr. Emorn Udomkesmalee, Thailand

Output: Carrying out its work by correspondence, this group completed its task of preparing a publication describing newer assessment methods, particularly those designed to measure subclinical vitamin A deficiency.

9. FY93 Dietary Assessment Methodology

Members: Dr. Keith West, USA, Chairman, and others to be named after the close of this cooperative agreement.

Output: It is expected that this task force will evaluate IVACG's *Guidelines for the Development of a Simplified Dietary Assessment to Identify Groups at Risk for Inadequate Intake of Vitamin A* published in FY89 as well as other dietary assessment methods. The task force will make recommendations for revising the IVACG method based on experience gathered in developing countries where the IVACG method has been used.

10. FY94 New activities were recommended by the Steering Committee:

IVACG Task Force to revise *Vitamin A Supplements: A Guide to Their Use in the Treatment and Prevention of Vitamin A Deficiency and Xerophthalmia*

IVACG Task Force on Indicators of Vitamin A Deficiency as a Public Health Problem

Subcommittee of the IVACG Task Force on Dietary Assessment to consider food composition

Consensus panel on vitamin A and childhood morbidity

Publications

1. FY88 *Vitamin A Supplements: A Guide to Their Use in the Treatment and Prevention of Vitamin A Deficiency and Xerophthalmia*

Published jointly with UNICEF and WHO; available in English

and French.

2. FY88 *Guidelines for the Use of Vitamin A in Emergency and Relief Operations*

Used and distributed by AID, WHO, Helen Keller International, and other organizations providing direct relief and/or advice to relief organizations.

3. FY88 "Control of Vitamin A Deficiency through Primary Health Care"

Prepared for the Joint WHO/UNICEF Nutrition Support Program (JNSP).

4. FY89 *Methodologies for Monitoring and Evaluating Vitamin A Deficiency Intervention Programs*

5. FY89 *Guidelines for the Development of a Simplified Dietary Assessment to Identify Groups at Risk for Inadequate Intake of Vitamin A*

Published in loose-leaf format to allow the possibility for future updates.

6. FY93 *Nutrition Communications in Vitamin A Programs: A Resource Book*

A description of communications methodology, a collection of program materials, and an in-depth discussion of successful communication programs to promote reduction of vitamin A deficiency.

7. FY93 *A Brief Guide to Current Methods of Assessing Vitamin A Status*

Description of newer methods for determining vitamin A status with an emphasis on those capable of identifying marginal vitamin A deficiency.

A summary of the number of requests for IVACG publications received and filled by the secretariat is provided in Table 1.

Liaison Activities

1. FY88-94 *Xerophthalmia Club Bulletin*

IVACG co-funds this newsletter with Sight Savers. Dr. Donald McLaren is the editor of the publication devoted to vitamin A

and nutritional blindness published 3 times a year. In FY90, IVACG instituted an editorial committee to review the text of the newsletter and offer comments to the editor, prior to publication of each issue. More than 3000 copies of each issue are circulated worldwide. Nineteen issues were published during the life of this cooperative agreement.

2. FY91-92 Global Micronutrient Activities

IVACG and the IVACG Secretariat actively participated in conferences designed to call attention to micronutrient malnutrition including vitamin A, iron, and iodine deficiencies. These conferences included the 1991 Ending Hidden Hunger conference sponsored by UNICEF and WHO, and the 1992 International Conference on Nutrition sponsored by FAO and WHO.

3. FY88-94 Contact with NGOs and PVOs

Throughout the life of this cooperative agreement, the secretariat has actively worked with other NGOs and PVOs interested in vitamin A deficiency. Some of these groups provided funding for IVACG activities. A partial list of these organizations includes: Helen Keller International, International Agency for the Prevention of Blindness, Worldview International Foundation, CARE, Task Force SIGHT AND LIFE, National Council for International Health, International Eye Foundation and International Science and Technology Institute.

4. FY88-94 Support from Food Industry

Funding for IVACG activities was also provided by several multinational food companies with an interest in vitamin A including The Coca Cola Company, F. Hoffmann-LaRoche, Ltd., The Procter and Gamble Company, and Nestlé S.A.

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INACG Activities

Leadership and Steering Committee

Until his death in December 1988, Dr. Edouard DeMaeyer served as chairman of INACG. Dr. Samuel Kahn, USAID, served as Secretary from FY88-94. Dr. Alberto Pradilla, Head, Nutrition Unit, World Health Organization, accepted an invitation to serve in the same capacity as Dr. DeMaeyer but using the title Senior Advisor in the spring of 1989. He remained in this position until his retirement from WHO in 1991.

An INACG Advisory Committee was established in FY90 consisting of Dr. Fatimah Linda Collier Jackson, Dr. Richard Theuer, Dr. J. Peter Greaves, Dr. Ray Yip, and Dr. Samuel Fomon, all US-based scientists. This group met in January 1990 and ranked priorities for new INACG initiatives aimed at global control of iron deficiency anemia.

In 1991, INACG appointed a steering committee in response to USAID direction to have more developing country input. The members of the committee were Dr. Richard Theuer, USA, chairman; Dr. Rodolfo Florentino, Philippines; Dr. Samuel Kahn, USA; Dr. T. N. Maletnlema, Tanzania; and Dr. Tomas Walter, Chile. This group met in November 1991 and again in March 1993. Dr. Louis Sullivan, USA, joined the group in 1993 and Dr. Maletnlema resigned. The Steering Committee developed a mission statement and a plan of action for INACG. At the direction of the steering committee, the secretariat produced an INACG directory, a list of individuals world-wide with an interest in iron deficiency anemia.

Conferences and Workshops

1. FY89 Workshop on Maternal Nutritional Anemia, 14-16 November 1988, Geneva, Switzerland

Purpose: The focus was successful implementation programs to prevent nutritional anemia during pregnancy. The workshop was held at the World Health Organization and participation was limited to those actively working in the field.

Output: Drawing on the workshop discussion, a group of four individuals--Dr. Thomas H. Bothwell, Chairman, South Africa; Dr. Peter R. Dallman, USA; Dr. Rodolfo Florentino, Philippines; and Dr. Fatimah Linda Collier Jackson, USA--drafted a clear statement of risks to the mother and unborn child when anemia is present during pregnancy and

provided guidance for appropriate intervention.

2. FY90 Combatting Iron Deficiency Anemia Through Food Fortification - 5-7 December 1990 - Washington, D.C.

Purpose: To produce an action plan for developing national iron fortification systems through establishing partnerships among industry, government, and donor groups.

Output: A clear, concise action plan was developed by a small group at the end of the conference. The secretariat published the plan in English, French and Spanish. A more detailed meeting report was also published.

Task Forces

1. FY88-91 Task Force on the Relationship of Anemia to Mental and Behavioral Development

Members: Dr. Ernesto Pollitt, Chairman, University of California, Davis
Dr. Peter Dallman, University of California, San Francisco
Dr. David Levitsky, Cornell University
Dr. Betsy Lozoff, Rainbow Babies and Children's Hospital
Dr. Moussa B.H. Youdim, Technion-Israel Institute of Technology

Output: This task force developed a draft document summarizing the current understanding of the complex relationship between brain function and iron nutriture. The secretariat attempted development of a shorter brochure based on the comprehensive draft document. To date this project remains unfinished because of the difficulty of presenting a clear, crisp message that is entirely truthful.

Publications

1. FY90 *Guidelines for the Control of Maternal Nutritional Anemia*

A short action-oriented brochure based on the discussions at the FY89 Workshop on Maternal Nutritional Anemia available in

English, French, and Spanish.

2. FY92 *Combatting Iron Deficiency Anemia Through Food Fortification*

A clear, concise guide to linkages and partnerships between public and private sector entities necessary to the successful development of iron fortification programs, available in English, French and Spanish.

3. FY93 *Iron EDTA for Food Fortification*

A comprehensive monograph covering data related to the safety and efficacy of iron EDTA for use in food fortification program. The monograph also cites the provisional approval by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) for the use of this compound. The monograph was distributed to potential manufacturers of the compound as well as developing country policymakers and program managers.

A summary of the number of requests for INACG publications received and filled by the secretariat is provided in Table 1.

Liaison Activities

1. FY 88-89 Research Project to Determine the Effectiveness of Iron Fortified Infant Cereal in Prevention of Iron Deficiency Anemia

Objective: To determine whether infant cereal fortified with electrolytic iron powder in North America is effective in preventing iron deficiency anemia in a developing country.

Process: INACG developed the protocol for the study in collaboration with Dr. Peter Dallman, University of California, San Francisco and Dr. Tomas Walter, Instituto de Nutricion y Tecnologia de Los Alimentos (INTA), Universidad de Chile. The study was carried out at INTA under Dr. Walter's direction. Funding was provided by the Gerber Products Company.

Output: The infant cereal fortified with electrolytic iron in the same manner as in the U.S. was quite effective in preventing iron deficiency anemia. These findings were published in *Pediatrics* 91:976-982 (1993).

2. FY89 ACC/SCN Background Paper on Strategies for Controlling Iron Deficiency

Objective: At the request of the chairman of the ACC/SCN, prepare working paper for development of strategies for controlling iron deficiency.

Output: INACG Secretariat completed a comprehensive literature search compiling a list of over 1130 citations for the ACC/SCN. Working with ACC/SCN, a document reviewing the status of iron deficiency anemia was developed and presented to the ACC/SCN Advisory Group on Nutrition (AGN). The AGN then recommended that the ACC/SCN undertake an international workshop on iron supplementation which was held in Dublin, Ireland and resulted in the publishing of *Controlling Iron Deficiency*.

3. FY91-92 Global Micronutrient Activities

INACG and the INACG Secretariat actively participated in conferences designed to call attention to micronutrient malnutrition including vitamin A, iron, and iodine deficiencies. These conferences included the 1991 Ending Hidden Hunger conference sponsored by UNICEF and WHO, and the 1992 International Conference on Nutrition sponsored by FAO and WHO.

INPF Activities

Leadership and Steering Committee

The Nutrition Foundation took over responsibility for the International Nutrition Planners Forum (INPF) in May 1990 (FY90). At that time a steering committee was in place. The members were Dr. Mamdouh K. Gabr, Egypt, Chairman; Prof. Jaime Ariza, Puerto Rico; Dr. Mathurin C. Nago, Benin; Dr. A. Wynante Patterson, Jamaica; Julia Tagwireyi, Zimbabwe; and Dr. Aree Valyasevi, Thailand.

This group met in June 1990, January 1991, September 1991, and March 1993. At the first three of these meetings the steering committees provided guidance to the secretariat in organizing the Sixth INPF Conference. At the March 1993 meeting, the group developed a plan of action for INPF.

Conferences and Workshops

1. FY91 Sixth INPF Conference, "Effective Nutrition Communication for Behavioral Change," at UNESCO in Paris, France, 4-6 September 1991.

Purpose: This conference was designed as a practical follow-up to the Fifth INPF Conference, "Crucial Elements of Successful Community Nutrition Programs" with program assistance from the Academy for Educational Development (AED). Twelve developing country teams participated in plenary sessions during which elements of successful nutrition communications programs were described and were given individualized help in developing a country-specific nutrition communication project.

Output: Each team returned home with a well-developed nutrition communication project ready for implementation. The plenary discussions were published in an INPF report.

Task Forces

Several task forces were suggested between FY90 and FY94, but none came to fruition. Funding was always a limiting factor.

Publications

1. FY92 *Effective Nutrition Communication for Behavior Change*

Published in English, French and Spanish. The report was written by Dr. Cheryl Achterberg, who served as the rapporteur for the Sixth INPF Conference on this topic.

2. The secretariat also distributed the report of the Fifth INPF Conference, *Crucial Elements of Successful Community-Based Nutrition Programs* upon request.

A summary of the number of requests for INPF publications received and filled by the secretariat is provided in Table 1.

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INNE Activities

At the request of AID Office of Nutrition, the Nutrition Foundation organized three International Nutrition Network Exchange (INNE) meetings. These were two-day convocations of individuals from all organizations participating in USAID Office of Nutrition funded activities under grants, cooperative agreements, and contracts. The purpose of these meetings was to foster information exchange and networking, strengthen nutrition programs funded by the Office and identify areas for policy development. The second and third INNE meetings had specific themes around which the meeting program was organized. All were held in the Washington, D.C. area.

The three meetings were:

FY 91 - First Annual INNE Convocation - 2-3 October 1990

FY 91 - Second Annual INNE Convocation - "Empowering Families"
- 6-7 May 1991

FY 92 - Third Annual INNE Convocation - "Nutrition: Capacity-
Building for Development" - 5-6 May 1992.

The Nutrition Foundation organized each meeting and wrote a summary report of the first and second INNE meetings which were circulated to the participants. At AID request, no report was written for the third meeting.

Project SUSTAIN Activities

Project SUSTAIN was included in the cooperative agreement with the Nutrition Foundation from December 1987 through December 1989. At that time AID transferred SUSTAIN to its "Nutribusiness" program where it remains an active program directed by another organization.

Project SUSTAIN responded to requests from developing countries by providing technical information, short term consultant services and short term training. Project SUSTAIN also produces a quarterly newsletter, SUSTAIN NOTES, that addresses the needs of food processors in developing countries.

Outputs: Over the course of the two years that SUSTAIN was a part of this cooperative agreement, requests from 31 developing countries were successfully handled and 61 U.S. food-related companies provided technical expertise.

1988 - Reconnaissance visits with U.S. food industry scientists were made to Yemen, Pakistan, and Honduras. These visits each resulted in a list of specific recommendations to be implemented at the country-level, in some cases with additional help from SUSTAIN. Workshops on specific topics (food packaging, product development, and general food processing) were held in Belize, Kenya, and Yemen. A short course on food packaging was given at Clemson University for representatives from nine developing countries. Short-term consultants were provided to Honduras and Peru. Four issues of SUSTAIN NOTES were published each addressing a separate topic. These were distributed to approximately 1400 food industry recipients in 50 countries.

1989 - Reconnaissance visits were made to Swaziland, eastern Caribbean islands, and Bolivia. Workshops were held in Honduras (food packaging, requirements for export to U.S., food hydration), Pakistan (mango production and marketing), and Kenya (food processing sanitation and waste disposal). A two-week training course on post-harvest technologies was also offered to the mango growers in Pakistan. Short term consultants were placed in Swaziland, the Philippines, and Peru. Three issues of SUSTAIN NOTES were published, each addressing a separate specific topic, and distributed to approximately 1500 individuals associated with the food industry in 50 countries.

JMCG Activities

In FY90 AID Office of Nutrition asked the Nutrition Foundation to establish a working relationship between the three micronutrient consultative groups, INACG, IVACG and the International Council for the Control of Iodine Deficiency Disorders (ICCIDD). This was accomplished through a series of meetings and conference calls with representatives from all three groups (December 1991, January 1992, April 1992, and October 1992).

Output: The group developed a grid of assessment methods commonly used in the field that could be circulated to program managers interested in any one of the three micronutrients.

To further test the notion that integrated strategies for the three micronutrients might be feasible, a four-member team was selected for a two-week mission to the Philippines. The objective was two fold: 1) to determine the feasibility of developing a country-specific plan for integrated assessment, intervention and evaluation, and 2) to determine if a expert team approach working with counterparts in a specific developing country would be helpful.

The micronutrient mission team consisting of Dr. Abraham Horwitz, Chairman, Dr. James Cook, Dr. John Dunn, and Dr. Keith West worked closely with counterparts in the Philippine Ministry of Health. The Nutrition Foundation provided organizational support and arranged the logistical components of the mission. Team meetings were held in January and April 1993, with two conference calls in May 1993. Helen Keller International in the Philippines provided crucial on-the-ground support. The mission took place 12-16 June 1993.

The team developed a report which was submitted to USAID in the fall of 1993. Their major findings included:

- There are geographic areas in the Philippines where coordinated strategies designed to address vitamin A, iron, and iodine would be appropriate.
- Targeting 6-7 year old school entrant children for micronutrient status surveillance should be considered.
- More emphasis should be placed on implementation of programs.
- Shifting more resources to food-based interventions is appropriate.

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The mission exercise elucidated the complexity involved in coordinating activities for all three micronutrients, but also re-confirmed that combining efforts in several policy and programmatic areas can be more effective than separate, single endeavors. Overall the mission approach is valuable when the host country is eager and able to participate fully in the discussions.

III. SIGNIFICANCE OF ACTIVITIES

Through this cooperative agreement, the Nutrition Foundation, Inc. provided a secretariat function for six different entities, each with its own goals and objectives. These entities ranged broadly in scope which affects the overall significance of the outputs of each.

IVACG is the premier example of how a well-funded, scientifically-oriented entity can have a major impact on a health-related problem in the developing world. Over the course of the past six years and even before, IVACG guided the development of a worldwide commitment to eliminating vitamin A deficiency as a public health problem. IVACG developed manuals for use in the field to assess the extent of vitamin A deficiency, manuals to guide implementation of successful intervention strategies, and manuals for evaluating program success.

IVACG also encouraged the development of a well-educated network of scientists, program managers, policy planners, and donor groups through the IVACG Meetings, the *Xerophthalmia Club Bulletin*, and IVACG publications. By keeping this network informed about the latest scientific findings related to the importance of vitamin A status to child health and survival as well as the success of various intervention strategies, IVACG has served as the linchpin for a global effort to meet the International Conference on Nutrition Goal of eliminating vitamin A deficiency as a public health problem by the year 2000.

INACG is a similar entity, but has not had the same global impact as IVACG. The reasons for this are several and not clearly defined. Funding for INACG during this cooperative agreement has been more limited, thus limiting the ability to develop a large cadre of dedicated policy officials and program managers. INACG did not take the approach used by IVACG of providing an opportunity for individuals outside of the scientific community to interact in the generation of consensus. Furthermore, iron deficiency anemia (IDA), the major focus of INACG, does not result in clearly discernable health effects. This has not aided efforts to convince policy officials to undertake programs to reduce the prevalence of IDA.

Nonetheless INACG has made significant contributions to global efforts to assess the extent of IDA and treat the condition. INACG more recently has embarked on activities related to food-based solutions to preventing IDA. Both the action plan for food fortification programs and the monograph on iron EDTA are examples of the shift to prevention through food. Iron EDTA is the first new fortificant to be promoted for iron fortification in a number

of years. Its increased bioavailability and stability make its potential significant, particularly for hard-to-fortify vehicles like whole wheat flour. INACG's efforts to have the Joint FAO/WHO Expert Committee on Food Additives (JECFA) review the toxicology data amassed on iron EDTA was crucial to promoting the use of this compound. Since it is not currently approved in the United States, developing countries have been reluctant to utilize the compound. The provisional approval from JECFA is an important step, initiated by INACG, toward broad use of this effective fortificant.

The Joint Micronutrient Consultative Group (JMCG) was a brief but beneficial exercise to foster communication among the three micronutrient consultative groups. Concrete progress was made in understanding possible areas of coordination. These undoubtedly will be enhanced through the OMNI Project. The joint mission to the Philippines offered an unprecedented opportunity to promote an integrated approach to solving micronutrient malnutrition. While this approach cannot be universally applied, more such efforts would be beneficial.

Though the Nutrition Foundation was associated with Project SUSTAIN for a limited period of time (two years), this effort was successful. The program is an ongoing program at AID with a different cooperator. Project SUSTAIN offered tangible opportunities to engage multinational food companies in exchanging information and problem solving capability with developing country governments and industry. It is a success story for AID, the developed world imparting practical know-how to the developing world.

The activities of INPF have focussed on behavior change in response to nutrition messages. This is an important tool for micronutrients as well as other nutritional questions. The INPF Steering Committee offered AID the opportunity to support and interact with an outstanding group of developing country nutrition leaders. A key to the success of this group is well-focussed activity.

The Sixth INPF Conference was a successful venture by providing hands on support for the development of nutrition communications programs. It was a logical off-shoot of the 5th INPF meeting by taking broad concepts and putting them into practice. Unfortunately, the long term impact of the training provided was not realized because funds were not available for follow-up activities.

The final entity, INNE, was designed with a limited scope -- engendering communication between the various contractors, cooperators and grantees of the AID Office of Nutrition. It met

its modest goals by bringing together a group of individuals who did not necessarily interact in other ways. Having a theme for the latter two meetings helped to generate a better focus to the discussions. Given the small cost associated with such meetings and the positive feelings they seemed to generate among those involved, INNE was worthwhile.

IV. COMMENTS AND RECOMMENDATIONS

The Nutrition Foundation, Inc. is proud of the work accomplished under this cooperative agreement and wishes to thank AID for the opportunity to work with the Office of Nutrition to carry out mutually agreed upon activities of importance to the improvement of nutritional status of people in developing countries.

We encourage AID to continue its support of IVACG and INACG through the OMNI Project. This will also further interaction with ICCIDD, thus accomplishing the goals of the JMCG. The IVACG model is successful by keeping vitamin A deficiency on the minds of policy makers, program managers, research scientists, NGOs, PVOs, and donor agencies. The international meetings provide for a broad exchange of information which allows the field to push forward. This large forum provides the opportunity for consensus development and engenders a feeling of optimism necessary for reaching the public health goals.

INACG has taken a different approach which has worked well in some areas -- building a strong scientific base for specific interventions. Both IVACG and INACG have produced a series of outstanding monographs that are used worldwide as guides for policy decisions and for program implementation. INACG has not used the large forum approach, partly because of funding restrictions. Such an approach for iron may be beneficial.

Project SUSTAIN is a unique contribution by AID to the transfer of knowledge about food processing from the developed world to the developing world. Such knowledge is essential for the development of adequate food supplies worldwide. We encourage AID to continue this project.

Clear direction is generally necessary for any successful project. It has been particularly true of the activities undertaken by the Nutrition Foundation under this cooperative agreement. Whether it is the primary focus of the entity, such as is the case for INPF, or the need to focus the work of a specific task force, when clear objectives were embraced, progress was achieved more rapidly and with greater certainty.

Dr. Frances Davidson and Dr. Samuel Kahn have provided strong guidance to the secretariat throughout the life of this cooperative agreement. The secretariat staff want to commend their efforts and those of Dr. Eunyong Chung in guiding the work conducted under this cooperative agreement. AID's role in setting objectives for these entities is clear. From time to time leadership changes within the Office of Nutrition resulted in reversal of previously agreed upon objectives or uncertainty about direction and priorities. It is

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difficult for the secretariat and the various steering committees to function at their best under such conditions. Therefore, we recommend continuity where possible in administering these programs.

V. SIGNIFICANCE TO AID

This year marks the twentieth anniversary of IVACG. AID's long-term commitment to this program and others such as INACG and Project SUSTAIN must be viewed as a commitment to providing sustainable nutrition programs in developing countries. AID has had the foresight to provide steady funding allowing these programs time to mature. Certainly AID can take credit for the growing awareness that the vitamin A goal set by the World Summit for Children and reaffirmed at the ICN will be met. AID was active when vitamin A deficiency was not on the minds of national leaders throughout the developing world. AID's long-term commitment to vitamin A is a significant factor in the progress over these twenty years.

Sustaining IVACG and INACG for a few more years will assure the greatest pay-off for the US investment in better nutrition for people around the world. Better nutrition means better health and individual development. These, in turn, will mean greater prosperity for the countries in which these healthier people live, the goal of the AID program.

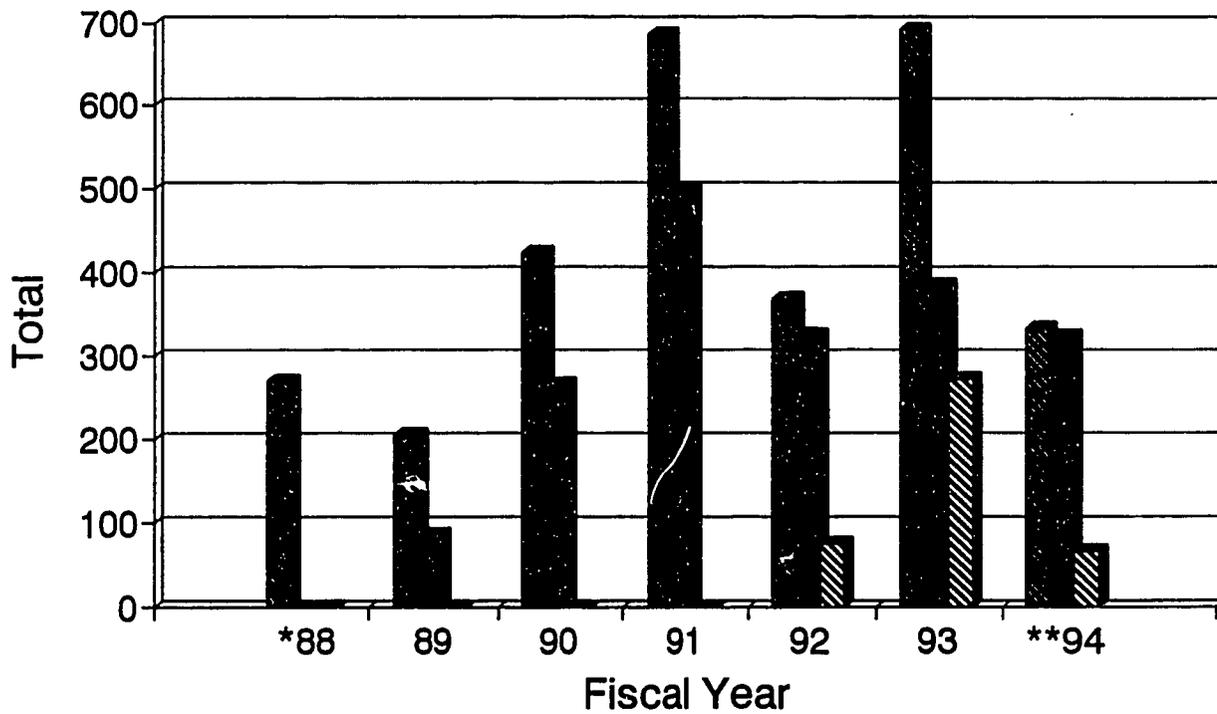
AID has shown through this cooperative agreement a commitment to the strength of the free market for producing food. SUSTAIN is a premier example of the benefit of sharing free market experience to produce a stable food supply for both the developing country whose food supply improves for the donor country who stimulates trade and business opportunities around the world.

The Nutrition Foundation, Inc. is proud of its long relationship with AID and the good work that these two organizations have accomplished together for the betterment of the people of our world.

VI. FINANCIAL SUMMARY

Tables 2 and 3 provide a financial summary for Cooperative Agreement DAN-5115-A-00-7114-00. The Nutrition Foundation, Inc. is please to have exceeded the in-kind contribution requirement of the cooperative agreement. A total of \$1,429,131.56 was provided by the Nutrition Foundation, Inc. as in-kind contributions, a significant component of the total funds expended under this cooperative agreement.

Table 1
Information Requests



* INACG Data Not Available

** 1 October 1993-31 May 1994



TABLE 2

THE NUTRITION FOUNDATION, INC.
Cooperative Agreement Number DAN-5115-A-00-7114-00

FINANCIAL SUMMARY
October 1, 1987 through May 31, 1994

Fiscal Year	IVACG	INACG	SUSTAIN	INPF	INNE	TOTAL
1988	324,196.01	62,824.61	156,025.68	-----	-----	543,046.30
1989	716,299.03	331,218.88	735,505.62	-----	-----	1,783,023.53
1990	178,812.46	101,793.24	6,977.42	10,170.54	36,613.48	334,367.14
1991	515,207.08	201,326.28	-----	377,328.33	33,153.55	1,127,015.24
1992	240,948.75	100,266.56	-----	20,485.73	26,816.28	388,517.32
1993	668,316.96	105,710.73	-----	41,519.54	-----	815,547.23
1994	174,504.51	50,891.52	-----	41,347.76	-----	266,743.79
TOTALS	2,818,284.80	954,031.82	898,508.72	490,851.90	96,583.31	5,258,260.55
IN-KIND CONTRIBUTION	862,408.61	86,607.95	397,555.00	67,652.00	14,908.00	1,429,131.56
NON-REIMBURSABLE	72,835.19	275,053.32	7,541.76	4,276.93	3,133.90	362,841.10
TOTAL FED. SHARE	1,883,041.00	592,370.55	493,411.96	418,922.97	78,541.41	3,466,287.89

At the inception of the cooperative agreement, the negotiated cost-sharing (matching) amount was established at \$1,400,000. The Nutrition Foundation, Inc. exceeded this amount by \$391,972.66 -- providing a total of \$1,791,972.66 in cost-sharing (matching) funds.

TABLE 3

Cooperative Agreement DAN-5115-A-00-7114-00
Cooperative Agreement and Overall Modification History

	Increase	Total
Initial Obligated Amount 11/23/87		\$1,181,938.00
Modification #1 11/09/88	\$229,000.00	\$1,410,938.00
Modification #2 09/19/89	\$60,000.00	\$1,470,938.00
Modification #3 02/27/90	\$60,000.00	\$1,530,938.00
Modification #4 08/21/90	\$565,000.00	\$2,095,938.00
Modification #5 05/08/91	\$300,000.00	\$2,395,938.00
Modification #6 07/11/91	\$303,000.00	\$2,698,938.00
Modification #7 09/30/92	\$585,882.00	\$3,284,820.00
Modification #8 08/06/93	\$191,444.00	\$3,476,264.00
TOTAL OBLIGATED AMOUNT		\$3,476,264.00

Specific Project Allocation of Funds

	IVACG	INACG	INPF	INNE	SUSTAIN	TOTAL
Initial 11/23/87	772,991	50,000	----	----	358,947	1,181,938
Mod. #1 11/09/87	----	229,000	----	----	----	229,000
Mod. #2 09/19/89	----	----	----	----	60,000	60,000
Mod. #3 02/27/90	----	----	----	----	60,000	60,000
Mod. #4 08/21/90	300,000	150,000	85,535	15,000	14,465	565,000
Mod. #5 05/08/91	300,000	----	----	----	----	300,000
Mod. #6 07/11/91	50,000	----	228,000	25,000	----	303,000
Mod. #7 09/30/92	313,357	131,294	103,942	37,289	----	585,882
Mod. #8 08/06/93	146,693	42,052	1,446	1,253	----	191,444
SUB-TOTALS	1,883,041	602,346	418,923	78,542	493,412	3,476,264

Publications Developed During the Cooperative Agreement

IVACG Publications

1. *Vitamin A Supplements: A Guide to Their Use in the Treatment and Prevention of Vitamin A Deficiency and Xerophthalmia (out of stock)*
2. *Vitamin A Emergency and Relief Operations*
3. *Methodologies for Monitoring and Evaluating Vitamin A Deficiency Intervention Programs*
4. *Guidelines for the Development of a Simplified Dietary Assessment to Identify Groups at Risk for Inadequate Intake of Vitamin A*
5. *Nutrition Communications in Vitamin A Programs: A Resource Book*
6. *A Brief Guide to Current Methods of Assessing Vitamin A Status*
7. *Toward Comprehensive Programs to Reduce Vitamin A Deficiency: A Report of the XV International Vitamin A Consultative Group Meeting*

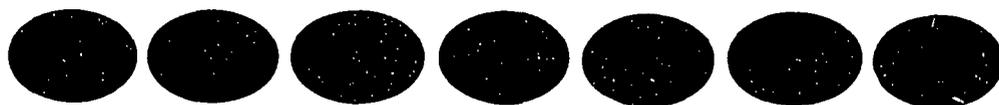
INACG Publications

1. *Guidelines for the Control of Maternal Nutritional Anemia*
2. *Combatting Iron Deficiency Anemia Through Food Fortification Technology: An Action Plan*
3. *Combating Iron Deficiency Anemia Through Food Fortification Technology: XII INACG Meeting Summary*
4. *Iron EDTA for Food Fortification*

INPF Publications

1. *Effective Nutrition Communication for Behavior Change*

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



WORLD HEALTH ORGANIZATION
GENEVA

**GUIDELINES FOR THE USE OF
VITAMIN A IN EMERGENCIES
AND RELIEF OPERATIONS**

A REPORT OF THE INTERNATIONAL VITAMIN A CONSULTATIVE GROUP (IVACG)⁵

Introduction

The following guidelines were developed in recognition of the special needs of malnourished populations during famine and the logistical constraints of relief operations. Shortages of all kinds are often severe under these circumstances, and health personnel may not be trained to recognize vitamin A deficiency. The guidelines are written in broad terms to anticipate most situations but should be adapted to reflect local logistical constraints and any other important factors. They differ somewhat from the guidelines on the use of vitamin A supplements recently published by WHO and IVACG[®] because they address situations that are quite different in terms of nutritional status and logistical resources.

The prevention and control of vitamin A deficiency should always be an integral part of relief operations during famine; they can be achieved effectively through vitamin A supplementation. Other measures, such as breast-feeding promotion, fortification of relief foods with vitamin A, and, whenever possible, use of local vitamin A-rich dietary sources, should also be considered.

1. Populations at risk

The guidelines apply primarily to famine where a population is malnourished and is likely to have minimal vitamin A stores. Vitamin A supplementation should be initiated as a priority procedure if a population in a relief operation meets any of the following criteria:

- a) The population originates from a known or presumed vitamin A-deficient area
- b) Active xerophthalmia (night blindness, Bitot's spots, xerosis or ulceration of the cornea, keratomalacia) is present in the population affected by the emergency
- c) The population has been deprived of normal food supply for several months and is subsisting on relief food supplies

These actions should not be delayed while survey results are awaited.

2. Prevention programs

Prevention measures should include the provision of large-dose vitamin A supplements and vitamin A-fortified relief foods and the use of local vitamin A-rich food sources when available. Breast milk is also a good source of vitamin A. Infants and preschool-age children and pregnant and lactating women should have priority access to supplemental relief foods containing natural vitamin A or fortified with vitamin A. Because of the often-unknown vitamin A content of relief food supplies and the special needs of those at risk of a deficiency, mass distribution of large-dose vitamin A supplements is one of the most effective public health measures for prevention (Table 1).

- a) **Infants and children** less than 6 years of age or less than 110 cm in height are at highest risk of developing severe vitamin A deficiency because of their high metabolic demands and frequent episodes of illness, such as diarrhea, respiratory diseases, and particularly measles. First priority therefore should be given to this group by providing large-dose (200,000 IU) oral vitamin A supplements every 3 months. Infants younger than 12 months of age should be given 100,000 IU of vitamin A every 3 months beginning a few weeks after birth.

During famine, xerophthalmia may also be found in older children and in adults. It may be necessary to extend the age of periodic supplements accordingly.

- b) **Lactating women** provide the major source of vitamin A for their infants through breast-feeding, but many women are themselves at high risk of deficiency. Therefore, lactating women should receive a large-dose supplement (200,000 IU) at or within 2 months of delivery.
- c) **Pregnant women** are best supplemented through their diet or daily small doses (<10,000 IU) because of the possible teratogenic effects of large doses of vitamin A, possibly leading to fetal malformations primarily during the first trimester of pregnancy. If this is not feasible, a large-dose (100,000 IU) supplement can be given during the last trimester (e.g., at the time of tetanus toxoid administration).

3. Treatment of xerophthalmia

- a) Anyone with active xerophthalmia should receive orally the full schedule of three 200,000 IU doses of vitamin A (Table 2). The first dose should be given immediately on diagnosis, the second the next day, and the third 1–4 weeks later. Children less than 12 months of age should receive half of this amount (100,000 IU per dose). Corneal lesions from vitamin A deficiency are a medical emergency requiring immediate treatment with vitamin A and referral, if possible, to a hospital.
- b) **Pregnant women** with milder signs of xerophthalmia (i.e., night blindness or Bitot's spots) should receive supplemental dietary vitamin A and/or 10,000 IU supplements daily. The decision to use a large dose of vitamin A in case of active corneal lesions must be balanced against potential teratogenic effects during the first trimester of pregnancy.

4. High-risk priority groups

Certain subgroups who are at especially high risk for developing active xerophthalmia should be given special attention when seen by the health services (Table 3):

- a) **Severely malnourished children and adults** should receive the full treatment schedule (three doses). Malnourished children with active xerophthalmia are prone to relapse and may require a fourth dose at 4–6 weeks after the start of treatment.

b) **Children with measles, diarrhea, and lower respiratory diseases** should receive one supplemental dose at the time of diagnosis. However, in Africa, where measles is especially severe and vitamin A deficiency endemic, the full vitamin A treatment schedule (three doses) should be given.

5. Supply of vitamin A

Currently the most appropriate vitamin A preparation is the soft gelatin capsule, which contains 200,000 IU of vitamin A and 40 IU of vitamin E. Capsules can be obtained through UNICEF and should be part of relief agencies' lists of essential drugs. They have a shelf life of up to 2 years when stored appropriately. For half doses of 100,000 IU, the nipple of the capsule should be cut, 2-3 drops squeezed out, and the remaining liquid squeezed into the child's mouth. Sugar-coated tablets containing 10,000 IU of vitamin A can be stocked if daily distribution to pregnant women is planned. Capsules and tablets should be stored centrally for periodic mass distribution but should also be made available to hospitals and feeding centers. Preventive doses should be distributed to people when they are first seen and, if at all possible, records should be kept to avoid under- or overdosing.

Vitamin A supplementation should be continued until adequate dietary vitamin A intake has been achieved. Later, it may become integrated in a national or regional vitamin A-deficiency control program, which should include nutrition education.

Side effects of high-dose vitamin A – chiefly headache, nausea, vomiting, and somnolence – occur in a small percentage of children, especially in infants or grossly underweight children receiving the full 200,000 IU dose. The side effects are transient and will resolve themselves within hours with no long-term sequelae.

6. Other sources of vitamin A

Dried skim milk and other common relief food supplies should be routinely fortified with vitamin A. If not labeled as fortified, they should be assumed to be unfortified and not counted on as a supplementary dietary source.

The feasibility of promoting family, community, and in-camp gardening during relief and rehabilitation efforts should be given serious consideration.

TABLE 1 – Prevention Schedule

Children between 1 and 6 years of age or less than 110 cm in height (may be adjusted up to puberty)	– 200,000 IU vitamin A orally every 3 months
Infants less than 12 months	– 100,000 IU vitamin A orally every 3 months
Lactating women	– 200,000 IU vitamin A orally once during the first 2 months after delivery
Pregnant women	– No more than 10,000 IU per day during first half of pregnancy or, when necessary, 100,000 IU orally once during last trimester of pregnancy

TABLE 2 – Treatment Schedule

Immediately on diagnosis	– 200,000 IU vitamin A orally*
Next day	– 200,000 IU vitamin A orally*
1–4 weeks later	– 200,000 IU vitamin A orally*

* Use half dose for infants less than 12 months of age.

TABLE 3 – High-priority Risk Groups

Children and adults with severe protein-energy malnutrition	– Full treatment schedule* and continue in prevention program
Children with measles	– Single dose or full treatment schedule (see text)*
Children with diarrhea, lower respiratory tract disease, or other acute infections	– 200,000 IU vitamin A orally* once and continue in prevention program

* Use half dose for infants less than 12 months of age.

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These guidelines were developed on the recommendation of the IVACG meeting in Hyderabad, India, September 1985. The initial draft was developed by Dr. Rita Leavell and Victoria Sheffield of Helen Keller International based on a document on vitamin A supplementation that was collaboratively written by Centers for Disease Control, Helen Keller International, International Center for Epidemiologic and Preventive Ophthalmology, and World Health Organization. (See third bibliographical reference.)

This document has been reviewed and modified by the IVACG steering committee. The final draft was prepared by Dr. Edouard M. DeMaeyer.

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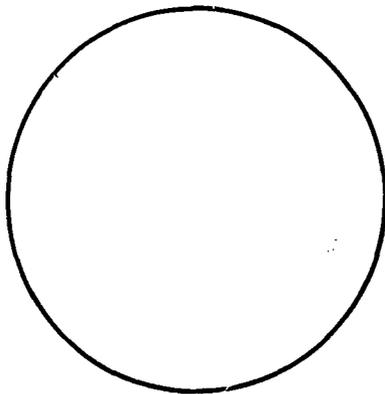
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The publication of these guidelines is made possible through a cooperative agreement between the Agency for International Development of the United States of America and The Nutrition Foundation, Inc., Washington, D.C. Other publications are available from the IVACG Secretariat.

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Published September 1988



Guidelines for the Control of Maternal Nutritional Anemia

A Report of the International Nutritional Anemia Consultative Group (INACG)[®]

I. Introduction

Anemia is a major and pressing problem. Recent World Health Organization (WHO) statistics indicate a worldwide prevalence of about 30%, with even higher figures in developing countries. Young children and pregnant women are the most affected groups, with an estimated global prevalence of about 40% and 50%, respectively. Although many causes of anemia have been identified, nutritional deficiency due primarily to a lack of bioavailable dietary iron accounts for well over half the total number of cases. Deficiency of the vitamin folate is a contributing factor in many areas. Nutritional anemia is most prevalent in Africa and South Asia, but even in industrialized countries a significant number of women have insufficient nutrient reserves to meet the increased requirements of pregnancy. These guidelines outline short- and long-range strategies for controlling prenatal nutritional anemia.

II. Consequences of Iron and Folate Deficiency

Consequences to the Mother

Iron needs increase significantly during pregnancy because of growth of the fetus and placenta

Women frequently enter pregnancy with inadequate iron stores, and thus the increased demands associated with pregnancy result in anemia.

and expansion of the mother's blood volume. Women frequently enter pregnancy with inadequate iron stores, and thus the increased demands associated with pregnancy result in anemia—i.e., a decline in hemoglobin concentration to well below the normal range for healthy pregnant women. Adult women living at sea level are anemic when hemoglobin levels fall below 12.0 g/dL in nonpregnant women or below 11.0 g/dL in pregnant women.

Anemia with hemoglobin concentrations below 11.0 g/dL is associated with decreased work capacity and mental performance and probably with impaired resistance to infection. Anemic women are less tolerant of blood loss at delivery, particularly when hemoglobin levels fall below 8.0 g/dL. When malaria and/or hookworm complicate iron deficiency, anemia can be more severe, with hemoglobin levels below 6.0 or even 4.0 g/dL. At 6.0 g/dL, evidence of circulatory decompensation becomes apparent. Women experience breathlessness and increased cardiac output at rest. At this stage, added stress from labor, sponta-

neous abortion, or other major complications can result in maternal death.

Without effective treatment, maternal death from anemic heart failure and the effects of severe hypoxia is likely with a hemoglobin concentration of 4.0 g/dL. Even a blood loss of 100 mL can cause circulatory shock and death. Moreover, malaria and pregnancy both increase folate needs, and folate deficiency compounds anemia.

Identify and reinforce those local dietary and health practices that improve iron nutrition.

Consequences to the Newborn

Low birth weight and increased perinatal mortality are associated with maternal anemia. Low birth weight is a major factor in subsequent infant morbidity and mortality. Any intervention that decreases the prevalence of low birth weight reduces infant mortality. Maternal iron and folate deficiencies have relatively little effect on hemoglobin concentrations in the newborn. Nevertheless, a major benefit of preventing these deficiencies in the mother is a healthier baby.

Benefits of Preventing Iron and Folate Deficiencies

To the mother:

- Improved work capacity
- Improved mental performance
- Improved resistance to infection
- Safer pregnancy and delivery

To the newborn:

- Higher birth weight
- Improved health

III. Guidelines for Short-Range Intervention

Iron Supplementation

Programs for the control of maternal nutritional anemia aim to provide sufficient absorbable iron to women before and during pregnancy. As a short-range measure, give all pregnant women an oral iron preparation at the first prenatal visit. This should occur by the fifth month of pregnancy. Continue treatment throughout the remainder of pregnancy and during the first months of lactation. Ferrous sulfate is inexpensive and is usually the preparation of choice. A daily dose of 120 mg elemental iron in two tablets containing 60 mg each (300 mg hydrated ferrous sulfate contains 60 mg iron) taken on an empty stomach is preferred. However, in the presence of undesirable side effects, the dose may be given with or immediately after a meal. Some women experience minor side effects, such as a change in stool character or abdominal distress, especially during the first week. Assure them that these mild symptoms are temporary. If the side effects are debilitating, minimize them by dividing the dose between two meals, or start with smaller daily doses of 30 mg or 60 mg iron. In women with relatively mild iron deficiency, a single tablet providing 60 mg per day is probably adequate.

Folate requirements also increase during pregnancy. Some prenatal supplements contain a combination of 60 mg iron and 250 μ g folate, providing 500 μ g folate daily when two tablets are taken. The cost of iron tablets is not increased significantly when folate is added. Folate deficiency is not a problem in all populations, but routine addition of folate to prenatal iron supplements will maintain adequate folate status in individuals whose diets supply insufficient folate.

Importance of the Delivery System

The delivery system is critical to a supplementation program. Many iron-supplementation programs have failed because the tablets did not reach the mothers or the mothers did not take them.

Schedule of Iron Supplementation for Pregnant Women

Pregnant women from 4th or 5th month of pregnancy through early lactation:

Two tablets, each containing 60 mg elemental iron* and 250 µg folic acid, taken once daily**

* 300 mg ferrous sulfate (hydrated) is equivalent to 60 mg elemental iron

** Usual administration is one tablet, two times daily, without food. In the presence of undesirable side effects, take dose with or immediately after a meal, or decrease dose to 30–60 mg daily for a week before taking full dose.

Exert all efforts to achieve reasonable program efficiency.

Generally, iron tablets can be distributed through existing channels of the country's health care delivery system. The program must be considered integral to (and not added on to) the system. Iron supplementation is usually integrated into maternal and child health (MCH) programs within the context of primary health care. Attendance at prenatal clinics is often poor in developing countries, especially in rural areas. Use community health care workers to reach mothers and increase distribution. Alternatively, use traditional care givers such as midwives or traditional birth attendants.

To ensure efficient delivery of supplements and a high level of adherence, implement the following before and throughout the course of the program:

1. Obtain the full commitment of health policy makers and planners at the top level and managers at the middle level through intensive and periodic orientation in the program's benefits and its place in the health care delivery system.

2. Motivate traditional care givers and supervise them closely.

3. Educate, train, and retrain all personnel adequately.

4. Ensure a continuous supply of supplements and provide other logistic requirements (e.g., storage areas and monitoring forms).

5. Educate mothers and the community (including husbands, local leaders, adolescent girls, and young women) about the program's importance, citing benefits they will derive from the program within the context of their own health priorities. Use traditional community and women's organizations (including female initiation societies), social clubs, and schools to maximize community involvement, cooperation, and support.

6. Assure mothers that the side effects of iron supplements are harmless and temporary. Provide for dosage changes if side effects persist.

7. Monitor program implementation continuously and evaluate program effectiveness periodically.

IV. Guidelines for Long-Range Intervention

The success of interventions depends on the participants' perception that the program addresses their own health interests and that the project is supported by local and national leaders.

Dietary modification and fortification are the most effective long-range strategies for alleviating nutritional anemia. Fortification has the advantage that it increases the iron content of the diet without a change in dietary habits. However, there are problems in identifying foods suitable for fortification and absorbable iron compounds compatible with those foods. An alternative is to improve iron nutrition by increasing the bioavailability of dietary iron and by modifying dietary habits (e.g., by increasing the intake of ascorbic acid-containing foods and reducing the intake of foods that are known to inhibit iron absorption). This may

be difficult, especially in populations with very limited financial and food resources.

Iron Fortification

The effectiveness of any fortification program is enhanced by determining the prevalence of and reasons for iron deficiency in the population. First, establish the relative importance of total dietary iron content, decreased bioavailability, and increased blood losses from, for example, hookworm infection. Failure to eliminate hookworm may negate the effects of an otherwise effective fortification program.

Elements for Successful Iron Supplementation Programs

- Commitment from top-level policy makers and planners down to village-level implementers
- Motivated and closely supervised primary-level workers
- Adequately educated and trained personnel at all levels
- Adequate logistics
- Well-informed, motivated mothers and involved, supportive communities
- Continuous monitoring and periodic evaluation

Next, identify a suitable food or foods to fortify. Choose foods with the following characteristics:

- Commonly and widely consumed and preferred by the population at risk
- Centrally processed
- Technologically and economically possible to fortify

Successful pilot fortification programs have used whole wheat flour, salt, sugar, 26%-fat milk powder, cookies, curry powder, and fish sauce as vehicles and various iron compounds as fortifi-cants. Fortification should produce minimal

changes in the taste, texture, and appearance of foods. Targeted groups may reduce their consumption of fortified staples or condiments if the foods are radically changed, thus countering the aims of the program.

Identifying foods suitable for fortification may be difficult in developing countries, where few foods are centrally processed. Although salt and sugar may be suitable for national and regional fortification programs, other foods may be better for programs targeted at specific population groups. For example, in a successful program for schoolchildren in Chile, cookies containing dried hemoglobin were provided with school lunches. Similarly, infants in that country were fed formula prepared from full-fat (26%) milk powder fortified with both iron and ascorbic acid.

Another problem is the poor bioavailability of most dietary iron. Consequently, any fortification iron added to the diet also is poorly absorbed. Consider these two strategies to overcome the problem: Use an iron compound that is less susceptible to dietary inhibitors; add ascorbic acid, a potent promoter of iron absorption, to the iron fortificant.

Regarding dietary fortification with folate, data indicate that a cereal such as maize can be fortified successfully with folate and that the consumption of folate-fortified maize prevents prenatal folate deficiency.

Fortification programs are urgently needed because they offer the best way to ensure that women enter pregnancy with normal hemoglobin concentrations and sufficient nutrient reserves to cope with the extra requirements of pregnancy. *A successful fortification program requires cooperation among scientists, the food industry, and government agencies.*

Dietary Modification

Where opportunities for fortification are limited, increase iron intake and improve iron and folate bioavailability by modifying the population's methods of selecting, processing, and consuming food. It is rarely desirable or easy to change people's eating habits radically. Therefore, be familiar with existing dietary conditions and the availability and cost of foods, and base dietary modifications on that knowledge. Be aware of food taboos (especially before, during, and just

after pregnancy), intentional caloric restriction during pregnancy, the symbolic value of particular foods, the use of traditional medicines, and preferences for foods that affect the absorption of iron or folate. Local conversion from iron pots to aluminum cookware also may reduce the amount of iron available. These factors will influence the method and extent of dietary modification.

The success of interventions depends on the participants' perception that the program addresses their own health interests and that the project is supported by local and national leaders.

Dietary variety also depends on economic and cultural factors. Nevertheless, in addition to increased intake of foods rich in bioavailable iron, encourage increased eating of vegetables and fruits high in vitamin C with the main meal. Identify and reinforce those local dietary and health practices that improve iron nutriture. Discourage consumption of tea and other tannin-containing products with meals, because these products can reduce iron absorption.

Complicating Conditions

In communities in which iron deficiency anemia is complicated by malaria, hookworm infection,

and schistosomiasis, treat these conditions as well. Where malaria is endemic, administer antimalarial drugs at the mother's first prenatal visit and provide them throughout pregnancy.

Bear in mind the importance of clean water. A safe water supply decreases enteric infections and increases nutrient absorption.

Suggested Reading

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