

**Combating
Iron
Deficiency
Anemia
Through
Food
Fortification
Technology**

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Introduction

The XII International Nutritional Anemia Consultative Group (INACG) Meeting, held 5-7 December 1990 at the Pan American Health Organization in Washington, D.C., focused on the theme, "Combating Iron Deficiency Anemia Through Food Fortification Technology." The meeting brought together individuals from industry, academia, governments, and private nonprofit organizations who would work as partners to develop an effective strategy for food fortification.

Iron deficiency, the most prevalent nutritional disorder in the world, affects primarily women and children. Elimination of a health problem of this magnitude, with its complex political, social, and economic ramifications, requires innovative thinking coupled with political commitment. Long-term solutions to iron deficiency require large-scale, integrated prevention programs which, of necessity, demand multisectoral partnerships. Programs such as iron fortification of food have the potential to prevent iron deficiency in substantial segments of the population. They have proven successful in developed countries. Now, with emerging technologies for fortification, it is reasonable to expect iron fortification programs to be conducted in developing countries as well.

The group's objective was to produce an action plan for developing national iron fortification programs through partnerships among industry (both multinational and national), donor agencies (multilateral, bilateral, and nongovernmental), and country leadership (national, provincial, state, and local government). Through multidisciplinary working groups, participants at the meeting formulated the design and implementation of a national initiative against iron deficiency anemia, emphasizing iron fortification of food. The Action Plan presented in this document represents the synthesis of ideas generated by the working groups.

Background

Worldwide, more than 1.6 billion people are affected by anemia. More than half of these cases are preventable and treatable iron deficiency anemia. Because iron deficiency has significant consequences for all age groups and both sexes, elimination of this nutritional problem would do more than any other single program to achieve the goals of world health.

Nutritional anemia in infants is associated with impaired cognitive development which, if not corrected, may affect ability to learn. Iron deficiency in women of childbearing age increases the hazards associated with complications of pregnancy and of prematurity and low birthweight, causing infants to enter life with suboptimal iron reserves. Definitive studies report reduced work capacity of iron-deficient laborers, who therefore are less productive and, ultimately, economically insecure.

Although in principle, prevention and treatment of nutritional iron deficiency are simple, i.e., increasing iron intake through diet, achieving this goal is not. Supplementation of individuals in susceptible population groups with bioavailable iron salts corrects the problem. However, the health infrastructure required for delivery of these supplements to those in need often limits the success of this approach.

A workshop convened in June 1990 by the Administrative Coordinating Committee/Subcommittee on Nutrition of the United Nations (ACC/SCN) considered how to increase the effectiveness of programs for control of iron deficiency, particularly supplementation. The participants considered issues of supply and logistics, service delivery systems, training, choice of iron fortificant, dosage, assessment of iron status during pregnancy, compliance with iron therapy, and monitoring compliance. They concluded that a comprehensive, up-to-date review of fortification interventions was needed. The XII INACG Meeting was planned and conducted in response to this need.

No change in existing food beliefs and practices is required to integrate iron-fortified foods into the conventional food system, as value-added products require. By judicious selection, fortified foods can be targeted to reach either specific population groups or the general population. The process of fortifying food with iron, however, is not a simple one. A suitable vehicle to be fortified must be identified, one that is regularly consumed by the target group; the iron fortificant must not alter the taste or appearance of the vehicle, it must have acceptable bioavailability, and an appropriate and specific policy framework and infrastructure must exist to ensure the success of a fortification program through food fortification.

Discussions held within the working groups at the XII INACG Meeting led to consensus on a number of issues. This Action Plan presents the consensus on strategies for combating iron deficiency anemia through food fortification.

Consensus Statement

Points of consensus reached by workshop participants are as follows:

- There is clear evidence of the widespread prevalence of iron deficiency anemia in the developing world.
- Those most critically affected by iron deficiency are children six months to two years of age and women of reproductive age. This public health problem has significant economic impact on health care costs, wasted educational resources, and lost productivity.
- Affected segments of the population can be readily identified, and their patterns of food intake can be determined.
- Technology either exists or can be developed to fortify foods with readily bioavailable iron compounds.
- Developing political resolve and commitment of a country's leadership is essential to implement an effective program.
- To maintain political commitment and ensure development of a distribution program affordable by both industry and the consumer, target groups (consumers) must recognize the benefits gained from their improved iron status and encourage the continuation of long-term programs.

Recommendations

Based on the consensus reached about iron deficiency anemia, the XII INACG Meeting participants recommended the following guidelines for developing countries to use in establishing a long-term national strategy:

- Establish a national coordinating committee to link the various sectors responsible for different aspects of food fortification. Countries with a high prevalence of iron deficiency should establish programs that mandate iron fortification of country-specific foods to achieve long-term, sustainable prevention of iron deficiency. These programs should be within the context of a broader anemia-control strategy requiring the commitment of political leadership.
- Involve leadership at the ministerial level in health and other sectors, but recognize that consumer groups and public health activists serve an important role in obtaining political commitment and influencing donors and industry.

- Ensure that food fortification technology, regulatory and monitoring mechanisms, consumer research, and information dissemination are available. Obtain assistance through donors or multinational food corporations where needed.
- Solicit initial financial support from donor agencies. Aid development of a self-sustaining fortification program by promoting recognition of the benefits to consumers and permitting a reasonable profit for the supplying industry.

Facilitating and Implementing Roles

A multisectoral partnership is imperative in establishing a successful and sustainable program for iron fortification of food. These partners are a national coordinating committee, country agencies, international donor agencies, industry, and consumers. The workshop participants' view of the role of each is stated below.

National Coordinating Committee

An essential first step for a national program for iron fortification of food is the formation of a national coordinating committee. The committee should include members from concerned ministries (e.g., health, education, agriculture, and planning), involved industries (multinational or national), relevant academic and technology groups (research, nutrition, public health, and food technology), public health and food consumer groups (where they exist), and others with interest and expertise in food and nutrition, public health, consumer education, and marketing. This group's primary role is to clarify and define the problem of implementing an iron fortification program in country-specific terms and propose a strategy to overcome impediments. Issues to address include

- need for fortification,
- legislation and enforcement mechanisms essential for establishment of iron fortification programs,
- selection of the appropriate food vehicle for a given country,
- selection of the appropriate bioavailable iron source,
- feasibility of producing a fortified product,
- cost factors (e.g., fortificant and distribution costs),
- funding sources over the short, medium, and long term,
- proposed system of distribution,

- type of system for monitoring effectiveness,
- design of programs to increase consumer awareness (social marketing), and
- type of management structure required to implement the program and provide technical assistance and oversight.

This coordinating committee should consider the program from the standpoint of both short-term and long-term objectives. Financial support from donor agencies or other sources may be necessary to underwrite initial start-up costs until the program's value can be successfully demonstrated to target groups. From the outset the long-term goal is to achieve program self-sufficiency. This can be accomplished if industry markets a profitable product that consumers perceive as providing them with sufficient value to justify the minor additional cost.

Figure 1 shows the proposed interactions among donors, country agencies, and industry at the national level, with the national coordinating group serving as the link for strategy development. Similar linkages should exist at the community level, with the national level of activity serving as an example. These community-level linkages are depicted in Figure 2.

Figure 1.

Linkages and Partnerships National Level

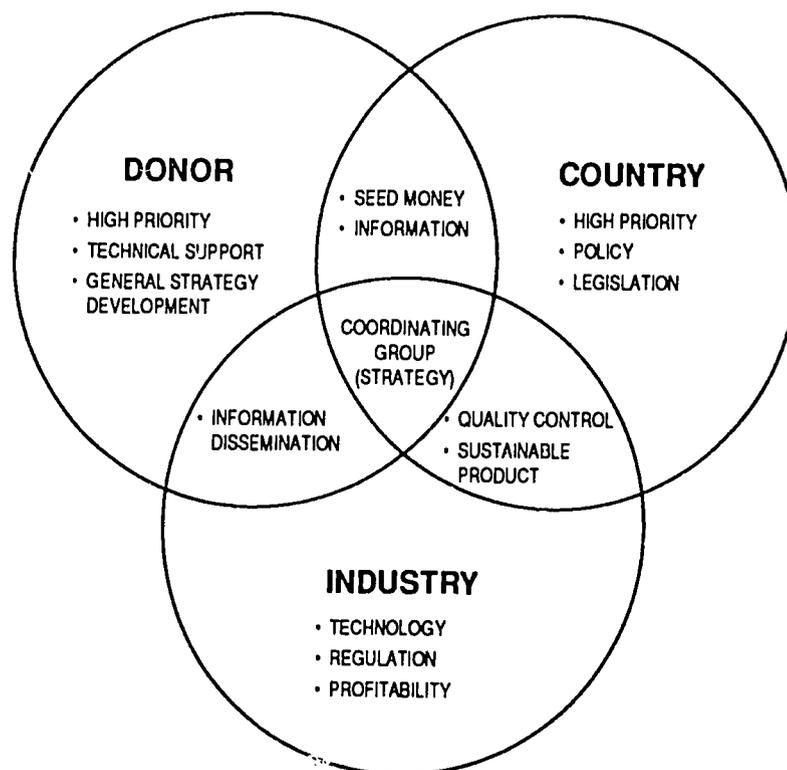
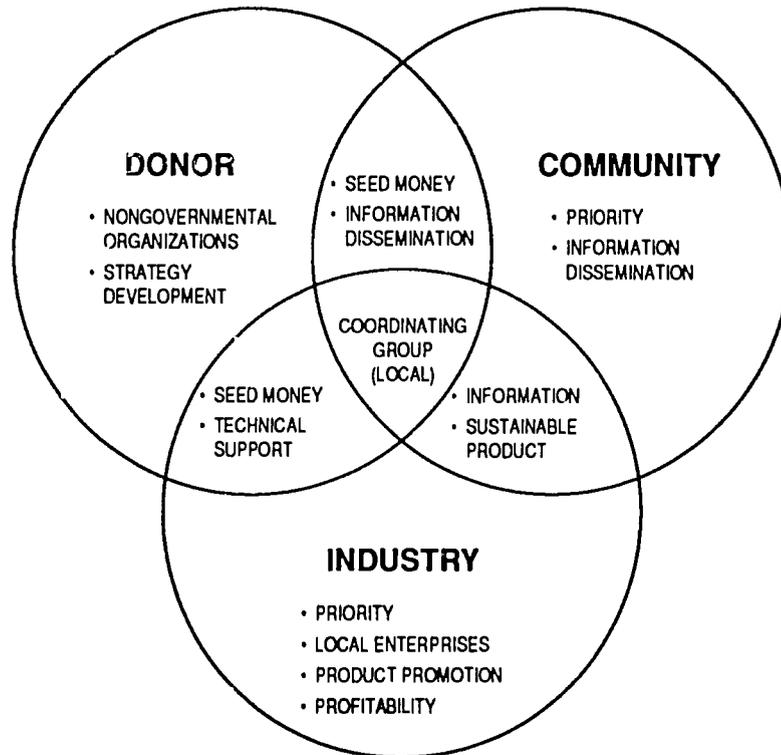


Figure 2.

Linkages and Partnerships Community Level



The responsibilities of each separate group as perceived by the workshop participants are itemized below.

National Agencies

The primary tasks of national agencies in the multisectoral partnership are

- to help organize a national planning and coordinating committee for development of a country-specific program,
- to convince the political leadership of the significance of iron deficiency anemia in their country,
- to solidify commitment at the ministerial level and to create the necessary policies for implementation of the program, and
- where necessary, to initiate legislation establishing the program.

Provincial, State, and Community Agencies

Agencies at the state, provincial, and community levels should

- recognize and champion the need for the program and promote its value to the population affected, and
- facilitate implementation of the program at the local level.

Country Institutions

Country institutions can

- gather the epidemiologic and food consumption data needed to identify the appropriate fortification vehicle,
- assist in technological development to provide an effective fortification vehicle,
- participate in evaluation of the program, and
- assist in education and dissemination of information.

International Community

Donors and international agencies need to

- increase awareness in governments of seriously affected countries of the problem of iron deficiency anemia,
- assist in the collection, development, and packaging of information needed to obtain the political commitment needed to solve this problem,
- advocate the formation of a national committee to coordinate implementation of a food fortification program,
- provide start-up funds to aid in developing a strategy and initiating action where needed, and
- provide appropriate involvement of the committee for the Codex Alimentarius.

Industry (National or Multinational)

National and multinational companies need to

- participate in the national coordinating committee to aid in defining a feasible, affordable fortification strategy designed for the target population,

- assist in the development of appropriate products, both the fortificant and the food product to deliver this fortificant, and
- define and develop quality assurance programs.

Industry (Local)

Local industry must

- prepare the specified product, maximizing use of local materials where feasible to minimize costs,
- maintain an effective quality control program to ensure safe delivery of the specified product, and
- assist in the promotional and educational efforts to reach the target population.

Consumers

Consumer awareness of the serious adverse effects of iron deficiency anemia can be a strong factor in obtaining the necessary political support for initiating and sustaining government action. Nongovernmental organizations can help develop local solutions, possibly through organizations of local industries serving a village or area, and can demonstrate the effect of an appropriate iron fortification program at the village level. This effort, in turn, can lead to a growing demand for solutions at the national level. Coordination of national and local activities is important to assure that the actions of the local groups are appropriate and that national activities address local concerns.

INACG

The principal role of INACG is to provide technical assistance and guidance to both planners and implementers. INACG has shown leadership in identifying the extent of iron deficiency anemia in the developing world and defining the target groups most affected. This group has the ability to access the technology of iron fortification.

INACG should now move into a proactive role, coordinating and mobilizing the resources of donor agencies and developed countries to address iron deficiency anemia through appropriate fortification of food in developing countries.

Implementing the Action Plan: Immediate Steps

Iron deficiency anemia is not the only public health problem faced by developing countries. The political leadership, including the health- and food-related ministries in these countries, faces many urgent issues. Medical groups tend to view treatment of

a prevalent disease as a higher priority than the prevention of disease through such mechanisms as food fortification. To gain their attention and that of donor agencies, an advocate recognized at the international level is needed to reinforce the message that benefits can result from addressing the widespread nutritional problem of iron deficiency anemia.

Immediate steps to maintain the momentum gained at the XII INACG Meeting are outlined below.

Action by Public Health Leaders in Developing Countries

- Develop or update the policy framework for anemia control, emphasizing iron fortification. In countries where the iron content of the local diet is not a limiting factor, the policy framework should place equal emphasis on preventing iron losses and increasing consumption of foods that promote absorption of the iron already present.
- Collaborate with industry and consumer groups to form a national consortium oriented to achieve significant reduction in prevalence and severity of anemia within five to 10 years and develop a commensurate plan of action.
- Identify technical assistance and foreign exchange requirements to facilitate action by donor agencies.

Action by Donor Agencies

- Provide resources to assist developing countries over a five- to 10-year period in meeting their needs for technologies, fortificants, technical assistance, and funds. Country assistance should be demand driven and geared to engaging local industry. Needs for technical assistance are foreseen in helping countries develop locally appropriate regulatory, quality control and enforcement mechanisms, food technology, consumer research, and iron deficiency surveillance.
- Ensure that food in the form of processed commodities destined for vulnerable groups in developing countries is appropriately fortified with iron. Since there may be a tendency to maximize tonnage received within a dollar ceiling, make fortification a requirement or offset the loss in tonnage by increasing the dollar amount of the program.

Action by INACG

- Develop a compelling document describing the serious implications of iron deficiency anemia in the developing world that can be used by advocacy groups to gain political and financial support for addressing the problem.

- Gain a broader base of financial support for a secretariat that will provide leadership to move this problem to a higher priority on the political and public health policy agenda of developing countries.
- Maintain a strong technical image and credibility. Strengthen the capability to coordinate and facilitate the exchange of technical, policy, and program information concerning effective ways to fortify food with biologically available iron sources.

Action by Industry

- Develop and test the efficacy and safety of iron fortificants such as iron ethylenediamine tetraacetate (EDTA) and others that have the potential for being effective in diets of populations of developing countries.
- Link with government regulatory groups to promote the use of effective, safe, new fortificants such as iron EDTA.
- Develop food fortification processes and technologies that can offer low-cost, acceptable, iron-fortified foods to low-income consumers in developing countries.
- Support the leadership role of INACG as an action-oriented advocacy group.

Template for Action

To help guide the process of establishing national programs of iron fortification of food, INACG proposes the four-phase approach outlined in Table 1.

Conclusion

Table 1 presents the four-phase approach to establishing viable national programs for iron fortification of food. This approach describes a process and identifies, in broad terms, the sequential steps to be taken by each of the major groups. With this strategy as a start, international, national, and local organizations should customize the activities and responsibilities to their specific situations. It is hoped that this plan will stimulate the action necessary to solve the growing problem of nutritional iron deficiency anemia.

Table 1

Developing a National Iron Fortification Program: Responsibilities During Each Phase

| PHASE 1. Increase awareness of prevalence and severity of iron deficiency anemia (IDA) | | | |
|--|--|---|--|
| INACG | Donors and International Organizations | Governments | Multinational Industry |
| Develop social marketing plan to promote the imperative of treating and preventing IDA. Iron fortification of foods is a central theme for sustainable programs. | Promote awareness of the severe impact of IDA. Assist in developing and packaging information needed to obtain political and policy-maker commitment to solving the problem. Allocate funds to assist in the development of national iron fortification systems. | Based on documented high prevalence of IDA in a particular country and with urging of donors, develop ministry-level commitment to establish a national iron fortification program; identify national leader and members of interdisciplinary coordinating committee. | Endorse fortification approach; accept role as facilitator and provider of technical expertise to countries where IDA is highly prevalent. |

| PHASE 2. Initiate national strategy for iron fortification | | | |
|--|---|--|--|
| Donors and International Organizations | National Coordinating Committee | Multinational Industry | Academic Institutions |
| Provide seed money to assist in developing national strategies for iron fortification of food. | Integrate activities of domestic and international organizations to achieve goal of implementing a national iron fortification program. | Participate with national coordinating committee to aid in defining a feasible fortification strategy. | Gather epidemiologic and food consumption data needed to identify appropriate food to fortify with iron. |
| Advocate formation of a national coordinating committee. | Convince political leadership of the significance of IDA in their own country, to ensure sustainable control measures. | Assist with development of appropriate products, both fortificant and vehicle, to meet demands of target population. | Assist with technical development to provide an effective fortification vehicle. |
| Contribute expertise to aid national groups develop and implement fortification systems. | Based on country data, select appropriate food vehicle and iron source for fortification. | | |
| | Choose management structure for implementing the program. | | |
| | Recommend legislation to the government, when needed, to ensure compliance with the national fortification program. | | |

Table 1 (Continued)

Developing a National Iron Fortification Program: Responsibilities During Each Phase

| PHASE 3. Implement national fortification program | | | |
|---|---|--|--|
| Donors and International Organizations | National Coordinating Committee | Provincial/State/Local Government | Local Industry |
| Possibly assist with purchase of iron premix to be added to chosen food or commodity vehicle and with purchase of equipment needed to prepare premix. | Design programs to increase consumer awareness (social marketing). | Recognize need for the program and promote its value to the target population. | Prepare and distribute the specialized product, maximizing use of local materials. |
| | Track cost factors associated with fortification and prepare financial reports for consideration of sustainability. | Facilitate implementation of program at local level. | Assist in promotion and education effort to reach target population. |

| PHASE 4. Monitor and assess program effectiveness | | | |
|---|---|---|---|
| National Coordinating Committee | Local Industry | Country Institutions | Consumers |
| Determine type of monitoring system to be used to show effectiveness. | Maintain effective quality control to ensure delivery of product meeting specified objectives. | Participate in assessing the effectiveness of the program and provide ongoing surveillance of its impact. | Understand the serious adverse effects of IDA and benefits gained from iron fortification. This is critical for obtaining political support and inducing sustained action at the government level. |
| Continue to obtain policy-maker commitment to long-term, sustainable solutions. | Determine cost factors related to premix, additional equipment, storage, and consumer acceptability that affect sustainability. | | Nongovernmental organizations working in the community should help communicate this message to target populations. Coordination at national and local levels is needed to ensure effectiveness of community programs. |

INACG Publications

The following monographs are published by the International Nutritional Anemia Consultative Group:

- *Guidelines for the Control of Iron Deficiency Anemia* (1977)
- *Iron Deficiency in Infancy and Childhood* (1979) (Available in English, French, and Spanish)
- *Iron Deficiency in Women* (1981) (Available in English, French, and Spanish)
- *Iron Deficiency and Work Performance* (1983)
- *Design and Analysis of Iron Supplementation Trials* (1984)
- *Measurements of Iron Status* (1985)
- *Combating Iron Deficiency in Chile: A Case Study* (1986) (Available in English, French, and Spanish)
- *Guidelines for the Control of Maternal Nutritional Anemia* (1989) (Available in English, French, and Spanish)
- *Combating Iron Deficiency Anemia Through Food Fortification Technology: An Action Plan* (1992)

These reports are available free of charge to developing countries and for \$3.50 (U.S.) to developed countries. Copies can be ordered from the INACG Secretariat:

INACG Secretariat
The Nutrition Foundation, Inc.
1126 Sixteenth Street, Suite 700
Washington, DC 20036