Prevention and Control of Iron Deficiency: Policy and Strategy Issues1,2

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ABSTRACT Substantial efforts have been made in the past several decades to implement programs to reduce iron deficiency. Yet, compared with other micronutrients such as vitamin A and iodine, overall progress in reducing iron deficiency has been limited. Such limited progress is not attributed to a lack of scientific knowledge about the prevalence, causes or consequences of iron deficiency, but to limited implementation of effective interventions and ineffective communication tools. The challenge is to coordinate and balance research efforts more constructively with the implementation of practical and effective intervention programs. More attention must be paid to evaluating the operational feasibility of various intervention strategies to demonstrate their effectiveness under normal field conditions. Moreover, intervention efforts must be supported by substantially increased attention to communications to achieve effective advocacy for policy support and resource mobilization, foster partnerships and alliances, clarify priority target groups, including infants and young children, and support behavioral change. Through collaboration, researchers, program implementers and communicators can achieve substantial progress in reducing iron deficiency.


KEY WORDS: • iron deficiency • anemia • treatment interventions • communications strategies

The magnitude of the problem of iron deficiency anemia (IDA)4 and its effect on global health and development is well appreciated, especially by those engaged in nutrition fields. In the past several decades, much effort has been invested in reducing iron deficiency, in parallel with other efforts to improve intakes of other micronutrient such as vitamin A and iodine. However, it is fair to state that current overall progress in reducing iron deficiency is limited, especially compared with efforts to reduce deficiencies of other micronutrients. It is also reasonable to propose that the relatively slow progress in preventing and controlling iron deficiency is not due to the lack of information about the nature of the problem or what has to be done. In fact, iron supplementation can be regarded as one of the best-studied areas of nutrition research, from the molecular to the population level. In essence, we have very adequate information on what needs to be done. What we lack are mechanisms at country and global levels to ensure that effective measures are implemented.

Requirements for effective intervention

Three essential elements are required to achieve effective prevention and control of iron deficiency: a well-defined goal, an enabling policy and an effective program strategy. These elements are, in turn, supported by three major program components: research and development (R&D), communications and program operations (Table 1).

Interrelationships among program components

The interrelationships among R&D, communications and program operations components are illustrated in Figure 1. Ideally, these components should work together to form a functional system that can define goals, generate policy support and implement effective programs. In essence, the R&D component helps to define what to do; the operational component enacts the activity. Knowing what to do is a necessary but not sufficient condition for the successful elimination of iron deficiency. A meaningful action component, able to ensure improved iron intake, is the other part of the equation for success.

The relationships among the key components of an action program, represented by three circles of equal-size, are shown in Figure 2. It is worth noting that one of the circles is labeled “communication” because communication encompasses the effort to generate political support and funding, as well as to motivate acceptance of better nutrition practices by families and communities through health education and promotion. Ideally, a balanced program with interconnected components is required to support an effective IDA reduction. However, the current state of affairs falls short of this ideal.

The author’s view of current programmatic efforts for the reduction of IDA is presented in Figure 3. This figure displays...
a relatively well-developed R&D component, but a less well-developed operational component. The R&D and operational components are not well linked to communications. This lack of linkage may help explain the relatively slow pace of progress in global and country-level efforts to reduce IDA, compared with efforts to reduce vitamin A and iodine deficiencies.

Policy support

Strong and sustained policy support for iron deficiency intervention efforts requires two major elements, i.e., the problem must be perceived as severe and damaging to the country, and there must be feasible and economically viable strategies to manage the problem. Both criteria can be met for iron deficiency. The burden of iron deficiency in terms of morbidity, deficits in child development and reduced economic productivity are well established by those engaged in R&D (1). Moreover, the feasibility of reducing the health and economic burden through food fortification and supplementation for the most vulnerable groups has been demonstrated to be feasible (2). If this is the case, why then has there been a relative lack of progress and effective programmatic response? One reason may be the lack of effective communication to policy makers about the importance of iron deficiency. Another reason may be that although the general strategies for iron deficiency prevention and control are well defined, the operational feasibility of these strategies in different settings

Policy of research and development

Research and development is, by far, the most developed component of current efforts to reduce iron deficiency. Research efforts have provided essential information to support intervention programs, documenting the disease burden related to iron deficiency as well as the potential feasibility of intervention strategies (Table 2). Current data demonstrate best practices for diagnosing iron deficiency on an individual basis using the multiple tests available, but also allow defining the prevalence of the disorder on a population basis. There is strong evidence that IDA is common among younger children and women of childbearing age in a substantial proportion of the world’s population (3). Additionally, studies have demonstrated various negative effects of iron deficiency beyond the manifestation of anemia (4–6). The most notable consequences are reduced developmental quotients among young children and reduced work performance and productivity among adults. There is also evidence linking IDA to low birth weight and increased maternal and child mortality related to severe anemia. These findings have provided the scientific basis that can be used to position iron deficiency on global and national agendas for development of effective intervention

has not been adequately evaluated and is not an active area of research.

Role of research and development

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TABLE 1

Minimum requirements for effective prevention and control of iron deficiency anemia

<table>
<thead>
<tr>
<th>Essential elements</th>
<th>Major program components</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Goal: substantial reduction of iron deficiency in children and women by 2010</td>
<td>Research &amp; Development</td>
</tr>
<tr>
<td>• Policy: commitment to the goal and resources to support a program to achieve the goal</td>
<td>Define the strategy</td>
</tr>
<tr>
<td>• Program: a well-defined and effective strategy and capacity for sustained operation</td>
<td>Define the service delivery content</td>
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<tr>
<td></td>
<td>Communications: policy support and advocacy</td>
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<td></td>
<td>Program operations</td>
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<td></td>
<td>Funding</td>
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<tr>
<td></td>
<td>Promotion (social marketing)</td>
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<td></td>
<td>Defined service or product provider</td>
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</table>

FIGURE 1 Interrelationship among program components: research and development, communications and program operations.
programs. In short, R&D has done an excellent job of providing the necessary evidence of disease burden upon which policies can be formed and programs implemented. Moreover, the results of this work suggest that something must be done to avoid continuing damage to child development, maternal health and economic productivity due to iron deficiency.

However, demonstration of disease burden is not enough; there must also be evidence of the feasibility of prevention and control in order to ensure that programs can be funded and sustained. Again, we depend on the R&D community to provide this evidence.

There are two important aspects to this effort to demonstrate feasibility. One is to demonstrate the technical feasibility or efficacy of potential interventions, producing a meaningful response to treatment or intervention under closely supervised conditions. The other aspect is the operational feasibility, or effectiveness, of an intervention under normal or field conditions. To a large extent, current R&D efforts have been concentrating on technical feasibility, whereas the critical step of operational feasibility, through operational research, has been neglected. Subsequently, the effort to build effective programs to reduce iron deficiency has many promising leads on what to do, but often lacks clear guidance on which options can actually be effective in achieving the desired objective.

One good example may be found in several recent studies suggesting the desirability of supplementing older infants with iron and zinc. However, this new knowledge is difficult to apply in a practical setting. What is needed is applied research to define a safe and effective method to deliver iron and zinc to young children, in a form, that will have a reasonable chance of being consumed.

There are some speculations concerning why the R&D community has focused more on studies of technical rather than operational feasibility. One explanation is that the study of technical feasibility is an innovative process and, as such, is more highly valued within academic institutions. In contrast, research on operational feasibility appears to be less challenging and, hence, less worthy of recognition and funding. Also, there is a tendency to categorize the study of operational feasibility as a task handled more appropriately by government or support agencies, which have oversight of actual program implementation. Given these perceptions, there is a need for greater linkage of the R&D community and those working in program implementation to ensure that more investment is made to define the operational feasibility of promising interventions. Without this final step to provide evidence of operational feasibility, it will be hard to argue for policy and funding support for programs to eliminate iron deficiency.

### Role of communication

**Advocacy and resource mobilization.** One of the critical roles of communication is to translate the wealth of information on the extent of iron deficiency from technical and scientific language into economic and policy terms for the motivation of policy and funding support. One important criterion is defining who is best equipped to handle the communications component. For the most part, advocacy has been handled by research scientists because of their technical knowledge and expertise on the topic. However, experience demonstrates that communication extends beyond publishing findings in a scientific journal. Therefore, communication professionals must be included from the start of intervention planning as key partners. Why not let communication professionals work with the R&D professionals to position the issue of iron deficiency? Why not work with economists who have a strong interest in health and nutrition issues to translate epidemiologic findings into economic terms and present the effect of iron deficiency on economic productivity and human resource development?

The key to achieving greater support for iron interventions is to communicate the message effectively to those who make policy decisions. Most policy makers who shape decisions on funding and commitment to health programs do not have nutrition or health backgrounds. More likely, these policy leaders are versed in economics. For this reason, putting the principle argument in economic terms, rather than health or nutritional terms, may prove to be more useful to this particular audience. For example, the progress made toward eliminating iodine deficiency disorders (IDD) in the past decade was substantially influenced by changing the image of IDD as a thyroid or goiter problem to that of a mental development issue that substantially affects human resource development and economic productivity. Based on this valuable lesson, there is every reason for those engaged in iron deficiency elimination to project iron deficiency as more than a problem of anemia. Rather it is a problem, like IDD, that affects child development and reduces economic output due to reduced work productivity. Clearly, there is sufficient evidence to support policies to eliminate iron deficiency. The key is to put the argument in policy and economic terms and move beyond simply providing evidence in the language and terminology of health professionals.

**Partnership building.** Beyond the need for effective communication to affect policy, there is also a strong need to build partnerships between the public and private sectors in support of iron deficiency intervention efforts. For example, iron fortification of staples such as wheat flour requires—in addition to government and regulatory support—active partnership of millers and those involved in grain manufacturing. Experience has shown that simply passing legislation requiring fortification is insufficient. Enlisting the cooperation of the key stakeholders, i.e., food processors, as major partners is an essential element for a sustained program. Communications with industry-based partners must demonstrate the benefits to industry as well as to consumers.

**Intervention targeting.** Identifying target audiences for intervention strategies is another critical communications component. For example, pregnant women are a key target group requiring special effort (primarily for supplementation) to ensure adequate iron nutrition. However, less recognized is the equally important need for iron supplementation in infants and young children. Failure to clearly communicate this need to policy makers resulted in the omission of IDA in children as a key action point in the goals established at the 1991 Global
The prevalence of anemia in adults from various parts of the world is 30-50% among young children, and yet this knowledge has failed to attract sufficient attention among policy makers and intervention program planners until the last few years. Perhaps one way to communicate the great need for iron in this population is to demonstrate the substantially increased iron requirements of this target group. The traditional expression of daily iron requirements for a 9-mo-old infant indicates a small, absolute requirement compared with the requirement of an adult woman or man. The same information is communicated much more effectively as depicted in Figure 4 by expressing iron requirements in relation to body weight and thereby showing that infants have a much higher requirement.

Behavior change. Another role of communication is to promote behavior change. For example, to be effective, iron supplementation during pregnancy or other stages of the life cycle requires more than just handing out iron pills or syrups. How do we get health workers, women or parents to regard this as an important nutritional practice and be convinced of its beneficial effects? Clearly, this is a communication challenge. In fact, the reason that some of the current interventions have not been effective may be related to inadequate communication. Whether it is for advocacy, partnership building, intervention targeting or education, communication is an essential tool in translating R&D findings into effective interventions for reducing iron deficiency.

Role of program operation

The actual implementation of interventions to improve iron nutrition, such as supplementation for pregnant women or fortification of wheat flour, is usually the responsibility of national and local governments. Often such efforts in developing countries are supported by major international or bilateral agencies with input in terms of financial support, supplies and technical advice. The governments and key agencies can be regarded as the main players for the "program operations" component of the overall effort to improve iron nutrition. It is evident that this component is highly dependent on the two other major components, i.e., R&D and communications, which have been addressed.

As discussed earlier, the lack of adequate linkage or connectivity among the three major program components has diminished the effectiveness of iron interventions. Using iron supplementation as an example, it may be observed that the majority of the research has been on issues such as the type and dosage or iron compounds or frequency of administration. Less research has been focused on ways to improve the effectiveness of supplementation in terms of coverage or adherence to the supplement schedule. To correct this problem, program managers must work more closely with the R&D community to undertake the type of operational research that can help improve the feasibility of program implementation efforts.

One avenue for improvement is for those involved in programmatic operations to make an increased commitment to conduct objective evaluation of on-going efforts in the field. In fact, evaluation should be a built-in component of all programmatic efforts. A common pitfall in program efforts is that once the technical and operational aspects of the program are defined, there is little effort to measure the effectiveness of the program as long as the funds and supplies are used according to plan.

A functional system to achieve the goal

Meaningful progress can be made in eliminating IDA with implementation of a coordinated approach. This view is based on the propositions:

- There is sufficient scientific evidence demonstrating the burden of disease and harm caused by iron deficiency and related anemia. With proper communication, it will be feasible to rank iron deficiency high on global and national agendas.
- There is sufficient pragmatic experience indicating the likely feasibility of effective interventions.
- The combined evidence of high cost to society and feasibility for action can achieve the critical mass needed to gain political, and hence financial support, for programs.
- With measurable goals and adequate policy support in place, intervention programs are likely to be effective if they are based on the best available evidence of feasibility and are supported with targeted and effective communications plans.

In conclusion, the key is for the researchers, communication specialists and program operators to work together as a team. This is the essential formula for successful intervention programs to reduce IDA.

LITERATURE CITED